Sunday, December 31, 2017

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

Re: ALS Workorder: 1711189
Project Name: GW Background Study, October 2
Project Number: I18-001

Dear Ms. Waters-Husted:

Eight water samples were received from CH2M HILL Plateau Remediation Company, on 11/9/2017. The samples were scheduled for the following analyses:

Metals
Gamma Spectroscopy
Gross Alpha/Beta
Strontium-90

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 methods employed.

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

Sincerely,

ALS Environmental
For Shiloh J. Summy
Project Manager

We certify that theis data package is in compliance with the SOW, both technically and for completeness, including a full description of, explanation of, and corrective actions for, an 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

OrderNum: 1711189
Client Name: CH2M HILL Plateau Remediation Company
Client Project Name: GW Background Study, October 2
Client Project Number: I18-001
Client PO Number: BOA 54854

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
B3DCR3	1711189-1		WATER	07-Nov-17	9:00
B3DCT0	1711189-2		WATER	07-Nov-17	9:00
B3DCR8	1711189-3		WATER	07-Nov-17	9:00
B3DCR6	1711189-4		WATER	07-Nov-17	9:00
B3DCR7	1711189-5		WATER	07-Nov-17	9:00
B3DCR5	1711189-6		WATER	07-Nov-17	9:00
B3DCP5	1711189-7		WATER	07-Nov-17	9:00
B3DCR9	1711189-8		WATER	07-Nov-17	9:00

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C.# I18-001-006 Page 1 of 1

Collector: KATHY TURNER CHPRC	**Contact/Requester:** WATERS-HUSTED, K	**Telephone No.:** 376-4650
SAF No.: I18-001	**Sampling Origin:** Hanford Site	**Purchase Order/Charge Code:** 300071
Project Title: GW Background Study, October 2	**Logbook No.:** HNF-N-506 94178	**Ice Chest No.:** GWS-368
Shipped To (Lab): ALS Environmental Ft. Collins	**Method of Shipment** Commercial Carrier	**Bill of Lading/Air Bill No.:** 770698394654
Protocol SURV	**Priority:** 30 Days	**Offsite Property No.:** 8689

POSSIBLE SAMPLE HAZARDS/REMARK
*Contains Radioactive Material at concentrations that are not be 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
B3DCR3	N	W	11-7-17	0900	1x4-L G/P	GAMMA_GS: COMMON	6 Months	HNO3 to pH <2

12/31/2017
ALS171189

Relinquished By / Print First and Last Name	Signature	Date/Time	Received By / Print First and Last Name	Signature	Date/Time
KATHY TURNER CHPRC	Kathy Turner	NOV 0 7 2017 1220	SSU-1		NOV 0 7 2017 1220
SSU-1		NOV 0 8 2017 0730	Barbara Briggs /CHPRC	Barbara Briggs	NOV 0 8 2017 0730
Barbara Briggs /CHPRC	Barbara Briggs	NOV 0 8 2017 1400	FEDEX		
Fedex			Fedex Slusher		11-9-17 0900

Matrix *
S = Soil, SE = Sediment, SO = Solid, SL = Sludge, W = Water, O = Oil, A = Air, DS = Drum Solids, DL = Drum Liquid, T = Tissue, WI = Wipe, L = Liquid, V = Vegetation, X = Other

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

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C.# I18-001-013 Page 1 of 1

Collector: KATHY TURNER CHPRC	**Contact/Requester:** WATERS-HUSTED, K	**Telephone No.:** 376-4650
SAF No.: I18-001	**Sampling Origin:** Hanford Site	**Purchase Order/Charge Code:** 300071
Project Title: GW Background Study, October 2	**Logbook No.:** HNF-N-506 94178	**Ice Chest No.:** GWS-3168
Shipped To (Lab): ALS Environmental Ft. Collins	**Method of Shipment** Commercial Carrier	**Bill of Lading/Air Bill No.:** 7706 9839 4654
Protocol SURV	**Priority:** 30 Days	**Offsite Property No.:** 8689

POSSIBLE SAMPLE HAZARDS/REMARK
*Contains Radioactive Material at concentrations that are not be 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
B3DCT0	N	W	11-7-17	0900	1x1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2

12/31/2017
ALS1711189

Relinquished By: KATHY TURNER CHPRC / Print First and Last Name	Signature	NOV 0 7 2017 1220 / Date/Time	Received By: SSU-1 / Print First and Last Name; Signature; NOV 0 7 2017 1220 / Date/Time
Relinquished By: SSU-1 / Print First and Last Name	Signature	NOV 0 8 2017 0730 / Date/Time	Received By: Barbara Briggs /CHPRC / Print First and Last Name; Signature; NOV 0 8 2017 0730 / Date/Time
Relinquished By: Barbara Briggs /CHPRC / Print First and Last Name	Signature	NOV 0 8 2017 1400 / Date/Time	Received By: FEDEX / Print First and Last Name; Signature; Date/Time
Relinquished By: FedEx / Print First and Last Name	Signature	Date/Time	Received By: Rocky Shuster / Print First and Last Name; Signature; 11-9-17 0900 / Date/Time

Matrix *

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

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

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C.# I18-001-011 Page 1 of 1

Collector: KATHY TURNER CHPRC	**Contact/Requester:** WATERS-HUSTED, K	**Telephone No.:** 376-4650
SAF No.: I18-001	**Sampling Origin:** Hanford Site	**Purchase Order/Charge Code:** 300071
Project Title: GW Background Study, October 2	**Logbook No.:** HNF-N-506 94178	**Ice Chest No.:** GWS-368
Shipped To (Lab): ALS Environmental Ft. Collins	**Method of Shipment** Commercial Carrier	**Bill of Lading/Air Bill No.:** 770698394654
Protocol SURV	**Priority:** 30 Days	**Offsite Property No.:** 8689

POSSIBLE SAMPLE HAZARDS/REMARK
*Contains Radioactive Material at concentrations that are not be 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
B3DCR8	N	W	11-7-17	0900	1x1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2

3

12/31/2017
ALS171189

Relinquished By	Print First and Last Name	Signature	Date/Time	Received By	Print First and Last Name	Signature	Date/Time
	KATHY TURNER CHPRC	Kathy Turner	NOV 0 7 2017 1220		SSU-1		NOV 0 7 2017 1220
	SSU-1		NOV 0 8 2017 0730	Barbara Briggs /CHPRC	Barbara Briggs	Barbara Briggs	NOV 0 8 2017 0730
Barbara Briggs /CHPRC	Barbara Briggs	Barbara Briggs	NOV 0 8 2017 1400		FEDEX		
	Fedex				Kody Slusher		11-9-17 0900

Matrix *

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

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

5 of 62

REV.0

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C.# I18-001-009
		Page 1 of 1

Collector: KATHY TURNER CHPRC	**Contact/Requester:** WATERS-HUSTED, K	**Telephone No.:** 376-4650
SAF No.: I18-001	**Sampling Origin:** Hanford Site	**Purchase Order/Charge Code:** 300071
Project Title: GW Background Study, October 2	**Logbook No.:** HNF-N-506 94/78	**Ice Chest No.:** GWS-368
Shipped To (Lab): ALS Environmental Ft. Collins	**Method of Shipment** Commercial Carrier	**Bill of Lading/Air Bill No.:** 770698394654
Protocol SURV	**Priority:** 30 Days	**Offsite Property No.:** 8689

POSSIBLE SAMPLE HAZARDS/REMARK
*Contains Radioactive Material at concentrations that are not be 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
B3DCR6	N	W	11-7-17	0900	1x500-mL G/P	6020_METALS_ICPMS: GW 01; 6010_METALS_ICP: GW 04	6 Months	HNO3 to pH <2

4

12/31/2017
ALS171189

Relinquished By: KATHY TURNER CHPRC (Print First and Last Name)	Kathy Turner (Signature)	NOV 07 2017 0826 (Date/Time)	Received By: SSU-1 (Print First and Last Name) / NOV 07 2017 0826 (Signature, Date/Time)
Relinquished By: SSU-1 (Print First and Last Name)	(Signature)	NOV 08 2017 0730 (Date/Time)	Received By: Barbara Briggs /CHPRC (Print First and Last Name) / Be Briggs (Signature) / NOV 08 2017 0730 (Date/Time)
Relinquished By: Barbara Briggs /CHPRC (Print First and Last Name)	Be Briggs (Signature)	NOV 08 2017 1402 (Date/Time)	Received By: FEDEX (Print First and Last Name) (Signature) (Date/Time)
Relinquished By: Fedex (Print First and Last Name)	(Signature)	(Date/Time)	Received By: Kelli Slusher (Print First and Last Name) / (Signature) / 11-9-17 0960 (Date/Time)

Matrix *

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

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

Printed On 9/18/2017 FSR ID = FSR51198 A-6004-842 (REV 3)

REV.0

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C.# I18-001-010 Page 1 of 1

Collector: KATHY TURNER CHPRC	**Contact/Requester:** WATERS-HUSTED, K	**Telephone No.:** 376-4650
SAF No.: I18-001	**Sampling Origin:** Hanford Site	**Purchase Order/Charge Code:** 300071
Project Title: GW Background Study, October 2	**Logbook No.:** HNF-N-506 94178	**Ice Chest No.:** GWS-368
Shipped To (Lab): ALS Environmental Ft. Collins	**Method of Shipment** Commercial Carrier	**Bill of Lading/Air Bill No.:** 770698394654
Protocol SURV	**Priority:** 30 Days	**Offsite Property No.:** 8689

POSSIBLE SAMPLE HAZARDS/REMARK
*Contains Radioactive Material at concentrations that are not be 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
B3DCR7	N	W	11-7-17	0900	1x500-mL G/P	6020_METALS_ICPMS: GW 01; 6010_METALS_ICP: GW 04	6 Months	HNO3 to pH <2

5

12/31/2017
ALS171189

Relinquished By: KATHY TURNER CHPRC / Kathy Turner / NOV 0 7 2017 1220	Print First and Last Name / Signature / Date/Time	Received By: SSU-1 / NOV 0 7 2017 1226	Print First and Last Name / Signature / Date/Time
Relinquished By: SSU-1 / NOV 0 8 2017 0730	Print First and Last Name / Signature / Date/Time	Received By: Barbara Briggs /CHPRC / BeBriggs / NOV 0 8 2017 0730	Print First and Last Name / Signature / Date/Time
Relinquished By: Barbara Briggs /CHPRC / BeBriggs / NOV 0 8 2017 1400	Print First and Last Name / Signature / Date/Time	Received By: FEDEX	Print First and Last Name / Signature / Date/Time
Relinquished By: FedEx	Print First and Last Name / Signature / Date/Time	Received By: Kody Slusher / KS / 11-9-17 0900	Print First and Last Name / Signature / Date/Time

Matrix *

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	

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

Printed On 9/18/2017 FSR ID = FSR51198 A-6004-842 (REV 3)

REV.0

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C.# I18-001-008
		Page 1 of 1

Collector: KATHY TURNER CHPRC	**Contact/Requester:** WATERS-HUSTED, K	**Telephone No.:** 376-4650
SAF No.: I18-001	**Sampling Origin:** Hanford Site	**Purchase Order/Charge Code:** 300071
Project Title: GW Background Study, October 2	**Logbook No.:** HNF-N-506 94178	**Ice Chest No.:** GW5-368
Shipped To (Lab): ALS Environmental Ft. Collins	**Method of Shipment** Commercial Carrier	**Bill of Lading/Air Bill No.:** 770698394654
Protocol SURV	**Priority:** 30 Days	**Offsite Property No.:** 8689

POSSIBLE SAMPLE HAZARDS/REMARK
*Contains Radioactive Material at concentrations that are not be 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
B3DCR5	N	W	11-7-17	0900	1x500-mL G/P	6020_METALS_ICPMS: GW 01; 6010_METALS_ICP: GW 04	6 Months	HNO3 to pH <2

6

12/31/2017
ALS171189

Relinquished By: KATHY TURNER CHPRC — Print First and Last Name	Signature	NOV 0 7 2017 1220 — Date/Time	Received By: SSU-1 — Print First and Last Name / Signature / NOV 0 7 2017 1220 — Date/Time
Relinquished By: SSU-1 — Print First and Last Name	Signature	NOV 0 8 2017 0730 — Date/Time	Received By: Barbara Briggs /CHPRC — Print First and Last Name / Signature / NOV 0 8 2017 0730 — Date/Time
Relinquished By: Barbara Briggs /CHPRC — Print First and Last Name	Signature	NOV 0 8 2017 1400 — Date/Time	Received By: FEDEX — Print First and Last Name / Signature / Date/Time
Relinquished By: Fedex — Print First and Last Name	Signature	Date/Time	Received By: Rodney Sutton — Print First and Last Name / Signature / 11-9-17 0900 — Date/Time

Matrix *	
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

8

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

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. # I18-001-001
		Page 1 of 1

Collector: KATHY TURNER CHPRC	**Contact/Requester:** WATERS-HUSTED, K	**Telephone No.:** 376-4650
SAF No.: I18-001	**Sampling Origin:** Hanford Site	**Purchase Order/Charge Code:** 300071
Project Title: GW Background Study, October 2	**Logbook No.:** HNF-N-506 94 178	**Ice Chest No.:** GWS-368
Shipped To (Lab): ALS Environmental Ft. Collins	**Method of Shipment** Commercial Carrier	**Bill of Lading/Air Bill No.:** 770698394654
Protocol SURV	**Priority:** 30 Days	**Offsite Property No.:** 8689

POSSIBLE SAMPLE HAZARDS/REMARK
*Contains Radioactive Material at concentrations that are not be 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
B3DCP5	N	W	11-7-17	0900	1x1-L P	9310_ALPHABETA_GPC: COMMON	6 Months	HNO3 to pH <2

12/31/2017
ALS171189

Relinquished By: KATHY TURNER CHPRC / Kathy Turner	NOV 0 7 2017 1220	Received By: SSU-1	NOV 0 7 2017 1220
Relinquished By: SSU-1	NOV 0 8 2017 0730	Received By: Barbara Briggs /CHPRC / BeBriggs	NOV 0 8 2017 0730
Relinquished By: Barbara Briggs /CHPRC / BeBriggs	NOV 0 8 2017 1400	Received By: FEDEX	
Relinquished By: FedEx		Received By: Rody Slusher	11-9-17 0900

Matrix *

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

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

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. # I18-001-012
		Page 1 of 1

Collector: KATHY TURNER CHPRC	**Contact/Requester:** WATERS-HUSTED, K	**Telephone No.:** 376-4650
SAF No.: I18-001	**Sampling Origin:** Hanford Site	**Purchase Order/Charge Code:** 300071
Project Title: GW Background Study, October 2	**Logbook No.:** HNF-N-506 94178	**Ice Chest No.:** GW5-368
Shipped To (Lab): ALS Environmental Ft. Collins	**Method of Shipment** Commercial Carrier	**Bill of Lading/Air Bill No.:** 7706 9839 4654
Protocol SURV	**Priority:** 30 Days	**Offsite Property No.:** 8689

POSSIBLE SAMPLE HAZARDS/REMARK
*Contains Radioactive Material at concentrations that are not be 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
B3DCR9	N	W	11-7-17	0900	1x1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2

Relinquished By: KATHY TURNER CHPRC — Print First and Last Name	Kathy Turner — Signature	NOV 0 7 2017 1220 — Date/Time	Received By: SSU-1 — Print First and Last Name / Signature / NOV 0 7 2017 1220 — Date/Time
Relinquished By: SSU-1 — Print First and Last Name	Signature	NOV 0 8 2017 0730 — Date/Time	Received By: Barbara Briggs /CHPRC — Print First and Last Name / Signature / NOV 0 8 2017 0730 — Date/Time
Relinquished By: Barbara Briggs /CHPRC — Print First and Last Name	Barbara Briggs — Signature	NOV 0 8 2017 1402 — Date/Time	Received By: FEDEX — Print First and Last Name / Signature / Date/Time
Relinquished By: Fedex — Print First and Last Name	Signature	Date/Time	Received By: Kody Rusher — Print First and Last Name / Signature / 11-9-17 0900 — Date/Time

Matrix *

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

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

Printed On 9/18/2017 — FSR ID = FSR51198 — A-6004-842 (REV 3)

12/31/2017
ALS171189

REV.0

10 of 62

10 of 62

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: CHPRC Workorder No: 1711189

Project Manager: _____ Initials: KS Date: 11-9-17

1.	Does this project require any special handling in addition to standard ALS procedures?		YES	(NO)
2.	Are custody seals on shipping containers intact?	NONE	(YES)	NO
3.	Are Custody seals on sample containers intact?	NONE	(YES)	NO
4.	Is there a COC (Chain-of-Custody) present or other representative documents?		(YES)	NO
5.	Are the COC and bottle labels complete and legible?		(YES)	NO
6.	Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7.	Were airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
8.	Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	(YES)	NO
9.	Are all aqueous non-preserved samples pH 4-9?	N/A	(YES)	NO
10.	Is there sufficient sample for the requested analyses?		(YES)	NO
11.	Were all samples placed in the proper containers for the requested analyses?		(YES)	NO
12.	Are all samples within holding times for the requested analyses?		(YES)	NO
13.	Were all sample containers received intact? (not broken or leaking, etc.)		(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	(N/A)	YES	NO
15.	Do any water samples contain sediment? Amount Amount of sediment: ____ dusting ____ moderate ____ heavy	N/A	YES	(NO)
16.	Were the samples shipped on ice?		YES	(NO)
17.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: (#2) #4	RAD ONLY	YES	(NO)

Cooler #:	1								
Temperature (°C):	10.2								
No. of custody seals on cooler:	2								
DOT Survey/ Acceptance Information — External µR/hr reading:	10								
Background µR/hr reading:	10								

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

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: _____ 11/22/17

*IR Gun #2: Oakton, SN 29922500201-0066
*IR Gun #4: Oakton, SN 2372220101-0002

Form 201r24.xls (06/04/2012)

1711189

10-2

ORIGIN ID:PSCA (509) 373-7409
BARBARA BRIGGS
CH2M
6267 LATAH ST

RICHLAND, WA 99354
UNITED STATES US

SHIP DATE: 08NOV17
ACTWGT: 42.00 LB
CAD: 10706605/INET3920

BILL THIRD PARTY

TO JULIE ELLINGSON
ALS GLOBAL
225 COMMERCE DRIVE

FORT COLLINS CO 80524
(970) 490-1511
INV:
PO:

REF: GWS-368 & GWS-412
DEPT:

549J3/F877/M04C

FedEx Express

THU - 09 NOV 10:30A
PRIORITY OVERNIGHT
DSR

TRK# 0201 7706 9839 4654
MASTER

XH FTCA

80524
DEN
CO-US

1 of 2

1024

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
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Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in a FedEx account number.
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Metals

Case Narrative

CH2M HILL Plateau Remediation Company

GW Background Study, October 2 – I18-001

Work Order Number: 1711189

1. This section consists of 3 water samples.

2. The samples were received intact at ambient temperature by ALS on 11/09/17.

3. The samples had a pH less than 2 upon receipt.

4. The samples were prepared and analyzed based on SW-846, 3rd Edition procedures.

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

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

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

6. All standards and solutions are NIST traceable and were used within their recommended shelf life.

7. The samples were prepared and analyzed within the established hold times.

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

8. 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. Aluminum, lead and nickel 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.

9. Matrix specific quality control procedures.

   Sample 1711248-1 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 this batch. All acceptance criteria for accuracy were met.
   - Matrix spike recoveries could not be evaluated for the following analytes:

Analyte	Sample ID
Calcium	1711248-1MS/MSD
Manganese	1711248-1MS/MSD
Strontium	1711248-1MS/MSD

   The concentrations of these analytes in the native sample were greater than four times the concentration of matrix spike added during the digestion. When sample concentration is that much greater than the spike added, spike recoveries may not be accurate. The laboratory control samples indicate that the digestion and analysis were in control.

   - A serial dilution was analyzed with each ICP batch. All acceptance criteria were met with the following exception:

Analyte	Sample ID
Barium	1711248-1L

   - The associated sample results are flagged for serial dilution failure.

10. 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 — 12/13/17
Inorganics Primary Data Reviewer — Date

Inorganics Final Data Reviewer — 12/31/17
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 <=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: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: B3DCR6
Lab ID: 1711189-4

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 07-Nov-17
Date Extracted: 01-Dec-17
Date Analyzed: 04-Dec-17
Prep Method: SW3005 Rev A

Prep Batch: IP171201-10
QCBatchID: IP171201-10-2
Run ID: IP171204-2A3
Cleanup: NONE
Basis: As Received
File Name:

Analyst: Amanda J. Lynn
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	21	B	30	6.6
7440-70-2	CALCIUM	1	120	U	1000	120
7439-89-6	IRON	1	17	U	50	17
7439-95-4	MAGNESIUM	1	97	U	750	97
7440-09-7	POTASSIUM	1	150	U	1000	150
7440-23-5	SODIUM	1	110	U	500	110
7440-62-2	VANADIUM	1	9.3	B	10	0.98

Data Package ID: *IP1711189-1*

Total Recoverable ICP Metals

Method SW6010B

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: B3DCR7
Lab ID: 1711189-5

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 07-Nov-17
Date Extracted: 01-Dec-17
Date Analyzed: 04-Dec-17
Prep Method: SW3005 Rev A

Prep Batch: IP171201-10
QCBatchID: IP171201-10-2
Run ID: IP171204-2A3
Cleanup: NONE
Basis: As Received
File Name:

Analyst: Amanda J. Lynn
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	15	B	30	6.6
7440-70-2	CALCIUM	1	120	U	1000	120
7439-89-6	IRON	1	17	U	50	17
7439-95-4	MAGNESIUM	1	97	U	750	97
7440-09-7	POTASSIUM	1	150	U	1000	150
7440-23-5	SODIUM	1	110	U	500	110
7440-62-2	VANADIUM	1	9.1	B	10	0.98

Data Package ID: *IP1711189-1*

Total Recoverable ICP Metals

Method SW6010B

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: B3DCR5
Lab ID: 1711189-6

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 07-Nov-17
Date Extracted: 01-Dec-17
Date Analyzed: 04-Dec-17
Prep Method: SW3005 Rev A

Prep Batch: IP171201-10
QCBatchID: IP171201-10-2
Run ID: IP171204-2A3
Cleanup: NONE
Basis: As Received
File Name:

Analyst: Amanda J. Lynn
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	26	B	30	6.6
7440-70-2	CALCIUM	1	130	B	1000	120
7439-89-6	IRON	1	17	U	50	17
7439-95-4	MAGNESIUM	1	97	U	750	97
7440-09-7	POTASSIUM	1	150	U	1000	150
7440-23-5	SODIUM	1	110	U	500	110
7440-62-2	VANADIUM	1	7.9	B	10	0.98

Data Package ID: *IP1711189-1*

Total Recoverable ICPMS Metals

Method SW6020A

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: B3DCR6
Lab ID: 1711189-4

Analysis ReqCode: 6020_METALS_I

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 07-Nov-17
Date Extracted: 01-Dec-17
Date Analyzed: 01-Dec-17
Prep Method: SW3005 Rev A

Prep Batch: IP171201-10
QCBatchID: IP171201-10-1
Run ID: IM171201-10A5
Cleanup: NONE
Basis: As Received
File Name: 130SMPL_

Analyst: Brent A. Stanfield
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
7429-90-5	ALUMINUM	10	12	BC	100	8.7
7440-36-0	ANTIMONY	10	9.6		1	0.049
7440-38-2	ARSENIC	10	8.9		2	1.6
7440-39-3	BARIUM	10	1.6	U	5	1.6
7440-41-7	BERYLLIUM	10	0.081	U	0.5	0.081
7440-43-9	CADMIUM	10	15		2	0.062
7440-47-3	CHROMIUM	10	48		10	0.82
7440-48-4	COBALT	10	47		5	0.16
7440-50-8	COPPER	10	51		8	1.6
7439-92-1	LEAD	10	14		2	0.096
7439-96-5	MANGANESE	10	48		5	0.32
7439-98-7	MOLYBDENUM	10	0.15	U	2	0.15
7440-02-0	NICKEL	10	48	C	20	0.81
7782-49-2	SELENIUM	10	4.8	B	10	0.18
7440-22-4	SILVER	10	10		0.5	0.023
7440-24-6	STRONTIUM	10	0.12	U	5	0.12
7440-28-0	THALLIUM	10	10		0.1	0.015
7440-29-1	THORIUM	10	0.014	U	0.2	0.014
7440-31-5	TIN	10	0.73	U	10	0.73
7440-61-1	URANIUM	10	19		0.1	0.022
7440-66-6	ZINC	10	51	B	100	3.5

Data Package ID: *IM1711189-1*

Total Recoverable ICPMS Metals

Method SW6020A

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: B3DCR7
Lab ID: 1711189-5

Analysis ReqCode: 6020_METALS_I

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 07-Nov-17
Date Extracted: 01-Dec-17
Date Analyzed: 01-Dec-17
Prep Method: SW3005 Rev A

Prep Batch: IP171201-10
QCBatchID: IP171201-10-1
Run ID: IM171201-10A5
Cleanup: NONE
Basis: As Received
File Name: 131SMPL_

Analyst: Brent A. Stanfield
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
7429-90-5	ALUMINUM	10	11	BC	100	8.7
7440-36-0	ANTIMONY	10	10		1	0.049
7440-38-2	ARSENIC	10	11		2	1.6
7440-39-3	BARIUM	10	1.6	U	5	1.6
7440-41-7	BERYLLIUM	10	0.081	U	0.5	0.081
7440-43-9	CADMIUM	10	16		2	0.062
7440-47-3	CHROMIUM	10	50		10	0.82
7440-48-4	COBALT	10	49		5	0.16
7440-50-8	COPPER	10	53		8	1.6
7439-92-1	LEAD	10	15		2	0.096
7439-96-5	MANGANESE	10	50		5	0.32
7439-98-7	MOLYBDENUM	10	0.15	U	2	0.15
7440-02-0	NICKEL	10	50		20	0.81
7782-49-2	SELENIUM	10	5.6	B	10	0.18
7440-22-4	SILVER	10	11		0.5	0.023
7440-24-6	STRONTIUM	10	0.12	U	5	0.12
7440-28-0	THALLIUM	10	10		0.1	0.015
7440-29-1	THORIUM	10	0.014	U	0.2	0.014
7440-31-5	TIN	10	0.73	U	10	0.73
7440-61-1	URANIUM	10	20		0.1	0.022
7440-66-6	ZINC	10	52	B	100	3.5

Data Package ID: *IM1711189-1*

Total Recoverable ICPMS Metals

Method SW6020A

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: B3DCR5
Lab ID: 1711189-6

Analysis ReqCode: 6020_METALS_I

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 07-Nov-17
Date Extracted: 01-Dec-17
Date Analyzed: 01-Dec-17
Prep Method: SW3005 Rev A

Prep Batch: IP171201-10
QCBatchID: IP171201-10-1
Run ID: IM171201-10A5
Cleanup: NONE
Basis: As Received
File Name: 132SMPL_

Analyst: Brent A. Stanfield
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
7429-90-5	ALUMINUM	10	10	B	100	8.7
7440-36-0	ANTIMONY	10	9.2		1	0.049
7440-38-2	ARSENIC	10	11		2	1.6
7440-39-3	BARIUM	10	1.6	U	5	1.6
7440-41-7	BERYLLIUM	10	0.081	U	0.5	0.081
7440-43-9	CADMIUM	10	15		2	0.062
7440-47-3	CHROMIUM	10	50		10	0.82
7440-48-4	COBALT	10	48		5	0.16
7440-50-8	COPPER	10	54		8	1.6
7439-92-1	LEAD	10	15		2	0.096
7439-96-5	MANGANESE	10	49		5	0.32
7439-98-7	MOLYBDENUM	10	0.15	U	2	0.15
7440-02-0	NICKEL	10	52		20	0.81
7782-49-2	SELENIUM	10	5.2	B	10	0.18
7440-22-4	SILVER	10	10		0.5	0.023
7440-24-6	STRONTIUM	10	0.12	U	5	0.12
7440-28-0	THALLIUM	10	10		0.1	0.015
7440-29-1	THORIUM	10	0.014	U	0.2	0.014
7440-31-5	TIN	10	0.73	U	10	0.73
7440-61-1	URANIUM	10	20		0.1	0.022
7440-66-6	ZINC	10	48	B	100	3.5

Data Package ID: *IM1711189-1*

ICP Metals

Method SW6010B

Method Blank

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Lab ID: IP171201-10MB

Sample Matrix: WATER
% Moisture: N/A
Date Collected: N/A
Date Extracted: 01-Dec-17
Date Analyzed: 04-Dec-17

Prep Batch: IP171201-10
QCBatchID: IP171201-10-2
Run ID: IP171204-2A3
Cleanup: NONE
Basis: N/A
File Name:

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	6.6	U	30	6.6
7440-70-2	CALCIUM	1	120	U	1000	120
7439-89-6	IRON	1	17	U	50	17
7439-95-4	MAGNESIUM	1	97	U	750	97
7440-09-7	POTASSIUM	1	150	U	1000	150
7440-23-5	SODIUM	1	110	U	500	110
7440-62-2	VANADIUM	1	0.98	U	10	0.98

Data Package ID: *IP1711189-1*

ICP Metals

Method SW6010B

Laboratory Control Sample

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Lab ID: IP171201-10LCS

Sample Matrix: WATER
% Moisture: N/A
Date Collected: N/A
Date Extracted: 12/01/2017
Date Analyzed: 12/04/2017
Prep Method: SW3005A

Prep Batch: IP171201-10
QCBatchID: IP171201-10-2
Run ID: IP171204-2A3
Cleanup: NONE
Basis: N/A
File Name:

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	1020	30		102	80 - 120%
7440-70-2	CALCIUM	40000	38200	1000		96	80 - 120%
7439-89-6	IRON	1000	1050	50		105	80 - 120%
7439-95-4	MAGNESIUM	40000	37200	750		93	80 - 120%
7440-09-7	POTASSIUM	40000	40800	1000		102	80 - 120%
7440-23-5	SODIUM	40000	42700	500		107	80 - 120%
7440-62-2	VANADIUM	500	493	10		99	80 - 120%

Data Package ID: *IP1711189-1*

ICP Metals

Method SW6010B

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: SHARED QC
LabID: 1711248-1MS

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 08-Nov-17
Date Extracted: 01-Dec-17
Date Analyzed: 04-Dec-17
Prep Method: SW3005 Rev A

Prep Batch: IP171201-10
QCBatchID: IP171201-10-2
Run ID: IP171204-2A3
Cleanup: NONE
Basis: As Received

Sample Aliquot: 50 ml
Final Volume: 50 ml
Result Units: UG/L
File Name:

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
7440-42-8	BORON	6.6	U	1100		30	1000	110	80 - 120%
7440-70-2	CALCIUM	200000		231000		1000	40000	88	80 - 120%
7439-89-6	IRON	180		1100		50	1000	92	80 - 120%
7439-95-4	MAGNESIUM	33000		71600		750	40000	97	80 - 120%
7440-09-7	POTASSIUM	7700		49400		1000	40000	104	80 - 120%
7440-23-5	SODIUM	54000		96000		500	40000	105	80 - 120%
7440-62-2	VANADIUM	0.98	U	501		10	500	100	80 - 120%

Field ID: SHARED QC
LabID: 1711248-1MSD

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 08-Nov-17
Date Extracted: 01-Dec-17
Date Analyzed: 04-Dec-17
Prep Method: SW3005 Rev A

Prep Batch: IP171201-10
QCBatchID: IP171201-10-2
Run ID: IP171204-2A3
Cleanup: NONE
Basis: As Received

Sample Aliquot: 50 ml
Final Volume: 50 ml
Result Units: UG/L
File Name:

CASNO	Target Analyte	MSD Result	MSD Qual	Spike Added	MSD % Rec.	Reporting Limit	RPD Limit	RPD
7440-42-8	BORON	1130		1000	113	30	20	3
7440-70-2	CALCIUM	233000		40000	92	1000	20	1
7439-89-6	IRON	1150		1000	97	50	20	4
7439-95-4	MAGNESIUM	73200		40000	101	750	20	2
7440-09-7	POTASSIUM	50500		40000	107	1000	20	2
7440-23-5	SODIUM	96500		40000	106	500	20	0
7440-62-2	VANADIUM	516		500	103	10	20	3

Data Package ID: *IP1711189-1*

Prep Batch ID: IP171201-10

Start Date: 12/01/17
Start Time: 10:37
Prep Analyst: Amanda J. Lynn
End Date: 12/01/17
End Time: 18:00
Concentration Method: NONE
Extract Method: SW3005A
Initial Volume Units: ml
Final Volume Units: ml
Batch Created By: ajl2
Date Created: 12/01/17
Time Created: 10:37
Validated By: ajl2
Date Validated: 12/01/17
Time Validated: 12:57

Comments:

QC Batch ID: IP171201-10-2

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
IP171201-10	MB	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
IP171201-10	LCS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-1	MS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-1	MSD	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-1	DUP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711189-4	SMP	B3DCR6	WATER	11/7/2017	50	50	NONE	1	1711189
1711189-5	SMP	B3DCR7	WATER	11/7/2017	50	50	NONE	1	1711189
1711189-6	SMP	B3DCR5	WATER	11/7/2017	50	50	NONE	1	1711189
1711248-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-3	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-4	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-5	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-6	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711377-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711377
1711407-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711407
1711408-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711408

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: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Lab ID: IP171201-10MB

Sample Matrix: WATER
% Moisture: N/A
Date Collected: N/A
Date Extracted: 01-Dec-17
Date Analyzed: 01-Dec-17

Prep Batch: IP171201-10
QCBatchID: IP171201-10-1
Run ID: IM171201-10A5
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	12	B	100	8.7
7440-36-0	ANTIMONY	10	0.049	U	1	0.049
7440-38-2	ARSENIC	10	1.6	U	2	1.6
7440-39-3	BARIUM	10	1.6	U	5	1.6
7440-41-7	BERYLLIUM	10	0.081	U	0.5	0.081
7440-43-9	CADMIUM	10	0.062	U	2	0.062
7440-47-3	CHROMIUM	10	0.82	U	10	0.82
7440-48-4	COBALT	10	0.16	U	5	0.16
7440-50-8	COPPER	10	1.6	U	8	1.6
7439-92-1	LEAD	10	0.15	B	2	0.096
7439-96-5	MANGANESE	10	0.32	U	5	0.32
7439-98-7	MOLYBDENUM	10	0.15	U	2	0.15
7440-02-0	NICKEL	10	2.4	B	20	0.81
7782-49-2	SELENIUM	10	0.18	U	10	0.18
7440-22-4	SILVER	10	0.023	U	0.5	0.023
7440-24-6	STRONTIUM	10	0.12	U	5	0.12
7440-28-0	THALLIUM	10	0.015	U	0.1	0.015
7440-29-1	THORIUM	10	0.014	U	0.2	0.014
7440-31-5	TIN	10	0.73	U	10	0.73
7440-61-1	URANIUM	10	0.022	U	0.1	0.022
7440-66-6	ZINC	10	3.5	U	100	3.5

Data Package ID: *IM1711189-1*

ICPMS Metals

Method SW6020A

Laboratory Control Sample

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Lab ID: IM171201-10LCS

Sample Matrix: WATER
% Moisture: N/A
Date Collected: N/A
Date Extracted: 12/01/2017
Date Analyzed: 12/01/2017
Prep Method: SW3005A

Prep Batch: IP171201-10
QCBatchID: IP171201-10-1
Run ID: IM171201-10A5
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	4390	100		88	80 - 120%
7440-36-0	ANTIMONY	30	27.6	1		92	80 - 120%
7440-38-2	ARSENIC	100	96.5	2		96	80 - 120%
7440-39-3	BARIUM	100	97.8	5		98	80 - 120%
7440-41-7	BERYLLIUM	50	47.6	0.5		95	80 - 120%
7440-43-9	CADMIUM	30	30.2	2		101	80 - 120%
7440-47-3	CHROMIUM	500	464	10		93	80 - 120%
7440-48-4	COBALT	100	92.8	5		93	80 - 120%
7440-50-8	COPPER	1000	1000	8		100	80 - 120%
7439-92-1	LEAD	50	45.7	2		91	80 - 120%
7439-96-5	MANGANESE	100	95.2	5		95	80 - 120%
7439-98-7	MOLYBDENUM	100	91	2		91	80 - 120%
7440-02-0	NICKEL	500	478	20		96	80 - 120%
7782-49-2	SELENIUM	100	97.9	10		98	80 - 120%
7440-22-4	SILVER	10	9.92	0.5		99	80 - 120%
7440-24-6	STRONTIUM	100	93.4	5		93	80 - 120%
7440-28-0	THALLIUM	2	1.95	0.1		98	80 - 120%
7440-29-1	THORIUM	10	9.77	0.2		98	80 - 120%
7440-31-5	TIN	500	459	10		92	80 - 120%
7440-61-1	URANIUM	10	9.35	0.1		94	80 - 120%
7440-66-6	ZINC	2000	2020	100		101	80 - 120%

Data Package ID: *IM1711189-1*

ICPMS Metals

Method SW6020A

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: SHARED QC
LabID: 1711248-1MS

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 08-Nov-17
Date Extracted: 01-Dec-17
Date Analyzed: 01-Dec-17
Prep Method: SW3005 Rev A

Prep Batch: IP171201-10
QCBatchID: IP171201-10-1
Run ID: IM171201-10A5
Cleanup: NONE
Basis: As Received

Sample Aliquot: 50 ml
Final Volume: 50 ml
Result Units: UG/L
File Name: 136SMPL_

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
7429-90-5	ALUMINUM	14	BC	4750		100	5000	95	75 - 125%
7440-36-0	ANTIMONY	0.13	B	29.3		1	30	97	75 - 125%
7440-38-2	ARSENIC	1.9	B	97.8		2	100	96	75 - 125%
7440-39-3	BARIUM	89		186		5	100	97	75 - 125%
7440-41-7	BERYLLIUM	0.081	U	49.5		0.5	50	99	75 - 125%
7440-43-9	CADMIUM	0.062	U	31.6		2	30	105	75 - 125%
7440-47-3	CHROMIUM	0.82	U	472		10	500	94	75 - 125%
7440-48-4	COBALT	3	B	97.8		5	100	95	75 - 125%
7440-50-8	COPPER	6.4	B	1000		8	1000	100	75 - 125%
7439-92-1	LEAD	0.5	BC	49.5		2	50	98	75 - 125%
7439-96-5	MANGANESE	1400		1480		5	100	76	75 - 125%
7439-98-7	MOLYBDENUM	2	B	100		2	100	98	75 - 125%
7440-02-0	NICKEL	3.2	BC	480		20	500	95	75 - 125%
7782-49-2	SELENIUM	0.93	B	101		10	100	100	75 - 125%
7440-22-4	SILVER	0.06	B	10.4		0.5	10	104	75 - 125%
7440-24-6	STRONTIUM	800		877		5	100	77	75 - 125%
7440-28-0	THALLIUM	0.11		2.02		0.1	2	95	75 - 125%
7440-29-1	THORIUM	0.014	U	10.3		0.2	10	103	75 - 125%
7440-31-5	TIN	0.73	U	482		10	500	96	75 - 125%
7440-61-1	URANIUM	4.7		14.7		0.1	10	100	75 - 125%
7440-66-6	ZINC	3.5	U	1990		100	2000	99	75 - 125%

Data Package ID: *IM1711189-1*

ICPMS Metals

Method SW6020A

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: SHARED QC
LabID: 1711248-1MSD

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 08-Nov-17
Date Extracted: 01-Dec-17
Date Analyzed: 01-Dec-17
Prep Method: SW3005 Rev A

Prep Batch: IP171201-10
QCBatchID: IP171201-10-1
Run ID: IM171201-10A5
Cleanup: NONE
Basis: As Received

Sample Aliquot: 50 ml
Final Volume: 50 ml
Result Units: UG/L
File Name: 137SMPL_

CASNO	Target Analyte	MSD Result	MSD Qual	Spike Added	MSD % Rec.	Reporting Limit	RPD Limit	RPD
7429-90-5	ALUMINUM	4710		5000	94	100	20	1
7440-36-0	ANTIMONY	29.9		30	99	1	20	2
7440-38-2	ARSENIC	102		100	100	2	20	4
7440-39-3	BARIUM	183		100	94	5	20	2
7440-41-7	BERYLLIUM	50.3		50	101	0.5	20	2
7440-43-9	CADMIUM	30.8		30	103	2	20	2
7440-47-3	CHROMIUM	479		500	96	10	20	2
7440-48-4	COBALT	101		100	98	5	20	3
7440-50-8	COPPER	1000		1000	99	8	20	0
7439-92-1	LEAD	49.9		50	99	2	20	1
7439-96-5	MANGANESE	1440		100	38	5	20	3
7439-98-7	MOLYBDENUM	101		100	99	2	20	1
7440-02-0	NICKEL	492		500	98	20	20	3
7782-49-2	SELENIUM	101		100	100	10	20	1
7440-22-4	SILVER	10.7		10	106	0.5	20	3
7440-24-6	STRONTIUM	854		100	54	5	20	3
7440-28-0	THALLIUM	2.12		2	100	0.1	20	5
7440-29-1	THORIUM	10.8		10	108	0.2	20	5
7440-31-5	TIN	495		500	99	10	20	3
7440-61-1	URANIUM	14.9		10	102	0.1	20	2
7440-66-6	ZINC	2030		2000	102	100	20	2

Data Package ID: *IM1711189-1*

Prep Batch ID: IP171201-10

Start Date: 12/01/17
Start Time: 10:37
Prep Analyst: Amanda J. Lynn
End Date: 12/01/17
End Time: 18:00
Concentration Method: NONE
Extract Method: SW3005A
Initial Volume Units: ml
Final Volume Units: ml
Batch Created By: ajl2
Date Created: 12/01/17
Time Created: 10:37
Validated By: ajl2
Date Validated: 12/01/17
Time Validated: 12:57

Comments:

QC Batch ID: IP171201-10-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
IP171201-10	MB	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
IM171201-10	LCS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-1	MS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-1	MSD	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-1	DUP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711189-4	SMP	B3DCR6	WATER	11/7/2017	50	50	NONE	1	1711189
1711189-5	SMP	B3DCR7	WATER	11/7/2017	50	50	NONE	1	1711189
1711189-6	SMP	B3DCR5	WATER	11/7/2017	50	50	NONE	1	1711189
1711248-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-3	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-4	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-5	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711248-6	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711248
1711377-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711377
1711407-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711407
1711408-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1711408

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			

Gross Alpha/Beta

Case Narrative

CH2M HILL Plateau Remediation Company

GW Background Study, October 2 – I18-001

Work Order Number: 1711189

1. This section of the report consists of the analytical results for one water sample received by ALS on 11/09/2017.

2. The sample was prepared according to the current revision of SOP 702.

3. The sample was analyzed for gross alpha and beta activity by gas flow proportional counting according to the current revision of SOP 724. The analysis was completed on 12/05/2017. Gross alpha results are referenced to ^{241}Am. Gross beta results are referenced to ^{90}Sr/Y.

4. The analysis results for these samples are reported in units of pCi/L. The samples were not filtered prior to analysis.

5. The duplicate and matrix spike of sample 1711183-6 are shared for this work order. The duplicate and matrix spike were performed on a CH2M HILL Plateau Remediation Company sample. The results can be found in the following report

6. In accordance with project specific instructions, the evaluation threshold for Relative Percent Difference (RPD) has been set at 20%. RPD is defined as:

$$RPD = \frac{/S - D/}{(S + D)/2} * 100$$

Where: S = sample activity result and D = duplicate activity result.

7. No anomalous situations were encountered during the preparation or analysis of this sample. All quality control criteria were met.

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.

Pik Yee Yuen — 12/12/17
Pik Yee Yuen — Date
Radiochemistry Primary Data Reviewer

12/31/17
Radiochemistry Final Data Reviewer — Date

Gross Alpha/Beta by GFPC

PAI 724 Rev 12

Method Blank Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Lab ID: AB171128-2MB

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 21
Date Collected: 28-Nov-17
Date Prepared: 28-Nov-17
Date Analyzed: 03-Dec-17

Prep Batch: AB171128-2
QCBatchID: AB171128-2-2
Run ID: AB171128-2A
Count Time: 1000 minutes

Final Aliquot: 200 ml
Result Units: pCi/l
File Name: abc1203a

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
12587-46-1	GROSS ALPHA	4.22E-01 +/- 4.55E-01	7.35E-01	3.00E+00	NA	U
12587-47-2	GROSS BETA	1.53E-01 +/- 6.00E-01	9.95E-01	4.00E+00	NA	U

Comments:

Qualifiers/Flags:
U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.

Abbreviations:
TPU - Total Propagated Uncertainty
MDC - Sample specific Minimum Detectable Concentration
BDL - Below Detection Limit

M - Requested MDC not met.
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.
DL - Decision Level

Data Package ID: *AB1711189-1*

Gross Alpha/Beta by GFPC

PAI 724 Rev 12

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Lab ID: AB171128-2LCS

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 21
Date Collected: 28-Nov-17
Date Prepared: 28-Nov-17
Date Analyzed: 03-Dec-17

Prep Batch: AB171128-2
QCBatchID: AB171128-2-2
Run ID: AB171128-2A
Count Time: 30 minutes

Final Aliquot: 200 ml
Result Units: pCi/l
File Name: abc1203

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
12587-46-1	GROSS ALPHA	2.61E+02 +/- 4.71E+01	6.58E+00	2.260E+02	115	72 - 130	
12587-47-2	GROSS BETA	1.86E+02 +/- 3.27E+01	1.25E+01	1.920E+02	97.0	86 - 115	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: *AB1711189-1*

Gross Alpha/Beta by GFPC

PAI 724 Rev 12

Matrix Spike Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: Shared QC
Lab ID: 1711183-6MS

Analysis ReqCode: 9310_ALPHABET

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 21
Date Collected: 07-Nov-17
Date Prepared: 28-Nov-17
Date Analyzed: 03-Dec-17

Prep Batch: AB171128-2
QCBatchID: AB171128-2-2
Run ID: AB171128-2A
Count Time: 30 minutes
Report Basis: Unfiltered

Final Aliquot: 200 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: abc1203

CASNO	Target Nuclide	Matrix Spike	Sample Results	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
12587-46-1	GROSS ALPHA	2.92E+02	1.52E+01	8.45E+00	2.260E+02	123	72 - 130	
12587-47-2	GROSS BETA	2.29E+02	3.82E+01	1.23E+01	1.920E+02	99.3	86 - 115	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y1 - Chemical Yield in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

N - Matrix Spike Recovery outside control limits

P - Matrix Spike Recovery within control limits

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

Abbreviations:

MDC - Sample specific Minimum Detectable Concentration

Data Package ID: *AB1711189-1*

ALS1711189

Gross Alpha/Beta by GFPC

PAI 724 Rev 12

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: Shared QC
Lab ID: 1711183-6DUP

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 21
Date Collected: 07-Nov-17
Date Prepared: 28-Nov-17
Date Analyzed: 05-Dec-17

Prep Batch: AB171128-2
QCBatchID: AB171128-2-2
Run ID: AB171128-2A
Count Time: 200 minutes
Report Basis: Unfiltered

Final Aliquot: 200 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: abc1205

CASNO	Analyte	Sample			Duplicate			DER	DER Lim
		Result +/- 2 s TPU	MDC	Flags	Result +/- 2 s TPU	MDC	Flags		
12587-46-1	GROSS ALPHA	1.52E+01 +/- 3.51E+00	2.43E+00		1.43E+01 +/- 3.44E+00	2.82E+00		0.347	3
12587-47-2	GROSS BETA	3.82E+01 +/- 6.55E+00	2.55E+00		3.90E+01 +/- 6.69E+00	2.70E+00		0.166	3

Comments:

Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

D - DER is greater than Control Limit of 3

LT - Result is less than Request MDC, greater than sample specific MDC

M - Requested MDC not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

Abbreviations:

TPU - Total Propagated Uncertainty

DER - Duplicate Error Ratio

BDL - Below Detection Limit

NR - Not Reported

Data Package ID: *AB1711189-1*

Gross Alpha/Beta by GFPC

PAI 724 Rev 12

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: Shared QC
Lab ID: 1711183-6DUP

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 21
Date Collected: 07-Nov-17
Date Prepared: 28-Nov-17
Date Analyzed: 05-Dec-17

Prep Batch: AB171128-2
QCBatchID: AB171128-2-2
Run ID: AB171128-2A
Count Time: 200 minutes
Report Basis: Unfiltered

Final Aliquot: 200 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: abc1205

CASNO	Analyte	Sample			Duplicate			RPD	RPD Lim
		Result +/- 2 s TPU	MDC	Flags	Result +/- 2 s TPU	MDC	Flags		
12587-46-1	GROSS ALPHA	1.52E+01 +/- 3.51E+00	2.43E+00		1.43E+01 +/- 3.44E+00	2.82E+00		6.00	20
12587-47-2	GROSS BETA	3.82E+01 +/- 6.55E+00	2.55E+00		3.90E+01 +/- 6.69E+00	2.70E+00		2.00	20

Comments:

Qualifiers/Flags:

+ - Duplicate RPD not within limits.
LT - Result is less than Request MDC, greater than sample specific MDC
U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
NC - Not Calculated for duplicate results less than 5 times MDC

Abbreviations:

TPU - Total Propagated Uncertainty
BDL - Below Detection Limit
NR - Not Reported

Data Package ID: *AB1711189-1*

Gross Alpha/Beta by GFPC

PAI 724 Rev 12

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: Shared QC
Lab ID: 1711183-6

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 21
Date Collected: 07-Nov-17
Date Prepared: 28-Nov-17
Date Analyzed: 05-Dec-17

Prep Batch: AB171128-2
QCBatchID: AB171128-2-2
Run ID: AB171128-2A
Count Time: 200 minutes
Report Basis: Unfiltered

Final Aliquot: 200 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: abc1205

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
12587-46-1	GROSS ALPHA	1.52E+01 +/- 3.51E+00	2.43E+00	3E+00	NA	
12587-47-2	GROSS BETA	3.82E+01 +/- 6.55E+00	2.55E+00	4E+00	NA	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: *AB1711189-1*

Gross Alpha/Beta by GFPC

PAI 724 Rev 12

Sample Duplicate Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: Shared QC
Lab ID: 1711183-6DUP

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 21
Date Collected: 07-Nov-17
Date Prepared: 28-Nov-17
Date Analyzed: 05-Dec-17

Prep Batch: AB171128-2
QCBatchID: AB171128-2-2
Run ID: AB171128-2A
Count Time: 200 minutes
Report Basis: Unfiltered

Final Aliquot: 200 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: abc1205

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
12587-46-1	GROSS ALPHA	1.43E+01 +/- 3.44E+00	2.82E+00	3E+00	NA	
12587-47-2	GROSS BETA	3.90E+01 +/- 6.69E+00	2.70E+00	4E+00	NA	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

D - DER is greater than Control Limit of 2.13

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: *AB1711189-1*

Gross Alpha/Beta by GFPC

PAI 724 Rev 12

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: B3DCP5
Lab ID: 1711189-7

Analysis ReqCode: 9310_ALPHABET

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 21
Date Collected: 07-Nov-17
Date Prepared: 28-Nov-17
Date Analyzed: 05-Dec-17

Prep Batch: AB171128-2
QCBatchID: AB171128-2-2
Run ID: AB171128-2A
Count Time: 200 minutes
Report Basis: Unfiltered

Final Aliquot: 170 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: abc1205

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
12587-46-1	GROSS ALPHA	1.31E+01 +/- 3.23E+00	2.49E+00	3E+00	NA	
12587-47-2	GROSS BETA	4.06E+01 +/- 7.03E+00	3.05E+00	4E+00	NA	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: *AB1711189-1*

Prep Batch ID: AB171128-2

Start Date: 11/28/17
Start Time: 11:27
Prep Analyst: Rebecka M. Olivares
End Date: 11/28/17
End Time: 11:27
Concentration Method: NONE
Extract Method: PAI 70221
Initial Volume Units: ml
Final Volume Units: ml
Batch Created By: rmo
Date Created: 11/28/17
Time Created: 11:27
Validated By: rmo
Date Validated: 11/30/17
Time Validated: 18:45

Comments:

QC Batch ID: AB171128-2-2

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
AB171128-2	MB	XXXXXX	WATER	XXXXXX	200	200	NONE	1	1710459
AB171128-2	LCS	XXXXXX	WATER	XXXXXX	200	200	NONE	1	1710459
1711183-6	MS	XXXXXX	WATER	XXXXXX	200	200	NONE	1	1711183
1711183-6	DUP	XXXXXX	WATER	XXXXXX	200	200	NONE	1	1711183
1710459-1	SMP	XXXXXX	WATER	XXXXXX	200	200	NONE	1	1710459
1711183-5	SMP	XXXXXX	WATER	XXXXXX	200	200	NONE	1	1711183
1711183-6	SMP	XXXXXX	WATER	XXXXXX	200	200	NONE	1	1711183
1711189-7	SMP	B3DCP5	WATER	11/7/2017	170	170	NONE	1	1711189

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		

Gamma Spectroscopy

Case Narrative

CH2M HILL Plateau Remediation Company

GW Background Study, October 2 – I18-001

Work Order Number: 1711189

1. This section of the report consists of the analytical results for one water sample received by ALS on 11/09/2017.

2. The sample was prepared according to the current revision of SOP739.

3. The sample was analyzed for the presence of gamma emitting radionuclides according to the current revision of SOP713. The analysis was completed on 12/06/2017.

4. The analysis results for the sample are reported in units of pCi/L. The sample was not filtered prior to analysis.

5. In accordance with project specific instructions, the evaluation threshold for Relative Percent Difference (RPD) has been set at 20%. RPD is defined as:

$$RPD = \frac{/S - D/}{(S + D)/2} * 100$$

Where: S = sample activity result and D = duplicate activity result. RPD is not evaluated for sample/duplicate pairs where the reported activity is less than 5 times the sample specific MDC, as indicated with an "NC" on the Duplicate Sample Results (RPD) page.

6. No problems were encountered with either the client sample or the associated quality control samples. All quality control criteria were met.

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.

Pik Yee Yuen — 12/12/17
Pik Yee Yuen, Radiochemistry Primary Data Reviewer — Date

12/31/17
Radiochemistry Final Data Reviewer — Date

Gamma Spectroscopy Results

PAI 713 Rev 14

Method Blank Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Lab ID: GS171201-1AMB
Library: FANP.LIB

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 12
Date Collected: 01-Dec-17
Date Prepared: 01-Dec-17
Date Analyzed: 06-Dec-17

Prep Batch: GS171201-1
QCBatchID: GS171201-1-2
Run ID: GS171201-1A
Count Time: 500 minutes

Final Aliquot: 1000 ml
Result Units: pCi/l
File Name: 171217d09A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10198-40-0	Co-60	-2.70E+00 +/- 3.76E+00	7.05E+00		NA	U
10045-97-3	Cs-137	-8.74E-01 +/- 3.40E+00	5.98E+00	1.00E+01	NA	U
14683-23-9	Eu-152	-2.69E+00 +/- 1.96E+01	3.50E+01		NA	U
15585-10-1	Eu-154	-9.90E+00 +/- 2.13E+01	3.82E+01		NA	U
14391-16-3	Eu-155	-5.43E+00 +/- 6.05E+00	1.06E+01		NA	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TP
U
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

DL - Decision Level

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: *GSW1711189-1*

Gamma Spectroscopy Results

PAI 713 Rev 14

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Lab ID: GS171201-1LCS
Library: ANALYTICAL.LI

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 12
Date Collected: 01-Dec-17
Date Prepared: 01-Dec-17
Date Analyzed: 06-Dec-17

Prep Batch: GS171201-1
QCBatchID: GS171201-1-2
Run ID: GS171201-1A
Count Time: 30 minutes

Final Aliquot: 1000 ml
Result Units: pCi/l
File Name: 170128d10

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14596-10-2	Am-241	1.03E+05 +/- 1.21E+04	9.75E+02	9.950E+04	103	85 - 115	
10198-40-0	Co-60	3.89E+04 +/- 4.55E+03	8.63E+01	3.880E+04	100	85 - 115	
10045-97-3	Cs-137	3.97E+04 +/- 4.65E+03	9.94E+01	3.730E+04	106	85 - 115	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TP
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS Recovery within control limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty
MDC - Minimum Detectable Concentration

SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 halflives.

Data Package ID: *GSW1711189-1*

Gamma Spectroscopy Results

PAI 713 Rev 14

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: B3DCR3
Lab ID: 1711189-1DUP
Library: FANP.LIB

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 12
Date Collected: 07-Nov-17
Date Prepared: 01-Dec-17
Date Analyzed: 05-Dec-17

Prep Batch: GS171201-1
QCBatchID: GS171201-1-2
Run ID: GS171201-1A
Count Time: 500 minutes
Report Basis: Unfiltered

Final Aliquot: 1000 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 171357d08

CASNO	Analyte	Sample			Duplicate			DER	DER Lim
		Result +/- 2 s TPU	MDC	Flags	Result +/- 2 s TPU	MDC	Flags		
10198-40-0	Co-60	5.47E+01 +/- 8.15E+00	7.48E+00		5.24E+01 +/- 7.60E+00	6.17E+00		0.409	3
10045-97-3	Cs-137	2.36E+01 +/- 5.66E+00	6.61E+00		2.89E+01 +/- 5.46E+00	4.93E+00		1.36	3
14683-23-9	Eu-152	3.89E+00 +/- 2.32E+01	3.98E+01	U	-5.54E+00 +/- 1.74E+01	3.12E+01	U	0.65	3
15585-10-1	Eu-154	9.14E-01 +/- 2.43E+01	4.18E+01	U	3.63E+00 +/- 2.01E+01	3.43E+01	U	0.172	3
14391-16-3	Eu-155	-6.65E+00 +/- 1.04E+01	1.80E+01	U	-1.68E+00 +/- 5.66E+00	9.68E+00	U	0.838	3

Comments:

Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
D - DER is greater than Control Limit of 3
LT - Result is less than Request MDC, greater than sample specific MDC
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 halflives.
G - Sample density differs by more than 15% of LCS density.

Abbreviations:
TPU - Total Propagated Uncertainty
DER - Duplicate Error Ratio
BDL - Below Detection Limit
NR - Not Reported

Data Package ID: *GSW1711189-1*

Gamma Spectroscopy Results

PAI 713 Rev 14

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: B3DCR3
Lab ID: 1711189-1DUP
Library: FANP.LIB

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 12
Date Collected: 07-Nov-17
Date Prepared: 01-Dec-17
Date Analyzed: 05-Dec-17

Prep Batch: GS171201-1
QCBatchID: GS171201-1-2
Run ID: GS171201-1A
Count Time: 500 minutes
Report Basis: Unfiltered

Final Aliquot: 1000 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 171357d08

CASNO	Analyte	Sample			Duplicate			RPD	RPD Lim
		Result +/- 2 s TPU	MDC	Flags	Result +/- 2 s TPU	MDC	Flags		
10198-40-0	Co-60	5.47E+01 +/- 8.15E+00	7.48E+00		5.24E+01 +/- 7.60E+00	6.17E+00		4.00	20
10045-97-3	Cs-137	2.36E+01 +/- 5.66E+00	6.61E+00		2.89E+01 +/- 5.46E+00	4.93E+00		NC	20
14683-23-9	Eu-152	3.89E+00 +/- 2.32E+01	3.98E+01	U	-5.54E+00 +/- 1.74E+01	3.12E+01	U	NC	20
15585-10-1	Eu-154	9.14E-01 +/- 2.43E+01	4.18E+01	U	3.63E+00 +/- 2.01E+01	3.43E+01	U	NC	20
14391-16-3	Eu-155	-6.65E+00 +/- 1.04E+01	1.80E+01	U	-1.68E+00 +/- 5.66E+00	9.68E+00	U	NC	20

Comments:

Qualifiers/Flags:

+ - Duplicate RPD not within limits.
LT - Result is less than Request MDC, greater than sample specific MDC
U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
NC - Not Calculated for duplicate results less than 5 times MDC
SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 halflives.
G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty
BDL - Below Detection Limit
NR - Not Reported

Data Package ID: *GSW1711189-1*

Gamma Spectroscopy Results

PAI 713 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: B3DCR3
Lab ID: 1711189-1
Library: FANP.LIB
Analysis ReqCode: GAMMA_GS: CO

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 12
Date Collected: 07-Nov-17
Date Prepared: 01-Dec-17
Date Analyzed: 05-Dec-17

Prep Batch: GS171201-1
QCBatchID: GS171201-1-2
Run ID: GS171201-1A
Count Time: 500 minutes
Report Basis: Unfiltered

Final Aliquot: 1000 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 171433d07

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10198-40-0	Co-60	5.47E+01 +/- 8.15E+00	7.48E+00		NA	
10045-97-3	Cs-137	2.36E+01 +/- 5.66E+00	6.61E+00	1E+01	NA	
14683-23-9	Eu-152	3.89E+00 +/- 2.32E+01	3.98E+01		NA	U
15585-10-1	Eu-154	9.14E-01 +/- 2.43E+01	4.18E+01		NA	U
14391-16-3	Eu-155	-6.65E+00 +/- 1.04E+01	1.80E+01		NA	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TP

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: *GSW1711189-1*

Gamma Spectroscopy Results

PAI 713 Rev 14

Sample Duplicate Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: B3DCR3
Lab ID: 1711189-1DUP
Library: FANP.LIB

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 12
Date Collected: 07-Nov-17
Date Prepared: 01-Dec-17
Date Analyzed: 05-Dec-17

Prep Batch: GS171201-1
QCBatchID: GS171201-1-2
Run ID: GS171201-1A
Count Time: 500 minutes
Report Basis: Unfiltered

Final Aliquot: 1000 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 171357d08

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10198-40-0	Co-60	5.24E+01 +/- 7.60E+00	6.17E+00		NA	
10045-97-3	Cs-137	2.89E+01 +/- 5.46E+00	4.93E+00	1E+01	NA	
14683-23-9	Eu-152	-5.54E+00 +/- 1.74E+01	3.12E+01		NA	U
15585-10-1	Eu-154	3.63E+00 +/- 2.01E+01	3.43E+01		NA	U
14391-16-3	Eu-155	-1.68E+00 +/- 5.66E+00	9.68E+00		NA	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

D - DER is greater than Control Limit of 2.13

SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 halflives.
G - Sample density differs by more than 15% of LCS density.

Abbreviations:
TPU - Total Propagated Uncertainty
MDC - Sample specific Minimum Detectable Concentration
BDL - Below Detection Limit
DL - Decision Level

Data Package ID: *GSW1711189-1*

Date Printed: Tuesday, December 12, 2017

Prep Batch ID: GS171201-1

Start Date: 12/01/17
Start Time: 7:46
Prep Analyst: Nicholas M. Pratt
End Date: 12/01/17
End Time: 7:46
Concentration Method: NONE
Extract Method: PAI 73912
Initial Volume Units: ml
Final Volume Units: ml
Batch Created By: nmp
Date Created: 12/01/17
Time Created: 7:47
Validated By: nmp
Date Validated: 12/01/17
Time Validated: 9:51

Comments:

QC Batch ID: GS171201-1-2

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
GS171201-1A	MB	XXXXXX	WATER	XXXXXX	1000	1000	NONE	1	1710459
GS171201-1	LCS	XXXXXX	WATER	XXXXXX	1000	1000	NONE	1	1710459
1711183-8	DUP	XXXXXX	WATER	XXXXXX	1000	1000	NONE	1	1711183
1711189-1	DUP	B3DCR3	WATER	11/7/2017	1000	1000	NONE	1	1711189
1710459-1	SMP	XXXXXX	WATER	XXXXXX	1000	1000	NONE	1	1710459
1711183-7	SMP	XXXXXX	WATER	XXXXXX	1000	1000	NONE	1	1711183
1711183-8	SMP	XXXXXX	WATER	XXXXXX	1000	1000	NONE	1	1711183
1711189-1	SMP	B3DCR3	WATER	11/7/2017	1000	1000	NONE	1	1711189

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		

Strontium-90

Case Narrative

CH2M HILL Plateau Remediation Company

GW Background Study, October 2 – I18-011

Work Order Number: 1711189

1. This section of the report consists of the analytical results for three water samples received by ALS on 11/09/2017.

2. The samples were prepared according to the current revision of SOP 707.

3. The samples were analyzed for the presence of ^{90}Sr according to the current revision of SOP 724. The analyses were completed on 12/13/2017.

4. Total radio-strontium is reported as ^{90}Sr. The presence of other radioisotopes of strontium may cause positive bias in the measured strontium concentration.

5. The analysis results for these samples are reported in units of pCi/L. The samples were not filtered prior to analysis.

6. Sample volume was insufficient to allow preparation of a duplicate. A laboratory control sample duplicate (LCSD) was prepared in lieu of a client sample duplicate.

7. In accordance with project specific instructions, the evaluation threshold for Relative Percent Difference (RPD) has been set at 20%. RPD is defined as:

$$RPD = \frac{/S - D/}{(S + D)/2} * 100$$

Where: S = sample activity result and D = duplicate activity result.

8. Due to uncertainty associated with the ICP-AES determination of strontium concentration in the samples, the calculated yield for samples 1711189-8 and SR171204-1LCSD fell between 100% and 110%. To minimize the potential for low bias, results have been calculated conservatively assuming quantitative chemical yield (100%). The magnitude of the low bias is estimated to be less than 10% of the reported value and is acceptable according the ALS LQAP. The samples are identified with a "Y" qualifier on the final report.

9. No further anomalous situations were encountered during the preparation and analysis of these samples. All remaining quality control criteria were met.

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.

Pik Yee Yuen — 12/14/17
Radiochemistry Primary Data Reviewer — Date

Radiochemistry Final Data Reviewer — 12/31/17
Date

Strontium-90 by GFPC

PAI 724 Rev 12

Method Blank Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Lab ID: SR171204-1MB

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 14
Date Collected: 04-Dec-17
Date Prepared: 04-Dec-17
Date Analyzed: 13-Dec-17

Prep Batch: SR171204-1
QCBatchID: SR171204-1-2
Run ID: SR171204-1A
Count Time: 900 minutes

Final Aliquot: 994 ml
Result Units: pCi/l
File Name: SRC1213A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10098-97-2	Sr-90	-8.65E-02 +/- 1.11E-01	1.89E-01	1.00E+00	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.060E+03	1.04E+03	ug	99.0	40 - 110 %	

Comments:

Qualifiers/Flags:
U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.

Abbreviations:
TPU - Total Propagated Uncertainty
MDC - Sample specific Minimum Detectable Concentration
BDL - Below Detection Limit

M - Requested MDC not met.
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.
DL - Decision Level

Data Package ID: *SR1711189-1*

Strontium-90 by GFPC

PAI 724 Rev 12

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Lab ID: SR171204-1LCS

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 14
Date Collected: 04-Dec-17
Date Prepared: 04-Dec-17
Date Analyzed: 13-Dec-17

Prep Batch: SR171204-1
QCBatchID: SR171204-1-2
Run ID: SR171204-1A
Count Time: 30 minutes

Final Aliquot: 994 ml
Result Units: pCi/l
File Name: SRC1213B

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
10098-97-2	Sr-90	9.06E+00 +/- 2.41E+00	1.04E+00	9.580E+00	94.5	75 - 125	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.060E+03	1.03E+03	ug	97.6	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: *SR1711189-1*

Strontium-90 by GFPC

PAI 724 Rev 12

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Lab ID: SR171204-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 14
Date Collected: 04-Dec-17
Date Prepared: 04-Dec-17
Date Analyzed: 13-Dec-17

Prep Batch: SR171204-1
QCBatchID: SR171204-1-2
Run ID: SR171204-1A
Count Time: 30 minutes

Final Aliquot: 994 ml
Result Units: pCi/l
File Name: SRC1213B

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
10098-97-2	Sr-90	9.00E+00 +/- 2.40E+00	1.08E+00	9.580E+00	93.9	75 - 125	Y

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.060E+03	1.06E+03	ug	101	40 - 110 %	Y

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: *SR1711189-1*

ALS1711189

Strontium-90 by GFPC

PAI 724 Rev 12

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID:
Lab ID: SR171204-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 14
Date Collected: 04-Dec-17
Date Prepared: 04-Dec-17
Date Analyzed: 13-Dec-17

Prep Batch: SR171204-1
QCBatchID: SR171204-1-2
Run ID: SR171204-1A
Count Time: 30 minutes

Final Aliquot: 994 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC1213B

CASNO	Analyte	Sample			Duplicate			DER	DER Lim
		Result +/- 2 s TPU	MDC	Flags	Result +/- 2 s TPU	MDC	Flags		
10098-97-2	Sr-90	9.06E+00 +/- 2.41E+00	1.04E+00		9.00E+00 +/- 2.40E+00	1.08E+00	Y	0.0339	3

Comments:

Duplicate Qualifiers/Flags:

U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
D - DER is greater than Control Limit of 3
LT - Result is less than Request MDC, greater than sample specific MDC
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits

Abbreviations:
TPU - Total Propagated Uncertainty
DER - Duplicate Error Ratio
BDL - Below Detection Limit
NR - Not Reported

Data Package ID: *SR1711189-1*

ALS1711189

Strontium-90 by GFPC

PAI 724 Rev 12

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID:
Lab ID: SR171204-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 14
Date Collected: 04-Dec-17
Date Prepared: 04-Dec-17
Date Analyzed: 13-Dec-17

Prep Batch: SR171204-1
QCBatchID: SR171204-1-2
Run ID: SR171204-1A
Count Time: 30 minutes

Final Aliquot: 994 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC1213B

CASNO	Analyte	Sample			Duplicate			RPD	RPD Lim
		Result +/- 2 s TPU	MDC	Flags	Result +/- 2 s TPU	MDC	Flags		
10098-97-2	Sr-90	9.06E+00 +/- 2.41E+00	1.04E+00		9.00E+00 +/- 2.40E+00	1.08E+00	Y	1.00	20

Comments:

Qualifiers/Flags:

+ - Duplicate RPD not within limits.
LT - Result is less than Request MDC, greater than sample specific MDC
U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
NC - Not Calculated for duplicate results less than 5 times MDC

Abbreviations:

TPU - Total Propagated Uncertainty
BDL - Below Detection Limit
NR - Not Reported

Data Package ID: *SR1711189-1*

Strontium-90 by GFPC

PAI 724 Rev 12

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: B3DCT0
Lab ID: 1711189-2

Analysis ReqCode: SRISO_SEP_PR

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 14
Date Collected: 07-Nov-17
Date Prepared: 04-Dec-17
Date Analyzed: 13-Dec-17

Prep Batch: SR171204-1
QCBatchID: SR171204-1-2
Run ID: SR171204-1A
Count Time: 180 minutes
Report Basis: Unfiltered

Final Aliquot: 994 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC1213

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10098-97-2	Sr-90	1.94E+01 +/- 4.61E+00	3.92E-01	1E+00	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.220E+03	1.16E+03	ug	95.5	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: *SR1711189-1*

Strontium-90 by GFPC

PAI 724 Rev 12

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: B3DCR8
Lab ID: 1711189-3

Analysis ReqCode: SRISO_SEP_PR

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 14
Date Collected: 07-Nov-17
Date Prepared: 04-Dec-17
Date Analyzed: 13-Dec-17

Prep Batch: SR171204-1
QCBatchID: SR171204-1-2
Run ID: SR171204-1A
Count Time: 180 minutes
Report Basis: Unfiltered

Final Aliquot: 994 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC1213

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10098-97-2	Sr-90	1.98E+01 +/- 4.71E+00	4.07E-01	1E+00	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.260E+03	1.18E+03	ug	93.5	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: *SR1711189-1*

Strontium-90 by GFPC

PAI 724 Rev 12

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1711189
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: GW Background Study, October 2 I18-001

Field ID: B3DCR9
Lab ID: 1711189-8

Analysis ReqCode: SRISO_SEP_PR

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 14
Date Collected: 07-Nov-17
Date Prepared: 04-Dec-17
Date Analyzed: 13-Dec-17

Prep Batch: SR171204-1
QCBatchID: SR171204-1-2
Run ID: SR171204-1A
Count Time: 180 minutes
Report Basis: Unfiltered

Final Aliquot: 994 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC1213

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10098-97-2	Sr-90	1.90E+01 +/- 4.52E+00	3.91E-01	1E+00	NA	Y

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.180E+03	1.20E+03	ug	102	40 - 110 %	Y

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: *SR1711189-1*

Prep Batch ID: SR171204-1

Start Date: 12/04/17
Start Time: 9:32
Prep Analyst: Macey S. Hall

End Date: 12/04/17
End Time: 9:32

Concentration Method: NONE
Extract Method: PAI 70714
Initial Volume Units: ml
Final Volume Units: ml

Batch Created By: msh2
Date Created: 12/04/17
Time Created: 9:32
Validated By: msh2
Date Validated: 12/13/17
Time Validated: 10:52

Comments:

Due to limited volume, a LCSD was performed.
Due to limited volume, a reduced aliquot was taken for samples 1711549-3, 1711569-3, -8, -16, 1712006-3, -8, & -11

QC Batch ID: SR171204-1-2

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
SR171204-1	CAR	XXXXXX	WATER	XXXXXX	1000	1000	NONE	1	1710459
SR171204-1	MB	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1710459
SR171204-1	LCS	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1710459
SR171204-1	LCSD	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1710459
1710459-1	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1710459
1711189-2	SMP	B3DCT0	WATER	11/7/2017	1000	994.01	NONE	1	1711189
1711189-3	SMP	B3DCR8	WATER	11/7/2017	1000	994.01	NONE	1	1711189
1711189-8	SMP	B3DCR9	WATER	11/7/2017	1000	994.01	NONE	1	1711189

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			