Winter 2-10-2022

Revised Lead and Arsenic Enrichment Study

Environmental Standards, Inc.

Ramboll

Mike McAnulty

Atlantic Richfield Company

317 Anaconda Road
Butte MT 59701

Mike Mc Anulty
Liability Manager

Direct (406) 782-9964
Fax (406) 782-9980

February 15, 2022

Nikia Greene
Remedial Project Manager
US EPA – Montana Office
Baucus Federal Building
10 West 15th Street, Suite 3200
Helena, Montana 59626

Erin Agee
Senior Assistant Regional Counsel
US EPA Region 8 Office of Regional Counsel
CERCLA Enforcement Section
1595 Wynkoop Street
Denver, CO 80202
Mail Code: 8ORC-C

Daryl Reed
DEQ Project Officer
P.O. Box 200901
Helena, Montana 59620-0901

Jonathan Morgan, Esq.
DEQ, Legal Counsel
P.O. Box 200901
Helena, Montana 59620-0901

RE: Revised Lead and Arsenic Enrichment Study

Agency Representatives:

On October 28, 2021, Environmental Standards and Ramboll prepared a draft study work plan for Atlantic Richfield Company (Atlantic Richfield) to review and approve entitled *Comparison of Sieved Soil Sample Results at Lead Site for Assessment of Incidental Ingestion: 250 µm and 150 µm Sieved Samples for Lead Enrichment Determination*. This draft study work plan was forwarded to U.S. Environmental Protection Agency (EPA) Region 8 and the Montana Department of Environmental Quality (DEQ) on October 28, 2021, for review and comment.

Informal comments from EPA were received by Atlantic Richfield on February 1, 2022. All comments were reviewed with most being acceptable, and the study text was modified to include the accepted comments. These comments included reorganizing the study text and adding four additional samples that exceeded the lead action limit. These samples were collected after the original submission of the work plan. The following comments are also made to clarify the work plan.

- The sieve study work plan will only include samples from the Residential Metals Abatement Program (Schools) Program; we have not yet collected any samples at daycare facilities.
- Atlantic Richfield and the project team understand that EPA's comments are informal and that no EPA approval of the sieve study work plan will be provided.

Initial implementation of the work plan has started with an anticipated completion date of mid-March 2022 for re-sieving and reanalysis, which will be followed by a final report including conclusions after the data is analyzed.

Atlantic Richfield Company

317 Anaconda Road
Butte MT 59701
Direct (406) 782-9964
Fax (406) 782-9980

If you have any questions or comments, please call me at (907) 355-3914.

Sincerely,

Mike McAnulty

Mike Mc Anulty
Liability Manager & Global Risk Champion
Remediation Management Services Company
An affiliate of **Atlantic Richfield Company**

Atlantic Richfield Company

317 Anaconda Road
Butte MT 59701
Direct (406) 782-9964
Fax (406) 782-9980

Cc: Patricia Gallery / Atlantic Richfield - email
Chris Greco / Atlantic Richfield – email
Josh Bryson / Atlantic Richfield - email
Mike Mc Anulty / Atlantic Richfield - email
Loren Burmeister / Atlantic Richfield – email
Dave Griffis / Atlantic Richfield - email
Jean Martin / Atlantic Richfield - email
Irene Montero / Atlantic Richfield - email
David A. Gratson / Environmental Standards / email
Mave Gasaway / DGS - email
Brianne McClafferty / Holland & Hart - email
Joe Vranka / EPA - email
David Shanight / CDM - email
Curt Coover / CDM - email
James Freeman / DOJ - email
John Sither / DOJ - email
Jenny Chambers / DEQ - email
Dave Bowers / DEQ - email
Carolina Balliew / DEQ - email
Matthew Dorrington / DEQ - email
Jim Ford / NRDP - email
Ray Vinkey / NRDP - email
Harley Harris / NRDP - email
Katherine Hausrath / NRDP - email
Meranda Flugge / NRDP - email
Ted Duaime / MBMG - email
Gary Icopini / MBMG - email
Becky Summerville / MR - email
Kristen Stevens / UP - email
Robert Bylsma / UP - email
John Gilmour / Kelley Drye - email
Leo Berry / BNSF - email
Robert Lowry / BNSF - email
Brooke Kuhl / BNSF – email
Mark Engdahl / BNSF - email
Jeremie Maehr / Kennedy Jenks - email
Annika Silverman / Kennedy Jenks - email
Matthew Mavrinac / RARUS - email
Harrison Roughton / RARUS - email
Brad Gordon / RARUS - email
Mark Neary / BSB - email
Eric Hassler / BSB - email

Atlantic Richfield Company

317 Anaconda Road
Butte MT 59701
Direct (406) 782-9964
Fax (406) 782-9980

Julia Crain / BSB - email
Chad Anderson / BSB - email
Brandon Warner / BSB – email
Abigail Peltomaa / BSB - email
Eileen Joyce / BSB – email
Sean Peterson/BSB – email
Gordon Hart / BSB – email
Jeremy Grotbo / BSB – email
Karen Maloughney / BSB – email
Josh Vincent / WET - email
Craig Deeney / TREC - email
Scott Bradshaw / TREC - email
Brad Archibald / Pioneer - email
Pat Sampson / Pioneer - email
Joe McElroy / Pioneer – email
Andy Dare / Pioneer – email
Karen Helfrich / Pioneer - email
Leesla Jonart / Pioneer - email
Randa Colling / Pioneer – email
Ian Magruder/ CTEC- email
CTEC of Butte – email
Scott Juskiewicz / Montana Tech – email

File: MiningSharePoint@bp.com - email
BPSOU SharePoint - upload

STUDY WORK PLAN

Comparison of Sieved Soil Sample Results at Lead Site for Assessment of Incidental Ingestion: 250 µm and 150 µm Sieved Samples for Lead Enrichment Determination

Prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8, MONTANA OFFICE
FEDERAL BUILDING,
10 West 15th Street, Suite 3200
Helena, MT 59626-0096

Approved and Submitted by:

ATLANTIC RICHFIELD COMPANY
317 Anaconda Road
Butte, MT 59701

Study Work Plan Prepared by:

ENVIRONMENTAL STANDARDS, INC.
1140 Valley Forge Road
P.O. Box 810
Valley Forge, PA 19482-0810

and

RAMBOLL
901 5th Ave. Ste. 2820
Seattle, WA 98164

Study Final Revised Report Date: February 10, 2022

STUDY TYPE: Sample Sieving Preparation and Analytical Method Study

TEST MATERIAL: Homogenized, air-dried, and sieved soil samples (250 µm and 150 µm)

SPONSOR: Atlantic Richfield Company

EXECUTIVE SUMMARY:

During the 2021 execution of the Butte-Silver Bow (BSB) Multi-Pathway Residential Metals Abatement Program (RMAP) Plan (BSB and Atlantic Richfield Company, 2020), 1536 soil samples were collected, processed, and analyzed for lead and arsenic, and those results were compared to risk-based limits to assess the need for potential remedial action in the vicinity of schools, playgrounds, and sports fields. Consistent with prior sampling programs, the soil samples were air-dried, disaggregated, and sieved to less than 250 µm fraction, reflecting the fine fraction of soil that has a greater potential to adhere to children's hands.

The most recent US EPA guidance (EPA OLEM Directive 9200.1-128) requires sieving to less than 150 µm based on studies that suggested lead enrichment in very fine soil fractions (*e.g.,* less than 63 µm). There does not appear to be a substantial amount of published data that predict enriched lead concentrations in the less than 150 µm compared with the less than 250 µm fraction. Considering this uncertainty, the US EPA previously agreed with the use of the less than 250 µm fraction for the 2021 sampling program while the particle size enrichment demonstration study described herein was conducted.

The sieve study procedures detailed herein provide for the selection of 123 samples from the 1536 samples earlier collected for the purpose of comparing the already collected 250 µm sieved sample results to newly analyzed results for the 150 µm re-sieved samples. Once the selected samples are re-sieved to 150 µm and analyzed for lead and arsenic, the data will be compared to determine if lead and arsenic enrichment is apparent. Upon completion of the study detailed in this report, the conclusions will be prepared for review and consideration by the US EPA.

PROJECT OBJECTIVES:

Generate data to determine lead and arsenic concentration differences, if any, between 250 µm sieved and 150 µm sieved soil sample aliquots to assess the possibility of particle size enrichment in very fine soil fractions. Investigate the potential for particle size enrichment in very fine soil fractions at various levels of contamination (i.e., does enrichment occur when concentrations are low, moderate, high, or at all levels?).

STUDY PLAN PROTOCOL:

As part of the study, a total of 123 previously collected air-dried, disaggregated and 250 µm sieved soil samples will be re-sieved to less than 150 µm and reanalyzed for lead and arsenic. Upon completion, the data will be validated, and statistical analyses will be performed to determine if there is a significant difference in the lead and/or arsenic concentrations in the two size fractions.

A. Study Design:

1. Site Description:

The Butte-Silver Bow (BSB) Multi-Pathway Residential Metals Abatement Program (RMAP) Plan (BSB and Atlantic Richfield Company, 2020), hereinafter referred to as "RMAP" was designed to mitigate exposure of residents of the Butte Priority Soils Operable Unit (BPSOU) in Butte, Montana and rural residential development within the Silver Bow Creek/Butte Area Superfund Site to sources of lead and arsenic contamination.

Potential releases of metals to the environment may originate from both mining-related (waste rock, tailings, aerial emissions) and non-mining-related sources (e.g., lead-based paint). The potential sources of lead and/or arsenic exposure addressed by the RMAP include lead and arsenic present in soil and dust. The RMAP requires systematic soil sampling of non-residential parcels (schools, parks, and non-residential daycare centers) that fall under the RMAP.

The US EPA Region 8 and the Montana Department of Environmental Quality are responsible for project oversight, review, and approval of all RMAP-generated sampling data and subsequent site-specific remediation plans.

2. Sample Collection Designations and Characteristics

A total of 20 schools and one playground location throughout the Butte, Montana area were sampled during the 2021 RMAP sampling events under the BSB and Atlantic Richfield Company, 2021. Residential Metals Abatement Program (RMAP) Quality Assurance Project Plan (QAPP) (Non-Residential Parcels).. Exterior soil sampling was conducted at multiple depth intervals (0 to 2 inches, 2 to 6 inches, and 6 to 12 inches) to enable assessment of potential health risks under different land uses, and to obtain data that were comparable to those from previous sampling efforts. Flower/vegetable garden components were sampled at additional depth intervals of 12 to 18 inches and 18 to 24 inches.

The land use categories, area descriptions, and maximum sampling component size designations were identified as:

- Land Use Category #1 (playground areas): 6,250 square feet.
- Land Use Category #2 (highly accessible areas/barren sports fields): 9,375 square feet.
- Land Use Category #3 (maintained grass areas/grass sports fields): 10,890 square feet.
- Land Use Category #4 (low access areas/low maintenance areas/open space): 21,780 square feet.
- Land Use Category #5 (flower/vegetable gardens): 3,125 square feet.

3. Sampling

For each land use category, subsamples (when applicable) were composited in the field, and a single composite sample per depth interval per sampling component was analyzed for lead and arsenic. Each location was equally represented in the total sample mass by collecting subsamples with similar mass.

Field Duplicate Frequency: 1:20 samples per school location or 1 per sampling day (whichever was more frequent). Four field duplicate samples (approximately 5% of the field duplicates collected) were randomly included in this sieve study to evaluate precision between field duplicate pairs analyzed at both sieve sizes.

Number of sampling intervals (all land use categories): 0 to 2 inches, 2 to 6 inches, and 6 to 12 inches.

Flower/vegetable garden components were sampled at additional depth intervals of 12 to 18 inches and 18 to 24 inches.

4. Sampling Method and Equipment

Soil sample locations were excavated using available hand tools including a sampling probe, Sharpshooter® type shovels, and heavy duty 5- to 6-foot steel pry bars. Single-use scoops and protective (latex/nitrile) gloves were used to collect interval samples from the excavation and mix the samples. Zipper-style bags were used as sample containers for those samples requiring lead and arsenic analyses.

Soil samples were thoroughly mixed in a clean 1-gallon plastic zipper-style bag or stainless-steel bowl to ensure representativeness of the aliquot ultimately submitted for analyses. During this field homogenization process, particles greater than 0.5 inches in diameter were discarded. Sample volumes consisted of approximately 500 to 800 grams of material. Soil samples were submitted to the laboratory by the Samplers under Chain-of-Custody (COC) procedures.

5. Sample Handling and Storage

After soil sample collection and labeling, the samples were maintained under strict COC protocols. The field sampling personnel completed COC Records for each shipment/delivery (*i.e.*, batch of coolers) of soil samples delivered to the laboratory for further processing and analysis.

The coolers containing project soil samples collected in zipper-style bags for lead and arsenic were shipped from the field at ambient temperature conditions to the Pace Analytical Laboratories, LLC (Pace) Green Bay, Wisconsin, laboratory (1241 Bellevue Street, Suite 9, Green Bay, WI 54302) for processing defined as drying, disaggregation and sieving. Upon completion of drying/sieving activities, the 250 µm sieved sample aliquots were shipped to the Pace facility in Minneapolis, Minnesota, for digestion according to a modified US EPA Method 3050B and analysis by SW-846 Method 6020A. The soil samples were stored at ambient temperatures at secure locations within the Pace laboratory locations.

II. MATERIALS AND METHODS

A total of 1553 soil samples were collected and analyzed for lead and arsenic during 2021 as part of the RMAP Project from schools, and playgrounds within the RMAP Expanded Area. The lead results ranged from 3.8 to 5220 mg/Kg lead and the arsenic results ranged from (3.5 to 727 mg/Kg). The samples were air dried, disaggregated, and sieved to 250 µm followed by digestion according to a modified US EPA Method 3050B and analysis by SW-846 Method 6020A). The samples were grouped into the following lead-concentration ranges for study selection. The concentration ranges were based on discussions with US EPA personnel with consideration of the BPSOU Residential Soil Action action limit (1200 mg/kg) and distribution of sample concentrations of the entire data set.

- 23 samples with reported results of greater than 1200 mg/Kg.
- 94 samples with reported results between 400-1200 mg/Kg.
- 717 samples with reported results between 50-400 mg/Kg.
- 706 samples with reported results less than 50 mg/Kg.

A semi-random selection of samples was made in the last two groups ensuring that results from each school and playground and all three interval depth intervals sampled at all non-residential parcels (0 to 2 inches, 2 to 6 inches, and 6 to 12 inches) are represented in the study. Deeper samples (12 to 18 inches and 18 to 24 inches) were only collected from a limited number of properties where gardens are present. A total of 8 garden samples were randomly selected for this study. Table 1 lists the sample identifications and remaining mass of the 250 µm sample aliquots that will be re-sieved to 150 µm.

- 23 samples with reported results greater than 1200 mg/Kg.
- 40 samples with reported results between 400-1200 mg/Kg.
- 40 samples with reported results between 50-400 mg/Kg.
- 20 samples with reported results less than 50 mg/Kg.

III. ANALYTICAL METHODOLOGIES

A. Initial Sample Preparation Method: 250 µm aliquot

Sample preparation and analyses were performed in accordance with the US EPA digestion/analytical method specifications, the approved Quality Assurance Project Plan (QAPP), and the laboratory's standard operating procedures (SOPs). Once received, the samples were logged into the laboratory information management system, labeled with a laboratory identification number, air-dried, and then disaggregated by use of a 2.2 kg marble rolling pin between sheets of paper to reduce the potential for cross contamination to gently remove finer material from larger material. This method did not result in crushing or further reducing the size of larger size material. Samples were sieved using a No. 60 sieve to obtain the fine fraction, less than 250 µm, placed in a new plastic zipper style bag for metals digestion and analysis. The remaining coarse fraction was also placed in a new plastic bag labeled with the original sample number, date of sieving, and "Coarse Fraction" and then archived. The weight of the coarse fraction and the fine fraction were measured and recorded by the laboratory for each soil sample prepared in this manner. The fine fraction (<250 µm) was sent under COC to the Pace Minneapolis laboratory. Each sample bag containing the fine fraction were placed flat on a clean laboratory bench top and the air dried and sieved sample was spread-out in the unopened bag to evenly distribute the sample. The sample bags were then

gently rolled to further homogenize the sample. This technique provided good sample homogeneity as shaking the sample bag may preferentially cause the finer particles to migrate to the bottom of the bag. After the sample bag was opened, the sample preparation personnel, removed a small portion of the sample from several different locations in the bag using a clean metal scoopula and placed a total of 1.0 to 1.1 grams of sample material into a labeled digestion tube and were digested for metals analyses. The remaining mass of the fine sample portion was placed in storage at the Pace Minneapolis laboratory.

B. Secondary Sample Preparation Method: 150 µm aliquot

As part of the resieving study, the 123 samples designated for re-sieving will be removed from laboratory storage and used to determine the total mass remaining from the initial 250 µm sieving. This weight is expected to be approximately 1 gram less than the original weight due to removal of a sample aliquot for original testing. The entire contents of the sample bag will be sent back to Pace Green Bay for re-sieving to 150 µm. The weights of the 250 µm and 150 µm re-sieved portions will also be recorded to provide an indication of the sample size fractionation. Once re-sieved, the 150 µm sample aliquots will be returned to Pace Minneapolis for digestion and analysis.

C. Sample Digestion and Analysis Methods

Approximately 1 gram of the fine fraction (<250 µm) samples were digested and 1 gram of the re-sieved fine fraction (<150 µm) samples will be digested according to a modified US EPA Method 3050B, and arsenic and lead concentrations will be determined per US EPA Method 6020A (inductively coupled plasma mass spectrometry [ICP-MS]).

D. Quality Control

Quality assurance/quality control (QA/QC) will be performed in accordance with the BSB and Atlantic Richfield Company, 2021. Residential Metals Abatement Program (RMAP) Quality Assurance Project Plan (Non-Residential Parcels) (QAPP) for the 150 µm re-sieved sample aliquots using the same procedures as originally performed for the 250 µm samples.

Laboratory QC samples will be analyzed in addition to the calibration samples with each QC batch. Laboratory QC samples will be introduced into the measurement process to evaluate laboratory performance and sample measurement bias.

Laboratory blanks, laboratory control samples, analytical duplicates, serial dilutions, and pairs of matrix spike/matrix spike duplicate (MS/MSD) samples will be analyzed in each laboratory QC batch with a minimum frequency of one set for each SDG of a maximum of 20 field samples.

E. Storage Stability

The holding time for arsenic and lead in soil samples is 6 months in accordance with Table 3-2 of SW-846 Chapter 3. Stability of metals may be extended based on US EPA approval.

DATA ANALYSIS

Validated analytical data will be used to determine if there is a significant difference in lead and/or arsenic concentrations between the two particle size fractions. Paired analytical results for the 250 µm and 150 µm sieved portions of each sample will be statistically compared using paired t-tests or the nonparametric equivalent (depending on the data distributions). The statistical analysis will test the null hypothesis that lead or arsenic concentrations in the 150 µm sieved sample portions are equal to the lead or arsenic concentrations in the 250 µm sieved sample portions, using a two-sided test. Alpha will be set equal to 0.05; if the p-value is less than 0.05, the null hypothesis will be rejected. If the null hypothesis is rejected, i.e., the two-sided test indicates that the two populations are not equal, then a one-sided test will be used to test the null hypothesis that analyte concentrations in the 250 µm sieved fraction are less than or equal to concentrations in the 150 µm sieved fraction. The results of the hypothesis testing will be used to determine if there is lead and/or arsenic enrichment in 150 µm sieved fraction compared to the 250 µm sieved fraction.

REFERENCES

BSB and Atlantic Richfield Company, 2020. Revised Final Multi-Pathway Residential Metals Abatement Program (RMAP) Plan. Priority Soils Operable Unit Silver Bow Creek/Butte Area, National Priorities List Site, Butte, Montana. Butte-Silver Bow County and Atlantic Richfield Company, November 2020.

BSB and Atlantic Richfield Company, 2021. Residential Metals Abatement Program (RMAP) Quality Assurance Project Plan (QAPP) (Non-Residential Parcels).

US EPA Guidance (EPA OLEM Directive 9200.1-128) “Recommendations for Sieving Soil and Dust Samples at Lead Sites for Assessment of Incidental Ingestion,” July 2016.

Pace Analytical Standard Operating Procedure “Soil Sieve” ENV-SOP-GBAY-0164, April 2021.

US EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods, SW-846, Third Edition. Method 3050B and Method 6020A.

Table 1
Sample Identifications and Remaining Mass for Resieving

Table 1
Resieving Study - List of Samples for Reprocessing

two batches from these 23 samples

SAMPLE_NAME	SAMPLE_DATE	LAB_SAMPLE_ID	DILUTION_FACTOR	REPORT_RESULT_VALUE	REPORT_RESULT_UNIT	REPORT_RESULT_LIMIT	REPORT_METHOD_DETECTION_LIMIT	Mass of 250um sieve portion remaining (g) for resieving to 150 um	Original Sieved Amount less than #60 Sieve	Initial weight from ICPMS Prep Log
S-S-0009-GA3-3	8/2/2021	10573125017	10	5220	MG/KG	1.8	0.27	34.59	35.68	1.09
S-S-0009-GA5-3	8/3/2021	10573125029	10	2370	MG/KG	1.9	0.29	48.81	49.84	1.03
S-S-0019-PA4-3	8/10/2021	10574183037	10	2230	MG/KG	1.9	0.28	20.51	21.52	1.01
S-S-0009-GA7-2	8/3/2021	10573129001	10	2090	MG/KG	1.8	0.27	20.87	21.96	1.09
S-S-0019-PA6-3	8/10/2021	10574185037	5	1940	MG/KG	0.95	0.14	16.1	17.15	1.05
S-S-0009-GA5-1	8/3/2021	10573125025	10	1840	MG/KG	1.9	0.29	26.91	27.94	1.03
S-S-0009-GA5-2	8/3/2021	10573125027	10	1790	MG/KG	1.9	0.27	23.88	24.95	1.07
S-S-0013-PA1-1	7/20/2021	10571071005	10	1730	MG/KG	1.9	0.27	62.63	63.71	1.08
S-S-0009-GA3-2	8/2/2021	10573125015	10	1520	MG/KG	2.0	0.29	38.64	39.66	1.02
S-S-0019-HA1-1	8/10/2021	10574185001	10	1500	MG/KG	1.9	0.28	18.62	19.68	1.06
S-S-0019-GA3-3	8/9/2021	10574183013	10	1490	MG/KG	2.0	0.29	25.93	26.94	1.01
S-S-0019-PA4-2	8/10/2021	10574183035	10	1410	MG/KG	1.9	0.28	20.52	21.56	1.04
S-S-0019-HA2-3	8/9/2021	10574185013	10	1400	MG/KG	1.9	0.27	30.3	31.37	1.07
S-S-0015-GA5-3	7/23/2021	10571701005	5	1350	MG/KG	0.99	0.15	122.6	123.61	1.01
S-S-0013-PA1-2	7/20/2021	10571071007	10	1340	MG/KG	2.0	0.29	34.9	35.91	1.01
S-S-0013-PA1-3	7/20/2021	10571071009	10	1340	MG/KG	1.9	0.27	42.55	43.63	1.08
S-S-0019-HA3-1	8/9/2021	10574185015	10	1320	MG/KG	1.9	0.28	35.47	36.52	1.05
S-S-0009-HA2-D-3	8/3/2021	10573129035	10	1280	MG/KG	1.8	0.27	14.43	15.53	1.1
S-S-0019-HA4-3	8/9/2021	10574185025	5	1220	MG/KG	0.96	0.14	16.56	17.6	1.04
S-S-0009-GA2-SA1-1	11/11/2021	10587755005	20	2690	MG/KG	3.8	0.56	TBD		
S-S-0009-GA2-SA1-2	11/11/2021	10587755007	20	2610	MG/KG	3.8	0.55	TBD		
S-S-0009-GA2-SA1-3	11/11/2021	10587755008	20	2820	MG/KG	3.7	0.54	TBD		
S-S-0009-GA2-SA1-D-1	11/11/2021	10587755006	20	3100	MG/KG	3.8	0.56	TBD		
S-S-0009-GA17-3	8/4/2021	10573145033	10	1130	MG/KG	1.9	0.28	13.76	14.81	1.05
S-S-0016-HA1-2	7/22/2021	10571701011	5	1120	MG/KG	1.0	0.15	34.21	35.21	1
S-S-0005-LA4-3	7/16/2021	10570536023	5	1100	MG/KG	0.95	0.14	35.18	36.23	1.05
S-S-0009-HA2-3	8/3/2021	10573129033	10	1070	MG/KG	1.9	0.28	15.96	17	1.04
S-S-0019-HA1-2	8/10/2021	10574185003	10	1060	MG/KG	1.9	0.28	29.93	30.97	1.04
S-S-0009-GA18-3	8/4/2021	10573145039	10	1040	MG/KG	2.0	0.29	17.97	18.99	1.02
S-S-0019-HA5-2	8/9/2021	10574185029	5	1030	MG/KG	0.97	0.14	16.42	17.45	1.03
S-S-0014-PA2-1	7/21/2021	10571704009	10	1020	MG/KG	1.9	0.28	17.96	19.02	1.06
S-S-0005-GA2-3	7/15/2021	10570541017	5	851	MG/KG	0.99	0.15	25.76	26.77	1.01
S-S-0019-HA5-3	8/9/2021	10574185031	5	849	MG/KG	0.93	0.14	21.92	22.99	1.07
S-S-0015-GA5-D-1	7/23/2021	10571701007	1	843	MG/KG	0.19	0.028	100.55	101.6	1.05
S-S-0011-HA1-2	7/22/2021	10571703019	5	810	MG/KG	0.98	0.14	29.36	30.38	1.02
S-S-0011-HA1-1	7/22/2021	10571703017	5	798	MG/KG	0.94	0.14	48.21	49.27	1.06
S-S-0007-LA1-2	7/27/2021	10572097009	5	759	MG/KG	0.96	0.14	85.23	86.27	1.04
S-S-0019-HA1-3	8/10/2021	10574185007	1	732	MG/KG	0.19	0.028	15.16	16.22	1.06
S-S-0014-PA3-3	7/21/2021	10571704019	1	731	MG/KG	0.19	0.027	26.07	27.15	1.08
S-S-0019-HA3-3	8/9/2021	10574185019	1	701	MG/KG	0.20	0.029	21.78	22.8	1.02
S-S-0009-GA14-3	8/3/2021	10573145015	10	671	MG/KG	2.0	0.29	14.45	15.47	1.02
S-S-0009-HA2-2	8/3/2021	10573129031	10	660	MG/KG	1.8	0.27	10.01	11.11	1.1
S-S-0007-LA2-3	7/27/2021	10572097019	5	632	MG/KG	0.94	0.14	75.69	76.75	1.06
S-S-0014-PA2-2	7/21/2021	10571704011	1	631	MG/KG	0.19	0.027	30.15	31.22	1.07
S-S-0013-PA2-2	7/20/2021	10571071013	5	619	MG/KG	0.94	0.14	20.09	21.15	1.06
S-S-0014-GA1-3	7/21/2021	10571704037	1	613	MG/KG	0.19	0.027	39.81	40.89	1.08
S-S-0007-LA1-1	7/27/2021	10572097007	5	580	MG/KG	0.95	0.14	143.53	144.58	1.05
S-S-0019-HA2-2	8/9/2021	10574185011	1	572	MG/KG	0.19	0.027	59.55	60.62	1.07
S-S-0019-PA3-1	8/10/2021	10574183027	10	558	MG/KG	2.0	0.29	27.72	28.73	1.01
S-S-0005-GA2-2	7/15/2021	10570541015	5	553	MG/KG	1.0	0.15	34.26	35.26	1
S-S-0011-G1-3	7/23/2021	10571703011	5	553	MG/KG	0.92	0.13	54.26	55.35	1.09
S-S-0005-GA7-3	7/15/2021	10570540039	5	547	MG/KG	0.92	0.13	100.57	101.66	1.09
S-S-0013-PA2-1	7/20/2021	10571071011	5	534	MG/KG	0.96	0.14	17.78	18.82	1.04
S-S-0019-PA1-3	8/10/2021	10574183019	10	529	MG/KG	2.0	0.29	14.1	15.12	1.02
S-S-0011-G1-4	7/23/2021	10571703013	5	527	MG/KG	0.93	0.14	71.1	72.17	1.07
S-S-0012-HA1-3	7/22/2021	10571703039	5	506	MG/KG	0.97	0.14	49.99	51.02	1.03
S-S-0011-HA1-3	7/22/2021	10571703021	5	489	MG/KG	0.95	0.14	20.16	21.21	1.05
S-S-0020-GA2-2	8/9/2021	10573770015	1	440	MG/KG	0.20	0.029	62.7	63.71	1.01
S-S-0016-HA1-3	7/22/2021	10571701013	1	425	MG/KG	0.19	0.028	58.37	59.41	1.04
S-S-0020-G2-3	8/9/2021	10573776017	10	425	MG/KG	1.9	0.28	22.52	23.58	1.06
S-S-0014-GA1-2	7/21/2021	10571704035	1	408	MG/KG	0.20	0.029	46.05	47.06	1.01
S-S-0007-LA2-D-2	7/27/2021	10572097015	1	404	MG/KG	0.19	0.028	105.19	106.25	1.06
S-S-0005-GA9-2	7/15/2021	10570540017	5	401	MG/KG	0.99	0.15	42.95	43.96	1.01

Table 1
Resieving Study - List of Samples for Reprocessing

SAMPLE_NAME	SAMPLE_DATE	LAB_SAMPLE_ID	DILUTION_FACTOR	REPORT_RESULT_VALUE	REPORT_RESULT_UNIT	REPORT_RESULT_LIMIT	REPORT_METHOD_DETECTION_LIMIT	Mass of 250um sieve portion remaining (g) for resieving to 150 um	Original Sieved Amount less than #60 Sieve	Initial weight from ICPMS Prep Log
S-S-0020-GA2-1	8/9/2021	10573770013	1	388	MG/KG	0.19	0.029	35.47	36.5	1.03
S-S-0009-GA10-2	8/3/2021	10573129019	1	384	MG/KG	0.19	0.028	22.46	23.52	1.06
S-S-0005-G4-4	7/16/2021	10570539027	5	376	MG/KG	1.0	0.15	28.11	29.11	1
S-S-0019-PA2-1	8/10/2021	10574183021	1	367	MG/KG	0.19	0.029	22.71	23.74	1.03
S-S-0011-G1-1	7/23/2021	10571703007	5	361	MG/KG	0.99	0.15	54.06	55.07	1.01
S-S-0009-GA10-3	8/3/2021	10573129021	1	357	MG/KG	0.19	0.028	12.85	13.89	1.04
S-S-0007-GA6-D-3	7/26/2021	10572094013	1	336	MG/KG	0.19	0.029	6.25	7.28	1.03
S-S-0007-GA6-3	7/26/2021	10572094011	1	324	MG/KG	0.20	0.029	6.71	7.71	1
S-S-0014-PA5-3	7/21/2021	10571704031	1	306	MG/KG	0.19	0.028	16.89	17.95	1.06
S-S-0014-PA5-2	7/21/2021	10571704029	1	296	MG/KG	0.19	0.029	12.22	13.25	1.03
S-S-0005-G3-5	7/16/2021	10570538003	5	236	MG/KG	1.0	0.15	18.9	19.9	1
S-S-0012-G1-3	7/23/2021	10571703029	5	232	MG/KG	1.0	0.15	25.3	26.3	1
S-S-0020-GA2-3	8/9/2021	10573770017	1	206	MG/KG	0.18	0.027	15.85	16.94	1.09
S-S-0005-G3-4	7/16/2021	10570538001	5	193	MG/KG	0.98	0.14	27.94	28.96	1.02
S-S-0019-PA1-2	8/10/2021	10574183017	1	172	MG/KG	0.20	0.029	48.83	49.85	1.02
S-S-0012-G1-2	7/23/2021	10571703025	5	146	MG/KG	0.99	0.15	23.74	24.75	1.01
S-S-0016-GA2-1	7/19/2021	10571070021	1	127	MG/KG	0.19	0.027	69.82	70.9	1.08
S-S-0002-GA2-3	7/21/2021	10571072039	1	125	MG/KG	0.20	0.029	48.27	49.29	1.02
S-S-0010-GA2-2	8/9/2021	10574180009	1	117	MG/KG	0.19	0.028	169.14	170.19	1.05
S-S-0006-GA10-2	7/28/2021	10572112035	1	114	MG/KG	0.19	0.028	50.14	51.18	1.04
S-S-0008-HA2-3	8/5/2021	10573759007	1	113	MG/KG	0.19	0.028	148.97	150.02	1.05
S-S-0008-HA1-3	8/5/2021	10573757039	1	111	MG/KG	0.20	0.029	15.7	16.71	1.01
S-S-0017-HA8-1	8/5/2021	10573765005	1	104	MG/KG	0.20	0.029	27.19	28.21	1.02
S-S-0003-GA3-2	7/19/2021	10570542025	5	103	MG/KG	0.93	0.14	45.71	46.79	1.08
S-S-0017-HA8-2	8/5/2021	10573765007	1	99	MG/KG	0.19	0.029	22.85	23.88	1.03
S-S-0006-GA10-3	7/28/2021	10572112037	1	97.7	MG/KG	0.19	0.029	51.52	52.55	1.03
S-S-0004-GA43-1	7/27/2021	10572110013	1	95.3	MG/KG	0.20	0.029	82.57	83.59	1.02
S-S-0002-LA3-1	7/22/2021	10571695031	1	90.1	MG/KG	0.20	0.029	135.48	136.49	1.01
S-S-0016-GA1-3	7/19/2021	10571070019	1	89.9	MG/KG	0.19	0.027	49.78	50.85	1.07
S-S-0015-GA13-2	7/21/2021	10571071033	1	79.6	MG/KG	0.18	0.027	102.02	103.12	1.1
S-S-0015-GA13-1	7/21/2021	10571071031	1	76.6	MG/KG	0.19	0.027	138.88	139.95	1.07
S-S-0003-GA3-3	7/19/2021	10570542027	5	73.6	MG/KG	1.0	0.15	48.37	49.37	1
S-S-0010-GA2-3	8/9/2021	10574180011	1	72.6	MG/KG	0.19	0.029	129.31	130.34	1.03
S-S-0018-GA14-2	7/14/2021	10569905011	5	65.7	MG/KG	0.94	0.14	87.07	88.13	1.06
S-S-0018-GA15-1	7/14/2021	10569905001	5	65.4	MG/KG	0.94	0.14	85.9	86.96	1.06
S-P-0001-GA15-1	7/29/2021	10572664009	1	63	MG/KG	0.20	0.029	40.44	41.46	1.02
S-P-0001-GA36-1	8/3/2021	10573147029	1	61.5	MG/KG	0.19	0.028	97.68	98.73	1.05
S-P-0001-GA37-1	8/2/2021	10572671023	1	58.6	MG/KG	0.19	0.028	28.2	29.26	1.06
S-S-0004-GA43-2	7/27/2021	10572110015	1	58.3	MG/KG	0.19	0.028	81.1	82.15	1.05
S-P-0001-GA15-2	7/29/2021	10572664011	1	51	MG/KG	0.19	0.028	47.4	48.45	1.05
S-S-0003-GA1-2	7/20/2021	10571041035	5	48.5	MG/KG	0.99	0.15	17.77	18.78	1.01
S-S-0018-GA15-2	7/14/2021	10569905003	5	48.1	MG/KG	0.95	0.14	128.09	129.14	1.05
S-S-0008-GA18-2	8/4/2021	10573754031	1	47.9	MG/KG	0.19	0.028	30.12	31.16	1.04
S-P-0001-GA11-1	7/29/2021	10572663023	1	43.7	MG/KG	0.20	0.029	22.76	23.78	1.02
S-S-0014-HA2-1	7/21/2021	10571701035	1	40.3	MG/KG	0.20	0.029	51.25	52.25	1
S-S-0017-OP1-2	8/5/2021	10573768003	1	39.9	MG/KG	0.20	0.029	47.51	48.52	1.01
S-S-0015-GA4-1	7/20/2021	10571065001	5	35.9	MG/KG	0.91	0.13	153.56	154.66	1.1
S-S-0005-OP2-3	7/16/2021	10570537023	5	35	MG/KG	0.93	0.14	23.12	24.2	1.08
S-S-0007-LA3-3	7/27/2021	10572097025	1	33	MG/KG	0.19	0.027	24.56	25.64	1.08
S-S-0012-G1-4	7/23/2021	10571703031	5	32	MG/KG	0.97	0.14	11.61	12.64	1.03
S-S-0002-LA2-2	7/22/2021	10571695027	1	30.6	MG/KG	0.19	0.028	101.29	102.34	1.05
S-S-0004-GA10-1	7/22/2021	10571684011	1	29.5	MG/KG	0.20	0.029	127.87	128.88	1.01
S-S-0016-G1-2	7/22/2021	10571701017	1	27.7	MG/KG	0.20	0.029	14.65	15.66	1.01
S-S-0006-G11-4	7/27/2021	10572099009	1	25.8	MG/KG	0.19	0.029	34.99	36.02	1.03
S-S-0002-GA11-1	7/22/2021	10571694025	1	25.1	MG/KG	0.20	0.029	14.85	15.87	1.02
S-S-0020-G1-5	8/9/2021	10573776009	1	20.2	MG/KG	0.19	0.027	37.2	38.27	1.07
S-S-0010-HA2-3	8/10/2021	10574182019	1	17.7	MG/KG	0.18	0.027	38.22	39.31	1.09
S-P-0001-GA16-3	7/29/2021	10572664019	1	16.4	MG/KG	0.19	0.028	21.18	22.22	1.04
S-S-0015-G3-5	7/20/2021	10571067039	5	11.3	MG/KG	0.99	0.15	117.92	118.93	1.01
S-S-0017-PA1-3	8/5/2021	10573768037	1	6.9	MG/KG	0.19	0.028	10.99	12.04	1.05

Color Coding for Sample Delivery Group Designation