APPENDIX D

Results of X-Ray Fluorescence Study

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Calibration and Usability Assessment of Field Portable X-Ray Fluorescence Data From the August 1998 Sampling in the Coeur d'Alene Drainage, Idaho - DRAFT

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1.0 Introduction

Pursuant to United States Environmental Protection Agency (EPA) Region 10 Work Assignment No. 54-50-OC2Q (URS Greiner, Inc. (URSG) in conjunction with Work Assignment No. 31-81-OC2Q (CH2M HILL, Inc.), aerial photogrammetry and hyperspectral imaging (HI) of selected portions of the Coeur d'Alene basin was conducted as part of the Coeur d'Alene Basin RI/FS. A Spectrace 9000 field portable x-ray fluorescence (FPXRF) instrument was used to analyze multimedia samples in the field at selected locations in the Coeur d'Alene Basin, Idaho, during August of 1998. This work was the ground-truthing portion of the hyperspectral imaging data collection task that is described in the *Field Sampling Plan and Quality Assurance Project Plan Addenda for the Bunker Hill Basin-Wide RI/FS: Addendum 09, Delineation of Contaminant Source Areas in the Coeur d'Alene Basin using Survey and Hyperspectral Imaging Techniques* (URS Greiner and CH2M HILL September 25, 1998).

The primary purpose for collecting the FPXRF field measurements was to obtain spectra and XRF measurements for background and mining-related materials (i.e., bedrock, vegetation, waste rock, tailings, and precipitates) within the same areas that were flown for HI analysis. The collected FPXRF data will ultimately be used to correlate the actual element concentrations to the HI spectral signature for the same materials. Once the HI/FPXRF correlation is established, the HI results can be extrapolated to other locations with limited or no conventional sampling information.

The purpose of this memorandum was to evaluate the FPXRF data quality for quantitative usability (i.e., do they met screening level or higher data quality criteria) and to calibrate the FPXRF field measurements using contract laboratory program (CLP) validated laboratory data. This memorandum is not intended to serve as a data presentation report. To achieve the objectives, the following activities were performed and described below.

- Review the FPXRF field data set for precision and reduce database by eliminating outliers that do not meet 99 percent confidence limit.

- Assess the degree of correlation between the reduced FPXRF field measurements and analytical data obtained by standard EPA methods (CLP) using the linear least squares fit (LLSF) method. Also, assess the degree of correlation between the reduced FPXRF field measurements and analytical data obtained by nonstandard methods.
- Develop a calibration curve for the FPXRF field measurements using standard method data (CLP) and the LLSF equation for selected elements (lead, and zinc). Derive a "calculated" FPXRF value from the field measured FPXRF concentration using the LLSF calibration equation (derived values are contained in Attachment A). Perform this same step using the larger nonstandard method data set for selected elements (cadmium, lead, zinc, and iron)
- Evaluate the improvement in the calculated FPXRF concentrations by comparing the laboratory / field FPXRF percent difference (PD) to the laboratory / calculated FPXRF percent difference and assess usability of data (screening or quantitative).

This technical memorandum addresses the quality assurance of the FPXRF data consistent with the EPA Method 6200 generic protocol for the *Field Portable X-Ray Fluorescence Spectrometry For The Determination Of Elemental Concentrations In Soil And Sediment*. The Spectrace FPXRF instrument is included in the method detection limits, precision and accuracy tables for typical analytical results from FPXRF instruments as "TN 9000" instrument in the EPA Method 6200 document.

2.0 Available Data

In addition to FPXRF field measurements on 725 samples, sample splits or archived samples were sent to four commercial laboratories for metals analysis. The participating laboratories and their roles are summarized below.

- Columbia Analytical Services, Inc. (CAS), Kelso, Washington, analyzed a subset of archived soil samples in August, 1999, using the EPA-CLP RAS total metals method. This work was intended to validate the results of the FPXRF measurements as well as the two non-CLP laboratories noted below.
- Mineral Exploration, Carson City, Nevada, and Chemex Labs, Inc., Reno, Nevada (referred to collectively as Chemex laboratories, or simply Chemex) analyzed soil and vegetation samples in early February 1998. Chemex used analytical methods comparable to, but more rigorous than, the EPA Standard Method used by the Columbia Analytical Services (CAS) laboratory.
- The Mineral Lab, Inc., Lakewood, Colorado, analyzed soil samples in late January, 1998 using x-ray fluorescence total metals analysis.

Table 1 summarizes the project data sets and purpose for their collection. Details on the number of samples analyzed and the analytical methods used by each laboratory are presented below.

2.1 Columbia Analytical Services, Inc. (CAS) (EPA Standard Method)

A total of 12 splits/duplicates (10 original and two splits/duplicates) of archived samples from the August 1998 samples analyzed by the Chemex Laboratory were sent to Columbia Analytical Services, Inc. laboratory. These samples were analyzed for 23 elements (analytical data are presented in Attachment B) using standard EPA-CLP RAS total metals methods to be compare with, and thereby determine the relative validity of, most of the earlier chemical results from the other laboratories. The samples included two tailings and eight soils.

The CAS analytical results were validated by Luce and Associates, Midway Park, North Carolina. Their validation designation for each reported analytical concentration is the handwritten alpha characters on the attached analytical data results from CAS (Attachment D). Only the selenium concentrations were rejected.

2.2 Chemex Laboratories (Nonstandard Aggressive Digestion Method)

Samples were sent to Chemex Laboratories to be digested by methods more aggressive than standard EPA methods. These data are expected to provide measurements closer to the "total" values measured by XRF.

A total of 40 "soil" samples (35 original and five splits/duplicates) and 14 vegetation samples were sent Chemex Laboratories for preparation and chemical analysis. The samples included three known tailings and two known aqueous precipitates within the soil data set that contained various amounts of organic matter (typical of the forest litter samples collected in the field). The 35 soil samples were pulverized in a tungsten carbide equipped mill. The tungsten carbide contributes 30 to 300 milligrams per kilogram (mg/kg, equivalent to parts per million) tungsten and 10 to 100 mg/kg cobalt (see Attachment B). Tungsten was equal to and generally much less than 80 mg/kg and cobalt equal to or less than 20 mg/kg in the attached analytical results.

The 14 vegetation samples were floated and washed to remove as much as possible of the inorganic particulates present in the samples. The organic samples were then microwaved dry, macerated and ashed for chemical analysis. Inorganic particulates were present in minor amounts and archived for future analytical work, if necessary.

The pulverized soil and ashed vegetation samples were digested in two stages, the first using pure nitric acid followed by aqua-regia. The nitric acid facilitates the digestion of both sulfide minerals and destruction of organic matter (Chemex website: www.chemex.com). This digestion is reported to generally produce data that are fractionally higher than a digestion that uses only an aqua-regia digestion (3:1 HCl:HNO3). However it, similar to aqua-regia digestion alone, is still a partial digestion and does not completely dissolve a sample. Aluminum, barium, titanium, sodium and potassium are rarely fully dissolved so that their concentrations will probably not match data generated by stronger digestions or true total metals analytical techniques like x-ray fluorescence (XRF).

Chemex analyzed metals in all the soil samples and most of the metals in the ashed vegetation samples using inductively coupled plasma (ICP) in their G32 package designed for soils, silts, lake and stream sediments. This package includes 32 elements as listed with their detection limits on the cover sheets of the attached analytical results (Attachment C).

Chemex used a combination ICP-MS (Mass Spectroscopy) to increase the accuracy and precision of selected elements present in the ashed samples. The concentrations of antimony, arsenic, cadmium, copper, mercury, silver and several other metals (see Attachment B, the cover sheet on the attached analytical data set for the ashed vegetation samples) in these organic phases were totally unknown prior to analysis so this method was used for their analysis. This was shown to be necessary for mercury, where only four of the 14 samples equaled or exceeded one mg/kg in the ashed samples.

Conversely, 10 of the 14 ashed vegetation samples contained more than one- percent (10,000 mg/kg) manganese and 13 of the 14 ashed samples contained more than 15 percent calcium. Both lead and zinc exceeded one percent in two of the ashed vegetation samples that contained detectable mercury (sample REP 04 at 1 mg/kg and REP 05, the highest detected mercury, at 4 mg/kg). Concentrations for the two samples are 3.42 and 2.12 percent lead, respectively and 1.18 and 1.19 percent zinc, respectively. These ashed vegetation concentrations must be multiplied by the average six percent ash to convert the concentrations back to a dry weight concentration in the original samples.

2.3 The Mineral Lab, Inc. (laboratory XRF)

A total of 10 splits/duplicates of the 35 samples analyzed by Chemex and six of the same samples analyzed by CAS were analyzed by the Mineral Lab (see Attachment D). This laboratory used x-ray fluorescence (XRF) to analyze 31 major, minor and trace elements. This analytical method is a true total metals analysis in which preparation includes only air-drying and pulverization; eliminating the partial digestion necessary by AA, ICP and ICP-MS analytical analysis of the other two laboratories. As such, the analytical data from this laboratory is expected to equal or exceed the partial to near complete digestion results of the other two laboratories. Later text demonstrates that XRF data essentially equals arsenic concentrations but generally exceeds iron, manganese, copper, lead and zinc concentrations reported by the other two laboratories.

As stated in the cover letter of the attached analytical data report from the Mineral Laboratory (Attachment D), a 5 to 10 percent relative precision/accuracy is expected for the major-minor elements (reported in percent) and 10 to 15 percent for the trace elements (reported in mg/kg) in "samples of average geologic composition." The subsequent text indicates that these are reasonable expectations.

3.0 Data Review/ Reduction of FPXRF Spectrace 9000 Measurements

The precision of the FPXRF data is monitored by replicate measurements. The standard deviation of the mean sample is used to assess method precision. Three times the standard deviation is used to establish the confidence level. Data points associated with lower confidence levels than the project's criteria (99 percent) were eliminated from use to provide a higher precision database (Attachment A).

A total of 725 field measurements were recorded for the August, 1998 use of the Spectrace 9000 field portable x-ray fluorescence (FPXRF) instrument. The instrument was use to analyze 25 elements. After averaging duplicate measurements the total number drops to

662 measurements. Average values are identifiable by the blanks (no values) in the time column of the working database (Attachment A).

The FPXRF instrument uses the common radioactive isotopes to activate the individual elements, a mercury iodide crystal detector provides replicate measurements, and a fundamental parameter model computes element concentrations and standard deviation for each value for each of the 25 elements as an integral part of the analysis. Table 2 lists the average standard deviation for each of the elements analyzed in the 35-sample soil data set and the 14-sample vegetation data set shared with the above laboratories. There is a direct relationship between the elemental concentrations and the standard deviation resulting from the FPXRF measurement. In other words, the standard deviation increases with increasing concentration. FPXRF field measurements less than three times the associated standard deviation have been eliminated from the working database (Attachment A).

In addition, the initially reported FPXRF negative values have been eliminated from the working database. The FPXRF fundamental parameter (and other models) computation results in both positive and negative values. Positive values represent elemental concentrations that are above both the detection limit and interference from other elements. Negative values are those in which the element concentration in the sample is either below the detection limit for the element and/or an interfering element is significantly higher than the sample calibration. In this case, the lead concentration is very high in many of the samples and since lead interferes with the arsenic determination, the relatively low but still ordinarily detectable arsenic concentrations are computed as negative values. The highest arsenic concentration in the Chemex 35 sample data set is only 102 mg/kg compared with the lead concentrations commonly near 10,000 mg/kg.

Eliminating each element concentration that is less than three times the standard deviation results in a significant decrease in useful elements in the FPXRF data set. Table 3 lists the number of original values in the initial data set and the remaining values after these procedures were performed. Chromium is computed in two ways to eliminate iron interference in the fundamental parameter computation. In this case, high chromium is eliminated and low chromium is relatively common. As shown in Table 3, it is apparent that several elements are not present in sufficient concentrations to be statistically useful. Table 3 shows that 10 elements (cobalt, nickel, selenium molybdenum, mercury, cadmium, tin, silver, uranium and thorium) have 11 or less values remaining after three standard deviations and negative values are subtracted. The elimination of these values results in a higher precision working database that is presented in Attachment A.

4.0 Data Comparability

4.1 Methodology

The data sets from the different laboratories were compared to assess their degree of correlation to the EPA standard method results. Comparability refers to the confidence with which one data set can be compared to another. In this case, FPXRF data generated from the TN 9000 instrument were compared to a validated EPA CLP data set and a larger nonstandard method data set. An evaluation of comparability was conducted by using linear regression analysis. Three factors were determined using the linear regression. These factors were the y-intercept, the slope of the line, and the coefficient of determination (r^2).

In order to compare the data sets, nondetect results were assigned half the reporting limit. Values with a greater than concentration were assigned the greater than value with the exception of manganese in the Chemex ashed-vegetation samples. Manganese greater than one percent were not included because only three of the values were less than one percent. Duplicates of all four data sets (Chemex, CAS, Mineral Lab, and FPXRF) are averaged with the mean value used in all computations.

4.2 Findings

Pulverization was common to all three laboratories. No specific instructions were given to any of the three laboratories on how a representative sample was to be taken for pulverization, prepared or analyzed (except for selection of the ICP and ICP-MS packages at Chemex). This is not a usual condition as most soil and sediment submittals include specific instructions to the laboratory not only to homogenize a sample prior to taking the sample for pulverization but also the appropriate procedure to homogenize the sample. Most good laboratories have a reasonably reliable homogenization step but it is important to assure that this is done well. Larger lighter density particles tend to concentrate at the top of a transported sample while finer-grained and denser particles tend to settle to the bottom. Experience has shown that some laboratories just pour a subset of the sample as received generally resulting in a preponderance of lower concentration data. Other laboratories forego most to all of the pulverization by pulling a sample directly from the finer-grained sample at the bottom of the received sample generally resulting in higher concentrations of metals.

The digestion procedure of the Chemex and CAS laboratories makes these results somewhat different, particularly compared with the Mineral Laboratory where there is no digestion procedure necessary in the sample preparation. As discussed above, the Chemex laboratories impose a more rigorous digestion than CAS that should result in slightly higher recovery of elements from the samples. Both the Chemex and CAS laboratory results are anticipated to be less than those of the Mineral Lab because the XRF analytical method used by the Mineral Lab is a true total metals analysis rather than a relatively rigorous partial sample digestion procedure (independent of mineralogy).

Table 4 lists linear least-square fit (LLSF) equations between reported analytical data for iron, manganese, copper, lead, zinc and arsenic. This suite of elements was selected from the FPXRF database because these elements are important in the ores/tailings of Coeur d'Alene district and were among the elements with the most samples above their respective method detection limits. This suite of elements (plus cadmium, antimony and mercury) is strongly intercorrelated.

The LLSF results indicate that analytical results from one laboratory can be very reliably converted to analytical results of the other two but the assumption that the individual element concentrations are interchangeable without a calibration curve is seriously flawed. In other words, single element concentrations are not the same between laboratories (with the near exception of arsenic concentrations) but single element concentrations can be very reliably converted to comparable analytical results from any of the other laboratories.

4.2.1 Nonstandard Method (Chemex Laboratories) versus Standard EPA Method (CAS)

As shown in Table 4, the correlation coefficients for the 10 samples indicate an almost perfect correlation between the analytical results reported by both laboratories with 92 to 100 percent of the variance accounted for in the correlation. However, both the intercepts and the slopes of individual elements are generally significantly different.

The 10 arsenic concentrations have an almost perfect equivalence with an intercept near the perfect value of zero and a slope very near that of 1.000. The zinc concentrations are also very close to the ideal fit with a higher intercept of 11 mg/kg compared to the Chemex results and a slope of 1.067 when 9 of the 10 samples are considered. The tenth sample that was removed from this set is the unoxidized tailings sample from the area of Tamarack tailings removal. If this tenth sample is included, the zinc results more clearly correlate with most of the other elements. This relationship illustrates the ability of a single high concentration to strongly affect LLSF equations. Single high concentrations also affect mean values. As in this and other element comparisons, removal of the single very high concentration did not affect the correlation coefficient (see copper in Table 4 also), but strongly affects both the intercept and slope of the calibration curve used to convert, in this case, CAS zinc results to comparable Chemex zinc results.

With the exception of the manganese, the slope values indicate that even though the analytical results are comparable and consistent, higher concentrations of these elements are extracted using the more rigorous digestion of the Chemex laboratory. Copper has the lowest extraction by CAS resulting in a slope of 1.479 for 9 or the 10 samples (tailings sample removed) and 2.449 for all 10 samples but the correlation is still excellent.

The Chemex laboratory results for iron, manganese, copper, lead, zinc and arsenic are quantitatively comparable to the validated CAS data.

4.2.2 Nonstandard Method (Chemex) versus Laboratory XRF (the Mineral Lab)

Similar to the Chemex versus CAS, there is excellent correlation for all elements but a somewhat lower correlation coefficient (0.94) for manganese. With the exception of manganese, the correlation accounts for 97 to 100 percent of the total variance, and it accounts for 88 percent even for manganese.

Arsenic concentrations are almost equivalent between the two samples with an intercept of only -8.7 and a slope of 0.9967. All other elements indicate lower slopes for the Chemex digestion than the total metals analysis by XRF in The Mineral Lab. This is probably a result of the digestion, which although rigorous, does not totally digest the sample. Copper, similar to that of the Chemex-CAS combination has the lowest slope (0.54). This supports the conclusion that digestion is probably responsible for the decrease. However, the samples probably involve similar mineralogies because the digestion gives sufficiently consistent results that the correlation for copper still accounts for 98 percent of the variance.

The Mineral Lab results for iron, manganese, copper, lead, zinc and arsenic are quantitatively comparable to the Chemex data.

4.2.3 Standard EPA Method (CAS) versus Laboratory XRF (The Mineral Lab)

The CAS comparison with the Mineral Lab analytical results shows excellent correlation. Similar to the Chemex results, manganese has the poorest correlation but still has a

correlation of 0.95 accounting for 91 percent of the variance. Except for manganese, the correlation between the two analytical results from the two laboratories is greater than 0.98, accounting for more than 96 percent of the variance.

As anticipated, the slopes are fractionally lower for the CAS data using the lesser aggressive digestion procedure than for the Chemex results when compared to the XRF method used by The Mineral Lab.

The Mineral Lab results for iron, manganese, copper, lead, zinc and arsenic are quantitatively comparable to the validated CAS data.

5.0 FPXRF Data Calibration/ Recalculation

5.1 Methodology

The FPXRF results were calibrated following field sample measurement and the data reduction described above using methodology equivalent to “empirical calibration “ per method 6200 as follows. In an empirical calibration, one must apply the goals of the project and relevant criteria for the analytes of interest. It is within these criteria that the FPXRF instrument should be calibrated most accurately. For this project, the CLP results meet project criteria; thus, FPXRF field measurements are calibrated against CLP results.

An empirical calibration using site specific calibration standards (SSCS) involves analysis of SSCS by the FPXRF instruments and by a conventional analytical method such as ICP or AA. A total acid digestion procedure should be used by the laboratory for sample preparation. Generally, a minimum of 10 and a maximum of 30 well characterized SSCS site typical standards are required to perform an adequate empirical calibration. The number of required standards depends on the number of analytes of interest and interfering elements. Theoretically, an empirical calibration with SSCS should provide the most accurate data for a site because the calibration compensates for site-specific matrix effects. For the following FPXRF calibrations, 10 CLP measurements were used. These measurements are representative of site conditions in terms of concentration ranges and location distribution.

The calibration equation is developed using a least squares fit regression analysis. After the regression terms to be used in the equation are defined, a mathematical equation can be developed to calculate the analyte concentration in an unknown sample. In some FPXRF instruments, the software of the instrument calculates the regression equation. In this case, the regression equations were calculated independent of the FPXRF instrument using SYSTAT software. The software uses calculated intercept and slope values to form a multiterm equation.

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

acceptable, the regression equation for a specific analyte should have a correlation coefficient of 0.98 or greater or meet the goals of the project.

5.2 Findings

Lead, zinc and cadmium are elements of particular interest and their concentrations in the environment are largely controlled by iron and manganese. This relationship is demonstrated by the high correlation between iron, manganese, copper, lead, zinc, cadmium, antimony and silver in all data sets. The FPXRF concentrations of lead has the highest correlation with the nonstandard laboratory data set at r=0.98 (where r is the correlation coefficient); zinc is second at 0.95; manganese follows at 0.94; copper at 0.93; and iron at 0.86. These correlation have been performed for both standard (CLP) and nonstandard (Chemex) results and are discussed below.

With the exception of cadmium (r=-.62), the correlation between the FPXRF and Chemex is above and significantly exceeds the r-squared value of 0.7 (70 percent of the variance accounted for) necessary to qualify the data as screening level (EPA Method 6200 Protocol). In fact, both lead and zinc could potentially meet definitive data level data criteria of 0.9 or greater and both manganese and copper are close to meeting this specification. Cadmium has a typically strong correlation with zinc both in the Coeur d'Alene area and in most mineral deposits around the world in which zinc is a major constituent. Cadmium is calculated from the zinc concentration in soils, forest litter and vegetation by LLSF equations as described in the following section on cadmium.

Iron has a slightly low correlation partly because iron concentrations are typically above a percent and in some cases above 10 percent. The calibration of the fundamental parameter model becomes increasingly nonlinear above several percent. One method of dealing with this potential problem is to recalculate a calibration model using LLSF equations. Although not discernable using correlation coefficients, zinc concentrations above about 3,000 mg/kg apparently become nonlinear with the concentrations less than 3,000 mg/kg so a separate LLSF equation is used for the two concentration ranges.

The following discussions outline the construction of a new calibration curve for lead, zinc and iron using LLSF equation. The relative improvement is judged by the percent difference between the standard (C_s, in this case, the CAS or Chemex concentration) and the measured concentration (C_m, in this case the FPXRF concentration):

$$Percent\ Difference\,(PD) = ((C_s - C_m)/(C_m)\,x100$$

As described in the EPA Method 6200 Protocol. The acceptance range for the calibration is plus or minus 20 percent.

5.2.1 Lead

The LLSF equation relating the validated 10 CAS lead concentrations with their respective FPXRF measurements is:

$$Calculated\ Lead = 1.724\ x\ FPXRF - 316$$

The average PD resulting from this equation is –13 percent with a median PD of 0.33 percent (half of the samples are above this concentration and half are below). This equation is used to calculate the lead concentrations CPBCAS listed in Attachment A.

Given the small number of validated analytical data and the excellent correlation between the validated data and the larger analytical data set from the Chemex laboratory, a more definitive correlation is expected from using this larger data set. The average PD between the field measured FPXRF and Chemex lead concentrations is 78 percent and between the FPXRF and CAS, 56 percent. A LLSF calibration results in the following equation:

$$Calculated\ Lead\ (CPB) = 44.3 + 1.752\ x\ FPXRF\ Lead\ Concentration$$

Table 5 shows the results along with the other parameters relative to the lead concentration in the 35-sample data set. The results have an average PD of 19 percent (median of 0.0 percent) between the Chemex and the calculated FPXRF field data from the individual PD values on Table 4 (column PDPB). This indicates that the calculated lead concentrations for all 35 samples are within the definitive level criteria. However, when the single high PD of 309 percent (GEM06S) is removed, the average PD drops to 10 percent (median of 0.0 percent). In addition to the above qualifying parameters (three standard deviations above the method detection limit and over 90 percent of the variance accounted for), this PD is well within the range of acceptable data for definitive level data quality criteria (above screening level).

The above equation was used to calculate a lead concentration for all samples and the results are included in the working database included as Attachment A.

5.2.2 Zinc

The LLSF equation relating the 10 validated CAS zinc concentrations with their respective FPXRF measurements is:

$$Calculated\ Zinc = 2.058\ x\ FPXRFZN - 0.006\ x\ FPXRFFE - 456$$

Although there are 10 validated analytical concentrations, there are only 9 FPXRF zinc concentrations that pair with these 10 because one FPXRF value is below the method detection limit. The average PD resulting from this equation is 12 percent with a median PD of –0.2 percent. The iron concentration in the soils is high enough that it partially affects the zinc concentration of this small data set.

Similar to the above lead calibration, the LLSF between the larger Chemex data set is expected to more accurately reflect the zinc concentrations. The average PD between the field measured FPXRF and Chemex zinc concentrations is 91 percent. A LLSF calibration results in two equations to account for nonlinearity in the zinc concentration range:

Less than 3,000 mg/kg FPXRF (ZNS)

$$Calculated\ Zinc\,(CZN) = -11.2 + 1.1284\,x\,FPXRF\ Zinc\ Concentration$$

Greater than 3,000 mg/kg FPXRF (ZNS)

$$Calculated\ Zinc\,(CZN) = -1163 + 2.676\,x\,FPXRF\ Zinc\ Concentration$$

The results of these calculations and other zinc parameters are listed on Table 6. The calibration considerably decreased the average PD for the Chemex-FPXRF comparison to 53 percent (median of 12 percent) and the CAS-FPXRF comparison to a much more acceptable 18 percent. Removing the single high PD of 946 percent, the average PD drops to 27 percent (median of 12 percent). This suggests that there is considerable heterogeneity probably involving zinc mineralogy and more complicated elemental interference in the samples that are affecting the zinc much more than the lead concentration. However, given the acceptable CAS comparison (validated data, albeit with fewer samples) and the results after removing the single high PD, the zinc data are acceptable at the screening level and may be acceptable at the definitive level.

The above equations were used to calculate a zinc concentration for all samples and the results are included in the working database included as Attachment A.

5.2.3 Iron

The average PD between Chemex and the field measured FPXRF iron concentrations is an acceptable 14 percent (median of 3 percent) but a calibration was performed to ascertain if the calculated iron concentrations would remove potential interference in the measured zinc and manganese concentrations. The resulting LLSF equation is:

$$Calculated\ Iron\,(CFE) = 2730 + 1.494\,x\,FES - 5.1818\,x\,TIS + 0.5091\,x\,KS$$

Where FES, TIS and KS are the field measured FPXRF iron, titanium and potassium measurements for each sample. The results from this calculation and the other parameters for iron are listed on Table 7. The average PD for iron in the Chemex-FPXRF data sets drops to -2 percent (median of –1 percent). Unfortunately, the calculated iron concentration did not add sufficiently to the PD of either zinc or manganese to be useful. The iron concentration data are acceptable at the screening level.

The above equation was used to calculate an iron concentration for all samples and the results are included in the working database included as Attachment A.

5.2.4 Manganese

Table 8 lists the manganese comparison between Chemex and FPXRF data and other manganese data. The percent difference for manganese could not be improved so it is used as an example of the variability created by heterogeneity in the sample coupled with the apparently minimal differences in precision and accuracy of the commercial laboratories. The average PD between Chemex and the FPXRF is 4.9 percent (median of 0.0) but between the CAS and FPXRF, an acceptable 1.4 percent. The variability in the FPXRF manganese concentrations could also be a nonlinear interference between manganese and iron. The manganese concentration is considered acceptable at the screening level based on the PD comparison with the validated CAS laboratory data.

5.2.5 Cadmium

The measured cadmium FPXRF values are not useful even at the screening level because they are generally too low (generally much less than the method detection limit) but the consistency between the zinc and cadmium concentrations allows the cadmium concentration to be estimated from the zinc concentration. The cadmium to zinc ratio of the Chemex 35 sample data set has a median of 0.0067. Using this simple ratio to calculate cadmium from the measured FPXRF zinc (ZNS) and the calculated zinc concentration (CZN):

$$Calculated\ \ Cadmium = 0.0067\ xZinc$$

The results are shown on Table 9. The average cadmium PD for the Chemex versus the measured FPXRF zinc data is 90 percent and for the Chemex versus the calculated FPXRF zinc concentration, and improved PD of 53 percent.

Calculating a LLSF equation for the data and eliminating the two precipitates (REXPREC and HECLAM) results in the following equation:

$$Calculated\ Cadmium\,(CCD) = 4.2 + 0.01\,x\ FPXRF\ Zinc\ Concentration$$

This equation gives an average cadmium PD of only –8.4 percent (median of –14) allowing the calculated FPXRF cadmium data to be accepted at the screening level for soils.

The cadmium to zinc ratio for vegetation, as anticipated, is different from that of soil. The forest litter contains a small but apparently measurable mixture of soil and organics that complicates the end members. Two LLSF equations were developed from the data to represent vegetation and forest litter:

$$Forest\ Litter - Calculated\ Cadmium\,(CCD) = -30 + 0.3414\,x\ FPXRF\ Zinc\ Concentration$$

$$Vegetation - Calculated\ Cadmium\ (CCD) = -5 + 0.2862\ x\ FPXRF\ Zinc\ Concentration$$

These give an average PD of -23 percent for the forest litter and -10 percent for the Chemex versus calculated FPXRF ashed vegetation zinc concentrations. These PDs indicate that the equations can be used to estimate the cadmium concentration at a level that may be acceptable at the screening level.

The above equations were used, and where appropriate coupled with the average 0.06 factor to convert from an ashed value to a dry weight vegetation concentration, to calculate a cadmium concentration for all samples. The results are included in the working database included at Attachment A.

6.0 Summary

The Spectrace 9000 field portable x-ray fluorescence (FPXRF) data for lead, zinc, iron, manganese and cadmium have been evaluated to ascertain that the field measurements met screening level or higher data quality criteria. The Columbia Analytical Services Laboratory results, using EPA standard methods (CLP), were validated and compared to Chemex Laboratory data that used a slightly more aggressive acid digestion and The Mineral Lab x-ray fluorescence data (true total metals data). The correlation between the data for these three laboratories was excellent indicating the data from all three commercial laboratories are comparable.

The samples analyzed by the laboratories were randomly selected on the basis of representing the spatial distribution (all areas sampled), media (soils, forest litter, precipitates and tailings) and concentration ranges (particularly lead and zinc).

The levels for acceptance at either a screening level or definitive level are described in the EPA Method 6200 Protocol for FPXRF measurements. A correlation based r-squared value of 0.7 or better is needed for the data to meet screening level and greater than 0.9 at a 99 percent confidence level is needed for the definitive level data criteria.

Calibrating the FPXRF field measurements, against the results of the EPA standard and nonstandard methods, using linear-least-square fit equations indicates that lead and zinc are both above screening level and may be definitive level data based on the plus or minus 20 percent difference criteria. Iron, manganese and estimated cadmium are screening level data. Given the broad characteristics of the sample media and concentrations coupled with both the heterogeneity of the samples and the precision / accuracy of three laboratories plus a field instrument, this is excellent.

Attachment A presents the final working FPXRF database. This database was created from the original FPXRF field data set by systematically following data processing procedures to: (1) develop a single estimator for each value; (2) eliminate all values that were less than the method detection limit (three standard deviations); and (3) using calculated lead, zinc, iron and cadmium concentrations for all the samples based on the equations developed from the comparison between the FPXRF and the commercial laboratory.

Table 1
Project Data Sets

Data Set/Method	Quantity	Collection Purpose
Hyperspectral Imaging	Very Large Number of Spectral Signatures	The product of the HI process is a map generated by continuous sample coverage at an average five-meter grid within selected areas (virtually impossible to accomplish with conventional sampling techniques). **These data are not discussed in this memorandum.**
Field XRF (Spectral 9000 FPXRF measurements)	725 Soil and Vegetation Samples	Portable instrumentation was used to collect spectra and XRF measurements at key features (waste rock, tailings, precipitates, vegetation, etc.) within the areas to be flown for HI. Collected data (contained in Attachment A) will be used to correlate the actual element concentrations to the HI spectral signature for the same materials.
Non Standard Method Using Aggressive Digestion (Chemex Laboratories)	35 Soil Samples 14 Vegetation Samples	This data set (from a subset of the FPXRF samples) was compared to the EPA standard method CLP values. With a high correlation established between the standard and nonstandard methods, this larger data set (collected at lower cost) was also used to calibrate the FPXRF field measurements.
EPA Standard Method (CLP) (CAS Laboratory)	10 Soil Samples	This data set (from a subset of the FPXRF samples) was used to empirically calibrate, or requantify, the FPXRF field measurements and assess the suitability (quality) of the aggressive digestion data for use in calibrating the field XRF measurements.
Laboratory XRF (The Mineral Lab)	10 Soil Samples	This data set (from a subset of the FPXRF samples) was compared to field XRF data.

Table 2
Average Standard Deviations for
Spectrace 9000 FPXRF (mg/kg)

Parameter	Average std. Dev. (mg/kg)	
	Soils	Vegetation
Chromium-high (CRH)	286.0	191.0
Potassium (K)	544.0	383.0
Calcium (CA)	265.0	385.0
Thallium (TI)	180.0	124.0
Chromium-low (CRL)	151.0	151.0
Manganese (MN)	458.0	326.0
Iron (FE)	976.0	377.0
Cobalt (CO)	318.0	137.0
Nickel (NI)	82.0	49.0
Copper (CU)	53.0	38.0
Zinc (ZN)	116.0	59.0
Arsenic (AS)	119.0	49.0
Selenium (SE)	19.0	11.0
Strontium (SR)	14.0	8.8
Zirconium (ZR)	9.9	3.8
Molybdenum (MO)	4.7	2.5
Mercury (HG)	42.0	27.0
Lead (PB)	98.0	35.0
Rubidium (RB)	16.0	7.0
Cadmium (CD)	63.0	28.0
Tin (SN)	40.0	19.0
Antimony (SB)	24.0	10.0
Barium (BA)	17.0	5.8
Silver (AG)	39.0	16.0
Uranium (U)	12.0	7.2
Thorium (TH)	13.0	7.1
Number of Samples	35.0	14.0

Values represent the average standard deviation for samples sent to the laboratory for confirmation analysis.

Table 3
Comparison of the Original Number of Analytical Values and the Resulting Number of Analytical Values After Eliminating Concentrations Less Than Three Times the Standard Deviation

Parameter	Original Analytical Value	After Eliminating Concentrations Less Than 3x The Std. Dev.
Chromium-high (CRH)	94	3
Potassium (K)	694	650
Calcium (CA)	692	648
Thallium (TI)	643	461
Chromium-low (CRL)	680	375
Manganese (MN)	635	312
Iron (FE)	693	641
Cobalt (CO)	238	2
Nickel (NI)	218	6
Copper (CU)	667	193
Zinc (ZN)	670	514
Arsenic (AS)	469	80
Selenium (SE)	13	0
Strontium (SR)	606	344
Zirconium (ZR)	624	472
Molybdenum (MO)	192	3
Mercury (HG)	505	9
Lead (PB)	677	507
Rubidium (RB)	636	418
Cadmium (CD)	60	7
Tin (SN)	185	7
Antimony (SB)	601	70
Barium (BA)	669	582
Silver (AG)	179	8
Uranium (U)	265	0
Thorium (TH)	407	11

CRH and CRL, high and low chromium concentrations, repsectively, compensating for iron interference.

Table 4
Linear Least-Square Fit Equations Relating Commercial Laboratory Measurements

Chemex Laboratory versus Columbia Analytical Services, Inc.						
Parameter (X=)	**Intercept (A)**	**Slope (B times)**	**Compound (XCAS)**	**Number of Samples (N)**	**Correlation Coefficient ®**	**Percent Variance Accounted For R**
Fe=	-861.0	1.131	FeCAS	10.0	1.00	99
Mn=	529.0	0.926	MnCAS	10.0	0.98	97
Cu=	-91.0	2.449	CuCAS	10.0	0.99	98
Cu=	-19.0	1.479	CuCAS	9.0	0.99	98
Pb=	-607.0	1.311	PbCAS	10.0	0.96	92
Zn=	-457.0	1.262	ZnCAS	10.0	1.00	100
Zn=	11.0	1.067	ZnCAS	9.0	0.99	98
As=	-5.9	1.090	AsCAS	10.0	0.99	98
Chemex Laboratory versus The Mineral Laboratory						
Parameter (X=)	**Intercept (A)**	**Slope (B times)**	**Compound (XCAS)**	**Number of Samples (N)**	**Correlation Coefficient ®**	**Percent Variance Accounted For R**
Fe=	-8027.0	0.8108	FeF	10	0.99	98
Mn=	-374.0	0.8717	MnF	10	0.94	89
Cu=	7.4	0.5454	CuF	10	0.99	98
Pb=	-253.0	0.8420	PbF	10	0.99	99
Zn=	-121.0	0.7855	ZnF	10	1.00	100
As=	-8.7	0.9967	AsF	10	0.99	97
Columbia Analytical Services Laboratory versus The Mineral Laboratory						
Parameter (X=)	**Intercept (A)**	**Slope (B times)**	**Compound (XCAS)**	**Number of Samples (N)**	**Correlation Coefficient ®**	**Percent Variance Accounted For R**
FeCAS=	-6954.0	0.7493	FeF	6	1.00	99
MnCAS=	-624.0	0.8469	MnF	6	0.95	91
CuCAS=	19.0	0.3556	CuF	6	0.98	96
PbCAS=	92.0	0.6858	PbF		1.00	99
ZnCAS=	92.0	0.6220	ZnF	6	1.00	100
AsCAS=	-3.4	0.9872	AsF	6	1.00	99

Element without suffix - Chemex Laboratory measurement (nonstandard method)
Element with an CAS - Columbia Analytical Services Laboratory measurement (EPA standard method)
Element with an F - The Mineral Laboratory (Laboratory XRF)
r = Standard correlation coefficient
R = Coefficient of Variance (r^2)

Table 5
Lead - Laboratory Comparisons With the Field Portable XRF Measurements and Calculated Concentrations From the FPXRF

Sample	MEDIA	TIME	Concentration (mg/kg)						Percent Difference (%)					
			FPXRF Measurement (PBS)	FPXRF std. dev. (PBSD)	Chemex Lab (PB)	CAS Lab (PBCAS)	Mineral Lab (PBF)	FPXRF & Chemex Calculated (CPB)	Calculated Using Chemex (PDPB)	FPXRF Using Chemex (PDPBS)	FPXRF Using CAS (PDPBC)	Calculated Using CAS (PDPBCC)	FPXRF Using Mineral Lab (PDPBF)	Calculated Using Mineral Lab (PDPBFC)
REP01	Soil	10.536	1310	68	282			2251	-87	-78				
REP01	Soil	16.035	861	54	1335			1465	-8	54				
REP02B	A Horizon Soil		2064	85	3490			3571	-2	69				
REP03A	A Horizon Soil		9981	209	28700			17442	64	187				
Rep4B	A Horizon Soil		7655	180	12100		13700	13367	-9	58			79	2
Rep4C	B Horizon Soil		2415	96	3920	3860	5717	4186	-6	62	59	-7	137	36
REP05B	A Horizon Soil		1554	72	4130			2678	54	165				
REP05C	B Horizon Soil		90	23	60	53		113	-47	-33	-40	-52		
Rep9C	B Horizon Soil		753	51	218	63	172	1274	-82	-71	-91	-95	-77	-86
Rep10	Soil		2118	87	2540	2730	3336	3667	-30	19	28	-25	57	-9
REXPREC	Filter	20.341	953	93	2550			1625	56	167				
REX09S	Tailings	18.133	4034	140	7050			7024	0	74				
Rex11s	Soil	18.22	17	16	32	34	56			82	98		219	
REX17S	Soil	18.598	628	51	1060			1057	0	68				
RL01S	Soil	23.809	153	28	243			224	8	58				
RL04S	Soil	24.225	72	20	80			82	-3	10				
Tam1C	Soil	22.228	244	33	430		874	384	11	75			257	127
TamOXT	Tailings	21.859	3085	118	7470		9110	5360	39	142			195	69
TamOUX	Tailings		2439	102	8250	7315	10700	4228	95	238	199	72	339	153
BRL04L	Leaves	20.921	1501	78	3220			2586	24	114				
BRL11RR	Soil	21.555	5528	168	16700	10600		9640	73	202	91	9		
BRL09L	Leaves	21.33	1300	71	2160			2234	-3	66				
BRL12s	Soil	22.318	2329	110	4345	4360	5983	4036	7	86	87	8	157	48
BRL15S	Soil	22.665	3205	126	5180			5571	-7	61				
BRL21S	Soil	23.567	4214	150	7940			7339	8	88				
BRL22S	Soil	23.653	2199	98	3930	3995		3808	3	78	81	4		
BRL23S	Soil	23.729	6651	187	10195	9890		11609	-12	53	48	-14		
HECLAM	Precipitate	19.72	5465	174	14400			9530	51	163				
SUC02S	Soil	22.97	49	19	100			42	135	101				
SUC05S	Soil	23.834	33533	489	126500			58702	115	277				
SUC08S	Soil	24.033	3372	112	5250			5863	-10	55				
YD01S	Soil	17.701	93	22	90			120	-25	-4				
YD3s	Soil	17.774	128	24	149		216	181	-17	15			67	18
GEM06S	Soil	16.754	32	17	54			13	309	64				
GEM08AS	Soil	17.005	446	41	324			737	-56	-27				
Average			3156	97	8128	4290	4986	5647	19	78	56	-11	143	40

Table 6
Zinc - Laboratory Comparisons With the Field Portable XRF Measurements and Calcuated Concentrations.

Sample	MEDIA	TIME	Concentration (mg/kg)						Percent Difference (%)					
			FPXRF Measurement (ZNS)	FPXRF std. dev. (ZNSD)	Chemex Lab (ZN)	CAS Lab (ZNCAS)	Mineral Lab (ZNF)	Calculated Using FPXRF Measurement (CZN)	Calculated Using Chemex (PDZN)	FPXRF Using Chemex (PDZNS)	FPXRF Using CAS (PDZNC)	FPXRF Using Mineral Lab (PDZNF)	Calculated Using CAS (PDZNCC)	Calculated Using Mineral Lab (PDZNFC)
REP01	Soil	10.536	255	58	138			277	-50	-46				
REP01	Soil	16.035	211	52	290			227	27	37				
REP02B	A Horizon Soil		953	87	844			1064	-20	-11				
REP03A	A Horizon Soil		972	92	2250			1086	107	131				
Rep4B	A Horizon Soil		702	82	1020		1170	781	30	45				49
Rep4C	B Horizon Soil		720	81	790	808	1103	801	-1	9	12		0	37
REP05B	A Horizon Soil		684	72	870			761	14	27				
REP05C	B Horizon Soil		555	72	380	445		615	-38	-31	-19		-27	
Rep9C	B Horizon Soil		1087	97	1040	522	1513	1216	-14	-4	-52		-57	24
Rep10	Soil		382	64	700	637	1006	420	66	82	66		51	139
REXPREC	Filter	20.341	6511	313	18200			16259	11	179				
REX09S	Tailings	18.133	488	77	5650			540	946	1056				
Rex11s	Soil	18.220	74	43	158	171	209	73	115	110	128		133	184
REX17S	Soil	18.598	1559	110	4090			1748	133	162				
RL01S	Soil	23.809	240	57	309			259	18	28				
RL04S	Soil	24.225	100	46	96			101	-5	-4				
Tam1C	Soil	22.228	4372	175	4080		4925	10536	-61	-6				-53
TamOXT	Tailings	21.859	1512	116	4060		5853	1695	139	168				245
TamOUX	Tailings		13103	314	33200	26300	42300	33896	-2	153	100		-22	24
BRL04L	Leaves	20.921	2200	131	6510			2471	163	195				
BRL11RR	Soil	21.555	3341	174	8190	6930		7778	5	145	107		-10	
BRL09L	Leaves	21.330	7730	232	9210			19519	-52	19				
BRL12s	Soil	22.318	3511	182	5080	5310	7238	8233	-38	44	51		-35	-12
BRL15S	Soil	22.665	2778	160	5190			3124	66	86				
BRL21S	Soil	23.567	2808	165	5770			3157	82	105				
BRL22S	Soil	23.653	2293	137	4810	5060		2576	86	109	120		96	
BRL23S	Soil	23.729	2392	151	4555	4110		2688	69	90	71		52	
HECLAM	Precipitate	19.720	8494	283	22300			21562	3	162				
SUC02S	Soil	22.970	319	58	318			349	-9	-0				
SUC05S	Soil	23.834	401	76	994			441	125	147				
SUC08S	Soil	24.033	1174	95	1905			1314	44	62				
YD01S	Soil	17.701	170	48	92			180	-49	-45				
YD3s	Soil	17.774	126	45	116		192	131	-11	-8				45
GEM06S	Soil	16.754	180	49	112			192	-41	-37				
GEM08AS	Soil	17.005	189	51	228			202	12	20				
Average			2074	116	4387	5029	6551	4179	53	91	58		18	68

Table 7
Iron - Laboratory Comparisons With the Field Portable XRF Measurements and Calculated Concentrations From the FPXRF

Sample	MEDIA	TIME	Concentration (mg/kg)						Percent Difference (%)					
			FPXRF Measurement (FES)	FPXRF std. dev. (FESD)	Chemex Lab (FE)	CAS Lab (FECAS)	Mineral Lab (FEF)	FPXRF & Chemex Calculated (CFE)	Calculated Using Chemex (PDFE)	FPXRF Using Chemex (PDFES)	FPXRF Using CAS (PDFEC)	Calculated Using CAS (PDFECC)	FPXRF Using Mineral Lab (PDFEF)	Calculated Using Mineral Lab (PDFEFC)
REP01	Soil	10.536	11643	579	14800			11466	29	27				
REP01	Soil	16.035	9375	514	4800			8458	-43	-48				
REP02B	A Horizon Soil		19248	732	18000			17825	0	-6				
REP03A	A Horizon Soil		31840	927	33800			42126	-19	6				
Rep4B	A Horizon Soil		26296	874	22200		38676	23598	-5	-15			47	63
Rep4C	B Horizon Soil		24860	841	23100	21100	39795	22398	3	-7	-15	-5	60	77
REP05B	A Horizon Soil		14018	615	14000			14176	-1	-0				
REP05C	B Horizon Soil		23652	815	19500	19200		21716	-10	-17	-18	-11		
Rep9C	B Horizon Soil		26296	867	19600	19800	35249	22020	-10	-25	-24	-10	34	60
Rep10	Soil		17329	693	16500	13600	30703	16671	-1	-4	-21	-18	77	84
REXPREC	Filter	20.341	211421	2618	150000			313540	-52	-29				
REX09S	Tailings	18.133	63682	1355	62300			92708	-32	-2				
Rex11s	Soil	18.22	22579	787	19700	17300	29025	17907	10	-12	-23	-3	28	62
REX17S	Soil	18.598	29453	909	39200			38124	2	33				
RL01S	Soil	23.809	21984	783	23350			20931	11	6				
RL04S	Soil	24.225	17923	704	18500			17499	5	3				
Tam1C	Soil	22.228	18927	731	23000		33571	19323	19	21			77	73
TamOXT	Tailings	21.859	50188	1193	49100		77633	73646	-33	-2			54	5
TamOUX	Tailings		28767	885	48700	44200	65603	41625	16	69	53	6	128	57
BRL04L	Leaves	20.921	34984	981	44400			47492	-6	26				
BRL11RR	Soil	21.555	60647	1324	114000	94300		85952	32	87	55	9		
BRL09L	Leaves	21.33	21777	770	27900			28766	-3	28				
BRL12s	Soil	22.318	71507	1435	85500	76800	112603	101595	-15	19	7	-24	57	10
BRL15S	Soil	22.665	60166	1320	80700			84177	-4	34				
BRL21S	Soil	23.567	73472	1464	102000			104446	-2	38				
BRL22S	Soil	23.653	44933	1118	80100	72250		66033	21	78	60	9		
BRL23S	Soil	23.729	62109	1349	109500	103000		90147	21	76	65	14		
HECLAM	Precipitate	19.72	74671	1465	119500			105594	13	60				
SUC02S	Soil	22.97	18995	720	16800			18058	-6	-11				
SUC05S	Soil	23.834	38097	1092	54600			55046	-0	43				
SUC08S	Soil	24.033	22730	787	28900			27275	5	27				
YD01S	Soil	17.701	18467	708	14400			18986	-24	-22				
YD3s	Soil	17.774	16045	661	14950		33711	14957	-0	-6			110	125
GEM06S	Soil	16.754	20799	756	21200			18109	17	1				
GEM08AS	Soil	17.005	20722	755	20800			21861	-4	0				
Average			37989	975	44440	48155	49657	49264	-2	14	14	-3	67	62

Table 8
Manganese - Laboratory Comparisons With the Field Portable XRF Measurements

Sample	MEDIA	TIME	Concentration (mg/kg)					Percent Difference (%)		
			FPXRF Measurement (MNS)	FPXRF std. dev. (MNSD)	Chemex Lab (MN)	CAS Lab (MNCAS)	Mineral Lab (MNF)	FPXRF Using Chemex (PDMNS)	FPXRF Using CAS (PDMNC)	FPXRF Using Mineral Lab (PDMNF)
REP01	Soil	10.536	583	347	140			-75		
REP01	Soil	16.035	174	257	85			-51		
REP02B	A Horizon Soil		1213	355	1495			23		
REP03A	A Horizon Soil		972	375	620			-36		
Rep4B	A Horizon Soil		1119	382	1210		1471	8		31
Rep4C	B Horizon Soil		737	340	800	774	1161	8	4	57
REP05B	A Horizon Soil		539	262	935			73		
REP05C	B Horizon Soil		1660	399	1070	991		-35	-40	
Rep9C	B Horizon Soil			520	3740	1800	4259			
Rep10	Soil		1414	374	1160	1210	1471	-17	-14	4
REXPREC	Filter	20.341		523	3870					
REX09S	Tailings	18.133	3043	528	825			-72		
Rex11s	Soil	18.22	839	324	835	887	1316	-0	5	56
REX17S	Soil	18.598	1462	386	1900			29		
RL01S	Soil	23.809	283	291	817			188		
RL04S	Soil	24.225	349	275	665			90		
Tam1C	Soil	22.228	1760	395	2360		2323	34		32
TamOXT	Tailings	21.859	2728	492	730		3485	-73		27
TamOUX	Tailings		3400	498	2640	2095	4414	-22	-38	29
BRL04L	Leaves	20.921	3734	521	4430			18		
BRL11RR	Soil	21.555	8311	756	10000	10100		20	21	
BRL09L	Leaves	21.33	3260	482	3280			0		
BRL12s	Soil	22.318	9507	804	8520	8250	9526	-10	-13	0
BRL15S	Soil	22.665	8284	758	7880			-4		
BRL21S	Soil	23.567	11024	860	9500			-13		
BRL22S	Soil	23.653	5713	627	8210	7815		43	36	
BRL23S	Soil	23.729	7371	729	10000	11100		35	50	
HECLAM	Precipitate	19.72	3327	556	4240			27		
SUC02S	Soil	22.97	631	297	1005			59		
SUC05S	Soil	23.834	1063	433	420			-60		
SUC08S	Soil	24.033	510	296	1115			118		
YD01S	Soil	17.701	1106	333	700			-36		
YD3s	Soil	17.774	1177	338	997		1239	-15		5
GEM06S	Soil	16.754	3170	472	1455			-54		
GEM08AS	Soil	17.005	2248	420	1360			-39		
Average			3513	495	3495	6708	3717	11	10	25

Table 9
Cadmium - Laboratory Comparisons With the Field Portable XRF Measurements and Calculated Concentrations From the FPXRF

Sample	MEDIA	TIME	Concentrations (mg/kg)					Percent Difference (%)	Ratio
			FPXRF Measurement (CDS)	FPXRF std. dev. (CDSD)	Chemex Lab (CD)	CAS Lab (CDCAS)	Calculated Using Equation For Soil (CCD)	FPXRF Using Chemex (PDCD)	Using Chemex Measurements (Cd/Zn)
REP01	Soil	10.536	178	69	0.5		7	-92	0.003623
REP01	Soil	16.035		57	3		6	-52	0.010345
REP02B	A Horizon Soil			47	13		11	-5	0.015403
REP03A	A Horizon Soil			80	10.5		11	-25	0.004667
Rep4B	A Horizon Soil			61	9.5		8	-15	0.009314
Rep4C	B Horizon Soil			63	8	6	8	-30	0.010127
REP05B	A Horizon Soil			33	25		8	127	0.028736
REP05C	B Horizon Soil			56	4	3.9	7	-59	0.010526
Rep9C	B Horizon Soil		48	66	34	5.8	13	126	0.032692
Rep10	Soil		30	71	10.5	10	5	31	0.015000
REXPREC	Filter	20.341		112	18.5				0.001016
REX09S	Tailings	18.133		75	27.5		8	203	0.004867
Rex11s	Soil	18.22		53	0.5	0.32	1	-90	0.003165
REX17S	Soil	18.598		61	11		18	-44	0.002689
RL01S	Soil	23.809		58	5		3	-24	0.016181
RL04S	Soil	24.225		53	2		1	-61	0.020833
Tam1C	Soil	22.228		59	29.5		50	-38	0.007230
TamOXT	Tailings	21.859	78	73	19		18	-2	0.004680
TamOUX	Tailings				126	96.1	135	-7	0.003795
BRL04L	Leaves	20.921		54	54		25	106	0.008295
BRL11RR	Soil	21.555		72	39.5	32.7	39	5	0.004823
BRL09L	Leaves	21.33		43	101			24	0.010966
BRL12s	Soil	22.318		74	34	32.3	41	-14	0.006693
BRL15S	Soil	22.665	64	85	35.3		32	10	0.006792
BRL21S	Soil	23.567		76	29		32	-10	0.005026
BRL22S	Soil	23.653		62	30.5	29.7	27	12	0.006341
BRL23S	Soil	23.729	55	77	24.8	22	28	-12	0.005434
HECLAM	Precipitate	19.72		80	56				0.002511
SUC02S	Soil	22.97		51	1.5		4	-80	0.004717
SUC05S	Soil	23.834		66	3		5	-63	0.003018
SUC08S	Soil	24.033		46	18.5		14	16	0.009711
YD01S	Soil	17.701		49	0.25		2	-95	0.002717
YD3s	Soil	17.774		48	0.5		2	-91	0.004310
GEM06S	Soil	16.754		53	1		2	-83	0.008929
GEM08AS	Soil	17.005		48	4		2	-34	0.017544
Average			55	58	12.17	22.0	7	-55	0.006543

Attachment A
Working XRF Database Listing

Attachment A: Spectrace 9000 Field-Portable X-Ray Fluorescence Data, Coeur d'Alene drainage basin, October, 1998.

ID	DATE	Sample	Sample Type	Time	Chromium-high (mg/kg)	Chromium-high standard deviation	Potassium (mg/kg)	Potassium standard deviation	Calcium (mg/kg)	Calcium standard deviation	Thallium (mg/kg)	Thallium standard deviation	Chromium-low (mg/kg)	Chromium-low standard deviation	Manganese (mg/kg)	Manganese standard deviation	Iron (mg/kg)	Iron standard deviation	Cobalt (mg/kg)	Cobalt standard deviation	Nickel (mg/kg)	Nickel standard deviation	Copper (mg/kg)	Copper standard deviation	Zinc (mg/kg)	Zinc standard deviation	Arsenic (mg/kg)	Arsenic standard deviation	Selenium (mg/kg)	Selenium standard deviation	Strontium (mg/kg)	Strontium standard deviation	Zirconium (mg/kg)	Zirconium standard deviation	Molybdenum (mg/kg)
ID	DATE	Sample	Sample Type	Time	CRHI	CRHISD	K	KSD	CA	CASD	TI	TISD	CRLO	CRLSD	MN	MNSD	FE	FESD	CO	COSD	NI	NISD	CU	CUSD	ZN	ZNSD	AS	ASSD	SE	SESD	SR	SRSD	ZR	ZRSD	MO
3	36070	SUCC01	rock	9.65		277.06	8795.8	513.37	1626.8	174.04	418.92	126.77	397.16	114.42		367.66	64125	1339		408.21		89.065	285.54	63.109	529.4	76.504		93.991		14.96		5.3116	97.419	7.8507	
4	36070	GERT01	rock	9.748		289.67	8529.5	510.32	2255.9	199.89	850.28	135.09	458.88	123.12		439.17	82649	1540.1		476.37		93.499		54.285		58.943		30.365		21.589	36.928	9.6864	160.05	10.201	
5	36070	SUCC02	rock	9.869		346.79	9842.9	563.22	745.72	159.03	393.8	100.37		111.75		321.84	20650	732.41		245.92		84.776		88.848	78092	855.8		195.74		24.405		10.183		7.2114	
6	36070	SUCC03	rock	10.26		248.21	4780.3	396.86	805.4	125.35		78.431	359.61	105.54		308.72	18562	691.19		242.29		90.045		75.187	62349	726.62		230.99		23.792		8.3145		6.0696	
7	36070	SUCC04	rock	10.361		313.68	54879	1245.9	1312	301.22	3937.4	265.3	639.52	148.65		309.5	16177	712.65		211.71		64.247		40.348	171.01	50.341	120.81	31.258		13.857		5.5014	228.01	10.172	
8	36070	SUCC05	Gravel	10.476		315.97	11248	596.2	703.7	169.83	842.61	139.22		140.01		399.38	52123	1216.2		374.83		89.93		57.511	1407.7	113.41		186.07		25.86	82.599	13.023	134.72	10.119	
9	36070	REX01	Gray Soil/Tailings	10.571		261.91	8405.6	517.67	3222.3	236.79	1090.6	159.65	493.06	144.44	1148.6	336.86	22608	780.9		240.08		74.073	177.93	51.165	2710.3	137.29		71.074		12.952	21.085	6.8194	35.304	4.7876	
10	36070	REX02	Dark Gray Soil/Tailings	10.654		204.27	17158	719.63	1655.9	218.87	1397.3	190.41		156.77	2701.7	462.34	28440	895.28		291.64		68.88		37.181	1275	101.33		124.47		19.529	87.085	11.793	116.23	8.3946	
11	36070	REX03	White Material "Acid Drum"	10.79		193.21		221.58		88.305		72.806	651.89	145.28		142.45	1635.7	220.98		86.163		50.297		26.978		40.716		27.8		10.754		2.467		1.9204	
12	36070	REX04	Dk Red Bn Drum Material	10.91		236.7		214.28		114.29	5080.8	248.72		151.31		178.27	1677.2	241.33		106.95		69.975		55.02	553.44	70.46		68.273		14.471		5.0054		2.8996	
13	36070	REX05	rock	11.009		389.32	6414.7	470.74	633.97	134.04	919.66	147.22		125.72	1578	488.52	81520	1552.7		485.82		131.44	1682.6	176.33	47903	768.4		466.87		43.784		14.813	74.57	13.938	
14	36070	TAM01	rock	11.147		423.47	1465.5	267.56	1932.4	175.68		67.871		112.2	16314	1153.6	175405	2480.8		783.3		187.33		92.272	2106.3	182.45		606.18		59.437		23.416	85.59	16.773	
15	36070	TAM02	rock	11.231		348.8	4103.4	363.82	1294.3	145.93		87.163		102.79	23654	1289	182142	2431		755.11		150.48	202.35	62.991	588.31	101.83	568.6	125.49		17.031		7.3189		4.8904	
16	36070	SUCC06	rock	11.45		329.14	1798.7	291.43	477.66	117.95		85.763		109.86		397.99	63132	1245.6		404.99		116.05		125.99	140894	1450.6		147.91		25.087		7.2748		3.7733	
17	36070	REX06	rock	11.537		466	2454.5	312.62	1546.5	158.41		106.86		108.12	28297	1364.3	82656	1630.7		538.43		133.26		73.439	8247.7	303.58		500.23		47.65		18.516	68.725	14.667	
18	36070	REX07	rock	11.616		353.33	5122.6	408.73	758.63	125.33	453.53	119.07		102.18	8741.1	800.94	87849	1618.6		498.44		114.28	227.83	67.137	1631	133		306		27.463		13.206	40.05	9.936	
19	36070	REX08	rock	11.692		177.76	21766	788.98		172.48	1385.8	148.25	424.05	105.53		206.99	9107.8	503.64		182.41		53.697	119.64	38.01		41.566		40.314		10.435		4.1814	131.26	7.19	
20	36070	REX09	rock	11.768		281.76	14855	655.6	831.28	161.33	892.78	135.65	311.08	102.03		305	26406	851.16		263.25		75.953	162.17	45.69	205.99	50.554		54.426		12.706		5.9675	129.59	7.7309	
21	36070	REX10	rock	11.841		228.48	23628	820.1	677.63	183.62	1121.7	143.13	400.05	101.86		239.9	9981.2	528.12		142.97		32.426		33.073	147.04	42.513		32.899		10.73		4.3021	85.9	5.8937	
22	36070	REX11	rock	11.918		156.91	20718	773.12	1796.1	217.58	1323.7	168.64	371.37	119.09	1630.7	362.2	13695	619.67		209.26		65.236	187.08	47.894	252.76	52.368		52.682		11.301		6.0534	118.09	7.0961	
23	36070	TAM03	rock	12.009		278.7	18591	732.55	1498.3	201.06	1163.7	154.53	340.49	112.71		267.07	41970	1087.6		328.44		65.272		43.793	207.25	53.712		29.717		10.647	22.28	7.2239	117.92	7.7143	
26	36071	REP01	soil			390	15985	695	2700	245	1916	199		143		303	10509	547		215		60.5	203	56.5	234	55.6		81.3		16.1	128	12.6	345	12.2	
27	36071	REP02T	western white pine	10.671		207.05	3711.5	420.02	15765	468.21		96.514	847.49	181.28		286.76	728.33	201.06		110.04		70.401		48.675	538.36	73.46		33.241		16.05	28.008	6.6607		2.9791	
28	36071	REP02B	soil			232.11	10818	590	7392	335	2357	217		153	1214	355	19248	732		237		57.4		45	954	87.3		108		18.2	118	12.7	189	9.71	
29	36071	REP02C	soil			304	13853	657	5019	301	3261	247		152		354	22886	802		264		68.5		42.9	1550	109		46.1		15.4	151	14	312	12	
30	36071	REP02A	forest litter			192	2792	372	14476	441	361	106	560	154	1288	304	2589	272		108		41.9	126	38.4	464	60.3		37.1		9.98	19.2	5.49	10.6	2.76	
31	36071	REP03G	grass			58.3	1483	259	1435	150		67.7	621	133		157	451	97.3		52.4		39.4	75.8		133	36		21.2		7.07		2.38		1.53	
32	36071	REP03A	soil			313	13552	652	1780	214	1653	179	190	141	973	376	31840	928		300		81.5	235	65.8	962	92.9		237		25.6	84.8	13.6	240	13.1	
33	36071	REP04A	forest litter			169	7345	499	11898	413	1219	155	3100	149	1163	307	9949	506		172		49.3	49.3	36.9	788	75.6		112		14	50.9	8.8	40.1	5.13	
34	36071	REP04C	soil			269	15756	697	4966	303	3445	256	263	162		340	24860	841		279		77.9		52.6	720	81.6		123		18.7	155	14.7	275	12	
35	36071	REP04B	soil			307	15646	702	5281	314	3597	251	300	163		383	26296	875		283		67.8		52.4	703	83		213		23.5	146	15.6	254	12.8	
36	36071	REP04T	western white pine	11.316		293.52	4088.7	434.23	23003	554.98		105.37	684.88	165.33		264.01	1298.8	236.35		127.73		73.891		56.994	939.1	88.657	146.5	44.176		17.996	24.319	6.6723		3.061	
37	36071	REP05A	forest litter			209	8324	527	10449	393	3390	183		145	886	281	13335	572		190		60.4		44.1	869	81.5		99.4		16.4	99.1	10.8	71.4	6.12	
38	36071	REP05B	soil			207	5766	448	7805	335	1199	152	405	134		263	14018	616		199		61.9		37.3	685	72.9		90.5		15.3	110	11.6	65.9	6.05	
39	36071	REP05C	soil			309	12931	636	6637	330	3004	243		157	1660	400	23652	816		274		68.7		36.1	556	72.6		35.4		16.4	155	14.1	257	11	
40	36071	REP05T	western white pine	11.611		175.2	4115.8	383.67	5315.3	276.26	473.23	107.5	564.97	132.02		195.48	2756.6	288.39		130.06		66.976		44.959	330.35	58.5		43.428		10.097		5.0151		2.3047	
41	36071	REP05T2	western white pine	11.681		278.31	5562.3	449.61	6836.9	320.65	394.95	123.31	640.63	159.52		250.49	4912.8	382.74		164.64		65.411		59.326	449.82	70.271		50.104		17.027	19.388	6.1093	10.978	3.6518	
42	36071	REP05T3	cedar	11.754		208.34	6666.8	491.45	7945.8	348.71	606.08	151.66	582.58	172.76		243.97	5823.1	412.85		146.28		62.414		49.948	506.11	72.39	192.76	60.527		17.103	71.479	9.4087		3.456	
43	36071	REP06A	forest litter			193	6102	484	20170	510	842	155	901	167	1696	359	9067	507		181		53.6	168	44.9	1113	89.1		73.4		12.6	103	11.3	53.8	5.51	
44	36071	REP06B	soil			277	12634	632	11525	418	2355	221		157	1704	406	23402	817		271		61.5		47.9	779	83.4		123		17.8	186	15.8	191	10.2	
45	36071	REP06C	soil	12.006		262.29	16895	720.96	8548.2	376.61	3546.2	267.92		160.24		373.62	26381	870.78		275.48		80.021		43.015	388.04	68.043		45.726		16.737	213.48	16.659	412.65	14.041	
46	36071	REP06T	conifer	12.086		217.25	2861.4	348.02	13922	427.43		83.515	722.64	131.2		209.93	711.3	173.7		105.61		47.944		48.004	373.44	59.086		30.906		12.845	26.057	6.2273		2.434	
47	36071	REP06M	moss	12.172		177.83	3344.2	371.09	2282.6	207.53		78.137		122.41		224.26	577.3	163.62		91.837		73.346		39.168	271.2	53.632		47.152		10.469		5.4141	16.648	3.2742	
48	36071	REP07T1	cedar	12.274		234.54	8460.6	550.75	14548	459.52	705.66	168.35		173.06		281.9	9158.9	517.43		176.08		73.515		69.452	720.62	84.869		80.406		19.981	81.07	10.337	19.322	4.6268	
49	36071	REP07T2	western white pine	12.373		290.33	6330.8	483.03	14197	445.41		102.68	568.94	153.6		237.6	2994.4	310.12		134.91		73.138	187.89	62.135	332.33	63.574		50.147		13.542	31.546	6.9765		3.1004	
50	36071	REP07T3	douglas fir	12.464		298.51	3320.7	432.77	31913	648.56		137.36		174.68		300.96	1965.2	274.95		134.64		75.751		64.104	517.02	74.992	141.58	41.341		16.927	28.858	7.0142		3.4753	
51	36071	REP07A	forest litter			189	1307	326	13986	428		103	499	162	2041	365	1810	245		96.4		45.8	118	40.6	496	62.7	104	36		12.5	39.4	6.2		2.4	
52	36071	REP07B	soil			174	9292	559	12569	421	2141	210		149	1210	311	20618	758		253		65.5	164	50.5	601	73.3		99.7		15.8	148	13.8	90.8	7.34	
53	36071	REP07C	soil			284	13253	645	6607	332	3461	255		160	2421	461	27998	892		298		74.1		49.1	354	65.9		36.1		17.8	199	16.1	284	11.8	
54	36071	REP08T1	cedar	12.8		265.78	5944.4	491.54	13675	446.34		152.39		185.55		261.58	3271.3	330.32		121.46		69.029		59.071	649.54	80.367		46.231		18.93	67.416	9.1803		3.5615	
55	36071	REP08T2	western white pine	12.88		245.12	8234.1	525.3	8435.3	355.05	1039.5	144.6		139.14		320.97	6141	426.93		163.72		75.447		61.611	423.84	70.002		47.121		17.464		6.065		3.0794	
56	36071	REP08T3	cedar	12.961		280.86	6719.3	506.88	13503	442.51	858.69	155.67		163.91		296.96	6237.8	433.59		166.19		83.562		52.361	451.1	73.376	196.15	53.21		17.453	55.251	8.6285		3.7207	
83	36071	REP08T4	douglas fir	13.722		264.69	4553.5	473.08	35885	687.19		154.82		166.7		301.65	2629.1	307.44		120.58		66.093		54.823	486.48	74.052		43.108		16.021	50.926	8.4993		3.5141	
57	36071	REP08A	forest litter			210	2761	370	14560	411	576	109		158	5810	417	3822.53	307		110		56.4		36.4	582	66.1		39		12.7	73.5	6.59		2.71	
58	36071	REP08B	soil			272	10400	587	11008	404	2846	240		158	3092	497	28114	896		310		81.3		54.2	1000	93.7		121		19.5	166	15.4	169	9.93	
95	36071	REP08C	soil	17.695		273.64	13246	643.55	7868.5	354.74	3527.7	252.35		161.7	3025.4	491.96	26270	864.6		281.35		72.458	172.25	55.015	431.51	68.703		42.242		17.013	187.02	15.612	264.92	11.369	
84	36071	REP09T1	cedar	13.809		314.49	2607.4	379.38	12943	427.28		113.59		162.35		310.94	1333.1	238.23		125.94		66.543		54.681	778.38	82.423	140.86	42.082		17.773	66.884	9.0341		2.9714	
85	36071	REP09T2	douglas fir	13.878		258.63	3625.8	416.62	25660	581.14		105.84	557.9	149.86		313.76	1716.7	258.23		118.65		74.756		52.73	791.04	82.922		38.367		16.477		5.584		2.8714	
86	36071	REP09T3	western white pine	13.95		362.24	10936	630.28	30295	648.89		117.62		176.21		291.33	900.53	233.64		147.32		80.82		63.979	881.04	92.954		43.139		24.7		6.1926		3.8361	
87	36071	REP09A	forest litter			208	7553	532	22658	559	1144	174		161	2482	424	12431	593		200		56.9		41.5	1090	91		79.3		14.8	121	12.3	42.3	5.38	
88	36071	REP09B	soil			265	9193	556	7622	346	2162	216		164	3448	493	24457	832		262		63.1	167	53.6	1035	93.3		158		19.2	123	13.7	114	8.64	
89	36071	REP09C	soil			251	13562	648	7314	345	3686	251		148	3475	521	26297	868		277		76.6		48.7	1088	97.2		68.9		20.4	188	15.9	270	11.7	
59	36071	REP10	soil			263	9308	532	3721	245	1930	185		119	1414	375	17330	694		229		63.5	185	51.6	383	64.2		107		19	184	15.1	256	11	
60	36071	REP11G	grass			115	1991	298	3752	231		71.5	405	127		104		80.2		57.8		36.5	106	30.1	305	47.1		19.2		6.68		3.14		1.5	
61	36071	REP11S	tailings/soil				15460	684	3026	251	2158	199	445	141		297	18286	714		220		79.1	185	55.7	1127	94		82.2		17.4	158	14.1	242	10.7	
102	36071	ROSET	RoseLake Dredge Spoil	18.233		257.06	8449.8	519.53	811.46	160.56	786.13	143.45	518.17	148.38	9405.9	812.19	85951	1584.2		475.04		83.439		39.9	1499.8	126.12		141.69		22.422		7.264	132.75	10.027	
103	36071	END	End of Fligh	18.342		162.91	6258.9	428.62	996.15	127.42		90.811	283.58	81.726		185.58	3546.7	308.72		124.88		41.967		21.316		27.399	88.437	17.801		7.5199		4.2976	50.732	4.3788	
106	36072	GEM01	douglas fir	8.319			3139.03	339.769	4830.69	259.641	329.407	104.532	503.962	123.515			3243.49	303.756						45.9353		44.783		35.2917				4.65055		2.60682	

ID	DATE	Sample	Sample Type	Time	Chromium-high (mg/kg)	Chromium-high standard deviation	Potassium (mg/kg)	Potassium standard deviation	Calcium (mg/kg)	Calcium standard deviation	Thallium (mg/kg)	Thallium standard deviation	Chromium-low (mg/kg)	Chromium-low standard deviation	Manganese (mg/kg)	Manganese standard deviation	Iron (mg/kg)	Iron standard deviation	Cobalt (mg/kg)	Cobalt standard deviation	Nickel (mg/kg)	Nickel standard deviation	Copper (mg/kg)	Copper standard deviation	Zinc (mg/kg)	Zinc standard deviation	Arsenic (mg/kg)	Arsenic standard deviation	Selenium (mg/kg)	Selenium standard deviation	Strontium (mg/kg)	Strontium standard deviation	Zirconium (mg/kg)	Zirconium standard deviation	Molybdenum (mg/kg)
107	36072	GEM02	douglas fir	8.474			4456.55	413.602	7044.38	322.224		124.615	579.755	158.315		296.52	2752.4	296.559						56.652	198.698	55.2789		40.2915			56.1824	8.29687		3.17594	
108	36072	GEM03	douglas fir	8.614			4962.44	439.143	9159.83	365.435		122.209		158.035			2135.78	266.489						49.5332	176.59	53.6384		37			21.4922	6.12618		3.03623	
109	36072	GEM04	douglas fir	8.815		189.72	3055.6	340.74	4850.8	262.22		108.68	701.03	139.84		237.94	2227.4	262.24		102.69		56.528	161.9	50.533	151.71	47.728	157.62	35.555		13.124	30.281	6.4967		2.8096	
110	36072	GEM05	douglas fir	8.97		276.05	6029.3	456.03	4393.7	265.31	599.64	135.09		141.28		273.79	8953.5	500.13		179.1		76.803		55.47	320.63	64.022	203.67	58.029		18.234	62.673	9.02	24.149	4.4772	
111	36072	GEM06	True Fir	9.092		258.88	3791.2	406.36	14260	442.48		108.94	782.14	165.61		298.42	1222.3	225.92		127.49		75.218		56.854	264.58	60.243		35.142		14.184	75.842	9.3719		3.1127	
112	36072	GEM06A	True Fir	9.18		301.38	4162.8	463.37	38638	710.32		126.22	815.23	180.99		329.11	986.61	223.72		116.74		62.746		57.956	255.15	63.692		41.526		17.569	137.29	12.524		3.7715	
113	36072	GEM07	douglas fir	9.282		228.43	2802.3	360.62	13102	420.78	373.65	104.58	544.06	142.86		207.55	1582.9	230.67		117.42		64.631		39.819	194.97	50.905		34.455		12.845	24.284	6.1936		2.4558	
114	36072	GEM08	Maple	9.411		284.42	7346.7	516.96	14981	460.54		119.63	695.34	171.37		280.17	904.74	214.45		110.79		79.256		54.682	306.66	65.3		35.42		18.499	201.04	14.347		3.7394	
115	36072	GEM08A	douglas fir	9.492		254.35	2219.1	320.2	8570.2	341.85		92.721		132.67		192.54		140.4		92.703		53.578		43.99	141.21	46.443		27.196		10.241		4.955		2.2103	
116	36072	GEM08B	Ponderosa Pine	9.57		172.27		319.56	12522	420.56		89.735	538.92	179.59		255.43		159.33		116.83		63.782		55.12		50.631		30.932		14.086	16.624	5.5324		2.6745	
117	36072	GEM09	western white pine	9.726		249.42	6244	489.54	19480	515.99		92.365	543.11	154.3		226.2	1021.7	217.4		127.98		84.788		51.432		58.498	146.69	40.536		19.411		5.9936		3.0865	
118	36072	GEM09A	Larch	9.811		239.38	5051	458.52	12475	424.67		147.44		161.5		197.55	3208	314.86		129.48		77.042		49.399	284.95	59.792		38.342		15.606	63.136	8.7723		3.5061	
119	36072	GEM10	cedar	9.925		296.74	3770.8	401.41	7759.7	339.57	425.58	135.46		157.05		196.64	2496.8	285.25		125.5		65.869		54.685	253.69	59.631	125.65	39.359		17.272	54.344	8.1894		3.1661	
120	36072	GEM11	douglas fir	10.035		236.35	4338.9	441.32	16261	476.35		127.76	665.71	183.36		249.19	1803	256.06		112.08		71.531		57.53	233.28	59.132		41.489		14.687	31.506	6.8737		2.7265	
121	36072	GEM12	western white pine	10.243		259.85	2727.1	351.29	6842.5	314.97		100.52	490.47	149.63		242.63	1802.2	254.28		120.69		73.465		54.939	176.36	56.427	139.9	40.485		17.151	19.32	5.9022		2.7835	
122	36072	GEM13	douglas fir	10.508		261.94	3311.1	364.03	4914.1	271.2		85.837	533.05	143.22		152.94	857.14	183.59		88.161		53.536		47.726	254.92	54.181		35.461		12.361		4.5705		2.5441	
123	36072	GEM14	douglas fir	10.605		272.94	4350.9	419.3	10312	382.95	623.05	119.17	551.39	155.52		264.8	2301.9	277.78		111.37		60.857		52.981	260.6	59.069		36.901		15.052		5.3143		2.869	
124	36072	GEM15	douglas fir	10.756		283.77	3631.3	410.97	11234	402.59		116.31		170.39		221	1544.5	242.38		136.44		71.875		57.87	262.18	61.264	108.06	35.278		17.5		4.9669		2.341	
125	36072	GEM15A	Shrub	10.851		218.13	2642.1	410.44	28828	618.36		126.33		175.97		320.68		204.74		126.56		96.519		57.224	206.25	65.671		37.917		20.644	183.23	13.972		3.9555	
126	36072	YD02	douglas fir	11.744		317.2	3703.3	460.95	37861	706.11		120.85		187.51		288.47		181.09		111.43		67.606		60.662	238.12	64.704		37.872		16.028		5.8308		3.197	
127	36072	YD03	douglas fir	11.909		256.64	2487.7	321.95	4162	246.97		85.878	810.96	147.87		222.95	1103.5	204.4		98.849		67.447		51.393	161.95	50.629		29.283		11.275		4.5413		2.6212	
128	36072	YD03A	douglas fir	11.998		192.89	5483.7	464.92	14572	451.87		141.25		164.22		287.24	3330.8	322.63		118.33		61.065		43.296	383.23	63.821		43.661		12.796	53.286	8.2761		3.1439	
129	36072	YD03A	douglas fir	12.109		250.58	6369.6	489.02	14151	447.1	726.57	138.81	807.61	173.03		246.03	3171	315.81		154.98		74.321		52.051	337.97	62.271		45.954		14.456	30.921	6.8753		2.8667	
130	36072	YD04	douglas fir	12.191		233.86	3874.4	418.58	22773	549.31		110.2		142.86		214.72	1803.7	245.94		107.4		63.541		40.706	215.14	52.797		33.111		12.589	29.027	6.6566		2.5202	
131	36072	YD05	douglas fir	12.307		319.08	3468.6	425.97	32076	647.26		96.18		141.66		266.7	910.24	207.9		110.9		70.751		56.739	371.99	65.812		35.533		11.965	26.593	6.6754		3.0225	
132	36072	YD06	douglas fir	12.412		263.48	5719	503.5	28509	621.64		143.22		173.88		288.44	1785.8	264.41		117.11		78.096		65.338	383.53	68.982		42.657		18.673	50.733	8.3739		3.5109	
133	36072	YD07	douglas fir	12.526		256.4	4108	453.17	31679	647.04		129.38	646.16	175.4		281.79	968.1	215.76		109.68		79.182		59.873	208.26	59.852	130.67	40.162		15.359	31.069	7.0824		3.2621	
134	36072	YD08	douglas fir	12.625		226.07	3211.9	353.97	4855.2	266.27		100.35	778.81	148.65		261.26	1461.5	229.99		125.57		62.474		49.761	204.55	54.075		30.967		14.032	23.356	6.0632		2.5041	
135	36072	YD08	douglas fir	12.698		256.88	5163	453.15	14287	446.48		133.14	490.41	162.13		299.42	3573.8	336.57		139.22		71.456		51.529	356.68	65.445		37.316		18.166	38.778	7.5195		3.0701	
136	36072	YD09	douglas fir	12.807		271.26	2808.8	419.16	34695	673.29		103.72	554.6	171.71		295.43	1102	226.89		117.82		71.662		58.258	374.88	68.266	121.78	36.442		17.734		6.0005		2.9209	
137	36072	YD09A	white precip coat fracture/rk	12.891		323.75	11402	635.51	50777	818.95	571.64	160.38		134.16		294.74	9973.9	553.2		187.66		64.74		32.204		49.15		40.441		14.068		5.1935	129.38	7.6067	
138	36072	YD09B	douglas fir	12.969		224.98	3798.8	409.75	16695	475.61	310.65	100.62	484.27	148.59		278.23	1598.3	241.8		114.33		74.632		57.917	279.91	59.131	117.53	34.078		15.178	31.081	6.8529		2.6418	
141	36072	GEM01D	forest litter	16.296		152.25	2055.9	316.42	9162.8	352.98		94.263	858.63	151.4	1503.9	309.18	2161.3	252.18		87.629		43.882	156.64	38.143	167.64	41.194		31.107		7.9486	18.386	5.4489	8.827	2.5872	
142	36072	GEM02D	forest litter	16.374		191.04	1206.8	299.24	10241	376.36		105.73	532.09	155.93	2094.2	369.81	2645.3	284.58		112.1		54.713		33.719	207.5	48.275		34.3		10.13	61.109	8.4529	16.245	3.4483	
143	36072	GEM03D	forest litter	16.448		244.21	2998.3	357.71	9981.3	369.49		117.57	644.53	146.55	1959.7	367.9	6625.1	428.3		145.29		33.546		36.029	239.13	49.453		34.891		10.9	106.3	10.873	32.651	4.4295	
144	36072	GEM03L	maple leaves	16.528		173.94	1486.2	285.62	5971.1	290.04		80.197	662.38	147.45		169.97		110.94		73.753		43.637	95.77	29.331		25.852		15.213		6.717	20.668	5.4888		1.7234	
145	36072	GEM04D	forest litter	16.607		225.23	1014.8	282.29	9271	357.52		88.8		145.54	1816.3	347.02	601.39	166.98		83.763		52.59		38.429	220.14	48.557		25.962		11.284	43.124	7.2738		2.4029	
146	36072	GEM05D	forest litter	16.681		162.25	1272.9	277.21	7801	326.29		101.65	424.02	135.41	1272.5	305.66	3951.4	334.33		132.71		36.6		36.579	207.83	48.081		31.263		12.077	58.225	8.2553	18.845	3.5303	
147	36072	GEM06S	pale yellow soil/pebbles	16.754		218.44	7367.1	495.6	5466.5	292.39	2404.6	210.09	466.86	154.98	3170.4	472.24	20799	756.85		262.85		57.635		31.942	180.44	49.536		27.374		14.019	121.82	12.371	133.23	7.9396	
148	36072	GEM08D	forest litter	16.847		193.46	2656	359.98	10948	390.14	570.96	129.81	525.91	156.86	1168.6	304.63	6814	432.92		149.2		49.064		38.685	217.65	49.276		34.224		10.83	71.219	9.1513	11.737	3.3173	
149	36072	GEM08L	yellow shrub leaves	16.924		188.98	2997.1	355.08	6189.4	299.39		73.892	861.04	156.66		117.89		112.19		60.252		30.197	112.24	34.112		29.515		18.074		8.0584	23.188	5.7153		1.8876	
150	36072	GEM08AS	pale yellow soil/pebbles	17.005		229.79	6571.5	481.34	9404.3	369.53	1670.4	199.44		159.74	2248.7	420.09	20722	755.43		240.23		75.63		46.815	189.43	51.4		58.7		13.573	128.94	12.754	144.48	8.3215	
151	36072	GEM09D	forest litter	17.083		227.48	1263.1	302.68	9613.3	366.53		92.115		156	851.67	265.99	491.13	151.98		85.252		47.438		32.232		39.917		27.682		10.756	41.035	7.0777		2.3097	
152	36072	GEM10D	forest litter	17.159		199.89	3017.9	360.77	7436.8	326.05		118.43	799.06	162.34	1134.8	295.16	4707.5	361.47		152.98		48.289		37.238	187.88	45.661		29.359		12.929	33.02	6.7867	44.728	4.4506	
153	36072	GEM10S	medium brown soil	17.234		238.89	6894.7	488.97	8518.9	354.12	2117.8	207.82		159.72	2232.2	415.3	19000	723.59		242.6		63.444		31.085	253.36	54.216		42.395		13.915	173.9	14.432	115.82	7.6068	
154	36072	GEM12D	forest litter	17.312		231.65	1223.4	286.68	7564.4	325.9		90.473	594.16	152.82		220.36	1172.6	199.01		88.756		65.219		39.789	181.05	46.498		28.135		12.212	40.58	7.0531	11.007	2.9661	
155	36072	GEM13L	large green leaves	17.392		95.477	4317.3	384.51	3338.3	224.47		71.138	574.98	129.98		90.057		47.541		30.733		29.552	84.412	19.082		15.016	48.946	12.154		3.9753		2.4689		0.86286	
156	36072	GEM14D	forest litter	17.472		191.17	1408.5	279.93	6912.9	308.2		83.399		127.68	834.71	253.32	1534	217.14		93.185		38.038	144.66	39.657	175.97	43.252		25.909		8.1606	30.656	6.3718		2.4306	
157	36072	GEM1415R	red weathering lichen coated	17.55		202.19	5948.3	433.3	716.14	132.46		110.3	365.52	120.95	955.69	281.06	5775.2	394.48		140.45		48.324	116.23	35.677		28.98		17.94		10.031		3.5092	134.28	6.8796	
158	36072	GEM15D	forest litter	17.631		167.27	1371.1	304.47	11739	399.14		91.202	674.3	155.5		231.79	1407.4	211.56		100.27		46.82		36.817	131.41	41.802		24.27		10.172	40.064	7.0742		2.6261	
159	36072	YD01S	dark brown/blk soil	17.701		226.67	6981.8	480.66	5680.8	293.52	1621.2	192.82		143.59	1106.5	333.44	18467	708.04		243.22		55.489		43.85	170.3	48.722		35.207		13.203	141.45	12.989	177.53	8.8978	
160	36072	YD03S	dark brown/blk soil	17.774		267.57	7890	505.22	4551.1	269.7	1771.2	173.74	670.44	149.78	1177.4	338	16045	661.19		223.28		68.475		37.757		45.569		34.693		14.003	72.56	9.7521	166.74	8.3919	
161	36072	YD0405G	bear? Grass	17.852		133.64	1950.5	312.47	6661.3	307.12		77.039	633.59	148.71		145.11		74.834		62.432		37.879		32.188		35.977		18.316		11.268		4.5539	7.7758	2.282	
162	36072	YD_CAP	rye? Grass on Hecla rem pile	17.933		165.13	2565.8	331.8	4568	260.25		66.486	547.32	139.35		163.7		118.2		55.47		38.256	163.99	40.355	176.55	42.268		22.019		7.8067		3.9326		2.0487	
163	36072	YD09WP	white precip coat fracture/rk	18.03		166.75	9018.8	546.21	14082	444.5	1240.4	169.17		138.85		206.33	8867.1	495.53		161.51		52.213		37.381		34.699		28.916		11.322		5.2246	233.33	9.4128	
164	36072	PHO01	Orangeoxid on pho-Burke d	18.136		295.2	16232	687.69	1899.6	208.5	1075.6	155.09		113.96		317.82	73918	1467.9		431.29		100.32	240.43	62.369		42.764		34.135		15.14	26.407	8.5768	151.48	9.6069	
165	36072	PHO02	"paler orange coating rock	18.256		275.03	10213	546.25	1310.9	161.78	797.83	131.78	431.18	104.99		262.4	52811	1209.6		363.02		65.792	136.99	41.001		43.687		28.732		11.619		6.771	80.648	6.6557	
166	36072	PHO03	rock from splash H met lab	18.341		358.39		254.84	2657.8	219.2		92.699		161.23		766.29	332776	3543.8		1085		287.97		140.19	41405	958.24		230.36		47.854		19.942	140.35	16.427	
167	36072	YDR01	Hematite-rich qtzite	18.479		215.74	9945.9	538.49	537.12	125.35	563.69	116.56	468.96	105.34		227.24	3539.3	314.17		117.89		59.034		29.885		30.731		22.467		11.973		3.2663	137.23	6.9673	
168	36072	YDR02F	Red hematitic stained rock	18.565		217.17	16451	693.51	7260.7	336.53	852.8	143.82	457.62	112.27		296.5	20403	753.88		254.23		74.869	122.53	40.077		41.318	88.583	23.28		11.771		4.6019	124.92	7.2933	
169	36072	YDR02W	Red hematitic stained rock	18.653		231.24	13261	622.37	1648.6	188.25	993.85	138.99	550.17	117.68		223.96	7348.4	448.42		144.45		48.642		26.937		29.26	60.565	20.138		9.8012		3.7577	91.462	5.9912	
170	36072	YDR03F	Pale green country rock	18.755		180.81	9635.5	531.43	2265.5	193.72	494.04	106.38	407.38	95.888		141.94	5170.9	373		120.48		51.346	111.1	33.359		31.181	82.606	17.135		9.0766		3.299	111.7	6.3253	
171	36072	YDR03W	Pale green country rock	18.854		207.06	33247	976.15	1404.5	246.52	2592	217.42		132.57		220.16	7690.6	477.59		187.77		74.874		41.814		45	77.791	24.927		12.52		5.8697	224.31	9.4722	
172	36073	YDR04F	light brown qtzite	19.388		242.54	14532	647.6	827.73	158.14	606.72	116.94	719.58	119.9		181.3	6733.4	430.21		159.36		50.559		30.711		35.523		20.398		11.499		3.8533	110.32	6.4713	
175	36073	SUC01	douglas fir	33.361			2081.59	355.252	10465.6	388.07			679.837	178.924			934.254	203.283						52.9366	164.426	54.7649		31.0885			54.618	8.17985			
176	36073	SUC01A	cedar	33.467		250.19	5584.9	475.99	12818	431.31		142.1		168.53		238.29	2499.1	292.26		120.78		74.27		49.784	233.21	61.009		35.2		15.661	76.68	9.4307		3.4893	12.675
177	36073	SUC02	douglas fir	33.6		243.73	2296.8	337	5304.6	284.22		84.448	612.86	159.41		274.22		160.27		97.542		68.307		54.681	265.62	59.391		28.818		14.838		5.114		2.6808	
178	36073	SUC02A	cedar	33.679		263.46	1790.2	354.7	12302	418.85		118.6	761.83	191.47		268.44		174.84		127.06		81.631		55.238	298.41	65.252		35.863		18.53	108.07	10.838		3.5623	
179	36073	SUC03	cedar	33.829		344.8	4275.3	443.49	15801	472.08		119.36	654.1	184.82		212.85	1271	233.35		134.9		79.377		51.099	275.15	64.265		39.984		16.126	63.391	8.897		3.2375	
180	36073	SUC03A	douglas fir	33.906		246.83	4276.2	446.99	21515	541.48	450.28	126.68		164.33		225.13	3064	322.71		143.06		93.688		58.339	375.06	70.352		39.814		18.933	63.966	8.9832		3.9192	
181	36073	SUC03B	douglas fir	33.989		233.63	4776.8	430.66	12480	415.88		113.42		141.69	1023.6	320.17	2694.4	298.96		139.94		66.183		51.567	260.91	59.773		39.832		15.196	68.362	9.0903		3.6473	
182	36073	SUC04	douglas fir	34.12		254.9	3940.9	429.27	11894	416.44		110.82	676.06	186.8	1517.6	368.98	1839.6	267.16		120.11		62.83		54.971	407.78	68.974		40.252		17.532	22.363	6.3419		3.2073	

ID	DATE	Sample	Sample Type	Time	Chromium-high (mg/kg)	Chromium-high standard deviation	Potassium (mg/kg)	Potassium standard deviation	Calcium (mg/kg)	Calcium standard deviation	Thallium (mg/kg)	Thallium standard deviation	Chromium-low (mg/kg)	Chromium-low standard deviation	Manganese (mg/kg)	Manganese standard deviation	Iron (mg/kg)	Iron standard deviation	Cobalt (mg/kg)	Cobalt standard deviation	Nickel (mg/kg)	Nickel standard deviation	Copper (mg/kg)	Copper standard deviation	Zinc (mg/kg)	Zinc standard deviation	Arsenic (mg/kg)	Arsenic standard deviation	Selenium (mg/kg)	Selenium standard deviation	Strontium (mg/kg)	Strontium standard deviation	Zirconium (mg/kg)	Zirconium standard deviation	Molybdenum (mg/kg)
183	36073	SUC04A	cedar	34.253		292.4	3001.3	401.09	11947	416.81		157.85		189.47		291.1	3167	325.16		155.39		71.734		55.796	336.22	68.068		43.065		19.612	83.388	9.8564	13.315	4.0542	
184	36073	SUC05	douglas fir	34.427		248.53	4996.1	447.91	10905	397.28		129.14	648.3	176.11	1346.6	355.96	2404.2	292.13		137.47		82.923		51.669	407.04	68.8		44.523		18.434	54.216	8.4067		3.4441	
185	36073	SUC06	douglas fir	34.563		193.56	3514.6	396.9	15148	454.14		107.51	614.09	158.3		281.46	2051.6	267.43		114.22		63.721		58.98	443.83	67.616		39.409		12.522	79.293	9.6015		3.2996	
186	36073	SUC07	douglas fir	34.696		237.3	4377	400.66	7180.5	319.4	375.94	104.29	506.54	134.82		261.03	3283.6	318.1		121.05		70.829		52.766	241.4	57.521		43.035		16.872	90.037	10.037		3.229	
187	36073	SUC07A	cedar	34.771		224.47	5210.6	457.85	11404	406.77		137.76		173.29		282.23	3482.6	334.32		140.35		76.047		55.31	543.64	74.508		41.265		17.325	90.224	10.214		3.6394	
188	36073	SUC08	douglas fir	34.924		234.2	2712.3	336.74	5245.1	275.52		108.52	587.49	143.35		188.75	4712.7	362.29		142.09		52.608		44.539	225.11	51.807		42.403		10.682	44.669	7.557		3.2108	
189	36073	SUC08A	douglas fir	35.011		264.62	3180	368.73	11633	397.64	342.69	101.9	607.88	141.61		298.43	3401.9	324.49		136.42		51.865		43.141	402.6	64.648		49.728		17.504	83.245	9.8564		3.2637	
190	36073	SUC08B	western white pine	35.15		343.92	5737.8	527.33	49100	801.58		95.783		174.82		336.13	806.62	228.7		139.01		81.571		55.214	936.93	95.023		42.303		18.956	29.096	7.4068		3.1307	
191	36073	SUC08C	douglas fir	35.234		159.19	6370	493.96	12713	429.27	845.01	149.68	645.78	177.97		267.26	5848.2	410.16		135.44		56.851		45.835	454.75	65.758		42.453		12.833	58.298	8.5617	13.143	3.4415	
192	36073	TAM01	douglas fir	36.486			3926.95	404.765	8433.73	350.922				148.527		283.719	1479.76	231.658						46	376.083	61.7724		39.568			45.0667	7.65375			
193	36073	TAM01A	douglas fir	36.565		193.29	6401.3	463.92	5683.4	292.56		88.039	619.7	143.29		262.68	2281.4	267.93		105.89		63.243	197.02	54.242	329.16	57.755		39.377		11.522	34.465	6.9047		2.6739	
194	36073	TAM01B	western white pine	36.653		314.77	6918.4	559.84	50853	818.16		109.57		176.89		359.3		219.42		156.51		103.96		64.286	969.99	99.339		46.948		22.792	48.651	8.8299		3.732	
195	36073	TAM02	douglas fir	36.839		274.89	10331	611.79	22679	568.59		120.79	711.82	193.69		302.8	1717.1	272.3		156.76		86.287		62.183	841.55	89.849		48.423		20.106	139.08	12.588		4.0015	
196	36073	TAM03	douglas fir	36.99		208.03	2112.7	341.56	23408	549.37		72.944	529.84	120.21		185.39	516.28	159.39		77.203		59.195		44.863	580.85	68.91	111.58	30.25		13.732	131.83	11.795		2.7024	
197	36073	TAM03A	western white pine	37.062		293.84	5756.5	474.5	21349	536.53		82.188	497.66	142.87		253.59	1580.9	246.33		119.6		75.049		57.483	911.29	86.064	147.43	48		16.569	61.53	8.8555		3.1393	
198	36073	REX02	douglas fir	14.352		137.77	9710	567.55	3363.1	258.21	1310.8	157.32		162.98		206.1	6698.3	432.72		153.23		67.918		42.945	392.13	61.81		58.359		12.775		5.616		2.8963	
199	36073	REX03	true fir	14.44		247.03	5931.1	478.87	11540	410.18	440.71	137.91	648.2	177.01		319.22	2803.8	307.83		142.41		78.105		53.57	740.61	81.115		57.437		18.009	114.29	11.392		3.6046	
200	36073	REX04	douglas fir	14.532	1429.4	417.38	2522.6	351.68	2967.4	232.51		91.695		166.49	1025.2	331.06	1353.6	230.08		117.23		70.368		56.233	298.41	60.172		32.235		14.741	18.803	5.8442		2.7163	
201	36073	REX05	cedar	14.604		317.97	2668	373.43	11859	408.92		111.5	681.23	173.03		238.5	1344	236.81		116.84		73.493		56.123	757.33	81.972	184.75	44.258		18.865	88.024	10.007		3.1996	
202	36073	REX06	cedar	14.684		248.75	7747	513.22	7014.9	328.92	921.27	151.2	649.41	162.32		238.83	7882.2	476.09		175.72		67.059		58.925	1108.1	94.853		60.248		19.106	143.77	12.799		4.511	
203	36073	REX07	cedar	14.762		237.82	5086.8	476.75	23304	564.63		134.84		177.95		242.21	750.96	199.64		107.97		79.402		49.319	2078.7	119.04		37.202		20.215	197.27	14.504		3.8761	
204	36073	REX08	douglas fir	14.865		230.36	3949.2	403.7	11258	396.52		118.7	472.08	150.32		242.08	3178.4	310.26		113.02		63.948		53.298	386.7	61.71	241.99	64.519		13.415	30.403	6.8066	10.516	3.322	
205	36073	REX09	douglas fir	14.964		183.71	4854	411.7	4762.4	266.78	510.7	121.52	608.36	141.04		210.35	3727.5	328.2		129.24		72.163		51.174	433.09	62.498		63.161		13.853	35.135	7.0417		2.8042	
206	36073	REX10	douglas fir	15.054		212.69	3828	390.49	8066.3	339.12		104.56	546.05	146.94		183.01	2191.3	264.35		124.59		70.062		46.072	291.82	57.717		38.565		13.659	24.884	6.2188		3.0348	
207	36073	REX11	douglas fir	15.148		225.17	2917.9	344.27	6191.2	295.75	346.47	109.05		126.91		225.81	1962	250.47		93.687		64.238		41.708	406.98	61.112		38.955		13.92	30.846	6.5722		2.3735	
208	36073	REX12	douglas fir	15.249		300.87	7884.3	532.67	12983	435.02	1132.9	169.94		169.4		249.21	5522.4	406.48		160.48		62.405		55.034	319.38	64.088	179.32	52.419		16.916	74.935	9.6308		3.7464	
209	36073	REX13	douglas fir	15.352		265.79	5313.2	443.6	10550	385.5	767.78	133.33	613.3	151.479		244.89	4232.09	339.604		134.34		51.937		49.2814	392.447	63.075	176.055	50.602		15.116	57.3924	8.235		3.1544	
211	36073	REX14	douglas fir	15.778		165.04	5578.2	472.14	19269	513.26	672.67	133.39	590.08	161.24		220.21	4676.2	373.78		118.02		60.075		54.345	333.03	62.326		52.151		14.329	74.734	9.6056		3.6647	
212	36073	REX15	douglas fir	15.862		213.4	5235.4	437.79	7634.2	334.06	697.67	117.02	784.16	156.52		283.57	4425.7	365.24		154.48		72.919		58.863	323.7	63.698		42.926		16.847	81.026	9.7904		3.4653	
213	36073	REX16	douglas fir	15.952		237.96	7365	505.13	5518.4	300.16		128.86	703.84	169.99		231.4	5108.5	383.02		148.72		58.923	184.67	56.555	271.08	57.401		48.944		15.045	63.112	8.7965	11.136	3.5646	
214	36073	REX17	western white pine	16.076		290.22	5325.8	473.76	24415	573.21		104.32	519.58	157.78		288.38	1713.6	261.7		120.8		79.896		59.846	577.55	77.045	184.24	45.755		18.406	37.801	7.583		3.3468	
215	36073	REX17A	douglas fir	16.157		251.05	4163.4	392.47	5383.8	282.03		109.28	579.6	146.35		217.15	4493.7	356.41		135.5		52.877		48.433	299.34	56.245	151.5	48.621		13.237	99.43	10.472		3.3074	
216	36073	REXTBG	brown/gray tailings over yello	17.853			12088	621.277	15320.2	468.69	1780.6	195.063		144.058	2883.92	489.226	41116.5	1088.73					441.755	76.7855	2598.6	146.514		85.4772			75.4203	11.4351	33.198	5.62957	
217	36073	REXTG	yellow tailings	17.961			8563.01	516.286		124.288	949.701	132.778		126.354		290.157	18355.3	703.272		247.389				42.4537		43.3232		1386				5.68147	90.7245	6.46529	
218	36073	REXTGB	gray to black tailings	18.052		254.53	17075	712.09	2825	244.41	1009.2	163.34		134.08	2840.2	477.14	29670	916.46		301.25		71.96	217.42	57.165	1274.2	102.25		99.609		17.116	457.23	24.359	113.68	9.1853	
219	36073	REX09S	jig tailings	18.133		298.96	10988	587.6		156.85	913.51	156.12	655.12	159.07	3043.7	528.13	63682	1355.1		445.62		86.978		51.045	488.51	77.51		168.6		17.417		8.3136	97.604	8.6961	
220	36073	REX11S	soil	18.22		271.94	6422.5	471.53	7033.2	323.73	2813.8	214.55	738.38	163.91		324.68	22579	787.24		274.8		73.639		39.081		43.502		27.083		13.726	493.6	23.916	134.71	9.0745	
221	36073	REX11D	forest litter	18.31		137.73	3679.5	399.96	9956.7	377.62	666.14	137.48	644.6	167.62	1442.4	332.51	8196.2	474.87		156.87		55.696		42.677	320.52	56.138		44.438		11.531	175.45	13.694	40.897	5.1493	
222	36073	REX14S	soil	18.379		276.51	7433.1	504.95	8272.6	351.43	2025.1	201.74		158.54	1149.1	349.75	18891	722.11		247.16		66.318		43.775		43.088		28.766		13.851	685.35	27.821	155.01	9.9194	
223	36073	REX15S	soil	18.451		282.19	6189.2	463.02	6804.8	318.12	1524.6	187.63		145.89		304.23	17985	698.96		215.18		71.912		32.846		43.95		27.382		10.92	627.68	26.27	114.48	8.7895	
224	36073	REX16S	soil	18.526		265.52	6744.6	479.63	7123.4	325.41	2175.9	195.87	650.18	157.46	3163	474.09	18334	711.99		230.01		60.582		41.842	338.03	58.945		28.215		13.413	526.1	24.419	120.05	8.7117	
225	36073	REX17S	soil	18.598		274.65	11007	597.44	9881.5	387.14	1505.6	165.84	630.88	159.38	1462.4	386.61	29453	909.66		298.49		79.868	183.33	53.146	1559.5	110.92		66.953		15.654	603.69	27.669	110.28	9.3857	
226	36073	MPANICK	MissionFlat Nicks metal/soil	18.673		243.21	5869.1	448.35	1656.9	186.26		127.69		145.02	6704	672.93	50788	1189.1		359.06		91.298	206.42	63.504	5105.9	206.5		145.28		19.573		7.3485	106.03	8.3216	
227	36073	MFP1N	MissionFlat Nicks metal/soil	18.79		115.71	1210.1	280.2	2184.1	199		87.211	924.19	172.85		114.63	691.09	159.41		88.411		46.016		32.899	132.59	42.676		21.59		10.909		3.1688		1.6194	
228	36073	MFOATS	MissionFlat Nicks metal/soil	18.892		102.01	4928.7	424.79	3098	233.11		81.473	849.11	164.56		134.65	561.1	150.4		74.328		51.226		37.678		40.933		20.935		10.894		2.9286		1.6693	
229	36073	MFP1S	MissionFlat Nicks metal/soil	18.986		327.05	7250.1	488.09	1295	177.05	849.36	139.22	553.63	149.71	7485.1	729.18	69872	1417		444.71		118.44		48.17	833.77	95.679		127.45		19.044		9.0496	133.47	9.4454	
230	36073	MFP1D	Mission Flat forest litter	19.089		191.76	4573.8	412.09	6583.7	310.67	704.45	137.66		142.16	4094.2	499.59	14248	622.34		197.72		52.085	104.33	34.659	857.93	78.578		40.004		8.9041	24.951	6.526	10.364	3.0055	
231	36073	MFBS	Mission Flat bear scat	19.183		262.77	7801.2	502.16	2007.3	201.5	654.24	127.5	487.49	143.22	6095.2	656.42	55316	1246.8		391.61		87.57		59.249	795.22	92.424		83.662		19.242		8.0888	75.248	7.1113	
232	36073	MFDS	Mission Flat mule deer scat	19.287		195.95	2885.5	366.29	11986	405.5		82.054	1020.9	165.67	1027	305.01	914.64	200.98		122.76		63.714		46.694	675.63	74.394	180.59	33.448		15.62	53.707	8.1408		3.0211	
233	36073	TAMOXT	Oxidized tailings	21.859		273.65	12060	612.5	760.91	173.12	817.91	142.84	542.64	151.38	2728	492.61	50188	1193.1		381.57		106.32	187.01	59.107	1512.5	116.53		147.73		22.411	48.992	10.525	86.583	8.4036	
234	36073	TAMOPHO	Transported oxidized tailings	21.963		303.64	10564	586.88	741.37	178.81	1387.1	164.13		159.76	2743.6	493.08	45854	1141.5		382.18		93.036	187.83	60.522	1717.3	122.8		175.03		22.852	65.159	11.79	85.323	8.5023	
235	36073	TAMSEEPP	red oxide historic seep	22.046		314.93	1017.1	250.65	736.72	133.06		78.335		137.9		494.63	198830	2517.4	3011.4	822.15		158.21		55.757	1849.1	167.29		67.97		13.691		12.475		4.5893	
236	36073	TAM01B	Transported oxidized tailings	22.132		378.63	22640	831.96	1629.8	238.84	1895.6	182.81		154.18	3869.1	578.64	48612	1209.5		386.64		73.532	247.02	73.373	10768	308.42		225.63		25.283	43.4	11.843	112.42	10.216	
237	36073	TAM01C	alluvial soil	22.228		243.73	14869	675.16	8080.6	359.51	2371.6	217.19		149.02	1760	395.81	18927	731.62		240.33		70.389		46.126	4372.9	175.03		42.95		15.359	529.58	25.345	152.02	9.8103	
238	36073	TAM01D	forest litter	22.348		134.95	7816.5	509.43	5400.5	292.8	801.53	128.97	547.87	146.94	1447.7	335.48	14140	619.08		211		59.665	169.82	45.494	660.59	71.61		78.55		13.76	30.952	7.2396	25.997	4.0761	
239	36073	TAM03B	Transported oxidized tailings	22.424		275.5	15882	694.18	1244.3	198.73	947.11	153.47		132.31	3023.4	519.23	53094	1241.5		385.56		100.1	198.63	60.446		54.674		170.52		20.503	31.977	9.7913	93.693	8.705	
240	36073	TAM03C	soil-alluvium mixture	22.505		292.2	15737	693.48	4156.6	282.24	2046.5	214.3		146.75	1411.8	391.27	27745	888.92		287.1		60.289	166.46	53.786	293.18	61.291		117.44		17.779	389.4	22.459	161.86	10.145	
241	36073	TAM03D	forest litter	22.588		205.67	3708.7	399.98	10053	378.8	452	120.59	482.47	157.94	1144.3	298.71	4157.4	344.26		146.56		55.881	165.05	46.488	942.69	80.619		37.033		9.6929	60.247	8.5412		2.9908	
242	36073	SUC01S	soil	22.747			6537.18	474.436	7965.89	341.105	2456.34	212.558		147.326	1083.64	343.206	21279	764.029						41.9319	155.633	48.6511		23.8477			464.739	23.0872	192.861	10.1717	
243	36073	SUC02A	organic rich soil	22.825		249.07	6642.4	484.8	9531.9	372.47	1996.5	195.02	495.84	159.07	4289.8	541.56	22821	798.13		262.4		69.359		34.586	571.06	72.612		48.854		13.539	378.98	21.344	129.41	8.8189	
244	36073	SUC02D	forest litter	22.901		219.33	2545.1	369.63	16960	478.28	495.65	121.17		153.71	4487.5	519.96	5353.9	398.41		121.41		49.277		30.68	405.6	59.066		40.325		10.951	158.61	13.155	20.018	4.2236	
245	36073	SUC02S	soil	22.97		242.61	6995.3	486.57	7489.8	332.77	1917.5	201.69	514.41	155.97		297.36	18995	720.44		253.08		50.419	145.47	46.125	319.84	58.079		25.205		13.023	440.45	22.284	151.14	9.165	
246	36073	SUC03D	forest litter	23.076		214.57	1317	294.64	7981.3	334.96		85.151	547.48	150.51	1695	339.25	1098.4	201.73		96.361		54.763	145.1	45.317	147.59	45.049		26.731		10.902	46.547	7.5348		2.2724	
247	36073	SUC04G	green rock - cpy-azurite	23.151		280.7	1824.2	290.93	6940.9	310.74		76		99.268		324.2	21248	722.71		233.28		85.807	1848.6	169.24	100864	996.8		75.87		15.057	723.29	41.338		9.7212	
248	36073	SUC04G	green rock - cpy-azurite	23.235		345.77	4161.9	455.39	42345	745.19	585.9	126.77	395.87	127.09		328.06	31901	955.32		320.19		97.564	9075.5	326.02	32034	535.64		90.274		19.055	2314.5	65.34		15.022	
249	36073	SUC04R1W	rock	23.323		308.47	53662	1237.2	2332.3	325.8	3010.7	255.88		140.82		356.45	17935	752.81		252.7		68.424		42.073	1059.2	94.72		71.163		12.623	29.836	7.9611	262.99	11.274	
250	36073	SUC04R1F	rock	23.399		224.82	23054	813.05	2601.6	244.69	1436.8	162.29	361.76	106.59		284.62	9342.3	514.93		190.92		59.78	114.97	36.986		38.118		26.664		9.6612		5.231	126.6	7.1352	
251	36073	SUC04R2W	rock	23.48		207.04	13180	617.48	901.7	154.22		75.581	454	96.742		186.93	2514.4	268.36		105.24		36.217		24.796	114.53	37.866		62.277		10.346	73.059	9.1201	21.469	3.9157	
252	36073	SUC04R2F	rock	23.593		191.04	26056	868.53	3938	289.5		88.061	312.62	103.04		199.01	2560.8	282.51		120.97		53.78	165.61	45.492		34.43		97.533		13.862	172.93	13.935	26.602	5.1128	
253	36073	SUC04S	soil	23.739		237.98	6685.8	482.66	6263.1	311.64	1354.2	174.61		156.56	1123.6	335.49	17140	683.84		235.6		62.629		42.45	574.64	70.23		45.473		12.869	546.99	24.681	123.2	8.865	
254	36073	SUC05S	soil	23.834		453.26	10790	618.89	1465.4	204.33	798.38	146.29		153.5		433.49	38097	1092.3		359.4		106.54		59.302	401.14	76.224		468.07		40.316		18.092	71.361	15.807	
255	36073	SUC08S	soil	24.033		270.56	4232.5	403.95	6710.3	314.94	1050.9	165.02		147.96		296.03	22730	787.78		260.6		69.582		50.77	1174.8	95.502		140.93		17.523	211.35	16.67	91.293	8.1563	

ID	DATE	Sample	Sample Type	Time	Chromium-high (mg/kg)	Chromium-high standard deviation	Potassium (mg/kg)	Potassium standard deviation	Calcium (mg/kg)	Calcium standard deviation	Thallium (mg/kg)	Thallium standard deviation	Chromium-low (mg/kg)	Chromium-low standard deviation	Manganese (mg/kg)	Manganese standard deviation	Iron (mg/kg)	Iron standard deviation	Cobalt (mg/kg)	Cobalt standard deviation	Nickel (mg/kg)	Nickel standard deviation	Copper (mg/kg)	Copper standard deviation	Zinc (mg/kg)	Zinc standard deviation	Arsenic (mg/kg)	Arsenic standard deviation	Selenium (mg/kg)	Selenium standard deviation	Strontium (mg/kg)	Strontium standard deviation	Zirconium (mg/kg)	Zirconium standard deviation	Molybdenum (mg/kg)
257	36074	BRL01	western white pine	11.906			2430.56	336.76	4468.38	263.166			565.07	155.896		214.031	2566.77	277.67						46.6008	221.471	51.8817		34.8738							
258	36074	BRL02	western white pine	12.006		260.52	3281.6	376.36	7543.6	331.24		113.16	568.51	157.16		203.15	5034.7	379.68		158.42		72.302		52.6	344.01	61.783		46.732		12.851		5.66	9.8741	3.1016	
259	36074	BLR03	western white pine	12.204		207.04	3438.5	380.11	5472.6	289.81		105.15		150.31		224.72	3663.2	325.38		106.47		48.006		42.786	323.42	57.325		42.379		12.463		4.1932		2.3832	
260	36074	BRL03A	cottonwood	12.363		168.95	4552.1	406.77	11271	390.32		98.682		113.29		191.72	2327.9	265.77		113.25		51.237		39.152	571.06	66.862		27.928		12.144	26.957	6.3212		2.6866	
261	36074	BRL04	western white pine	12.524		277.16	3095.5	362.3	4160.2	256.83	288.79	95.867	672.3	157.42		225.04	3019.3	306.65		107.84		72.52		51.365	364.97	64.149		42.14		15.024		4.4957		3.141	
262	36074	BRL04A	cottonwood	12.633		204.6	3657.5	356.55	7013.9	306.03	305.89	93.972	705.34	119.42		210.45	2586.2	274.59		103.69		41.835		32.322	343.53	54.827		31.111		10.333		4.8437		2.4189	
263	36074	BRL05	cottonwood	12.763		296.17	9852.5	573.65	15242	465.49		120.74	447.59	147.61		305	4410.8	378.2		155.55		75.697		59.282	1223.6	100.3		42.495		19.942	66.581	9.3393		3.9079	
264	36074	BRL06	cottonwood	12.881		250.73	9463	561.41	15264	463.79	616.59	140.9	559.35	149.01	1317.4	345.44	7314.5	461.95		180.42		69.701		54.972	1531.2	105.03		50.632		16.813	66.568	9.3951	15.053	3.8297	
265	36074	BRL06A	ponderosa	12.978		272.32	4695.2	419.19	5740	295.48	339.93	111.56	581.48	153.29		263.6	6068.8	419.07		170.91		67.019		54.299	448.66	69.759		50.096		15.25		4.613		2.9263	
266	36074	BRL07	cottonwood	13.091		225.98	4960.6	405.49	7310.5	315.3	383.33	102.07	601.13	116.09		268.55	5550.7	393.88		145.8		60.823		37.418	818.58	77.151	164.05	40.682		12.326	35.457	7.0645		2.9466	
267	36074	BRL08	cottonwood	13.201		192.71	3253.4	376.56	16881	472.65		87.187		121.55		143.99	1270.1	209.4		94.608		64.904		42.964	671.02	71.752	114.31	32.76		12.418	35.077	6.9255		2.784	
268	36074	BRL09	cottonwood	13.311		365.05	14127	667.89	14794	466.86	1160.2	151.4	558.95	152.05		349.85	13797	635.24		216.36		86.68		63.341	1629.7	114.56		52.912		15.053	78.334	10.55	19.619	4.6727	
269	36074	BRL10	cottonwood	13.433		303.38	18499	763.13	20819	556.78	1107.5	170.98		164.87		346.23	10600	570.37		209.72		82.273		58.349	1332	107.98		54.075		20.776	62.382	9.6605		4.1396	
270	36074	BRL11	cottonwood	13.538		252.4	11346	612.15	18328	509.51	382.79	113.05		144.03		269.89	2169.8	276.44		131.45		56.654		55.916	893.58	85.286		34.483		16.454	50.152	8.2764		3.075	
271	36074	BRL11A	ponderosa	13.646		318.18	6084.3	484.08	17415	490.89	465.68	133.01		154.33	1451.3	385.56	9224.2	521.61		186.07		82.803		58	1387.4	105.66	279.35	73.194		18.58	27.075	7.2435		3.9496	
272	36074	BRL12	cottonwood	13.754		316.9	17344	743.04	14562	477.64		88.124	738.89	182.85		302.8		162.16		127.39		72.838		64.808	666	82.122		37.153		19.596	36.147	7.5304		3.5907	
273	36074	BRL12A	ponderosa	13.861		164.17	2040.6	285.55	1637.4	160.77		82.246	525.16	126.47		203.18	2980.8	292.09		100.72		62.046		35.582	160.35	46.352		36.298		10.826		2.9054		2.3283	
274	36074	BRL13	cottonwood	13.985		299.82	12997	652.84	15980	485.53	476.11	113.71		159.89		296.28	1404.1	247.48		109.1		71.959		59.222	1008.3	92.045		36.536		18.982	31.518	7.1669		3.5558	
275	36074	BRL13A	conifer	14.068		220.57	1210.6	247.18	2872.8	202.69		66.792	487.84	121.67		155.76	507.04	145.8		78.026		48.583		38.866	172.45	45.171		24.103		10.422		2.9184		1.8965	
276	36074	BRL14	cottonwood	14.164		241.79	11355	607.14	14257	453.98	444.72	116.99	637.58	152.88	2593.4	439.64	2240.4	289.98		133.72		55.835		43.706	835.25	84.34		43.268		18.105	25.449	6.7341		3.0185	
277	36074	BRL15	conifer	14.269		225.74	4545.3	399.68	7639.9	325.19	378.09	113.9	543.04	128.01		272.21	6040.6	411.95		153.77		66.318		40.208	881.04	81.013		53.758		12.235	30.482	6.8868		3.0346	
278	36074	BRL15A	cottonwood	14.361		155.93	8680.1	542.02	11026	401.54		102.48	532.47	151.75	979.09	320.84	2170.6	280.28		144.2		64.833		54.392	847.8	84.613	132.84	38.037		17.925	25.441	6.5934		3.3314	
279	36074	BRL16	conifer	14.536		177.15	6986.8	488.77	6052.8	306.4	513.09	127.56	512.59	151.07	910.27	293.52	6927.1	440.62		171.52		48.993		46.921	457.64	64.553	280.78	64.503		14.201		5.8641	10.599	3.2311	
280	36074	BRL16A	cottonwood	14.634		250.56	6981.7	493.85	18106	494.43		95.419	790.48	141.02		231.88	1610.6	234.69		101.43		58.888		39.121	537.61	67.295		31.058		14.344	45.667	7.7152		2.9592	
281	36074	BRL17	cottonwood	14.734	2152.8	494.17	10534	587.48	13604	443.05	1117	155.59	554.21	152.36	1936	431.96	9193.7	524.41		202.07		82.241		64.556	1059.6	94.984		49.71		17.477	87.54	10.711	17.49	4.5108	
282	36074	BRL18	conifer	14.908			3705.59	410.626	3946.43	268.71	358.949	109.508	724.75	187.659		275.125	2425.68	286.568						56	291.27	62.9478		39.8775							
283	36074	BRL18A	birch	14.999		307.43	1391.3	335.09	2100.1	223.89		101.38	629.09	197.57		322.92		172.06		137.05		75.749		63.916	1287.6	99.143		38.863		20.19	23.714	6.4263		3.253	
284	36074	BRL19	cottonwood	15.094		280.27	11738	632.38	23952	580.19	1098.1	143.97	695.35	170.65		239.18	5502.8	416.61		165.83		72.704		59.637	1474	107.98		45.666		16.413	78.902	10.206		4.0506	
285	36074	BRL19A	conifer	15.178		232.26	2329.7	331.41	3637.2	242.17		82.833	577.81	155.33		173.02	867.57	185.37		78.954		58.483		50.23	193.98	51.136	117.65	30.681		12.381		3.5393		2.1144	
286	36074	BRL20	conifer	15.302	1966.5	459.13	4115	405.58	3293	241.83		111.24		158.21	1420.5	368.37	5075.4	386.7		155.55		65.59		53.375	357.23	62.623		46.066		13.95		4.7513		3.0138	
287	36074	BRL20A	cottonwood	15.391		143.77	9341.8	575.77	23870	573.99	452.86	127.32		150.67		300.72	4106.7	363.47		146.53		91.449		47.7	1331.4	101.27		46.088		17.137	86.584	10.331		3.3452	
288	36074	BRL21	conifer	15.518		298.58	6437.9	497.36	8910.5	371.74	778.39	137.72		178.93		281.89	6943.5	450.77		169.38		89.333		59.397	663.36	80.003		62.67		18.343		6.0574		3.2405	
289	36074	BRL21A	cottonwood	15.598		241.11	7189.2	505.71	19588	515.26		94.487	402.76	130.4		260.38	1810	250.78		120.27		59.345		54.605	836.17	80.619		34.923		15.145	51.046	8.1282		2.8406	
290	36074	BRL22	conifer	15.731		190.04	4368	418.47	7428.6	333.24	637.76	134.26	538.25	162.81		204.64	3159.6	302.93		129.53		60.061	191.37	50.767	234.58	51.219	96.221	31.61		13.855		4.8455		2.5019	
291	36074	BRL22A	conifer	16.389		215.29	4887.6	428.93	7897.4	339.5	390.55	106.53	561.46	150.43		240.25	4729.3	364.34		123.53		50.951		37.437	334.66	55.845		41.96		12.037	27.699	6.4812		2.4505	
292	36074	BRL22A	conifer	16.484		95.604	3496.9	349.02	3284.9	217.86		91.281	693.88	128.91		174.17	3037.5	291.14		118.37		51.237		35.524		40.849	128.2	33.726		8.9145		5.1605		2.4114	
293	36074	BRL22B	cottonwood	16.571		260.69	12437	640	22991	567.38	677.99	140.72	773.57	164.78		231.33	4392	372.13		130.38		75.367		39.562	562.58	74.575		37.796		15.626	114.92	11.59		3.5342	
294	36074	BRL23	cottonwood	16.706		257.8	6146.4	498.16	30288	634.1	548.57	115.82	719.76	155.69		217.35	2144.4	272.1		139.14		68.748		55.274	1864.9	113.79		32.395		15.922	110.3	11.393		3.7022	
295	36074	BRL23A	conifer	16.785		271.81	2270.7	347.91	7156	326.47		101.22	748.75	173.34		281.07	1516	239.36		106.82		76.016		51.993		54.581		34.908		15.447		4.3206		2.676	
296	36074	RL01	douglas fir	17.203		205.19	5230.6	431.48	6207.3	303.24		107.79	654.47	148.41		183.41	1622.4	231.59		103.72		60.25		43.789	155.59	48.559		34.733		13.046		5.3575		2.3152	
297	36074	RL02	douglas fir	17.302		266.25	5539.4	461.47	8219.4	352.8	752.54	131.19		162.76		221	2613.3	295.56		110.32		60.882		60.483	369.16	66.807		32.023		18.238	20.131	6.1025		3.1492	
298	36074	RL03	western white pine	17.394		189.36	1437.5	264.58	2774	202.91		74.231	656.45	137.78		115.18		120.47		67.6		59.142		34.884	145.11	43.891		22.069		10.384		2.8198		1.9089	
299	36074	RL04	western white pine	17.474		173.38	2362.4	298.92	2312.4	184.4		84.227	414.78	117.1		189.36	1867.9	234.57		87.794		57.712		34.514		36.476		23.638		9.5549		3.8142		1.8797	
300	36074	RL05	conifer	17.593		257.34	4554.9	410.32	6402.1	306.32	541.3	123.72	512.24	144.76		228.65	4063.4	347.78		135.09		58.071	197.14	60.869		53.716		29.431		13.362	18.298	5.8979		2.8668	
301	36074	RL06	conifer	17.686		234.85	3201.3	348.99	3431.7	228.49		94.645	646.17	140.01		226.83	1453.3	227.81		105.41		64.783		56.288	184.21	53.063	97.223	31.47		14.065		3.9431		2.3167	
302	36074	CCSILT	Filter, CanyonCk silt	18.648		172.65	20331	767.02	1724.9	214.06	1038.6	151.68		109.64	796.75	255.65	11187	555.31		174.19		46.777	132.27	26.089	386.31	52.755		57.163		6.2719		2.4904		1.8667	
303	36074	CCSILTA	Filter, CanyonCk silt	18.728		223.25	21346	795.78	1099	214.46	1134.7	155.96	786.67	163.49	884.93	282.66	9936.5	527.99		177.29		52.286	146.33	39.107	647.11	69.389	260.18	60.995		9.3796		2.4038		2.2146	
304	36074	BRLWET	Filter,adjto Bull Run Lake orange	18.812		123.38	823.95	190.41	609.56	87.163		52.702	402.61	97.978		89.542	3437.1	294.75		80.144		33.547	84.741	13.659		9.3017	30.239	9.5079		2.3303		0.1125		1.0133	
305	36074	BRLWETA	Filter," 2 filters	18.907		214.37		248.61	9901.6	364.17		70.348		120.86		196.61	6897.6	430.03		157.45		38.782		32.015		39.634		21.425		9.8406		4.1109	69.087	5.1553	
306	36074	HECLAM	Accum Precip Hecla Met Lab	19.72		329.26	5397.5	436.63	1925.5	195.11	1031.9	141.25	449.26	144.58	3327.4	556.48	74671	1465.8		461.44		105.2		64.516	8494.1	283.83		208.49		25.846	113	16.138	108.81	10.549	
308	36074	FHECLAM	Filter, Hecla Met Lab discharge	20.042		415.29	1407.6	322.15	1166.6	182.06		112.22		155.29		784.96	368026	4038.7		1206.3		308.22		164.23	10378	489.21		895.62		84.161		31.794	135.81	25.293	
309	36074	SUCMUCK	Byrl, muck in pool adj Success dump	20.151		326.2	15631	698.48	5758.8	321.46	1847.3	196.31		150.55	2328.2	464.05	31832	958.02		303.64		81.023	198.69	65.35	7426.9	239.81		161.22		19.568	372.87	23.552	133.12	10.399	
310	36074	CCBLK	Filter, BLACK mine Q Upper CC, Phoebe	20.246		382.57	961.24	251.64	2839.9	210.91		83.398		126.21	64725	1932.7	47630	1230.3		449.76		127.46	362.77	100.11	19725	477.13		265.87		32.223	45.049	13.776		8.1775	
311	36074	REXPREC	Filter, precip below Rex flot tailings	20.341		340.44		211.58	1937.6	180.42		73.203	550.3	145.48		523.98	211421	2618.1		805.81		193.47		88.617	6511.7	313.23		128.32		29.899	286.21	29.104		8.2895	
312	36074	BRL01S	pale yellow fg flood sand	20.443		311	7752	506.14	1921.4	202.43	1082.3	146.4	561.21	152.41	8096.9	744.28	58691	1297.4		417.55		88.063		51.889	2820.3	159.56		142.89		19.607		8.7295	154.8	10.149	
313	36074	BRL01S2	river level muddy dk gray mud	20.532		286.17	8023	513.02	1099.4	175.8	968	147.09		139.02	7397.9	728.63	72662	1449.3		478.75		96.538		53.652	2251.7	148.05		133.97		21.666		7.7834	165.39	10.562	
314	36074	BRL03S1	dark maroon soil below yello	20.639		293.63	7748.9	497.84	487.3	141.03	820.33	150.79	521.2	147.2	6195	658.38	53161	1223		371.5		98.734		45.366	1509.4	116.69		115.25		19.145		7.7979	143.81	9.2996	
315	36074	BRL03S2	yellow flood sand	20.735		297.33	7852.7	508.23	1977	203.58	1037	147.54		136.84	8226.1	750.34	60817	1321.8		424.51		87.359	179.11	59.534	2786.6	159.47		150.13		24.089	32.401	9.8719	128.48	9.6644	
316	36074	BRL04S	yellow flood sand	20.843		298.85	7685.7	502.79	1731.2	194.98	1346.3	153.33	842.25	161.9	6536.9	672.46	50084	1189.7		357.08		87.148	194.2	59.334	2399.2	143.69		125.63		20.174	39.124	9.5919	143.82	9.2842	
317	36074	BRL04L	leaves 2" below yellow sand	20.921		234.3	5366	437.69	5490.7	289.76	822.48	141.28	479.66	147.12	3734	521.01	34984	981.01		324.23		61.776		46.184	2200.6	131.22		103.02		15.178	114.47	13.095	115.9	8.2628	
318	36074	BRL06S	yellow flood sand	20.998		342.93	8290.4	523.25	935.7	172.92	1129.6	156.82	602.58	161.43	6032.7	656.2	49068	1181.4		377.79		102.49		52.119	2246.6	139.95		150.46		17.856	27.384	9.0368	157.3	10.041	
319	36074	BRL06L	leaves 1" below yellow sand	21.08		234.16	5478	440.29	4081.1	257.19	540.5	136.09	539.29	151.76	3692.3	514.27	32352	940.73		304.65		66.979		51.463	5057.1	193.88		131.94		15.579	31.721	8.6391	94.28	7.623	
320	36074	BRL08S	red soil	21.163		252.49	6531.3	463.54	1242.4	168.19	612.73	134.06	509.35	142.89	8960.8	770.79	60675	1312.3		400.46		98.251	243.66	63.336	2060.6	137.4		146.41		19.052	29.266	9.3286	149.74	10.096	
321	36074	BRL08S2	red/gray mud at river level	21.251		232.67	3706.2	365.71	704.88	134.45	737.98	124.79	480.07	137.07		315.35	24072	800.64		259.15		48.259		38.03	549.59	69.977		101.48		16.222		6.1538	116.17	7.5109	
322	36074	BRL09L	1" matted leaves below 9S	21.33		304.67	5062	435.1	5018.9	283.29	622.52	133.96	539.73	159.41	3260	482.99	21777	770.32		261.32		73.842		56.97	7730.4	232.62		89.86		15.501	49.47	9.3915	95.233	7.2048	
323	36074	BRL09S	brown fg flood sand/soil	21.405		305.58	6486.9	464.26	1428	176.61	755.44	137.14	685.02	151.52	5023.6	600.4	45949	1133.7		364.51		83.936		45.103	2240	137.02		148.66		16.732		8.2665	104.84	8.4817	
324	36074	BRL10S	red soil	21.479		278.9	9337.1	552.97	1604.2	201.45	1026.6	156.46		153.74	6878.9	702.4	62231	1339		419.39		97.288		51.747	3427.7	176.62		159.59		21.213	34.229	10.087	155.87	10.447	
325	36074	BRL11RR	black flood wash from railroad	21.555		299.45	7681.1	506.82	1825.9	200.02	1005.9	145.57		144.7	8311.1	756.48	60647	1324.1		416.97		105.41		51.151	3341.9	174.35		199.41		23.342	63.967	12.658	107.73	9.8077	
326	36074	BRL11S	red-brown soil	21.632		235.07	8317.1	521.75	1741.7	198.52	564.33	144.13		142.3	6846	690.25	56824	1269.9		394.2		101.96		58.854	2868.6	159.31		146.15		20.472	39.641	10.159	173.88	10.568	
327	36074	BRL12S	yellow flood sand	22.318		308.3	6477.2	466.06	1124.6	168.48	1001.1	142.19	477.38	146.19	9507.1	804.44	71507	1435.5		447.36		110.34	212.67	65.991	3511.9	182.64		141		18.597		8.7626	165.16	10.505	
328	36074	BRL13S	yellow flood sand	22.414		305.15	9015	540.42	1129.2	181.31		146.43		155.97	8870	775.34	62385	1337.9		396.67		98.486		57.921	2964	164.52		126.61		20.471	39.696	10.063	142.54	9.6862	
330	36074	BRL14S	yellow to red brown soil/sand	22.595		298.62	8106.8	514.02	1271.5	180.3	1025.9	150.29		136.94	7947	739.07	59723	1307.1		420.74		80.832		56.697	2545.4	152.14		136.01		21.86	40.917	10.201	203.52	11.385	

ID	DATE	Sample	Sample Type	Time	Chromium-high (mg/kg)	Chromium-high standard deviation	Potassium (mg/kg)	Potassium standard deviation	Calcium (mg/kg)	Calcium standard deviation	Thallium (mg/kg)	Thallium standard deviation	Chromium-low (mg/kg)	Chromium-low standard deviation	Manganese (mg/kg)	Manganese standard deviation	Iron (mg/kg)	Iron standard deviation	Cobalt (mg/kg)	Cobalt standard deviation	Nickel (mg/kg)	Nickel standard deviation	Copper (mg/kg)	Copper standard deviation	Zinc (mg/kg)	Zinc standard deviation	Arsenic (mg/kg)	Arsenic standard deviation	Selenium (mg/kg)	Selenium standard deviation	Strontium (mg/kg)	Strontium standard deviation	Zirconium (mg/kg)	Zirconium standard deviation	Molybdenum (mg/kg)
331	36074	BRL15S	maroon sand/soil	22.665		292.21	9661.3	565.77	1020	189	1360.6	174.52		154.02	8284.3	758.69	60166	1320.3		420.03		112.26		50.21	2778.7	160.54		154.18		22.103	42.5	10.72	198.88	11.579	
332	36074	BRL16S1	yellow/reddish brown top 1-2"	22.741		328.72	8992.7	536.72	1515.7	190.38	884.92	143.35	486	147.74	9466.8	797.44	61142	1328.9		417.83		81.319	191.61	59.964	2533.5	152.75		130.71		18.393		8.6618	135.1	9.5376	
333	36074	BRL16S2	dk maroon bn/blk 2-4"	22.819		258.48	6937.7	479.26	1201.2	172.29	822.14	142.47		143.6	7980.3	738.13	62488	1333.2		405.14		90.021		56.876	2642	155.19		136.24		18.957		7.9201	143.13	9.7298	
334	36074	BRL17S	reddish brown sand/soil	22.892		249.19	6290.8	461.49	2021.9	199.37	755.92	138.46		139.79	5532.3	631.48	55425	1247.2		367.45		76.011		48.052	3361	169.96		142.37		20.383		8.1889	154.46	9.954	
335	36074	BRL18S1	yellow/reddish brown top 1-2"	22.969		270.18	9042.1	540.54	997.36	174.98	1104.1	151.58		145.28	6314.1	668.06	54314	1242.2		389.42		90.692		49.026	2863.3	158.16		137.53		22.091		8.5715	160.95	10.026	
336	36074	BRL18S2	dk maroon bn/blk 2-4"	23.046		273.89	7871	508.18	1319	181.77	909.79	136.92		143.87	8720.5	772.03	66608	1384.3		441.01		104.14		57.889	2775.3	161.4		145.79		20.631		9.3282	132.18	9.6513	
337	36074	BRL19S1	yellow brown 0-1"	23.129		304.67	9007.5	541.17	1123.8	182.09	677.35	152.03		150.66	8240.6	750.14	59616	1306.9		400.63		89.072		58.94	2433.2	149.09		131.14		21.703	30.323	9.3951	140.04	9.6545	
338	36074	BRL19S2	dk maroon to black 1-4"	23.221		292.2	7317.4	490.85	879.97	161.66	750.03	138.04		141.1	10462	839.09	73585	1460.1		453.95		110.4		61.764	3371.1	180.19		153.49		22.149		9.4871	133.98	9.9546	
339	36074	BRL19G	grass	23.305		234.21	1789.6	300.88	1209.8	163.3		80.9	556.01	152.74		186.21	864.17	168.71		59.49		44.441		28.806	507.12	59.563		25.938		9.9077		2.9278		1.6287	
340	36074	BRL20S1	yellow to brown 0 to 1 or 2"	23.374		297.92	7916.3	511.06	1783.5	198.62	902.25	150.63	470.95	152.15	7516.5	725.68	61940	1334.6		422.44		108.29		53.424	2618.5	155.18		157.49		18.691	42.923	10.673	163.72	10.557	
341	36074	BRL20S2	dk maroon to black 1-4"	23.469		251.92	7652.8	501.06	1290.1	178.91	795.02	140.74	538.99	150.98	6694.2	682.85	57966	1281.3		398.95		72.876		46.664	2436.5	147.18		139.11		20.365	48.662	10.6	124.85	9.1242	
342	36074	BRL21S	reddish brown sand/soil	23.567		305.15	6613.7	473.02	1552.1	185.98	1027.7	145.21		144.41	11024	860.73	73472	1464		458.1		108.28		54.653	2808	165.93		183.28		25.18		8.7603	117.37	9.8656	
343	36074	BRL22S	yellow brown flood sand/soil	23.653		255.91	8510.5	521.03	578.72	150.34	466.27	140.11	598.41	153.28	5713.1	627.75	44933	1118.9		337.36		79.572		43.506	2293	137.64		127.42		16.629		7.7483	148.5	9.3611	
344	36074	BRL23S	dark brown organic-rich soil	23.729		329.11	8202.5	530.08	4149	271.92	706.03	163.31		155.78	7371.5	729.26	62109	1349		432.65		92.362	888.74	112.23	2392.3	151.01		226.23		25.673	50.163	12.075	143.47	10.886	
345	36074	RL01S	yellow-brn pebbly soil	23.809		319.41	10760	598.08	7223.6	345.47	2520.8	225.27		181.97		291.98	21984	783.85		242.27		79.128		48.344	240.3	57.323		44.144		15.972	173.37	14.663	211.04	10.04	
346	36074	RL01N	western white pine needles	23.953		134.71	1936.3	306.43	3937.5	244.75		89.888	718.14	154.95		185.88	1100	182.98		63.614		38.734		28.432		35.647	60.18	17.887		8.0265		3.2252		1.6346	
347	36074	RL01NDUP	yellow-brn pebbly soil	24.036		150.58	1951.7	290.14	2812.3	205.26		82.413	842.08	144.71		127.12	736.83	147.12		47.711		27.952	84.798	22.081		23.705	55.111	13.863		8.3015		2.1585		1.3157	
348	36074	RL03S	yellow-brn pebbly soil	24.148		185.59	11189	594.59	3937.7	267.92	2064.7	207.55		159.22	997.41	330.71	18991	723.58		231.65		75.365		45.711		45.262		32.107		13.942	132.12	12.716	239.65	10.262	
349	36074	RL04S	yellow-brn pebbly soil	24.225		200.74	12774	632.59	3714.5	268.26	2243.9	210.13		165.77		275.32	17923	704.15		223.51		68.172		44.836		46.294		34.025		12.934	104.45	11.44	236.99	10.069	
350	36077	DD02BW	rock	38.409		181.17	4135.4	355.11	726.55	105.97		110.85	412.84	103.06		160.9	5755.9	390.33		140.66		50.66	116.4	33.902		28.68		18.04		8.0749		4.3811	75.367	5.3176	
351	36077	DD02BF	rock	38.496		180.26	10232	547.8	1015.1	149.82	662.79	134.6	409.73	107.48		168.73	3643.8	318.6		105.08		59.053	133.1	37.246		28.236		23.813		10.064	143.22	12.172	96.992	6.5093	
352	36077	DD03	Fine grained brown soil	38.568		207.01	8168.7	519.08	5079.3	286.88	1731.7	201.02		157.94	1037.2	331.92	18268	707.89		236.79		71.724		41.166		47.553		36.676		12.043	166.69	14.047	200.3	9.5382	
363	36077	BRLSL06	Bull Run Lake, soil Ahorizon	35.873		374.57	10548	594.63	3678	271.58	1377.6	184.52		163.39	6972.8	723.05	62495	1359.8		410.84		89.506		62.284	2550.9	156.16		175.17		25.724	79.555	13.443	239.78	13.136	
364	36077	BRLSL06A	" fine grained soil	35.959		311.16	8632.5	529.01	2054.6	207.72	789.99	148.84		146.61	7297.8	718.93	62518	1344.7		439.69		99.519	180.34	59.238	2506.8	152.37		141.92		20.523		8.8395	150.77	10.121	
365	36077	BRLSL01	" fine grained soil	36.046		292.66	8925	542.27	2323.3	221.54	1277.1	162.36		152.17	9646.8	814.85	67602	1408.7		450.37		93.281		60.204	3172.8	173.97		165.13		19.187	34.772	10.482	188.06	11.595	
366	36077	BRLSL01A	" fine grained soil	36.114		304.96	9648.5	555.44	1454	191.42	1316.8	154.06		140.65	6127.1	666.83	56797	1278.1		388.79		94.079		54.528	2606.5	152.62		133.08		17.718		7.6539	148.87	9.8777	
367	36077	BRLSL02	" fine grained soil	36.221		308.4	8501.7	527.36	1323.5	185.2	999.29	158.95		151.13	8149.1	762.34	71666	1447.5		427.59		98.688		51.718	946.27	101.86		165.62		21.798		8.4063	148.85	10.61	
368	36077	BRLSL03	soil, Ahorizon	36.284		226.99	6893.8	485.05	2687.6	225.99	686.17	150.27	540.1	160.16	2442.2	450.33	32327	943.79		306.77		90.667		45.178	686.68	81.061		115.1		19.756	53.576	9.816	121.88	8.1735	
369	36077	BRLSL05	soil, Ahorizon	36.349		310.05	6966.6	486.78	1458.7	187.59	1277.8	153.12		144.02	6780	697.01	59572	1308.8		432.19		85.505	286.73	70.763	1756.5	129.54		153.39		21.849	39.724	10.432	184.57	11.021	
370	36077	BRL18A	soil, fine grained tan	36.514		351.89	10110	575	1891.3	215.18	1083.5	160.21		154.41	10398	852.94	75860	1504.6		471.71		113.96		64.923	3937.6	197.39		161.62		24.763		10.371	185.49	11.778	
371	36077	TDR03F	rock	36.674		258.1	14274	641.71	608.14	145.81	1018.1	162.78	385.43	110.55		263.34	11662	564.85		204.99		50.376	106.84	30.743		33.13		22.458		7.9326		5.3366	86.189	5.8567	
372	36077	TDR03W	rock	36.753		230.64	3001.1	312.26	933.41	118.62		136.22		112.44	2128	398.2	23582	790.07		257.87		67.06		36.723		35.353	128.5	31.868		12.832		5.5479	75.75	5.8872	
373	36077	RL044	reddish brown sand/soil	36.827		224.12	10415	572.62	4085.7	266.27	1803.2	185.85		140.49		323.46	18419	712.19		235.18		73.505		40.479		43.791	96.099	27.052		11.557	135.22	12.799	190.86	9.2283	
374	36077	RL0344	reddish brown sand/soil	36.898		278.83	12075	610.62	2944.9	240.66	1887.6	191.49		144.33		235.34	18178	708.06		232.91		66.781		42.256		42.943		27.82		12.326	99.207	11.149	189.78	9.0332	
375	36077	DD01	lt tan fine grained soil	37.802		267.88	9869.7	558.48	2138.6	212.85	2828.8	225.13	575.47	161.85		314.04	19033	724.25		236.67		77.188		39.307		47.148		28.863		13.545	86.395	10.628	284.87	10.97	
376	36077	DD02W	rock	37.972		244.93	9070.6	520.57	1130.7	155.75	923.53	165.82	405.51	123.83		277.19	34111	964.62		291.06		81.958		38.655		43.907		28.304		14.757	42.479	8.4813	72.557	6.1943	
377	36077	DD02F	rock	38.072		254.29	6086.3	427.08	688.64	115.67	412.35	100.46	508.67	104.14		175.9	1822.3	231.71		102.81		48.241	111.87	37		32.939	75.519	22.751		10.331		4.6079	81.096	5.4101	
378	36077	DD02AW	rock	38.214		219.82	17709	720.32	1436.1	201.46	2385.7	231.14		130.74		252.42	4233.9	353.37		145.79		47.911		33.742		33.612		23.402		14.291		5.1719	214.42	8.8737	
379	36077	DD02AF	rock	38.331		249.34	11391	577.05	844.74	147.77	745.5	127.11	580.82	114.59		215.4	2567.5	274.56		120.52		48.49	119.09	38.93		26.879		21.748		11.192		4.5814	111.87	6.3309	
380	36077	TDR01AF	rock	15.276		164.08	6210.4	442.76	7124.4	312.19	503.17	105.76	671.72	113.26		272	6181.8	412.13		153.28		53.973		31.667		36.158		19.836		10.684	31.237	6.7169	184.76	8.2257	
381	36077	TDR01BW	rock	15.351		260.83	16457	693.7	3180.4	245.89	1899.1	206.68		127.44	1268	362.67	25440	846.84		278.14		54.221		36.847		41.716		26.856		13.275	46.529	8.6507	210.97	9.7471	
382	36077	TDR01BF	rock	15.464		336.51	21623	788.03	994.37	190.27	1068.6	159.05	485.73	117.57		201.69	13799	623.25		204.34		43.822	168.99	42.075		36.825		21.383		12.619	29.082	6.9092	96.74	6.5103	
383	36077	TDR02	soil	15.56		274.28	12109	612.01	2816.8	238.17	1473.3	195.53		145.15		319.91	21346	768.67		254.36		65.839		38.931		40.084		25.735		14.571	110.02	11.869	280.7	11.065	
384	36077	TDR05	soil	15.628		236.7	10737	582.95	2172.6	218.26	1691.3	186.04	497.12	156.45		244.91	17640	697.45		256.04		50.083		46.15	205.36	52.42		97.245		16.189	48.947	8.8511	170.21	8.8671	
385	36077	TDR06	soil	15.697		260.31	12610	629.49	2496.8	234.42	1709.3	185.04		153.53	1508.2	395.9	31612	944.7		298.29		65.264	188.35	55.234	849.74	87.036		136.99		16.644	65.844	10.781	174.23	9.7601	
386	36077	MFLALF1	soil ahorizon	15.994		268.94	9241.3	545.55	2907.5	235.03	842.95	134.86		142.21	8427.5	765.48	67259	1396.4		399.94		79.925		49.11	1213.1	111.39		120.81		18.078		7.8866	138.23	9.5242	
387	36077	MFLR1G1	soil	16.075		286.66	8472.1	524.57	912.56	170.1	601.24	132.97		143.82	10274	837.32	76985	1498.9		468.85		95.941	251.53	68.06	1761.6	134.61		116.93		20.014		7.3329	128.55	9.5785	
388	36077	MFLR1G2	gray fine grained soil	16.201		221.14	9481	608.36	56841	866.08	1359.4	154.27		141.03	1323.8	340.12	10870	579.05		182.76		49.149	243.01	49.513		40.019	6843.1	169.21		14.818	22.092	6.8098	11.395	3.3533	
389	36077	MFLSM01	soil	16.976		291.63	6781.8	471.42	619.93	146.07	552.3	128.51	474.35	144.14	10033	833.11	85317	1578.7		496.75		105.69		48.838	1169.1	113.91		103.02		16.166		6.77	111.78	8.9011	
390	36077	MFLSM02	soil	17.075		286.15	7112.1	479.34	744.89	149.85	649.46	135.01	534	144.19	10459	856.97	93674	1662.7		501.88		101.93		44.486	1156.5	115.5		118.54		21.415		9.8655	148.23	10.263	
391	36077	MFLSM03	soil	17.154		363.52	7247.1	487.58	666.53	151.98	614.66	132.38		138.66	15357	1021.8	102480	1763.7		560.98		125.82		61.404	2325.2	162.83		147.45		20.942		8.6729	162.73	11.209	
392	36077	MFLSM05	soil	17.219		268.04	7034.4	487.34	820.25	164.63	405.71	133.82		142.73	9368.5	800.95	73435	1457.3		479.91		94.481		49.29	2721.2	163		131.96		20.05		9.2427	146.4	10.105	
393	36077	MFLSM06	soil	17.323		279.37	5310.4	430.41	962.06	160.33	445.73	131.72	515.24	153.29	17494	1088.8	119494	1909.9		627.25		102.02		68.34	1332.4	132.36		140.26		22.636		8.2904	167.47	11.683	
394	36077	MFLSM07	soil	17.525		280.66	7295	489.66	735.6	156.65	879.04	137.6	457.94	146.69	9740.4	824.27	83476	1562.6		485.61		102.99		44.048	908.17	102.8		109.95		19.964		7.6739	171.82	10.766	
395	36077	MFLSM08	soil	17.589		330.81	8148.8	521.68	824.01	173.24	617.86	143.19		157.29	15701	1053.1	123330	1958		596.7		123.88		73.282	1389.7	136.08		139.1		20.923		10.582	218.17	13.441	
396	36077	MFLSM09	soil	17.676		320.86	6397.1	457.49	1242.2	166.25	570.46	124.59	678.25	146.15	6026	663.5	64591	1356.2		433.25		94.81		53.788	1287.9	112.5		111.48		18.835		8.3469	103.59	8.3237	
397	36077	MFLSL01	soil	17.745		299.84	9493	554.74	577.8	164.5	912.88	148.41		156.15	10946	874.43	86078	1601		490.02		79.306		63.636	1645.6	134.39		145.58		27.049		9.1021	144.76	10.73	
398	36077	MFLSL02	soil	17.813		342.4	6685.5	473.68	495.87	146.53	855.84	137.3		144.13	14941	1034.9	131124	2020.1		604.86		133		73.607	1821.2	153.85	468.49	148.31		17.959		8.873	182.02	12.65	
399	36077	MFLSL03	soil	17.897		308.95	6658	472.43	1245.9	175.15	742.1	136.66	502.18	150.16	9615.6	810.88	74255	1466		448.94		101.82	182.26	60.325	1262	115.2		115.65		18.023		8.6574	150.36	10.03	
400	36077	MFLBGM1	soil	17.983		331.87	7927.8	508.72	495.25	148.69	684.72	139.49	483.95	150.53	9149.2	803.04	78403	1516.8		481.57		101.03		54.667	2130.1	147.24		153.73		24.786		9.6199	126.66	9.9056	
401	36077	MFLQA2	soil	18.065		244.79	8173.9	514.54	789.39	161.65	670.56	131		139.38	10053	828.58	77589	1503.1		481.68		105.66		48.9	1382.6	121.17		123.1		18.349		8.0606	120.28	9.2498	
402	36077	MFL01	soil	18.13		269.54	8587.3	523.21	1269	177.74	707.67	129.24		135.14	9901.7	836.52	89669	1628		511.98		121.19		62.273	1255.4	119.33		127.43		22.891		8.5049	148.73	10.298	
403	36077	MFLOG01	" ahorizon	18.191		315.37	8426.4	529.43	6313.6	315.42	1009.9	148.16	521.48	152.3	10030	845.28	85350	1598.3		497.2		93.458	191.56	62.873	1177.8	116.06		123.12		17.12		9.2909	178.95	11.216	
404	36077	MFT501	soil	22.92		277.81	7242.8	486.53	659.19	150.59	770.5	139.69		142.5	8732.7	779.58	74929	1473.6		462.26		101.83		46.084	1035.3	105.88		125.03		21.327		8.2415	127.28	9.2474	
405	36077	MFT502	soil	22.994		231.16	11768	606.34	3137.2	247.8	1391.2	176.33		153.46	1141.5	344.39	20085	745.15		239.12		70.624		32.812		48.984		37.871		11.627	52.997	8.8214	159.26	8.3432	
406	36077	MFT503	soil	23.058		244.63	11485	602.6	3366.5	255.78	1289.4	184.64		154.85		322.72	16679	678.77		230.31		68.84		43.043		43.786		31.182		14.418	68.112	9.5597	197.08	9.128	
407	36077	MFT504	soil	23.139		367.54	7368	495.84	1010.3	171.58	755.21	143.15		153.3	12972	951.77	100691	1746		527.67		128.71		65.533	1222.4	122.13		146.62		24.156		8.7137	139.45	10.696	
408	36077	MFT506	soil	23.211		236.34	6432.8	463.22	1346	175.01	817.88	142.74	551.18	149.17	8893.7	785.99	77799	1501.1		472.8		113.25	217	65.073	1584.7	128.33		127.36		16.811		8.0164	108.87	8.8238	
409	36077	MFT507	soil	23.277		281.34	9452.3	547.6	2595.7	224.18	946.65	157.16	489.93	148.87	3801.3	530.7	35441	994.82		316.95		77.485		50.012	631.69	78.153		79.765		14.442	48.744	9.3198	121.37	7.9588	
410	36077	MFT508	soil	23.354		329.32	8202.5	519.22	1812.9	201.17	806	145.68		143.46	10669	861.8	82218	1562.7		494.18		106.99	203.78	65.681	1501.2	128.01		148.66		19.369		10.098	143.57	10.441	
411	36077	MFT508A	soil	23.419		325.02	6538.4	468.47	1173.1	171.13	682.1	134.33		145.67	13308	950.05	92231	1658.4		515.93		123.04		59.865	1888.8	144.57		147.91		21.788		8.7086	120.04	9.8171	
412	36077	MFT509	soil	23.794		290.15	9539.4	551.84	2587.5	226.23	984.62	162.22	509.94	154.37	4647.3	579.93	39276	1050.6		319.66		74.87		51.105	722.06	83.792		82.797		18.336	74.606	11.167	146.83	9.0908	

ID	DATE	Sample		Sample Type	Time	Chromium-high (mg/kg)	Chromium-high standard deviation	Potassium (mg/kg)	Potassium standard deviation	Calcium (mg/kg)	Calcium standard deviation	Thallium (mg/kg)	Thallium standard deviation	Chromium-low (mg/kg)	Chromium-low standard deviation	Manganese (mg/kg)	Manganese standard deviation	Iron (mg/kg)	Iron standard deviation	Cobalt (mg/kg)	Cobalt standard deviation	Nickel (mg/kg)	Nickel standard deviation	Copper (mg/kg)	Copper standard deviation	Zinc (mg/kg)	Zinc standard deviation	Arsenic (mg/kg)	Arsenic standard deviation	Selenium (mg/kg)	Selenium standard deviation	Strontium (mg/kg)	Strontium standard deviation	Zirconium (mg/kg)	Zirconium standard deviation	Molybdenum (mg/kg)
413	36077	MFT510	soil		23.99		310.43	6940.8	469.27	890.58	148.22	500.94	127.31	443.92	130.7	9621.4	801.92	66750	1386.1		420.79		88.787	160.68	52.001	1063.6	103.75		123.57		18.603		7.0646	81.93	7.5281	
414	36077	MFT511	soil		24.081		302.05	7965.7	506.82	852.13	159.84	649.84	137.55		132.63	9898.3	822.35	73126	1461.3		473.54		96.418	187.18	60.227	1555.8	126.27		141.48		19.043	33.741	10.102	118.01	9.4208	
415	36077	MFT512	soil		24.153		317.37	5928.3	445.75	702.08	146		121.77	699.26	154.43	9102.8	780.68	62960	1341.6		410.71		81.43	210.63	60.211	866.9	95.74		122.97		17.345		7.9178	92.434	8.109	
416	36077	MFT513	soil		24.267		305.83	5618.7	437.31	821.3	152.14	512.4	119.21		138.66	7252	705.92	60727	1310.3		396.42		99.87		47.412	1418.4	115.68		94.868		19.375		6.9195	79.123	7.3799	
417	36077	MFT514	soil		24.361		329.98	5767.8	445.67	1034.4	164.82	780.72	133.03	444.44	147.11	9251.9	794.54	69480	1413.6		434.67		112.92	198.42	65.314	2254.5	148.1		110.97		19.203		8.1958	142.97	9.7485	
418	36077	MFT516	soil		24.431		254.93	6576.8	472.28	1128.2	172.59	664.88	130.21	597.14	155.66	6482.3	678.04	61559	1321.9		417.9		91.514		55.213	1314.2	113.02		121.23		19.726		8.1023	140.48	9.441	
419	36077	STRT01	soil		24.499		270.33	8434	517.08	905.48	159.54	735.53	129.83	480.57	136.81	2600.6	444.47	21832	773.56		250.03		75.312		44.986	4131.5	169.48		114.44		13.818	66.729	10.42	171.36	9.3612	
420	36077	STRT02	soil		24.622		231.2	12308	625.56	1226.6	198.45	1447.2	170.69		156.06	3718.4	536.48	35067	998.47		321.4		77.024	262.64	65.706	1772.5	121.44		150.46		20.848	95.351	12.788	243.47	11.932	
421	36077	STRT03	soil		24.692		309.88	11730	609.05	1327.8	195.52	1193.1	167.09		142.04	3655.2	531.02	31964	952.45		312.28		84.322		50.607	2384.5	136.98		153.67		20.878	75.144	11.718	226.15	11.45	
422	36077	STRT04	soil		24.761		223.18	7990.1	504.98	1435.9	178.71	786.95	131.29		123.24	3172	479.89	23666	806.6		251.99		70.951		43.978	1948.6	119.51		106.94		17.172	85.645	11.253	194.48	9.9282	
423	36077	STRT05A	grass		24.847		168.2	7841.2	507.47	2024.6	206.22	518.74	132.83	638.62	158.04	853.58	263.23	3240.5	305.13		124.69		48.937		32.643		33.594		29.88		10.129		5.3059	12.409	2.861	
424	36077	STRT05B	soil		24.943		251.49	13997	655.82	2133.7	225.79	1722.5	184.18		149.93		307.48	19872	744.53		246.65		72.769		41.419		49.13		62.72		14.941	68.472	9.8579	256.81	10.647	
425	36077	STRT06	soil		25.006		288.49	14604	670.95	2110.3	228.69	1651.4	193.02		157.04	1172.8	363.68	21780	783.45		261.59		67.941		43.93	335.95	61.484		89.882		16.886	73.422	10.454	247.84	10.735	
426	36077	STRT06A	grass		25.074		88.145	2359.2	315.88	2493.2	200.85		71.991	833.08	149.49	751.24	230.13	898.16	171.73		66.745		42.755		24.944	373.64	52.595	71.897	23.406		7.3906		4.0254		1.624	
427	36077	STRT07	soil		25.142		207.01	10694	573.68	1563.9	191.01	1581.3	171.09		136.83		306.67	17162	685.64		222.54		70.834		37.775		45.337		38.362		11.163	39.736	7.7719	187.17	8.8651	
428	36077	STRT07A	grass		25.203		179.92	2515.3	324.13	3383.9	227.53	857.48	120.49	636.69	142.34		165.66	1255	191.02		70.682		30.679	135.98	32.7		31.093		15.849		7.7329		2.7538		1.4191	
429	36077	STRT08	grass		25.266		117.71	2505.1	331.84	4705.4	264.86		71.392	596.55	145.51		146.15	902.1	170.05		73.714		44.943		24.99	235.64	45.703	92.503	23.979		8.2969		4.0671		1.5422	
430	36077	STRT08A	soil		25.329		266.07	12592	626.45	1826.5	213.47	1503.3	187.46		145.68		340.6	22315	789.26		267.39		71.418		38.311	487.65	68.632		100.53		15.922	110.21	12.33	200.04	9.8809	
431	36077	STRT09F	rock		25.405		263.77	1379.9	237.48	1124.9	127.39		68.619		97.627	7818.3	699.53	44975	1106.2		311.77		61.491		40.007	1792.5	121.63		58.901		10.584		5.7999		2.983	
432	36077	STRT09W	rock		25.52		272.14	4926.7	385.93	505.38	97.543		77.971	700.21	111.5	4791	551.99	24465	813.09		208.16		45.753		41.811	337.09	58.336		35.853		13.097		3.1874		2.2663	
433	36077	CALIB401	soil		25.591		236.01	6785.9	460.04	1596.6	171.24	481.32	119.12	473.59	122.5		202.1	7236	441.53		148.71		60.663		30.302		37.352		23.651		10.809	29.714	6.5806	155.53	7.5837	
434	36077	CALIB03	soil		25.674		172	11033	579.17	988.08	168.32	1448.8	167.44	540.49	139.76		284.87	16519	671.38		232.18		65.812		36.923		36.84		27.684		11.3	36.523	7.5518	177.17	8.5464	
436	36078	CCP101W	rock		14.735		169.65	15418	672.48	1224.3	183.83	3197.7	225.73	404.87	127.07		245.92	7383.7	455.8		172.82		60.391		33.901		42.73		25.298		11.794	25.954	6.5911	396.28	12.156	
437	36078	CCP101F	rock		14.816		212.35	7139.3	457.28	732.01	117.48	742.8	106.98	526.8	95.012		174.01	4063.9	331.8		111.36		42.508	96.744	29.844		30.503		19.232		10.802		4.2442	69.18	5.0117	
438	36078	CCP102	soil		14.908		282.64	6344.9	476.36	8924.4	362.11	1647.5	187.27	499.25	159.62	2425.1	457	35422	995.92		314.17		74.494		37.713	1443.9	109.17		73.181		15.663	100.18	12.332	173.13	9.5701	
439	36078	CCP103W	rock		14.976		198.77	20417	770.55	1532.5	210.65	1536.7	174.2	491.17	128.51		258.14	8890	502.9		174.46		57.282		32.669		41.531		26.281		10.696	60.002	8.8482	224.15	9.4012	
440	36078	CCP103F	rock		15.068		198.44	12223	593.2	651.72	135.68	389.44	125.67	512.61	106.61		155.16	4541.7	351.95		124.35		32.876	85.195	26.342		28.649	70.645	17.892		8.8749		4.7615	151.37	7.3264	
441	36078	CCP104	tailings		15.145		198.19	14000	652.44	4397	280	1229.4	163.82	842.7	158.47		253.68	13603	614.25		194.32		50.924		36.981		33.277		20.516		12.361	20.822	6.3023	189.99	8.6846	
442	36078	CCP201	soil		15.212		301.68	10588	586.02	4726.4	287.65	1985.6	194.25		158.61	1576.1	403.27	30000	920.64		298.12		77.579		51.17	2579.6	140.71		134.5		17.724	151.65	15.015	195.16	10.604	
443	36078	CCP201RW	rock		15.275		324.76	18001	723.82	617.65	170.01	2112.3	199.96		124.65	1833.2	507.17	93292	1687.9		498.33		129.96	353.79	76.577		45.988		45.023		17.449		6.5922	247.87	12.695	
444	36078	CCP201RF	rock		15.339		219.97	23734	826.39	5283.3	311.08	2036.6	183.16	663.99	120.88		150.21	5272.5	390		132.5		33.234		29.033		25.376		18.881		10.749		4.3961	143.02	7.3582	
445	36078	CCP203R	rock		15.422		210.76	17476	712.26	2165.3	217.78	1614.1	179.83	529.81	124.13		224.99	17995	707.75		230.4		54.404		30.311		37.88	84.838	27.802		12.138		5.312	111.25	6.9604	
446	36078	CCP203R	rock		15.528		182.76	11887	584.61	556.94	128.56	658.7	113.75	567.73	100.04		209.02	6689.8	425.52		156.27		39.624	109.67	29.153		25.957		16.758		9.6342		3.9185	73.42	5.2383	
447	36078	CCP203R	rock		15.602		209.74	19314	747.68	1218.7	193.38	1288.3	178.32	370.32	121.52		258.73	7815.7	470.6		159.58		56.278	126.67	40.583		38.492	120.75	30.848		11.179		4.5404	136.68	7.309	
448	36078	CCP203R	rock		15.665		198.55	17208	704.16	751.96	164.6	923.08	140.91	448.7	108.06		241.51	7086.3	444.92		147.14		52.061		29.976		32.295	96.866	21.379		10.582		4.7415	99.115	6.2261	
449	36078	CCP202A	rock		16.923		198.47	22761	808.81	836.27	189.55	1087.5	154.94	487.83	117.63		251.84	17420	700.8		231.82		57.906	119.57	36.481		32.885		22.905		9.6272		4.4821	141.39	7.6582	
450	36078	CCP202A	rock		17.002		319.58	21441	791.96	1500	216.67	1406.1	174.86		119.36	3530.2	588.93	83447	1597		481.57		105.72	195.27	60.791	583.14	86.814		98.109		16.723		4.6919	180	11.076	
451	36078	CCP202A	rock		17.064		258.75	26446	870.6	1267.8	215.72	1428.3	163.66	360.67	108.46		312.16	16062	678.97		223.5		53.383		36.568	178.89	47.031		33.404		14.369		4.8617	123.05	7.2448	
452	36078	CCP202A	rock		17.149		412.38	2231.7	297.29	1722.2	166.72		84.776		108.5	63542	2143	271664	3201		1039.4	885.55	183.2	449.63	111.1	1530.6	178.99		154.11		24.698		10.128		4.2495	
453	36078	CCP202A	rock		17.209		366.27	1100.2	234.17	3068.9	204.99		58.076		97.557	36695	1609.9	221908	2764.6		858.8	583.02	161.36		50.222		59.477	162.87	46.22		15.834		8.146		3.0888	
454	36078	CCP203S	soil		17.277		204.55	7609.9	501.67	4213.9	264	1523.6	185.86		150.24		259.1	19262	725.41		248.47		55.709		46.573	421.44	64.463		79.287		14.177	129.22	12.762	155.94	8.6988	
455	36078	CCP301R	rock		17.39		228.77	16068	683.5	1781	201.04	1035	149.2	442.48	113.67	938.91	312.82	7348.5	455.54		135.99		39.947		35.337		40.819		31.816		12.754		4.4671	352.37	11.387	
456	36078	CCP301R	rock		17.452		136.39	5510.4	405.58	2990.6	201.59		73.486	529.05	92.089		212.25	2907.3	281.28		101.51		41.947	128.29	29.952		16.57		15.279		4.5317		3.423	63.656	4.691	
457	36078	CCP301S	soil		17.519		245.45	9398.4	547.09	3226.1	241.95	1349.9	183.61		149.22	2031.8	412.58	18781	720.32		243.93		56.399	186.89	51.85	537.83	69.698		69.561		12.439	77.316	10.339	307.74	11.542	
458	36078	CCP302S	soil		17.689		269.5	7579.1	503.36	1887	198.92	1468.9	166.83	717.35	157.09		319.48	17388	698.14		230.57		58.285		50.079	217.69	54.384		204.69		23.613	58.472	10.837	217.36	11.085	
459	36078	CCP502W	rock		17.882		217.56	10652	563.18	599.31	137.78	752.83	130.69	596.57	122.08		282.95	18149	703.77		234.04		62.556		30.81	599.67	70.57		102.71		14.224		5.1845	110.31	7.3193	
460	36078	CCP502F	rock		17.952		257.28	18044	728.75	9517.6	383.09	704.12	131.28	532.79	116.64	2655.4	445.38	16082	679.39		219.51		66.108		38.145	537.79	68.36		25.36		12.061		4.5909	129.33	7.4538	
461	36078	CCP302R	rock		18.037		260.31	9005.8	516.08	1058.2	146.7	770.68	117.83	416.83	98.749		284.82	9990.3	521.4		158.62		52.316		24.342		32.178		75.672		8.6663		3.605	96.161	6.3391	
462	36078	CCP302R	rock		18.101		237.73	9693.3	530.43	464.51	115.9		95.008	370.28	92.604		263.62	5231.9	378.15		136.42		29.896	86.668	27.523		26.551		31.532		10.784		3.5619	131.56	6.8523	
463	36078	CCP303R	rock		18.208		286.44	13828	646.47	1496.3	199.24	1389.9	169.18	507.44	144.82	1752.3	391.6	19379	736.02		245.43		73.393		35.345	342.22	59.561		41.051		16.346	38.687	8.0068	160.44	8.5	
464	36078	CCP401R	rock		18.308		240.06	3075.2	316.27	1110.4	127.39	431.14	91.846	368.51	95.647		248.82	6089.6	405.93		143.86		56.652		38.626		36.154		29.618		9.7957		3.508	55.407	4.7167	
465	36078	CCP401R	rock		18.372		221.67	17066	702.33	588.73	159.51	637.71	131.13	474.85	113.57		217.79	3514.9	319.16		134.23		59.804		34.905		29.737	90.466	22.953		11.551		3.5946	172.36	7.8998	
466	36078	CCP401R	rock		18.438		277.47	21510	788	859.96	188.55	1558.7	168.72	566.61	125.09		260.6	15938	671.5		224.99		49.852	134.27	43.767		33.108		27.998		12.513		4.2391	176.26	8.5202	
467	36078	CCP401R	rock		18.507		205.78	9175.2	516.32	827.55	131.93	468.4	116.96	363.03	93.198		207.24	5549.1	386.82		125.94		45.269		20.424		28.543	66.856	20.226		7.0228		2.9968	56.142	4.6078	
468	36078	CCP401S	soil		18.587		181.99	6319.3	465.53	5087.9	282	2077.3	199.11		152.38	1795.7	391.76	21981	776.45		263.23		68.807		45.02	353.43	61.506		51.907		12.358	161.92	14.176	191.83	9.5434	
469	36078	CCP402W	rock		18.712		219.06	13908	640.25	629.09	155.11	841.16	150.05		103.89		300.6	19870	740.25		251.7		70.795		37.652	346.28	58.299		70.104		11.889		4.7611	125.02	7.4358	
470	36078	CCP403W	rock		19.195		238.01	21629	790.6	1110.3	197.71	1778.4	181.08	431.68	120.36		181.43	8571.7	492.7		180.34		48.708		30.495		30.603		34.539		9.6186		4.3763	166.26	8.0304	
471	36078	CCP403F	rock		19.256		259.36	12893	633.13	20283	529.27	609.19	121.24	578.98	115.41	1311.4	349.72	18939	736.45		236.81		61.078		31.384		36.688		24.843		9.7289		4.475	88.321	6.2412	
472	36078	CCP403S	soil		19.33		219.42	8796.3	554.71	3218	252.67	1681	184.02	534.42	165.32	1869.6	437.31	30350	943.12		315.37		88.923		57.478	400.38	70.898		313.62		32.635	82.024	15.09	194.74	13.61	
473	36078	CCP501R	rock		19.4		223.29	19092	743.14	1150.2	189.8	1221.1	166.84		113.44		222.19	9353	512.21		186.72		44.548	120.95	39.067		35.522		24.317		9.9777		3.7955	156.29	7.7696	
474	36078	CCP501R	rock		19.465		207.33	13760	630.24	814.29	152.05	877.14	140.41	336.45	97.891		192.9	6203.6	412.81		152.66		47.651		25.843		32.201	65.087	20.156		10.058		4.3528	97.348	6.0667	
475	36078	CCP501S	soil		19.529		244.98	10757	586.14	3300.6	252.71	2072.6	213.74		166.58	1089.9	348.51	18841	722.67		229.19		55.071		41.049	196.33	51.905		41.151		15.097	100.71	11.382	334.23	11.967	
476	36078	CCP503T	???Do not know what this is		19.593		241.16	14040	656.1	1449.4	203.64	1302.6	164.2		146.7	1407.4	366.97	20808	761.8		252.47		56.476		43.321	724.58	77.944		89.886		14.777		6.3157	184.01	9.2047	
477	36078	CCP504R	rock		19.668		185.35	15081	663.16	2231.9	211.91	1614.9	169.7	465.75	113.67	1264.2	340.51	16950	685.97		203.12		46.878		26.188	305.22	53.702		53.976		10.697		5.0984	244.02	10.006	
478	36078	CCP504R	rock		19.752		194.31	21111	779.52	980.56	188.82	1413.4	167.69	339.98	109.25		252.3	9613.9	520.6		199.75		47.024		25.392		32.536		28.666		9.2599		4.0461	88.079	6.069	
479	36078	CCP601R	rock		19.88		228.14	28749	908.88	722.66	209.06	1547.8	180.61	550.84	132.42		272.12	17512	711.31		218.57		57.485		40.804		43.214		32.566		12.911	51.052	8.7756	162.89	8.4885	
480	36078	CCP601R	rock		19.944		276.19	23192	815.05	584.68	179.59	1284.6	159.46	643.43	121.56		246.6	10008	532.71		188.56		57.756	110.73	34.884		34.311		22.809		13.14	19.934	6.1053	102	6.4946	
481	36078	CCP603	soil		20.022		313.73	7278	498.63	2112.3	211.48	1496.8	161.61	519.74	156.83	2609.9	477.24	37167	1021.8		338.23		80.489	225.29	63.164	1945.1	126.83		153.36		21.813	73.508	11.775	169.14	10.349	
482	36078	CCP604	soil		20.456		214.12	10230	566.46	1192	181.27	974.56	161.85	741.04	161.19	1323.5	344.21	13510	610.08		205.73		71.153		41.943	241.12	52.874		77.701		13.376	61.523	9.283	159.24	8.3654	
483	36078	CCP605S	soil		20.517		267.16	8715.7	528.01	2408.1	215.23	895.93	171.31		140.24		321.02	24374	818.67		247.74		69.718		47.961	224.88	53.933		121.5		16.59	247.73	17.764	186.93	10.112	
484	36078	CCP606R	rock		20.596		330.85	3979.2	364.83	545.14	116.47		154.94		132.99		527.83	172765	2338		696.07		156.7	500.86	106.7		64.653		58.511		21.169	57.953	14.214	191.08	13.326	
485	36078	CCP606R	rock		20.673		259.69	11560	589.51	4278.4	263.6	2175.4	192.61	426.68	122.96		252.18	15934	663.89		207.81		67.057		38.989		40.962		39.773		11.827	31.805	7.2708	155.89	8.0804	

ID	DATE	Sample	Sample Type	Time	Chromium-high (mg/kg)	Chromium-high standard deviation	Potassium (mg/kg)	Potassium standard deviation	Calcium (mg/kg)	Calcium standard deviation	Thallium (mg/kg)	Thallium standard deviation	Chromium-low (mg/kg)	Chromium-low standard deviation	Manganese (mg/kg)	Manganese standard deviation	Iron (mg/kg)	Iron standard deviation	Cobalt (mg/kg)	Cobalt standard deviation	Nickel (mg/kg)	Nickel standard deviation	Copper (mg/kg)	Copper standard deviation	Zinc (mg/kg)	Zinc standard deviation	Arsenic (mg/kg)	Arsenic standard deviation	Selenium (mg/kg)	Selenium standard deviation	Strontium (mg/kg)	Strontium standard deviation	Zirconium (mg/kg)	Zirconium standard deviation	Molybdenum (mg/kg)
486	36078	CCP606R	rock	20.799		267.15	29627	922.22	981.75	219.55	1497.3	180.44		120.11		248.43	33334	989.04		294.82		78.754	158.13	49.694		42.066		41.295		15.777	28.126	7.6669	151.6	8.7531	
487	36078	CCP606S	soil	20.861		198.96	7918.9	504.12	1976.1	197.95	1588.8	169.14	702.61	150.57		288.48	21627	767.4		254.87		65.761	166.71	47.704		41.513		101.05		15.312	213.17	16.175	141.99	8.8673	
488	36078	CCP25	stream grave	22.629		325	5154.5	437.92	2307.3	214.1	941.79	146.65	605.97	163.99	2392	471.15	42647	1096.6		375.61		91.094	185.14	59.188	1515.7	115.09		195.1		22.61	122.68	14.932	170.2	10.965	
489	36078	CCP35	stream cobbles	22.729		151.57	7068.7	468.12	369.55	118.75		116.42	585.92	131.9		207.61	9054.4	490.96		152.15		46.848		18.941	124.8	39.68	104.67	30.832		10.398	19.581	5.8081	101.76	6.2332	
490	36078	CCP35	stream cobbles	22.801		290.01	5046.6	406.56	365.91	114.16	455.84	114.66		120.46		295.75	39748	1037.2		332.56		73.961	208.31	53.511	589.01	74.594		51.547		12.202		6.0126	129.2	8.0014	
491	36078	CCP45	stream cobbles	22.923		175.22	4673.7	388.23	596.2	117.42		91.095	569.9	122.71		361.63	65452	1343.4		430.97		80.413	263.86	57.498	886.12	92.141		77.33		17.719		4.4968	46.949	5.6123	
492	36078	CCP44	stream sand and gravel	23.077		335.99	6844.9	489.28	2020.9	210.32	1102.9	171.89		161.94	2708.6	498.49	48192	1170.4		395.26		96.312	297.42	68.936	1546.3	117.74		174.33		19.141	85.813	12.952	255.44	12.538	
493	36078	CCP16	stream cobbles	23.202		136.75	4611.5	386.53	648.42	120.45	2243.7	182.27	542.12	127.37		158.69	4082.8	332.47		133.54		50.875	123.44	33.891		30.07	63.763	20.877		8.4029		4.2542	54.803	4.5435	
494	36078	CCP34	stream sand and gravel	23.298		275.64	5187.2	435	2740.5	224.81	633.22	142.88		147.2	2629.7	468.1	37453	1015.9		315.43		86.819		48.596	1989.9	126.24		111.53		19.556	99.471	12.555	153.95	9.5258	
495	36078	CCP26	stream cobbles	23.418		170.42	13606	634.49	616.03	156.26	1376.4	160.01	402.95	123.05		247.92	9033.4	498.13		159.19		45.671	132.9	38.416		36.512	77.512	23.048		12.626	18.504	5.8562	169.74	8.0231	
496	36078	GGG01	waste rock	24.098		238.3	14239	657.4	1906.2	215.73	1408.1	164.18	495.22	145.54		287.62	16132	669.33		226.71		58.575		33.493		37.004	101	32.322		13.495		6.11	191.98	8.8975	
497	36078	REP01	soil	24.162		309.14	9912.5	557.66	1042.8	174.63	1498.3	173.09	675.55	156.99		219.94	13825	615.04		202.54		56.22		37.775		41.28		39.259		14.247	102.08	11.05	227.65	9.7115	
498	36078	WHC203	???Do not know what this is	24.23		165.37	2233.4	269.17	875.58	103.96		66.673	443.1	90.858	1334.2	295.96	7945.6	457.06		135.08		43.609	102.3	23.576		28.692		79.799		8.3307		1.4253	10.193	3.1897	
499	36078	REPST01	tailings	24.443		144.7	2137	275.67	684.13	104.62		89.97	407.54	109.43		128.54	9601.6	497.95		133.6		22.071	76.226	22.395		32.547		36.887		6.0732		3.0681	39.649	3.9941	
500	36078	REPST02	Probably tailings??	24.513		243.6	7000.2	476.81	961.02	154.76	557.18	124.04		120.23	1408.8	387.96	36583	1008.7		327.84		72.347		48.761	678.57	79.765		179.24		18.646	77.851	12.095	129.57	9.4134	
501	36078	UGA01	???Do not know what this is	24.64		199.34	2754.5	331.34		92.037		80.451		125.24		222.26	4159.6	335.6		118.25		44.144		29.378		27.994		19.869		12.124		3.9653	15.643	2.8913	
503	36079	HRC503	rock	15.261		206.6	3603.9	334.64	1005.9	119.6		72.711	613	104.31		246.21	21532	753.97		242.98		58.338		45.167		40.234	1188.5	73.473		12.615		3.7229		2.5402	
504	36079	WHC202	soil/tailings	15.351		187.03	14903	677.16	765.32	181.47	1452.7	174	450.17	148.75	3111.9	482.64	20711	768.64		258.72		71.943		46.21	656.34	76.46		163.38		20.937		7.7739	194.46	10.24	
505	36079	GGG01	soil	15.417		239.54	10786	592.69	2011.3	218.46	1399.1	195.09		157.34	1405.1	385.35	25316	847.18	1028.9	315.21		75.631		55.171	1535.3	110.63		195.85		22.26	48.277	10.494	220.62	11.472	
506	36079	GGG02	tailings	15.498		233.52	10227	563.35	570.43	154.38	566.89	127.05	602.69	146.6		209.29	17640	690.56		204.64		63.485		42.973		34.804	1312	71.278		11.276		4.236	120.66	7.123	
507	36079	GGG03	green rock	15.581		214.16	3569.9	349.67	965.23	135.2	372.44	107.13	624.71	130.88		188.91	3727.2	319.55		106.11		61.954		36.074	153.34	42.126	84.786	27.11		11.42	16.799	5.4501	120.55	6.5887	
508	36079	BLR203	rocks plus fine grained material	15.645		360.21	19217	771.45	860.43	205.48	1819.3	188.15	722.76	169.83	3417.1	536.46	33536	997.24		317.59		97.42	393.92	76.014	1937.3	127.6		222.32		22.301		8.771	210.83	11.865	
509	36079	BLG201	???Do not know what this is	15.705		244.46	12095	610.72	540.36	161.08	819.08	153.39		139.98	1939.6	392.59	14425	633.47		225.64		69.305	225.94	53.201	696.6	74.759		105.13		13.883		5.5102	168.51	8.6899	
510	36079	HRC501	rock	15.787		322.07	3975.3	366.28	569.4	117.86		93.299	454.05	122.19	1832.1	494.76	102798	1731		550.02		101.29	132.43	43.995	1341.3	120.82		98.404		13.807		5.513	40.148	5.7974	
511	36079	HRC301	rock	15.855		163.23	1800.2	261.33	840.15	114.95	400.56	123.47	697.53	132.08		194.18	13897	601.2		195.73		50.132	137.56	32.805		31.938		23.545		5.1803	117.18	11.406	62.611	5.4608	
512	36079	HUM01	Soil	15.927		275.66	10231	567.87	1218.9	182.84	1175.5	154.03	519.8	148.02	1705	448.96	63116	1346.6		430.02		92.752	187.18	57.63	244.6	62.69		121.29		20.535		7.2533	160.67	10.05	
513	36079	BLG103	rock	15.993		138.53	11896	596.07	1713.2	191.43	594.41	127.55	774.57	137.83		263.54	10705	539.85		176.65		45.838		31.478	337.13	53.902		33.329		10.679		4.837	92.733	6.1815	
514	36079	HRC502	rock	16.061		240.01	4482.8	400.35	5570.1	284.98		115.75		129.96	3567.7	508.99	37262	1011		315.96		69.536		42.666	1799.4	119.3		83.816		17.402		4.9043	60.124	5.9844	
515	36079	HRC306	rock	16.142		213.88	20033	774.92	876.3	203.94	1605.4	178.24		150.88		258.16	23171	811.09		254.25		69.902		45.59	211.56	53.51		91.374		18		6.4755	184.6	9.233	
516	36079	HUM02A	rock	16.252		509.91	5899.9	441.26	4710.2	264.84	678.85	124.34		118.79	156485	3130.7	34239	1210.4		496.56		118.3	428.49	107.56	14040	446.54		255.03		27.034	54.318	15.805	143.74	13.522	
517	36079	HUM02B	rock	16.332		289.67	6450.7	443.62	886.96	132.93	448.43	102.23	393.42	103.88	2460.1	551.16	117994	1880.2		587.89		101.23		47.523	256.64	69.431		106		18.849		5.3158	21.613	5.2556	
518	36079	HUM02C	rock	16.426		433.82	7268.5	486.4	455.2	132.07	376.31	114.17		120.36		662.43	224793	2824.8		870.08		222.28	398.27	107.1	548.85	113.47		341.35		37.243		11.579	77.333	12.98	
519	36079	BLG102	rock	16.504		343.77	3443.2	356.43	782.44	133.4		89.044	517.86	134.15	18134	1123.4	124672	1979.8		594.97		127.3	289.99	74.712	306.74	76.431		320.41		27.728		12.347		8.8137	
520	36079	HRC302	" - green lichen partially covers	16.576		196.32	12714	619.21	1849.8	203.57	990.31	153.5	564.35	139.92		280.21	22355	785.27		264.91		66.158		36.391		39.955		43.627		10.671	22.322	6.7556	157.8	8.3143	
521	36079	HRC307	rock	16.636		201.04	8175	502.41	863.55	149.6	510.94	130.96	471.44	130.63		266.8	36584	996.8		316.89		64.877	132.01	37.962		42.1	133.8	37.493		12.998	23.632	6.9555	59.216	5.5435	
522	36079	BLRX01	rock	16.699		247.75	15187	673.96		163.73	1796.4	181.35	553.99	145.94	1383.5	342.71	9700.8	522.29		174.19		49.146		34.241		33.32		25.275		11.429		4.0389	141.77	7.4906	
523	36079	UGA02	rock	16.774		377.48	8125.6	527.45	900.6	152.01	432.51	110.82		114.33		331.86	25389	869.83		276.04		86.404		62.811	17382	372.48		441.77		39.258		15.847	52.754	13.334	
524	36079	HRC303	soil	16.84		279.06	8511.5	527.41	1086	174.43	1759	195.11		147.27	1663.3	392.32	18590	721.74		236.47		55.876		50.805	171.29	51.776		165.06		18.623	43.554	9.4091	206.36	10.575	
525	36079	BLR202	rock	16.902		239.75	9058.5	531.3	1879.1	195.3	1455.1	168.35	648.46	145.94		276.86	26365	848.53		258.89		50.051		36.81		41.722		38.164		13.227		6.4117	132.76	7.7539	
526	36079	HRC305	rock	16.966		271.27	7245.1	477.63	483.57	131.43	719.25	149.71	491.32	139.13		323.5	28168	875.02		266.84		54.634		34.422		43.461		40.747		9.7426		5.3153	241.37	10.214	
527	36079	HRC304	rock	17.041		600.11	8546.8	517.96	2024.4	197.1	616.57	129.74		121.69	167229	3382.2	104388	2020.3		735.15	891.92	168.21		86.681	3716.7	251.29		355.32		33.553	91.259	20.91	60.917	12.199	
528	36079	BLG101	rock	17.114		260.25	12345	618.29	792.11	169.09	1193.7	151.95	545.75	141.78	2318.8	437.82	23436	814.13		263.27		56.208	197	52.905	337.77	60.703		173.04		18.933		6.893	170.49	9.8165	
529	36079	WHC201	rock	17.185		471.06	1667.2	314.22	1343.7	176.32		104.98		154	20409	1282.7	174779	2514		729.56	753.25	202.26	482.85	122.17	1627.3	167.27		647.96		58.195		23.107	87.588	19.13	
530	36079	CATMK05	soil	17.546		232.28	7527.7	487.9	1027.3	158.02	1213.4	147.63	503.92	133.77	2773.8	454.39	23496	801.65		259.91		61.545		34.937	869.6	83.616		70.051		13.246	35.941	7.9693	190.76	9.2934	
531	36079	CATVK02	grass	17.613		151.36	3604.8	364.59	1027.2	151.56		77.178		132.91		124.43	540.52	138.78		77.634		44.1	125.78	36.009	197.12	43.13		20.834		7.7873		3.1107		2.037	
532	36079	CATVK071	grass	17.699		165.12	1706.8	251.56	1290.5	133.07		62.963	561.25	111.21		163.59	399.59	118.86		44.349		40.077	93.104	25.959		28.524		14.28		6.0973		2.1577		0.98182	
533	36079	CATVK04	grass	17.809		117.31	3466	349.76	1363.5	155.96		70.38	386.39	121.03		155.67		113.48		49.902		37.316	88.386	27.862	187.99	40.813		18.614		6.9776		2.1701		1.4444	
534	36079	CATVK081	grass	17.891		113.64	4118.2	388.74	1259.6	166.79		125.93	724.15	158.92	4550.2	511.6	6799.9	436		147.8		43.868	202.13	49.971	6417.8	198.11		41.82		10.433		4.0442	33.832	4.0425	
535	36079	MFPA07	soil	23.773		313.82	6515.2	465.89	1081.7	165.47	450.93	127.82		137.55	8768.3	789.23	81147	1541.3		506.64		102.31		62.41	1300	119.44		138.72		19.5		8.5396	110.67	8.9643	
536	36079	MFPA05	soil	23.909		314.83	6263.2	456.18	1165	165.63	367.72	119.42	417.62	139.14	8652.3	776.6	74569	1470.3		465.95		95.675		50.896	1679.5	130.06		128.27		20.181		8.9833	105.75	8.8003	
537	36079	MFPB01	soil	24.038		259.17	8187.8	510.53	790.76	155.56	672.52	131.1		128.5	6294.1	654.1	45543	1132.6		381.69		66.249		44.271	1391.6	110.83		98.696		15.984		7.1116	104.13	7.9205	
538	36079	MFPB02	soil	24.143		283.4	5559.8	442.66	1508	184.12	608.95	128.04	470.36	151.16	5709.1	625.07	40906	1067.6		343.6		75.757		52.544	3419.8	165.94		116.58		19.756		7.9225	98.499	7.7875	
539	36079	CATVK01	grass	18.204		137.19	3168.6	359.83	1202	164.55	16312	444.4	647.48	180.66		96.95	445.33	133.03		61.314		46.093		33.682	326.77	52.417	75.322	21.727		8.6224		3.4444		1.3835	
540	36079	CATVK05	grass	18.278		68.04	1203.8	237.25	1029.7	129.58		69.73	802.76	137.01		153.7		100.18		43.38		37.437	119.63	29.971		31.294		15.415		6.9527		2.3978		1.0536	
541	36079	CATVK03	grass	18.346		178.59	2694.2	324.9	999.74	144.76		72.27	505.95	136.7		167.82		106.68		58.273		43.361		28.33	247.29	45.664	60.268	19.885		7.15		2.8926		1.5757	
542	36079	CATVK082	grass	18.429		183.39	4342	395.12	1277.9	165.28	7445.1	291.61	683.58	151.86		203.57		115.15		52.915		41.766		29.652	874.75	75.799		23.434		11.636		2.2866		1.6915	
543	36079	CATVK10	grass	18.499		84.86	2598.9	334.97	3054.3	223.14		73.129	842.67	158.06	1391.4	291.18	414	135.31		67.376		36.72		28.516	362.63	51.704		18.079		8.4457		2.9601		1.2313	
544	36079	CATVK12	grass	18.567		159.9	1477.4	259.48	909.92	130.15		71.147	720.34	139.09		185.74	369.11	118.08		59.723		37.716	72.439	23.622	159.66	37.981	60.415	15.076		6.0966		2.853		1.1952	
545	36079	CATVK09	grass	18.63		134.85	2273.9	289.17	724.94	114.31		63.653	743.59	128.72		192.27	1001.5	173.1		92.158		38.223	145.14	33.356	292.71	46.51		19.321		4.5733		2.3522		1.517	
546	36079	CATVK072	grass	19.582		135.16	2595.2	329.68	1255.6	162.25		76.176	454.33	141.37		193.46	535.26	142.65		81.523		36.002		32.655		37.223		20.268		9.7031		3.4947		1.6432	
547	36079	CATK11B	grass	19.798		362.88	7909.8	510	674.46	159.12	590.96	139.89		143.34	7427.6	724.91	61663	1333.8		417.45		85.04		52.157	1309	113.96		123.06		18.477		8.8921	130.63	9.3526	
548	36079	CATK03	soil	19.88		257.97	11188	593.52	1348.7	194.08	1337.8	167.8	531.3	156.54	2153.6	432.62	27478	875.14		278.41		51.645		49.12	827.57	85.418		88.097		17.565	33.139	8.205	196.02	9.6978	
549	36079	CATK01	soil	20.029		183.59	10875	586.04	2025.8	214.09	1310.4	174.23		153.05	1402.1	373.6	26098	850.57		282.07		59.648		49.691	519.32	71.099		94.889		18.883	54.958	9.5287	199.97	9.8327	
550	36079	CATK04	soil	20.13		230.81	10579	578.51	1479.4	195.64	1464.1	165.43	496.58	151.42	4261.5	558.94	37176	1022.6		312.09		63.551		52.54	1302.7	105.39		101.56		17.771	31.125	8.3766	211.44	10.579	
551	36079	CATK05	soil	20.212		269.54	11224	594.93	1395.1	196.27	1320.3	168.04		150.61	3456	514.45	31980	947.57		286.45		65.793		46.233	1380.7	106.5		91.165		18.155	37.715	8.716	215.9	10.478	
552	36079	CATMK07	soil/moss	20.291		202.01	4311	375.17	1037.4	137.57	533	112.04	574.1	123.1	4514.8	552.97	38404	1021.5		297.06		62.521		40.158	1331.6	103.18		72.8		11.111		6.5871	103.67	7.2364	
553	36079	CATK07A	soil	20.361		317.5	7861.6	511.28	695.4	163.29	991.76	145.46		148.56	9091.7	815.08	90842	1643.9		508.46		119.89		54.115	2003	147.79		127.65		20.989		10.203	211.14	12.255	
554	36079	CATK08	soil	20.429		278.9	9210.1	537.53	965.16	166.08	1020	129.99	578.82	140.05	7383.3	707.23	51027	1204.6		378.46		90.33		44.551	1343.7	110.91		82.289		17.545	33.762	8.8796	149.62	9.3099	
555	36079	CATK09	soil	20.488		262.67	8407.7	517.65	867.57	160.78	1056.1	149.69	594.1	148.05	6125.5	651.5	47381	1155.7		334.23		93.74		48.13	2070.3	132.92		100.96		17.073	24.919	8.219	157.34	9.5846	
556	36079	CATK10	soil	20.551		249.29	8795.5	526.81	744.52	155.94	932.38	138.47	495.53	140.27	2904.3	474.89	32732	950.02		299.34		73.191		44.711	1244.9	100.7		79.418		14.871		7.1515	145.59	8.5819	
557	36079	CATK11T	soil	20.629		330.85	7445.6	497.39	494.44	148.87	561.84	129.05		140.49	16136	1056.1	113201	1867.9		583.57		134.14		67.476	4059.1	217.47		191.18		21.938		9.7035	149.87	11.472	
558	36079	CATK12	soil	20.704		220.03	5658.9	425.05	747.89	132.52	643.14	119.12	625.65	130.46	1734.9	379.69	23396	793.03		237.18		56.297		37.755	771.02	78.084		61.465		11.29		6.2532	149.92	8.0387	

ID	DATE	Sample	Sample Type	Time	Chromium-high (mg/kg)	Chromium-high standard deviation	Potassium (mg/kg)	Potassium standard deviation	Calcium (mg/kg)	Calcium standard deviation	Thallium (mg/kg)	Thallium standard deviation	Chromium-low (mg/kg)	Chromium-low standard deviation	Manganese (mg/kg)	Manganese standard deviation	Iron (mg/kg)	Iron standard deviation	Cobalt (mg/kg)	Cobalt standard deviation	Nickel (mg/kg)	Nickel standard deviation	Copper (mg/kg)	Copper standard deviation	Zinc (mg/kg)	Zinc standard deviation	Arsenic (mg/kg)	Arsenic standard deviation	Selenium (mg/kg)	Selenium standard deviation	Strontium (mg/kg)	Strontium standard deviation	Zirconium (mg/kg)	Zirconium standard deviation	Molybdenum (mg/kg)
559	36079	MFPA01	soil	20.806		350.9	6888.5	475.99	1665.8	186.76	534.69	123.3	482.61	141.95	10708	852.4	75260	1483.8		452.25		112.85		56.875	2319.7	151.99		109.81		20.523		7.7693	112.52	9.0729	
560	36079	MFPA02	soil	20.871		280.89	7711.2	504.89	1362	184.39	586.18	126.23		147.26	7985.2	749.7	70860	1431.3		425.84		92.451		58.273	2147.4	144.38		112.71		24.94		8.7389	110.55	8.6589	
561	36079	MF001	soil	20.965		335.25	9231.3	547.53	487.29	157.75	854.27	141.58		146.73	11017	882.24	88441	1631.6		519.17		114.05		61.714	2200.8	154.39		163.32		21.205		10.136	135.94	10.669	
562	36079	CATK15	pine needles	23.244		128.59	1296.3	275.76	1515.7	172.05		76.553	668.11	155.57		232.22		121.72		76.355		60.232		45.384		46.229		26.956		12.696		3.7085		2.1127	
563	36079	MFPA06	???do not know what this is	23.497		299.54	2986.1	348.63	725.77	143.98		108.23	608.07	155.59	10560	827.94	62167	1327.6		429.59		83.965		56.561	1372.6	118		130.58		19.849		6.2285	72.846	7.2913	
564	36079	MFPA04	soil	23.568		240	3354.2	351.84	701.99	132.93	473.5	104.45	665.32	142.97	11407	843.51	56028	1253.6		385.97		75.13	237.45	61.846	1767.3	127.08		104.64		20.65		7.0356	61.354	6.5299	
565	36079	MFPA03	soil	23.673		305.83	8599.1	531.52	1052.6	179.01	419	136.37	573.15	162.36	10699	873.15	94428	1683.6		534.39		103.98	207.24	68.789	2433.5	163.27		141.55		21.59		8.8	146.32	10.751	
566	36079	MFPB03	soil	24.202		379.4	7768.5	504.43	1184.5	175.71	599.25	131.37	522.8	150.08	8065.7	752.89	64567	1369.5		411.85		86.572	188.36	59.484	963.94	100.91		124.78		21.308		7.3489	101.92	8.551	
567	36079	MFPB04	soil	24.271		200.1	2663.5	314.95	583.58	116.17		92.354	519.96	130.14	4126.1	525.82	35996	984.79		323.62		57.303		32.464	848.51	83.423		75.802		11.535		4.2125	39.203	4.874	
568	36080	MFPB06	soil	0.657		288.63	7131.5	490.37	1372.5	185.22	608.69	137.67		153.76	10780	862.51	84493	1577.6		475.81		109.86		56.835	1218.2	116.81		123.34		24.27		6.8989	144.7	10.129	
569	36080	MFBS02	soil	0.741		296.54	6832.7	478.44	740.84	156.99	652.37	136.02	529.6	153.48	8785.4	775.73	66209	1382		456.68		89.236		49.423	1653.2	127.74		115.37		16.433		8.9411	159.48	10.108	
570	36080	CATK02	soil	0.809		195.31	9843.3	563.35	2358.4	223.67	1588.6	167		146.28	1889.3	408.66	25503	841.19		277.65		74.735	172.61	55.522	965.54	90.469		87.479		18.231	73.212	10.566	167.94	9.2352	
571	36080	CATK07B	soil	0.881		254.7	10247	565.37	570.24	156.11	917	145.83	453.77	143.76	2540.4	441.93	21203	765.34		236.57		74.816		40.755	383.74	62.551		62.752		13.53	23.263	6.9148	158.04	8.481	
572	36080	CATK07C	soil	0.948		247.28	8206.4	512.01	1096.4	169.38	771.32	140.77	664.76	151.48	3499	505.31	30208	913.13		273.88		65.834		41.802	684.46	78.434		67.293		12.844	23.842	7.2342	153.06	8.6524	
573	36080	CATK10T	soil	1.014		253.15	3550.5	352.41	906.02	135.92		106.43		116.78	1492.1	360.42	25269	821.33		259.74		47.925		32.983	898.88	83.126		53.304		12.065		5.997	58.355	5.3065	
574	36080	CATK11M	soil	1.076		246.73	10084	564.56	593.19	160.93	837.67	152.3	621.52	158.63	2212.2	433.51	30580	919.89		279.45		72.831		38.506	305.81	60.484		76.251		14.672		7.1038	148.16	8.5143	
575	36080	CATK11C	soil	1.14		272.38	5842.2	441.04	748.89	145.72		127.22		137.87	10938	837.47	58780	1293.4		412.19		91.268	252.5	64.452	1736.9	127.67		102.02		15.456		7.1073	123.26	8.7316	
576	36080	CATK14	soil	1.208		331.19	7029.9	488.12	800.37	163.93	957.23	148.33	607.9	161.23	3494.5	530.36	45254	1127.6		347.83		93.825		50.817	1643.9	119.08		123.89		18.755		8.285	146.1	9.3369	
581	36080	HRC504	rock marked 4 slag?	9.967		239.07	10571	588.47	18783	511.82	2977.3	269.2		154.55		303.38	15233	663.92		235.98		65.959		33.453	160.58	47.724		69.64		13.508	903.86	32.479	214.2	11.869	
582	36080	HRC505	rock 5	10.073		218.91	14776	657.47	1510.9	188.93	1599.3	165.41	442.7	114.63	1829.5	412.87	36572	1016.2		343.22		55.581		40.841		41.259	633.73	58.542		12.479		5.3745	145.89	8.3934	
583	36080	HRC506	rock 6	10.149		227.45	5099.2	417.19	2253	194.49	659.87	129.58		118.02		321.51	24979	835.49		256.38		77.624		46.009	1307.2	101.23		250.46		22.631		9.4451		6.7943	
584	36080	HRC507	rock 7	10.235		201.91	24501	841.86	2659.7	253.32	1401	188.63		118.91		276.54	11135	566.57		168.08		52.513	127.27	41.224	140.85	44.95		52.563		12.689		5.1462	141.99	7.7305	
585	36080	HRC508	rock 8	10.342		301	26825	881.55	1988.6	243.13	1859.3	187.64	491.08	129.69	10223	814.75	20806	796		265.33		66.001	189.15	53.068	2074.9	127.5	352.51	88.397		15.267		6.0445	267.68	11.49	
586	36080	HRC509	rock 9 Ore?	10.41		375.11	6508.7	473.29	1910.9	192.47	542.78	119.73		116.25	4435.6	713.81	152282	2251		711.72		167.95	530.47	109.04	4338.6	240.18		433.56		44.072	58.732	18.458	39.943	12.505	
587	36080	HRC510	rock 10	10.478		279.2	10721	565.27	2631.1	213.14	903.47	132.58	380.29	105.4	2524.7	490.16	64751	1363.9		421.5		86.413	135.95	43.344	1539.6	118.84		87.644		15.939		4.3666	67.331	6.4711	
588	36080	HRC511	rock 11	10.549		278.51	9847.4	543.64	2462.6	206.3	632.57	115.53	351.34	103.81	7877.2	740.19	64771	1368.8		403.36		105.42		46.569	444.85	73.57		98.162		16.036		5.5841	119.06	8.7603	
589	36080	HRC512	rock 12	10.618		204.43	28182	903.99	1053	218.18	2592.3	207.24	455.83	125.17		262.7	14473	651.1		211.47		44.335		39.275		42.061		106.12		14.628		6.7234	157.63	8.7356	
590	36080	HRC513	rock 13	10.688		270.96	26256	873.36	2210.1	248.97	2349.5	203.32	626.75	139.81		340.54	20177	767.47		231.96		63.1		36.812	574.22	72.101		74.777		14.807		5.893	155.21	8.5461	
591	36080	HRC514	rock 14	10.754		304.23	7599.4	480.84	1675.6	172.4	502.27	122.52		103.89	2955.5	565.25	107293	1788.7		551.9		98.122	268.16	62.986	499.84	82.077		88.75		13.18		7.4383	61.324	7.1885	
592	36080	BB04A	rock	10.849		275.84	25025	849.48	696.46	195.6	1471.6	181.17		119.08	1219.4	342.2	10629	555.75		196.62		53.972		38.025		42.033		29.291		11.459		4.2551	145	7.6924	
593	36080	BB04B	rock	11.002		234.49	19312	747.49	573.22	169.05	1493.3	161.03	583.05	121.83		253.75	12356	588.96		199.25		51.652		34.321		37.032		25.22		8.5928		4.9065	179.11	8.392	
594	36080	BB04C	rock	11.084		212.98	18658	732.93	560.26	162.13	1903.3	181.46		99.604		263.6	5602.8	399.62		124.94		51.924		22.534		33.284		20.211		11.734		3.6903	117.8	6.6723	
595	36080	BB01A	rock	11.229		204.04	12144	592.97	992.68	152.55	572.09	118.07	428.28	97.611		149.61	8170.6	470.21		149.94		34.224	113.48	31.422		29.812		23.515		8.4188		5.1091	73.351	5.4302	
596	36080	BB01B	rock	11.297		294.67	5378.3	402.59	911.59	122.44		83.226	332.81	89.228	1354.5	345.43	19775	727.71		227.74		47.459		30.943	288.03	52.127		69.569		8.6042		5.0268	102.2	6.6191	
597	36080	BB01C	rock	11.696		252.56	33511	985.95	4318.5	322.45	1154.6	170.3		122.49		269.53	10861	568.84		167.07		68.854		39.302	573.86	70.466		61.383		14.963	24.498	6.8167	74.899	6.005	
598	36080	BB01D	rock	12.485		240.03	15979	684	2212.1	216.01	900.86	136.76	384.36	109.37	1076.2	319.74	11851	576.51		195.77		52.575	135.14	42.745	543.84	67.068		62.15		11.215		4.6328	122.26	7.2906	
599	36080	CCGEM12	rock	16.201		227.86	4415.2	391.3	1047.9	149.98		106.9	398.74	131.55	4010.7	560.15	62241	1322.3		398		90.98	162.6	49.302	1267.9	108.4		159.56		15.261		6.9467	68.366	7.1012	
600	36080	CCP73	cobbles	16.274		275.81	5194	425.84	1310.4	170.47	999.49	137.74		137.57	3478.4	509.46	31975	939.53		317.32		68.123	358.82	69.668	2507.6	138.86		133.3		16.297	27.691	8.3837	179.38	9.9778	
601	36080	CCGEM01	sediment	16.335		274.22	6285.4	465.43	1013	166.95	933.06	148.84		147.86	6097.5	639.78	33079	964.35		312.88		70.616		49.92	2677.4	144.99		171.46		19.744	48.836	10.389	194.09	10.876	
602	36080	CCP55	sediment	16.4		316.59	6586.3	483.07	1700	200.48	1124.8	170.31		158.79	1643.6	406.83	25725	847.27		257.52		95.719		46.95	2463.8	136.15		168.4		21.323	44.546	9.7991	229.38	11.203	
603	36080	CCP68	pebbles	16.469		207.17	3249.8	335.23	935.84	131.04	388.34	101.58	525.25	122.74		147.87	3964.6	325.14		109.52		35.047	94.456	29.11	503.56	58.741		38.207		8.6774		3.403	185.37	7.9327	
604	36080	CCP67	sediment	16.535		201.45	5061.4	429.63	1151.5	170.48	625.78	136.29		143.33	2597.5	453.98	25502	839.86		265.66		62.368	181.74	58.483	3285	155.05		191.84		23.962	32.218	9.5044	154.81	9.9202	
605	36080	CCGEM09	sediment	16.607		258.23	8982.9	542.68	2629.9	228.87	4258.1	249.49	734.95	169.07	3558.6	527.86	39749	1065		333.32		79.399		51.013	2124.6	132.47		136.59		15.681	81.341	12.098	139.56	9.2492	
606	36080	CCP47	rock	16.69		204.07	21479	788.1	2656.5	243.52	1491.2	166.54	447.96	115.22		230.38	12153	586.83		192.88		59.5		39.555		39.454		26.615		15.073		5.1542	123.67	7.1806	
607	36080	CCGEM02B	rock	16.758		249.42	1773	265.28	714.96	112.86		88.187	405.58	116.8		254.39	21162	744.94		214.9		57.727		31.937	1270.2	94.591		45.858		10.633		4.2373	54.577	5.0201	
608	36080	CCGEM08A	rock	16.829		241.4	9281.4	539.17	859.96	161.42	4143.8	249.02		131.88		231.93	13025	598.26		190.89		43.697		35.685	649.76	71.148		58.329		10.801		4.5112	115.66	6.9567	
609	36080	CCGEM08B	rock	16.899		238.74	10370	559.47	1055.3	162.73	820.46	126.15	592.9	127.22		260.23	14105	619.19		203.91		58.393		37.305	347.19	55.721		56.729		12.066		5.1987	149.41	7.802	
610	36080	CCP71	rock	16.972		202.71	17406	721.21	7462.5	349.38	1522.1	180.49	528.59	140.28		242.16	6180.3	422.77		139.33		65.914		29.37		39.895		25.994		13.983		5.2597	89.809	6.0464	
611	36080	CCP72	rock	17.048		160.66	3845.9	356.92	549.52	111.14		95.864	617.95	126.57		169.56	2663.4	270.84		117.46		49.49		29.958	135.38	38.663		31.585		7.509		2.7508	105.04	6.0475	
612	36080	BB02	rock	17.122		185.47	5592.3	456.24	14285	443.9	337.56	102.36		133.92		256.53	8540.4	484.33		153.43		47.995	139.58	36.978	1421.7	96.249		41.189		12.976	35.74	7.2009	38.235	4.2933	
613	36080	CCP15	sediment	17.184		290.89	3396.8	372.07	1381	177.7	857.9	142.64		155.04		283.84	12049	571.48		218.62		67.453		51.398	237.93	55.362		43.278		14.34	53.742	8.511	204.55	9.0737	
614	36080	CCGEM05	pebbles	17.253		169.16		190.28	1101.3	138		61.898	532.77	131.7	1392.3	347.89	29368	874.08		260.84		76.028		45.766	13476	311.81		36.392		11.839		5.9851	46.322	5.1733	
615	36080	CCGEM02	sediment	17.326		264.97	1072	232.9	1175.5	137.97		83.23	473.64	124.6	1779.7	424.37	53714	1207.7		363.47		80.428		48.274	3932.1	179.06		102.33		15.731		5.3193	107	8.0354	
616	36080	CCGEM10	sediment	17.393		213.17	7211.8	487.01	1893.6	195.77	627.64	131.46	600.53	148.16	2344.8	432.34	27156	863.42		262.09		66.819	183.16	52.4	2006.5	122.12		121.61		16.048	34.468	8.3942	146.24	8.789	
617	36080	BB03	precipitate	17.472		221.47	2764.2	334.56	2429.7	200.8		93.696		128.9	1922.8	543.73	141811	2067.6		644.6		151.37		74.581	8155.3	314.5		111.3		21.013		10.181		5.4735	
618	36080	CCGEM07	pebbles	17.544		262.92		211.8	995.23	145.77	713.88	130.31		147.79	7968.3	777.48	107267	1767.4		554.97		127.09		74.602	10768	346.28		147.35		26.59		9.2218	73.071	8.7682	
619	36080	CCGEM04	???do not know what this is	17.608		329.36	824.46	226.75	1275.2	147.14		70.595		125.45		545.04	159212	2201.9		681.53		143.37		69.665	15728	455.44		64.025		18.556		9.33		3.4683	
620	36080	AA11	rock	17.736		220.08	18169	737.64	4125.7	284.66		128.35	516.01	147.63		310.31	12807	600.93		169.24		57.465	133.96	42.066		32.79	84.232	23.735		13.777	596.32	25.421	89.927	8.1056	
621	36080	AA08	rock	17.807		186.6	8695.8	531.67	4507.4	274	826.84	138.02		140.71		283.87	7729.3	462.51		170.37		55.871		35.916	145.65	44.169		25.644		11.689	292.46	17.417	116.86	7.5795	
622	36080	AA09	rock	17.872		198.19	13770	651.71	4683.5	289.68	1461	163.64	632.27	154.07	1549	371.2	16377	678.58		233.84		75.432		37.448		41.404		28.007		14.145	333.02	19.456	163.05	9.1255	
623	36080	AA02	coarse to fine	17.941		314.92	8029.9	515.73	595.61	154.1	591.35	135.78		144.38		422.38	80067	1534.2		487.99		105	196.32	65.089	1055.7	108.79		222.46		22.931	69.158	13.646	110.26	10.501	
624	36080	AA06C	fine grain	18.019		274.49	12174	621.24	4561.2	285.36	1761.5	180.2		142.9	3175.8	501.8	30775	937.49		292.39		79.311		52.695	3980	174.27		146.54		16.084	355.53	22.457	156.27	10.389	
625	36080	AA10	rock	18.09		180.74	13491	639.39	1721.2	205.29	1719.2	169.94	785.5	152.63		240.08	10646	541.4		175.89		54.952	125.93	36.945		33.638		29.879		10.141	36.864	7.3922	217.65	9.1188	
626	36080	AA05	rock	18.163		216.91	8774	526.95	1606	187.91	518.67	121.5		131.77	1692.9	361.91	13152	599.54		184.85		59.943	147.98	43.919	1626.1	104.93		84.626		12.2	56.118	9.0176	96.048	6.8671	
627	36080	CCW01	rock	18.471		249.78	17247	707.23	553.7	160.21	947.64	137.4	328.83	104.99		194	10763	547.25		176.28		59.966		41.122		38.07	83.649	25.749		11.835		4.1795	113.17	6.7541	14.564
628	36080	CCW02	rock	18.538		262.68	19938	760.42	893.06	185.45	1260.9	161.39	502.26	124.04		284.92	7087.1	451.26		146.53		66.053		27.852		35.24	86.259	25.133		11.553		4.1271	126.45	7.0668	14.246
629	36080	CCW04	rock	18.609		246.55	24274	837.65	881.57	200.5	2072.2	209.06		119.84		207.67	7389.7	462.66		180.3		70.73		37.505		36.332		25.141		9.9687		3.7272	192.51	8.6415	
630	36080	YD02	rock	18.678		242.66	17493	734.03	4468.4	298.38	1699.1	185.88		161.8		293.2	23164	812.61		268.65		71.078		44.521	1583.3	109.91		113.41		16.886	72.412	10.713	126.43	8.299	
631	36080	YD01A	rock	19.139		166.64	5516.9	410.55	1383.5	148.97		86.997	555.49	109.79	1557.9	336.18	8864.5	489.6		162.17		55.236		31.728		34.477		36.091		9.4379		4.1491	59.71	4.9291	
632	36080	YD01B	rock	19.201		218.23	11660	585.36	1142.4	163.13	663.58	129.67		101.22		259.18	14032	618.19		183.45		54.809	151.66	43.908	139.28	44.561		26.698		12.137		4.8381	98.104	6.3638	
633	36080	YD01C	rock	19.265		242.52	26800	882.09	8824.4	390.61	918.9	144.02	366.17	115.9	1302.3	337.5	6539.4	443.81		146.69		77.878		37.746		36.122	144.93	31.603		13.149	21.78	6.411	72.473	5.7419	
634	36080	YD01D	rock	19.338		298.32	4031.5	376.97	11161	383.52		82.879	506.49	102.01	20365	1127.8	77612	1517.7		474.24	1349.4	191.55		37.883	839.7	94.991	5748.2	186.39		19.707		8.2947	28.628	4.9948	

ID	DATE	Sample	Sample Type	Time	Chromium-high (mg/kg)	Chromium-high standard deviation	Potassium (mg/kg)	Potassium standard deviation	Calcium (mg/kg)	Calcium standard deviation	Thallium (mg/kg)	Thallium standard deviation	Chromium-low (mg/kg)	Chromium-low standard deviation	Manganese (mg/kg)	Manganese standard deviation	Iron (mg/kg)	Iron standard deviation	Cobalt (mg/kg)	Cobalt standard deviation	Nickel (mg/kg)	Nickel standard deviation	Copper (mg/kg)	Copper standard deviation	Zinc (mg/kg)	Zinc standard deviation	Arsenic (mg/kg)	Arsenic standard deviation	Selenium (mg/kg)	Selenium standard deviation	Strontium (mg/kg)	Strontium standard deviation	Zirconium (mg/kg)	Zirconium standard deviation	Molybdenum (mg/kg)
635	36080	YD01E	rock	19.409		261.42	23487	830.09	12663	446.41	1322.8	167.34		114.09		272.39	10267	549.93		176.73		56.555		39.938	417.72	62.692		41.641		12.703	40.734	7.9378	200.42	9.1718	
636	36080	AA05T	tailings	19.486		331.34	9517.3	553.11	994.02	173.78	852.68	137.35	628.79	152.76		377.85	52552	1225.8		388.5		94.988	174.67	57.697	722.62	86.987		169.65		22.162	113.21	14.414	113.52	9.3892	
637	36080	AA07	tailings	19.55		366.17	10330	580	695.75	167.83	945.92	143.34		138.15		356.8	61250	1342.2		404.22		105.86	265.61	70.125	1184.4	109.54		247.04		25.94	62.98	13.17	111.35	10.685	
638	36080	AA15	coarse sand and rocks	19.622		287.18	9549.3	565.02	4177.7	273.05	656.39	148.54	469	152.52	1250.9	398.91	38267	1053.2		344.24		81.236		56.658	1146.6	102.06		260.47		25.226	456.83	27.204	116.8	11.705	
639	36080	AA12	rock	19.689		219.63	9752.7	544.06	2815.6	220.01		114.03		117.13		264.19	4973.7	373.32		141.44		48.545	114.65	37.346		36.062		29.976		10.242	595.43	24.233	40.304	6.5785	
640	36080	AA16A	soil	19.751		309.85	7234.7	510.79	3734.5	262.44	1077.6	175.76		152.4		432.51	75805	1516		484.69		107.35		65.205	1008.2	107.92		342.47		34.503	178.09	21.162	94.771	13.006	
641	36080	SUC23	rock	19.819		165.42	3331.9	352.58	675.63	133.61		102.85	505.04	140.06		174.4	9457.6	496.95		172.92		44.26	83.987	25.261	794.69	71.872		54.879		11.025	37.778	7.1247	19.151	3.4034	
642	36080	AA14	rock	19.886		166.25	8150.9	498	482.91	126.28	894.82	131.39	670.74	129.7		200.14	8540.5	477.3		172.06		44.963	76.073	24.252		31.465		18.926		9.4838		3.6264	66.323	5.0507	
643	36080	SH05	rock	19.949		331.08	8154.5	523.36	605.57	151.04		126.55		132.86	5652.4	683.64	78331	1542.1		465.96		104.78		63.32	381.16	76.5		343.37		31.343		11.492	49.729	11.16	
644	36080	SUC22A	rock	20.028		326.87	19155	752.29	3340.5	261.85		92.541		105.33		215.22	45002	1140.4		343.72		70.277	168.8	54.566	321.28	64.993		105.11		18.936	156.82	15.452	35.282	6.1758	
645	36080	SUC22B	rock	20.093		262.16	46688	1156.3	1999.7	298.99	4339.8	276.69		135.37		338.36	12484	624.52		187.4		70.561	197.01	53.604	712.79	79.206		60.092		11.916		4.8197	360.43	12.573	
646	36080	SUC22C	rock	20.157		338.48	47075	1169.5	10122	463.25	2725.9	248.44		159.72	1511	428.53	21923	841.1		274.82		83.712	223.9	64.355	2370.2	140.34		94.873		20.134	919.81	35.522	166.45	12.054	
647	36080	SUC22D	rock	20.229		304.68	20226	768.92	1177.4	195.65		93.359		97.975		283.57	28163	896.31		275.68		66.098		45.388	536.17	71.583		123.47		19.092	65.615	10.626	56.938	6.3416	
648	36080	SUC22E	rock	20.294		315.13	7020.1	472.97	1521.8	175.52	4909.9	310.51		149.78	2411.7	572.75	126961	1984.1		605.34		148.63	277.42	76.876	1487.3	137.67		65.718		24.113		8.1269	220.33	13.034	
649	36080	AA16A	rock	20.372		328.48	10820	588.51	3863.1	260.98	980.64	159.42		122.2		446.96	133963	2076.8		640.4		136.77	593.85	106.27	2999.2	192.69		321.62		34.83	47.686	15.031	51.023	10.493	
650	36080	AA16B	rock	20.438		292.35	4661.5	388.89	2237.3	184.13	440.75	116.62	398	109.57		415.77	85358	1573.9		497.84		118.91	328.26	72.244	1340	118.7		199.83		23.26		9.2733	118.17	9.917	
651	36080	SH07	rock	20.513		268.69	12852	643.21		158.04	660.87	155.51		138.85		374.47	58490	1312.5		417.4		86.374		58.936	396.83	73.858		260.45		28.68		10.549	128.32	11.148	
652	36080	AA18	rock	20.6		181.14	11250	581.94	559.52	147.77	866.69	140.47	475.45	129.57		305.88	27551	867.45		295.71		54.268		34.249	136.7	44.092		31.193		11.763	26.937	7.0704	179.73	8.9144	
653	36080	SH01	very wet soil	20.661		350.71		248.67		99.789		97.575	615.17	170.84		298.47	8685.3	503.74		198.28		81.679	592.96	85.377	1073.9	92.332		293.35		26.241		11.51	39.441	9.4937	
654	36080	AA13	dump rock	20.746		282.53	12777	634.91	5016	298.81		136.77		151.15		269.43	11109	557.66		197.18		58.279		46.387	1986.9	116.29		48.765		16.582	668.58	27.048	69.041	8.0066	
655	36080	SUC21	rock	20.813		249.84	806.1	222.15	2830.3	200.27		85.037		119.29	2899.2	479.72	47327	1133.3		352.87		72.856		40.763	852.99	88.318		79.947		15.83		6.6698		3.3459	
656	36080	SH04A	rock	20.876		228.57	796.41	211.52	366.81	86.758		68.012	442.75	120.76		219.37	3402.9	315.93		122.79		59.373	300.24	55.842	593.9	65.932		234.52		20.28		6.4317		6.3895	
657	36080	SH04	rock	20.943		317.24	8419.3	514.43	2741.8	218.05	1031.6	148.64	435.74	127.27	1968.7	410.01	24425	823.54		275.97		68.759	171.38	48.337	2054.7	122.54		129.65		15.736	46.432	9.3133	126.9	8.3142	
658	36080	AA01B	rock	21.02		318.23	10676	577.51	923.74	169.03	1076.9	143.8	460.62	137.23	1743.7	447.24	55583	1264.5		394.39		86.124		48.834	1353.9	112.53		160.01		20.587	39.031	10.174	161.09	10.336	
659	36080	SH02	rock	21.092		95.864	10098	555.26	782.96	155.66	915.91	157.97	544.73	141.28		259.4	11280	552.19		161.76		44.641		29.933		30.337	84.936	24.324		10.903		5.5567	106.74	6.4756	
660	36080	SUC20	soil	21.158		211.93	5820.1	450.28	5744.7	295.1	1533.9	179.18		146.52	1311.2	342.33	15617	653.54		216.53		57.214		42.028	219.62	50.86		30.078		13.62	440.09	21.964	115.74	8.2028	
661	36080	AA17D	rock	21.22		284.81	9623.3	560.15	2374.1	221.15	999.41	150.87		142.62		374.27	56330	1277.4		384.22		82.737		46.867	1412.7	114.98		227.54		28.045	194.45	18.914	94.198	10.205	
662	36080	SH06	sand	21.278		318.03	12474	620.04	1328.9	194.2	1045.7	163.79		150.08	1493.2	407.14	40392	1068.1		333.39		84.03		28.229		38.314		54.95		16.231		6.1683	161.98	9.1076	
663	36080	AA07M	sand and small pebbles	21.338		284.69	10881	590.67	4594.9	284.5	1603.2	176.34		153.82		329.95	14674	640.55		234.51		63.217		39.255	602.49	71.775		50.675		11.66	450.93	22.482	156.84	9.3407	
664	36080	S17005B	rock	24.302		393.51	3739	380.21	1153.1	152.19		92.384		109.05	14925	1014.8	58234	1357.6		421.93		93.654		72.1	4070.8	199.62		494.75		44.839		17.028		13.875	
665	36080	REXM11	soil	24.37		250.9	9524.1	546.3		141.44	661.43	135.94	526.18	140.93	2691.1	495.2	57080	1275.8		381.52		95.988		50.538	346.17	67.117		155.86		21.497		7.3829	77.967	7.9123	
666	36080	CCP805	sediment	24.439		279.39	6888.8	479.84	1201.8	173.22	1466.9	165.64	458.08	148.19	2420.6	454.29	26987	864.29		262.08		69.689	186.17	54.466	1183.7	97.591		119.22		16.29	65.69	10.469	418.53	14.228	
667	36080	BB05	rock	24.505		240.17	14793	665.29	1773.4	207.86	3428.6	232.43		137.44		337.64	27007	872.32		269.14		66.319		31.952		38.584		29.202		12.033		6.4969	137.95	7.947	
668	36080	REXM08	soil	24.574		232.61	19252	759.92	4504.3	295.68	1464.8	155.5		131.76	2487.4	458.6	27726	895.46		276.74		73.814		51.035	1405.8	107.03		102.76		16.551	507.38	25.703	109.83	9.5453	
669	36080	REXM10	tailings	24.638		265.91	13190	654.24	19466	528.45	2688.7	214.95	595.78	159.76		347.16	42028	1114.5		369.22		75.899	409.62	74.502	2017.1	131.57		78.921		13.867	77.196	11.597	57.552	6.4491	
670	36080	S17002	rock	24.758		391.36	2519.9	318	486.83	120.23		119.41		138.77	8608	931.08	235291	2859.2		875.32		205.03	454.43	107.71	1357.9	157.44		179.41		28.452		11.844	57.635	9.6586	
671	36080	S17002A	rock	24.855		292.24	1582.3	251.24	808.75	111.07		77.467	507.04	113.67		348.82	46110	1131.8		352.43		88.279		47.946	915.91	92.467		235.74		22.83		9.3189	21.01	6.8225	
672	36080	AA04	humus	21.941		207.14	6284.7	455.1	2638.6	212.23	567.17	130.87		128.51		254.73	8411.4	481.81		184.17		71.532	371.85	64.635	1558.2	102.32		120.9		15.281	394.25	20.934	40.891	6.8646	
673	36080	SH03	tailings	22.006		270.49	14653	675.29	878.25	186.35	1278.3	174.47	549.79	156.73		293.06	27035	878.9		286.61		78.765		46.333	245.85	57.578		193.51		20.544		6.4709	187.09	10.435	
674	36080	AA05F	tailings	22.076		189.13	8416.8	518.31	825.17	158.69	618.94	129.31	522	142.99		308.11	20398	744.05		243.83		63.735	163.24	50.156	3307.5	150.5		102.47		14.77	52.366	9.2561	75.871	6.8103	
675	36080	AA19	dolomite	22.139		121.31	11023	582.94	5220.2	289.39	829.95	136.88	503.93	132.16	1250.9	316.48	8045.1	474.06		172.62		46.408		27.478		38.836		25.589		9.5052	652.85	25.885	43.936	6.9319	
676	36080	AA03	tailings	22.201		311.85	5791.6	449.4	1159.2	169.21	519	135.05		146.29		379.95	65361	1368.2		400.08		90.093	259.47	67.621	1090.8	105.32		210.52		23.331	99.105	14.617	118.13	10.787	
677	36080	AA01A	???do not know what this is	22.295		303.44	6849.3	475.06	645.86	145.33	478.11	120.32	528.27	142.58		357.8	62620	1334.6		414.88		84.77		56.373	948.73	98.371		172.53		19.584	34.47	10.121	97.093	8.93	
678	36080	REX06	rock	22.451		293.7	2035.7	284.5	5563.4	271.51		67.472		91.677		370.73	87244	1577.6		475.5		102.64	572.4	90.102		55.087		49.092		20.032		4.4751		2.4019	
679	36080	S17001	rock	22.833		239.03	1889.9	265.84	838.54	110.68		61.198	352.48	97.029		353.91	59957	1302.6		410.44		85.647		52.217	888.98	94.016		279.15		27.475		9.9331		7.372	
680	36080	S17001A	rock	22.96		220.23	8285.9	509.88	5750.4	292.41	729.54	130.14	523.73	124.46		217.6	9253.1	502.81		163.22		37.805		35.814		40.006		40.088		12.863	49.257	8.0677	82.134	5.9608	
681	36080	S17003	rock	23.101		278.19	7448.5	494.08	2497.8	214.52	1340.4	149.09	756.65	149.71		333.67	33677	967.21		315.48		70.271		46.679	852.43	86.045		145.42		21.609	31.555	8.6305	118.23	8.4709	
682	36080	S17004	rock	23.165		229.39	13912	650.65	2354.5	227.92	1050.9	151.56	573.13	147.71	1519	362.56	15424	655.27		197.31		71.195	157.12	46.789	411.17	61.837		39.327		11.051		5.8487	162.39	8.1884	
683	36080	REXM04	tailings	23.24		289.84	19608	769.37	1670.8	227.69	1919.1	187.1		147.18	2798.1	484.59	31302	953.91		302.7		75.136		42.049	1122.9	98.072		127.86		17.786	115.11	13.42	151	9.5946	
684	36080	REXM05	tailings	23.309		268.02	12546	633.83	3795.8	274.25	1584.4	173.6		146	1076.1	349.54	26592	862.91		266.79		74.095		54.32	3217.4	153.89		79.083		18.129	46.842	9.0642	43.084	5.4008	
685	36080	HRC5A01	???do not know what this is	23.376		293.98		204.21	464	129.65		101.22		157.09	19346	1033	13595	638.73		188.18		73.835		61.687	7476.2	232.77		131.35		21.818		7.0824		4.1107	
686	36080	REXM03	rock	23.466		293.8	1322.2	246.06	308.37	91.506	278.5	90.783	571.31	129.53	3744	554.81	71404	1406		419.39		78.02		53.977	4975.5	211.42		46.924		14.55	27.024	8.6151	40.987	5.6747	
687	36080	REXM02	rock	23.56		262.98	1757.1	272.95	2365	186.57		84.978	413.75	120.14	9010.3	725.3	19639	738.92		246.15		70.248		45.166	1192.9	95.194		142.5		16.183		6.8596		3.8351	
688	36080	S17003	rock	23.624		214.86	5663	424.49	465.67	117.96	503	104.56	696.8	131.71	1140.8	317.73	13395	598.15		172.82		62.279	205.84	48.103		35.702		28.415		10.532		3.2629	158.32	7.7473	
689	36080	CCP801	soil	23.784		213.6	6206.3	459.57	2946.4	227.41	1562.4	173.18		141.9		212.68	10537	535.72		165.18		66.477		39.227	265.34	54.285		54.523		13.901	132.25	12.24	187.36	8.8888	
690	36080	CCGEM23	soil	23.875		190.83	7849.6	502.48	4121.5	257.93	1282.4	161.2	804.25	153.01		300.09	14935	638.43		205.27		67.598	151.86	45.74		35.256		25.368		12.76	137.62	12.677	136.47	7.8103	
691	36080	REXM09	rock	24.007		300.92	3094.3	342.31	479.51	116.62		103.82	589.66	141	7392.1	705.92	50683	1201.8		382.56		90.144	189.26	57.307	5299.3	212.05		257.34		26.285		10.665		7.981	
692	36080	CCP802	sludge	24.075		287.35	5496.6	440.17	1056.6	166.22	668.11	138.68		147.42		291.25	11252	556.46		182.29		81.105		57.133	7526.9	219.97		125		20.912		7.3713	99.956	7.4967	
693	36080	CCP803	soil	24.161		291.75	9487.5	549.13	1116.5	174.54	1043.8	151.68		138.88		304.4	10542	541.35		177.83		59.847		43.303	6586.4	205.59		126.88		16.767	74.901	10.639	185.39	9.6655	
694	36080	S17005A	rock	24.233		373.74	5184.3	410.94	733.69	127.36		100.26		108.82	21900	1238.4	140595	2132.8		674.15		128.47		65.99	613.18	101.44		268.98		27.573		13.569	76.019	10.461	
695	36080	S17002B	rock with black spot	24.921		317.05	11298	588	914.27	159.01	601.14	110.4	326.23	107.75	14006	971.9	77069	1530.3		484.82		90.359	227.34	63.667	1661.4	132.49		249.8		26.414		9.1663	44.588	8.0092	
696	36080	S17002C	rock	25.001		263.21	13523	641.68	4630.3	279.81	3005.8	232.29		121.13	9937.7	836.18	69078	1449.5		466.65		92.859		43.139	594.1	82.991		204.06		22.235		8.4508	149.21	10.825	
697	36081	SUCC05	tailings	1.349		269.87	11808	608.2	540.21	158.99	695.97	135.37		138.61		357.76	52650	1231.2		373.1		97.818	185.71	58.985	1382.8	113.01		200.5		24.447	68.427	12.529	105.92	9.6173	
698	36081	REXM07	tailings	1.43		200.19	5695.1	418.84	419.34	104.09	350.93	110.08	318.16	104.08		209.67	11413	551.89		184.66		56.042		34.244		38.379		76.41		9.7826		4.0164	57.807	5.198	
699	36081	CCP804	pebbles	1.504		218.46	17406	729.5		176.39	1742.3	198.13		157.84	2347.1	429.07	12882	609.24		204.66		62.006		40.261	738.91	78.093		100.68		16.789		6.6305	225.73	9.9626	
700	36081	CCP804A	rock	1.593		259.27	13127	634.35		161.44	754.62	147.89		131.33	1649.5	364.98	6005.3	416.97		153.67		74.378		35.79	235.5	51.429	233.57	73.618		11.99		4.4109	188.78	8.6278	
701	36081	CCP804B	rock	1.729		276.83	13721	650.18	642.72	177.16	1220.7	162.43	673.19	162.41		309.13	11535	568.55		192.13		74.149		43.77	237.08	52.981		54.233		15		3.9003	272.45	10.354	
702	36081	YD03A	rock	1.855		151.31	9289	525.63	1657.2	174.52	749.62	132.31		100.9		224.29	7294.9	445.66		138.55		58.229		33.797		35.255		21.69		10.523		2.6086	375.12	11.52	
703	36081	YD03B	rock	1.923		187.52	16733	699.21	2123.1	216.27	1663.2	192.98	415.13	127.24	3807.3	502.05	8362.8	494.28		173.71		62.173	139.57	44.158		37.811		27.485		12.329		4.3606	202.57	8.928	
704	36081	CCGEM06	filter cake	2.04		350.36	1339.9	277.21	5042.6	270.47		91.595		124.12	6675.9	946.87	333520	3554.9		1021.6	1468.8	327.07		113.01	33701	857.14		151.66		32.819		16.247		8.0348	
705	36081	CCP69	filter cake	2.169		247.2	9647.1	553.89	1681.2	192.72	719.68	146.62		133.12	2139.4	432.83	33266	966.62		308.58		74.2	301.18	65.1	5789.1	209.4		194.95		19.297		9.0996	128.69	9.5015	
706	36081	CCP86	filter cake	2.43		165.85	3065.8	317.05	1006.8	122.91	260.22	83.11	595.35	110.63		171.82	7139.6	431.05		138.57		45.869	120.23	26.758	1619.5	98.016		60.292		7.4512		3.222	9.4222	2.3308	

ID	DATE	Sample	Sample Type	Time	Chromium-high (mg/kg)	Chromium-high standard deviation	Potassium (mg/kg)	Potassium standard deviation	Calcium (mg/kg)	Calcium standard deviation	Thallium (mg/kg)	Thallium standard deviation	Chromium-low (mg/kg)	Chromium-low standard deviation	Manganese (mg/kg)	Manganese standard deviation	Iron (mg/kg)	Iron standard deviation	Cobalt (mg/kg)	Cobalt standard deviation	Nickel (mg/kg)	Nickel standard deviation	Copper (mg/kg)	Copper standard deviation	Zinc (mg/kg)	Zinc standard deviation	Arsenic (mg/kg)	Arsenic standard deviation	Selenium (mg/kg)	Selenium standard deviation	Strontium (mg/kg)	Strontium standard deviation	Zirconium (mg/kg)	Zirconium standard deviation	Molybdenum (mg/kg)
707	36081	CCP27	filter cake	2.502		189.44	7420.3	489.23	2940.6	222.94	930.1	140.21		121.34	1456.6	358.38	24486	821.94		260.15		55.265	204.17	46.871	1003.5	87.244		168.58		15.621	28.593	8.4062	76.757	7.1182	
708	36081	CCP56	filter cake	2.595		274.47	9875.8	558.29	1501.6	187.1	891.13	156.09		134.96	1403.2	368.41	23874	815.33		271.53		66.04		38.932	3478.6	157.31		166.3		15.898	41.188	9.3587	120.02	8.6414	
709	36081	CCP26	filter cake	2.666		345.5	2109.5	322.29	4036.5	252.32		117.12		141.38	2463.4	572.5	126320	1957.1		635.46		153.99		77.738	5056.9	244.57		149.19		22.801	52.737	13.282	50.122	8.1306	
710	36081	CCP74	filter cake	2.735		233.88	6073.7	438.94	1245.8	153.19	531.35	111.55	638.45	125.26	1466.9	356.04	21625	766.52		249.62		57.97	127.84	41.442	3802.2	161.08		145.24		14.359	26.03	7.8533	92.524	7.2896	
711	36081	CCGEM10	filter cake	2.796		246.61	9793	554.64	1388	180.49	752.72	136.56	607.96	140.39	1437	370.11	27396	873.06		283.38		52.69		44.527	3885.7	167.44		172.07		15.393		7.5078	83.313	7.7571	
712	36081	CCGEM13	filter cake	2.854		275.15	7493.9	498.4	1277.7	176.77	535.66	133.29		139.31	1246.6	361.42	22321	786.48		264.87		74.622		49.877	4199.1	172.65		168.49		16.132	35.164	9.217	74.931	7.5823	
713	36081	CCP46	filter cake	2.92		238.74	2628.4	308.83	1727.4	162.45		90.566		99.632	1068.9	327.67	32218	927.71		272.49		43.859	134.96	35.765	3094	147.99		99.241		12.933		5.1902		3.7123	
714	36081	CCGEM03	filter cake	2.977		283.88	5856	436.34	857.39	141.34	610.01	117.27	604.69	132.39	4229.1	552.96	44434	1112.6		352.06		74.625	156.49	47.693	5018.9	199.86		150.91		12.855		5.429	53.396	6.1967	
715	36081	CCGEM20	rock	3.055		143.02	6276.3	443.06	666.79	127.96	710.69	119.49	360.49	112.53		192.38	19487	720.45		217.43		44.222	227.39	46.619	178.36	44.566		68.479		9.9321	42.332	7.9221	69.582	5.6538	
716	36081	REP10A	rock	3.128		331.47	45188	1139.7	1015	273.28	4996	308.18		162.6		250.79	9731.5	553.76		193.3		61.98		34.413		41.679		24.642		12.842		5.2613	204.93	9.3723	
717	36081	REP10B	rock	3.19		262.28	17633	719.27	2330.4	226.11	1025.4	154.13		103.53	1252.5	357.13	15551	663.5		218.37		62.863		43.523	2183.2	123.74		71.527		15.457		4.902	307.71	11.49	
718	36081	CCP62	sludge	8.475		164.53	1921.9	326.68		142.65	9012.8	345.07	962.41	201.57	1995.9	415.26	20584	762.63		242.02		79.571		47.03	2691	140.86		187.42		21.792	26.893	8.951	159.47	9.5854	
719	36081	CCP33	sludge	8.545		262.97	1340.2	304.77	1081.4	174.4		114.27		170.46	2489.6	474.26	42969	1084.1		348.46		88.029		59.438	3384.1	167		130.49		24.58		8.5688	77.329	7.3923	
720	36081	CCP42	sludge	8.613		247.39		216.03		85.488		80.1		156.58		207.39	2258.8	274.65		115.78		88.637		53.361	486.24	70.142		44.376		17.444		4.4632		2.7033	
721	36081	CCP4	panning	8.691		221.11		218.29	1256.9	154.43	604.79	130.08	659.57	154.91	2103.6	409.51	33463	946.22		302.77		71.38		36.49	324.42	56.863		102.34		16.708		5.7915	62.96	5.9407	
722	36081	CCP24	panning	8.8		367.06	6426.2	487.24	3380.8	254.91	1072.3	155.9		171.9	6564.8	732.9	95534	1702.9		533.19		117.32	291.24	77.296	3119.4	183.29		200.46		24.725	178.41	19.855	204.11	13.353	
724	36081	CCP1	???do not know what this is	9.317		299.87	2434.7	331.72	1597.3	179.63	7093.8	323.41		162.45		618.41	187890	2496.5		777.82		162.44		60.837	751.41	114.92		134.97		19.468	48.446	14.14	826.09	28.325	
725	36081	CCP3HM	???do not know what this is	9.531		314.06	1452.9	260.82	2814.8	202.41		105.45		115.58	4482.2	619.37	90112	1621.3		505.58		105.26	296.24	64.961	1106.8	109.02		203.32		24.029	60.082	12.865	87.42	9.6018	

Attachment A: Spectrace 9000 Field-Portable X-Ray Fluorescence Data, Co

ID	DATE	Sample	Sample Type	Time	Molybdenum standard deviation	Mercury (mg/kg)	Mercury standard deviation	Lead (mg/kg)	Lead standard deviation	Rubidium (mg/kg)	Rubidium standard deviation	Cadmium (mg/kg)	Cadmium standard deviation	Tin (mg/kg)	Tin standard deviation	Antimony (mg/kg)	Antimony standard deviation	Barium (mg/kg)	Barium standard deviation	Silver (mg/kg)	Silver standard deviation	Uranium (mg/kg)	Uranium standard deviation	Thorium (mg/kg)	Thorium standard deviation	Calculated Iron (mg/kg)	Calculated Lead Concentration Compared to CAS (mg/kg)	Calculated Lead (mg/kg)	Calculated Zinc Concentration Compared to CAS (mg/kg)	Calculated Zinc (mg/kg)	Calculated Copper (mg/kg)	Calculated Cadmium (mg/kg)
ID	DATE	Sample	Sample Type	Time	MOSD	HG	HGSD	PB	PBSD	RB	RBSD	CD	CDSD	SN	SNSD	SB	SBSD	BA	BASD	AG	AGSD	U	USD	TH	THSD	CFE	CPBCAS	CPB	CZNCAS	CZN	CCU	CCD
3	36070	SUCC01	rock	9.65	4.4149		33.72	1075.1	71.12	83.587	16.192		69.303		44.797		26.849	157.19	13.784		42.183		10.112		9.6148	95132.44326	1537.3724	1839.16769	248.7552	586.17496	381.0965	6.1981
4	36070	GERT01	rock	9.748	5.6965		36.827		20.843	226.25	25.058		91.953		54.569		32.59	597.88	25.469		57.75		12.63		7.3744	120167.415				136.800944		1.61834
5	36070	SUCC02	rock	9.869	5.324	451.98	110.4	3975.7	160.86	51.214	16.943	535.46	97.19		56.725		33.04		8.8041		52.353		8.4929		13.041	30846.99009	6538.0068	6920.72883	160133.436	207772.146		393.01384
6	36070	SUCC03	rock	10.26	4.2429		79.908	5990.2	188.04		13.445	257.53	68.096		40.751		23.728		6.695		38.451		7.9824		16.001	26843.28738	10011.0048	10449.93138	127746.87	165651.7495		298.24098
7	36070	SUCC04	rock	10.361	5.0733		30.651		17.703	283.49	23.77		63.04		40.601		22.638	584.32	22.218		39.57		15.716		7.9949	26472.4281				181.767684		2.076615
8	36070	SUCC05	Gravel	10.476	5.1886		47.096	5153.9	155.17	108.52	19.224		77.491		48.454		28.916	151.19	14.074		48.872		13.018		17.567	75981.02942	8569.2236	8984.81741	2128.3086	1577.24868	41.53425	16.29855
9	36070	REX01	Gray Soil/Tailings	10.571	3.3353		33.66	754.79	53.342	61.534	12.556		53.134		33.802		19.828	95.175	10.046		31.053		9.7034		9.1175	28986.76926	985.15796	1278.016601	4986.1494	3047.10252	87.85925	31.27845
10	36070	REX02	Dark Gray Soil/Tailings	10.654	4.6545		40.917	2534.8	100.26	175.86	20.369		61.835		39.005		22.686	180.22	13.472		38.484		14.427		14.18	40372.83975	4053.8952	4396.41612	1997.31	1427.51		14.7725
11	36070	REX03	White Material "Acid Drum"	10.79	2.2358		25.247	87.614	18.476		5.737		36.488		25.442		13.484	50.231	6.8071		24.246		6.5357		5.7759			109.1909666		105.848932		1.302895
12	36070	REX04	Dk Red Bn Drum Material	10.91	3.1686		34.165	866.28	51.745		8.3196		50.535		33.048		18.55		5.2292		31.707		9.4127		10.443		1177.36672	1473.335932	672.91632	613.301696		6.47456
13	36070	REX05	rock	11.009	7.6007		100.7	20251	412.26		27.52	324.27	89.264		50.525		32.308	31.157	10.353		50.385		12.138		24.249	117000.0181	34596.624	35433.4269	97639.254	127001.4765	4188.085	211.27606
14	36070	TAM01	rock	11.147	8.7512		98.094	30896	577.53		32.31		74.998		48.069		31.348		9.2367	166.95	53.375		12.338		26.842	259766.9231	52948.604	54082.4024	2826.3354	2365.54892	233.1835	24.33245
15	36070	TAM02	rock	11.231	3.6701		52.331	888.02	84.927		12.28		79.578		48.657		28.237		8.2586		48.718		5.0111		6.3846	270642.3792	1214.84648	1511.422238		652.649004	154.40375	6.875565
16	36070	SUCC06	rock	11.45	4.0219		150.91	1247.4	110.7		10.27	798.77	110.27		58.542		42.694		8.9995		52.882		4.2796		6.1764	92852.5412	1834.4176	2141.02006	289125.06	375798.897		771.08188
17	36070	REX06	rock	11.537	7.9184		90.482	26612	478.23		25.779		66.593		43.69		25.232	46.055	10.216		42.419		13.605		29.236	120421.3041	45562.988	46577.2628	16021.8306	20903.72135		
18	36070	REX07	rock	11.616	5.5818	218.05	71.304	11302	266.97	101.44	21.311		63.603		43.379		25.06	75.624	11.401		39.215		11.597		22.234	128511.8121	19168.548	19755.6738	2373.504	1829.2204	223.83675	18.8665
19	36070	REX08	rock	11.692	3.5495		23.474	215.34	28.86	120.59	14.826		51.151		32.151		18.947	220.62	13.285		28.387		11.51		7.7488	13897.57884	55.14616	332.954146		126.318108		1.511505
20	36070	REX09	rock	11.768	4.0335		34.582	403.76	40.402	105.55	15.697		57.213		36.077		21.869	194.01	13.311		33.253		11.628		8.2724	39096.52587	379.98224	663.047144		221.239116	44.91325	2.478885
21	36070	REX10	rock	11.841	3.2382		26.366	115.11	21.914	106.62	13.863		48.337		31.651		17.948	163.32	11.722		25.247		10.859		6.211	17687.31051		157.361209		154.719936		1.80096
22	36070	REX11	rock	11.918	3.8429		29.295	390.84	38.171	133.01	16.133		58.211		36.34		21.432	227.74	13.949		37.475		12.485		8.0363	20580.02385	357.70816	640.412596		274.014384	112.793	3.01674
23	36070	TAM03	rock	12.009	4.1832		32.568		18.562	150.59	18.35		61.7		40.05		23.832	270.89	16.037		37.244		11.465		5.9601	62679.46065		26.5906335		222.6609		2.493375
26	36071	REP01	soil		5.01		32.6	1086	61.7	139	17.2		63.4		35.9		20.9	412	18.1		34.6		13.2	37.8	12.5	9963	1556.164	1858		252	155	2.8
27	36071	REP02T	western white pine	10.671	3.8284		38.872		19.253		8.2267		51.776		34.796		19.607	50.717	7.9611		27.412		9.5764		7.4877			23.9242417	647.5749	596.285424		6.30114
28	36071	REP02B	soil		4.21		38.94	2064	85.7	95.6	15.4		47.5		32.7		17.3	229	13.9		28.6		12.1		13.1	17825.00568	3242.236	3571.79679	1391.844	1064.768894		11.0756525
29	36071	REP02C	soil		5.04		39.9	250	33.9	119	17		60.9		38.2		22.6	449	19.2		35		12.7		8.66	19548	114.9	394	2596.584	1738		17.9
30	36071	REP02A	forest litter		2.35		29.3	202	26.3		5.7		25.9		17.3		9.51	19.5	4.45		13.5		6.24		6.12	2648	32.148	309	483.378	512		5.44
31	36071	REP03G	grass		1.54		18.3	86.6	15		3.96		17.1		14.2		6.67	17.4	2.34		8.66		4.75		4.51			107		137		1.6
32	36071	REP03A	soil		5.77		49.9	9981	209	98.2	19.4		80.6		50.3	135	32.2	299	18.3		50.7		14.6		23.3	42126	16891.144	17443	1332.756	1075	243	11.2
33	36071	REP04A	forest litter		2.67		31.4	3049	89.4	101	9.14		26.8		18.6	73.6	10.2	38.4	5.31		15.3		8.2		12	9507	4940.376	5296	1106.01	878	38	9.17
34	36071	REP04C	soil		4.96		40	2415	96.9	108	17.1		64		41.8		24.3	441	19.7		38.4		13.1		14.4	22398	3847.36	4187	876.6	802	44.7	8.39
35	36071	REP04B	soil		5.79		48.8	7656	180	118	19.3		61.4		40.6	82.1	24.6	334	18.1		36.1		14.8		21.9	23599	12883	13368	833	782		8.19
36	36071	REP04T	western white pine	11.316	3.7948		45.496	94.045	23.473		8.5146		52.781		34.852		19.596	41.549	7.6863		27.171		9.9359		8.2719	248.166		120.4574355	1468.875	1048.48044		10.90965
37	36071	REP05A	forest litter		3.49		33.2	1990	76.5	35.9	10.9		38.6		24.2		14.3	69.2	7.49		22.2		9.41		11.4	10748	3114.66	3442	1252.392	969		14.2
38	36071	REP05B	soil		3.18		31.7	1554	72.7	41.2	10.6		33.6		22.3		12.5	78.9	8.08		17.8		9.38		11.2	14177	2362.996	2678	869.622	761		7.98
39	36071	REP05C	soil		4.66		30.8	90.1	23.9	99.8	15.5		56.3		36.3		20.6	382	17.6		33.2		11.6		7.77	21716		114	546.336	616		6.5
40	36071	REP05T	western white pine	11.611	2.8287		27.813	203.55	26.983		6.6742		40.947		27.703		16.192	33.283	6.4979		18.555		7.433		6.5281	731.052405	34.8202	312.299245	207.3207	361.56694		3.909025
41	36071	REP05T2	western white pine	11.681	3.6101		36.25	231.35	31.017		7.7697		47.999		31.81		17.286	40.474	7.4303		26.251		9.3718		8.9487	5144.947395	82.7474	361.002065	440.25276	496.376888		5.28293
42	36071	REP05T3	cedar	11.754	3.7627		41.71	409.98	38.463		9.2856		41.52		26.125		15.329	42.708	6.9767		23.57		10.18		9.2041	5839.04973	390.70552	673.943962	550.63578	559.894524		5.930265
43	36071	REP06A	forest litter		3		33	824	53.4	30	8.8		32.1		21.6		12.6	124	9.75		18.4		8.04		8.86	9027	1104.476	1399	1780.152	1245	61.4	12.9
44	36071	REP06B	soil		4.51		36.2	2429	96.4	64.7	13.9		50.8		32.1		19.2	286	15.6		27.1		11.1		13.5	24972	3871.496	4211	1006.77	867		9.06
45	36071	REP06C	soil	12.006	5.1801		42.571	226.4	34.029	94.744	16.17		69.779		45.663	85.556	27.115	629.32	23.121		41.715		11.923		8.9987	24658.8081	74.2136	352.33016	184.30032	426.664336		4.57246
46	36071	REP06T	conifer	12.086	2.9085		29.693		16.898		6.639		37.741		25.149		14.315	64.932	7.532		14.977		7.1012		6.5845			26.0633116	308.27172	410.189696		4.40456
47	36071	REP06M	moss	12.172	2.3707		28.518	449.38	37.446		6.7464		39.262		26.148		15.423	68.904	7.6705		20.849		7.4761		7.8098		458.63112	742.968822	98.6658	294.82208		3.2288
48	36071	REP07T1	cedar	12.274	4.2994		41.637	853.46	55.34		11.393		54.193		34.146		19.895	90.468	9.7384		31.27		11.793		10.702	11157.55302	1155.26504	1450.876574	972.08256	801.947608	45.9215	8.39713
49	36071	REP07T2	western white pine	12.373	3.2411		36.865	274.58	31.7		7.294		46.472		31.208		18.217	37.677	7.0879		23.07		8.1659		7.3546	3845.26992	157.27592	436.736702	209.96874	363.801172	115.00025	3.931795
50	36071	REP07T3	douglas fir	12.464	3.9946		41.728		20.36		9.7423		51.382		33.338		18.789	90.497	9.4486		27.138		10.144		7.5558	2034.902262		29.2289949	596.23596	572.205368		6.05573
51	36071	REP07A	forest litter		2.25		30	166	24.6		6.51		28.2		18		10.4		3.8		15.8		6.76		6.53	174		247	553.908	549		5.82
52	36071	REP07B	soil		3.57		36.1	1587	76.4	36.5	10.8		40.3		26.7		15.6	124	10.4		22.2		9.17		11.7	20353	2419.888	2736	657.15	667	50.6	7.03
53	36071	REP07C	soil		5.01		36.4	97.2	25.9	85.9	15.9		60		38.7		21.4	464	19.7		35.2		12.5		8.17	25715		126	104.544	389		4.18
54	36071	REP08T1	cedar	12.8	4.1593		42.442	108.27	26.233		9.5929		55.42		33.226		19.111	61.902	8.5167		32.526		10.821		9.2365	2719.357365		145.378213	861.12552	721.740936		7.57971
55	36071	REP08T2	western white pine	12.88	3.7181		40.597	211.28	30.794		9.3498		49.191		34.069		18.524	42.486	7.6013		26.22		10.249		8.5117	4590.14586	48.14672	325.841432	379.41672	467.061056		4.98416
56	36071	REP08T3	cedar	12.961	3.9948		38.812	198.26	30.544		9.2121		51.214		32.427		18.624	36.291	7.3403		30.087		10.638		8.7598	5015.652405	25.70024	303.031694	434.937	497.82124		5.29765
83	36071	REP08T4	douglas fir	13.722	3.9241		43.397	98.914	24.216		9.466		51.947		33.385		18.978	84.993	9.3149		29.122		10.062		8.2831	1661.91318		128.9874366	529.40124	537.744032		5.70452
57	36071	REP08A	forest litter		2.23		25.2	228	27.2	34.8	6.93		27.5		18.5		9.98		3.73		15.9		6.79		6.73	6502	76.972	354	718.82082	646		6.8
58	36071	REP08B	soil		4.59		44.7	2371	97.7	71.7	15.1		49.9		32.6		18.9	250	14.8		29.3		11.3		13.5	28014	3771.504	4109	1433.316	1117		11.6
95	36071	REP08C	soil	17.695	5.0066		37.535	150.27	28.654	97.308	15.583		56.251		35.778		20.239	428.38	18.781		34.581		11.399		7.9735	22742.87715		218.958013	274.42758	475.715884	72.38125	5.072365
84	36071	REP09T1	cedar	13.809	3.6734		44.778		22.014		8.7649		49.985		32.126		18.252	30.202	6.945		28.533		9.9143		8.7275	408.744423		64.4772229	1137.90744	867.123992		9.06137
85	36071	REP09T2	douglas fir	13.878	3.8973		41.279		20.91		9.1493		49.181		33.144		17.908	49.356	7.8114		24.832		9.8754		7.5759	451.070505		59.4054724	1161.66012	881.409536		9.20696
86	36071	REP09T3	western white pine	13.95	4.503		44.149		22.246		11.489		60.687		40.173		21.949	28.582	7.8619		35.429		12.086		8.2812	2879.719209			1351.77714	982.965536		10.24196
87	36071	REP09A	forest litter		3.14		35.4	948	57.5	36.1	9.48		33.8		23.1		12.7	62.9	7.49		19.2		8.81		9.68	13035	1318.252	1617	1712.634	1219		12.6
88	36071	REP09B	soil		4.24		43.5	4168	128	70.5	15.2		42.2		28.2	57	16.9	171	12.3		25.8		11.9		16.8	25916	6869.532	7258	1527.288	1157	58.9	12
89	36071	REP09C	soil		5.14		38.5	753	51.7	98.5	17.1		66.8	144	43		24.5	582	22.2		37.8		13		10.2	22021	982.072	1275	1625.322	1216		12.6
59	36071	REP10	soil		4.72		39.6	2119	87.1	82.1	14.7		71.6	309	46.3	199	27.1	538	21.1		40.6		12.4		13.6	16672	3337.056	3667	228.234	421	107	4.51
60	36071	REP11G	grass		1.49		17.8	62.7	9.93		4.04		19.8		14.4		7.15	25.3	3.38		10.6		4.91		3.69			65.5		333		3.62
61	36071	REP11S	tailings/soil		4.87		38.1	1081	63	123	16.9		70.2		42.9		25.3	499	20.3		42.8		13.6	36.9	11.8	19910	1547.544	1849	1753.65	1261	106	13.1
102	36071	ROSET	RoseLake Dredge Spoil	18.233	4.9422		42.397	2296.5	111.71	78.763	16.61		73.16		48.197		28.28	400.51	21.267		45.9		9.4584		11.692	125434.2751	3643.066	3978.93835	2114.8824	1681.17432		17.3577
103	36071	END	End of Fligh	18.342	2.5681		21.424		6.4875	54.312	9.3998		38.326		25.92		14.477	252.75	13.071		19.393		8.656		5.1211	4430.960055				5.0907108		0.2760255
106	36072	GEM01	douglas fir	8.319			32.6816	108.564	21.2437						23.7245		13.4319	45.4676	6.47616							1798.172651		145.8932716		124.4855864		1.492829

ID	DATE	Sample	Sample Type	Time	Molybdenum standard deviation	Mercury (mg/kg)	Mercury standard deviation	Lead (mg/kg)	Lead standard deviation	Rubidium (mg/kg)	Rubidium standard deviation	Cadmium (mg/kg)	Cadmium standard deviation	Tin (mg/kg)	Tin standard deviation	Antimony (mg/kg)	Antimony standard deviation	Barium (mg/kg)	Barium standard deviation	Silver (mg/kg)	Silver standard deviation	Uranium (mg/kg)	Uranium standard deviation	Thorium (mg/kg)	Thorium standard deviation	Calculated Iron (mg/kg)	Calculated Lead Concentration Compared to CAS (mg/kg)	Calculated Lead (mg/kg)	Calculated Zinc Concentration Compared to CAS (mg/kg)	Calculated Zinc (mg/kg)	Calculated Copper (mg/kg)	Calculated Cadmium (mg/kg)
107	36072	GEM02	douglas fir	8.474				131.618	24.6997		8.41569				28.8352	57.7039	17.0834	49.659	7.23475							2469.375177		186.2815742		213.0108232		2.395027
108	36072	GEM03	douglas fir	8.614			39.2351	111.506	23.1089						27.7042			53.4368	7.28733							1347.935852		151.0473614		188.064156		2.140785
109	36072	GEM04	douglas fir	8.815	2.9151		29.039	61.357	18.335		7.8175		36.38		25.347		14.286	46.943	6.7092		16.309		8.4617		7.2004	728.535465		63.1913283		159.989564	44.1775	1.854665
110	36072	GEM05	douglas fir	8.97	3.549		38.831	343.24	36.646		9.8739		48.075		30.188		16.695	79.11	8.8133		25.336		10.634		9.3443	10229.72634	275.64576	557.022156	150.13554	350.598892		3.797245
111	36072	GEM06	True Fir	9.092	3.2953		36.278	64.839	19.971		8.0374		47.265		30.134		17.485	89.322	9.0009		24.167		10.183		7.3941	154.38966		69.2914441	81.17184	287.352072		3.15267
112	36072	GEM06A	True Fir	9.18	3.8336		42.299	83.968	22.629		8.7501		53.03		33.798		20.617	106.11	10.092		29.215		9.957		7.5116	233.661993		102.8035392	63.17904	276.71126		3.044225
113	36072	GEM07	douglas fir	9.282	3.0146		33.428	95.449	20.801		6.3655		36.689		25.247		13.967	37.013	6.242		16.534		7.3582		6.9061			122.9171031		208.804148		2.352155
114	36072	GEM08	Maple	9.411	3.5523		40.516		18.446		8.7964		49.875		31.795		17.884	55.942	8.07		28.678		10.198		8.2657	1955.904464			169.67784	334.835144		3.63659
115	36072	GEM08A	douglas fir	9.492	2.8068		32.368		16.753		6.4326		35.389	78.137	24.634		12.94	48.761	6.6323		15.067		8.1146		6.4117			42.3069284		148.141364		1.733915
116	36072	GEM08B	Ponderosa Pine	9.57	2.9169		29.824		15.837		6.4834		40.492		25.638		15.144	17.01	5.4752		20.701		7.924		6.6428			5.3541017		144.699744	18.1265	1.69884
117	36072	GEM09	western white pine	9.726	3.9054		40.328		20.331		8.5409		49.804		32.467		18.196	33.389	7.1751		27.606		9.4034		8.4084	1548.462992		25.3975896		185.638096		2.11606
118	36072	GEM09A	Larch	9.811	3.7373		36.272	108.4	23.168		8.301		42.209		28.068		16.484	64.814	7.9052		22.151		9.4156		7.2951	2182.622565		145.60596	111.1791	310.33758		3.386925
119	36072	GEM10	cedar	9.925	3.6847		36.147	63.587	20.977		7.5455		45.426		30.531		17.474	77.492	8.5239		24.297		9.4369		7.6527	444.44529		67.0980653	51.11322	275.063796		3.027435
120	36072	GEM11	douglas fir	10.035	3.2785		34.806	114.78	23.657		8.4461		44.02		30.009		16.485	65.749	8.1085		23.276		9.4679		7.3978	2306.388903		156.783082	13.27224	252.033152		2.79272
121	36072	GEM12	western white pine	10.243	3.2885		35.632	66.469	21.437		9.2096		48.247		31.938		17.586	27.349	6.6351		25.91		9.8186		8.1569	165.874695		72.1470411		187.804624		2.13814
122	36072	GEM13	douglas fir	10.508	2.8731		35.911	87.058	19.771		6.4434		34.423	85.87	25.352		13.004	34.295	6.004		16.855		7.7473		6.0956			108.2169102	63.48252	276.451728		3.04158
123	36072	GEM14	douglas fir	10.605	3.3442		34.284	62.444	20.145		7.7648		44.243		29.503	60.203	17.848	45.835	7.2544		20.799		10.086		7.5996			65.0956436	66.5034	282.86104		3.1069
124	36072	GEM15	douglas fir	10.756	3.4119		39.591		16.349		7.7877		46.279		31.432		17.137	37.856	7.084		25.531		9.2314		6.977				74.29944	284.643912		3.12507
125	36072	GEM15A	Shrub	10.851	3.7881		45.205		16.462		9.7499		57.364		35.643		20.299	62.861	8.7951		33.639		10.549		7.5507					221.5325		2.481875
126	36072	YD02	douglas fir	11.744	4.0005		44.215		19.218		10.657		53.837		33.801		19.427	68.478	8.7076		26.511		11.202		8.0277	416.846079				257.494608		2.84838
127	36072	YD03	douglas fir	11.909	3.2063		36.464		15.125		7.0319		39.446		27.097		14.904	43.591	6.7251		18.285		8.1201		6.3433			1.8030004		171.54438		1.972425
128	36072	YD03A	douglas fir	11.998	3.0955		36.519	166.49	26.142		8.563		39.699		25.91		14.954	58.632	7.4709		21.684		8.9707		7.867	2654.253885		247.373831	312.70254	421.236732		4.517145
129	36072	YD03A	douglas fir	12.109	3.2797		33.087	223.39	29.341		8.3413		40.394		26.507		15.017	39.744	6.673		21.087		8.4248		6.6744	1023.641115	69.02436	347.056941	220.51626	370.165348		3.996655
130	36072	YD04	douglas fir	12.191	2.9165		34.161	109.69	22.682		6.8738		35.986		24.258		13.408	35.484	6.2296		16.951		7.5415		7.233	426.836055		147.865911		231.563976		2.58411
131	36072	YD05	douglas fir	12.307	4.0846		33.935		18.147		8.9383		46.099		30.333		17.461	51.53	7.6325		21.618		10.429		7.9165			17.7225157	304.09398	408.553516		4.387885
132	36072	YD06	douglas fir	12.412	3.6058		41.233	114.78	24.933		7.5856		50.143		33.197		18.433	68.885	8.5691		25.678		9.0309		7.3759	1125.69318		156.783082	322.58994	421.575252	67.994	4.520595
133	36072	YD07	douglas fir	12.526	3.6133		42.404		20.484		7.8024		47.647		30.343		17.047	90.952	9.1441		24.854		8.777		7.2992			54.4037979		223.800584		2.50499
134	36072	YD08	douglas fir	12.625	3.2537		31.935		16.674		8.0936		39.428		27.299		14.224	49.751	7.0832		19.646		9.1806		6.1928			14.7250148		219.61422		2.462325
135	36072	YD08	douglas fir	12.698	3.464		41.485	81.932	22.518		8.0136		46.906		30.845		17.302	41.747	7.2202		24.307		8.9447		7.4829	3257.787945		99.2366708	256.60464	391.277712		4.21182
136	36072	YD09	douglas fir	12.807	3.8662		40.867		16.25		8.5347		48.171		31.201		18.266	48.671	7.6516		23.968		9.5254		7.6857	1117.222635			308.89104	411.814592		4.42112
137	36072	YD09A	white precip coat fracture/rk	12.891	4.0694		32.355	133.64	25.455	90.963	14.682		68.95		43.065		24.838	689.64	23.456		41.717		11.463		7.0021	14652.66963		189.823916		145.218808		1.70413
138	36072	YD09B	douglas fir	12.969	3.4255		39.593		16.667		8.1815		40.277	101.99	29.55		15.625	42.888	6.9366		20.974		8.9133		7.5514				110.46498	304.650444	69.193	3.328965
141	36072	GEM01D	forest litter	16.296	2.2376		18.567	134.6	21.617		6.0087		18.401		14.137		7.3986	24.327	4.4559		11.539		6.3851		5.6612	627.08265		191.50574		177.964976	29.844	2.03786
142	36072	GEM02D	forest litter	16.374	2.2972		28.605	174.2	24.824		6.5154		31.566		20.388		10.625	62.504	6.9799		16.642		7.3313		6.3412	371.22441		260.88098		222.943		2.49625
143	36072	GEM03D	forest litter	16.448	2.6639		31.527	166.66	24.642		7.0506		26.4		18.469		10.363	62.332	6.9467		15.911		7.4165		6.3365	6647.39487		247.671654		258.634292		2.859995
144	36072	GEM03L	maple leaves	16.528	1.5781		24.14		9.6444		3.4501		17.958		13.067		6.8617		2.6558		9.6917		4.6209		4.4437							0.0547632
145	36072	GEM04D	forest litter	16.607	2.326		28.769		15.142		5.184		27.118		19.015		9.5207	21.78	4.7347		15.844		6.4603		5.741			20.9705383		237.205976		2.64161
146	36072	GEM05D	forest litter	16.681	2.4785		27.549	102.76	20.466		6.7916		28.264		17.788		10.964	40.534	5.8883		16.724		7.6684		6.0262	3033.447255		135.725244		223.315372		2.500045
147	36072	GEM06S	pale yellow soil/pebbles	16.754	3.9139		26.687		17.7	87.965	13.998		53.741		35.675		20.905	647.91	22.111		32.468		11.025		6.8486	18109.37121		13.1991099		192.408496		2.18506
148	36072	GEM08D	forest litter	16.847	2.4438		27.038	140.27	23.08		6.3795		26.405		18.671		10.072	20.021	4.6892		16.708		6.7102		6.0046	5482.19904		201.439013		234.39626		2.612975
149	36072	GEM08L	yellow shrub leaves	16.924	1.6903		21.629		8.7285		3.5863		19.226		14.536		7.7614		2.3303		11.903		4.8269		4.4562							0.2175526
150	36072	GEM08AS	pale yellow soil/pebbles	17.005	3.9422		28.888	446.27	41.452	59.466	12.676		48.824		32.043		18.289	376.75	17.103		30.126		10.505		8.2515	21861.21285	453.26948	737.520413		202.552812		2.288445
151	36072	GEM09D	forest litter	17.083	2.3387		24.274	59.756	16.541		5.1747		26.764		17.569		10.131		3.8474		15.462		6.4023		5.5679			60.3865364		82.2845548		1.0627405
152	36072	GEM10D	forest litter	17.159	2.6568		28.185	102.84	20.5	54.319	10.337		32.579		22.812		11.301	184.75	11.219		20.012		9.666		6.0388	4364.67669		135.865396		200.803792		2.27062
153	36072	GEM10S	medium brown soil	17.234	3.9008		28.248	194.32	28.755	73.825	12.246		51.702		31.982		18.424	437.09	18.235		31.868		9.4757		7.0186	16849.37247	18.90768	296.129208		274.691424		3.02364
154	36072	GEM12D	forest litter	17.312	2.4302		23.894	66.322	17.748		5.3032		27.809		19.204		9.3271	27.132	5.1548		16.591		7.0718		5.5505			71.8895118		193.09682		2.192075
155	36072	GEM13L	large green leaves	17.392	0.74577		12.606		6.4426		2.7044		12.659		10.046		3.9725		1.924		7.1077		3.2284		2.8764	550.3370595						
156	36072	GEM14D	forest litter	17.472	1.9949		22.271	51.93	14.39		5.7839		23.107		16.485		9.1264	32.596	5.14		12.563		6.5187		4.446			46.676167		187.364548		2.133655
157	36072	GEM1415R	red weathering lichen coated	17.55	2.8374		28.628		12.351	28.52	8.3505		45.988		30.516		17.799	264.41	13.711		25.927		8.8201		5.9805	7605.092175						0.01471675
158	36072	GEM15D	forest litter	17.631	2.2138		27.232	49.743	14.954		4.943		24.138		17.354		9.5795	15.381	4.1596		14.951		5.9978		4.8905			42.8447617		137.083044		1.621215
159	36072	YD01S	dark brown/blk soil	17.701	4.2565		27.933	93.887	22.807	57.81	12.334		49.739		32.275		19.67	342.97	16.204		28.557		10.638		7.2982	18986.72028		120.1806353		180.96652		2.06845
160	36072	YD03S	dark brown/blk soil	17.774	4.0054		33.056	128.97	24.644	78.336	13.524		48.018		32.473		17.202	337.73	15.965		27.248		11.394		7.0812	14957.1153		181.642543		131.802132		1.567395
161	36072	YD0405G	bear? Grass	17.852	1.691		20.698		11.478		3.8895		19.985		14.142		7.156		2.8408		12.166		4.8633		3.907					84.2897216		1.083176
162	36072	YD_CAP	rye? Grass on Hecla rem pile	17.933	2.0538		20.221		12.16		4.3183		20.368		14.73		7.3688		2.6673		11.143		5.8442		4.5893			3.8106778		188.01902	49.87275	2.140325
163	36072	YD09WP	white precip coat fracture/rk	18.03	4.2768		25.673	69.177	19.265	128.11	15.347		51.901		33.622		19.988	553.44	19.909		30.901		12.431		7.9287	7894.31121		76.8911863		14.2860424		0.369739
164	36072	PHO01	Orangeoxid on pho-Burke d	18.136	5.3895		39.509		21.32	180.8	22.056		73.18		45.353		27.33	411.25	20.812		45.509		11.674		6.6011	109731					258.17175	
165	36072	PHO02	"paler orange coating rock	18.256	3.8086		33.628	64.688	20.6	85.745	14.609		60.62		40.607		22.565	241.47	15.424		32.483		9.6716		5.8269	76742.74175		69.0269072		89.7229676		1.1385485
166	36072	PHO03	rock from splash H met lab	18.341	10.631		123.71	2958.4	198.18		32.423		230.66		138.45		79.203	825.5	47.692		143.45		7.4912		8.0604	494210.3834	4784.1816	5138.52096	82758.834	109616.0775		172.1581
167	36072	YDR01	Hematite-rich qtzite	18.479	3.0734		20.724		13.231	67.406	10.89		49.306		29.669		18.353	207.6	12.46		26.668		9.6316		6.7315	4342.403415				1.3963292		0.2383745
168	36072	YDR02F	Red hematitic stained rock	18.565	3.8485		28.797		11.9	102.66	14.649		51.147		33.292		18.739	432.17	18.336		32.183		10.96		5.8898	31171.3902				90.6933916		1.1484385
169	36072	YDR02W	Red hematitic stained rock	18.653	3.2757		22.83		11.333	102.59	13.293		46.212		32.1		17.054	434.12	17.43		26.786		11.086	22.048	7.1801	9219.172995						0.0254727
170	36072	YDR03F	Pale green country rock	18.755	2.9884		23.525	22.625	5.5105	65.372	10.454		41.48		28.865		16.485	312.79	14.712		22.02		9.1854		6.0271	7027.73718				24.4202028		0.4730205
171	36072	YDR03W	Pale green country rock	18.854	4.7785		25.198		13.325	190.86	18.877		64.527		42.5		24.114	720.63	23.418		40.029		14.653		7.9808	10606.55928				118.137208		1.42813
172	36073	YDR04F	light brown qtzite	19.388	3.3603		29.57		10.635	75.647	11.784		51.751		35.132		19.441	293.43	14.813		29.345		10.299		6.6883	11199.7605				32.0256188		0.5505305
175	36073	SUC01	douglas fir	33.361					14		8.66961						16.2351	41.0036	6.86873											174.3382984		2.000899
176	36073	SUC01A	cedar	33.467	4.0666		33.526		17.236		8.8071		49.182		33.363		18.072	62.471	8.2804		27.258		9.9957		7.0194	1370.567715			8.95158	251.954164		2.791915
177	36073	SUC02	douglas fir	33.6	3.649		35.489		14.728		8.8185		46.643		29.881		16.655	34.585	6.8313		23.715		10.452		7.1498					288.525608		3.16463
178	36073	SUC02A	cedar	33.679	3.8406		46.997		17.003		8.491		48.996		32.705		18.09	58.291	8.0625		27.41		10.451		8.2257					325.525844		3.541715
179	36073	SUC03	cedar	33.829	3.8148		44.812		20.418		8.0746		51.964		33.904		18.085	40.663	7.4935		28.822		9.9667		7.9504	286.552605		40.1555952	102.6327	299.27926		3.274225
180	36073	SUC03A	douglas fir	33.906	4.0323		33.833		19.177		10.228		56.696		36.553		21.216	26.834	7.3388		31.779		11.055		8.3725	1405.59444			297.48948	412.017704		4.42319
181	36073	SUC03B	douglas fir	33.989	3.544		39.444	95.141	22.328		8.079		45.92		30.375	56.36	18.261	59.669	7.9557		23.973		9.9348		7.8936	2272.729395		122.3775179	64.78638	283.210844		3.110465
182	36073	SUC04	douglas fir	34.12	3.7971		41.499	88.929	22.839		8.4972		47.4		31.809		18.264	26.224	6.6617		27.066		9.9565		7.3662	1398.57402		111.4947151	372.17364	448.938952		4.79947

ID	DATE	Sample	Sample Type	Time	Molybdenum standard deviation	Mercury (mg/kg)	Mercury standard deviation	Lead (mg/kg)	Lead standard deviation	Rubidium (mg/kg)	Rubidium standard deviation	Cadmium (mg/kg)	Cadmium standard deviation	Tin (mg/kg)	Tin standard deviation	Antimony (mg/kg)	Antimony standard deviation	Barium (mg/kg)	Barium standard deviation	Silver (mg/kg)	Silver standard deviation	Uranium (mg/kg)	Uranium standard deviation	Thorium (mg/kg)	Thorium standard deviation	Calculated Iron (mg/kg)	Calculated Lead Concentration Compared to CAS (mg/kg)	Calculated Lead (mg/kg)	Calculated Zinc Concentration Compared to CAS (mg/kg)	Calculated Zinc (mg/kg)	Calculated Copper (mg/kg)	Calculated Cadmium (mg/kg)
183	36073	SUC04A	cedar	34.253	4.0004		38.121	100.94	24.912		8.6719		52.277		34.869	74.583	20.809	68.749	8.7444		29.763		10.234		8.512	2042.73585		132.536786	216.93876	368.190648		3.97653
184	36073	SUC05	douglas fir	34.427	3.5688		43.211	137.09	26.178		10.126		47.557		32.239		17.754	61.185	8.1279		26.377		10.142		8.1681	3222.141237		195.867971	367.26312	448.103936		4.79096
185	36073	SUC06	douglas fir	34.563	3.2515		39.42	111.81	22.856		7.5377		45.339	109.21	31.767		16.732	62.909	8.0134		23.871		8.7412		7.7815	2184.628365		151.579939	445.09254	489.617772	28.45425	5.214045
186	36073	SUC07	douglas fir	34.696	3.2093		36.375	146.94	26.05		7.6118		46.68	101.6	31.267		17.362	59.923	7.9105		21.318		8.7139		8.0399	2217.60729		213.124186	21.0996	261.19576		2.8861
187	36073	SUC07A	cedar	34.771	3.8981		42.837	95.986	23.558		8.9972		48.184		30.356		18.02	67.619	8.3903		29.019		9.9703		7.8005	3098.145615		123.8578734	641.91552	602.243376		6.36186
188	36073	SUC08	douglas fir	34.924	2.7989		30.862	205.3	27.286		7.4154		33.83		23.753		12.979	28.785	5.675		16.677		8.0952		7.4821	3806.138175	37.8372	315.36507		242.814124		2.698765
189	36073	SUC08A	douglas fir	35.011	3.373		41.699	268.24	31.842		7.7499		42.492		28.53		15.605	53.639	7.5092		21.36		8.5136		8.2469	1978.455405	146.34576	425.629656	352.1394	443.09384		4.7399
190	36073	SUC08B	western white pine	35.15	4.2373		48.295		21.866		11.097		60.112		37.983		22.148	59.173	8.9684		33.647		10.466		8.501	685.832841		4.175073	1467.36222	1046.031812		10.884695
191	36073	SUC08C	douglas fir	35.234	3.0538		28.133	186.7	26.607		7.3464		37.798		25.245		13.762	26.632	5.9107		19.385		8.1472		6.3096	4335.241575	5.7708	282.77973	444.7863	501.9399		5.339625
192	36073	TAM01	douglas fir	36.486	3.21207		40.4375	139.589	24.195		7.60011							20.8237	4.758949									200.2459691	309.100254	413.1720572		4.4349545
193	36073	TAM01A	douglas fir	36.565	3.0765		34.041	141.6	23.385		6.7215		35.688		23.555		12.985		4.5063		16.119		7.9644		6.4086	4491.319745		203.76904	207.72288	360.224144	139.8795	3.89534
194	36073	TAM01B	western white pine	36.653	4.721		53.539		26.438		11.994		66.258		41.928		22.3	39.096	8.6039		37.81		11.952		9.642	187.720554		67.1436147		1083.336716		11.264885
195	36073	TAM02	douglas fir	36.839	3.9192		45.626	104.26	26.412		9.2267		55.832		36.837		19.682	34.874	7.7007		33.467		10.07		8.4852	3482.428245		138.353094	1265.6073	938.40502		9.787825
196	36073	TAM03	douglas fir	36.99	2.7634		32.894		14.066		6.5209		39.781		25.879		14.423	44.087	6.7585		17.101		7.8351		5.7022				736.29162	644.23114		6.789775
197	36073	TAM03A	western white pine	37.062	3.1993		38.077	186.65	28.653		7.682		44.968		30.9		16.865		5.6993		22.849		8.3361		8.3588	1827.805545	5.6846	282.692135	1409.94942	1017.099636		10.589835
198	36073	REX02	douglas fir	14.352	3.0244		33.052	465.74	39.562		7.8422		34.739		23.848		12.363	17.723	5.0862		18.772		8.2418		8.1853	4595.74089	486.83576	771.629906	310.81374	431.279492		4.619495
199	36073	REX03	true fir	14.44	3.78		43.003	433.8	39.457		9.1628		46.905		31.455		16.648	74.426	8.5732		26.262		9.9824		8.9284	1914.970215	431.7712	715.67422	1051.35258	824.504324		8.627015
200	36073	REX04	douglas fir	14.532	3.2916		37.734		16.431		7.3669		39.42		25.092		14.657		4.0934		22.709		9.6592		7.6606	848.7397305			150.00618	325.525844		3.541715
201	36073	REX05	cedar	14.604	3.8747		42.237		22.51		8.3724		48.339		32.613		17.765	47.888	7.6062		27.865		10.128		8.6574			69.9694294	1094.52114	843.371172		8.819295
202	36073	REX06	cedar	14.684	3.7629		42.934	426.43	40.56		9.9058		53.583		34.51	75.557	21.346	82.701	9.3818		28.598		10.294		10.187	7631.959665	419.06532	702.762717	1777.1766	1239.18004		12.85315
203	36073	REX07	cedar	14.762	4.0657		41.486	68.101	22.052		9.3513		47.902		29.142		16.005		5.451		27.965		11.267		7.4354	331.864773		75.0061419	3817.45884	2334.40508		24.01505
204	36073	REX08	douglas fir	14.865	2.9405		33.729	551.04	42.756		7.4563		38.432		24.843		14.514	29.823	5.9888		19.838		8.0226		8.621	2286.91461	633.89296	921.066976	320.7582	425.15228	36.19325	4.55705
205	36073	REX09	douglas fir	14.964	3.0213		31.478	576.4	43.292		7.121		35.122		23.856		12.559	26.318	5.6569		15.611		8.3207		8.8059	2339.6667	677.6136	965.49516	412.93422	477.498756	18.6715	5.090535
206	36073	REX10	douglas fir	15.054	3.3459		31.503	122.64	23.083		7.9863		37.654		26.542		14.135	42.348	6.7029		19.038		8.7965		6.9479	852.8265		170.553016	131.41776	318.089688		3.46593
207	36073	REX11	douglas fir	15.148	2.9287		30.556	135.76	24.009		6.3922		36.762		26.009		14.135	52.604	7.0228		17.361		7.8245		7.1087			193.537944	369.79284	448.036232		4.79027
208	36073	REX12	douglas fir	15.249	3.6442		37.444	242.46	31.865		8.3672		49.757		32.615		18.116	58.729	8.111		25.292		8.6909		8.8041	2944.2408	101.90104	380.465674	168.14964	349.188392		3.78287
209	36073	REX13	douglas fir	15.352	3.277		34.208	279.97	31.749		8.0565		41.459		27.556		15.392	38.639	6.615		20.238		8.1308		8.2029	1831.659	166.56828	446.1856	326.263386	431.6865		4.62314
211	36073	REX14	douglas fir	15.778	3.4871		42.302	328.34	34.729		7.0245		41.089		25.633		15.476	33.158	6.4293		21.153		9.0074		8.0329	3183.576885	249.95816	530.918846	201.31854	364.591052		3.939845
212	36073	REX15	douglas fir	15.862	3.7971		41.598	165.74	27.068		8.3317		45.039		31.386		17.28	62.864	8.091		23.333		9.8693		8.3591	2489.272755		246.059906	183.6204	354.06308		3.83255
213	36073	REX16	douglas fir	15.952	3.0311		33.482	277.58	31.832		7.5532		39.212		25.005		14.287	46.965	6.9184		21.181		8.4801		7.965	6466.153455	162.44792	441.992402	71.23164	294.686672	106.22575	3.22742
214	36073	REX17	western white pine	16.076	3.9279		44.324	80.382	24.149		9.7896		52.445		35.122		19.828	39.191	7.6546		29.265		10.392		8.8528	729.53451		96.5212258	722.3163	640.50742		6.751825
215	36073	REX17A	douglas fir	16.157	3.1839		37.245	277.58	31.024		7.2795		37.884		24.404		13.325	39.861	6.4653		19.098		8.2318		7.0839	5725.534853	162.44792	441.992402	133.07952	326.575256		3.55241
216	36073	REXTBG	brown/gray tailings over yello	17.853				919.525	63.6875	100.246	15.8727						24.2484	90.4368	10.9508						9.6183	54503.96565	1269.1611	1566.615848	4645.2198	2921.06024	806.782375	29.9939
217	36073	REXTG	yellow tailings	17.961				1385.57	69.5849	58.2186	12.3491							73.872	9.15246							23531.91791	2072.62268	2383.080083		71.95788936		0.9574971
218	36073	REXTGB	gray to black tailings	18.052	4.6586		37.789	1548.6	78.704	178.25	20.179		64.29		38.973		23.66	179.83	13.546		40.349		14.194		11.399	44426.7333	2353.6864	2668.69234	1988.2836	1426.60728	195.4695	14.7633
219	36073	REX09S	jig tailings	18.133	5.0001		30.625	4034.8	140.59	112.82	19.837		75.336		47.731		27.382	145.05	13.833		47.412		12.478		14.964	92708.74547	6639.8952	7024.26612	167.26158	540.034684		5.727865
220	36073	REX11S	soil	18.22	3.9866		30.727		16.186	64.136	13.192		53.341		35.254		18.517	597.71	21.427		32.863		10.988		7.1439	17907.39915				73.37358		0.971925
221	36073	REX11D	forest litter	18.31	2.694		24.031	337.14	34.363		8.0389		32.715		21.407		12.787	60.806	7.219		18.633		8.5612		7.5742	7514.87952	265.12936	546.335566	154.45296	350.474768		3.79598
222	36073	REX14S	soil	18.379	4.0569		35.234		16.022	87.496	14.822		59.076		37.82		21.455	599.64	21.464		36.635		12.282		7.8846	17499.96816				55.0957568		0.785648
223	36073	REX15S	soil	18.451	3.7635		29.595		16.195	63.776	12.204		51.739		32.645		19.008	445.55	18.346		31.924		10.864		7.7066	18425.02212				104.934928		1.29358
224	36073	REX16S	soil	18.526	3.8349		30.984		15.958	55.833	11.791		51.76		33.045		19.57	533.97	20.044		30.796		10.279		6.6826	15439.69791		10.6816296	129.66174	370.233052		3.997345
225	36073	REX17S	soil	18.598	4.3289		37.372	628.75	51.374	82.682	15.577		61.565		38.728		22.514	483.35	20.296		37.099		11.823		9.4591	38124.948	767.865	1057.207125	2576.733	1748.5398	102.57425	18.04425
226	36073	MPANICK	MissionFlat Nicks metal/soil	18.673	4.2041		44.477	2965.4	117.66		13.519		70.297		42.653		26.828	242.61	16.18		41.385		8.9979		12.418	74719.63988	4796.2496	5150.78426	9747.2142	12497.83545	165.4945	58.82785
227	36073	MFP1N	MissionFlat Nicks metal/soil	18.79	2.4004		30.35		11.501		5.3843		26.366		18.858		10.316		2.2115		17.166		6.7316		5.287					138.414556		1.634785
228	36073	MFOATS	MissionFlat Nicks metal/soil	18.892	2.1329		26.304		11.567		4.5566		27.007		17.712		10.199		2.8313		15.237		6.1372		4.9561	578.1633224				103.750108		1.281505
229	36073	MFP1S	MissionFlat Nicks metal/soil	18.986	4.9293		34.451	1874	96.973	71.341	15.756		71.018		42.621		27.336	231.54	16.168		46.016		9.3108		10.483	100428.7544	2914.676	3238.7606	840.66666	929.626068		9.698355
230	36073	MFP1D	Mission Flat forest litter	19.089	1.8173		25.666	189.82	26.546		6.0911		22.352		16.481		7.9795	16.018	3.9682		13.413		5.4359		5.7779	16790.46566	11.14968	288.245658	1224.13194	956.888212		9.976195
231	36073	MFBS	Mission Flat bear scat	19.183	4.0387		37.163	772.2	60.455		12.451		61.938		38.906		21.636	74.976	10.093		35.946		8.4135		8.7116	80093.59428	1015.1728	1308.51718	848.66676	886.126248	14.12075	9.25503
232	36073	MFDS	Mission Flat mule deer scat	19.287	2.9745		38.352		12.299		7.5793		41.361		25.405		15.396		5.2119		25.148		8.1036		6.7632				928.9587	751.180892		7.879745
233	36073	TAMOXT	Oxidized tailings	21.859	4.8646		43.921	3085.3	118.66	153.2	20.337		73.235		43.688		25.289	163.4	13.873		44.721		12.852	52.9	15.259	73646.66507	5002.9572	5360.83707	2355.597	1695.505	112.60225	17.50375
234	36073	TAMOPHO	Transported oxidized tailings	21.963	4.6843		42.593	4777.2	147.65	107.08	18.5		82.568		49.526		28.712	169.98	14.693		49.647		12.409		17.151	63096.92325	7919.7928	8324.87668	2803.0794	1926.60132	114.83675	19.85895
235	36073	TAMSEEPP	red oxide historic seep	22.046	3.8522		41.521	274.5	49.948		9.3442		85.015		53.539		32.536		8.2806		57.231		3.7393		3.9282	295681.3065	157.138	436.59655	2156.4678	2075.32444		21.37465
236	36073	TAM01B	Transported oxidized tailings	22.132	5.7764		55.594	7049.9	192.92	126.14	22.549	395.6	88.582		51.776		33.34	118.39	13.624		50.231		13.598		18.661	70407.387	11837.9276	12306.41981	21412.872	27646.784	276.1295	
237	36073	TAM01C	alluvial soil	22.228	4.3803		36.943	244.54	33.677	128.84	17.348		59.772		37.041		22.315	615.71	22.299		35.834		12.991		8.2399	19323.2694	105.48696	384.109626	8429.8662	10536.69395		50.39835
238	36073	TAM01D	forest litter	22.348	2.6299		31.58	1070.2	60.346		7.5604		25.393		18.052		9.3273		3.7733		13.838		7.374		9.2616	17715.07985	1528.9248	1830.58338	818.65422	734.209756	65.7595	7.706785
239	36073	TAM03B	Transported oxidized tailings	22.424	5.2243		49.754	4321.5	142.32	131.54	20.304		74.592		45.252		26.759	155.19	13.901		45.909		13.399		16.366	79183.13087	7134.166	7526.53585		126.476084	144.26675	1.513115
240	36073	TAM03C	soil-alluvium mixture	22.505	4.398		43.821	2282.6	94.603	109.14	17.289		61.094		38.909		22.35	515.31	21.054		36.733		13.275		13.125	34833.49995	3619.1024	3954.58694		319.624312	56.6035	3.48157
241	36073	TAM03D	forest litter	22.588	2.2713		30.499	149.5	23.075		6.2389		25.766		17.968		9.9412		2.6976		15.985		6.7033		5.5761	2740.53999		217.60905	1459.11162	1052.531396	52.76125	10.950935
242	36073	SUC01S	soil	22.747			33.6854		13	57.6286	12.0111							522.954	20.0696						7.44027	18103.07375				164.4162772		1.8997795
243	36073	SUC02A	organic rich soil	22.825	4.1255		29.234	255.73	33.475	63.545	13.423		51.18		32.388		19.361	488.91	19.488		33.917		11.309		8.0698	23136.43089	124.77852	403.713387	582.31548	633.184104		6.67719
244	36073	SUC02D	forest litter	22.901	2.4574		26.163	218.45	27.854		6.6808		25.226		18.48		9.1908	36.688	5.5788		13.911		6.818		6.1758	3682.103655	60.5078	338.402555	346.6014	446.47904		4.7744
245	36073	SUC02S	soil	22.97	3.7891		34.71		19.046	57.469	12.439		51.207		33.131		18.538	524.64	19.863		31.094		10.636		7.1867	18058.56198		42.5031412	88.26072	349.707456		3.78816
246	36073	SUC03D	forest litter	23.076	2.4582		30.376		13.872		6.1121		27.564		18.603		10.841	19.504	4.5862		16.178		7.3861		5.6639			7.486164		155.340556		1.807285
247	36073	SUC04G	green rock - cpy-azurite	23.151	3.9783		93.321	478.13	60.236		12.086	321.68	81.222		42.142		30.322		7.4487		44.857		6.0542		5.5349	30030.98744	508.19612	793.335947	206994.624	268698.632	4640.435	530.10128
248	36073	SUC04G	green rock - cpy-azurite	23.235	4.7267		59.91	808.35	69.393		11.825		82.039		50.168		29.138		8.7919		47.999		10.089		9.9772	43649.42844	1077.4954	1371.848365	65278.566	84543.967	24333.7375	115.74468
249	36073	SUC04R1W	rock	23.323	5.3223		36.866	722.66	54.845	245.31	23.325		70.506		43.014		24.742	681.53	24.354		44.774		15.952		10.506	33871.83675	929.76584	1221.728054	1616.2236	1184.00128		12.2908
250	36073	SUC04R1F	rock	23.399	3.6101		25.186	76.347	19.421	119.07	14.967		49.758		31.805		18.585	280.17	14.716		27.959		11.76		6.8	14606.96949		89.4523093		75.0176588		0.9886805
251	36073	SUC04R2W	rock	23.48	2.7416		23.357	719.19	47.143	76.568	11.591		42.87		27.459		15.591	171.16	11.372		23.475		10.301		9.5039	7022.46138	923.78356	1215.648961		118.035652		1.427095
252	36073	SUC04R2F	rock	23.593	3.3605		32.534	1907	78.062	114.97	14.625		57.392		37.102		20.224	298.88	15.445		34.716		12.503		13.276	13804.32401	2971.568	3296.5733			54.28725	0.18132645
253	36073	SUC04S	soil	23.739	3.8618		30.67	264.84	32.801	100.54	15.045		62.28		38.97		22.307	652.63	22.298		39.077		12.696		8.7819	18406.63008	140.48416	419.673196	623.76912	637.223776		6.71836
254	36073	SUC05S	soil	23.834	8.2463	370.17	88.99	33533	489.44	91.914	27.077		66.81		45.779	114.08	29.034	71.361	11.877		44.614		18.405		39.291	55046.16207	57494.792	58702.1627	140.96412	441.446376		4.72311
255	36073	SUC08S	soil	24.033	4.2308		36.052	3372.1	112.39	66.907	13.888		46.972		31.973		18.517	170.34	12.341		28.959		11.653		16.397	27275.5431	5497.4004	5863.28199	1825.3584	1314.44432	12.81275	13.6202

ID	DATE	Sample	Sample Type	Time	Molybdenum standard deviation	Mercury (mg/kg)	Mercury standard deviation	Lead (mg/kg)	Lead standard deviation	Rubidium (mg/kg)	Rubidium standard deviation	Cadmium (mg/kg)	Cadmium standard deviation	Tin (mg/kg)	Tin standard deviation	Antimony (mg/kg)	Antimony standard deviation	Barium (mg/kg)	Barium standard deviation	Silver (mg/kg)	Silver standard deviation	Uranium (mg/kg)	Uranium standard deviation	Thorium (mg/kg)	Thorium standard deviation	Calculated Iron (mg/kg)	Calculated Lead Concentration Compared to CAS (mg/kg)	Calculated Lead (mg/kg)	Calculated Zinc Concentration Compared to CAS (mg/kg)	Calculated Zinc (mg/kg)	Calculated Copper (mg/kg)	Calculated Cadmium (mg/kg)
257	36074	BRL01	western white pine	11.906			35.7761	123.264	22.1908									19.7144	5.12678									171.6462016		238.7078764		2.6569165
258	36074	BRL02	western white pine	12.006	3.2269		39.049	225.01	29.421		8.1389		40.466		25.443		15.381	32.56	6.3519		21.483		8.3465		6.9375	4829.307195	71.81724	349.895019	221.76438	376.980884		4.066115
259	36074	BLR03	western white pine	12.204	2.8551		33.81	220.13	28.022		6.8096		37.433		24.28		13.621	23.485	5.5478		18.767		7.3222		6.9073	3517.126665	63.40412	341.345747	187.61916	353.747128		3.82933
260	36074	BRL03A	cottonwood	12.363	2.9551		27.653	64.37	17.451		6.6328		33.029		22.71		13.329	25.019	5.4625		15.159		7.8531		5.8817	1909.80276		68.469803	705.27408	633.184104		6.67719
261	36074	BRL04	western white pine	12.524	3.3132		42.405	149.44	25.423		7.4606		44.67		29.365		16.434	27.821	6.4383		22.209		8.5781		7.7905	1677.334425		217.503936	276.99246	400.632148		4.307155
262	36074	BRL04A	cottonwood	12.633	2.4886		27.907	113.16	20.62		5.2262		32.73		22.086		13.22	26.505	5.4934		14.451		6.3551		4.8405	1216.770945		153.945004	235.46754	376.439252		4.060595
263	36074	BRL05	cottonwood	12.763	4.2213		42.54		23.581		10.484		51.355		33.46		18.843	41.973	7.7285		29.287		10.957		8.7721	6993.05226		76.2377276	2035.704	1369.51024		14.1814
264	36074	BRL06	cottonwood	12.881	3.1777		40.156	265.68	32.605		8.1042		40.375		26.914		14.409	32.682	6.4263		21.442		8.0351		7.1978	9430.041735	141.93232	421.144792	2651.3226	1716.60608		17.7188
265	36074	BRL06A	ponderosa	12.978	3.6589		42.272	243.75	31.152		8.8002		46.807		30.834		17.663		6.2461		25.202		9.8098		8.8004	6751.051455	104.125	382.725625	430.92948	495.067944		5.26959
266	36074	BRL07	cottonwood	13.091	2.9323		29.82	141.43	23.698		5.8113		36.698		25.274		13.483	31.164	6.0071		14.696		7.542		6.4558	5859.446865		203.471217	1195.33344	912.485672		9.52367
267	36074	BRL08	cottonwood	13.201	2.6448		28.998		17.341		6.4685		36.629		23.695		13.198	16.756	5.0922		17.595		7.1356		6.2136	1043.597094		44.468773	917.33856	745.978968		7.82673
268	36074	BRL09	cottonwood	13.311	4.0278		51.844	225.27	32.672		11.077		53.229		36.137		20.272	47.757	8.3002		29.763		10.35		8.6905	18328.2891	72.26548	350.350513	2815.1406	1827.75348		18.85155
269	36074	BRL10	cottonwood	13.433	4.2574		47.7	180.43	31.7		12.463		59.441		36.431		21.893	36.58	8.069		35.866		11.563		8.3371	16083.43215		271.795317	2221.656	1491.8288		15.428
270	36074	BRL11	cottonwood	13.538	3.3368		41.381		18.262		8.4179		46.12		31.484		17.408	27.378	6.6845		23.578		8.987		7.2598	4061.317125		18.610729	1369.96884	997.115672		10.38617
271	36074	BRL11A	ponderosa	13.646	4.0735		45.501	583.41	47.444		9.7569		52.322		35.02		19.333		6.8592		28.121		9.7946		9.3947	11441.68011	689.69884	977.775979	2343.924	1554.34216		16.0651
272	36074	BRL12	cottonwood	13.754	3.7654		47.283		18.708		9.6158		54.76		35.354		20.481		6.8952		30.676		10.39		8.5069	5070.600122				740.3144		7.769
273	36074	BRL12A	ponderosa	13.861	2.6489		25.626	137.02	22.37		5.264		35.851		23.791		13.734	36.841	6.1293		13.956		6.4321		5.642	2512.249184		195.745338		169.73894		1.954025
274	36074	BRL13	cottonwood	13.985	3.7929		43.531		17.567		9.214		51.329		35.424		19.006	31.624	7.3256		30.377		10.654		7.8391	3214.673295			1610.6568	1126.56572		11.70545
275	36074	BRL13A	conifer	14.068	2.4735		27.29		14.423		5.3421		30.252		21.307		10.887	23.325	5.0137		12.703		6.8114		5.7224			18.8349722		183.39258		2.093175
276	36074	BRL14	cottonwood	14.164	3.8839		43.437	141.45	25.965		8.8427		47.16		30.655		16.674	27.314	6.7618		26.568		9.4242		7.0818	3811.0569		203.506255	1249.5021	931.2961		9.715375
277	36074	BRL15	conifer	14.269	3.1389		35.659	423.4	37.985		7.8424		39.214		25.211	52.227	16.058	25.502	5.9062		16.816		8.5855		7.5243	6410.564145	413.8416	697.45446	1320.93672	982.965536		10.24196
278	36074	BRL15A	cottonwood	14.361	3.9368		41.258		18.114		8.3528		47.125		30.744		18.286	21.028	6.3529		24.779		9.5229		7.4387	3631.375335			1275.7488	945.45752		9.8597
279	36074	BRL16	conifer	14.536	3.0119		32.877	520	41.958		7.5269		35.968		22.71		13.047	30.556	5.8949		17.157		7.9081		8.2466	8192.731245	580.38	866.688	444.26052	505.200976		5.37286
280	36074	BRL16A	cottonwood	14.634	2.8255		32.984		16.355		6.8678		37.026		24.901		13.526	20.404	5.4582		16.093		7.7312		5.8897	2379.27465		28.000913	640.73778	595.439124		6.292515
281	36074	BRL17	cottonwood	14.734	3.9787		42.834	228.15	32.019		10.102		48.791		31.575		18.164	30.179	6.9884		26.358		9.757		8.8252	9871.74081	77.2306	355.395985	1669.4946	1184.45264	54.01475	12.2954
282	36074	BRL18	conifer	14.908	3.82693			77.8846	22.3698						32.3789		18.6135	28.5941	6.8391							692.6647365		92.14603074	128.87958	317.469068		3.459605
283	36074	BRL18A	birch	14.999	3.857		44.065		18.634		9.1932		55.823		34.726		20.445	28.301	7.2925		32.898		10.819		8.3077					1441.72784		14.9174
284	36074	BRL19	cottonwood	15.094	3.6466		47.354	115.15	25.654		10.538		54.113		35.306		20.056	46.673	8.1097		30.632		10.949		7.8942	5079.35499		157.431285	2544.4752	1652.0616		17.061
285	36074	BRL19A	conifer	15.178	3.0309		30.51		14.049		6.5518		38.612		25.854		14.373	31.182	6.0833		17.238		8.6353		6.6436					207.687032		2.34077
286	36074	BRL20	conifer	15.302	3.285		35.881	196.09	28.413		7.6737		43.82		28.024		16.123	26.009	6.2201		21.416		8.4807		8.0771	5387.19858	21.95916	299.230071	248.72694	391.898332		4.218145
287	36074	BRL20A	cottonwood	15.391	3.7649		34.379	207.43	30.002		8.468		50.301		32.606		18.132	24.634	6.791		27.169		9.5781		7.6248	5527.58628	41.50932	319.096617	2259.381	1491.15176		15.4211
288	36074	BRL21	conifer	15.518	3.8596		43.779	448.41	40.971		9.5528		50.236		33.8		18.137	34.475	7.3204		26.174		9.3698		9.2986	6394.144725	456.95884	741.269479	867.53388	737.335424		7.73864
289	36074	BRL21A	cottonwood	15.598	2.8352		33.646	70.468	20.597		7.1486		38.92		25.621		14.521	30.735	6.2674		19.211		7.1605		6.8638	3016.954575		79.1528892	1253.97786	932.334228	49.028	9.725955
290	36074	BRL22	conifer	15.731	2.3353		30.345	58.639	17.775		5.8825		31.134		20.205		11.288		4.5249		16.822		7.0657		5.6637	504.33252		58.4296641	7.80804	253.500072	124.48325	2.80767
291	36074	BRL22A	conifer	16.389	2.492		32.524	204.77	27.067		6.2553		31.221		21.556		10.763	21.2	5.0539		15.419		6.9358		6.4091	4552.854975	36.92348	314.436563	204.35448	366.430344		3.95859
292	36074	BRL22A	conifer	16.484	1.8729		33.236	98.39	19.482		5.761		28.162		19.573		9.8337	22.27	4.8323		11.601		6.1427		5.7725	2309.545335		128.069441		122.052756		1.468035
293	36074	BRL22B	cottonwood	16.571	3.5735		39.955		19.539		7.9979		44.994		31.911	59.858	18.173	61.606	8.2067		24.905		8.7304		7.1793	6219.757485		39.4741061	675.43764	623.615272		6.57967
294	36074	BRL23	cottonwood	16.706	3.3345		40.467		18.565		7.989		44.312		30.393		16.965	37.249	6.942		22.946		8.9922		7.3607	411.654615		23.3706413	3369.0978	2093.15316		21.55635
295	36074	BRL23A	conifer	16.785	3.4957		37.475		19.124		7.2416		44.559		28.039		15.989		5.9007		22.467		8.6182		7.9719			27.0110895		165.981368		1.91573
296	36074	RL01	douglas fir	17.203	2.8067		28.73	85.459	19.847		6.8291		35.59		24.486		13.075	41.749	6.4287		17.853		7.623		6.38	578.593515		105.4156221		164.367756		1.899285
297	36074	RL02	douglas fir	17.302	3.8473		39.214		17.511		8.8774		47.776		32.209		17.291		5.9244		27.266		10.21		8.121				288.05148	405.360144		4.35534
298	36074	RL03	western white pine	17.394	2.5397		27.242		11.483		5.8145		31.692		22.213		13.007	28.987	5.5313		13.474		6.995		5.2657					152.542124		1.778765
299	36074	RL04	western white pine	17.474	2.1651		25.575	45.899	14.674		4.1294		29.774		19.438		10.739	24.247	4.9547		12.728		5.6767		4.9649	915.5763075		36.1104581		54.9174696		0.783831
300	36074	RL05	conifer	17.593	3.546		39.018		14.361		7.7933		42.766		30.47		15.873	33.847	6.7502		23.332		9.0909		7.1586	2511.28416				157.811752	140.2065	1.83247
301	36074	RL06	conifer	17.686	2.7451		36.012		14.696		6.2998		43.075		28.693		16.072	20.01	5.902		21.522		8.2612		7.3933					196.662564	59.95525	2.228415
302	36074	CCSILT	Filter, CanyonCk silt	18.648	1.1752		12.817	514.13	41.105	15.7	4.4572		12.741		10.973		5.8953		2.2039		6.4141		4.2015		6.6971	18294.1521	570.26012	856.404347	271.90398	424.712204		4.552565
303	36074	CCSILTA	Filter, CanyonCk silt	18.728	1.5639		22.001	479.25	40.43		5.0335		18.821		15.861		8.1735		2.3907		13.03		5.2906		7.385	16383.1086	510.127	795.298075	816.13338	718.998924	1.74925	7.551765
304	36074	BRLWET	Filter,adjto Bull Run Lake orange	18.812	0.6995		7.6996		7.5213	9.0192	2.2688		9.3475		9.2416		3.7191		1.1694		5.8699		2.5904		1.4642	3180.826541						
305	36074	BRLWETA	Filter," 2 filters	18.907	2.6097		25.459		11.922		5.3234		51.953		33.496		18.919		5.8947		32.896		6.6771		5.3783	7729.875446				86.7067544		1.107809
306	36074	HECLAM	Accum Precip Hecla Met Lab	19.72	5.3258		60.507	5465.1	174.48	94.065	18.931		80.393		48.698		29.584	180.43	15.801		52.247		10.627		16.66	105594.6324	9105.7324	9530.00869	16576.8318	21562.96455		
308	36074	FHECLAM	Filter, Hecla Met Lab discharge	20.042	13.775		162.94	42531	837.11		49.728		153.42		93.484		56.26		17.48		91.118		11.765		25.064	547044.6708	73007.344	74465.7589	18693.768	26603.339	725.34575	
309	36074	SUCMUCK	Byrl, muck in pool adj Success dump	20.151	5.5015		49.086	3723.4	128.33	100.13	18.523		76.425		46.835		27.967	453.23	21.272		45.367		13.314		15.405	42045.78465	6103.0416	6478.72446	14637.5682	18707.67095	144.43025	
310	36074	CCBLK	Filter, BLACK mine Q Upper CC, Phoebe	20.246	6.6299		66.663	7328.5	222.87		18.435		67.008		41.006		25.391	65.174	10.579		39.193		9.9992		17.297	69072.7763	12318.234	12794.49915	39852.27	51611.2375	591.54825	41.6445
311	36074	REXPREC	Filter, precip below Rex flot tailings	20.341	5.6119		77.11	953	93.198		16.614		112.13		74.242		41.073		11.504		75.017		6.9261		7.4565	313540.1659	1326.872	1625.2607	11676.5526	16259.05335	49.98175	
312	36074	BRL01S	pale yellow fg flood sand	20.443	4.4924		53.263	2781.6	116.64	71.368	16.114		71.512		43.708		25.909	340.67	18.875		45.003		9.6241		12.834	82621.14195	4479.3784	4828.78504	4996.0314	3171.22652		32.54345
313	36074	BRL01S2	river level muddy dk gray mud	20.532	5.3626		44.738	2116.7	104.75	66.557	16.668		72.091		44.261		26.211	263.62	17.218		42.05		9.8828		11.09	104301.0279	3333.0908	3663.94673	3742.0266	2529.61828		26.00455
314	36074	BRL03S1	dark maroon soil below yello	20.639	4.474		38.105	1871.3	92.523	81.746	15.78		65.325		41.246		24.729	307.09	17.511		41.951		10.006		11.262	75880.35719	2910.0212	3234.03047	2331.3792	1692.00696		17.4681
315	36074	BRL03S2	yellow flood sand	20.735	5.2137		48.856	3032.4	122.84	93.763	17.879		68.019		42.222		25.232	352.63	19.194		43.504		10.33		13.54	86112.86817	4911.7576	5268.16156	4913.9208	3133.19944	91.07475	32.1559
316	36074	BRL04S	yellow flood sand	20.843	4.4788		41.38	2166.7	99.552	57.257	14.661		69.788		40.967		25.702	305.14	17.537		41.8		9.9712		11.183	68189.86452	3419.2908	3751.54173	4181.0496	2696.05728	132.195	27.7008
317	36074	BRL04L	leaves 2" below yellow sand	20.921	4.2081		33.971	1501.8	78.354	56.835	12.669		54.686		33.429		20.047	167.65	12.682		35.075		9.1642		10.734	47492.82192	2273.0032	2586.70342	3862.9308	2471.95704		25.4169
318	36074	BRL06S	yellow flood sand	20.998	5.0676		42.019	3359.4	124.44	86.374	16.921		72.382		44.281		27.531	310.75	17.949		44.284		10.841		14.239	68240.37744	5475.5056	5841.03286	3873.0948	2523.86344		25.9459
319	36074	BRL06L	leaves 1" below yellow sand	21.08	4.0778		41.453	2573.8	103.12	42.135	12.185		48.97		30.051		19.683	135.67	11.634		31.461		8.8726		12.886	45257.54415	4121.1312	4464.74022	9757.3998	12367.27105		58.26665
320	36074	BRL08S	red soil	21.163	4.2447		38.516	2932.7	119.48	54.72	15.314		59.793		38.059	111.57	25.187	294.83	17.425		38.298		9.7886		13.228	87696.56783	4739.8748	5093.49713	3420.6648	2313.98104	266.9735	23.8069
321	36074	BRL08S2	red/gray mud at river level	21.251	3.4907		37.928	1770.8	80.039	61.672	12.775		55.456		35.684		21.332	167.26	12.459		31.865		10.157		12.164	30833.67939	2736.7592	3057.96452	530.62422	608.957356		6.430285
322	36074	BRL09L	1" matted leaves below 9S	21.33	3.6339		43.236	1300.9	71.551		8.7441		43.724		28.045		15.764	108.21	10.076		24.858		7.7766		9.8924	28766.30268	1926.6516	2234.74671	15322.5012	19519.6852	42.161	
323	36074	BRL09S	brown fg flood sand/soil	21.405	4.728		43.591	3226.7	119.95	59.259	14.422		64.491		39.817		24.421	284.13	16.844		40.371		10.628		14.514	64838.54385	5246.7308	5608.55573	3878.226	2516.416		25.87
324	36074	BRL10S	red soil	21.479	5.3503		45.714	3271	127.97	94.386	17.905		76.133		46.134		26.53	413.31	21.017		47.454		10.557		13.608	89042.02881	5323.104	5686.1649	6224.8206	8007.81135		39.52855
325	36074	BRL11RR	black flood wash from railroad	21.555	5.0374		52.527	5528.4	168.71	61.66	16.478		72.551		46.752		27.376	169.7	14.638		47.808		10.765		17.155	85952.43096	9214.8616	9640.90396	6057.7482	7778.25345		38.54185
326	36074	BRL11S	red-brown soil	21.632	4.6685		48.736	2876.1	117.44	87.825	17.014		68.148		44.941		25.781	343.75	18.871		44.442		10.572		12.883	83132.78471	4642.2964	4994.33959	5106.6348	3225.72824	58.3475	33.0989
327	36074	BRL12S	yellow flood sand	22.318	5.3954		46.87	2329.5	110.16	63.067	16.332		74.111		47.361		28.072	317.12	18.847		48.167		9.5537		10.724	101595.5523	3699.958	4036.75105	6342.4482	8233.08845	182.52575	40.49685
328	36074	BRL13S	yellow flood sand	22.414	5.0804		41.825	2063.6	100.83	82.911	16.731		71.536		45.276		27.03	321.74	18.527		45.617		9.9412		10.883	92681.77623	3241.5464	3570.92084	5269.602	6767.182	3.16625	34.196
330	36074	BRL14S	yellow to red brown soil/sand	22.595	4.8679		44.891	2399.9	108.25	79.775	16.157		67.646		43.156		24.383	344.75	18.888		43.304		9.4566		12.142	84672.05163	3821.3276	4160.08481	4424.0952	2861.02936	27.25525	29.3821

ID	DATE	Sample	Sample Type	Time	Molybdenum standard deviation	Mercury (mg/kg)	Mercury standard deviation	Lead (mg/kg)	Lead standard deviation	Rubidium (mg/kg)	Rubidium standard deviation	Cadmium (mg/kg)	Cadmium standard deviation	Tin (mg/kg)	Tin standard deviation	Antimony (mg/kg)	Antimony standard deviation	Barium (mg/kg)	Barium standard deviation	Silver (mg/kg)	Silver standard deviation	Uranium (mg/kg)	Uranium standard deviation	Thorium (mg/kg)	Thorium standard deviation	Calculated Iron (mg/kg)	Calculated Lead Concentration Compared to CAS (mg/kg)	Calculated Lead (mg/kg)	Calculated Zinc Concentration Compared to CAS (mg/kg)	Calculated Zinc (mg/kg)	Calculated Copper (mg/kg)	Calculated Cadmium (mg/kg)
331	36074	BRL15S	maroon sand/soil	22.665	5.5641		51.253	3205.6	126.36	89.333	18.112		85.879		52.109		31.291	450.83	22.082		49.696		11.101		13.804	84177.97053	5210.3544	5571.59064	4901.5686	3124.28508		32.06505
332	36074	BRL16S1	yellow/reddish brown top 1-2"	22.741	4.7284		38.614	2233.6	104.85	61.292	15.22		71.407		45.382		27.203	316.42	18.339		41.885		9.5378		11.687	88063.76715	3534.6264	3868.74384	4391.091	2847.6014	125.13725	29.24525
333	36074	BRL16S2	dk maroon bn/blk 2-4"	22.819	4.655		38.069	2400.8	108.54	71.958	16.928		72.013		46.676		26.986	312.02	18.283		43.987		10.744		11.949	89394.17988	3822.8792	4161.66152	4606.308	2970.0328	20.06125	30.493
334	36074	BRL17S	reddish brown sand/soil	22.892	4.4751		49.114	2820.2	115.2	63.972	14.888		68.494		42.659		26.303	308.57	17.924		44.209		9.2932		13.066	78895.90326	4545.9248	4896.40838	6128.388	7829.3555		38.7615
335	36074	BRL18S1	yellow/reddish brown top 1-2"	22.969	4.8815		49.983	2659.4	111.92	72.92	15.743		68.97		42.304		25.517	315.39	18.027		45.146		9.8633		12.327	76610.53746	4268.7056	4614.70286	5110.7874	3219.74772		33.03795
336	36074	BRL18S2	dk maroon bn/blk 2-4"	23.046	4.8849		52.383	2587.4	114.62	70.974	16.896		72.128		44.916		25.921	340.94	19.183		42.802		9.8708		11.905	95515.84739	4144.5776	4488.56606	4855.9194	3120.44852	9.27025	32.02595
337	36074	BRL19S1	yellow brown 0-1"	23.129	5.053		50.344	2130.8	101.81	95.709	16.982		71.912		44.085	91.887	28.218	346.49	19.021		43.75		10.412		11.797	86998.74608	3357.3992	3688.64852	4193.8296	2734.42288	59.8735	28.0918
338	36074	BRL19S2	dk maroon to black 1-4"	23.221	5.0233		47.805	2919.9	124.15	65.995	15.723		71.376		45.607		26.91	296.88	18.374		46.483		9.4033		12.302	106589.3043	4717.8076	5071.07281	6040.2138	7856.37805	74.17975	38.87765
339	36074	BRL19G	grass	23.305	1.6832		19.534	80.6	17.621		4.2269		23.861		15.725		8.8281		2.331		12.707		5.6991		4.734			96.90314	582.46794	561.034208		5.94188
340	36074	BRL20S1	yellow to brown 0 to 1 or 2"	23.374	4.7897		48.129	3292.6	128.02	61.285	16.026		70.683		44.304		26.542	371.96	19.798		42.691		9.8345		13.247	88607.38871	5360.3424	5724.00594	4561.233	2943.5154		30.22275
341	36074	BRL20S2	dk maroon to black 1-4"	23.469	4.5464		40.807	2669.4	112.87	81.287	16.619		63.079		39.602		23.511	274.1	16.845		39.637		9.9324		12.132	83158.81041	4285.9456	4632.22186	4210.521	2738.1466		28.12975
342	36074	BRL21S	reddish brown sand/soil	23.567	4.9466		60.674	4214.8	150.91	70.474	16.888		76.967		46.713		27.763	173.15	15.015		49.036		9.8223		14.725	104446.5718	6950.2152	7339.60812	4882.032	3157.3472		32.402
343	36074	BRL22S	yellow brown flood sand/soil	23.653	4.3548		40.401	2199.4	98.077	92.54	15.793		62.164		38.743	80.747	24.632	262.21	16.116		41.19		10.607		12.581	66033.08546	3475.6656	3808.82886	3993.396	2576.2212		26.4795
344	36074	BRL23S	dark brown organic-rich soil	23.729	5.3094		49.752	6651.9	187.91	53.205	16.78		77.753		47.041		29.15	230.92	16.822		45.93		10.805		17.746	90147.3359	11151.7756	11609.16361	4094.6994	2688.27132	2024.8165	27.62145
345	36074	RL01S	yellow-brn pebbly soil	23.809	4.0663		37.786	153.48	28.406	92.616	15.245		58.583		37.565		21.163	485.21	19.672		34.255		11.755		8.7459	20931.3324		224.581612		259.95452		2.87345
346	36074	RL01N	western white pine needles	23.953	1.6091		22.202		8.2733		3.7904		17.874		13.405		7.3908		1.6471		11.37		4.2933		3.7299	185.9509035				100.477748		1.248155
347	36074	RL01NDUP	yellow-brn pebbly soil	24.036	0.78914		18.746		6.4758		2.9355		13.386		11.824		4.7849		1.7402		8.1149		2.8793		1.5328					0.07000784		0.2248574
348	36074	RL03S	yellow-brn pebbly soil	24.148	4.1288		27.388		19.054	87.56	14.593		57.45		37.155		21.289	435.79	18.445		32.903		12.18		8.0576	19331.11425		44.0535727		102.71198		1.270925
349	36074	RL04S	yellow-brn pebbly soil	24.225	4.243		28.501	72.605	20.554	102.49	15.377		53.756		32.163		19.406	318.77	15.831		31.598		12.965		7.8058	17499.45015		82.8966995		101.707704		1.26069
350	36077	DD02BW	rock	38.409	2.671		19.673		9.9122	67.725	10.982		41.844		28.087		16.036	366.17	15.651		20.96		9.9176		6.1576	7100.049225						0.1958728
351	36077	DD02BF	rock	38.496	3.2875		23.881		15.341	139.29	15.481		43.893		28.364		16.822	1170	27.568		24.805		13.2		7.5738	4067.597925		18.7841671				0.00908865
352	36077	DD03	Fine grained brown soil	38.568	4.205		31.163	109.4	24.297	70.842	13.066		49.71		33.736		18.312	350.96	16.409		29.666		10.794		8.164	18650.66112		147.35786		138.978756		1.640535
363	36077	BRLSL06	Bull Run Lake, soil Ahorizon	35.873	5.8167		55.951	4077.6	144.44	83.612	18.531		76.658		49.677		29.558	382.74	20.591		46.861		11.944		15.891	88010.6997	6713.6824	7099.24744	4418.7822	2867.23556		29.44535
364	36077	BRLSL06A	" fine grained soil	35.959	5.0061		38.721	2634.7	114.54	65.488	16.45		70.924		44.606		25.893	341.51	19.023		43.966		10.237		12.518	90488.89634	4226.1228	4571.43093	4327.8864	2817.47312	94.4265	28.9382
365	36077	BRLSL01	" fine grained soil	36.046	5.4426		50.225	3331.6	131.94	86.723	17.3		79.204		48.565		29.728	449.05	22.115		50.118		10.034		13.715	95400.57975	5427.5784	5792.33004	5668.0104	7325.8264	28.318	36.5972
366	36077	BRLSL01A	" fine grained soil	36.114	4.359		45.368	2564.7	110.64	54.88	15.039		70.754		43.155		26.206	339.94	18.762		45.321		9.773		12.857	79392.00765	4105.4428	4448.79793	4567.395	2929.9746		30.08475
367	36077	BRLSL02	" fine grained soil	36.221	4.9763		43.35	3449.6	133.74	97.803	18.128		68.142		43.867		23.993	366.77	19.941		43.522		10.55		14.482	102874.3504	5631.0104	5999.05424	1061.42766	1056.571068		10.992105
368	36077	BRLSL03	soil, Ahorizon	36.284	4.2695		42.243	2077.7	90.967	57.036	13.809		56.205		35.55		19.721	243.76	14.845		33.507		10.487		11.971	45093.38954	3265.8548	3595.62263	763.22544	763.649712		8.00682
369	36077	BRLSL05	soil, Ahorizon	36.349	5.311		51.397	3250	126.19	87.89	17.471		75.013		45.868		27.559	328.29	18.743		47.759		10.817		13.533	82400.25636	5286.9	5649.375	2801.445	1970.8346	384.33925	20.30975
370	36077	BRL18A	soil, fine grained tan	36.514	5.2618		48.649	3178.6	132.39	96.96	19.344		88.776		51.29		31.349	469.56	23.187		53.207		10.401		13.153	109470.2543	5163.8064	5524.28934	7192.4208	9372.0488	72.76275	45.3924
371	36077	TDR03F	rock	36.674	2.947		20.074		13.556	83.329	12.026		43.512		27.769		16.597	319.54	15.221		22.647		9.2095		4.9898	16039.60515		18.1307084		52.2476752		0.756622
372	36077	TDR03W	rock	36.753	3.5881		27.457	56.063	18.198	77.397	12.602		51.304		33.053		19.135	475.02	18.876		29.87		9.5212		6.3131	37221.31496		53.9167697		27.0990244		0.5003215
373	36077	RL044	reddish brown sand/soil	36.827	4.223		34.221		13.585	96.047	14.59		51.033		32.386		18.761	381.08	17.059		30.578		12.003		7.2072	19603.869				92.7380524		1.1692765
374	36077	RL0344	reddish brown sand/soil	36.898	3.9915		26.69		17.034	83.295	13.951		53.166		33.406		19.646	317.35	15.808		31.284		11.955		6.6429	19597.7673		28.1445688		69.7604432		0.935102
375	36077	DD01	lt tan fine grained soil	37.802	4.8717		31.422		19.021	111.75	14.988		58.488		36.652		20.89	474.68	19.17		34.602		12.089		7.9148	14276.30337		50.9805853		135.413012		1.604195
376	36077	DD02W	rock	37.972	3.7162		35.671		15.186	67.782	12.883		70.291		44.878		25.953	121.09	12.014		41.826		9.5686		6.1656	47486.35046				41.6508708		0.6486255
377	36077	DD02F	rock	38.072	2.8926		26.364		11.538	44.459	9.471		48.881		28.03		17.97	191.77	11.961		26.563		9.3471		5.7163	692.339745				17.6780128		0.404308
378	36077	DD02AW	rock	38.214	4.116		33.746		14.328	155.44	16.566		60.506		38.748		22.33	376.19	16.83		39.043		13.821		7.4877							
379	36077	DD02AF	rock	38.331	3.305		19.569		13.14	97.25	13.072		52.015		33.131		19.023	263	13.891		29.147		11.875		5.9438	2568.0816						
380	36077	TDR01AF	rock	15.276	3.5557		26.846		10.804	38.304	9.2195		49.727		30.314		17.75	190.17	12.155		27.449		8.5343		6.3098	6741.483735				58.7698272		0.823092
381	36077	TDR01BW	rock	15.351	4.2239		29.583		17.99	106.07	15.47		56.74		37.419		21.357	600.52	21.855		33.069		11.457		7.2114	32613.33735		29.2149797		82.4098072		1.064017
382	36077	TDR01BF	rock	15.464	3.6994		24.775		15.128	133.27	16.058		51.008		30.793		19.023	642.77	21.726		27.683		12.901		6.9684	22680.4659				57.0806124	63.49775	0.8058765
383	36077	TDR02	soil	15.56	4.5611		34.821		18.361	100.73	15.438		57.901		37.473		21.864	471.01	19.231		34.835		12.288		7.5639	26759.62365		7.6946401		24.0692704		0.469444
384	36077	TDR05	soil	15.628	4.3933		33.711	1676	77.145	134.72	16.65		50.585		32.617		18.713	326.74	16.095		29.868		13.113		12.663	19254.82965	2573.324	2891.8844		220.528224		2.47164
385	36077	TDR06	soil	15.697	4.9211		37.641	2971.6	109.32	103.68	17.546		55.519		35.582		20.904	367.46	18.026		34.127		13.199		14.068	40982.00055	4806.9384	5161.64604	1103.09292	947.646616	116.25375	9.88201
386	36077	MFLALF1	soil ahorizon	15.994	4.2326		43.034	1706	92.289	58.595	15.254		72.533		45.884		26.057	281.46	17.61		47.28		9.1962		10.428	97575.16496	2625.044	2944.4414	1637.0058	1357.66204		14.06065
387	36077	MFLR1G1	soil	16.075	4.9374		43	1489.9	88.958	68.32	15.831		78.141		46.789		29.845	245.19	17.039		49.852		9.5114		10.35	113123.5167	2252.4876	2565.85581	2707.4628	1976.58944	288.41925	20.3684
388	36077	MFLR1G2	gray fine grained soil	16.201	2.1259		45.12	102.48	22.765		6.3017		99.311		162.05	185091	1062.9	440.48	53.349		66.476		5.0019		5.1975	10430.1492		135.234712		99.2884144	265.20225	1.236034
389	36077	MFLSM01	soil	16.976	4.9773		40.568	1085.7	77.366	61.269	15.381		76.003		44.992		27.828	262	17.488		45.796		8.33		8.4788	124998.2499	1555.6468	1857.73783	1438.1058	1308.01244		13.55465
390	36077	MFLSM02	soil	17.075	4.5766		37.349	1436.9	90.006	59.606	16.706		77.407		48.019	168.4	32.519	270.51	18.236		47.83		8.9656		8.2719	137088.9453	2161.1156	2473.00511	1362.033	1293.7946		13.40975
391	36077	MFLSM03	soil	17.154	6.2966		52.151	2195.6	115.66	83.188	19.513		85.894		50.522		31.533	309.7	19.916		54.184		9.7854		9.6698	150518.9634	3469.1144	3802.17164	3714.3816	2612.55568		26.8498
392	36077	MFLSM05	soil	17.219	4.3276		40.52	2021	102.77	67.444	16.48		80.981		50.4		30.855	306.13	18.759		49.966		9.5878		10.83	108224.5099	3168.104	3496.2899	4703.6196	3059.40208		31.4038
393	36077	MFLSM06	soil	17.323	5.4761		51.732	1698.3	105.15		16.171		87.619		55.097	124.43	34.632	300.29	20.175		57.205		8.1324		8.6102	175939.9288	2611.7692	2930.95177	1569.1152	1492.28016	128.95225	15.4326
394	36077	MFLSM07	soil	17.525	5.0627		43.772	1205	81.067	48.926	15.108		80.219		48.931		29.874	244.64	17.146		49.136		8.8332		8.9098	120607.3771	1761.32	2066.7395	912.15786	1013.579028		10.553955
395	36077	MFLSM08	soil	17.589	5.8109		53.777	1641.2	104.06	82.497	20.627		100.11		62.44		36.268	418.37	23.811		64.537		9.251		9.1438	182115.5547	2513.3288	2830.91828	1664.0226	1556.93748	168.383	16.09155
396	36077	MFLSM09	soil	17.676	4.7029		37.399	1490.5	85.228	57.94	14.532		66.842		42.498	99.873	26.848	213.07	15.364		42.015		9.0978		9.9756	93725.8734	2253.522	2566.90695	1806.9522	1442.06636		14.92085
397	36077	MFLSL01	soil	17.745	5.5594		43.966	2337.8	114.61	125.57	20.576		89.366		53.794		32.661	359.28	20.83		55.542		10.542		12.286	125417.6494	3714.2672	4051.29182	2414.1768	1845.69504	82.02775	19.0344
398	36077	MFLSL02	soil	17.813	5.8503		51.219	1731.1	108.24	64.94	19.576		94.612		59.821		35.8	299.4	20.789		60.683		9.2354		9.6921	191632.4762	2668.3164	2988.41409	2505.2856	2043.84208	185.08725	21.0538
399	36077	MFLSL03	soil	17.897	4.463		44.19	1481.8	87.447	60.895	14.609		72.224		45.903		27.614	228.36	16.324		46.236		8.7991		9.7941	107300.9255	2238.5232	2551.66542	1695.666	1412.8408	99.6585	14.623
400	36077	MFLBGM1	soil	17.983	5.2493		48.843	2813.7	123.13	92.61	18.259		79.565		47.406		30.076	287.39	18.459		49.963		10.335		12.461	114479.6026	4534.7188	4885.02103	3457.3278	2392.40484		24.60615
401	36077	MFLQA2	soil	18.065	5.2633		39.812	1696.6	94.644	66.324	16.272		75.747		46.977		28.653	288.33	18.15		47.623		9.4137		10.081	113470.9218	2608.8384	2927.97354	1923.8568	1548.92584		16.0099
402	36077	MFL01	soil	18.13	4.8191		45.721	1651.6	96.696	75.535	18.214		77.588		48.657	400.37	38.841	242.64	17.458		52.344		9.6497		9.2533	131516.6032	2531.2584	2849.13804	1589.5992	1405.39336	98.2415	14.5471
403	36077	MFLOG01	" ahorizon	18.191	5.1132		54.822	1467	90.276	69.174	16.652		77.895		47.287		28.045	235.74	16.942		45.636		8.9477		9.327	123222.2821	2213.008	2525.7373	1455.8124	1317.82952	125.001	13.6547
404	36077	MFT501	soil	22.92	4.7675		46.728	1803	96.634	54.363	14.682		78.046		45.779		27.617	322.12	18.9		45.839		9.0285		9.8053	108440.5599	2792.272	3114.3757	1225.0734	1157.03252		12.01595
405	36077	MFT502	soil	22.994	3.8192		31.35	134.12	24.609	82.696	13.57		49.241		30.623		17.208	249.84	14.09		28.462		11.056		7.0346	25179.4071		190.664828		150.95108		1.76255
406	36077	MFT503	soil	23.058	3.6557		29.091		18.455	81.566	13.887		47.201		30.644		17.024	235.71	13.578		28.789		11.412		7.449	20538.0693		32.941271		67.8545756		0.9156785
407	36077	MFT504	soil	23.139	5.2883		47.276	2271.3	116.37	87.613	18.971		83.982		53.038	126.52	33.427	448.41	23.316		55.122		9.6104		11.15	147089.4207	3599.6212	3934.79047	1455.5532	1368.15616	86.11525	14.1676
408	36077	MFT506	soil	23.211	4.5826		46.394	1962	101.81	70.464	16.982		78.057		48.319		29.022	373.28	20.353		48.162		9.3078		10.205	112041.1494	3066.388	3392.9278	2338.5186	1776.97548	194.325	18.33405
409	36077	MFT507	soil	23.277	3.9496		33.894	951.45	62.517	87.928	15.343		54.405		32.499		19.645	291.25	15.936		31.158		10.731		8.7276	49533.56921	1324.1998	1622.545255	631.37202	701.598996		7.374435
410	36077	MFT508	soil	23.354	5.5769		49.04	2599.3	119.62	90.693	18.795		85.336		51.994		30.905	370.38	20.823		53.259		9.8911		11.785	119614.5392	4165.0932	4509.41367	2140.1616	1682.75408	158.3005	17.3738
411	36077	MFT508A	soil	23.419	4.9113		50.474	2330.1	115.71	65.796	15.899		81.352		51.343		30.55	464.32	23.257		51.766		8.1722		10.834	134450.6839	3700.9924	4037.80219	2877.7644	2120.12192		21.8312
412	36077	MFT509	soil	23.794	4.145		42.157	980.22	64.788	85.659	15.203		55.917		35.668		21.21	275.77	15.796		32.89		10.054		10.087	55087.62387	1373.79928	1672.947418	794.34348	803.572504		8.41369

ID	DATE	Sample	Sample Type	Time	Molybdenum standard deviation	Mercury (mg/kg)	Mercury standard deviation	Lead (mg/kg)	Lead standard deviation	Rubidium (mg/kg)	Rubidium standard deviation	Cadmium (mg/kg)	Cadmium standard deviation	Tin (mg/kg)	Tin standard deviation	Antimony (mg/kg)	Antimony standard deviation	Barium (mg/kg)	Barium standard deviation	Silver (mg/kg)	Silver standard deviation	Uranium (mg/kg)	Uranium standard deviation	Thorium (mg/kg)	Thorium standard deviation	Calculated Iron (mg/kg)	Calculated Lead Concentration Compared to CAS (mg/kg)	Calculated Lead (mg/kg)	Calculated Zinc Concentration Compared to CAS (mg/kg)	Calculated Zinc (mg/kg)	Calculated Copper (mg/kg)	Calculated Cadmium (mg/kg)
413	36077	MFT510	soil	23.99	4.2488		41.559	1886.7	96.865	53.27	14.813		63.654		39.177		24.667	286.76	17.321		40.334		9.051		10.038	97633.36689	2936.5708	3261.00973	1332.3888	1188.96624	40.853	12.3414
414	36077	MFT511	soil	24.081	4.9189		44.751	2485.8	114.01	75.973	17.15		72.856		42.61		26.905	364.85	19.894		45.061		9.9336		11.869	106816.4256	3969.4192	4310.57302	2307.0804	1744.36472	113.0655	18.0017
415	36077	MFT512	soil	24.153	4.1969		44.238	2038.8	99.312	60.691	13.887		71.943		45.178		26.781	346.82	18.977		46.757		8.2997		11.335	92950.0352	3198.7912	3527.47372	950.3202	967.00996	176.96675	10.07935
416	36077	MFT513	soil	24.267	3.8065		30.854	1164.3	74.893	48.336	13.551		67.003		40.469		24.472	230.21	15.609		42.007		8.889		9.7898	87893.43687	1691.1532	1995.43717	2098.7052	1589.32256		16.4216
417	36077	MFT514	soil	24.361	4.839		50.411	1406.7	85.101	54.294	15.141		80.23		49.76	101.67	31.107	245.13	17.035		50.986		8.9068		9.7108	99487.73166	2109.0508	2420.09773	3766.881	2532.7778	143.6945	26.03675
418	36077	MFT516	soil	24.431	4.0407		45.084	1821.1	93.54	73.379	15.335		69.46		42.838		25.202	296.94	17.635		43.212		9.3972		10.884	88737.2583	2823.4764	3146.08509	1879.2696	1471.74328	16.90025	15.2233
419	36077	STRT01	soil	24.499	3.8538		42.474	2125.8	89.96	54.601	12.736		51.513		34.526		19.023	196.7	13.34		31.758		9.9645		12.942	29907.6257	3348.7792	3679.88902	7915.635	9890.82825		47.62225
420	36077	STRT02	soil	24.622	5.069		41.264	3422.1	120.71	135.26	19.346		77.694		45.787		26.781	339.56	18.377		46.317		13.541		15.967	47516.0877	5583.6004	5950.87699	2981.403	1988.889	318.694	20.49375
421	36077	STRT03	soil	24.692	5.1819		43.409	3715.2	124.95	93.813	16.943		66.812		40.314		22.808	288.56	16.736		40.951		12.481		16.249	44063.49585	6088.9048	6464.35888	4259.517	2679.4698		27.53175
422	36077	STRT04	soil	24.761	4.5065		34.332	1896	84.561	91.932	15.032		62.252		37.851		23.154	256.02	15.136		37.12		12.225		13.151	32122.99514	2952.604	3277.3024	3412.2228	2187.60024		22.5189
423	36077	STRT05A	grass	24.847	1.9993		28.404	83.516	18.29	22.531	6.8017		30.812		18.633		11.623	30.069	5.3716		18.351		6.4454		5.4234	3085.94538		102.0116804		11.3747704		0.340069
424	36077	STRT05B	soil	24.943	4.7504		32.493	566.03	46.838	116.05	16.671		61.327		38.88		23.673	435.55	18.741		38.913		13.299		9.8709	24068.23605	659.73572	947.327957		150.21762		1.755075
425	36077	STRT06	soil	25.006	4.8464		32.02	1272.9	69.441	132.8	17.757		61.813		41.468		23.24	485.39	20.005		38.924		13.209		11.505	27642.0795	1878.3796	2185.69351	104.7051	367.88598		3.973425
426	36077	STRT06A	grass	25.074	1.8156		25.04	41.486	13.111	17.626	5.8729		18.062		13.836		6.5922		1.975		10.254		6.1505		4.3592			28.3793234	307.56216	410.415376		4.40686
427	36077	STRT07	soil	25.142	3.9109		27.327	164.19	26.685	83.561	13.956		55.91		35.434		20.458	364.71	16.828		34.43		11.666		7.9816	19158.69795		243.344461		122.301004		1.470565
428	36077	STRT07A	grass	25.203	1.3751		17.46		9.3102		3.6409		16.157		12.008		6.5767		2.0298		9.189		4.0805		3.5807					57.7215436		0.8124085
429	36077	STRT08	grass	25.266	2.0163		24.904		11.952		5.3051		19.471		14.911		7.8881		1.6543		10.655		6.0993		4.6742	269.2237215		4.3800453	23.53452	254.696176		2.81986
430	36077	STRT08A	soil	25.329	4.5724		38.749	1623.4	78.105	103.33	16.398		62.236		39.961		22.502	362.8	17.544		39.327		12.957		12.004	28278.94065	2482.6416	2799.73446	413.6937	539.06426		5.717975
431	36077	STRT09F	rock	25.405	2.9839		34.565	400.7	42.297		6.4848		58.217		36.651		21.768		7.0041		32.706		5.429		6.4885	64737.23491	374.7068	657.68633	2963.115	2011.457		20.72375
432	36077	STRT09W	rock	25.52	2.8239		28.222	111.55	22.742		6.8345		51.054		33.7		19.472	61.174	8.5919		29.933		6.6303		5.6242	35265.10481		151.124445	90.94122	369.172356		3.986535
433	36077	CALIB401	soil	25.591	3.5199		29.784		14.023	41.4	9.8679		44.905		27.717		16.918	166.49	11.362		30.464		10.023		6.4831	8736.89607		5.0843091		63.8386		0.87475
434	36077	CALIB03	soil	25.674	4.0754		32.973	60.821	19.255	87.083	14.392		55.953		36.228		20.676	283.36	15.046		35.329		12.105		7.0518	19141.3992		62.2523099		0.6910792		0.231187
436	36078	CCP101W	rock	14.735	4.6937		30.038		17.486	98.685	14.522		55.61		35.241		20.693	275.84	14.689		32.946		12.795		8.51			32.5190631		126.611492		1.514495
437	36078	CCP101F	rock	14.816	2.3874		25.245		12.206	39.494	8.6835		40.197		25.956		16.079	148.54	10.528		20.726		8.8758		4.9266	2655.3216				29.270066		0.5224475
438	36078	CCP102	soil	14.908	4.8438		38.902	681.14	53.767	54.649	13.637		50.683		30.784		18.071	293.7	15.895		31.138		10.554		8.9842	43845.30444	858.18536	1148.989166	2303.0142	1618.09676		16.71485
439	36078	CCP103W	rock	14.976	4.1785		28.544		15.593	123.94	15.656		55.939		35.375		21.521	883.56	25.131		33.212		12.86		7.0898	12007.33275		6.4858291		99.8559996		1.2418185
440	36078	CCP103F	rock	15.068	3.302		19.78		9.1729	89.566	12.205		39.76		24.642		14.351	475.77	17.724		20.895		10.935		6.123	8013.43497				17.2052132		0.3994895
441	36078	CCP104	tailings	15.145	4.1208		26.668		11.655	151.92	17.282		55.651		35.87		20.109	406.7	17.554		33.471		13.678		6.8815	17571.099						
442	36078	CCP201	soil	15.212	4.3344		41.432	2812	107.02	93.881	16.421		62.351		39.935		22.77	339.07	17.656		39.405		12.132		14.355	35936.1372	4531.788	4882.0428	4672.8168	2899.62064		29.7754
443	36078	CCP201RW	rock	15.275	6.0126		28.542	156.66	35.028	172.87	22.873		89.203		54.834		31.923	498.16	24.102		53.356		10.654		6.5562	133550.1272		230.152654			567.07775	0.03081905
444	36078	CCP201RF	rock	15.339	3.4462		26.719		10.747	94.371	13.31		47.025		30.201	63.426	18.965	235.06	13.44		25.512		11.211		6.158	5381.71905						
445	36078	CCP203R	rock	15.422	3.4297		25.262		16.874	111.54	15.039		55.402		33.58		20.898	367.78	16.999		31.877		11.477		7.0758	23665.31925		20.1015959		55.8799948		0.7936405
446	36078	CCP203R	rock	15.528	2.7333	97.533	28.784		10.122	62.062	10.339		36.164		25.184		14.339	235.71	12.852		16.46		8.6877		4.6625	9485.59389						0.106851645
447	36078	CCP203R	rock	15.602	3.7628		19.711		17.146	110.41	14.902		55.592		35.011		20.195	467.44	18.489		32.457		12.75		7.2944	11285.78436		44.1289044		65.1103068		0.8877105
448	36078	CCP203R	rock	15.665	3.4842		25.247		9.1717	101.84	13.819		47.503		31.754		17.41	358.54	16.051		27.854		12.002		6.5013	11248.70991				11.1163668		0.3374355
449	36078	CCP202A	rock	16.923	3.8099	104.01	33.798		15.012	123.71	15.433		50.984		32.388		19.145	512.49	19.701		29.465		11.574		6.0183	28560.71235		18.6720455		4.1022324		0.2659515
450	36078	CCP202A	rock	17.002	5.4512		44.56	908.23	70.588	113.63	18.518		86.755		53.624		32.192	74.725	12.333		55.116		9.932		9.54	124699.0724	1249.68852	1546.828137	243.42012	646.815176	135.11075	6.81611
451	36078	CCP202A	rock	17.064	3.843		28.318	90.659	21.446	139.45	16.406		51.943		32.457		19.551	177.18	12.474		29.831		12.267		6.695	26424.54165		114.5255021		190.659476		2.167235
452	36078	CCP202A	rock	17.149	3.3786		44.443	1282.5	120.09		13.147		100.64		62.11		36.392		9.6479		59.148		3.5902		5.6776	403846.958	1894.93	2202.51175	1063.9908	1715.92904	828.24175	17.7119
453	36078	CCP202A	rock	17.209	3.8313		43.848		28.096		10.269		78.199		47.866		27.35		7.9864		50.56		4.406		4.0216	329425.4631		6.0828921		49.5214608		0.728838
454	36078	CCP203S	soil	17.277	4.406		32.492	971.04	59.424	78.655	13.538		54.508		36.389		20.285	317.51	16.033		34.7		11.331		10.982	21062.34009	1357.97296	1656.864976	295.75152	464.352896		4.95656
455	36078	CCP301R	rock	17.39	4.5299		24.215	95.656	21.445	75.977	12.536		54.47		35.668	64.486	21.34	233.75	13.681		33.185		11.018		7.8491	10408.93485		123.2797464		97.171536		1.21446
456	36078	CCP301R	rock	17.452	2.2803		19.202		9.4486	41.516	8.1075		32.812		20.962		12.268	61.823	7.2018		16.042		7.8427		3.915	4339.369545						
457	36078	CCP301S	soil	17.519	5.0702		34.997	675.5	50.188	110.67	15.65		56.53		36.644		21.224	275.65	15.129		35.007		12.532		9.7073	22264.78059	848.462	1139.10845	538.16814	595.687372	112.27525	6.295045
458	36078	CCP302S	soil	17.689	4.9865		47.059	7575.4	171	65.599	15.712		60.309		39.299	139.55	25.819	347.45	17.874		40.02		13.223		21.989	18564.61356	12743.8896	13227.04326		234.441396		2.613435
459	36078	CCP502W	rock	17.882	3.9516		34.367	1783.4	79.255	72.727	13.399		58.896		38.532		22.354	250.31	14.784		37.569		11.643		12.833	25432.64255	2758.4816	3080.03846	669.22686	665.467628		7.006205
460	36078	CCP502F	rock	17.952	3.6162		31.789		16.808	85.341	13.386		57.624		36.511		20.748	275.08	15.153		35.06		9.9639		6.3713	26390.61078		12.0340964	554.27982	595.642236		6.294585
461	36078	CCP302R	rock	18.037	3.4075		25.386	1018.9	57.593	58.313	10.941		46.738		32.356		18.03	322.36	15.474		23.974		9.7315		10.309	12299.15649	1440.4836	1740.71091		14.397754		0.3708775
462	36078	CCP302R	rock	18.101	3.1534		24.346	163.22	23.83	47.553	9.3393		40.046		24.601		15.205	245.07	13.089		19.181		8.5374		6.33	9059.750895		241.645118				0.0747479
463	36078	CCP303R	rock	18.208	4.1386		33.275	146.32	27.395	200.82	20.353		63.819		39.198		23.509	650.8	22.468		37.742		14.729		8.5327	25180.74135		212.038008	132.01476	374.961048		4.04553
464	36078	CCP401R	rock	18.308	3.0034		28.836	91.555	20.096		8.0251		56.335		32.907		20.856	142.23	11.09		32.528		8.0467		6.1724	5426.68551		116.0952045		28.99925		0.5196875
465	36078	CCP401R	rock	18.372	3.421		32.844		11.548	54.651	10.985		51.023		33.081		18.667	162.65	11.583		29.896		10.142		7.2046	7500.100035						
466	36078	CCP401R	rock	18.438	4.1002		36.578		17.888	113.03	15.895		59.7		38.768		21.658	325.49	16.332		37.311		13.044		7.1604	22967.59845		27.6645482				
467	36078	CCP401R	rock	18.507	2.2238		25.377		11.557	47.596	9.3584		38.023		24.151		14.281	142.57	10.295		17.69		8.5922		5.1575	7507.72905				17.241322		0.3998575
468	36078	CCP401S	soil	18.587	4.1266		38.554	380.82	39.028	49.032	11.663		53.97		33.717		19.871	371.76	17.136		32.691		10.236		8.6113	21246.59388	340.43368	622.858558	139.47294	387.610412		4.174445
469	36078	CCP402W	rock	18.712	3.8807		30.909	700.42	50.853	141.44	17.038		59.533		38.115		22.336	429.22	18.522		35.564		12.328		8.8648	29148.01434	891.42408	1182.765798	137.42424	379.542352		4.09222
470	36078	CCP403W	rock	19.195	3.878		25.383	156.96	25.868	186.86	18.267		51.493		34.484		18.638	572.6	20.334		30.831		14.012		7.6091	10742.39481		230.678224				
471	36078	CCP403F	rock	19.256	3.325		24.482		14.098	58.328	10.965		53.713		34.491		20.281	281.77	15.265		32.88		8.768		5.2778	28589.80199		6.2826087		33.975494		0.5704025
472	36078	CCP403S	soil	19.33	6.3737	220.95	67.769	15997	284.74	120.31	21.966		67.719		43.673	387.8	36.136	271.21	17.849		41.326		15.934		29.843	37319.30283	27262.728	27980.8443	185.88204	440.588792		4.71437
473	36078	CCP501R	rock	19.4	3.8376		26.168		15.874	144.36	16.22		53.846		34.952		19.918	413.9	17.522		31.591		12.665		6.9131	13860.95475		10.4678978		24.9415236		0.4783335
474	36078	CCP501R	rock	19.465	2.9726		21.621		11.635	76.015	11.917		44.16		27.47		16.172	278.51	14.095		20.508		9.9684		6.0407	8441.61639				36.773926		0.5989225
475	36078	CCP501S	soil	19.529	4.3209		32.525	185.14	29.207	98.766	14.831		58.483		37.37		21.641	463.06	19		36.026		11.661		9.0379	18841.0719	3.08136	280.046766		210.338772		2.367795
476	36078	CCP503T	???Do not know what this is	19.593	3.9767		35.384	1238.2	68	130.11	16.847		59.598		38.926		21.829	235.49	14.453		36.001		12.081		11.318	27931.9803	1818.5568	2124.90258	910.33764	806.416072		8.44267
477	36078	CCP504R	rock	19.668	4.0343		27.655	426.88	39.535	126.46	15.322		51.826		33.484		20.377	398.46	17.539		28.619		11.337		8.6239	20879.82645	419.84112	703.551072	70.44276	333.210248		3.62003
478	36078	CCP504R	rock	19.752	3.269		23.952	84.773	20.308	136.64	15.33		49.708		31.093		18.475	425.3	17.617		24.34		11.332		7.1988	14159.79297		104.2138187		18.4678928		0.412358
479	36078	CCP601R	rock	19.88	4.3007		34.004	95.332	22.983	168.69	18.154		58.689		39.355		21.963	366.96	17.385		37.413		12.812		7.2185	29068.4232		122.7121308		90.9856472		1.151417
480	36078	CCP601R	rock	19.944	3.4746		22.716		14.855	132.27	15.864		48.625		32.619		18.184	392.03	17.057		24.927		12.77		6.4816	16557.5565		0.180741		37.0075048		0.601303
481	36078	CCP603	soil	20.022	5.1062		49.834	3666.9	125.46	114.4	17.974		76.089		47.669	125.26	30.271	383.69	19.49		47.674		12.59		16.311	47804.7471	6005.6356	6379.74211	3324.0138	2183.65084	216.91525	22.47865
482	36078	CCP604	soil	20.456	3.6298		34.643	1069.2	60.648	88.456	13.855		57.696		36.395		20.985	391.78	17.394		34.726		11.22		10.816	16995.60864	1527.2008	1828.83148		260.879808		2.88288
483	36078	CCP605S	soil	20.517	4.3909		41.148	2540.6	97.465	84.297	15.184		56.542		35.246	85.476	22.823	322.96	16.667		37.424		12.318		14.064	32916.26237	4063.8944	4406.57714		242.554592		2.69612
484	36078	CCP606R	rock	20.596	7.1921		62.365	175.45	43.77	191.38	28.195		118.27		76.053		43.237	646.55	31.219		69.562		9.9079		5.8567	258463.2306		263.070855			967.8435	0.2151192
485	36078	CCP606R	rock	20.673	4.0723		31.767	149.06	26.104	137.49	16.886		58.562		37.475		20.972	476.71	19.112		35.341		13.044		7.3492	14307.8073		216.838214		76.8185852		1.0070345

ID	DATE	Sample	Sample Type	Time	Molybdenum standard deviation	Mercury (mg/kg)	Mercury standard deviation	Lead (mg/kg)	Lead standard deviation	Rubidium (mg/kg)	Rubidium standard deviation	Cadmium (mg/kg)	Cadmium standard deviation	Tin (mg/kg)	Tin standard deviation	Antimony (mg/kg)	Antimony standard deviation	Barium (mg/kg)	Barium standard deviation	Silver (mg/kg)	Silver standard deviation	Uranium (mg/kg)	Uranium standard deviation	Thorium (mg/kg)	Thorium standard deviation	Calculated Iron (mg/kg)	Calculated Lead Concentration Compared to CAS (mg/kg)	Calculated Lead (mg/kg)	Calculated Zinc Concentration Compared to CAS (mg/kg)	Calculated Zinc (mg/kg)	Calculated Copper (mg/kg)	Calculated Cadmium (mg/kg)
486	36078	CCP606R	rock	20.799	4.4906		27.861	157.15	28.851	190.54	20.655		64.703		42.07		25.035	476.81	20.522		42.427		13.933		8.2372	53452.06185		231.011085		28.0051296	33.90425	0.509556
487	36078	CCP606S	soil	20.861	3.9524		35.157	1617	76.63	105.08	15.339		55.875		34.068	74.23	22.202	312.05	16.097		37.343		11.836		12.818	24374.30529	2471.608	2788.5223		65.6237288	57.28475	0.892943
488	36078	CCP25	stream grave	22.629	5.9632		49.683	5840.6	163.4	89.164	18.61		69.757		44.607		25.457	387.92	19.766		46.961		13.65		18.597	58141.76294	9753.0944	10187.84714	2407.4286	1699.11588	107.5065	17.54055
489	36078	CCP35	stream cobbles	22.729	3.0474		23.875	80.061	18.932	112.05	13.759		46.166		28.85		15.883	406.85	16.766		26.625		10.799		6.1151	12603.59966		95.9588659		129.62432		1.5452
490	36078	CCP35	stream cobbles	22.801	3.9473		32.438	288.14	35.908	80.993	14.657		63.778		39.632		23.674	386.68	18.452		37.902		10.545		7.5263	56582.35542	180.65336	460.492466	517.69458	653.438884	170.64475	6.883615
491	36078	CCP45	stream cobbles	22.923	3.1694		29.537	757.72	59.99	61.578	13.312		57.442		36.059		20.368	29.258	7.8936		32.02		8.4219		7.8064	96231.89561	990.20928	1283.149668	974.92296	988.697808	322.0185	10.30038
492	36078	CCP44	stream sand and gravel	23.077	5.6085		37.504	4401.5	142.59	103.26	19.064		76.038		46.445		29.395	440.82	21.183		46.799		12.585		15.753	66350.82054	7272.086	7666.68785	2437.1334	1733.64492	413.4695	17.89245
493	36078	CCP16	stream cobbles	23.202	2.5867		21.259		11.982	56.188	10.242		40.286		26.628		15.791	601.67	19.711		18.716		9.641		4.9377					20.445978		0.4325175
494	36078	CCP34	stream sand and gravel	23.298	4.8764		40.609	1884.9	88.696	96.635	16.715		71.128		44.743	94.553	27.797	435.13	20.019		45.174		12.156		12.792	52192.43085	2933.4676	3257.85631	3414.4962	2234.20316		22.99385
495	36078	CCP26	stream cobbles	23.418	3.5137		24.909		13.055	141.42	16.117		46.566		31.089		17.531	391.9	16.726		27.829		12.998		6.6956	9686.84082				62.5556092		0.8616745
496	36078	GGG01	waste rock	24.098	3.9045		30.811	59.193	19.181	131.9	16.071		55.605		36.906		20.315	516.6	19.732		34.936		12.473		7.6838	20432.09265		59.4002167		10.1064488		0.327143
497	36078	REP01	soil	24.162	4.2205		30.523	135.41	25.879	113.58	15.154		53.954		33.151		19.622	369.53	16.675		33.036		12.19		8.383	14257.2927		192.924779		60.4974076		0.8406985
498	36078	WHC203	???Do not know what this is	24.23	1.6471		16.134	1113.7	58.612	31.788	6.4391		22.541		16.581	35.187	10.394	24.029	4.7185		10.232		6.2345	41.37	11.497	9641.37909	1603.9188	1906.79103		59.9151532		0.8347645
499	36078	REPST01	tailings	24.443	2.2381		19.846	208.43	26.01	39.716	8.0998		30.477		21.141		11.2	157.41	10.493		16.546		7.3513		5.9418	12216.35155	43.23332	320.848517		80.352734		1.0430525
500	36078	REPST02	Probably tailings??	24.513	4.6824		46.537	5202.9	148.81	105.6	18.148		63.459		41.494	116.07	26.2	290.8	16.879		40.946		13.359		18.22	52257.82689	8653.6996	9070.66051	720.99906	754.498388		7.913555
501	36078	UGA01	???Do not know what this is	24.64	2.214		22.403		12.758	21.861	7.0799		49.398		32.442		17.458	40.159	7.264		28.849		7.3683		5.2213	4728.323316						
503	36079	HRC503	rock	15.261	2.3312		29.446	143.29	24.826		6.7055		61.879		39.563		22.836		7.1859		38.185		6.261		5.5554	30481.48215		206.729751		44.9694952		0.682447
504	36079	WHC202	soil/tailings	15.351	5.1497		34.798	4560.5	133	104.95	17.796		63.305		38.622		23.928	217.91	14.495		39.048		14.181		17.853	27353.02965	7546.202	7945.23995	770.48172	729.414056		7.65791
505	36079	GGG01	soil	15.417	5.5084		48.043	6242.6	160.94	128.25	19.179		71.227		42.682	107.92	28.351	509.01	21.803		45.123		13.677		20.047	32450.18805	10446.1424	10892.11094	2551.7514	1721.23252	36.35675	17.76595
506	36079	GGG02	tailings	15.498	3.7627		34.546		14.893	80.832	13.112		54.779		34.479	185.3	24.8	297.4	15.415		33.65		10.879		6.8791	25537.56824						0.07994475
507	36079	GGG03	green rock	15.581	3.3305		26.11		16.183	48.956	10.143		48.665		31.4		16.839	210.03	12.459		26.937		9.9945		6.9478	2489.94891		36.0561492		161.828856		1.87341
508	36079	BLR203	rocks plus fine grained material	15.645	5.9597		52.885	7680.8	188.37	102.33	19.358		72.006		47.272	235.59	32.347	180	14.791		49.488		14.107		20.847	46580.62245	12925.5992	13411.69352	3329.7474	2174.84932	676.432	22.38895
509	36079	BLG201	???Do not know what this is	15.705	4.0059		32.571	1957.1	82.767	116.92	15.873		54.678		34.854	78.584	21.941	256.61	14.611		33.911		12.867		13.001	20217.02502	3057.9404	3384.34349	891.0528	774.84344	218.6865	8.1209
510	36079	HRC501	rock	15.787	3.6301		37.594	1082	78.197	57.911	14.295		55.651		37.074		20.515		7.3184		33.398		7.4116		7.2334	151473.4674	1549.268	1851.2558	1687.6074	1502.32292		15.53495
511	36079	HRC301	rock	15.855	2.4861		14.875	61.494	15.893	23.651	7.1974		31.709		21.067		11.812	509.91	18.449		13.352		6.8243		5.3111	16622.11056		63.4313386		60.8381844		0.8441715
512	36079	HUM01	Soil	15.927	5.0258		38.681	2020.2	98.374	111.26	18.534		72.72		47.108		27.77	224.92	15.993		44.649		10.897		11.759	89953.19415	3166.7248	3494.88838		264.80664	113.0655	2.9229
513	36079	BLG103	rock	15.993	3.2293		25.457	135.05	23.976	74.629	12.293		42.356		29.468		16.315	122.14	10.071		24.893		10.131		7.497	15864.16052		192.294095	173.58354	369.217492		3.986995
514	36079	HRC502	rock	16.061	3.3068		33.259	953.08	62.869	37.614	10.597		62.443		40.513		23.848		7.9412		38.826		8.1475		9.4549	54209.55867	1327.00992	1625.400852	3023.5932	2019.24296		20.8031
515	36079	HRC306	rock	16.142	4.9047		29.934	1282.3	69.896	190.79	20.761		65.483		40.116		24.798	649.84	23.105		42.644		15.339		10.958	32752.2057	1894.5852	2202.16137		227.524304		2.54294
516	36079	HUM02A	rock	16.252	6.6474		73.383	5740.9	216.23		20.742		64.824		39.748		23.958	99.639	11.634		41.435		9.1516		13.836	47487.08807	9581.2116	10013.18271	28232.886	36401.02	770.63525	7.4208
517	36079	HUM02B	rock	16.332	3.1291		52.766	1151	83.641		11.679		71.019		44.536		25.547		7.2191		45.747		5.8172		7.8937	174263.2956	1668.224	1972.1369		278.392576		3.06136
518	36079	HUM02C	rock	16.426	7.7167		85.801	8725.1	286.35		26.363		134.73		82.742	275.14	55.285		14.444		85.531		9.4734		16.078	334689.0135	14725.9724	15241.20269		608.12234	688.28575	6.421775
519	36079	BLG102	rock	16.504	5.2961		55.373	10374	275.05		18.776		58.393		40.679		21.374		7.3572		40.277		9.3246		18.778	184947.6278	17568.676	18129.9106		334.925416	393.22275	3.63751
520	36079	HRC302	" - green lichen partially covers	16.576	4.0629		32.844	185.29	28.926	133.27	17.645		59.71		39.483		21.631	564.39	20.998		37.07		13.204		7.3801	31385.65517	3.33996	280.309551		43.5183728		0.667658
521	36079	HRC307	rock	16.636	2.578		23.923	109.56	23.777	49.502	10.658		53.241		35.491		19.722	243.3	14.624		33.707		6.5566		5.3057	53126.45931		147.638164		113.025556		1.376035
522	36079	BLRX01	rock	16.699	3.9641		31.119		18.047	114.92	15.31		56.824		33.887		21.278	440.16	18.01		34.027		12.979		7.5752	9045.25374		43.3983621				0.0365058
523	36079	UGA02	rock	16.774	7.0583		77.949	27705	422.65		24.462	162.92	54.211		34.798	112.01	25.361	26.829	7.4949	187.1	38.6		16.196		34.72	36828.96623	47447.32	48492.0895	35163.822	45342.541		27.53964
524	36079	HRC303	soil	16.84	4.6694		39.77	4911.8	135.51	105.06	16.469		59.192		38.026		22.857	350.67	17.467		36.507		13.397		19.43	19147.50015	8151.8432	8560.68242		182.083636	5.646	2.079835
525	36079	BLR202	rock	16.902	3.9304		34.494	127.51	24.877	126.59	16.282		61.595		39.561		22.369	383.45	17.802		37.594		12.343		7.5116	32812.4025		179.084769		62.5793056		0.861916
526	36079	HRC305	rock	16.966	4.1192		30.271	175.14	27.698	88.78	14.117		59.967		37.323		22.873	856.19	25.85		33.972		11.098		7.3589	38864.96669		262.527766		100.6819884		1.2502365
527	36079	HRC304	rock	17.041	6.3725		71.095	8578.2	291.3		24.455		79.349		50.363		29.073	104.61	13.651		48.128		8.1697		14.704	154020.6517	14472.7168	14983.84858	6566.6406	8781.03085	158.76375	42.85205
528	36079	BLG101	rock	17.114	4.9624		38.134	5130.6	142.03	100.88	16.689		63.33		37.819	130.51	26.409	309.66	16.913		37.477		13.07		18.7	31629.71085	8529.0544	8943.99814	98.51466	369.939668	139.825	3.994355
529	36079	WHC201	rock	17.185	10.452		109.2	34410	625.87	212.86	37.816		85.417		60.099	205.93	40.663		8.7326		57.588		15.256	234.89	33.169	259491.5484	59006.74	60238.579	1844.3094	1825.04532	918.76625	18.82395
530	36079	CATMK05	soil	17.546	4.1537		30.985	807.29	55.168	71.106	12.903		49.161		31.414		18.654	233.67	13.907		27.85		10.074		9.6533	29152.25697	1075.66796	1369.991351	1192.6608	970.05664		10.1104
531	36079	CATVK02	grass	17.613	1.9881		19.043	55.628	14.366		4.7689		20.095		13.242		8.0655		2.2455		11.544		5.7272		4.2353			53.1546932		211.230208		2.37688
532	36079	CATVK071	grass	17.699	1.7791		20.693		9.8429		3.3663		16.294		12.816		5.4888		1.6305		6.2288		4.5031		3.645					39.66263		0.6283625
533	36079	CATVK04	grass	17.809	1.6444		21.361		10.22		4.3914		18.268		12.596		6.855		2.0072		9.5523		4.8948		3.9879	57.2708085				200.927916		2.271885
534	36079	CATVK081	grass	17.891	2.4175		25.351	239.52	29.715		6.0485		25.195		16.627		8.4697	16.731	4.2509		13.12		6.2962		5.9793	7365.51159	96.83248	375.315088	12711.033	16007.8239	153.80425	
535	36079	MFPA07	soil	23.773	4.5689		48.104	2076.9	105.85	87.063	17.149		71.565		45.392	89.074	28.193	226.6	16.389		44.532		8.3675		10.023	119221.1142	3264.4756	3594.22111	1732.518	1455.72	100.01275	15.06
536	36079	MFPA05	soil	23.909	4.2588		40.246	1944.9	100.8	77.061	16.679		82.799		45.782	124.97	32.633	329.43	19.338		48.184		8.8746		10.665	109747.473	3036.9076	3362.97031	2552.997	1883.9478		19.42425
537	36079	MFPB01	soil	24.038	4.1127		43.439	1382.1	78.328	68.699	13.913		63.347		38.082		24.277	284.99	16.5		39.757		8.9132		10.44	65580.25626	2066.6404	2377.00099	2134.6548	1559.08144		16.1134
538	36079	MFPB02	soil	24.143	3.6776		46.297	1978.1	92.798		12.211		67.491		42.216		25.527	222.81	15.123		40.89		9.2328		11.532	57683.15441	3094.1444	3421.13339	6336.5124	7986.6749		39.4377
539	36079	CATVK01	grass	18.204	2.0178		23.158		11.034		4.8608		19.458		16.066		7.989		2.6488		11.273		5.6379		4.3195				213.82068	357.527268		3.867855
540	36079	CATVK05	grass	18.278	1.1591		19.928		9.893		3.0561		15.326		10.42		6.1835		1.8125		7.2225		3.6682		3.726					72.4223388		0.9622305
541	36079	CATVK03	grass	18.346	1.605		25.334		10.406		3.8927		20.044		13.1		7.4343		1.8258		10.728		5.0618		4.5415					267.842036		2.953835
542	36079	CATVK082	grass	18.429	2.1175		25.073		12.935		6.3657		22.217		15.731		8.5181		2.4363		13.288		6.6202		4.3794			6.9167965		975.8679		10.169625
543	36079	CATVK10	grass	18.499	1.8483		15.294		10.472		4.2614		17.882		13.037		5.4268		1.6404		10.414		4.7877		3.5062				287.80854	397.991692		4.280245
544	36079	CATVK12	grass	18.567	1.5262		19.378		5.9307		3.3976		16.022		12.418		6.6002		1.6288		8.599		4.9301		3.2765					168.960344		1.94609
545	36079	CATVK09	grass	18.63	1.752		17.118	50.934	13.391		4.3192		17.587		12.047		6.4126		2.0941		7.7854		4.8819		3.6733			44.9312746	140.38818	319.093964		3.476165
546	36079	CATVK072	grass	19.582	1.3969		26.179		10.092		3.9561		19.829		13.542		7.5125		2.2105		10.081		4.8456		4.5885					101.80926		1.261725
547	36079	CATK11B	grass	19.798	4.6656		50.338	1905.8	96.423	81.238	16.584		77.259		47.891		26.966	266.28	17.19		50.064		10.02		11.359	90001.39932	2969.4992	3294.47102	1867.944	1465.8756		15.1635
548	36079	CATK03	soil	19.88	4.6359		43.415	1153.2	67.326	91.5	15.552		60.077		36.099		21.43	305.03	16.252		36.437		11.658		10.589	36242.1969	1672.0168	1975.99108	1082.27106	922.629988		9.627055
549	36079	CATK01	soil	20.029	4.4422		35.376	1436	74.151	81.626	15.274		55.833		34.039		21.781	272.06	15.292		32.749		12.163		11.59	34180.1415	2159.564	2471.4284	456.17256	574.800688		6.08218
550	36079	CATK04	soil	20.13	5.1431		35.612	1527.6	79.962	110.63	16.537		58.846		37.69		21.798	299.6	16.54		37.244		11.254		11.754	49688.99985	2317.4824	2631.90244	2001.9006	1458.76668	22.18675	15.09105
551	36079	CATK05	soil	20.212	4.8453		40.195	1317.1	73.175	97.657	16.243		63.955		40.035		22.848	323.56	17.058		39.161		12.31		11.655	43089.68685	1954.5804	2263.12749	2193.6006	1546.78188		15.98805
552	36079	CATMK07	soil/moss	20.291	3.504		33.457	769.87	55.929	77.792	13.276		45.511		30.603		17.798	153.23	11.928		27.186		9.1307		7.762	53750.5668	1011.15588	1304.435253	2054.0088	1491.37744		15.4234
553	36079	CATK07A	soil	20.361	5.3828		51.75	1677	97.43	60.836	16.274		86.783		54.046		32.237	337.53	20.282		53.615		8.574		9.5983	131246.9856	2575.048	2893.6363	3121.122	2248.9852		23.1445
554	36079	CATK08	soil	20.429	4.5048		34.905	795.11	61.202	123.86	18.405		65.976		42.464		23.788	211.24	14.82		40.496		10.824		8.8742	72273.63801	1054.66964	1348.653209	2003.1726	1505.03108		15.56255
555	36079	CATK09	soil	20.488	4.6579		37.286	1433	79.888	93.282	16.565		65.202		41.062		24.176	314.61	17.451		40.149		11.276		11.093	66206.87052	2154.392	2466.1727	3520.3914	2324.92652		23.91845
556	36079	CATK10	soil	20.551	3.7828		31.744	965.56	62.553	72.083	14.421		55.78		37.077	101.72	23.082	252.05	15.086		37.602		10.493		10.042	45234.16362	1348.52544	1647.264564	1909.6122	1393.54516		14.42635
557	36079	CATK11T	soil	20.629	5.992		63.893	3560.7	152.42	67.333	19.909		88.043		54.584		31.677	249.82	18.821		54.805		9.3518		11.572	166947.7432	5822.5468	6193.69033	7218.4218	9697.12205	8.7525	46.78965
558	36079	CATK12	soil	20.704	3.4383		25.174	633.27	48.066	62.421	12.171		47.306		31.014		18.473	193.3	12.685		27.674		9.3086		7.7004	31369.4787	775.65748	1065.125713	990.38316	858.818968		8.97673

ID	DATE	Sample	Sample Type	Time	Molybdenum standard deviation	Mercury (mg/kg)	Mercury standard deviation	Lead (mg/kg)	Lead standard deviation	Rubidium (mg/kg)	Rubidium standard deviation	Cadmium (mg/kg)	Cadmium standard deviation	Tin (mg/kg)	Tin standard deviation	Antimony (mg/kg)	Antimony standard deviation	Barium (mg/kg)	Barium standard deviation	Silver (mg/kg)	Silver standard deviation	Uranium (mg/kg)	Uranium standard deviation	Thorium (mg/kg)	Thorium standard deviation	Calculated Iron (mg/kg)	Calculated Lead Concentration Compared to CAS (mg/kg)	Calculated Lead (mg/kg)	Calculated Zinc Concentration Compared to CAS (mg/kg)	Calculated Zinc (mg/kg)	Calculated Copper (mg/kg)	Calculated Cadmium (mg/kg)
559	36079	MFPA01	soil	20.806	4.0877		43.793	1396.7	85.951	68.136	15.163		77.673		48.126		29.134	369.36	20.183		51.63		8.7786		10.135	110126.8596	2091.8108	2402.57873	3866.3826	2606.34948		26.78655
560	36079	MFPA02	soil	20.871	4.526		41.119	1680	92.906	76.704	16.947		75.3		46.594		28.676	302.62	18.304		46.814		9.5929		9.6671	103671.1816	2580.22	2898.892	3538.1892	2411.92616	33.95875	24.8051
561	36079	MF001	soil	20.965	5.194		53.68	3143.8	134.42	94.09	18.775		85.825		53.542		33.009	358.48	20.873		51.501		9.413		12.903	129156.4711	5103.8112	5463.32322	3542.6004	2472.18272	1.85825	25.4192
562	36079	CATK15	pine needles	23.244	2.5292		33.641		12.338		6.1914		32.752		20.121		12.237		3.3756		19.239		7.1549		6.1032					134.205624		1.59189
563	36079	MFPA06	???do not know what this is	23.497	4.158		45.99	2250.4	105.02	63.761	15.545		57.276		35.65	91.404	23.647	91.9	10.739		34.362		9.356		11.182	90484.61862	3563.5896	3898.17576	1995.8088	1537.64184		15.8949
564	36079	MFPA04	soil	23.568	3.4703		41.333	1258.3	77.187	51.588	12.756		64.904		40.891	85.313	25.667	167.74	13.618		39.507		8.3706		9.2059	79945.20387	1853.2092	2160.11577	2844.9354	1983.02132	250.05125	20.43395
565	36079	MFPA03	soil	23.673	4.896		45.991	2115.3	111.15	79.711	17.711		90.201		55.257		33.042	438.85	23.016		56.067		8.6297		10.818	140313.6107	3330.6772	3661.49407	3985.575	2734.7614	167.729	28.09525
566	36079	MFPB03	soil	24.202	5.0278		46.926	1867	96.217	78.613	16.314		73.342		45.871		27.137	303.52	18.097		46.559		10.162		11.616	94220.67533	2902.608	3226.4973	1140.38652	1076.509896	116.281	11.19531
567	36079	MFPB04	soil	24.271	2.8591		27.291	785.4	56.026		8.773		47.226		30.963	60.426	19.105	117.81	10.633		27.436		6.527		8.405	51707.8629	1037.9296	1331.64226	1074.25758	946.258684		9.867865
568	36080	MFPB06	soil	0.657	4.6998		45.645	1532.6	92.083	62.051	15.093		79.517		49.814		30.274	261.41	17.768		49.867		8.1738		9.7231	123616.8738	2326.1024	2640.66194	1544.0976	1363.41688		14.1193
569	36080	MFBS02	soil	0.741	4.8189		42.29	1732.5	93.055	61.904	15.132		77.158		46.733		28.761	261.16	17.089		48.665		9.1279		9.9865	95888.82143	2670.73	2990.86675	2549.0316	1854.27088		19.1218
570	36080	CATK02	soil	0.809	4.6469		37.876	1144.6	66.529	112.1	15.882		53.036		35.662		20.346	270.99	15.211		33.952		11.635		11.548	31147.08783	1657.1904	1960.92474	1378.06332	1078.315336	73.36225	11.21371
571	36080	CATK07B	soil	0.881	4.0872		31.356	589.33	47.467	83.65	14.561		58.669		36.695		21.816	305.71	15.863		37.34		12.256		9.823	28834.8261	699.90492	988.147227	206.51892	421.812216		4.52301
572	36080	CATK07C	soil	0.948	4.3514		32.448	716.41	53.507	93.452	14.884		61.505		38.45		22.136	266.35	15.344		38.132		11.174		9.6154	42099.76722	918.99084	1210.778679	771.37068	761.144664		7.98129
573	36080	CATK10T	soil	1.014	2.9478		25.082	444.85	40.624	33.936	9.064		47.57		30.409		16.432	105.56	9.9368		27.256		7.4244		6.738	35227.97826	450.8214	735.032715	1242.28104	1003.096192		10.44712
574	36080	CATK11M	soil	1.076	4.2111		38.946	872.02	58.739	81.75	14.731		66.163		39.751		25.36	279.79	15.933		40.885		11.229		9.7934	43225.47551	1187.26248	1483.391838		333.876004		3.626815
575	36080	CATK11C	soil	1.14	4.6157		44.023	1236.9	77.51	88.244	16.885		66.306		39.719		25.532	219.33	15.241		41.262		10.441		9.2601	86132.23155	1816.3156	2122.62511	2765.8602	1948.71796	291.0625	20.08435
576	36080	CATK14	soil	1.208	4.4682		39.57	2201.9	98.224	63.412	14.255		66.497		42.038	80.129	26.001	298.69	17.144		42.197		9.6879		12.567	62902.33154	3479.9756	3813.20861	2655.6222	1843.77676		19.01485
581	36080	HRC504	rock marked 4 slag?	9.967	4.4527		33.827	695.27	52.187		11.863		55.824		35.771		20.871	1191.4	30.342		34.268		11.555	41.908	11.564	8090.94795	882.54548	1173.743513		169.998472		1.95667
582	36080	HRC505	rock 5	10.073	4.2453		29.949	82.703	22.007	117.27	16.79		55.523		33.986	100.18	23.041	512.1	20.725		33.924		11.364		6.3307	50136.47415		100.5873857		53.750704		0.77194
583	36080	HRC506	rock 6	10.149	3.9378		46.906	10610	214.11		13.498		33.504		22.839		12.485		4.0052		20.625		11.118		24.681	33352.66883	17975.54	18543.359	2084.3436	1463.84448		15.1428
584	36080	HRC507	rock 7	10.235	4.3385		25.982	396.64	38.62	194.18	19.271		59.625		35.47		21.285	580.55	20.949		35.38		15.049		8.9197	18230.7711	367.70736	650.573616		147.73514		1.729775
585	36080	HRC508	rock 8	10.342	5.4875		33.238	905.25	61.657	199.15	21.574		59.781		36.591		21.588	468.69	19.843		38.472		14.334		10.497	31198.67625	1244.551	1541.607475	3689.3082	2330.11716	118.43375	23.97135
586	36080	HRC509	rock 9 Ore?	10.41	6.9227		73.283	17062	384.81		24.919		77.691		47.98		29.727		8.2061		50.686		11.555		22.732	224980.4063	29098.788	29846.6178	7559.1468	10444.9243	1048.53075	50.0039
587	36080	HRC510	rock 10	10.478	3.8689		30.743	833.78	63.812	121.32	17.619		58.276		37.912		21.998	107.01	11.554		35.12		9.2041		7.4137	94228.64021	1121.33672	1416.399182	2323.9908	1726.08464		17.8154
588	36080	HRC511	rock 11	10.549	4.3981		40.402	1022.3	71.417	92.9	16.891		62.959		40.253		23.239	153.66	13.39		40.573		9.3701		9.4763	95390.0081	1446.3452	1746.66737	70.8753	490.76874		5.225775
589	36080	HRC512	rock 12	10.618	4.2718		30.802	1797.3	80.412	132.67	16.89		57.705		36.499		21.946	588.51	21.686		34.99		13.7		13.499	18161.16255	2782.4452	3104.38987		77.9334444		1.0183965
590	36080	HRC513	rock 13	10.688	4.4208		28.708	876.52	58.002	179.51	19.677		60.609		39.326	73.989	23.777	464.29	19.666		39.343		14.601		10.325	27116.85495	1195.02048	1491.275388	604.68276	636.749848		6.71353
591	36080	HRC514	rock 14	10.754	3.3725		36.59	852.41	70.858		12.036		64.809		42.438		24.459		7.6071		41.504		6.5192		7.441	158544.3264	1153.45484	1449.037079		552.819456	333.736	5.85816
592	36080	BB04A	rock	10.849	3.9535		27.206	77.521	20.573	117.49	15.285		61.805		39.894		23.072	326.14	16.264		36.285		11.725		6.9215	17330.6376		91.5090399		78.8135964		1.0273665
593	36080	BB04B	rock	11.002	3.992		23.624		15.283	145.43	16.291		55.3		35.653		21.387	315.21	15.738		33.4		12.005		6.5848	16876.54395		4.1085008		37.738708		0.608755
594	36080	BB04C	rock	11.084	3.3134		26.568		11.958	99.76	13.502		46.595		31.409		17.499	277.3	14.281		25.374		11.362		6.2525	4066.70079				32.869662		0.5591325
595	36080	BB01A	rock	11.229	2.8387		19.376	51.773	16.147	69.235	11.665		38.21		25.373		14.665	289.66	14.222		21.316		10.548		6.5316	12333.13232		46.4011187		18.256882		0.4102075
596	36080	BB01B	rock	11.297	3.2583		22.297	726.74	50.494	47.077	10.562		43.348		28.4		16.784	39.132	7.2282		24.16		8.9822		8.2669	28773.13394	936.79976	1228.875806	18.11574	313.813052		3.422345
597	36080	BB01C	rock	11.696	3.5764		27.703	507.62	43.819	75.426	13.931		63.731		40.036		24.381	260.27	15.176		40.633		11.731		8.2148	23842.0023	559.03688	844.999478	659.83788	636.343624		6.70939
598	36080	BB01D	rock	12.485	3.8794		33.547	575.77	45.509	113.88	15.843		58.144		35.024		21.569	226.51	13.8		35.399		13.379		9.995	17872.20429	676.52748	964.391463	592.11672	602.469056		6.36416
599	36080	CCGEM12	rock	16.201	3.9125		41.165	3313.7	126.03	51.309	13.158		65.038		39.649	85.609	25.908	247.11	16.27		39.318		8.1799		12.892	91471.76342	5396.7188	5760.97103	1779.8922	1419.49836	46.085	14.69085
600	36080	CCP73	cobbles	16.274	4.6228		36.403	2902.9	108.96	64.469	14.849		66.538		41.388		25.003	313.13	17.174		42.914		11.255		14.741	41878.97534	4688.4996	5041.29051	4512.7908	2818.37584	580.7845	28.9474
601	36080	CCGEM01	sediment	16.335	4.7461		43.305	4477.5	138.74	69.096	16.094		68.437		43.118	103.15	27.288	346.85	18.331		43.392		12.462		17.249	44470.83723	7403.11	7799.83225	4855.6152	3009.97816		30.9001
602	36080	CCP55	sediment	16.4	5.3671		44.694	4725.8	137.92	110.89	17.904		78.26		47.696		28.263	422.93	20.053		47.669		13.209		17.55	32519.30403	7831.1792	8234.82902	4460.1504	2768.95192		28.4437
603	36080	CCP68	pebbles	16.469	2.926		21.859	199.88	25.572		6.2437		39.006		26.423		15.131	111.99	9.2763		23.054		6.8149		6.2707	2589.21867	28.49312	305.869772	556.53888	557.017104		5.90094
604	36080	CCP67	sediment	16.535	5.3288		49.328	6264.4	160.56	83.693	16.761		70.428		44.672	130.06	28.644	325.45	17.918		42.964		13.291		20.036	34313.29641	10483.7256	10930.30236	6151.518	7626.0175	98.2415	37.8875
605	36080	CCGEM09	sediment	16.607	4.8776		45.43	2613.4	106.64	100.13	17.628		66.071		42.915		25.447	377.39	19.029		44.341		11.904		13.024	36464.37024	4189.4016	4534.11546	3677.9328	2386.19864		24.5429
606	36080	CCP47	rock	16.69	3.9185		25.274		16.086	118.63	15.197		57.136		34.437		20.988	313.89	15.767		33.483		12.397		7.2686	17688.6396		6.6820419		71.1664296		0.949431
607	36080	CCGEM02B	rock	16.758	3.0925		27.342	270.49	31.82	28.498	8.8154		50.672		33.178		19.654	89.44	9.6674		27.919		7.7961		6.7294	29131.64372	150.22476	429.571431	2031.0996	1422.09368		14.7173
608	36080	CCGEM08A	rock	16.829	3.7236		28.334	515.3	42.974	135.11	16.08		54.961		34.169		20.451	340.43	16.242		33.047		12.416		8.9474		572.2772	858.45407	803.05608	721.989184		7.58224
609	36080	CCGEM08B	rock	16.899	3.771		25.799	447.87	39.952	113.25	15.169		51.109		31.706		19.444	386.09	17.021		30.816		11.857		8.2472	18852.62199	456.02788	740.323453	173.88702	380.569196		4.102685
610	36080	CCP71	rock	16.972	3.2979		25.111		14.91	86.97	12.926		53.368		35.078		19.724	273.61	14.557		31.632		10.686		6.4786	6510.27804				69.9184192		0.936712
611	36080	CCP72	rock	17.048	2.9893		23.073	138.14	21.572	64.346	10.264		40.121		28.007		16.014	123.12	9.7927		24.409		9.7663		6.7486	2080.531935		197.707466		141.562792		1.66687
612	36080	BB02	rock	17.122	2.3034		21.522	234.54	29.001	49.792	9.4963		43.597		26.979		16.147	103.21	9.4019		24.754		7.9888		5.885	10914.86679	88.24696	366.590626	2418.6162	1593.04628		16.45955
613	36080	CCP15	sediment	17.184	4.3488		31.8	198.66	28.522	61.049	12.52		61.593		37.739		21.801	314.7	15.659		38.48		12.28		8.8705	12012.44043	26.38984	303.732454		257.280212		2.846195
614	36080	CCGEM05	pebbles	17.253	2.5058		32.473	183.23	29.009	35.408	9.2628		53.555		33.203		19.804	250.74	14.992		28.935		6.4347		5.6805	41139.95136		276.700637	27101.4	34892.038		4.02552
615	36080	CCGEM02	sediment	17.326	3.8696		35.547	1276.1	76.036	62.687	13.607		63.298		40.153		23.812	187.96	14.247		34.732		8.9505		10.13	77738.1434	1883.8964	2191.29959	7313.9778	9357.33355		45.32915
616	36080	CCGEM10	sediment	17.393	4.3091		35.536	2212.5	92.772	114.33	16.311		62.626		40.116		23.342	307.56	16.588		40.159		11.708		13.297	37868.81484	3498.25	3831.77875	3510.441	2252.9346	102.111	23.18475
617	36080	BB03	precipitate	17.472	4.5312		47.662	1056	86.011	48.726	14.008		80.941		45.506		29.482	42.922	10.457		46.371		6.1946		7.27	209454.6642	1504.444	1805.7064	15476.7414	20656.50515	206.533	
618	36080	CCGEM07	pebbles	17.544	5.9174		51.403	2337.9	121.98		14.807		92.738		59.739		32.243	117.58	14.629		58.306		7.9947		10.74	153537.8861	3714.4396	4051.46701	21060.942	27646.784		
619	36080	CCGEM04	???do not know what this is	17.608	4.1695		46.613	226.97	45.461		10.31		94.75		57.392	112.94	36.946	98.099	14.916		58.037		4.6914		5.3057	236201.5662	75.19628	353.328743	30956.952	40917.264		17.58256
620	36080	AA11	rock	17.736	3.2355		29.743		11.619	103.96	14.246		56.879		34.969		20.76	646.78	21.868		35.761		12.251		7.5665	24386.28668						
621	36080	AA08	rock	17.807	3.6765		29.794		15.317	93.899	13.941		49.921		32.203		18.665	391.97	16.728		32.384		12.066		6.8818	8435.95623				153.15146		1.784975
622	36080	AA09	rock	17.872	4.3265		26.595		17.114	138.02	16.911		61.725		38.436		21.843	455.88	18.857		37.324		13.427		7.3639	20251.6296		2.090312		45.5404656		0.688266
623	36080	AA02	coarse to fine	17.941	5.6482		54.242	6183.2	184.76	168.35	23.574		83.488		53.388		31.665	140.97	14.73		54.719		12.794		17.917	117561.3702	10343.7368	10788.04808	1236.2286	1180.05188	137.972	12.25055
624	36080	AA06C	fine grain	18.019	5.1261		43.12	3242	117.01	121.24	19.096		65.943		41.199		23.117	355.13	18.341		39.853		13.106		14.244	39205.57815	5273.108	5635.3598	7550.19	9485.49		45.88
625	36080	AA10	rock	18.09	3.7919		26.378	87.149	19.249	97.736	13.646		50.336		32.011		18.132	337.77	15.817		30.361		11.343		6.4702	10043.4207		108.3763331		29.8444216		0.528301
626	36080	AA05	rock	18.163	3.3768		33.357	1294.3	66.679	69.84	12.826		53.331		33.084		19.821	84.385	9.4224		32.885		11.393		11.584	18371.99561	1915.2732	2223.18417	2811.6018	1823.69124	6.2455	18.81015
627	36080	CCW01	rock	18.471	4.3046		31.197		13.977	60.823	12.607		55.555		36.191		20.416	240.19	13.958		33.213		11.767		6.9545	16619.75526				37.7883576		0.609261
628	36080	CCW02	rock	18.538	4.2873		31.381		12.817	105.72	14.172		52.99		34.272		20.431	281.48	14.699		32.548		11.962		7.2318	10674.14268						0.21329185
629	36080	CCW04	rock	18.609	3.954		23.991		14.558	103.33	14.7		57.192		37.102		20.777	609.04	21.097		35.079		12.243		7.3426	8613.22641				20.011544		0.42809
630	36080	YD02	rock	18.678	4.1405		40.675	1975.4	87.275	99.122	15.369		67.132		42.431		23.756	310.18	16.851		40.831		11.385		12.603	30903.43815	3089.4896	3416.40326	2663.4474	1775.39572		18.31795
631	36080	YD01A	rock	19.139	3.049		29.632	149.23	23.584	32.738	8.7516		53.833		33.146		19.24	46.431	7.964		30.227		8.0468		6.0755	12909.81344		217.136037		17.2684036		0.4001335
632	36080	YD01B	rock	19.201	3.298		28.137		16.616	39.09	10.017		54.754		34.195		20.548	98.634	10.059		31.931		9.3604		6.3708	20313.08337		35.0891004		145.963552	16.2735	1.71172
633	36080	YD01C	rock	19.265	3.4742		34.855		16.019	118.12	15.429		59.686		36.138		20.569	129.84	11.286		36.692		12.71		7.0138	15339.08577		1.7767219				0.20333055
634	36080	YD01D	rock	19.338	2.2811		41.772	84.772	24.923		8.0756		51.372		34.38		19.099	25.719	7.3443		26.208		4.2214		3.6848	114513.6563		104.2120668	806.4306	936.31748		9.76655

ID	DATE	Sample	Sample Type	Time	Molybdenum standard deviation	Mercury (mg/kg)	Mercury standard deviation	Lead (mg/kg)	Lead standard deviation	Rubidium (mg/kg)	Rubidium standard deviation	Cadmium (mg/kg)	Cadmium standard deviation	Tin (mg/kg)	Tin standard deviation	Antimony (mg/kg)	Antimony standard deviation	Barium (mg/kg)	Barium standard deviation	Silver (mg/kg)	Silver standard deviation	Uranium (mg/kg)	Uranium standard deviation	Thorium (mg/kg)	Thorium standard deviation	Calculated Iron (mg/kg)	Calculated Lead Concentration Compared to CAS (mg/kg)	Calculated Lead (mg/kg)	Calculated Zinc Concentration Compared to CAS (mg/kg)	Calculated Zinc (mg/kg)	Calculated Copper (mg/kg)	Calculated Cadmium (mg/kg)
635	36080	YD01E	rock	19.409	4.078		29.021	215.42	30.14	121.16	16.124		55.047		33.861		20.73	447.39	18.558		36.261		12.607		7.9074	16872.498	55.28408	333.094298	342.06576	460.155248		4.91378
636	36080	AA05T	tailings	19.486	4.5311		47.356	4205.2	139.71	114.57	18.698		73.793		46.322		27.992	197.96	15.171		48.1		12.123		16.03	75682.39245	6933.6648	7322.78988	715.83996	804.204408	78.97575	8.42013
637	36080	AA07	tailings	19.55	5.5895		54.006	8740.7	214.77	102.47	20.334		81.553		52.247		29.251	128.3	13.901		52.277		12.671		21.527	88551.04248	14752.8668	15268.53233	1613.9952	1325.27696	326.78725	13.7306
638	36080	AA15	coarse sand and rocks	19.622	5.1932		57.049	10666	227.41	77.677	19.076		71.226		43.765	104.88	28.632	370.38	20.062		46.356		14.419		24.255	55494.72152	18072.084	18641.4654	1674.1008	1282.62344	24.85725	13.2959
639	36080	AA12	rock	19.689	3.4488		27.483	97.137	20.819	71.073	12.103		46.016		29.655	67.081	18.69	561.16	19.494		27.84		11.953		8.0482	8784.109365		125.8743103		52.9292288		0.763568
640	36080	AA16A	soil	19.751	6.202		67.79	14943	307.27	89.596	21.799		79.82		48.925	120.77	32.449	197.88	17.043		53.08		13.329		26.447	107958.5817	25445.632	26134.3417	1164.0456	1126.45288	56.68525	11.7043
641	36080	SUC23	rock	19.819	1.6928		16.958	489.56	39.566		5.5154		15.374		11.719		6.4311	9.9421	3.0069		10.741		5.5721		7.1149	11652.63198	527.90144	813.360164	1122.72642	885.528196		9.248935
642	36080	AA14	rock	19.886	2.3692		19.011		11.598	55.34	9.5844		36.383		23.518		13.593	97.252	8.8077		18.701		7.9647		5.1826	8975.18217				53.1898892		0.7662245
643	36080	SH05	rock	19.949	6.732		66.346	14176	300.89	139.93	24.09		91.847		57.385		34.857	303.52	20.851		56.192		13.654	77.813	25.799	117630.056	24123.324	24790.6344		418.900944	79.439	4.49334
644	36080	SUC22A	rock	20.028	4.472		41.091	1426.6	78.859	174.89	20.339		76.585		48.14		27.419	54.782	10.524		47.986		12.503		11.004	74097.55522	2143.3584	2454.96054		351.332352	62.98	3.80472
645	36080	SUC22B	rock	20.093	5.4109		33.556	475.55	44.097	236.69	21.813		65.127		41.933		24.106	77.473	10.428		40.829		15.213		9.8278	14442.5757	503.7482	788.816045	936.01782	793.112236	139.85225	8.307085
646	36080	SUC22C	rock	20.157	5.1461	176.91	53.512	1255.3	73.953	188.01	22.047		87.474		52.249		30.936	1422.5	36.311		51.426		15.076		12.061	38134.77225	1848.0372	2154.86007	4290.3336	2663.33368	213.1275	27.3673
647	36080	SUC22D	rock	20.229	4.1074	195.87	48.591	2603.4	101.04	182.43	20.013		58.776		37.729		22.723	62.364	9.462		37.258		13.9		13.543	48737.23208	4172.1616	4516.59646	478.45986	593.814228		6.275955
648	36080	SUC22E	rock	20.294	6.0464		48.152	268.19	45.997	112.6	21.233		102.68		63.381		35.722	238.79	19.343		63.629		9.3826		6.5438	161993.5021	146.25956	425.542061	1843.0974	1667.06932	358.9695	17.21395
649	36080	AA16A	rock	20.372	5.6621		68.034	9947.3	270.9		20.694		95.109		54.808		35.769	50.333	12.224	243.37	65.363		9.9671		18.784	197253.5191	16833.0452	17382.37487	4912.5756	6861.3596	1221.24125	34.6008
650	36080	AA16B	rock	20.438	4.6604		51.162	4836.9	163.35		15.367		74.726		47.529		28.812	64.908	11.376		43.169		9.1881		14.951	124629.1252	8022.7156	8429.46511	1789.572	1500.856	497.5085	15.52
651	36080	SH07	rock	20.513	6.3466		54.636	9499.7	223.76	155.44	23.268		84.104		49.325		30.379	203.11	16.378		50.641		14.543		22.514	87369.28811	16061.3828	16598.22443	9.73614	436.582972	17.3635	4.673545
652	36080	AA18	rock	20.6	3.9786		26.431	82.004	20.903	108.47	14.578		59.177		38.625		22.215	56.471	9.0071		33.903		10.385		6.7655	39123.99854		99.3628076		143.05228		1.68205
653	36080	SH01	very wet soil	20.661	5.3066	195.34	60.822	16707	265.17	56.41	17.142		68.138		41.728		26.105	93.432	11.468		41.739		15.845		33.194	9540.248481	28486.768	29224.6933	1701.9744	1200.58876	1218.816	12.45985
654	36080	AA13	dump rock	20.746	3.7267		33.002	327.66	36.325	113.9	15.544		62.063		38.215		21.993	659.51	22.29		38.286		13.129		9.528	18435.23606	248.78584	529.727554	3566.3862	2230.81796		22.95935
655	36080	SUC21	rock	20.813	2.875		33.059	975	64.457		8.1157		63.436		39.44		22.911		6.3901		41.203		6.363		8.7809	68345.76556	1364.8	1663.8025	1015.49142	951.313916		9.919385
656	36080	SH04A	rock	20.876	3.5856		43.924	10496	191.18	41.331	12.601		46.288		29.68		16.999	108.94	10.454		23.476		12.462		27.903	2273.676639	17779.004	18343.6424	745.8288	658.95676	421.154	6.93985
657	36080	SH04	rock	20.943	3.9497		35.271	2914.1	106.22	87.78	14.968		52.318		33.175		19.094	199.21	13.461		29.83		10.778		14.214	32052.17853	4707.8084	5060.91179	3626.0226	2307.32348	70.0105	23.73905
658	36080	AA01B	rock	21.02	4.9229		47.906	3817.5	134.22	152.87	20.502		72.495		44.421		27.143	189.83	14.969		44.795		11.745		14.878	79496.88585	6265.27	6643.57825	1996.8282	1516.54076		15.67985
659	36080	SH02	rock	21.092	3.3515		29.464		13.576	110.98	14.072		46.794		31.246		16.929	237.85	13.411		28.408		11.433		6.399	13937.37347						0.0678916
660	36080	SUC20	soil	21.158	3.3903		27.092	62.62	18.982	50.402	11.538		49.662		31.861		17.694	440.61	18.018		28.556		10.529		6.509	14644.49886		65.403978		236.619208		2.63563
661	36080	AA17D	rock	21.22	5.1901		50.318	7292.9	191.34	108.8	19.788		69.937		44.653	134.07	29.17	280.72	17.926		44.885		13.022		20.326	80528.07395	12256.8596	12732.13151	2113.3566	1582.89068		16.35605
662	36080	SH06	sand	21.278	4.5201		32.056	321.85	39.058	177.88	19.743		67.702		42.182		23.729	278.34	16.21		42.294		12.364		8.5975	57893.87355	238.7694	519.549015				
663	36080	AA07M	sand and small pebbles	21.338	3.9515		34.518	374.87	37.918	94.129	14.211		61.531		38.427		22	687.06	22.795		37.512		11.575		8.7943	15408.6561	330.17588	612.434753	695.88042	668.649716		7.038635
664	36080	S17005B	rock	24.302	7.2128		82.585	30452	493.58		25.157		45.604		30.986		17.59		6.0419		30.747		15.164		34.135	85324.29635	52183.148	53304.5588	7572.3024	9728.4254	159.96275	46.9242
665	36080	REXM11	soil	24.37	4.4448		38.637	3429.8	126.8	110.04	18.414		64.365		42.511		24.595	177.4	14.251		42.98		12.172		14.96	83564.83286	5596.8752	5964.36662		379.418228		4.090955
666	36080	CCP805	sediment	24.439	5.3448		36.676	2457.1	97.563	60.349	14.512		65.263		42.612		24.533	320.67	17.063		41.17		11.828		14.384	32568.60453	3919.9404	4260.29349	1818.1326	1324.48708	110.31325	13.72255
667	36080	BB05	rock	24.505	3.7416		24.232		18.329	105.4	15.26		58.842		36.844		21.489	261.37	15.144		33.683		10.961		6.7651	25208.3673		30.1417348		33.2205944		0.562709
668	36080	REXM08	soil	24.574	4.6662		37.673	1627.1	81.216	144.7	19.243		64.87		40.513		24.024	180.08	13.589		38.091		14.286		13.354	39979.2162	2489.0204	2806.21649	2270.7804	1575.10472		16.2767
669	36080	REXM10	tailings	24.638	3.3687		32.321	857.42	61.737	89.842	15.459		66.855		41.811		23.278	69.125	10.163		40.764		9.4931		8.5378	51143.26845	1162.09208	1457.814098	3443.0238	2264.89564	719.2145	23.30665
670	36080	S17002	rock	24.758	6.5509		53.099	2448.7	150.61		16.031		108.24		66.949	189.79	44.633	177.45	19.513		71.223		6.9536		8.8606	349394.9012	3905.4588	4245.57753	926.8122	1521.05436	841.32175	15.72585
671	36080	S17002A	rock	24.855	4.4698		53.581	8279.5	197.95		14.437		62.968		39.947	85.249	25.305		5.6093		40.736		11.299		21.306	66265.18842	13957.758	14460.55605	1152.28278	1022.312844		10.642965
672	36080	AA04	humus	21.941	3.4923		32.984	2587.7	93.257	66.124	13.371		51.228		33.125		17.975	293.45	15.174		29.368		12.104		15.758	9738.617145	4145.0948	4489.09163	2700.3072	1747.07288	616.29125	18.0293
673	36080	SH03	tailings	22.006	5.1931		49.043	6314.1	161.29	142.27	20.279		67.873		42.283		25.539	369.42	18.796		43.798		14.793		19.626	37690.45425	10569.4084	11017.37179		266.21714		2.937275
674	36080	AA05F	tailings	22.076	3.814		35.693	1766.6	80.983	71.764	14.264		58.837		38.452		21.567	113.52	11.003		35.543		11.556	40.035	13.215	28434.42189	2729.5184	3050.60654	6228.447	7686.21625	47.829	38.14625
675	36080	AA19	dolomite	22.139	3.121		26.249		16.076	52.314	11.492		51.288		33.659		18.911	494.65	18.768		28.677		11.34		7.0558	10074.53816		32.3438731		81.4517956		1.0542535
676	36080	AA03	tailings	22.201	5.031		49.488	6168.9	177.11	94.769	17.911		77.249		46.381		29.527	108.46	12.835		47.22		11.219	85.125	19.727	94867.64436	10319.0836	10762.99591	1396.7004	1219.65872	310.05575	12.6542
677	36080	AA01A	???do not know what this is	22.295	4.8204		51.557	4182.2	142.34	64.418	15.967		74.723		46.714		27.089	149.83	13.948		45.384		10.86		15.868	91548.1616	6894.0128	7282.49618	1120.76634	1059.346932	47.066	11.020395
678	36080	REX06	rock	22.451	3.1567		30.414	196.76	34.814		8.7427		73.692		43.871		25.449		5.8753		44.069		6.0197		5.7465	128316.6063	23.11424	300.403844		123.057032	1162.79	1.47827
679	36080	S17001	rock	22.833	4.2078		53.725	11151	244.13		15.874		52.739		35.152	143.7	24.943		5.1523		37.986		11.257		23.628	87172.06835	18908.224	19491.1369	1013.77884	991.925032	8.48	10.33327
680	36080	S17001A	rock	22.96	3.1984		28.095	226.21	29.022	55.11	11.189		51.421		33.772		19.118	246.66	13.808		29.893		10.523		7.4213	11070.43053	73.88604	351.997299		105.047768		1.29473
681	36080	S17003	rock	23.101	4.4581		37.43	3388.4	117.38	106.27	16.09		60.548		38.166		22.911	143.6	12.397		38.963		11.482		15.389	43586.45505	5525.5016	5891.83796	1096.23894	950.682012		9.912945
682	36080	S17004	rock	23.165	4.2172		32.123	169.43	27.203	115.81	15.919		54.132		33.955		19.68	239.64	13.972		32.729		12.94		7.351	21286.02075		252.524417	297.64386	452.764228	31.152	4.838455
683	36080	REXM04	tailings	23.24	4.1957		39.405	2613.5	103.78	122.85	18.026		64.326		38.564		23.298	200.04	14.207		39.072		12.48		14.293	42860.72805	4189.574	4534.29065	1667.1162	1255.88036		13.02335
684	36080	REXM05	tailings	23.309	3.7077		37.378	1003.2	63.191	70.918	13.476		64.531		40.297		22.83	101.09	10.949		38.338		10.252		9.5377	34174.7628	1413.4168	1713.20608	6005.8572	7445.1537	44.2865	37.1101
685	36080	HRC5A01	???do not know what this is	23.376	3.5164		41.515	2615.5	103.07		9.6228		37.16		22.689		14.322		4.378	109.4	27.18		8.5219		14.372	16102.59742	4193.022	4537.79445	14848.4496	18839.5731	25.02075	
686	36080	REXM03	rock	23.466	3.7021		39.388	241.18	36.344		9.7476		69.69		43.249		25.627	46.171	9.7122		41.439		6.1893		5.7287	103021.677	99.69432	378.223242	9355.155	12148.95025		57.32825
687	36080	REXM02	rock	23.56	3.127		33.381	3110.1	108.77		9.9485		51.358		32.716		19.333		6.0623		29.945		8.9331		14.442	27481.32172	5045.7124	5404.28419	1881.1542	1334.86836		13.82835
688	36080	S17003	rock	23.624	3.42		25.887	81.558	19.244	60.749	10.712		51.721		34.05		18.969	67.043	8.7728		30.134		8.8446		6.3133	17242.4763		98.5814602		27.2197632	163.914	0.501552
689	36080	CCP801	soil	23.784	4.0381		33.908	460.18	40.255	74.911	13.094		49.169		32.205	58.634	19.462	238.12	13.551		31.924		12.005		9.493	7084.24203	477.25032	761.889342	26.84772	288.209656		3.16141
690	36080	CCGEM23	soil	23.875	3.6726		33.307		15.284	57.24	12.493		51.399		32.365		18.69	331.69	15.805		32.064		11.279		6.6375	16121.95746					16.8185	0.0974029
691	36080	REXM09	rock	24.007	4.315		56.364	9287.5	221.44	66.014	16.706		42.576		30.304		17.859		5.037		27.655		11.59	92.868	23.016	73777.26381	15695.55	16226.47125	10145.8614	13015.27715	118.7335	61.05195
692	36080	CCP802	sludge	24.075	3.9397		44.381	2778.3	100.6	55.363	13.936		61.408		37.596		23.149	145.07	12.15		35.745		12.1		15.165	12994.78463	4473.6892	4823.00377	14966.8482	18975.22095		
693	36080	CCP803	soil	24.161	4.3576		33.798	2880	101.95	112.46	15.782		55.436		34.098		21.097	321.75	16.42		34.702		12.857		15.601	11779.64655	4649.02	5001.172	13035.5592	16458.9132		
694	36080	S17005A	rock	24.233	6.5608		67.862	7532.3	237.97		23.634		60.094		41.845	115.15	27.032	78.127	11.503		37.992		10.932		15.63	209108.3432	12669.5852	13151.53637		680.712312	106.49825	7.16157
695	36080	S17002B	rock with black spot	24.921	5.408		49.654	7135	204.97	88.163	19.475		71.794		44.217		27.125	62.96	10.925		44.283		10.519		17.569	114688.2854	11984.64	12455.5065	2500.7472	1863.52376	222.5015	19.2161
696	36080	S17002C	rock	25.001	4.7304		41.129	5176.3	167.43		14.994		56.175		38.177		22.459		6.7089		37.754		9.8968		16.027	89888.5674	8607.8412	9024.05997	352.1898	659.18244		6.94215
697	36081	SUCC05	tailings	1.349	5.0512		53.242	6132.7	171.67	92.981	18.225		70.328		44.687		26.469	148.15	13.787		43.209		11.761		18.927	77906.84636	10256.6748	10699.57713	2073.9024	1549.15152	109.05975	16.0122
698	36081	REXM07	tailings	1.43	3.0144		29.971	1001	57.126	49.399	10.551		43.536		25.415		14.545	48.841	7.3514		25.647		9.4229		10.35	15181.93511	1409.624	1709.3519		77.8014216		1.017051
699	36081	CCP804	pebbles	1.504	4.3654		34.845	1532.1	74.033	168.69	18.971		68.25		42.8		24.204	1037.6	28.343		43.251		14.666		12.214	15243.39465	2325.2404	2639.78599	987.38478	822.586044		8.607465
700	36081	CCP804A	rock	1.593	4.1685		31.473	790.4	51.502	88.022	14.197		63.534		38.456		23.145	452.94	18.437		39.17		12.822		10.631	8535.91902	1046.5496	1340.40176		254.5382		2.81825
701	36081	CCP804B	rock	1.729	4.4884		31.156	445.43	40.26	130.87	15.94		66.685		40.91		23.765	550.33	20.501		40.192		12.921		9.2916	14389.46865	451.82132	736.048817		256.321072		2.83642
702	36081	YD03A	rock	1.855	4.587		25.215		14.922	63.694	11.739		48.258		31.253		18.162	185.24	12.086		28.331		11.354		7.0509	8538.135		15.2716076		41.7716096		0.649856
703	36081	YD03B	rock	1.923	4.4654		27.753		18.008	53.311	11.432		53.411		34.048		19.654	233.23	13.647		33.459		10.486		7.6099	8607.97314		42.0669181		27.8787488		0.508268
704	36081	CCGEM06	filter cake	2.04	6.8013		99.414	891.09	110.42		22.327		154.75		94.809		56.678	121.97	21.763		97.795		4.735		5.2465	497111.8054	1220.13916	1516.800571	66899.538	89004.0255		125.78002
705	36081	CCP69	filter cake	2.169	4.577		47.245	5865.3	161.33	118.27	17.924		34.284		21.77	79.086	16.733	88.459	9.3472	79.657	24.58		12.031		18.631	47703.26433	9795.6772	10231.11907	11258.3718	14325.73705	423.7155	66.68465
706	36081	CCP86	filter cake	2.43	1.1106		17.693	636.99	44.348	13.619	4.3554		8.856		8.5412		3.1724		1.5481		5.0954		4.2229		6.9143	7985.41299	782.07076	1071.642781	2834.0934	1816.2438		18.73425

ID	DATE	Sample	Sample Type	Time	Molybdenum standard deviation	Mercury (mg/kg)	Mercury standard deviation	Lead (mg/kg)	Lead standard deviation	Rubidium (mg/kg)	Rubidium standard deviation	Cadmium (mg/kg)	Cadmium standard deviation	Tin (mg/kg)	Tin standard deviation	Antimony (mg/kg)	Antimony standard deviation	Barium (mg/kg)	Barium standard deviation	Silver (mg/kg)	Silver standard deviation	Uranium (mg/kg)	Uranium standard deviation	Thorium (mg/kg)	Thorium standard deviation	Calculated Iron (mg/kg)	Calculated Lead Concentration Compared to CAS (mg/kg)	Calculated Lead (mg/kg)	Calculated Zinc Concentration Compared to CAS (mg/kg)	Calculated Zinc (mg/kg)	Calculated Copper (mg/kg)	Calculated Cadmium (mg/kg)
707	36081	CCP27	filter cake	2.502	3.6659		34.736	4766.2	136.14	51.052	12.739		18.902		14.158	30.468	9.6575	38.625	5.8473		12.597		10.466		17.319	32225.31768	7900.8288	8305.60578	1462.287	1121.1494	159.36325	11.65025
708	36081	CCP56	filter cake	2.595	4.1562		36.626	4506.8	133.89	90.715	14.863		36.333		22.927	69.077	16.481	122.34	10.483		24.85		10.822		17.289	32787.64808	7453.6232	7851.16292	6559.7148	8143.9943		40.1139
709	36081	CCP26	filter cake	2.666	4.8161		61.75	2111.1	117.7		15.205		83.845		47.74		29.41	112.18	13.814		53.048		7.8454		10.148	186091.9107	3323.4364	3654.13609	9193.1802	12366.73595	71.23675	58.26435
710	36081	CCP74	filter cake	2.735	3.7629		30.681	3653.5	117.85	57.709	12.549		22.023		15.723		9.2027	49.365	6.5605		13.061		9.9475		15.272	29584.6982	5982.534	6356.26665	7239.1776	9009.7861		43.8353
711	36081	CCGEM10	filter cake	2.796	3.6546		32.624	4872.6	141.15	88.102	15.141		22.724		16.384		9.7574	59.277	7.2584	54.358	17.203		11.135		17.977	38813.75778	8084.2624	8492.00794	7376.3946	9233.19035		44.79555
712	36081	CCGEM13	filter cake	2.854	4.0907		47.407	5016.7	141.02	82.427	15.487		46.301		31.281		17.784	111.51	10.521		31.722		11.731		18.588	31322.67708	8332.6908	8744.45673	8051.8218	10071.69205		48.39965
713	36081	CCP46	filter cake	2.92	2.3154		26.821	1480.7	75.685	20.686	6.365		16.89		14.333		7.2974	21.384	4.3281		8.7229		6.0584		11.093	45734.46023	2236.6268	2549.73833	5718.144	7114.997		35.691
714	36081	CCGEM03	filter cake	2.977	3.2521		33.719	3338	122.45	49.156	13.095		28.89		21.603		12.467	66.098	8.0142		18.937		8.7647		13.107	63099.67262	5438.612	5803.5422	9606.2922	12265.06695	29.43525	57.82735
715	36081	CCGEM20	rock	3.055	2.7689		25.79	730.15	50.439	51.475	10.479		41.758		23.904		13.749	280.52	14.486		18.58		8.1825		7.5854	25449.53867	942.6786	1234.849785		190.061424	222.63775	2.16114
716	36081	REP10A	rock	3.128	3.8978		28.582		15.63	158.43	18.002		59.723		36.73		21.013	1661.4	36.075	115.55	38.152		12.901		7.1566	5747.76525				48.4145004		0.7175565
717	36081	REP10B	rock	3.19	4.4395		29.336	758.91	53.246	161.9	18.344		58.09		36.853		21.616	396.15	17.885		36.405		13.743		10.429	23518.5297	992.26084	1285.234429	3943.7196	2452.32288		25.2168
718	36081	CCP62	sludge	8.475	4.9046		50.54	6124.7	156.63	62.036	15.927		69.045		43.144	124.73	28.055	173.22	13.82		42.005		12.423		19.089		10242.8828	10685.56193	4958.574	3025.3244		31.0565
719	36081	CCP33	sludge	8.545	4.8857		53.264	2381.1	102.13	55.624	15.323		75.583		47.173		28.167	349.34	18.578		47.818		11.181		12.926	62136.006	3788.9164	4127.14909	6250.6638	7891.15955		39.02715
720	36081	CCP42	sludge	8.613	3.4544		38.296	226.43	29.827		8.5633		49.479		30.463		17.864		5.7854		29.015		9.9395		8.41	610.9957659	74.26532	352.382717	531.12912	537.473216		5.70176
721	36081	CCP4	panning	8.691	3.2701		30.3	1660.4	80.125		6.8586		32.332		20.861	48.696	14.196	70.439	8.0078		22.845		7.1988		10.974	43975.76514	2546.4296	2864.55476	10.87836	354.875528		3.84083
722	36081	CCP24	panning	8.8	6.3207		50.187	4329.1	161.14	85.152	20.406		78.46		48.114		30.536	555.49	25.699	167.17	50.614		10.888		14.007	137058.8571	7147.2684	7539.85029	5390.5212	7182.9547	396.629	35.9831
724	36081	CCP1	???do not know what this is	9.317	9.6389		47.87	1480.3	110.22		18.351		83.39		51.825		29.21	172.15	17.263		53.894		7.2645		9.6456	237998.2575	2235.9372	2549.03757		836.691044		8.751215
725	36081	CCP3HM	???do not know what this is	9.531	4.5821		38.13	4942.8	167.49		13.238		39.757		30.079	80.036	18.969	159.16	13.464		28.671		8.834		15.923	130899.7474	8205.2872	8614.99132	1281.1224	1237.71312	410.254	12.8382

Attachment B
CAS Laboratory Results

Luce and Associates

Environmental Consulting Quality Assurance Data Validation

August 28, 1999

Analytical Support Activities
URS Greiner Woodward Clyde
2401 4th Avenue
Suite 808
Seattle, WA 98121

DATA VALIDATION COVER LETTER

Client Project Number: Not available

Validator Project Number: 082899-01

Client Project Name: Bunker Hill

Client P.O.: Not available

Laboratory: Columbia Analytical

Sample Delivery Group: 51001

Sample Numbers and Analyses Validated:

Client Sample	Matrix	IN-CLP
51001	Soil	X
51002	Soil	X
51003	Soil	X
51004	Soil	X
51005	Soil	X
51006	Soil	X
51007	Soil	X
51008	Soil	X
51009	Soil	X
51010	Soil	X
51011	Soil	X
51012	Soil	X
51013	Soil	X
51014	Soil	X
51015	Soil	X
51001S	Soil	X
51001D	Soil	X

Method Reference: CLP SOW ILM04.0

Validation Criteria: *Functional Guidelines For Evaluating Inorganic Analyses* (2/94)

Validation Conducted By: R. Luce

Validation Level: D

Date Received For Validation: 08/28/99

Validation Completion Date: 08/28/99

9/1/99 53540056000.0031.03.02 (2-3)

2907 Norbrick Street Midway Park, North Carolina 28544 Tel: (910) 355-1941 Fax: (910) 355-1907

OVERALL ASSESSMENT OF THE DATA

____ The data are **acceptable** according to the criteria referenced above, with no qualifiers assigned by the reviewer.

_X_ The data are **acceptable with the qualifications noted and appended** to the data by the reviewer. These qualifiers modify the usefulness of the individual values to which they are assigned. (For definitions of the qualifiers used, see the end of the data validation worksheet).

____ The data are **unacceptable** according to the criteria referenced above, and have been rejected by the reviewer.

The conclusions presented in the attached narrative(s) and worksheet(s) were drawn based on the reviewer's professional judgement. The qualifiers assigned to the accompanying data (if any) were assigned based on the validation criteria referenced above and the reviewer's professional judgement. The signature below authorizes the release of the attached materials.

Authorization For Release _____ 8/28/99

Raymond E. Luce II — Date

DATA VALIDATION NARRATIVE COVERSHEET

Client Project Number: Not available

Validator Project Number: 082899-01

Client Project Name: Bunker Hill

Client P.O.: Not available

Laboratory: Columbia Analytical

Sample Delivery Group: 51001

Sample Numbers and Analyses Validated:

Client Sample	Matrix	IN-CLP
51001	Soil	X
51002	Soil	X
51003	Soil	X
51004	Soil	X
51005	Soil	X
51006	Soil	X
51007	Soil	X
51008	Soil	X
51009	Soil	X
51010	Soil	X
51011	Soil	X
51012	Soil	X
51013	Soil	X
51014	Soil	X
51015	Soil	X
51001S	Soil	X
51001D	Soil	X

Method Reference: CLP SOW ILM04.0

Validation Criteria: *Functional Guidelines For Evaluating Inorganic Analyses* (2/94)

Validation Conducted By: Name omitted at client request

Validation Level: D

Date Received For Validation: 08/28/99

Validation Completion Date: 08/28/99

OVERALL ASSESSMENT OF THE DATA

____ The data are **acceptable** according to the criteria referenced above, with no qualifiers assigned by the reviewer.

_X_ The data are **acceptable with the qualifications noted and appended** to the data by the reviewer. These qualifiers modify the usefulness of the individual values to which they are assigned. (For definitions of the qualifiers used, see the end of the data validation worksheet).

____ The data are **unacceptable** according to the criteria referenced above, and have been rejected by the reviewer.

Authorization For Release _Signature omitted at client request_

NARRATIVE - METALS (IN-CLP)

I. HOLDING TIMES

The holding times specified in *Functional Guidelines* were met. Holding times were calculated using the dates presented in the table below. The analysis of mercury must be performed within 28 days of sample collection. All other metals must be analyzed within six months of sample collection. Although holding time criteria have only been established for water samples, the criteria were applied to soil samples for the purposes of this data validation.

Sample Number	Matrix	Sampling Date	ICP Analysis	AA Analysis	Mercury Analysis
51001	Soil	before 02/19/99	*08/19/99*	*by 08/19/99*	*08/20/99*
51002	Soil	before 02/19/99	*08/19/99*	*by 08/19/99*	*08/20/99*
51003	Soil	before 02/19/99	*08/19/99*	*by 08/19/99*	*08/20/99*
51004	Soil	before 02/19/99	*08/19/99*	*by 08/19/99*	*08/20/99*
51005	Soil	before 02/19/99	*08/19/99*	*by 08/19/99*	*08/20/99*
51006	Soil	before 02/19/99	*08/19/99*	*by 08/19/99*	*08/20/99*
51007	Soil	before 02/19/99	*08/19/99*	*by 08/19/99*	*08/20/99*
51008	Soil	before 02/19/99	*08/19/99*	*by 08/19/99*	*08/20/99*
51009	Soil	before 02/19/99	*08/19/99*	*by 08/19/99*	*08/20/99*
51010	Soil	before 02/19/99	*08/19/99*	*by 08/19/99*	*08/20/99*
51011	Soil	before 02/19/99	*08/19/99*	*by 08/19/99*	*08/20/99*
51012	Soil	before 02/19/99	*08/19/99*	*by 08/19/99*	*08/20/99*
51013	Soil	08/12/99	08/19/99	by 08/19/99	08/20/99
51014	Soil	08/12/99	08/19/99	by 08/19/99	08/20/99
51015	Soil	08/13/99	08/19/99	by 08/19/99	08/20/99

In the table above, the dates marked with asterisks indicate those analyses that were not performed within the required holding time. Listed below are the data affected because analyses were not performed within holding times. The qualifiers shown have been assigned by the reviewer based on the recommendations in *Functional Guidelines*.

Sample	Analyte	Qualifier Assigned
51001	Mercury	J
51002	Mercury	J
51003	Mercury	J
51004	Mercury	J
51005	Mercury	J
51006	Mercury	J
51007	Mercury	J
51008	Mercury	J
51009	Mercury	J
51010	Mercury	J
51011	Mercury	J
51012	Mercury	J
51001	All other metals	Positive results received J qualifiers; negative results received UJ qualifiers.
51002	All other metals	Positive results received J qualifiers; negative results received UJ qualifiers.

Sample	Analyte	Qualifier Assigned
51003	All other metals	Positive results received J qualifiers; negative results received UJ qualifiers.
51004	All other metals	Positive results received J qualifiers; negative results received UJ qualifiers.
51005	All other metals	Positive results received J qualifiers; negative results received UJ qualifiers.
51006	All other metals	Positive results received J qualifiers; negative results received UJ qualifiers.
51007	All other metals	Positive results received J qualifiers; negative results received UJ qualifiers.
51008	All other metals	Positive results received J qualifiers; negative results received UJ qualifiers.
51009	All other metals	Positive results received J qualifiers; negative results received UJ qualifiers.
51010	All other metals	Positive results received J qualifiers; negative results received UJ qualifiers.
51011	All other metals	Positive results received J qualifiers; negative results received UJ qualifiers.
51012	All other metals	Positive results received J qualifiers; negative results received UJ qualifiers.

II. CALIBRATION

All initial calibrations were performed as specified in the Statement of Work. The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were analyzed as required and had recoveries within specified control limits.

The contract required detection limit (CRDL) check standards were analyzed at the frequency specified and for the required analytes. The recoveries for the ICP and GFAA CRDL check standards were consistent with acceptable instrument linearity in the lower range of the calibration curve.

III. BLANKS

The initial calibration blanks (ICB) and continuing calibration blanks (CCB) were analyzed at the frequency specified in the Statement of Work. Listed below are the sample data affected by calibration blanks that contained analytes at concentrations with absolute values equal to or greater than the IDL. The qualifiers shown have been assigned by the reviewer based on the recommendations in *Functional Guidelines*. Note that in the table below, the values in the column labeled "Blank Result" are in units of µg/L, and reflect the raw data taken from the instrument. The results in the column labeled "Reported Sample Results" are in the reporting units appropriate to the sample matrix. The calculations necessary to directly compare blank results with sample results were performed by the reviewer before any qualifiers were assigned.

Sample	Analyte	Time of Blank Analysis	Blank Result	Reported Sample Result	Action Taken
51008	Beryllium	08/19/99 19:20	0.2 µg/L	0.15 mg/Kg	0.15 U
51010	Beryllium	08/19/99 19:20	0.2 µg/L	0.16 mg/Kg	0.16 U
51011	Beryllium	08/19/99 19:20	0.2 µg/L	0.16 mg/Kg	0.16 U

Sample	Analyte	Time of Blank Analysis	Blank Result	Reported Sample Result	Action Taken
51010	Sodium	08/19/99 19:20	17.8 µg/L	18.3 mg/Kg	18.3 U
51013	Selenium	08/19/99 15:32	2.0 µg/L	0.47 mg/Kg	0.47 U

Preparation blanks were analyzed as required. Listed below are the sample data affected by preparation blanks that contained analytes at concentrations with absolute values equal to or greater than the IDL. The qualifiers shown have been assigned by the reviewer based on the recommendations in *Functional Guidelines*.

Sample	Analyte	Blank ID	Blank Result	Reported Sample Result	Action Taken
51001	Mercury	PBS	0.07 mg/Kg	0.15 mg/Kg	0.15 U
51005	Mercury	PBS	0.07 mg/Kg	0.16 mg/Kg	0.16 U
51006	Mercury	PBS	0.07 mg/Kg	0.16 mg/Kg	0.16 U

No evidence of trip blanks, field blanks, or equipment blanks was found.

IV. ICP INTERFERENCE CHECK SAMPLES (ICS)

The ICP ICS was analyzed for the required analytes and at the required frequency. The percentage recoveries for the ICS analytes fell within specified control limits. Listed below are the sample data affected by potential interference effects. The qualifiers shown have been assigned by the reviewer based on the recommendations in *Functional Guidelines*.

Sample	Analyte	Interferent	Qualifier Assigned
51008	Antimony	Iron	J
51008	Cadmium	Iron	J
51009	Antimony	Iron	J
51009	Cadmium	Iron	J
51010	Antimony	Iron	J
51010	Cadmium	Iron	J
51011	Antimony	Iron	J
51011	Cadmium	Iron	J
51012	Antimony	Iron	J
51012	Cadmium	Iron	J
51013	Antimony	Iron	J
51013	Cadmium	Iron	J
51015	Antimony	Iron	J
51015	Cadmium	Iron	J

V. LABORATORY CONTROL SAMPLE (LCS)

The LCS was analyzed as required. The recoveries for the LCS analytes fell within specified control limits.

VI. DUPLICATE SAMPLE ANALYSIS

Laboratory duplicates were analyzed as required, and results fell within specified control limits.

VII. MATRIX SPIKE SAMPLE ANALYSIS

Matrix (pre-digestion) spikes for soil/sediment samples were analyzed as required. Listed below are the sample data affected by matrix spike recoveries that did not meet specified control limits. The qualifiers shown have been assigned by the reviewer based on the recommendations in *Functional Guidelines*.

Spike Sample	Matrix	Analyte	Percent Recovery	Control Limits (%)	Samples Affected	Qualifier Assigned
51001S	Soil	Antimony	56.2	75-125	51001	J
51001S	Soil	Antimony	56.2	75-125	51002	J
51001S	Soil	Antimony	56.2	75-125	51003	J
51001S	Soil	Antimony	56.2	75-125	51004	J
51001S	Soil	Antimony	56.2	75-125	51005	J
51001S	Soil	Antimony	56.2	75-125	51006	UJ
51001S	Soil	Antimony	56.2	75-125	51007	J
51001S	Soil	Antimony	56.2	75-125	51008	J
51001S	Soil	Antimony	56.2	75-125	51009	J
51001S	Soil	Antimony	56.2	75-125	51010	J
51001S	Soil	Antimony	56.2	75-125	51011	J
51001S	Soil	Antimony	56.2	75-125	51012	J
51001S	Soil	Antimony	56.2	75-125	51013	J
51001S	Soil	Antimony	56.2	75-125	51014	J
51001S	Soil	Antimony	56.2	75-125	51015	J
51001S	Soil	Selenium	24.0	75-125	51001	R
51001S	Soil	Selenium	24.0	75-125	51002	R
51001S	Soil	Selenium	24.0	75-125	51003	R
51001S	Soil	Selenium	24.0	75-125	51004	R
51001S	Soil	Selenium	24.0	75-125	51005	R
51001S	Soil	Selenium	24.0	75-125	51006	R
51001S	Soil	Selenium	24.0	75-125	51007	R
51001S	Soil	Selenium	24.0	75-125	51008	R
51001S	Soil	Selenium	24.0	75-125	51009	R
51001S	Soil	Selenium	24.0	75-125	51010	R
51001S	Soil	Selenium	24.0	75-125	51011	R
51001S	Soil	Selenium	24.0	75-125	51012	R
51001S	Soil	Selenium	24.0	75-125	51013	J
51001S	Soil	Selenium	24.0	75-125	51014	R
51001S	Soil	Selenium	24.0	75-125	51015	R

VIII. FURNACE ATOMIC ABSORPTION QC

For all GFAA analyses, duplicate injections were made as required. For analytes with concentrations greater than the CRDL, the results from the duplicate injections agreed within 20% relative standard deviation (%RSD).

Post-digestion spikes (analytical spikes) were performed on all required samples analyzed by GFAA. All initial spike recoveries were greater than 40%. Listed below are the sample data affected by recoveries from post-digestion spikes that did not meet specified control limits. The qualifiers shown have been assigned by the reviewer based on the recommendations in *Functional Guidelines*. The absorbance of the analyte listed for each of these samples was less than 50% of the "spike absorbance", so no method of standard additions (MSA) analyses were required for these samples. Any samples that required MSA analysis are discussed in a later section below.

Spike Sample	Matrix	Analyte	Percent Recovery	Control Limits (%)	Samples Affected	Qualifier Assigned
51008A	Soil	Thallium	45.0	85-115	51008	J
51009A	Soil	Thallium	75.0	85-115	51009	J
51010A	Soil	Thallium	80.0	85-115	51010	UJ
51011A	Soil	Thallium	75.0	85-115	51011	J
51012A	Soil	Thallium	65.0	85-115	51012	UJ
51015A	Soil	Thallium	75.0	85-115	51015	J
51013A	Soil	Selenium	71.0	85-115	51013	UJ

The Method of Standard Additions (MSA) was used to determine the concentration of arsenic in samples 51001, 51004, 51005, 51006, and 51007.

IX. ICP SERIAL DILUTION

Serial dilutions were analyzed at the frequency required. For analytes with sufficiently high concentrations (minimally a factor of 50 times greater than the IDL), the results of the serial dilution fell within the specified control limits.

X. SAMPLE RESULT VERIFICATION

Concentration calculations were verified for ten percent of the analytes in each sample. All were found to be correct. All of the others were therefore assumed to be correct. All sample results were within the linear range of the ICP or within the calibrated range of the instrument being used. All results met the contract required detection limits.

Ten percent or more of the calculations and data transcriptions related to the parameters discussed in Sections II through IX above were checked and verified. No transcription or data reduction errors were found.

XI. FIELD DUPLICATES

Field duplicate samples were not identifiable from documentation in the data package.

XII. OVERALL ASSESSMENT OF THE DATA

The data are **acceptable with the qualifications noted and appended** to the data by the reviewer. These qualifiers modify the usefulness of the individual values to which they are assigned. (For definitions of the qualifiers used, see the end of the data validation worksheet).

TOTAL METALS

-1-

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

51001

Contract: URS Greiner Woodward Clyde

Lab Code: KLAB Case No.: SAS No.: SDG NO.: 51001

Matrix (soil/water): SOIL Lab Sample ID: K9905505-001

Level (low/med): LOW Date Received: 08/18/99

% Solids: 97.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	24100			P	J
7440-36-0	Antimony	4.9	B	N	P	J
7440-38-2	Arsenic	2.9		S	F	J
7440-39-3	Barium	157			P	J
7440-41-7	Beryllium	0.90	B		P	J
7440-43-9	Cadmium	0.64	U		P	UJ
7440-70-2	Calcium	1700			P	J
7440-47-3	Chromium	7.4			P	J
7440-48-4	Cobalt	4.9	B		P	J
7440-50-8	Copper	14.0			P	J
7439-89-6	Iron	17300			P	J
7439-92-1	Lead	34.8			P	J
7439-95-4	Magnesium	1780			P	J
7439-96-5	Manganese	887			P	J
7439-97-6	Mercury	0.05			CV	~~R~~ UJ
7440-02-0	Nickel	6.8	B		P	J
7440-09-7	Potassium	612	B		P	J
7782-49-2	Selenium	0.41	U	NW	F	R
7440-22-4	Silver	0.41	U		P	UJ
7440-23-5	Sodium	84.3	B		P	J
7440-28-0	Thallium	0.21	U		F	UJ
7440-62-2	Vanadium	29.8			P	J
7440-66-6	Zinc	171			P	J

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

009

Form I - IN

8/28/99

ILM04.0

TOTAL METALS

-1-

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

51002

Contract: URS Greiner Woodward Clyde

Lab Code: KLAB Case No.: SAS No.: SDG NO.: 51001

Matrix (soil/water): SOIL Lab Sample ID: K9905505-002

Level (low/med): LOW Date Received: 08/18/99

% Solids: 83.6

TAMUOK Unoxidized Tailings at Tronox Removal

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	8250			P	J
7440-36-0	Antimony	8.5	B	N	P	J
7440-38-2	Arsenic	26.2			F	
7440-39-3	Barium	33.5	B		P	
7440-41-7	Beryllium	0.36	B		P	
7440-43-9	Cadmium	96.7			P	
7440-70-2	Calcium	1980			P	
7440-47-3	Chromium	7.3			P	
7440-48-4	Cobalt	16.7			P	
7440-50-8	Copper	283			P	
7439-89-6	Iron	42500			P	
7439-92-1	Lead	7310			P	
7439-95-4	Magnesium	2620			P	
7439-96-5	Manganese	2040			P	
7439-97-6	Mercury	1.2			CV	J
7440-02-0	Nickel	22.0			P	J
7440-09-7	Potassium	3470			P	J
7782-49-2	Selenium	0.48	U	N	F	R
7440-22-4	Silver	10.3			P	J
7440-23-5	Sodium	40.9	B		P	
7440-28-0	Thallium	0.48	B		F	
7440-62-2	Vanadium	9.4	B		P	
7440-66-6	Zinc	26000			P	

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

010

Form I - IN

8/28/99

ILM04.0

000139

TOTAL METALS

-1-

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

51003

Contract: URS Greiner Woodward Clyde

Lab Code: KLAB Case No.: SAS No.: SDG NO.: 51001

Matrix (soil/water): SOIL Lab Sample ID: K9905505-003

Level (low/med): LOW Date Received: 08/18/99

% Solids: 83.1

Concentration Units (ug/L or mg/kg dry weight): MG/KG

TAMDGR Duplicate

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	8800			P	J
7440-36-0	Antimony	4.7	B	N	P	J
7440-38-2	Arsenic	23.8			F	
7440-39-3	Barium	39.2	B		P	
7440-41-7	Beryllium	0.36	B		P	
7440-43-9	Cadmium	95.5			P	
7440-70-2	Calcium	1800			P	
7440-47-3	Chromium	8.7			P	
7440-48-4	Cobalt	18.5			P	
7440-50-8	Copper	271			P	
7439-89-6	Iron	45900			P	
7439-92-1	Lead	7320			P	
7439-95-4	Magnesium	2900			P	
7439-96-5	Manganese	2150			P	
7439-97-6	Mercury	1.1			CV	J
7440-02-0	Nickel	24.2			P	J
7440-09-7	Potassium	3680			P	J
7782-49-2	Selenium	0.48	U	N	F	R
7440-22-4	Silver	10.4			P	J
7440-23-5	Sodium	35.5	B		P	
7440-28-0	Thallium	0.48	B		F	
7440-62-2	Vanadium	10.4	B		P	
7440-66-6	Zinc	26600			P	

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

011

TOTAL METALS

-1-

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

51004

Contract: URS Greiner Woodward Clyde

Lab Code: KLAB Case No.: SAS No.: SDG NO.: 51001

Matrix (soil/water): SOIL Lab Sample ID: K9905505-004

Level (low/med): LOW Date Received: 08/18/99

% Solids: 96.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Rep 04 C

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	24700			P	J
7440-36-0	Antimony	16.8		N	P	J
7440-38-2	Arsenic	7.5		S	F	
7440-39-3	Barium	215			P	
7440-41-7	Beryllium	0.65	B		P	
7440-43-9	Cadmium	6.0			P	
7440-70-2	Calcium	653	B		P	
7440-47-3	Chromium	7.5			P	
7440-48-4	Cobalt	5.3	B		P	
7440-50-8	Copper	38.5			P	
7439-89-6	Iron	21100			P	
7439-92-1	Lead	3860			P	
7439-95-4	Magnesium	1190			P	
7439-96-5	Manganese	774			P	
7439-97-6	Mercury	1.2			CV	J
7440-02-0	Nickel	6.0	B		P	J
7440-09-7	Potassium	828	B		P	J
7782-49-2	Selenium	0.42	U	NW	F	R
7440-22-4	Silver	9.8			P	J
7440-23-5	Sodium	79.6	B		P	J
7440-28-0	Thallium	0.21	B		F	J
7440-62-2	Vanadium	31.0			P	J
7440-66-6	Zinc	808			P	J

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

012

TOTAL METALS

-1-

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

51005

Contract: URS Greiner Woodward Clyde

Lab Code: KLAB Case No.: SAS No.: SDG NO.: 51001

Matrix (soil/water): SOIL Lab Sample ID: K9905505-005

Level (low/med): LOW Date Received: 08/18/99

% Solids: 97.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Rep 05C

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	23300			P	J
7440-36-0	Antimony	6.7	B	N	P	J
7440-38-2	Arsenic	6.5		S	F	
7440-39-3	Barium	263			P	
7440-41-7	Beryllium	0.55	B		P	
7440-43-9	Cadmium	3.9			P	
7440-70-2	Calcium	666	B		P	
7440-47-3	Chromium	7.4			P	
7440-48-4	Cobalt	5.5	B		P	
7440-50-8	Copper	9.3			P	
7439-89-6	Iron	19200			P	
7439-92-1	Lead	53.6			P	
7439-95-4	Magnesium	1230			P	
7439-96-5	Manganese	991			P	J
7439-97-6	Mercury	0.17			CV	~~K~~ ~~R~~ UJ
7440-02-0	Nickel	9.7			P	J
7440-09-7	Potassium	742	B		P	J
7782-49-2	Selenium	0.41	U	NW	F	R
7440-22-4	Silver	0.41	U		P	UJ
7440-23-5	Sodium	94.7	B		P	J
7440-28-0	Thallium	0.21	B		F	
7440-62-2	Vanadium	30.3			P	
7440-66-6	Zinc	445			P	

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

013

Form I - IN

00013 ILM04.0

TOTAL METALS

-1-

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

51006

Contract: URS Greiner Woodward Clyde

Lab Code: KLAB Case No.: SAS No.: SDG NO.: 51001

Matrix (soil/water): SOIL Lab Sample ID: K9905505-006

Level (low/med): LOW Date Received: 08/18/99

% Solids: 96.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Rep 8/9 C

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	24800			P	J
7440-36-0	Antimony	3.9	U	N	P	UJ
7440-38-2	Arsenic	7.1		S	F	J
7440-39-3	Barium	310			P	
7440-41-7	Beryllium	0.73	B		P	
7440-43-9	Cadmium	5.8			P	
7440-70-2	Calcium	762	B		P	
7440-47-3	Chromium	7.3			P	
7440-48-4	Cobalt	6.1	B		P	
7440-50-8	Copper	9.4			P	
7439-89-6	Iron	19800			P	
7439-92-1	Lead	63.0			P	
7439-95-4	Magnesium	1230			P	
7439-96-5	Manganese	1800			P	J
7439-97-6	Mercury	0.14			CV	UJ
7440-02-0	Nickel	8.6			P	J
7440-09-7	Potassium	730	B		P	J
7782-49-2	Selenium	0.41	U	NW	F	R
7440-22-4	Silver	0.41	U		P	UJ
7440-23-5	Sodium	93.7	B		P	J
7440-28-0	Thallium	0.21	U		F	UJ
7440-62-2	Vanadium	31.1			P	J
7440-66-6	Zinc	522			P	J

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

014

Form I - IN

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TOTAL METALS

-1-

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

51007

Contract: URS Greiner Woodward Clyde

Lab Code: KLAB Case No.: SAS No.: SDG NO.: 51001

Matrix (soil/water): SOIL Lab Sample ID: K9905505-007

Level (low/med): LOW Date Received: 08/18/99

% Solids: 89.1

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Rep 1Ø

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	20900			P	J
7440-36-0	Antimony	20.4		N	P	J
7440-38-2	Arsenic	9.9		S	F	
7440-39-3	Barium	227			P	
7440-41-7	Beryllium	0.59	B		P	
7440-43-9	Cadmium	10.0			P	
7440-70-2	Calcium	309	B		P	
7440-47-3	Chromium	5.3			P	
7440-48-4	Cobalt	8.7	B		P	
7440-50-8	Copper	59.7			P	
7439-89-6	Iron	13600			P	
7439-92-1	Lead	2730			P	
7439-95-4	Magnesium	922	B		P	
7439-96-5	Manganese	1210			P	
7439-97-6	Mercury	1.7			CV	J
7440-02-0	Nickel	5.7	B		P	J
7440-09-7	Potassium	460	B		P	J
7782-49-2	Selenium	0.45	U	NW	F	R
7440-22-4	Silver	8.4			P	J
7440-23-5	Sodium	68.8	B		P	
7440-28-0	Thallium	0.22	B		F	
7440-62-2	Vanadium	14.2			P	
7440-66-6	Zinc	637			P	

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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Form I - IN

8/28/99

TOTAL METALS

-1-

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

51008

Contract: URS Greiner Woodward Clyde

Lab Code: KLAB Case No.: SAS No.: SDG NO.: 51001

Matrix (soil/water): SOIL Lab Sample ID: K9905505-008

Level (low/med): LOW Date Received: 08/18/99

% Solids: 96.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

SRL 11 RRD

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	1880			P	J
7440-36-0	Antimony	32.8		N	P	J
7440-38-2	Arsenic	85.3			F	J
7440-39-3	Barium	77.4			P	J
7440-41-7	Beryllium	0.15	B		P	UJ
7440-43-9	Cadmium	32.7			P	J
7440-70-2	Calcium	813	B		P	J
7440-47-3	Chromium	3.8			P	~~R~~ J
7440-48-4	Cobalt	6.2	B		P	J
7440-50-8	Copper	104			P	
7439-89-6	Iron	94300			P	
7439-92-1	Lead	10600			P	
7439-95-4	Magnesium	1480			P	
7439-96-5	Manganese	10100			P	
7439-97-6	Mercury	5.6			CV	J
7440-02-0	Nickel	8.8			P	J
7440-09-7	Potassium	242	B		P	J
7782-49-2	Selenium	0.41	U	N	F	R
7440-22-4	Silver	17.2			P	J
7440-23-5	Sodium	30.0	B		P	J
7440-28-0	Thallium	0.21	B	W	F	J
7440-62-2	Vanadium	5.3	B		P	J
7440-66-6	Zinc	6930			P	J

8/28/99

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Comments:

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Form I - IN

8/28/99

TOTAL METALS

-1-

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

51009

Contract: URS Greiner Woodward Clyde

Lab Code: KLAB Case No.: SAS No.: SDG NO.: 51001

Matrix (soil/water): SOIL Lab Sample ID: K9905505-009

Level (low/med): LOW Date Received: 08/18/99

% Solids: 98.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

BKG 123

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	3110			P	J
7440-36-0	Antimony	28.3		N	P	J
7440-38-2	Arsenic	86.0			F	
7440-39-3	Barium	119			P	
7440-41-7	Beryllium	0.24	B		P	
7440-43-9	Cadmium	32.3			P	J
7440-70-2	Calcium	1840			P	
7440-47-3	Chromium	4.8			P	
7440-48-4	Cobalt	6.0	B		P	
7440-50-8	Copper	119			P	
7439-89-6	Iron	76800			P	
7439-92-1	Lead	4360			P	
7439-95-4	Magnesium	3820			P	
7439-96-5	Manganese	8250			P	
7439-97-6	Mercury	5.4			CV	J
7440-02-0	Nickel	8.2			P	J
7440-09-7	Potassium	389	B		P	J
7782-49-2	Selenium	0.41	U	N	F	R
7440-22-4	Silver	15.2			P	J
7440-23-5	Sodium	21.5	B		P	J
7440-28-0	Thallium	0.20	B	W	F	J
7440-62-2	Vanadium	5.5	B		P	J
7440-66-6	Zinc	5310			P	J

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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Form I - IN

8/28/99

TOTAL METALS

-1-

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

51010

Contract: URS Greiner Woodward Clyde

Lab Code: KLAB Case No.: SAS No.: SDG NO.: 51001

Matrix (soil/water): SOIL Lab Sample ID: K9905505-010

Level (low/med): LOW Date Received: 08/18/99

% Solids: 93.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

BRL 22.8

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	2610			P	J
7440-36-0	Antimony	26.7		N	P	J
7440-38-2	Arsenic	85.2			F	J
7440-39-3	Barium	69.5			P	J
7440-41-7	Beryllium	0.16	B		P	UJ
7440-43-9	Cadmium	30.3			P	J
7440-70-2	Calcium	1580			P	
7440-47-3	Chromium	4.6			P	
7440-48-4	Cobalt	6.5	B		P	
7440-50-8	Copper	117			P	
7439-89-6	Iron	72600			P	
7439-92-1	Lead	4080			P	
7439-95-4	Magnesium	3620			P	
7439-96-5	Manganese	7900			P	
7439-97-6	Mercury	5.2			CV	J
7440-02-0	Nickel	6.0	B		P	J
7440-09-7	Potassium	319	B		P	J
7782-49-2	Selenium	0.43	U	N	F	R
7440-22-4	Silver	13.4			P	J
7440-23-5	Sodium	18.3	B		P	U
7440-28-0	Thallium	0.21	U	W	F	UJ
7440-62-2	Vanadium	4.5	B		P	J
7440-66-6	Zinc	5170			P	J

Color Before: Clarity Before: Texture:

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Comments:

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Form I - IN

8/28/99

TOTAL METALS

-1-

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

51011

Contract: URS Greiner Woodward Clyde

Lab Code: KLAB Case No.: SAS No.: SDG NO.: 51001

Matrix (soil/water): SOIL Lab Sample ID: K9905505-011

Level (low/med): LOW Date Received: 08/18/99

% Solids: 92.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

BKL22 S
Duplicate/
Split

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	2870			P	J
7440-36-0	Antimony	26.4		N	P	J
7440-38-2	Arsenic	89.0			F	J
7440-39-3	Barium	80.1			P	J
7440-41-7	Beryllium	0.16	B		P	UJ
7440-43-9	Cadmium	29.0			P	J
7440-70-2	Calcium	1520			P	J
7440-47-3	Chromium	4.6			P	J
7440-48-4	Cobalt	6.4	B		P	J
7440-50-8	Copper	115			P	
7439-89-6	Iron	71900			P	
7439-92-1	Lead	3910			P	
7439-95-4	Magnesium	3700			P	
7439-96-5	Manganese	7730			P	
7439-97-6	Mercury	5.7			CV	J
7440-02-0	Nickel	5.9	B		P	J
7440-09-7	Potassium	387	B		P	J
7782-49-2	Selenium	0.43	U	N	F	R
7440-22-4	Silver	13.0			P	J
7440-23-5	Sodium	19.4	B		P	J
7440-28-0	Thallium	0.22	B	W	F	J
7440-62-2	Vanadium	4.8	B		P	
7440-66-6	Zinc	4950			P	

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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Form I - IN

8/28/99

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TOTAL METALS

-1-

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

51012

Contract: URS Greiner Woodward Clyde

Lab Code: KLAB Case No.: SAS No.: SDG NO.: 51001

Matrix (soil/water): SOIL Lab Sample ID: K9905505-012

Level (low/med): LOW Date Received: 08/18/99

% Solids: 92.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

BKL 23S

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	3790			P	J
7440-36-0	Antimony	54.2		N	P	J
7440-38-2	Arsenic	86.8			F	
7440-39-3	Barium	149			P	
7440-41-7	Beryllium	0.32	B		P	
7440-43-9	Cadmium	22.0			P	J
7440-70-2	Calcium	2830			P	
7440-47-3	Chromium	6.4			P	
7440-48-4	Cobalt	5.7	B		P	
7440-50-8	Copper	851			P	
7439-89-6	Iron	103000			P	
7439-92-1	Lead	9890			P	
7439-95-4	Magnesium	2420			P	
7439-96-5	Manganese	11100			P	
7439-97-6	Mercury	3.0			CV	
7440-02-0	Nickel	10.7			P	J
7440-09-7	Potassium	509	B		P	J
7782-49-2	Selenium	0.43	U	N	F	R
7440-22-4	Silver	15.1			P	J
7440-23-5	Sodium	45.2	B		P	J
7440-28-0	Thallium	0.22	U	W	F	UJ
7440-62-2	Vanadium	8.9	B		P	J
7440-66-6	Zinc	4110			P	J

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

Return-Path: <Todd_Goins@urscorp.com>
Received: from h4.mail.home.com ([24.0.0.57]) by news.rdc1.tx.home.com
(InterMail v4.01.01.00 201-229-111) with ESMTP
id <19990917172958.PFCL5655.news.rdc1.tx.home.com@h4.mail.home.com>
for <dkglanzman@mail.lakwod2.co.home.com>;
Fri, 17 Sep 1999 10:29:58 -0700
Received: from mx1-w.mail.home.com (mx1-w.mail.home.com [24.0.0.51])
by h4.mail.home.com (8.9.3/8.9.0) with ESMTP id KAA01462
for <DKGlanzman@home.com>; Fri, 17 Sep 1999 10:29:58 -0700 (PDT)
From: Todd_Goins@urscorp.com
Received: from mail2.ursgreiner.com ([38.202.96.99])
by mx1-w.mail.home.com (8.9.1/8.9.1) with SMTP id KAA29546
for <DKGlanzman@home.com>; Fri, 17 Sep 1999 10:29:57 -0700 (PDT)
Received: by mail2.ursgreiner.com(Lotus SMTP MTA v4.6.5 (863.2 5-20-1999)) id
852567EF.005F0AD5 ; Fri, 17 Sep 1999 13:18:06 -0400
X-Lotus-FromDomain: URSGREINER
To: DKGlanzman@home.com
cc: Steven_Hughes@urscorp.com
Message-ID: <852567EF.005F0A42.00@mail2.ursgreiner.com>
Date: Fri, 17 Sep 1999 13:23:20 -0400
Subject: Metals data qualifiers
Mime-Version: 1.0
Content-type: text/plain; charset=us-ascii
Content-Disposition: inline

Dick,

Steve Hughes tells me that you have some questions regarding the qualifiers on the laboratory forms from the HI confirmation sampling.

Using the EPA CLP reporting criteria there should be four discreet columns of qualifiers. The first three are from the laboratory and the final column is handwritten by the validator.

The laboratory qualifier columns are 'C' - concentration, 'Q' - quality assurance, and 'M' - methodology. The only columns that are important to you are the laboratory 'C' column and the data validation (handwritten) column.

It is important to note, that in every case if there is a data validation qualifier provided then it overrides the laboratory's concentration qualifier.

The valid validation qualifiers are 'U' - undetected, 'UJ' - undetected at an estimated detection limit, 'J' - estimated positive result, and 'R' - rejected from use. If there is no data validation qualifier then the laboratory concentration qualifier stands as the final qualifier.

The valid laboratory 'C' column qualifiers are 'U' - undetected, 'B' - detected below the CLP Contract Required Detection Limit (CRDL) but above the instument detection limit (IDL), and a blank which signifies a positive result.

This should help clarify the information you are looking at. If you have any other questions please call me at (206) 674-1843 or reply to this e-mail.

Todd Goins

Attachment C
Chemex Laboratory Results

Chemex Labs, Inc.

Analytical Chemists * Geochemists * Registered Assayers

994 Glendale Ave., Unit 3, Sparks
Nevada, U.S.A. 89431
PHONE: 775-356-5395 FAX: 775-355-0179

To: URS GREINER, INC. - WASHINGTON

2401 4TH AVE., STE. 808
SEATTLE, WASHINGTON
98121-1459

A9911173

Comments: ATTN: BILL GOODWIN CC: RICHARD GLANZMAN

CERTIFICATE A9911173

(QVR) - SHEA CLARK SMITH

Project:
P.O. # : SE 00030

Samples submitted to our lab in Vancouver, BC.
This report was printed on 18-FEB-1999.

SAMPLE PREPARATION

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION
1646	40	Tung. Carb. Ring approx 150 mesh
220	40	Transferring charge
229	40	ICP - AQ Digestion charge

* NOTE 1:

The 32 element ICP package is suitable for trace metals in soil and rock samples. Elements for which the nitric-aqua regia digestion is possibly incomplete are: Al, Ba, Be, Ca, Cr, Ga, K, La, Mg, Na, Sr, Ti, Tl, W.

ANALYTICAL PROCEDURES

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION	METHOD	DETECTION LIMIT	UPPER LIMIT
2118	40	Ag ppm: 32 element, soil & rock	ICP-AES	0.2	100.0
2119	40	Al %: 32 element, soil & rock	ICP-AES	0.01	15.00
2120	40	As ppm: 32 element, soil & rock	ICP-AES	2	10000
2121	40	Ba ppm: 32 element, soil & rock	ICP-AES	10	10000
2122	40	Be ppm: 32 element, soil & rock	ICP-AES	0.5	100.0
2123	40	Bi ppm: 32 element, soil & rock	ICP-AES	2	10000
2124	40	Ca %: 32 element, soil & rock	ICP-AES	0.01	15.00
2125	40	Cd ppm: 32 element, soil & rock	ICP-AES	0.5	500
2126	40	Co ppm: 32 element, soil & rock	ICP-AES	1	10000
2127	40	Cr ppm: 32 element, soil & rock	ICP-AES	1	10000
2128	40	Cu ppm: 32 element, soil & rock	ICP-AES	1	10000
2150	40	Fe %: 32 element, soil & rock	ICP-AES	0.01	15.00
2130	40	Ga ppm: 32 element, soil & rock	ICP-AES	10	10000
2131	40	Hg ppm: 32 element, soil & rock	ICP-AES	1	10000
2132	40	K %: 32 element, soil & rock	ICP-AES	0.01	10.00
2151	40	La ppm: 32 element, soil & rock	ICP-AES	10	10000
2134	40	Mg %: 32 element, soil & rock	ICP-AES	0.01	15.00
2135	40	Mn ppm: 32 element, soil & rock	ICP-AES	5	10000
2136	40	Mo ppm: 32 element, soil & rock	ICP-AES	1	10000
2137	40	Na %: 32 element, soil & rock	ICP-AES	0.01	10.00
2138	40	Ni ppm: 32 element, soil & rock	ICP-AES	1	10000
2139	40	P ppm: 32 element, soil & rock	ICP-AES	10	10000
2140	40	Pb ppm: 32 element, soil & rock	ICP-AES	2	10000
2141	40	Sb ppm: 32 element, soil & rock	ICP-AES	2	10000
2142	40	Sc ppm: 32 elements, soil & rock	ICP-AES	1	10000
2143	40	Sr ppm: 32 element, soil & rock	ICP-AES	1	10000
2144	40	Ti %: 32 element, soil & rock	ICP-AES	0.01	10.00
2145	40	Tl ppm: 32 element, soil & rock	ICP-AES	10	10000
2146	40	U ppm: 32 element, soil & rock	ICP-AES	10	10000
2147	40	V ppm: 32 element, soil & rock	ICP-AES	1	10000
2148	40	W ppm: 32 element, soil & rock	ICP-AES	10	10000
2149	40	Zn ppm: 32 element, soil & rock	ICP-AES	2	10000

The results of this assay were based solely upon the content of the sample submitted. Any decision to invest should be made only after the potential investment value of the claim or deposit has been determined based on the results of assays of multiple samples of geologic materials collected by the prospective investor or by a qualified person selected by him/her and based on an evaluation of all engineering data which is available concerning any proposed project

Statement required by Nevada State Law NRS 519

Chemex Labs, Inc.

Analytical Chemists * Geochemists * Registered Assayers

994 Glendale Ave., Unit 3, Sparks
Nevada, U.S.A. 89431
PHONE: 775-356-5395 FAX: 775-355-0179

To: URS GREINER, INC. - WASHINGTON **

2401 4TH AVE., STE. 808
SEATTLE, WASHINGTON
98121-1459

Project :
Comments: ATTN: BILL GOODWIN CC: RICHARD GLANZMAN

Certificate Date: 03-FEB-1999
Invoice No. : I9911173
P.O. Number : SE 00030
Account : QVR

CERTIFICATE OF ANALYSIS A9911173

SAMPLE	PREP CODE		Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Mo ppm
REP 1A	1646	220	< 0.2	1.06	8	130	< 0.5	< 2	0.05	0.5	10	5	19	1.48	< 10	< 1	0.16	20	0.09	140	< 1
REP 1B	1646	220	2.4	1.25	< 2	70	< 0.5	< 2	0.04	3.0	11	5	80	0.48	< 10	< 1	0.15	10	0.08	85	< 1
REP 2B	1646	220	8.0	1.94	10	250	0.5	< 2	0.19	13.0	12	8	34	1.80	< 10	3	0.12	< 10	0.14	1495	1
REP 3A	1646	220	69.4	0.77	22	50	< 0.5	< 2	0.06	10.5	15	4	237	3.38	< 10	12	0.25	< 10	0.09	620	< 1
REP 4B	1646	220	22.4	1.88	12	180	0.5	< 2	0.11	9.5	11	7	92	2.22	< 10	4	0.14	10	0.13	1210	1
REP 4C	1646	220	10.6	2.93	6	210	0.5	< 2	0.08	8.0	10	10	36	2.31	< 10	1	0.12	10	0.14	800	2
REP 5B	1646	220	3.6	0.82	10	160	< 0.5	< 2	0.34	25.0	8	7	39	1.40	< 10	1	0.12	< 10	0.13	935	1
REP 5C	1646	220	0.2	2.46	2	230	0.5	< 2	0.07	4.0	9	7	6	1.95	< 10	< 1	0.10	< 10	0.13	1070	1
REP 9C	1646	220	0.6	2.84	< 2	320	0.5	< 2	0.11	34.0	11	8	11	1.96	< 10	< 1	0.10	< 10	0.15	3740	1
REP 10	1646	220	8.6	2.51	4	210	0.5	< 2	0.05	10.5	13	6	54	1.65	< 10	3	0.12	10	0.13	1160	1
REX PREC	1646	220	0.6	0.04	46	60	0.5	6	0.38	18.5	17	< 1	< 1	>15.00	10	1	0.01	30	0.01	3870	9
REX 09S	1646	220	9.0	1.29	26	30	< 0.5	< 2	0.08	27.5	10	10	55	6.23	< 10	1	0.48	< 10	0.28	825	1
REX 11S	1646	220	< 0.2	2.43	< 2	120	0.5	< 2	0.18	0.5	10	8	8	1.97	< 10	< 1	0.09	20	0.17	835	1
REX 17S	1646	220	1.6	1.18	< 2	150	< 0.5	< 2	1.25	11.0	19	18	73	3.92	< 10	1	0.24	10	0.22	1900	8
RL 01S	1646	220	0.4	2.37	8	290	0.5	< 2	0.28	5.0	12	15	18	2.33	< 10	1	0.22	10	0.39	815	3
RL 01SD	1646	220	< 0.2	2.56	12	320	0.5	< 2	0.28	5.0	14	16	16	2.34	< 10	1	0.22	10	0.40	820	2
RL 04S	1646	220	< 0.2	1.43	10	160	0.5	< 2	0.20	2.0	16	12	6	1.85	< 10	< 1	0.17	20	0.29	665	1
TAM 01C	1646	220	0.6	1.02	2	140	< 0.5	< 2	0.24	29.5	18	8	15	2.30	< 10	1	0.16	10	0.14	2360	< 1
TAMOXT	1646	220	10.2	1.00	26	40	< 0.5	< 2	0.04	19.0	7	8	106	4.91	< 10	< 1	0.38	10	0.22	730	< 1
TAMUOX	1646	220	12.2	1.21	12	40	0.5	< 2	0.17	126.0	21	10	405	4.87	< 10	3	0.46	< 10	0.34	2640	1
BRL 4L	1646	220	8.2	0.41	42	100	< 0.5	< 2	0.49	54.0	14	4	72	4.44	< 10	4	0.08	< 10	0.25	4430	1
BRL 11RR	1646	220	24.6	0.33	102	80	< 0.5	< 2	0.58	39.5	13	3	117	11.40	< 10	6	0.10	< 10	0.18	>10000	< 1
BRL 09C	1646	220	5.8	0.45	16	140	< 0.5	< 2	0.49	101.0	13	5	49	2.79	< 10	3	0.09	< 10	0.21	3280	1
BRL 12S	1646	220	15.4	0.64	82	200	< 0.5	< 2	0.20	34.0	14	6	131	8.54	< 10	9	0.12	< 10	0.44	8480	2
BRL 15S	1646	220	15.6	0.63	78	220	< 0.5	< 2	0.16	35.0	12	6	133	8.28	< 10	6	0.11	< 10	0.42	8060	1
BRL 21S	1646	220	15.4	0.26	64	70	< 0.5	< 2	0.11	29.0	11	1	97	10.20	< 10	6	0.08	< 10	0.20	9500	1
BRL 22S	1646	220	14.6	0.48	82	140	< 0.5	< 2	0.17	30.5	10	5	171	8.01	< 10	6	0.10	< 10	0.42	8210	< 1
BRL 23S	1646	220	35.0	0.46	96	120	< 0.5	< 2	0.31	26.0	9	6	2940	10.65	< 10	5	0.10	< 10	0.25	>10000	< 1
BRL 151SD	1646	220	15.6	0.62	86	170	< 0.5	< 2	0.17	35.5	9	6	136	7.86	< 10	7	0.10	< 10	0.42	7700	1
BRL 121SD	1646	220	14.6	0.56	86	130	< 0.5	< 2	0.18	34.0	10	5	127	8.56	< 10	6	0.10	< 10	0.42	8560	1
BRL 231S	1646	220	17.4	0.79	78	130	< 0.5	< 2	0.26	23.5	10	7	1195	11.25	< 10	6	0.15	< 10	0.27	>10000	1
HECLAM	1646	220	21.2	0.62	100	100	0.5	< 2	0.24	56.0	18	8	188	11.95	< 10	6	0.11	10	0.09	4240	1
SUC 02S	1646	220	< 0.2	2.15	< 2	180	0.5	< 2	0.28	1.5	6	6	7	1.68	< 10	< 1	0.09	10	0.16	1005	1
SUC 05S	1646	220	>100.0	0.78	50	50	< 0.5	6	0.06	3.0	3	6	79	5.46	10	16	0.26	< 10	0.15	420	1
SUC 08S	1646	220	11.8	2.76	2	230	0.5	< 2	0.49	18.5	17	10	108	2.89	< 10	4	0.10	10	0.23	1115	3
YD 01S	1646	220	0.6	2.04	6	210	0.5	< 2	0.15	< 0.5	8	4	15	1.44	< 10	1	0.11	10	0.11	700	< 1
YD 03S	1646	220	0.4	1.63	6	160	0.5	< 2	0.12	0.5	9	4	12	1.37	< 10	1	0.12	10	0.11	930	< 1
GEM 06S	1646	220	< 0.2	1.91	2	330	0.5	< 2	0.11	1.0	11	10	8	2.12	< 10	< 1	0.35	10	0.27	1455	1
GEM 08AS	1646	220	< 0.2	1.96	6	310	0.5	< 2	0.30	4.0	10	12	8	2.08	< 10	1	0.32	10	0.32	1360	1
YD 031S	1646	220	0.4	1.91	< 2	180	0.5	< 2	0.13	0.5	9	5	13	1.62	< 10	1	0.13	< 10	0.13	1065	< 1

CERTIFICATION: _____

Chemex Labs, Inc.

Analytical Chemists * Geochemists * Registered Assayers

994 Glendale Ave., Unit 3, Sparks
Nevada, U.S.A. 89431
PHONE: 775-356-5395 FAX: 775-355-0179

To: URS GREINER, INC. - WASHINGTON **

2401 4TH AVE., STE. 808
SEATTLE, WASHINGTON
98121-1459

Project :
Comments: ATTN: BILL GOODWIN CC: RICHARD GLANZMAN

Certificate Date: 03-FEB-1999
Invoice No. : I9911173
P.O. Number : SE 00030
Account : QVR

CERTIFICATE OF ANALYSIS A9911173

SAMPLE	PREP CODE		Na %	Ni ppm	P ppm	Pb ppm	Sb ppm	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
REP 1A	1646	220	0.01	5	170	282	< 2	1	10	0.01	< 10	< 10	15	40	138
REP 1B	1646	220	0.01	4	250	1335	< 2	1	8	0.02	< 10	< 10	7	60	290
REP 2B	1646	220	0.01	9	1120	3490	12	1	15	0.05	< 10	< 10	28	30	844
REP 3A	1646	220	< 0.01	5	300	>10000	112	1	9	0.01	< 10	< 10	7	80	2250
REP 4B	1646	220	0.01	7	580	>10000	34	1	13	0.05	< 10	< 10	27	30	1020
REP 4C	1646	220	0.01	9	420	3920	12	1	10	0.06	< 10	< 10	30	10	790
REP 5B	1646	220	0.01	7	490	4130	26	1	21	0.04	< 10	< 10	21	30	870
REP 5C	1646	220	0.01	9	640	60	< 2	1	8	0.05	< 10	< 10	27	10	380
REP 9C	1646	220	0.01	10	1420	218	< 2	1	12	0.06	< 10	< 10	27	10	1040
REP 10	1646	220	0.03	7	620	2540	12	2	9	0.05	< 10	< 10	16	30	700
REX PREC	1646	220	< 0.01	6	230	2550	8	< 1	481	< 0.01	< 10	10	< 1	20	>10000
REX 09S	1646	220	< 0.01	6	200	7050	4	1	13	0.03	< 10	< 10	11	40	5650
REX 11S	1646	220	0.01	6	1280	32	< 2	2	32	0.06	< 10	< 10	34	10	158
REX 17S	1646	220	0.03	10	400	1060	6	1	68	0.04	< 10	< 10	32	40	4090
RL 01S	1646	220	0.01	17	1490	278	< 2	3	31	0.07	< 10	< 10	31	10	378
RL 01SD	1646	220	0.01	17	1580	208	< 2	3	31	0.08	< 10	< 10	32	30	240
RL 04S	1646	220	< 0.01	10	380	80	< 2	2	17	0.04	< 10	< 10	27	20	96
TAM 01C	1646	220	0.01	10	500	430	< 2	1	45	0.05	< 10	< 10	42	30	4080
TAMOXT	1646	220	< 0.01	4	170	7470	< 2	1	46	0.03	< 10	< 10	11	30	4060
TAMUOX	1646	220	< 0.01	25	210	8250	10	1	10	0.04	< 10	< 10	11	40	>10000
BRL 4L	1646	220	0.01	9	440	3220	12	1	18	0.01	< 10	< 10	9	60	6510
BRL 11RR	1646	220	< 0.01	8	150	>10000	34	1	13	< 0.01	< 10	< 10	5	70	8190
BRL 09C	1646	220	< 0.01	13	620	2160	12	1	23	0.01	< 10	< 10	9	30	9210
BRL 12S	1646	220	< 0.01	9	280	4430	20	1	8	< 0.01	< 10	< 10	7	50	5060
BRL 15S	1646	220	< 0.01	8	290	5210	22	1	7	< 0.01	< 10	< 10	7	40	5190
BRL 21S	1646	220	< 0.01	6	190	7940	24	1	6	0.03	< 10	< 10	11	50	5770
BRL 22S	1646	220	< 0.01	9	230	3930	18	1	7	< 0.01	< 10	< 10	5	30	4810
BRL 23S	1646	220	< 0.01	15	490	>10000	70	1	26	0.01	< 10	< 10	10	40	4800
BRL 151SD	1646	220	< 0.01	10	320	5150	22	1	7	< 0.01	< 10	< 10	7	20	5190
BRL 121SD	1646	220	< 0.01	9	240	4260	14	1	7	< 0.01	< 10	< 10	6	30	5100
BRL 231S	1646	220	< 0.01	12	460	8590	24	2	25	0.02	< 10	< 10	11	20	4310
HECLAM	1646	220	< 0.01	12	250	>10000	46	1	38	0.02	< 10	< 10	10	30	>10000
SUC 02S	1646	220	0.01	5	2310	100	< 2	1	42	0.05	< 10	< 10	33	< 10	318
SUC 05S	1646	220	< 0.01	3	450	>10000	82	1	70	0.02	< 10	< 10	11	10	994
SUC 08S	1646	220	0.02	10	2300	5250	6	3	64	0.08	< 10	10	39	40	1905
YD 01S	1646	220	0.01	6	1060	90	< 2	3	17	0.06	< 10	< 10	16	10	92
YD 03S	1646	220	< 0.01	6	970	146	< 2	2	11	0.05	< 10	< 10	14	10	108
GEM 06S	1646	220	< 0.01	13	2260	54	< 2	2	18	0.05	< 10	< 10	19	10	112
GEM 08AS	1646	220	< 0.01	16	940	324	2	2	25	0.06	< 10	< 10	23	< 10	228
YD 031S	1646	220	< 0.01	6	1090	152	< 2	2	12	0.05	< 10	< 10	15	< 10	124

CERTIFICATION: _____

Chemex Labs, Inc.

Analytical Chemists * Geochemists * Registered Assayers

994 Glendale Ave., Unit 3, Sparks
Nevada, U.S.A. 89431
PHONE: 775-356-5395 FAX: 775-355-0179

To: URS GREINER, INC. - WASHINGTON **

2401 4TH AVE., STE. 808
SEATTLE, WASHINGTON
98121-1459

Project :
Comments: ATTN: BILL GOODWIN CC: RICHARD GLANZMAN

Certificate Date: 03-FEB-1999
Invoice No. : I9911173
P.O. Number : SE 00030
Account : QVR

CERTIFICATE OF ANALYSIS A9911173

SAMPLE	PREP CODE		Na %	Ni ppm	P ppm	Pb ppm	Sb ppm	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
REP 1A	1646	220	0.01	5	170	282	< 2	1	10	0.01	< 10	< 10	15	40	138
REP 1B	1646	220	0.01	4	250	1335	< 2	1	8	0.02	< 10	< 10	7	60	290
REP 2B	1646	220	0.01	9	1120	3490	12	1	15	0.05	< 10	< 10	28	30	844
REP 3A	1646	220	< 0.01	5	300	>10000	112	1	9	0.01	< 10	< 10	7	80	2250
REP 4B	1646	220	0.01	7	580	>10000	34	1	13	0.05	< 10	< 10	27	30	1020
REP 4C	1646	220	0.01	9	420	3920	12	1	10	0.06	< 10	< 10	30	10	790
REP 5B	1646	220	0.01	7	490	4130	26	1	21	0.04	< 10	< 10	21	30	870
REP 5C	1646	220	0.01	9	640	60	< 2	1	8	0.05	< 10	< 10	27	10	380
REP 9C	1646	220	0.01	10	1420	218	< 2	1	12	0.06	< 10	< 10	27	10	1040
REP 10	1646	220	0.03	7	620	2540	12	2	9	0.05	< 10	< 10	16	30	700
REX PREC	1646	220	< 0.01	6	230	2550	8	< 1	481	< 0.01	< 10	10	< 1	20	>10000
REX 09S	1646	220	< 0.01	6	200	7050	4	1	13	0.03	< 10	< 10	11	40	5650
REX 11S	1646	220	0.01	6	1280	32	< 2	2	32	0.06	< 10	< 10	34	10	158
REX 17S	1646	220	0.03	10	400	1060	6	1	68	0.04	< 10	< 10	32	40	4090
RL 01S	1646	220	0.01	17	1490	278	< 2	3	31	0.07	< 10	< 10	31	10	378
RL 01SD	1646	220	0.01	17	1580	208	< 2	3	31	0.08	< 10	< 10	32	30	240
RL 04S	1646	220	< 0.01	10	380	80	< 2	2	17	0.04	< 10	< 10	27	20	96
TAM 01C	1646	220	0.01	10	500	430	< 2	1	45	0.05	< 10	< 10	42	30	4080
TAMOXT	1646	220	< 0.01	4	170	7470	< 2	1	46	0.03	< 10	< 10	11	30	4060
TAMUOX	1646	220	< 0.01	25	210	8250	10	1	10	0.04	< 10	< 10	11	40	>10000
BRL 4L	1646	220	0.01	9	440	3220	12	1	18	0.01	< 10	< 10	9	60	6510
BRL 11RR	1646	220	< 0.01	8	150	>10000	34	1	13	< 0.01	< 10	< 10	5	70	8190
BRL 09C	1646	220	< 0.01	13	620	2160	12	1	23	0.01	< 10	< 10	9	30	9210
BRL 12S	1646	220	< 0.01	9	280	4430	20	1	8	< 0.01	< 10	< 10	7	50	5060
BRL 15S	1646	220	< 0.01	8	290	5210	22	1	7	< 0.01	< 10	< 10	7	40	5190
BRL 21S	1646	220	< 0.01	6	190	7940	24	1	6	0.03	< 10	< 10	11	50	5770
BRL 22S	1646	220	< 0.01	9	230	3930	18	1	7	< 0.01	< 10	< 10	5	30	4810
BRL 23S	1646	220	< 0.01	15	490	>10000	70	1	26	0.01	< 10	< 10	10	40	4800
BRL 151SD	1646	220	< 0.01	10	320	5150	22	1	7	< 0.01	< 10	< 10	7	20	5190
BRL 121SD	1646	220	< 0.01	9	240	4260	14	1	7	< 0.01	< 10	< 10	6	30	5100
BRL 231S	1646	220	< 0.01	12	460	8590	24	2	25	0.02	< 10	< 10	11	20	4310
HECLAM	1646	220	< 0.01	12	250	>10000	46	1	38	0.02	< 10	< 10	10	30	>10000
SUC 02S	1646	220	0.01	5	2310	100	< 2	1	42	0.05	< 10	< 10	33	< 10	318
SUC 05S	1646	220	< 0.01	3	450	>10000	82	1	70	0.02	< 10	< 10	11	10	994
SUC 08S	1646	220	0.02	10	2300	5250	6	3	64	0.08	< 10	10	39	40	1905
YD 01S	1646	220	0.01	6	1060	90	< 2	3	17	0.06	< 10	< 10	16	10	92
YD 03S	1646	220	< 0.01	6	970	146	< 2	2	11	0.05	< 10	< 10	14	10	108
GEM 06S	1646	220	< 0.01	13	2260	54	< 2	2	18	0.05	< 10	< 10	19	10	112
GEM 08AS	1646	220	< 0.01	16	940	324	2	2	25	0.06	< 10	< 10	23	< 10	228
YD 031S	1646	220	< 0.01	6	1090	152	< 2	2	12	0.05	< 10	< 10	15	< 10	124

CERTIFICATION: _____

Chemex Labs, Inc.

Analytical Chemists * Geochemists * Registered Assayers

994 Glendale Ave., Unit 3, Sparks
Nevada, U.S.A. 89431
PHONE: 775-356-5395 FAX: 775-355-0179

To: URS GREINER, INC. - WASHINGTON

2401 4TH AVE., STE. 808
SEATTLE, WASHINGTON
98121-1459

A9911163

Comments: ATTN: BILL GOODWIN CC: RICHARD GLANZMAN

CERTIFICATE A9911163

(QVR) - SHEA CLARK SMITH

Project:
P.O. # : SE 00030

Samples submitted to our lab in Vancouver, BC.
This report was printed on 18-FEB-1999.

SAMPLE PREPARATION

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION
225	15	Run as received
* NOTE	1:	

The 32 element ICP package is suitable for trace metals in soil and rock samples. Elements for which the nitric-aqua regia digestion is possibly incomplete are: Al, Ba, Be, Ca, Cr, Ga, K, La, Mg, Na, Sr, Ti, Tl, W.

ANALYTICAL PROCEDURES

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION	METHOD	DETECTION LIMIT	UPPER LIMIT
9201	15	Al %: ICP + ICP-MS package	ICP	0.01	15.00
9202	15	Sb ppm: ICP + ICP-MS package	ICP-MS/ICP	0.1	10000
9203	15	As ppm: ICP + ICP-MS package	ICP-MS/ICP	0.2	10000
9204	15	Ba ppm: ICP + ICP-MS package	ICP	10	10000
9205	15	Be ppm: ICP + ICP-MS package	ICP	0.5	100.0
9206	15	Bi ppm: ICP + ICP-MS package	ICP-MS/ICP	0.02	10000
9207	15	Cd ppm: ICP + ICP-MS package	ICP-MS/ICP	0.1	500
9208	15	Ca %: ICP + ICP-MS package	ICP	0.01	15.00
9209	15	Cr ppm: ICP + ICP-MS package	ICP	1	10000
9210	15	Co ppm: ICP + ICP-MS package	ICP	1	10000
9211	15	Cu ppm: ICP + ICP-MS package	ICP-MS/ICP	0.2	10000
9212	15	Ga ppm: ICP + ICP-MS package	ICP-MS/ICP	0.1	10000
9213	15	Ge ppm: ICP + ICP-MS package	ICP-MS	0.1	500
9214	15	Fe %: ICP + ICP-MS package	ICP	0.01	15.00
9215	15	La ppm: ICP + ICP-MS package	ICP	10	10000
9216	15	Pb ppm: ICP + ICP-MS package	ICP	2	10000
9217	15	Mg %: ICP + ICP-MS package	ICP	0.01	15.00
9218	15	Mn ppm: ICP + ICP-MS package	ICP	5	10000
9219	15	Hg ppm: ICP + ICP-MS package	ICP-MS/ICP	0.01	10000
9220	15	Mo ppm: ICP + ICP-MS package	ICP-MS/ICP	0.2	10000
9221	15	Ni ppm: ICP + ICP-MS package	ICP	1	10000
9222	15	P ppm: ICP + ICP-MS package	ICP	10	10000
9223	15	K %: ICP + ICP-MS package	ICP	0.01	10.00
9224	15	Sc ppm: ICP + ICP-MS package	ICP	1	10000
9225	15	Ag ppm: ICP + ICP-MS package	ICP-MS/ICP	0.02	100.0
9226	15	Na %: ICP + ICP-MS package	ICP	0.01	10.00
9227	15	Sr ppm: ICP + ICP-MS package	ICP	1	10000
9228	15	Te ppm: ICP + ICP-MS package	ICP-MS	0.1	500
9229	15	Tl ppm: ICP + ICP-MS package	ICP-MS/ICP	0.1	10000
9230	15	Ti %: ICP + ICP-MS package	ICP	0.01	10.00
9231	15	W ppm: ICP + ICP-MS package	ICP-MS/ICP	0.05	10000
9232	15	U ppm: ICP + ICP-MS package	ICP-MS/ICP	0.05	10000
9233	15	V ppm: ICP + ICP-MS package	ICP	1	10000
9234	15	Zn ppm: ICP + ICP-MS package	ICP	2	10000

The results of this assay were based solely upon the content of the sample submitted. Any decision to invest should be made only after the potential investment value of the claim or deposit has been determined based on the results of assays of multiple samples of geologic materials collected by the prospective investor or by a qualified person selected by him/her and based on an evaluation of all engineering data which is available concerning any proposed project

Statement required by Nevada State Law NRS 519

Chemex Labs, Inc.

Analytical Chemists * Geochemists * Registered Assayers

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2401 4TH AVE., STE. 808
SEATTLE, WASHINGTON
98121-1459

Project :
Comments: ATTN: BILL GOODWIN CC: RICHARD GLANZMAN

Certificate Date: 04-FEB-1999
Invoice No. : I9911163
P.O. Number : SE 00030
Account : QVR

*PLEASE NOTE

CERTIFICATE OF ANALYSIS A9911163

SAMPLE	PREP CODE		Al %	Sb ppm	As ppm	Ba ppm	Be ppm	Bi ppm	Cd ppm	Ca %	Cr ppm	Co ppm	Cu ppm	Ga ppm	Ge ppm	Fe %	La ppm	Pb ppm	Mg %	Mn ppm	Hg ppm
REP 04	225	--	3.07	136.0	36.0	1970	0.5	< 2.00	225	>15.00	9	18	372	< 10.0	Minrlzd	2.29	10	>10000	1.31	>10000	1.00
REP 05	225	--	3.30	136.0	26.0	1810	0.5	4.00	288	>15.00	18	15	599	< 10.0	Minrlzd	3.76	20	>10000	1.19	>10000	4.00
REP 06	225	--	2.08	55.7	12.0	2890	0.5	0.96	123.5	>15.00	12	13	165.0	3.6	< 0.1	1.89	10	7710	0.98	8940	< 0.01
REP 09	225	--	1.02	30.0	< 2.0	3000	< 0.5	< 2.00	109.5	>15.00	5	7	111.0	< 10.0	Minrlzd	1.27	< 10	4010	0.98	>10000	< 1.00
REX 11D	225	--	2.08	14.0	< 2.0	2630	0.5	< 2.00	74.5	>15.00	4	11	106.0	< 10.0	Minrlzd	1.41	10	4370	1.20	>10000	< 1.00
GEM 01D	225	--	1.50	18.0	14.0	2380	< 0.5	< 2.00	27.0	>15.00	8	9	119.0	< 10.0	Minrlzd	1.56	10	1600	1.78	>10000	< 1.00
GEM 02D	225	--	1.80	20.0	< 2.0	3360	0.5	< 2.00	90.0	>15.00	7	12	119.0	< 10.0	Minrlzd	1.65	10	3230	1.54	>10000	< 1.00
GEM 03D	225	--	1.13	6.0	< 2.0	3590	< 0.5	< 2.00	23.0	>15.00	4	6	106.0	< 10.0	Minrlzd	0.90	10	992	1.96	>10000	< 1.00
GEM 04D	225	--	1.05	8.0	< 2.0	2860	< 0.5	< 2.00	17.5	>15.00	1	3	121.0	< 10.0	Minrlzd	0.57	< 10	776	1.77	>10000	2.00
GEM 08D	225	--	1.32	28.0	12.0	1610	< 0.5	2.00	26.0	>15.00	4	7	3710	< 10.0	Minrlzd	0.83	< 10	1915	1.74	8290	1.00
GEM 09D	225	--	1.13	< 2.0	< 2.0	3180	< 0.5	< 2.00	24.0	>15.00	< 1	4	74.0	< 10.0	Minrlzd	0.33	< 10	960	1.96	>10000	< 1.00
GEM 14D	225	--	1.04	7.4	6.0	3860	< 0.5	0.28	20.9	>15.00	5	6	76.6	2.1	< 0.1	0.85	< 10	1070	1.48	9880	< 0.01
YD0405 G	225	--	0.05	< 2.0	< 2.0	1420	< 0.5	< 2.00	7.0	13.20	5	1	46.0	< 10.0	Minrlzd	0.12	< 10	46	1.43	2230	< 1.00
MFLPINE 1 DUFF.	225	--	0.79	16.0	22.0	1180	< 0.5	< 2.00	81.0	>15.00	5	25	176.0	< 10.0	Minrlzd	1.29	< 10	1600	5.96	>10000	< 1.00
V24020990	225	--	0.43	< 2.0	< 2.0	1010	< 0.5	< 2.00	12.5	10.90	6	5	236	< 10.0	Minrlzd	0.40	< 10	6	3.25	1065	< 1.00

CERTIFICATION: _____ *+

*INTERFERENCE: Ca (15%) ON ICP-MS As, ICP-AES RESULT SHOWN

Chemex Labs, Inc.

Analytical Chemists * Geochemists * Registered Assayers

994 Glendale Ave., Unit 3, Sparks
Nevada, U.S.A. 89431
PHONE: 775-356-5395 FAX: 775-355-0179

To: URS GREINER, INC. - WASHINGTON

2401 4TH AVE., STE. 808
SEATTLE, WASHINGTON
98121-1459

Project :
Comments: ATTN: BILL GOODWIN CC: RICHARD GLANZMAN

Certificate Date: 04-FEB-1999
Invoice No. : I9911163
P.O. Number : SE 00030
Account : QVR

*PLEASE NOTE

CERTIFICATE OF ANALYSIS A9911163

SAMPLE	PREP CODE		Mo ppm	Ni ppm	P ppm	K %	Sc ppm	Ag ppm	Na %	Sr ppm	Te ppm	Tl ppm	Ti %	W ppm	U ppm	V ppm	Zn ppm
REP 04	225	--	1.0	23	6790	0.58	2	29.0	0.66	1320	Minrlzd	< 10.0	0.05	< 10.00	< 10.00	20	>10000
REP 05	225	--	5.0	31	6160	0.69	5	18.60	0.62	1150	Minrlzd	< 10.0	0.08	< 10.00	< 10.00	31	>10000
REP 06	225	--	2.8	21	6060	0.61	2	7.18	0.44	1095	0.2	0.6	0.05	6.00	1.50	23	8060
REP 09	225	--	2.0	15	6110	0.55	1	6.40	0.42	1075	Minrlzd	< 10.0	0.04	< 10.00	< 10.00	15	8720
REX 11D	225	--	1.0	14	9970	0.66	1	4.00	0.42	2130	Minrlzd	< 10.0	0.04	< 10.00	< 10.00	14	5040
GEM 01D	225	--	1.0	16	9300	0.74	2	2.40	0.61	1240	Minrlzd	< 10.0	0.05	< 10.00	10.00	22	1895
GEM 02D	225	--	5.0	17	8180	0.49	3	2.80	0.46	1445	Minrlzd	< 10.0	0.05	< 10.00	< 10.00	23	2980
GEM 03D	225	--	2.0	13	9290	0.99	1	1.40	0.57	1850	Minrlzd	< 10.0	0.03	< 10.00	< 10.00	13	1790
GEM 04D	225	--	1.0	10	>10000	0.92	< 1	1.20	0.57	1750	Minrlzd	< 10.0	0.01	< 10.00	< 10.00	8	1830
GEM 08D	225	--	4.0	21	>10000	0.74	1	3.40	0.57	1445	Minrlzd	< 10.0	0.03	< 10.00	< 10.00	13	3690
GEM 09D	225	--	1.0	19	>10000	1.35	< 1	1.40	0.57	1765	Minrlzd	< 10.0	0.01	< 10.00	< 10.00	5	1600
GEM 14D	225	--	2.0	10	8190	0.57	1	1.70	0.38	1155	< 0.1	0.2	0.03	8.40	0.65	13	1555
YD0405 G	225	--	12.0	4	>10000	2.79	< 1	0.20	0.61	806	Minrlzd	< 10.0	< 0.01	< 10.00	< 10.00	< 1	1490
MFLPINE 1 DUFF.	225	--	6.0	56	9290	1.12	1	13.00	0.84	969	Minrlzd	< 10.0	0.02	< 10.00	< 10.00	21	9960
V24020990	225	--	45.0	53	>10000	>10.00	< 1	0.20	0.43	543	Minrlzd	< 10.0	0.01	< 10.00	< 10.00	37	798

CERTIFICATION: _____

*INTERFERENCE: Ca (15%) ON ICP-MS As, ICP-AES RESULT SHOWN

Chemex Labs, Inc.

Analytical Chemists * Geochemists * Registered Assayers

994 Glendale Ave., Unit 3, Sparks
Nevada, U.S.A. 89431
PHONE: 775-356-5395 FAX: 775-355-0179

To: URS GREINER, INC. - WASHINGTON

2401 4TH AVE., STE. 808
SEATTLE, WASHINGTON
98121-1459

A9911586

Comments: ATTN: BILL GOODWIN CC: RICHARD GLANZMAN

CERTIFICATE A9911586

(QVR) - SHEA CLARK SMITH

Project:
P.O. # : SE 00030

Samples submitted to our lab in Vancouver, BC.
This report was printed on 18-FEB-1999.

SAMPLE PREPARATION

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION
212	2	Overlimit pulp, to be found

ANALYTICAL PROCEDURES

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION	METHOD	DETECTION LIMIT	UPPER LIMIT
312	2	Pb %: Conc. Nitric-HCL dig'n	AAS	0.01	100.0
316	2	Zn %: Conc. Nitric-HCL dig'n	AAS	0.01	100.0

The results of this assay were based solely upon the content of the sample submitted. Any decision to invest should be made only after the potential investment value of the claim or deposit has been determined based on the results of assays of multiple samples of geologic materials collected by the prospective investor or by a qualified person selected by him/her and based on an evaluation of all engineering data which is available concerning any proposed project Statement required by Nevada State Law NRS 519

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To: URS GREINER, INC. - WASHINGTON

2401 4TH AVE., STE. 808
SEATTLE, WASHINGTON
98121-1459

Project :
Comments: ATTN: BILL GOODWIN CC: RICHARD GLANZMAN

Certificate Date: 05-FEB-1999
Invoice No. : I9911586
P.O. Number : SE 00030
Account : QVR

CERTIFICATE OF ANALYSIS A9911586

SAMPLE	PREP CODE	Pb %	Zn %
REP 04	212 --	3.42	1.18
REP 05	212 --	2.12	1.19

CERTIFICATION: _____

OVERLIMITS from A9911163

TECHNICAL INFO

Multi-Element Packages - Trace Geochemical Analysis by ICP Spectroscopy

- Introduction
- G32 - 32 Element Partial Leach Multielement ICP Analysis
- G32m - 32 Element Partial Leach Package with Quantitative Low Detection Mercury
- The G9 Multielement ICP Packages
- The VG Multielement Package for Vegetation and Humus
- T24 - 24 Element Total Digestion Multielement ICP Package
- T27 - 27 Element Total Digestion Multielement ICP Package
- Quality Control Procedures for ICP Spectroscopy
- FAQs

BACK

Introduction

Inductively-coupled plasma atomic emission spectroscopy (ICP spectroscopy) has been a highly successful and popular analytical technique for a number of reasons which have been outlined in the section entitled Plasma Emission Spectroscopy.

- Several of the most successful packages that have traditionally been offered by Chemex are outlined below.

BACK TOP

G32 - 32 Element Partial Leach Multielement ICP Analysis

The most important traditional ICP package in use at Chemex has been denoted G32 and has historically been our most popular and successful ICP package. Data for 32 elements are reported, giving the explorationist the widest possible range of information. Even though the leach has been designated "partial", it is still sufficiently strong to dissolve 18 of the elements in a quantitative manner. The remaining 14 elements are dissolved in a manner which is usually incomplete

- These elements are outlined both in our Fee Schedule and on our Certificates of Analysis.

In addition to offering the widest range of information about elemental concentrations, the G32 package is also the most economical of the large scale packages, thus providing extremely good value.

The G32 package has been designed for soils, silts, lake and stream sediment analysis. Rock characterization is better accomplished using the ICP package outlined below.

- For a complete list of G32 elements, detection limits, and upper limits, see the Nitric Aqua-Regia Leach Packages (ICP-32) section of the 1998 Fee Schedule .

Many laboratories offer some form of multielement ICP package roughly equivalent to the Chemex G32 package but subtle differences exist from one package to another and complete agreement between these various packages cannot necessarily be expected. Some of the features of the G32 package which should be borne in mind by explorationists are as follows:

Digestion or Leaching Procedure

Chemex uses a nitric acid-aqua regia digestion for the G32 package. The use of pure nitric acid in the early stage of the digestion facilitates both the dissolution of sulfide minerals and the destruction of organic matter. Consequently the nitric-aqua regia digestion is stronger than a 3:1 HCl:HNO3 aqua regia digestion or a 3:1:2 HCl:HNO3:H2O digestion used by other laboratories. Data produced with the Chemex G32 package is often fractionally higher than the data generated using weaker aqua regia systems. However, none of these partial leach digestion systems completely dissolves all elements, especially those shaded in yellow in the 1998 Fee Schedule . This issue is discussed in greater detail below. For explorationists requiring totally quantitative data, the Chemex T24 package described below offers an attractive alternative.

Detection Limits

A brief glance at the list of detection limits in the G32 package shows that there is a wide variation from one element to another. Several different factors such as analytical sensitivity of an elemental spectral line and interelement interferences have a major effect on the detection limit offered. The G32 package represents a compromise, an attempt to offer the most meaningful detection limit for the largest number of elements.

Accuracy and Precision

The precision of the G32 elements at the detection limits is +/- 100%. At concentration values 5 times higher than the detection limit, the precision is typically +/- 40%; at values 100 times the detection limit, the precision is typically +/- 10%. An explorationist who requires extremely precise data within the range of 1-5 times the detection limit of an element within the G32 package should consider using one of our ultratrace G32 package instead. These ultratrace packages have been designed to be quantitative and offer significantly lower detection limits.

Interelement Effects

The concentration values of some elements in the G32 package are routinely corrected for interelement effects caused by spectral line overlap. Great care and attention is taken to ensure that these corrections are made properly. Certain major elements such as Al and Fe have significant effects on some trace element concentrations (e.g. Be), depending on the analytical wavelength that has been selected. Although these interelement effects can usually be compensated for, in extreme cases the effect may be sufficiently great as to prevent the measurement of a small number of elements as stated in our Fee Schedule.

Evaluation of data for incompletely dissolved elements

Silicates, clays and resistant minerals are incompletely dissolved in all partial leach aqua regia digestion systems. Elements such as Al, Ba, Ti, Na and K (those shaded in yellow in the 1998 Fee Schedule will rarely be fully dissolved and so data for these elements will never match data generated by stronger digestion techniques such as total digestions or whole rock analyses.

Cautionary Notes

The explorationist should keep in mind the comments made above regarding the digestion efficiency of the various aqua regia digestion systems. Concentration values for many elements, especially those that are incompletely dissolved, are

more likely to be higher with a nitric-aqua regia digestion than with other weaker aqua regia digestions.

Professional opinion varies significantly on the potential usefulness of data derived from incompletely dissolved elements. Analysts have traditionally urged caution but at least one school of thought among exploration geochemists believes that much of this data may be potentially useful.

BACK TOP

G32m - 32 Element Partial Leach Package with Quantitative Low Detection Mercury

The analytical sensitivity for mercury using ICP spectroscopy is adequate for some sample types but in many cases explorationists require a better sensitivity than the 1 ppm detection limit offered by conventional ICP spectroscopy. In the G32m package, we substitute a quantitative geochemical procedure for mercury (Chemex code 20). This procedure uses conventional cold vapor atomic absorption spectroscopy with a detection limit for Hg of 10 ppb, a one hundred fold improvement over that offered in the G32 package.

BACK TOP

The G9 Multielement ICP Packages

Introduction

Not all explorationists require the comprehensive information provided by the G32 and the G32m packages. As a result Chemex designed a number of condensed 9-element packages which offer quantitative data for the elements reported.

- For a complete list of elements for the various G9 procedures and prices, see the ICP-AES Multielement Analysis section of the 1998 Fee Schedule.

The G9g Package

The G9g package includes pathfinder elements likely to be of interest to those explorationists searching for gold.

The G9m Package

The G9m package contains the same 9 elements as the G9g package. The only difference is that in the G9g package, mercury is determined by ICP spectroscopy to a detection limit of 1 ppm, whereas in the G9m package, mercury is determined by cold vapor atomic absorption spectroscopy to a detection limit of 10 ppb.

The G9b Package

The G9b multielement package has been designed to be of interest to those explorationists looking for base metals and the G9b package includes elements such as nickel, cobalt, iron and manganese instead of gold pathfinders.

BACK TOP

The VG Multielement Package for Vegetation and Humus

The VG package consists of a suite of 33 elements (including gold) which has been designed to offer the best possible detection limits for the analysis of highly organic samples. The VG package uses both ICP spectroscopy and instrumental neutron activation analysis (NAA) to obtain exceptionally low detection limits, e.g. 0.1 ppb Au.

These low detection limits can only be obtained if the samples are highly organic vegetation or humus samples and this package is not appropriate even for soils or sediments due to increased interferences from the inorganic constituents of such samples.

- For a complete list of elements for the VG package and prices, please contact a Chemex sales and marketing representative.

T24 - 24 Element Total Digestion Multielement ICP Package

Introduction

The Chemex T24 package has been designed to be complementary to the G32 package. Whereas the G32 package offers a partial leach, the T24 package includes a total digestion so that data reported for all 24 elements is considered quantitative. This package is considered most appropriate for rock characterization as it includes data for all major and minor elements except silicon.

- For a complete list of elements in the T24 package and prices, see the Triple-Acid Total Digestion section of the 1998 Fee Schedule.

Digestion

The T24 package uses a total digestion in which the sample is completely dissolved using a mixture of hot, concentrated nitric, perchloric and hydrofluoric acids. In order for this digestion to go to completion, the acid mixture must be taken to dryness. This process ensures the best possible dissolution but also results in the loss of volatile elements such as arsenic, antimony and mercury. In addition, this digestion particular acid mixture results in the loss of silicon, an element not normally considered to be volatile. Obviously reliable data cannot be reported for these four elements with the T24 package.

To assist in the final dissolution of the sample residue, hydrochloric acid is added and then sample analysis is carried out in a dilute hydrochloric acid matrix.

This digestion will be "total" for most rock samples. Certain types of highly resistant minerals, for example zircons, may not be totally attacked. In these limited cases, we recommend that the whole rock fusion technique be used.

- For a complete list of elements using the whole rock fusion technique and prices, see the Chemex packages in the Whole Rock Analysis section of the 1998 Fee Schedule.

Cautionary Note

Certain mineral species are capable of fully dissolving during the digestion process but because of their fundamental chemistry are prone to precipitation rather quickly. Barium, even if present in relatively low concentrations, is susceptible

to precipitation and may also remove (co-precipitate) other elements such as silver and lead as it precipitates. Laboratory technicians are trained to watch for this phenomenon and corrective action is taken where possible by quickly analyzing solutions following the digestion process.

Pricing

The T24 package yields substantially the same information as provided by whole rock analysis (with the exception of silicon) but also includes significant trace element information. Yet the total cost of the T24 package is half that of whole rock analysis and thus represents extremely good value for the budget-conscious explorationist.

BACK TOP

T27 - 27 Element Total Digestion Multielement ICP Package

As noted in the section above, three elements of significant interest to explorationists, namely arsenic, antimony and mercury, are lost during the T24 digestion. Since these elements are frequently crucial pathfinder elements in the search for gold, we have included them in an expanded T27 package. The T27 package includes the standard T24 package outlined above but with the addition of quantitative individual procedures for arsenic, antimony and mercury (Chemex codes 13, 22 and 20 respectively).

- For a complete list of elements in the T27 package and prices, see the ICP-AES Multielement Analysis section of the 1998 Fee Schedule.

BACK TOP

Quality Control Procedures for ICP Spectroscopy

- Click here for details of the Quality Control Procedures in place for ICP-AES.

BACK TOP

FAQs

Why are my barium results by the T24 procedure lower than those that I got by your whole rock procedure?

In the T24 procedure, samples are digested using the triple acid combination of nitric, perchloric and hydrofluoric acids. A sample containing a significant amount of sulfides will produce sulfate ions during the digestion and this can occasionally cause the premature precipitation of barium as barium sulfate, resulting in low barium data. In the whole rock procedure, the samples are greatly diluted following the whole rock fusion and this helps prevent precipitation of barium.

Why, instead of receiving data for thallium, did the certificate of analysis say "INTERFERENCE"?

Thallium is an element that suffers from spectral overlap from iron. Occasionally the iron concentration is so high as to

swamp the thallium signal. In this case, there is little that we can do but to report that an interference has prevented the measurement. If the thallium value is crucial to you, then we would propose the standard geochemical procedure (code 39) which is an AAS measurement.

Couldn't you report As, Sb and Hg data from a T24 package anyway and let me decide how to use the data?

We have looked at arsenic data after a T24 digestion and compared it with arsenic data generated by the optimized geochemical procedure by AAS (code 13). The data scatter was extremely wide-in some cases, most of the arsenic was lost, in others most of the arsenic remained. Under these circumstances we feel we would be reckless to report any data.

I'm not really interested in all that data from partially digested elements. Can you simplify my certificates by eliminating all the partially digested elements?

You bet we can. Just contact one of our Client Services representatives and we will make the necessary arrangements.

Why do you have an upper limit on your G32 package? Some other labs don't have upper limits on their ICP packages.

There are a number of reasons why we adopt this approach. The main one is our insistence on contamination control by sorting samples according to expected metal concentrations and routing them through separate batch streams. In this way we can provide better service for all clients by minimizing chances of cross contamination. We prefer that samples expected to exceed our G32 upper limits be analyzed by one of our ICP assay packages, A30 or A22, which have been especially designed for this purpose. The digestions for these packages take place in a physically separate part of the laboratory designed for handling higher grade samples. In addition, even though ICP-AES has linear calibration curves over several orders of magnitude, these curves cannot be extended indefinitely to higher concentrations. For best results it is preferable to prepare a more dilute solution as we do for the A22 and A30 packages.

I would like to have arsenic reported in my G9b package. Can I ask for arsenic instead of iron?

In choosing the elements that we allow to be substituted in our packages, we permit substitutions when the measurement procedure is identical for both elements. In the case of iron and arsenic, both are measured by AAS but they are made in fundamentally different ways on different equipment and the arsenic procedure is more costly. Hence we would not ordinarily allow this substitution. However it is likely that you could add arsenic at a significantly reduced rate if you discussed the matter with a Chemex Client Services representative. Incidentally we do constantly review our packages in order to make sure that we are satisfying industry demand. Let us know if there are certain combinations you would like to see packaged together.

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Last modified Wednesday, 25-Aug-99 00:20:08.

Attachment D
Mineral Laboratory Results

The Mineral Lab, Inc.
2700 Youngfield Suite 105
Lakewood, CO 80215
(303) 232-8708

January 20, 1999
Lab no. 990024

Mr. Dick Glanzman
CH2M Hill
P.O. Box 241325
Denver, Colorado 80224

Dear Mr. Glanzman:

Enclosed are the x-ray fluorescence (XRF) analytical results for the ten URS Greiner samples submitted last week with URS Greiner PO no. SE00029. Please give me a call if you would like this report mailed and/or faxed directly to URS Greiner in Washington. The invoice will ben sent directly to URS Greiner at the end of January.

The samples were air-dried before grinding and analysis. A representative portion of each sample was ground to approximately -400 mesh in a steel swing mill and then analyzed by our standard "XRF-powder" procedure for 31 major, minor and trace elements. The relative precision/accuracy for this procedure is ~5-10% for major–minor elements and ~10–15% for trace elements (those elements listed in ppm) at levels greater than twice the detection limit in samples of average geologic composition. A replicate sample and a standard reference material ("SY3", a Canadian standard rock) were analyzed with the samples to demonstrate analytical reproducibility for your samples and analytical accuracy for a geologic standard, respectively. The accepted ("known") values for the standard are listed with the XRF results.

Thank you for the opportunity to be of service.

Sincerely,

Peggy Dalheim

Peggy Dalheim

URS GREINER, INC.

JANUARY 20, 1999

XRF-POWDER RESULTS FOR SAMPLES SUBMITTED WITH PO# SE00029.

LAB NO. 990024

	PPM				
IDENT	Th	Nb	Zr	Rb	Y
REX11S	14	<10	159	110	45
BRL12S	28	14	241	99	69
REP04B	36	15	256	105	44
REP04C	29	12	296	99	42
REP10	40	15	294	91	66
TAM01C	27	16	199	180	67
TAMOUX	42	21	173	202	83
TAMOXT	29	17	160	176	86
REP09C	13	11	276	93	48
YD03S	17	13	287	164	72
QUALITY CONTROL					
REX11S(R)	17	13	169	115	52
SY3-XRF	951	174	313	196	710
SY3-known	990	145	320	208	740

ANALYSIS PERFORMED BY THE MINERAL LAB, INC.

JRS GREINER, INC. JANUARY 20, 1999
XRF-POWDER RESULTS FOR SAMPLES SUBMITTED WITH PO# SE00029. LAB NO. 990024

	WT %												
IDENT	Na2O	MgO	Al2O3	SiO2	P2O5	S	Cl	K2O	CaO	TiO2	MnO	Fe2O3	BaO
REX11S	3.11	0.71	18.8	57.2	0.40	<0.05	<0.02	4.00	1.90	0.50	0.17	4.15	0.12
BRL12S	0.43	1.33	9.85	68.2	0.07	0.36	<0.02	2.35	0.42	0.43	1.23	16.1	0.08
REP04B	0.93	0.76	13.5	53.3	0.20	<0.05	<0.02	2.16	0.87	0.72	0.19	5.53	0.06
REP04C	0.97	0.71	15.3	55.6	0.15	<0.05	<0.02	2.04	0.77	0.75	0.15	5.69	0.07
REP10	1.36	0.80	16.1	61.4	0.25	0.09	0.02	2.36	0.95	0.71	0.19	4.39	0.09
TAM01C	2.13	0.69	15.8	63.1	0.13	0.25	<0.02	5.05	0.99	0.57	0.30	4.80	0.13
TAMOUX	<0.05	1.22	15.2	62.8	<0.05	1.80	<0.02	4.22	0.26	0.37	0.57	9.38	0.04
TAMOXT	0.28	0.96	13.7	68.3	<0.05	0.64	<0.02	3.92	0.17	0.54	0.45	11.1	0.04
REP09C	1.16	0.80	15.3	56.4	0.53	<0.05	<0.02	2.13	1.03	0.74	0.55	5.04	0.10
YD03S	0.57	0.73	18.5	57.9	0.37	<0.05	<0.02	4.33	0.72	0.78	0.16	4.82	0.11
QUALITY CONTROL - REPLICATE (R) SAMPLE AND STANDARD REFERENCE MATERIAL (SY3) ANALYZED WITH SAMPLES													
REX11S(R)	3.09	0.73	19.0	58.0	0.41	<0.05	<0.02	4.05	1.93	0.51	0.17	4.26	0.12
SY3-XRF	4.10	2.57	12.2	58.8	0.70	<0.05	<0.02	4.38	8.20	0.12	0.29	6.59	0.05
SY3-known	4.15	2.67	11.8	59.7	0.54	0.05	0.014?	4.20	8.26	0.15	0.32	6.45	0.05

	PPM												
IDENT	V	Cr	Co	Ni	W	Cu	Zn	As	Sn	Pb	Mo	Sr	U
REX11S	67	47	11	20	<10	23	209	<20	93	56	<10	833	31
BRL12S	35	63	<10	11	<10	178	7238	90	147	5983	<10	53	31
REP04B	66	48	19	15	<10	114	1170	25	197	13700	<10	153	26
REP04C	72	52	17	23	<10	54	1103	<20	147	5717	<10	140	28
REP10	59	50	14	21	<10	98	1006	<20	74	3336	<10	173	20
TAM01C	77	69	17	21	<10	49	4925	<20	113	874	<10	597	19
TAMOUX	58	27	21	<10	<10	748	42300	31	60	10700	<10	48	11
TAMOXT	56	58	<10	<10	<10	133	5853	33	150	9110	<10	101	22
REP09C	65	68	15	27	<10	31	1513	<20	103	172	<10	170	28
YD03S	69	74	15	28	<10	29	192	<20	119	216	<10	96	16
QUALITY CONTROL													
REX11S(R)	70	49	11	21	<10	23	216	<20	95	59	<10	856	35
SY3-XRF	45	<10	18	<10	57	19	273	24	<50	159	<10	318	633
SY3-known	51	10	12	11	--	16	250	20	--	130	--	306	650

ANALYSIS PERFORMED BY THE MINERAL LAB, INC.