



Monday, July 30, 2018

Karen Waters-Husted  
CH2M HILL Plateau Remediation Company  
825 Jadwin Avenue  
Richland, WA 99352

Re: ALS Workorder: 1806686  
Project Name: 100-N Apatite Barrier, June 20  
Project Number: I18-012

Dear Ms. Waters-Husted:

Four water samples were received from CH2M HILL Plateau Remediation Company, on 6/27/2018. The samples were scheduled for the following analysis:

Metals

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the method employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental  
Katie M. O'Brien  
Project Manager

We certify that this data package is in compliance with the SOW, both technically and for completeness, including a full description of, explanation of, and corrective actions for, any and all deviations, from either the analyses requested or the case narrative requested. Release of the data contained in this hard copy data package has been authorized by the Laboratory Analytical Manager (or designee) and the laboratory's client services representative as verified by their signatures on this report.

# ALS -- Fort Collins

## Sample Number(s) Cross-Reference Table

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**OrderNum:** 1806686

**Client Name:** CH2M HILL Plateau Remediation Company

**Client Project Name:** 100-N Apatite Barrier, June 20

**Client Project Number:** I18-012

**Client PO Number:** BOA 54854

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Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
B3J902	1806686-1		WATER	26-Jun-18	11:47
B3J846	1806686-2		WATER	26-Jun-18	11:47
B3J847	1806686-3		WATER	26-Jun-18	11:47
B3J903	1806686-4		WATER	26-Jun-18	11:47

<b>Collector:</b> Larry Rosana JCHPRC	<b>Contact/Requester:</b> Karen Waters-Husted	<b>Telephone No.:</b> 509-376-4650
<b>SAF No.:</b> I18-012	<b>Sampling Origin:</b> Hanford Site	<b>Purchase Order/Charge Code:</b> 300071
<b>Project Title:</b> 100-N Apatite Barrier, June 20	<b>Logbook No.:</b> HNF-N-506 <span style="font-size: 1.5em;">100/54</span>	<b>Ice Chest No.:</b> <span style="font-size: 1.5em;">GWS-595</span>
<b>Shipped To (Lab):</b> ALS Environmental Ft. Collins	<b>Method of Shipment:</b> Commercial Carrier	<b>Bill of Lading/Air Bill No.:</b> <span style="font-size: 1.5em;">772572242713</span>
<b>Protocol:</b> CERCLA	<b>Priority:</b> 30 Days	<b>Offsite Property No.:</b> <span style="font-size: 1.5em;">9219</span>

**POSSIBLE SAMPLE HAZARDS/REMARK**  
 \*\* \*\* Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1

**SPECIAL INSTRUCTIONS**  
 N/A

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
1 B3J902	N	W	<span style="font-size: 1.2em;">6-26-18</span>	<span style="font-size: 1.2em;">1147</span>	1x500-mL G/P	6010_METALS_ICP: GW 04; 6020_METALS_ICPMS: GW 01	6 Months	HNO3 to pH <2
2 B3J846	Y	W	<span style="font-size: 1.2em;">6-26-18</span>	<span style="font-size: 1.2em;">1147</span>	1x500-mL G/P	6010_METALS_ICP: GW 04; 6020_METALS_ICPMS: GW 01	6 Months	HNO3 to pH <2

ALS1806686  
7/30/2018

Relinquished By: <span style="font-size: 1.2em;">Larry Rosana</span> <small>JCHPRC</small> Print First and Last Name      Signature      Date/Time <span style="font-size: 1.2em;">JUN 26 2018 1225</span>	Received By: <span style="font-size: 1.2em;">Lesly Wall</span> <small>JCHPRC</small> Print First and Last Name      Signature      Date/Time <span style="font-size: 1.2em;">JUN 26 2018 1225</span>	<b>Matrix *</b> S = Soil      DS = Drum Solids SE = Sediment      DL = Drum Liquid SO = Solid      T = Tissue SL = Sludge      WI = Wipe W = Water      L = Liquid O = Oil      V = Vegetation A = Air      X = Other
Relinquished By: <span style="font-size: 1.2em;">Lesly Wall</span> <small>JCHPRC</small> Print First and Last Name      Signature      Date/Time <span style="font-size: 1.2em;">JUN 26 2018 1400</span>	Received By: <b>FEDEX</b> Print First and Last Name      Signature      Date/Time	
Relinquished By: <span style="font-size: 1.2em;">Fed Ex</span> Print First and Last Name      Signature      Date/Time	Received By: <span style="font-size: 1.2em;">Nick Jostes</span> Print First and Last Name      Signature      Date/Time <span style="font-size: 1.2em;">6/27/18 10:25</span>	
Relinquished By: Print First and Last Name      Signature      Date/Time	Received By: Print First and Last Name      Signature      Date/Time	

<b>FINAL SAMPLE DISPOSITION</b>	Disposal Method (e.g., Return to customer, per lab procedure, used in process):	Disposed By:	Date/Time:
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30129

REV.0

1806686

<b>CH2MHill Plateau Remediation Company</b>	<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>	C.O.C. # <b>I18-012-021</b>
		Page 1 of 1

<b>Collector:</b> Larry Rosane /CHPRC	<b>Contact/Requester:</b> Karen Waters-Husted	<b>Telephone No.:</b> 509-376-4650
<b>SAF No.:</b> I18-012	<b>Sampling Origin:</b> Hanford Site	<b>Purchase Order/Charge Code:</b> 300071
<b>Project Title:</b> 100-N Apatite Barrier, June 20	<b>Logbook No.:</b> HNF-N-506 <i>100/54</i>	<b>Ice Chest No.:</b> <i>6WS-595</i>
<b>Shipped To (Lab):</b> ALS Environmental Ft. Collins	<b>Method of Shipment:</b> Commercial Carrier	<b>Bill of Lading/Air Bill No.:</b> <i>77257224273</i>
<b>Protocol:</b> CERCLA	<b>Priority:</b> 30 Days	<b>Offsite Property No.:</b> <i>9619</i>

**POSSIBLE SAMPLE HAZARDS/REMARK**  
 \*\* \*\* Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1

**SPECIAL INSTRUCTIONS**  
 N/A

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B3J847	Y	W	<i>6-26-18</i>	<i>1147</i>	1x500-mL G/P	6010_METALS_ICP: GW 04; 6020_METALS_ICPMS: GW 01	6 Months	HNO3 to pH <2
B3J903	N	W	<i>6-26-18</i>	<i>1147</i>	1x500-mL G/P	6010_METALS_ICP: GW 04; 6020_METALS_ICPMS: GW 01	6 Months	HNO3 to pH <2

ALS1806686  
7/30/2018

Relinquished By: <i>Larry Rosane</i> JUN 26 2018 <i>1225</i> <small>Print First and Last Name Signature Date/Time</small>	Received By: <i>Leahy Wall</i> JUN 26 2018 <i>1225</i> <small>Print First and Last Name Signature Date/Time</small>	<b>Matrix *</b> S = Soil      DS = Drum Solids SE = Sediment    DL = Drum Liquid SO = Solid      T = Tissue SL = Sludge      WI = Wipe W = Water        L = Liquid O = Oil            V = Vegetation A = Air            X = Other	
Relinquished By: <i>Leahy Wall</i> JUN 26 2018 <i>1400</i> <small>Print First and Last Name Signature Date/Time</small>	Received By: <b>FEDEX</b> <small>Print First and Last Name Signature Date/Time</small>		
Relinquished By: <i>FedEx</i> <small>Print First and Last Name Signature Date/Time</small>	Received By: <i>Nick Jostes</i> JUN 27 2018 <i>10:25</i> <small>Print First and Last Name Signature Date/Time</small>		
Relinquished By: _____ <small>Print First and Last Name Signature Date/Time</small>	Received By: _____ <small>Print First and Last Name Signature Date/Time</small>		
<b>FINAL SAMPLE DISPOSITION</b>	Disposal Method (e.g., Return to customer, per lab procedure, used in process):	Disposed By:	Date/Time:

4 0129

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ALS Environmental - Fort Collins  
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: CHPRC

Workorder No: 1806686

Project Manager: KO

Initials: NJ Date: 6/27/18

1. Does this project require any special handling in addition to standard ALS procedures?		YES	<input checked="" type="radio"/> NO
2. Are custody seals on shipping containers intact?	NONE	<input checked="" type="radio"/> YES	NO
3. Are Custody seals on sample containers intact?	NONE	<input checked="" type="radio"/> YES	NO
4. Is there a COC (Chain-of-Custody) present or other representative documents?		<input checked="" type="radio"/> YES	NO
5. Are the COC and bottle labels complete and legible?		<input checked="" type="radio"/> YES	NO
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		<input checked="" type="radio"/> YES	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	<input checked="" type="radio"/> YES	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	<input checked="" type="radio"/> YES	NO
9. Are all aqueous non-preserved samples pH 4-9?	<input checked="" type="radio"/> N/A	YES	NO
10. Is there sufficient sample for the requested analyses?		<input checked="" type="radio"/> YES	NO
11. Were all samples placed in the proper containers for the requested analyses?		<input checked="" type="radio"/> YES	NO
12. Are all samples within holding times for the requested analyses?		<input checked="" type="radio"/> YES	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		<input checked="" type="radio"/> YES	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ___ < green pea ___ > green pea	<input checked="" type="radio"/> N/A	YES	NO
15. Do any water samples contain sediment? Amount of sediment: ___ dusting ___ moderate ___ heavy	Amount N/A	YES	<input checked="" type="radio"/> NO
16. Were the samples shipped on ice?		YES	<input checked="" type="radio"/> NO
17. Were cooler temperatures measured at 0.1-6.0°C?	IR gun used*: #1 #3 #4	RAD ONLY YES	<input checked="" type="radio"/> NO
Cooler #: <u>1</u>			
Temperature (°C): <u>Amb</u>			
No. of custody seals on cooler: <u>2</u>			
External µR/hr reading: <u>12</u>			
Background µR/hr reading: <u>12</u>			
Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? YES / NO / NA (If no, see Form 008.)			

DOT Survey/ Acceptance Information

**Additional Information:** PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

If applicable, was the client contacted? YES / NO / NA Contact: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Project Manager Signature / Date: [Signature] 6/29/18

1806686

ORIGIN ID:PSCA (509) 528-9426  
LESLY WALL  
CH2M  
6267 LATAH ST.  
6269 LATAH ST.  
RICHLAND, WA 99354  
UNITED STATES US

SHIP DATE: 26 JUN 18  
ACTWGT: 22.00 LB  
CAD: 107066051/INET3980

BILL THIRD PARTY

TO JULIE ELLINGSON  
ALS GLOBAL  
225 COMMERCE DRIVE

FORT COLLINS CO 80524

(970) 490-1511

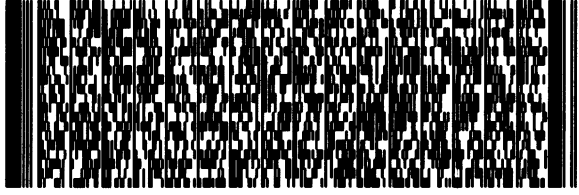
REF: 9619

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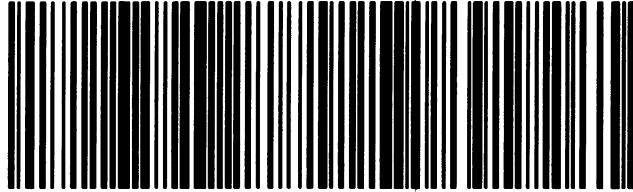
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WED - 27 JUN 10:30A  
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TRK# 7725 7224 2713  
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# Metals

## Case Narrative

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### **CH2M HILL Plateau Remediation Company**

100-N Apatite Barrier, June 20 – I18-012

Work Order Number: 1806686

1. The samples were prepared and analyzed based on SW-846, 3<sup>rd</sup> Edition procedures.

For analysis by Trace ICP and ICP-MS, the samples were digested following method 3005A and the current revision of SOP 806.

2. Analysis by ICP-MS followed method 6020A and the current revision of SOP 827.

Analysis by Trace ICP followed method 6010B and the current revision of SOP 834.

3. All standards and solutions are NIST traceable and were used within their recommended shelf life.
4. The samples were prepared and analyzed within the established hold time.

All in house quality control procedures were followed, as described below.

5. General quality control procedures.
  - A preparation (method) blank and laboratory control sample were digested and analyzed with the samples in this digestion batch.
  - The preparation (method) blank associated with this digestion batch was below the reporting limit for the requested analytes. Sample results have been compared to the blank results and are flagged as appropriate. Chromium, iron, potassium and sodium were detected above the MDL.
  - All laboratory control sample criteria were met.
  - All initial and continuing calibration blanks were below the reporting limit for the requested analytes.



- All initial and continuing calibration verifications were within the acceptance criteria for the requested analytes.
- The interference check samples and high standard read-backs associated with Method 6010B were within acceptance criteria.
- The interference check samples associated with Method 6020A were analyzed.

6. Matrix specific quality control procedures.

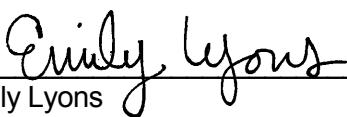
Sample 1806511-1 was designated as the quality control sample for each analysis. Results for the shared quality control samples are included at the client's request.

Similarity of matrix and therefore relevance of the QC results should not be automatically inferred for any sample other than the native sample selected for QC.

- A matrix spike and matrix spike duplicate were digested and analyzed with each batch. All acceptance criteria for accuracy were met.
- A sample duplicate and matrix spike duplicate were digested and analyzed with each batch. All acceptance criteria for precision were met.
- A serial dilution was analyzed with this ICP batch. All acceptance criteria were met with.

7. It is a standard practice that samples for ICP-MS are analyzed at a dilution. The 10X factor can be considered an artifact of the prep and does not indicate a secondary dilution and is therefore not flagged as a dilution.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

  
\_\_\_\_\_  
Emily Lyons  
Inorganics Primary Data Reviewer

7/29/18  
Date

  
\_\_\_\_\_  
Inorganics Final Data Reviewer

7/30/18  
Date



### Inorganic Data Reporting Qualifiers

The following qualifiers are used as needed by the laboratory when reporting results of inorganic analyses.

- Result qualifier -- A “B” is entered if the reported value was obtained from a reading that was less than the Reporting Limit but greater than or equal to the Method Detection Limit (MDL). If the analyte was analyzed for but not detected a “U” is entered. For samples, negative values are reported as non-detects (“U” flagged). For blanks, if the absolute value of the negative value is above the MDL and below the reporting limit, then the result is “B” flagged.
- QC qualifier -- Specified entries and their meanings are as follows:
  - E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
  - M - Duplicate injection precision was not met.
  - N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
  - Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
  - \* - Duplicate analysis (relative percent difference) not within control limits.
  - S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.
  - C - The analyte was detected in both the sample and the associated QC blank, and the sample concentration was  $\leq 20X$  the blank concentration.
  - D - Analyte was reported at a secondary dilution factor, typically  $DF > 1$  (i.e., the primary preparation required dilution to either bring the analyte within the calibration range or to minimize interference). Required for organics/wetchem if the sample was diluted.

# Total Recoverable ICP Metals

Method SW6010B

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Field ID:	B3J902
Lab ID:	1806686-1

Sample Matrix: WATER  
 % Moisture: N/A  
 Date Collected: 26-Jun-18  
 Date Extracted: 02-Jul-18  
 Date Analyzed: 05-Jul-18  
 Prep Method: SW3005 Rev A

Prep Batch: IP180702-10  
 QCBatchID: IP180702-10-2  
 Run ID: IT180705-1A5  
 Cleanup: NONE  
 Basis: As Received  
 File Name: 180705A.

Analyst: Steve Workman  
 Sample Aliquot: 50 ml  
 Final Volume: 50 ml  
 Result Units: UG/L  
 Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
7440-42-8	BORON	1	36	U	50	36
7440-70-2	CALCIUM	1	25000		1000	210
7439-89-6	IRON	1	30	U	50	30
7439-95-4	MAGNESIUM	1	5800		750	89
7440-09-7	POTASSIUM	1	1500	C	1000	130
7440-23-5	SODIUM	1	7700		500	38
7440-62-2	VANADIUM	1	2.9	B	10	0.43

Data Package ID: *IT1806686-1*

# Dissolved ICP Metals

Method SW6010B

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Field ID:	B3J846
Lab ID:	1806686-2

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 26-Jun-18

Date Extracted: 02-Jul-18

Date Analyzed: 05-Jul-18

Prep Method: SW3005 Rev A

Prep Batch: IP180702-10

QC Batch ID: IP180702-10-2

Run ID: IT180705-1A5

Cleanup: NONE

Basis: As Received

File Name: 180705A.

Analyst: Steve Workman

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: UG/L

Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
7440-42-8	BORON	1	36	U	50	36
7440-70-2	CALCIUM	1	25000		1000	210
7439-89-6	IRON	1	30	U	50	30
7439-95-4	MAGNESIUM	1	5800		750	89
7440-09-7	POTASSIUM	1	1400	C	1000	130
7440-23-5	SODIUM	1	7900		500	38
7440-62-2	VANADIUM	1	2.9	B	10	0.43

Data Package ID: IT1806686-1

# Dissolved ICP Metals

Method SW6010B

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Field ID:	B3J847
Lab ID:	1806686-3

Sample Matrix: WATER  
% Moisture: N/A  
Date Collected: 26-Jun-18  
Date Extracted: 02-Jul-18  
Date Analyzed: 05-Jul-18  
Prep Method: SW3005 Rev A

Prep Batch: IP180702-10  
QCBatchID: IP180702-10-2  
Run ID: IT180705-1A5  
Cleanup: NONE  
Basis: As Received  
File Name: 180705A.

Analyst: Steve Workman  
Sample Aliquot: 50 ml  
Final Volume: 50 ml  
Result Units: UG/L  
Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
7440-42-8	BORON	1	36	U	50	36
7440-70-2	CALCIUM	1	24000		1000	210
7439-89-6	IRON	1	30	U	50	30
7439-95-4	MAGNESIUM	1	5600		750	89
7440-09-7	POTASSIUM	1	1400	C	1000	130
7440-23-5	SODIUM	1	7500		500	38
7440-62-2	VANADIUM	1	2.2	B	10	0.43

Data Package ID: IT1806686-1

# Total Recoverable ICP Metals

Method SW6010B

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Field ID:	B3J903
Lab ID:	1806686-4

Sample Matrix: WATER  
 % Moisture: N/A  
 Date Collected: 26-Jun-18  
 Date Extracted: 02-Jul-18  
 Date Analyzed: 05-Jul-18  
 Prep Method: SW3005 Rev A

Prep Batch: IP180702-10  
 QCBatchID: IP180702-10-2  
 Run ID: IT180705-1A5  
 Cleanup: NONE  
 Basis: As Received  
 File Name: 180705A.

Analyst: Steve Workman  
 Sample Aliquot: 50 ml  
 Final Volume: 50 ml  
 Result Units: UG/L  
 Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
7440-42-8	BORON	1	36	U	50	36
7440-70-2	CALCIUM	1	25000		1000	210
7439-89-6	IRON	1	43	BC	50	30
7439-95-4	MAGNESIUM	1	5800		750	89
7440-09-7	POTASSIUM	1	1400	C	1000	130
7440-23-5	SODIUM	1	7800		500	38
7440-62-2	VANADIUM	1	2.2	B	10	0.43

Data Package ID: IT1806686-1

# Total Recoverable ICPMS Metals

## Method SW6020A

### Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Field ID:	B3J902
Lab ID:	1806686-1

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 26-Jun-18

Date Extracted: 02-Jul-18

Date Analyzed: 06-Jul-18

Prep Method: SW3005 Rev A

Prep Batch: IP180702-10

QC Batch ID: IP180702-10-1

Run ID: IM180706-10A4

Cleanup: NONE

Basis: As Received

File Name: 152SMPL\_

Analyst: Brent A. Stanfield

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: UG/L

Clean DF: 1

Analysis ReqCode: 6020\_METALS\_I

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
7429-90-5	ALUMINUM	10	320		100	10
7440-36-0	ANTIMONY	10	0.25	B	1	0.12
7440-38-2	ARSENIC	10	1.8	B	2	0.39
7440-39-3	BARIUM	10	16		5	0.56
7440-41-7	BERYLLIUM	10	0.054	U	0.5	0.054
7440-43-9	CADMIUM	10	0.083	U	2	0.083
7440-47-3	CHROMIUM	10	5.7	BC	10	0.46
7440-48-4	COBALT	10	0.11	U	5	0.11
7440-50-8	COPPER	10	0.32	U	8	0.32
7439-92-1	LEAD	10	0.079	U	2	0.079
7439-96-5	MANGANESE	10	5.8		5	0.36
7439-98-7	MOLYBDENUM	10	0.82	B	2	0.079
7440-02-0	NICKEL	10	1.7	B	20	0.92
7782-49-2	SELENIUM	10	0.65	U	10	0.65
7440-22-4	SILVER	10	0.029	U	0.5	0.029
7440-24-6	STRONTIUM	10	99		5	0.32
7440-28-0	THALLIUM	10	0.0041	U	0.1	0.0041
7440-29-1	THORIUM	10	0.016	U	0.2	0.016
7440-31-5	TIN	10	1.4	B	10	0.12
7440-61-1	URANIUM	10	0.21		0.1	0.0049
7440-66-6	ZINC	10	1.4	U	100	1.4

Data Package ID: IM1806686-1

# Dissolved ICPMS Metals

Method SW6020A

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Field ID:	B3J846
Lab ID:	1806686-2

Sample Matrix: WATER  
% Moisture: N/A  
Date Collected: 26-Jun-18  
Date Extracted: 02-Jul-18  
Date Analyzed: 07-Jul-18  
Prep Method: SW3005 Rev A

Prep Batch: IP180702-10  
QCBatchID: IP180702-10-1  
Run ID: IM180706-10A4  
Cleanup: NONE  
Basis: As Received  
File Name: 153SMPL\_

Analyst: Brent A. Stanfield  
Sample Aliquot: 50 ml  
Final Volume: 50 ml  
Result Units: UG/L  
Clean DF: 1

Analysis ReqCode: 6020\_METALS\_I

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
7429-90-5	ALUMINUM	10	270		100	10
7440-36-0	ANTIMONY	10	0.29	B	1	0.12
7440-38-2	ARSENIC	10	2.1		2	0.39
7440-39-3	BARIIUM	10	16		5	0.56
7440-41-7	BERYLLIUM	10	0.054	U	0.5	0.054
7440-43-9	CADMIUM	10	0.083	U	2	0.083
7440-47-3	CHROMIUM	10	6.8	BC	10	0.46
7440-48-4	COBALT	10	0.11	U	5	0.11
7440-50-8	COPPER	10	0.32	U	8	0.32
7439-92-1	LEAD	10	0.079	U	2	0.079
7439-96-5	MANGANESE	10	3.9	B	5	0.36
7439-98-7	MOLYBDENUM	10	0.85	B	2	0.079
7440-02-0	NICKEL	10	1.3	B	20	0.92
7782-49-2	SELENIUM	10	0.65	U	10	0.65
7440-22-4	SILVER	10	0.029	U	0.5	0.029
7440-24-6	STRONTIUM	10	99		5	0.32
7440-28-0	THALLIUM	10	0.0041	U	0.1	0.0041
7440-29-1	THORIUM	10	0.016	U	0.2	0.016
7440-31-5	TIN	10	0.77	B	10	0.12
7440-61-1	URANIUM	10	0.19		0.1	0.0049
7440-66-6	ZINC	10	1.4	U	100	1.4

Data Package ID: IM1806686-1

# Dissolved ICPMS Metals

Method SW6020A

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Field ID:	B3J847
Lab ID:	1806686-3

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 26-Jun-18

Date Extracted: 02-Jul-18

Date Analyzed: 07-Jul-18

Prep Method: SW3005 Rev A

Prep Batch: IP180702-10

QC Batch ID: IP180702-10-1

Run ID: IM180706-10A4

Cleanup: NONE

Basis: As Received

File Name: 154SMPL\_

Analyst: Brent A. Stanfield

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: UG/L

Clean DF: 1

Analysis ReqCode: 6020\_METALS\_I

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
7429-90-5	ALUMINUM	10	10	U	100	10
7440-36-0	ANTIMONY	10	0.38	B	1	0.12
7440-38-2	ARSENIC	10	1.8	B	2	0.39
7440-39-3	BARIUM	10	17		5	0.56
7440-41-7	BERYLLIUM	10	0.054	U	0.5	0.054
7440-43-9	CADMIUM	10	0.083	U	2	0.083
7440-47-3	CHROMIUM	10	4.1	BC	10	0.46
7440-48-4	COBALT	10	0.16	B	5	0.11
7440-50-8	COPPER	10	0.32	U	8	0.32
7439-92-1	LEAD	10	0.079	U	2	0.079
7439-96-5	MANGANESE	10	1.4	B	5	0.36
7439-98-7	MOLYBDENUM	10	0.87	B	2	0.079
7440-02-0	NICKEL	10	0.92	U	20	0.92
7782-49-2	SELENIUM	10	0.65	U	10	0.65
7440-22-4	SILVER	10	0.029	U	0.5	0.029
7440-24-6	STRONTIUM	10	97		5	0.32
7440-28-0	THALLIUM	10	0.0041	U	0.1	0.0041
7440-29-1	THORIUM	10	0.016	U	0.2	0.016
7440-31-5	TIN	10	0.55	B	10	0.12
7440-61-1	URANIUM	10	0.2		0.1	0.0049
7440-66-6	ZINC	10	1.4	U	100	1.4

Data Package ID: IM1806686-1

# Total Recoverable ICPMS Metals

## Method SW6020A

### Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Field ID:	B3J903
Lab ID:	1806686-4

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 26-Jun-18

Date Extracted: 02-Jul-18

Date Analyzed: 07-Jul-18

Prep Method: SW3005 Rev A

Prep Batch: IP180702-10

QCBatchID: IP180702-10-1

Run ID: IM180706-10A4

Cleanup: NONE

Basis: As Received

File Name: 155SMPL\_

Analyst: Brent A. Stanfield

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: UG/L

Clean DF: 1

Analysis ReqCode: 6020\_METALS\_I

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
7429-90-5	ALUMINUM	10	10	U	100	10
7440-36-0	ANTIMONY	10	0.22	B	1	0.12
7440-38-2	ARSENIC	10	2.2		2	0.39
7440-39-3	BARIUM	10	19		5	0.56
7440-41-7	BERYLLIUM	10	0.054	U	0.5	0.054
7440-43-9	CADMIUM	10	0.083	U	2	0.083
7440-47-3	CHROMIUM	10	4.2	BC	10	0.46
7440-48-4	COBALT	10	0.11	U	5	0.11
7440-50-8	COPPER	10	0.32	U	8	0.32
7439-92-1	LEAD	10	0.079	U	2	0.079
7439-96-5	MANGANESE	10	6.8		5	0.36
7439-98-7	MOLYBDENUM	10	0.84	B	2	0.079
7440-02-0	NICKEL	10	0.92	U	20	0.92
7782-49-2	SELENIUM	10	0.65	U	10	0.65
7440-22-4	SILVER	10	0.029	U	0.5	0.029
7440-24-6	STRONTIUM	10	100		5	0.32
7440-28-0	THALLIUM	10	0.0041	U	0.1	0.0041
7440-29-1	THORIUM	10	0.02	B	0.2	0.016
7440-31-5	TIN	10	1.9	B	10	0.12
7440-61-1	URANIUM	10	0.2		0.1	0.0049
7440-66-6	ZINC	10	1.4	U	100	1.4

Data Package ID: IM1806686-1

# ICP Metals

Method SW6010B

Method Blank

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Lab ID: IP180702-10MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 02-Jul-18

Date Analyzed: 05-Jul-18

Prep Batch: IP180702-10

QCBatchID: IP180702-10-2

Run ID: IT180705-1A5

Cleanup: NONE

Basis: N/A

File Name: 180705A.

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: UG/L

Clean DF: 1

CASNO	Target Analyte	DF	Result	Result Qualifier	Reporting Limit	MDL
7440-42-8	BORON	1	36	U	50	36
7440-70-2	CALCIUM	1	210	U	1000	210
7439-89-6	IRON	1	33	B	50	30
7439-95-4	MAGNESIUM	1	89	U	750	89
7440-09-7	POTASSIUM	1	210	B	1000	130
7440-23-5	SODIUM	1	77	B	500	38
7440-62-2	VANADIUM	1	0.43	U	10	0.43

Data Package ID: IT1806686-1

# ICP Metals

## Method SW6010B Laboratory Control Sample

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Lab ID: IP180702-10LCS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 07/02/2018

Date Analyzed: 07/05/2018

Prep Method: SW3005A

Prep Batch: IP180702-10

QCBatchID: IP180702-10-2

Run ID: IT180705-1A5

Cleanup: NONE

Basis: N/A

File Name: 180705A.

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: UG/L

Clean DF: 1

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
7440-42-8	BORON	1000	972	50		97	80 - 120%
7440-70-2	CALCIUM	40000	40000	1000		100	80 - 120%
7439-89-6	IRON	1000	949	50		95	80 - 120%
7439-95-4	MAGNESIUM	40000	39800	750		99	80 - 120%
7440-09-7	POTASSIUM	40000	43300	1000		108	80 - 120%
7440-23-5	SODIUM	40000	41100	500		103	80 - 120%
7440-62-2	VANADIUM	500	508	10		102	80 - 120%

Data Package ID: IT1806686-1

# ICP Metals

Method SW6010B

## Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 I18-012

Field ID: SHARED QC LabID: 1806511-1MS	Sample Matrix: WATER % Moisture: N/A Date Collected: 20-Jun-18 Date Extracted: 02-Jul-18 Date Analyzed: 05-Jul-18 Prep Method: SW3005 Rev A	Prep Batch: IP180702-10 QCBatchID: IP180702-10-2 Run ID: IT180705-1A5 Cleanup: NONE Basis: As Received	Sample Aliquot: 50 ml Final Volume: 50 ml Result Units: UG/L File Name: 180705A.
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CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
7440-42-8	BORON	36	U	978		50	1000	98	80 - 120%
7440-70-2	CALCIUM	13000		51700		1000	40000	98	80 - 120%
7439-89-6	IRON	300	C	1270		50	1000	98	80 - 120%
7439-95-4	MAGNESIUM	2700		41800		750	40000	98	80 - 120%
7440-09-7	POTASSIUM	1200	C	45000		1000	40000	109	80 - 120%
7440-23-5	SODIUM	20000		62800		500	40000	106	80 - 120%
7440-62-2	VANADIUM	0.88	B	499		10	500	100	80 - 120%

Field ID: SHARED QC LabID: 1806511-1MSD	Sample Matrix: WATER % Moisture: N/A Date Collected: 20-Jun-18 Date Extracted: 02-Jul-18 Date Analyzed: 05-Jul-18 Prep Method: SW3005 Rev A	Prep Batch: IP180702-10 QCBatchID: IP180702-10-2 Run ID: IT180705-1A5 Cleanup: NONE Basis: As Received	Sample Aliquot: 50 ml Final Volume: 50 ml Result Units: UG/L File Name: 180705A.
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CASNO	Target Analyte	MSD Result	MSD Qual	Spike Added	MSD % Rec.	Reporting Limit	RPD Limit	RPD
7440-42-8	BORON	988		1000	99	50	20	1
7440-70-2	CALCIUM	52200		40000	99	1000	20	1
7439-89-6	IRON	1270		1000	98	50	20	0
7439-95-4	MAGNESIUM	42100		40000	99	750	20	1
7440-09-7	POTASSIUM	45500		40000	111	1000	20	1
7440-23-5	SODIUM	63800		40000	109	500	20	2
7440-62-2	VANADIUM	503		500	100	10	20	1

Data Package ID: IT1806686-1

# ICP Metals

Method SW6010

## Duplicate Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Field ID:	SHARED QC
Lab ID:	1806511-1D

Sample Matrix: WATER  
% Moisture: N/A  
Date Collected: 06/20/2018  
Date Extracted: 07/02/2018  
Date Analyzed: 07/05/2018

Prep Batch: IP180702-10  
QCBatchID: IP180702-10-2  
Run ID: IT180705-1A5  
Cleanup: NONE  
Basis: As Received  
File Name: 180705A.

Sample Aliquot: 50 ml  
Final Volume: 50 ml  
Result Units: UG/L  
Clean DF: 1

CASNO	Target Analyte	Sample Result	Samp Qual	Duplicate Result	Dup Qual	Reporting Limit	Dilution Factor	RPD	RPD Limit
7440-42-8	BORON	36	U	36	U	50	1		20
7440-70-2	CALCIUM	13000		12500		1000	1	0	20
7439-89-6	IRON	300	C	294	C	50	1	0	20
7439-95-4	MAGNESIUM	2700		2740		750	1		20
7440-09-7	POTASSIUM	1200	C	1220	C	1000	1		20
7440-23-5	SODIUM	20000		20100		500	1	1	20
7440-62-2	VANADIUM	0.88	B	2.29	B	10	1		20

Data Package ID: IT1806686-1

**Prep Batch ID: IP180702-10**

Start Date: 07/02/18

End Date: 07/02/18

Concentration Method: NONE

Batch Created By: AJL2

Start Time: 11:07

End Time: 18:00

Extract Method: SW3005A

Date Created: 07/02/18

Prep Analyst: Amanda J. Lynn

Initial Volume Units: ml

Time Created: 11:07

**Comments:**

Final Volume Units: ml

Validated By: AJL2

Date Validated: 07/02/18

Time Validated: 11:58

QC Batch ID: IP180702-10-2

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
IP180702-10	MB	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806511
IP180702-10	LCS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806511
1806511-1	MS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806511
1806511-1	MSD	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806511
1806511-1	DUP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806511
1806511-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806511
1806511-3	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806511
1806529-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806529
1806529-3	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806529
1806529-4	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806529
1806529-5	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806529
1806612-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806612
1806612-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806612
1806686-1	SMP	B3J902	WATER	6/26/2018	50	50	NONE	1	1806686
1806686-2	SMP	B3J846	WATER	6/26/2018	50	50	NONE	1	1806686
1806686-3	SMP	B3J847	WATER	6/26/2018	50	50	NONE	1	1806686
1806686-4	SMP	B3J903	WATER	6/26/2018	50	50	NONE	1	1806686

**QC Types**

CAR	Carrier reference sample	DUP	Laboratory Duplicate
LCS	Laboratory Control Sample	LCSD	Laboratory Control Sample Duplicat
MB	Method Blank	MS	Laboratory Matrix Spike
MSD	Laboratory Matrix Spike Duplicate	REP	Sample replicate
RVS	Reporting Level Verification Standar	SMP	Field Sample
SYS	Sample Yield Spike		

# ICPMS Metals

Method SW6020A

Method Blank

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Lab ID: IP180702-10MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 02-Jul-18

Date Analyzed: 06-Jul-18

Prep Batch: IP180702-10

QCBatchID: IP180702-10-1

Run ID: IM180706-10A4

Cleanup: NONE

Basis: N/A

File Name: 128SMPL\_

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: UG/L

Clean DF: 1

CASNO	Target Analyte	DF	Result	Result Qualifier	Reporting Limit	MDL
7429-90-5	ALUMINUM	10	10	U	100	10
7440-36-0	ANTIMONY	10	0.12	U	1	0.12
7440-38-2	ARSENIC	10	0.39	U	2	0.39
7440-39-3	BARIUM	10	0.56	U	5	0.56
7440-43-9	CADMIUM	10	0.083	U	2	0.083
7440-47-3	CHROMIUM	10	1.1	B	10	0.46
7440-48-4	COBALT	10	0.11	U	5	0.11
7440-50-8	COPPER	10	0.32	U	8	0.32
7439-92-1	LEAD	10	0.079	U	2	0.079
7439-96-5	MANGANESE	10	0.36	U	5	0.36
7439-98-7	MOLYBDENUM	10	0.079	U	2	0.079
7440-02-0	NICKEL	10	0.92	U	20	0.92
7782-49-2	SELENIUM	10	0.65	U	10	0.65
7440-22-4	SILVER	10	0.029	U	0.5	0.029
7440-24-6	STRONTIUM	10	0.32	U	5	0.32
7440-28-0	THALLIUM	10	0.0041	U	0.1	0.0041
7440-29-1	THORIUM	10	0.016	U	0.2	0.016
7440-31-5	TIN	10	0.12	U	10	0.12
7440-61-1	URANIUM	10	0.0049	U	0.1	0.0049
7440-66-6	ZINC	10	1.4	U	100	1.4

Data Package ID: IM1806686-1

# ICPMS Metals

Method SW6020A

Method Blank

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Lab ID: IP180702-10MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 02-Jul-18

Date Analyzed: 10-Jul-18

Prep Batch: IP180702-10

QCBatchID: IP180702-10-1

Run ID: IM180710-10A2

Cleanup: NONE

Basis: N/A

File Name: 084SMPL\_

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: UG/L

Clean DF: 1

CASNO	Target Analyte	DF	Result	Result Qualifier	Reporting Limit	MDL
7440-41-7	BERYLLIUM	10	0.054	U	0.5	0.054

Data Package ID: IM1806686-1

**ICPMS Metals**  
**Method SW6020A**  
**Laboratory Control Sample**

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Lab ID: IM180702-10LCS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 07/02/2018

Date Analyzed: 07/06/2018

Prep Method: SW3005A

Prep Batch: IP180702-10

QCBatchID: IP180702-10-1

Run ID: IM180706-10A4

Cleanup: NONE

Basis: N/A

File Name: 129SMPL\_

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: UG/L

Clean DF: 1

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
7429-90-5	ALUMINUM	5000	4750	100		95	80 - 120%
7440-36-0	ANTIMONY	30	28.2	1		94	80 - 120%
7440-38-2	ARSENIC	100	100	2		100	80 - 120%
7440-39-3	BARIUM	100	93.9	5		94	80 - 120%
7440-41-7	BERYLLIUM	50	51.3	0.5		103	80 - 120%
7440-43-9	CADMIUM	30	30.5	2		102	80 - 120%
7440-47-3	CHROMIUM	500	497	10		99	80 - 120%
7440-48-4	COBALT	100	99.5	5		99	80 - 120%
7440-50-8	COPPER	1000	979	8		98	80 - 120%
7439-92-1	LEAD	50	47.6	2		95	80 - 120%
7439-96-5	MANGANESE	100	104	5		104	80 - 120%
7439-98-7	MOLYBDENUM	100	97.1	2		97	80 - 120%
7440-02-0	NICKEL	500	478	20		96	80 - 120%
7782-49-2	SELENIUM	100	104	10		104	80 - 120%
7440-22-4	SILVER	10	10.2	0.5		102	80 - 120%
7440-24-6	STRONTIUM	100	97.5	5		98	80 - 120%
7440-28-0	THALLIUM	2	2.1	0.1		105	80 - 120%
7440-29-1	THORIUM	10	9.42	0.2		94	80 - 120%
7440-31-5	TIN	500	461	10		92	80 - 120%
7440-61-1	URANIUM	10	9.24	0.1		92	80 - 120%
7440-66-6	ZINC	2000	2010	100		100	80 - 120%

Data Package ID: IM1806686-1

# ICPMS Metals

Method SW6020A

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 I18-012

Field ID: SHARED QC

LabID: 1806511-1MS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 20-Jun-18

Date Extracted: 02-Jul-18

Date Analyzed: 06-Jul-18

Prep Method: SW3005 Rev A

Prep Batch: IP180702-10

QCBatchID: IP180702-10-1

Run ID: IM180706-10A4

Cleanup: NONE

Basis: As Received

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: UG/L

File Name: 133SMPL\_

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
7429-90-5	ALUMINUM	130		4640		100	5000	90	75 - 125%
7440-36-0	ANTIMONY	0.12	U	27.4		1	30	91	75 - 125%
7440-38-2	ARSENIC	5.4		100		2	100	95	75 - 125%
7440-39-3	BARIUM	12		105		5	100	93	75 - 125%
7440-41-7	BERYLLIUM	0.054	U	49.1		0.5	50	98	75 - 125%
7440-43-9	CADMIUM	0.083	U	29.8		2	30	99	75 - 125%
7440-47-3	CHROMIUM	0.79	BC	490		10	500	98	75 - 125%
7440-48-4	COBALT	0.25	B	99		5	100	99	75 - 125%
7440-50-8	COPPER	0.32	U	961		8	1000	96	75 - 125%
7439-92-1	LEAD	0.56	B	48.4		2	50	96	75 - 125%
7439-96-5	MANGANESE	400		505		5	100	102	75 - 125%
7439-98-7	MOLYBDENUM	0.91	B	95.5		2	100	95	75 - 125%
7440-02-0	NICKEL	0.92	U	465		20	500	93	75 - 125%
7782-49-2	SELENIUM	0.65	U	97.7		10	100	98	75 - 125%
7440-22-4	SILVER	0.029	U	9.92		0.5	10	99	75 - 125%
7440-24-6	STRONTIUM	50		147		5	100	97	75 - 125%
7440-28-0	THALLIUM	0.0041	U	2.07		0.1	2	103	75 - 125%
7440-29-1	THORIUM	0.03	B	9.58		0.2	10	96	75 - 125%
7440-31-5	TIN	0.36	B	452		10	500	90	75 - 125%
7440-61-1	URANIUM	0.1		9.43		0.1	10	93	75 - 125%
7440-66-6	ZINC	1.4	U	1990		100	2000	100	75 - 125%

Data Package ID: IM1806686-1

# ICPMS Metals

Method SW6020A

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 I18-012

Field ID: SHARED QC

LabID: 1806511-1MSD

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 20-Jun-18

Date Extracted: 02-Jul-18

Date Analyzed: 06-Jul-18

Prep Method: SW3005 Rev A

Prep Batch: IP180702-10

QCBatchID: IP180702-10-1

Run ID: IM180706-10A4

Cleanup: NONE

Basis: As Received

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: UG/L

File Name: 134SMPL\_

CASNO	Target Analyte	MSD Result	MSD Qual	Spike Added	MSD % Rec.	Reporting Limit	RPD Limit	RPD
7429-90-5	ALUMINUM	4640		5000	90	100	20	0
7440-36-0	ANTIMONY	27.8		30	93	1	20	1
7440-38-2	ARSENIC	106		100	100	2	20	5
7440-39-3	BARIUM	105		100	94	5	20	0
7440-41-7	BERYLLIUM	50.2		50	100	0.5	20	2
7440-43-9	CADMIUM	29.6		30	98	2	20	1
7440-47-3	CHROMIUM	495		500	99	10	20	1
7440-48-4	COBALT	99.5		100	99	5	20	1
7440-50-8	COPPER	960		1000	96	8	20	0
7439-92-1	LEAD	49		50	97	2	20	1
7439-96-5	MANGANESE	509		100	106	5	20	1
7439-98-7	MOLYBDENUM	97.7		100	97	2	20	2
7440-02-0	NICKEL	466		500	93	20	20	0
7782-49-2	SELENIUM	99		100	99	10	20	1
7440-22-4	SILVER	10.2		10	103	0.5	20	3
7440-24-6	STRONTIUM	147		100	97	5	20	0
7440-28-0	THALLIUM	2.07		2	103	0.1	20	0
7440-29-1	THORIUM	9.73		10	97	0.2	20	2
7440-31-5	TIN	464		500	93	10	20	3
7440-61-1	URANIUM	9.47		10	94	0.1	20	0
7440-66-6	ZINC	1980		2000	99	100	20	0

Data Package ID: IM1806686-1

**ICPMS Metals**  
**Method SW6020**  
**Duplicate Sample Results**

Lab Name: ALS -- Fort Collins

Work Order Number: 1806686

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: 100-N Apatite Barrier, June 20 118-012

Field ID:	SHARED QC
Lab ID:	1806511-1D

Sample Matrix: WATER  
% Moisture: N/A  
Date Collected: 06/20/2018  
Date Extracted: 07/02/2018  
Date Analyzed: 07/06/2018

Prep Batch: IP180702-10  
QCBatchID: IP180702-10-1  
Run ID: IM180706-10A4  
Cleanup: NONE  
Basis: As Received  
File Name: 132SMPL\_

Sample Aliquot: 50 ml  
Final Volume: 50 ml  
Result Units: UG/L  
Clean DF: 1

CASNO	Target Analyte	Sample Result	Samp Qual	Duplicate Result	Dup Qual	Reporting Limit	Dilution Factor	RPD	RPD Limit
7429-90-5	ALUMINUM	130		56.1	B	100	10		20
7440-36-0	ANTIMONY	0.12	U	0.12	U	1	10		20
7440-38-2	ARSENIC	5.4		5.34		2	10		20
7440-39-3	BARIUM	12		11.8		5	10		20
7440-41-7	BERYLLIUM	0.054	U	0.054	U	0.5	10		20
7440-43-9	CADMIUM	0.083	U	0.09	B	2	10		20
7440-47-3	CHROMIUM	0.79	BC	1.29	BC	10	10		20
7440-48-4	COBALT	0.25	B	0.31	B	5	10		20
7440-50-8	COPPER	0.32	U	0.32	U	8	10		20
7439-92-1	LEAD	0.56	B	0.51	B	2	10		20
7439-96-5	MANGANESE	400		408		5	10	1	20
7439-98-7	MOLYBDENUM	0.91	B	0.89	B	2	10		20
7440-02-0	NICKEL	0.92	U	0.92	U	20	10		20
7782-49-2	SELENIUM	0.65	U	0.65	U	10	10		20
7440-22-4	SILVER	0.029	U	0.029	U	0.5	10		20
7440-24-6	STRONTIUM	50		52.6		5	10	4	20
7440-28-0	THALLIUM	0.0041	U	0.0041	U	0.1	10		20
7440-29-1	THORIUM	0.03	B	0.03	B	0.2	10		20
7440-31-5	TIN	0.36	B	0.2	B	10	10		20
7440-61-1	URANIUM	0.1		0.11		0.1	10		20
7440-66-6	ZINC	1.4	U	1.4	U	100	10		20

Data Package ID: IM1806686-1

**Prep Batch ID: IP180702-10**

<b>Start Date:</b> 07/02/18	<b>End Date:</b> 07/02/18	<b>Concentration Method:</b> NONE	<b>Batch Created By:</b> AJL2
<b>Start Time:</b> 11:07	<b>End Time:</b> 18:00	<b>Extract Method:</b> SW3005A	<b>Date Created:</b> 07/02/18
<b>Prep Analyst:</b> Amanda J. Lynn		<b>Initial Volume Units:</b> ml	<b>Time Created:</b> 11:07
<b>Comments:</b>		<b>Final Volume Units:</b> ml	<b>Validated By:</b> AJL2
<div style="border: 1px solid black; height: 30px; width: 100%;"></div>			<b>Date Validated:</b> 07/02/18
			<b>Time Validated:</b> 11:58

QC Batch ID: IP180702-10-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
IP180702-10	MB	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806511
IM180702-10	LCS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806511
1806511-1	MS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806511
1806511-1	MSD	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806511
1806511-1	DUP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806511
1806511-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806511
1806511-3	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806511
1806529-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806529
1806529-3	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806529
1806529-4	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806529
1806529-5	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806529
1806612-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806612
1806612-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1806612
1806686-1	SMP	B3J902	WATER	6/26/2018	50	50	NONE	1	1806686
1806686-2	SMP	B3J846	WATER	6/26/2018	50	50	NONE	1	1806686
1806686-3	SMP	B3J847	WATER	6/26/2018	50	50	NONE	1	1806686
1806686-4	SMP	B3J903	WATER	6/26/2018	50	50	NONE	1	1806686

**QC Types**

CAR	Carrier reference sample	DUP	Laboratory Duplicate
LCS	Laboratory Control Sample	LCSD	Laboratory Control Sample Duplicat
MB	Method Blank	MS	Laboratory Matrix Spike
MSD	Laboratory Matrix Spike Duplicate	REP	Sample replicate
RVS	Reporting Level Verification Standar	SMP	Field Sample
SYS	Sample Yield Spike		