Ft. Collins, Colorado

Thursday, September 19, 2019

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

Re: ALS Workorder: 1908446
Project Name: SURV, August 2019
Project Number: S19-008

Dear Ms. Waters-Husted:

Thirteen water samples were received from CH2M HILL Plateau Remediation Company, on 8/20/2019. The samples were scheduled for the following analyses:

Carbon-14 by Liquid Scintillation
Gamma Spectroscopy
GC/MS Volatiles
Metals
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
Katie M. OBrien
Project Manager

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

SAMPLE ISSUE RESOLUTION (SIR) REPORT

SIR Number: SIR19-0820
Rev. Number: 0
Date Initiated: 08/22/2019

SAMPLE EVENT INFORMATION

SAF NUM(S): S19-008

LABORATORY: ALS

SAMPLING INFORMATION

NUMBER OF SAMPLES: 3

SAMPLE NUMBERS: B3PWH4, B3PWW4, B3PXL9

SAMPLE MATRIX: WATER

SDG NUM(S): ALS1908446

ISSUE BACKGROUND

CLASS: Field Sampling Issue

TYPE: Insufficient Sample Volume Collected

DESCRIPTION: For sample B3PXL9, four of the five vials submitted for analysis have headspace > 6 mm.
For sample B3PWW4, two of the five vials submitted for analysis have headspace > 6 mm.
For sample B3PWH4, two of the five vials submitted for analysis have headspace > 6 mm.

RESOLUTION

PROPOSED RESOLUTION: ALS proposes that we use the vials without headspace for the final analysis.

FINAL RESOLUTION: Accept proposed resolution.

SUBMITTED BY:

O'BRIEN, KATIE 08/22/2019

ACCEPTED BY:

CUTSFORTH, EC 08/22/2019

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1908446
Client Name: CH2M HILL Plateau Remediation Company
Client Project Name: SURV, August 2019
Client Project Number: S19-008
Client PO Number: BOA 54854

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
B3PXK3	1908446-1		WATER	16-Aug-19	10:16
B3PYL0	1908446-2		WATER	16-Aug-19	10:16
B3PXL9	1908446-3		WATER	16-Aug-19	7:00
B3PXM0	1908446-4		WATER	16-Aug-19	8:28
B3PWW4	1908446-5		WATER	16-Aug-19	10:49
B3PWX3	1908446-6		WATER	16-Aug-19	7:00
B3PWX4	1908446-7		WATER	16-Aug-19	9:25
B3PWH4	1908446-8		WATER	16-Aug-19	9:59
B3PX07	1908446-9		WATER	16-Aug-19	11:27
B3PX12	1908446-10		WATER	16-Aug-19	7:45
B3PX15	1908446-11		WATER	16-Aug-19	7:45
B3PX98	1908446-12		WATER	16-Aug-19	8:32
B3PXB3	1908446-13		WATER	16-Aug-19	9:17

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 1908446	C.O.C.# S19-008-024 Page 1 of ~~1~~ 2

Collector:	Juan Aguilar /CHPRC	**Contact/Requester:**	Karen Waters-Husted	**Telephone No.:**	509-376-4650 8/16/19
SAF No.:	S19-008	**Sampling Origin:**	Hanford Site	**Purchase Order/Charge Code:**	300071
Project Title:	SURV, August 2019	**Logbook No.:**	HNF-N-506 -110140	**Ice Chest No.:**	GWS-361
Shipped To (Lab):	ALS Environmental Ft. Collins	**Method of Shipment**	Commercial Carrier	**Bill of Lading/Air Bill No.:**	7760 1577 7210
Protocol:	SURV	**Priority:**	30 Days	**Offsite Property No.:**	11464

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

SPECIAL INSTRUCTIONS
N/A

	Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
1	B3PXK3	Y	W	8-16-19	1016	1x500-mL G/P	6020_METALS_ICPMS: Chromium (1)	6 Months	HNO3 to pH <2
2	B3PYL0	N	W	8-16-19	1016	1x500-mL G/P	6020_METALS_ICPMS: Chromium (1)	6 Months	HNO3 to pH <2
2	B3PYL0	N	W	8-16-19	1016	2x1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2

Relinquished By	Print First and Last Name	Signature	Date/Time	Received By	Print First and Last Name	Signature	Date/Time
Relinquished By:	Juan Aguilar /CHPRC		AUG 16 2019 1030	Received By:	Lesly Wall /CHPRC		AUG 16 2019 1030
Relinquished By:	Lesly Wall /CHPRC		AUG 16 2019 1140	Received By:	SSU-1		AUG 16 2019 1140
Relinquished By:	SSU-1		AUG 19 2019 0715	Received By:	Tim Calloway /CHPRC		AUG 19 2019 0715
Relinquished By:	Tim Calloway /CHPRC		AUG 19 2019 1400	Received By:	FEDEX		

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:

ALS1908446 Sept. 24, 2019 Rev. 1 4 of 107

1908446

CHAIN OF CUSTODY SIGNATURE CONTINUATION

COC No: 519-008-024

Page 2 of 2

PRINT NAME / SIGNATURE		PRINT NAME / SIGNATURE	
Relinquished by: FEDEX	Date/Time:	Received by: Erik Evans	Date/Time: 8/20/19 0960
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A-6007-699 (REV 0)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 1908446	C.O.C. # S19-008-026 Page 1 of ~~1~~ 2

Collector:	Malcom Chunn CHPRC	**Contact/Requester:**	Karen Waters-Husted	**Telephone No.:**	509-376-4650 LW 8/16/19
SAF No.:	S19-008	**Sampling Origin:**	Hanford Site	**Purchase Order/Charge Code:**	300071
Project Title:	SURV, August 2019	**Logbook No.:**	HNF-N-506 ~~1114~~	**Ice Chest No.:**	GWS-361
Shipped To (Lab):	ALS Environmental Ft. Collins	**Method of Shipment**	Commercial Carrier	**Bill of Lading/Air Bill No.:**	7760 1577 7240
Protocol:	SURV	**Priority:**	30 Days	**Offsite Property No.:**	11464

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

SPECIAL INSTRUCTIONS
N/A

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
3 B3PXL9	N	W	8-16-19	0700	5x40-mL aGs*	8260_VOA_GCMS: COMMON	14 Days	HCl or H2SO4 to pH <2 / Cool <=6C

Relinquished By	Signature	Date/Time	Received By	Signature	Date/Time
Malcom Chunn CHPRC	MR Chunn	AUG 16 2019 0850	Lesly Wall /CHPRC	Lesly Wall	AUG 16 2019 0850
Lesly Wall /CHPRC	Lesly Wall	AUG 16 2019 0930	SSU-1 LW 8/16/19 FEDEX		AUG 16 2019 0930
SSU-1		AUG 19 2019 0715	Tim Callaway /CHPRC		AUG 19 2019 0715
Tim Callaway /CHPRC		AUG 19 2019 1400	FEDEX		

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:

ALS1908446 Sept. 24, 2019 Rev. 1 6 of 107

1908446

CHAIN OF CUSTODY SIGNATURE CONTINUATION

COC No: 519-008-026

Page 2 of 2

PRINT NAME / SIGNATURE		PRINT NAME / SIGNATURE	
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Relinquished by:	Date/Time:	Received by:	Date/Time:
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A-6007-699 (REV 0)

ALS1908446 Sept. 24, 2019 Rev. 1

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 1908446	C.O.C. # S19-008-027 Page 1 of 12

Collector:	Malcom Chunn CHPRC	**Contact/Requester:**	Karen Waters-Husted	**Telephone No.:**	509-376-4650
SAF No.:	S19-008	**Sampling Origin:**	Hanford Site	**Purchase Order/Charge Code:**	300071
Project Title:	SURV, August 2019	**Logbook No.:**	HNF-N-506-111-4	**Ice Chest No.:**	GWS-361
Shipped To (Lab):	ALS Environmental Ft. Collins	**Method of Shipment**	Commercial Carrier	**Bill of Lading/Air Bill No.:**	7766 1577 7290
Protocol:	SURV	**Priority:**	30 Days	**Offsite Property No.:**	11464

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

SPECIAL INSTRUCTIONS
N/A

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B3PXM0	N	W	8-16-19	0828	5x40-mL aGs*	8260_VOA_GCMS: COMMON	14 Days	HCl or H2SO4 to pH <2 / Cool <=6C

4

Relinquished By: Malcom Chunn CHPRC — Print First and Last Name / Signature / AUG 16 2019 0850 Date/Time	Received By: Lesly Wall /CHPRC — Print First and Last Name / Signature / AUG 16 2019 0850 Date/Time		Matrix *
Relinquished By: Lesly Wall /CHPRC — Print First and Last Name / Signature / AUG 16 2019 0930 Date/Time	Received By: SSU-1 — Print First and Last Name / Signature / AUG 16 2019 0930 Date/Time		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
Relinquished By: SSU-1 — Print First and Last Name / Signature / AUG 19 2019 0715 Date/Time	Received By: Tim Callaway /CHPRC — Print First and Last Name / Signature / AUG 19 2019 0715 Date/Time		
Relinquished By: Tim Callaway /CHPRC — Print First and Last Name / Signature / AUG 19 2019 1400 Date/Time	Received By: FEDEX — Print First and Last Name / Signature / Date/Time		

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

ALS1908446 Sept. 24, 2019 Rev. 1 8 of 107

1908446

CHAIN OF CUSTODY SIGNATURE CONTINUATION

COC No: S19-008-027

Page 2 of 2

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A-6007-699 (REV 0)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 1908446	C.O.C. # S19-008-042 Page 1 of 1

Collector:	Malcom Chunn CHPRC	**Contact/Requester:**	Karen Waters-Husted	**Telephone No.:**	509-376-4650
SAF No.:	S19-008	**Sampling Origin:**	Hanford Site	**Purchase Order/Charge Code:**	300071
Project Title:	SURV, August 2019	**Logbook No.:**	HNF-N-506 -111-4	**Ice Chest No.:**	GWS-361
Shipped To (Lab):	ALS Environmental Ft. Collins	**Method of Shipment**	Commercial Carrier	**Bill of Lading/Air Bill No.:**	7760 1577 7290
Protocol:	SURV	**Priority:**	30 Days	**Offsite Property No.:**	11484

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

SPECIAL INSTRUCTIONS
N/A

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
5 B3PWW4	N	W	8-16-19	1049	5x40-mL aGs*	8260_VOA_GCMS: COMMON	14 Days	HCl or H2SO4 to pH <2 / Cool <=6C

Relinquished By:	Received By:
Malcom Chunn CHPRC / MR / AUG 16 2019 1245 (Print First and Last Name / Signature / Date/Time)	SSU-1 / AUG 16 2019 1245 (Print First and Last Name / Signature / Date/Time)
SSU-1 / AUG 19 2019 0715 (Print First and Last Name / Signature / Date/Time)	Tim Callaway /CHPRC / AUG 19 2019 0715 (Print First and Last Name / Signature / Date/Time)
Tim Callaway /CHPRC / AUG 19 2019 1400 (Print First and Last Name / Signature / Date/Time)	FEDEX (Print First and Last Name / Signature / Date/Time)
FEDEX (Print First and Last Name / Signature / Date/Time)	Erik Evans / 8/20/19 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:

ALS1908446 Sept. 24, 2019 Rev. 1 10 of 107

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 1908446	C.O.C. # S19-008-044 Page 1 of 12

Collector: Juan Aguilar /CHPRC	**Contact/Requester:** Karen Waters-Husted	**Telephone No.:** 509-376-4650
SAF No.: S19-008	**Sampling Origin:** Hanford Site	**Purchase Order/Charge Code:** 300071
Project Title: SURV, August 2019	**Logbook No.:** HNF-N-506-110140	**Ice Chest No.:** GWS-361
Shipped To (Lab): ALS Environmental Ft. Collins	**Method of Shipment** Commercial Carrier	**Bill of Lading/Air Bill No.:** 7760 1577 7290
Protocol: SURV	**Priority:** 30 Days	**Offsite Property No.:** 11464

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

SPECIAL INSTRUCTIONS
N/A

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
6 B3PWX3	N	W	8-16-19	0700	2x1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2

Relinquished By:	Received By:
Juan Aguilar /CHPRC — AUG 16 2019 0710 (Print First and Last Name / Signature / Date/Time)	SSU-1 — Jeff Luzzo /CHPRC — AUG 16 2019 0710
Jeff Luzzo /CHPRC — AUG 16 2019 0710	SSU-1 — AUG 16 2019 0710
SSU-1 — AUG 19 2019 0715	Tim Calloway /CHPRC — AUG 19 2019 0715
Tim Calloway /CHPRC — AUG 19 2019 1400	FEDEX

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 6/10/2019 FSR ID = FSR81001 A-6004-842 (REV 3)

ALS1908446 Sept. 24, 2019 Rev. 1

1908446

CHAIN OF CUSTODY SIGNATURE CONTINUATION

COC No: 519-008-044

Page 2 of 2

PRINT NAME / SIGNATURE		PRINT NAME / SIGNATURE	
Relinquished by: FEDEX	Date/Time:	Received by: Erik Evans Erik E	Date/Time: 8/20/19 0900
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A-6007-699 (REV 0)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 1908446	C.O.C. # S19-008-045 Page 1 of 12

Collector:	Juan Aguilar /CHPRC	**Contact/Requester:**	Karen Waters-Husted	**Telephone No.:**	509-376-4650 RW 8/16/19
SAF No.:	S19-008	**Sampling Origin:**	Hanford Site	**Purchase Order/Charge Code:**	300071
Project Title:	SURV, August 2019	**Logbook No.:**	HNF-N-506 -110140	**Ice Chest No.:**	GWS-361
Shipped To (Lab):	ALS Environmental Ft. Collins	**Method of Shipment**	Commercial Carrier	**Bill of Lading/Air Bill No.:**	7760 1577 7240
Protocol:	SURV	**Priority:**	30 Days	**Offsite Property No.:**	11464

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

SPECIAL INSTRUCTIONS
N/A

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
7 B3PWX4	N	W	8-16-19	0925	2x1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2

Relinquished By	Print First and Last Name	Signature	Date/Time	Received By	Print First and Last Name	Signature	Date/Time
Juan Aguilar /CHPRC			AUG 1 6 2019 1030	Lesly Wall /CHPRC			AUG 1 6 2019 1030
Lesly Wall /CHPRC			AUG 1 6 2019 1140	SSU-1			AUG 1 6 2019 1140
SSU-1			AUG 1 9 2019 0715	Tim Calloway /CHPRC			AUG 1 9 2019 0715
Tim Calloway /CHPRC			AUG 1 9 2019 1400	FEDEX			

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:

ALS1908446 Sept. 24, 2019 Rev. 1 13 of 107

1908446

CHAIN OF CUSTODY SIGNATURE CONTINUATION

COC No: SY1-008-045

Page 2 of 2

PRINT NAME / SIGNATURE		PRINT NAME / SIGNATURE	
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A-6007-699 (REV 0)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 19084446	C.O.C. # S19-008-050 Page 1 of 1/2

Collector:	Malcom Chunn CHPRC	**Contact/Requester:**	Karen Waters-Husted	**Telephone No.:**	509-376-4650
SAF No.:	S19-008	**Sampling Origin:**	Hanford Site	**Purchase Order/Charge Code:**	300071
Project Title:	SURV, August 2019	**Logbook No.:**	HNF-N-506 -111-4	**Ice Chest No.:**	GWS-361
Shipped To (Lab):	ALS Environmental Ft. Collins	**Method of Shipment**	Commercial Carrier	**Bill of Lading/Air Bill No.:**	7760 1577 7290
Protocol:	SURV	**Priority:**	30 Days	**Offsite Property No.:**	11464

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

SPECIAL INSTRUCTIONS
N/A

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B3PWH4	N	W	8-16-19	0959	5x40-mL aGs*	8260_VOA_GCMS: COMMON	14 Days	HCl or H2SO4 to pH <2 / Cool <=6C

Relinquished By	Print First and Last Name	Signature	Date/Time	Received By	Print First and Last Name	Signature	Date/Time
Malcom Chunn CHPRC			AUG 16 2019 1034	Lesly Wall /CHPRC			AUG 16 2019 1034
Lesly Wall /CHPRC			AUG 16 2019 1140	SSU-1			AUG 16 2019 1140
SSU-1			AUG 19 2019 0715	Tim Calloway /CHPRC			AUG 19 2019 0715
Tim Calloway /CHPRC			AUG 19 2019 1400	FEDEX			

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:

ALS19084446 Sept. 24, 2019 Rev. 1 15 of 107

1908446

CHAIN OF CUSTODY SIGNATURE CONTINUATION

COC No: 519-008-050
Page 2 of 2

PRINT NAME / SIGNATURE		PRINT NAME / SIGNATURE	
Relinquished by: FEDEX	Date/Time:	Received by: Erik Evans	Date/Time: 8/20/19 0900
Relinquished by:	Date/Time:	Received by:	Date/Time:
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Relinquished by:	Date/Time:	Received by:	Date/Time:
Relinquished by:	Date/Time:	Received by:	Date/Time:
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A-6007-699 (REV 0)

ALS1908446

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 1908446	C.O.C. # S19-008-068 Page 1 of ~~10~~ 2

Collector: Tim Callaway /CHPRC	**Contact/Requester:** Karen Waters-Husted	**Telephone No.:** 509-376-4650 928-1649
SAF No.: S19-008	**Sampling Origin:** Hanford Site	**Purchase Order/Charge Code:** 300071
Project Title: SURV, August 2019	**Logbook No.:** HNF-N-506 -712	**Ice Chest No.:** GWS-361
Shipped To (Lab): ALS Environmental Ft. Collins	**Method of Shipment** Commercial Carrier	**Bill of Lading/Air Bill No.:** 7760157772 40
Protocol: SURV	**Priority:** 30 Days	**Offsite Property No.:** 11464

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

SPECIAL INSTRUCTIONS
N/A

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
9 B3PX07	N	W	8/16/19	1127	1x500-mL G/P	C14_LSC: COMMON	6 Months	None

Relinquished By	Print First and Last Name	Signature	Date/Time	Received By	Print First and Last Name	Signature	Date/Time
Tim Callaway /CHPRC			AUG 16 2019 1140	Janelle Zunker CHPRC			AUG 16 2019 1140
Janelle Zunker CHPRC			AUG 16 2019 1200	SSU-1			AUG 16 2019 1200
SSU-1			AUG 19 2019 0715	Tim Callaway /CHPRC			AUG 19 2019 0715
Tim Callaway /CHPRC			AUG 19 2019 1400	FEDEX			

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:

Sept. 24, 2019

Rev. 1

17 of 107

Printed On 6/10/2019 FSR ID = FSR80929 A-6004-842 (REV 3)

1908446

CHAIN OF CUSTODY SIGNATURE CONTINUATION

COC No: 519-008-068

Page 2 of 2

PRINT NAME / SIGNATURE		PRINT NAME / SIGNATURE	
Relinquished by: FEDEX	Date/Time:	Received by: Erik Evans	Date/Time: 8/20/19 0900
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Relinquished by:	Date/Time:	Received by:	Date/Time:

A-6007-699 (REV 0)

ALS1908446

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 1908446	C.O.C. # S19-008-069 Page 1 of 1 2

Collector:	Tim Callaway /CHPRC	**Contact/Requester:**	Karen Waters-Husted	**Telephone No.:**	509-376-4650 928-1069
SAF No.:	S19-008	**Sampling Origin:**	Hanford Site	**Purchase Order/Charge Code:**	300071
Project Title:	SURV, August 2019	**Logbook No.:**	HNF-N-506 -112	**Ice Chest No.:**	Cwis-361
Shipped To (Lab):	ALS Environmental Ft. Collins	**Method of Shipment**	Commercial Carrier	**Bill of Lading/Air Bill No.:**	7760 1577 7240
Protocol:	SURV	**Priority:**	30 Days	**Offsite Property No.:**	11464

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

SPECIAL INSTRUCTIONS
N/A

	Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
10	B3PX12	N	W	8/14/19	0745	1x500-mL G/P	7470_MERCURY_CV: COMMON (AQUEOUS); 6010_METALS_ICP: GW 04; 6020_METALS_ICPMS: GW 01	28 Days	HNO3 to pH <2
10	B3PX12	N	W	|	|	5x40-mL aGs*	8260_VOA_GCMS: GW 03	14 Days	HCl or H2SO4 to pH <2 / Cool <=6C
11	B3PX15	Y	W	8/14/19	0745	1x500-mL G/P	7470_MERCURY_CV: COMMON (AQUEOUS); 6010_METALS_ICP: GW 04; 6020_METALS_ICPMS: GW 01	28 Days	HNO3 to pH <2

Relinquished By	Print First and Last Name	Signature	Date/Time	Received By	Print First and Last Name	Signature	Date/Time
Tim Callaway /CHPRC			AUG 16 2019 0855	Janelle Zunker CHPRC			AUG 16 2019 0855
Janelle Zunker CHPRC			AUG 16 2019 0930	SSU-1			AUG 16 2019 0930
SSU-1			AUG 19 2019 0715	Tim Callaway /CHPRC			AUG 19 2019 0715
Tim Callaway /CHPRC			AUG 19 2019 1400	FEDEX			

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:

Sept. 24, 2019

Rev. 1

1908446

CHAIN OF CUSTODY SIGNATURE CONTINUATION

COC No: S116-008-069

Page of

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A-6007-699 (REV 0)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 1908446	C.O.C. # S19-008-074 Page 1 of 1

Collector:	Tim Callaway /CHPRC	**Contact/Requester:**	Karen Waters-Husted	**Telephone No.:**	509-376-4650
SAF No.:	S19-008	**Sampling Origin:**	Hanford Site	**Purchase Order/Charge Code:**	300071
Project Title:	SURV, August 2019	**Logbook No.:**	HNF-N-506 712	**Ice Chest No.:**	Cooler 361
Shipped To (Lab):	ALS Environmental Ft. Collins	**Method of Shipment**	Commercial Carrier	**Bill of Lading/Air Bill No.:**	7760 1577 7240
Protocol:	SURV	**Priority:**	30 Days	**Offsite Property No.:**	11461

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

SPECIAL INSTRUCTIONS
N/A

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
12 B3PX98	N	W	8/16/19	0832	1x1-L G/P	GAMMA_GS: COMMON	6 Months	HNO3 to pH <2

Relinquished By			Received By		
Print First and Last Name	*Signature*	*Date/Time*	*Print First and Last Name*	*Signature*	*Date/Time*
Tim Callaway /CHPRC		8/16/19 0855	Janelle Zunker CHPRC		8/16/19 0855
Janelle Zunker CHPRC	AUG 16 2019 0930		SSU-1	SSU-1 AUG 16 2019 0930	
SSU-1	AUG 19 2019 0915		Tim Callaway /CHPRC		AUG 19 2019 0915
Tim Callaway /CHPRC		AUG 19 2019 1400	FEDEX		
	FEDEX		Erik Evans		8/20/19 0900

Matrix *

S	= Soil	DS	= Drum Solids
SE	= Sediment	DL	= Drum Liquids
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 6/27/2019

FSR ID = FSR80933

A-6004-842 (REV 3)

ALS1908446

Sept. 24, 2019

Rev. 1

21 of 107

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 1908446	C.O.C. # S19-008-075 Page 1 of 12

Collector:	Tim Callaway /CHPRC	**Contact/Requester:**	Karen Waters-Husted	**Telephone No.:**	509-376-4650
SAF No.:	S19-008	**Sampling Origin:**	Hanford Site	**Purchase Order/Charge Code:**	300071
Project Title:	SURV, August 2019	**Logbook No.:**	HNF-N-506 ~112	**Ice Chest No.:**	GWS-361
Shipped To (Lab):	ALS Environmental Ft. Collins	**Method of Shipment**	Commercial Carrier	**Bill of Lading/Air Bill No.:**	7760 1577 7240
Protocol:	SURV	**Priority:**	30 Days	**Offsite Property No.:**	11464

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

SPECIAL INSTRUCTIONS
N/A

	Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
13	B3PXB3	N	W	8/16/19	~~0917~~ 1030	1x500-mL G/P	C14_LSC: COMMON	6 Months	None
13	B3PXB3	N	W		0917	1x1-L G/P	GAMMA_GS: COMMON	6 Months	HNO3 to pH <2

09/17

Relinquished By	Print First and Last Name	Signature	Date/Time	Received By	Print First and Last Name	Signature	Date/Time
Tim Callaway /CHPRC			AUG 16 2019 1025	Janelle Zunker CHPRC			AUG 16 2019 1025
Janelle Zunker CHPRC			AUG 16 2019 1045	SSU-1			AUG 16 2019 1045
SSU-1			AUG 19 2019 0715	Tim Callaway /CHPRC			AUG 19 2019 0715
Tim Callaway /CHPRC			AUG 19 2019 1400	FEDEX			

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:

ALS1908446 Sept. 24, 2019 Rev. 1 22 of 107

1908446

CHAIN OF CUSTODY SIGNATURE CONTINUATION

COC No: 519-008-05

Page 2 of 2

PRINT NAME / SIGNATURE		PRINT NAME / SIGNATURE	
Relinquished by: FEDEX	Date/Time:	Received by: Erik Evans Erik E	Date/Time: 8/20/19 0900
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A-6007-699 (REV 0)

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: CHPRC Workorder No: 1908446

Project Manager: KMO Initials: EE Date: 8/21/19

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	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?		YES	NO *
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO *
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO *
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO *
9.	Is there sufficient sample for the requested analyses?		YES	NO *
10.	Are all samples in the proper containers for the requested analyses?		YES	NO *
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO *
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO *
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1							
Temperature (°C):	1.1							
No. of custody seals on cooler:	2							
DOT Survey/ Acceptance Information — External µR/hr reading:	12							
Background µR/hr reading:	13							

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

*** Please provide details here for NO responses to gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.**

13)...8446-3-1,-2,-4,-5; -5-1,-3; -8-2 all have significant (>6mm) headspace

All client bottle ID's vs ALS lab ID's double-checked by: EE

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

Project Manager Signature / Date: 8/22/19

Form 201r27.xls
(02/11/2019)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1908446

ORIGIN ID:PSCA (509) 531-0450
TROY BACON
CH2M
6267 LATAH ST.
RICHLAND, WA 99352
UNITED STATES US

SHIP DATE: 19AUG19
ACTWGT: 90.00 LB
CAD: 10706051/INET4160

BILL THIRD PARTY

TO JULIE ELLINGSON
ALS GLOBAL-FORT COLLINS
225 COMMERCE DR
FORT COLLINS CO 80524
(970) 490-1511
INV:
PO:
REF: PTR#11464
DEPT:

12-2

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567J3/E9E7/05A2

FedEx Express

J1320190824Mw

TUE - 20 AUG 10:30A
PRIORITY OVERNIGHT
DSR
80524
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TRK# 0201 7760 1577 7290

XH FTCA

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.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

Carbon-14

Case Narrative

CH2M HILL Plateau Remediation Company

SURV, August 2019 – S19-008

Work Order Number: 1908446

1. The samples were prepared according to the current revision of SOP 772.

2. The samples were analyzed for the presence of Carbon-14 according to the current revision of SOP 704. The analyses were completed on 09/10/2019.

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

4. The matrix spikes of sample 1908541-3 are shared for this work order. The matrix spikes were performed on a CH2M HILL Plateau Remediation Company sample. The results can be found in the following report.

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

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

   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. The RPD value for 1908541-3MS and -3MSD is elevated above the 20% control limit at 30%. The DER value for this duplicate pair is in control at 2.49 Results are submitted without further qualification. The results for the matrix spike duplicate are flagged with an “X” qualifier.

6. No further anomalous situations were encountered during the preparation or 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 — 9/19/19

Pik Yee Yuen — Date

Radiochemistry Primary Data Reviewer

9/19/19

Radiochemistry Final Data Reviewer — Date

Carbon-14 by Liquid Scintillation

PAI 704 Rev 12

Method Blank Results

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: C190906-1MB

Sample Matrix: WATER
Prep SOP: PAI 772 Rev 6
Date Collected: 06-Sep-19
Date Prepared: 06-Sep-19
Date Analyzed: 10-Sep-19

Prep Batch: C190906-1
QCBatchID: C190906-1-1
Run ID: C190906-1A
Count Time: 120 minutes

Final Aliquot: 2.50 ml
Result Units: pCi/l
File Name: B60_05_090901

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
14762-75-5	C-14	-1.32E+02 +/- 2.90E+02	4.87E+02	5.00E+02	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.

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: *C1908446-1*

Carbon-14 by Liquid Scintillation

PAI 704 Rev 12

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: C190906-1LCS

Sample Matrix: WATER
Prep SOP: PAI 772 Rev 6
Date Collected: 06-Sep-19
Date Prepared: 06-Sep-19
Date Analyzed: 10-Sep-19

Prep Batch: C190906-1
QCBatchID: C190906-1-1
Run ID: C190906-1A
Count Time: 120 minutes

Final Aliquot: 2.50 ml
Result Units: pCi/l
File Name: B60_05_090901

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14762-75-5	C-14	4.70E+03 +/- 8.02E+02	4.87E+02	5.110E+03	92.1	75 - 125	

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.
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: *C1908446-1*

Carbon-14 by Liquid Scintillation

PAI 704 Rev 12

Matrix Spike Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: Shared QC
Lab ID: 1908541-3MS

Analysis ReqCode: C14_LSC: COM

Sample Matrix: WATER
Prep SOP: PAI 772 Rev 6
Date Collected: 21-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 10-Sep-19

Prep Batch: C190906-1
QCBatchID: C190906-1-1
Run ID: C190906-1A
Count Time: 120 minutes
Report Basis: Unfiltered

Final Aliquot: 2.50 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: B60_05_090901

CASNO	Target Nuclide	Matrix Spike	Sample Results	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14762-75-5	C-14	5.53E+03	8.14E+01	4.87E+02	5.100E+03	107	60 - 140	

Comments:

Qualifiers/Flags:

U - Result is less than the 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: *C1908446-1*

Carbon-14 by Liquid Scintillation

PAI 704 Rev 12

Matrix Spike Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: Shared QC
Lab ID: 1908541-3MSD

Analysis ReqCode: C14_LSC: COM

Sample Matrix: WATER
Prep SOP: PAI 772 Rev 6
Date Collected: 21-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 10-Sep-19

Prep Batch: C190906-1
QCBatchID: C190906-1-1
Run ID: C190906-1A
Count Time: 120 minutes
Report Basis: Unfiltered

Final Aliquot: 2.50 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: B60_05_090901

CASNO	Target Nuclide	Matrix Spike	Sample Results	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14762-75-5	C-14	4.08E+03	8.14E+01	4.87E+02	5.100E+03	78.3	60 - 140	X

Comments:

Qualifiers/Flags:

U - Result is less than the 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: *C1908446-1*

Carbon-14 by Liquid Scintillation

PAI 704 Rev 12

Sample Results

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: Shared QC
Lab ID: 1908541-3

Sample Matrix: WATER
Prep SOP: PAI 772 Rev 6
Date Collected: 21-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 10-Sep-19

Prep Batch: C190906-1
QCBatchID: C190906-1-1
Run ID: C190906-1A
Count Time: 120 minutes
Report Basis: Unfiltered

Final Aliquot: 2.50 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: B60_05_090901

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
14762-75-5	C-14	8.14E+01 +/- 2.93E+02	4.87E+02	5E+02	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.

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: *C1908446-1*

Carbon-14 by Liquid Scintillation

PAI 704 Rev 12

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: Shared QC
Lab ID: 1908541-3MSD

Sample Matrix: WATER
Prep SOP: PAI 772 Rev 6
Date Collected: 21-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 10-Sep-19

Prep Batch: C190906-1
QCBatchID: C190906-1-1
Run ID: C190906-1A
Count Time: 120 minutes
Report Basis: Unfiltered

Final Aliquot: 2.50 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: B60_05_090901

CASNO	Analyte	Sample			Duplicate			DER	DER Lim
		Result +/- 2 s TPU	MDC	Flags	Result +/- 2 s TPU	MDC	Flags		
14762-75-5	C-14	5.53E+03 +/- 9.20E+02	4.87E+02		4.08E+03 +/- 7.14E+02	4.87E+02	X	2.49	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: *C1908446-1*

Carbon-14 by Liquid Scintillation

PAI 704 Rev 12

Duplicate Sample Results (RPD)

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: Shared QC
Lab ID: 1908541-3MSD

Sample Matrix: WATER
Prep SOP: PAI 772 Rev 6
Date Collected: 21-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 10-Sep-19

Prep Batch: C190906-1
QCBatchID: C190906-1-1
Run ID: C190906-1A
Count Time: 120 minutes
Report Basis: Unfiltered

Final Aliquot: 2.50 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: B60_05_090901

CASNO	Analyte	Sample				Duplicate				RPD	RPD Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
14762-75-5	C-14	5.53E+03	+/- 9.20E+02	4.87E+02		4.08E+03	+/- 7.14E+02	4.87E+02	X	30.00	20

Comments:

Qualifiers/Flags:

+ - Duplicate RPD not within limits.
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: *C1908446-1*

Carbon-14 by Liquid Scintillation

PAI 704 Rev 12

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PX07
Lab ID: 1908446-9DUP

Sample Matrix: WATER
Prep SOP: PAI 772 Rev 6
Date Collected: 16-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 09-Sep-19

Prep Batch: C190906-1
QCBatchID: C190906-1-1
Run ID: C190906-1A
Count Time: 120 minutes
Report Basis: Unfiltered

Final Aliquot: 2.50 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: B60_05_090901

CASNO	Analyte	Sample			Duplicate			DER	DER Lim
		Result +/- 2 s TPU	MDC	Flags	Result +/- 2 s TPU	MDC	Flags		
14762-75-5	C-14	0E+00 +/- 2.92E+02	4.87E+02	U	2.19E+01 +/- 2.92E+02	4.87E+02	U	0.106	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: *C1908446-1*

Carbon-14 by Liquid Scintillation

PAI 704 Rev 12

Duplicate Sample Results (RPD)

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PX07
Lab ID: 1908446-9DUP

Sample Matrix: WATER
Prep SOP: PAI 772 Rev 6
Date Collected: 16-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 09-Sep-19

Prep Batch: C190906-1
QCBatchID: C190906-1-1
Run ID: C190906-1A
Count Time: 120 minutes
Report Basis: Unfiltered

Final Aliquot: 2.50 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: B60_05_090901

CASNO	Analyte	Sample			Duplicate			RPD	RPD Lim
		Result +/- 2 s TPU	MDC	Flags	Result +/- 2 s TPU	MDC	Flags		
14762-75-5	C-14	0E+00 +/- 2.92E+02	4.87E+02	U	2.19E+01 +/- 2.92E+02	4.87E+02	U	NC	20

Comments:

Qualifiers/Flags:

+ - Duplicate RPD not within limits.
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: *C1908446-1*

Carbon-14 by Liquid Scintillation

PAI 704 Rev 12

Sample Results

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PX07
Lab ID: 1908446-9

Analysis ReqCode: C14_LSC: COM

Sample Matrix: WATER
Prep SOP: PAI 772 Rev 6
Date Collected: 16-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 09-Sep-19

Prep Batch: C190906-1
QCBatchID: C190906-1-1
Run ID: C190906-1A
Count Time: 120 minutes
Report Basis: Unfiltered

Final Aliquot: 2.50 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: B60_05_090901

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
14762-75-5	C-14	0E+00 +/- 2.92E+02	4.87E+02	5E+02	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.

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: *C1908446-1*

Carbon-14 by Liquid Scintillation

PAI 704 Rev 12

Sample Duplicate Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PX07
Lab ID: 1908446-9DUP

Sample Matrix: WATER
Prep SOP: PAI 772 Rev 6
Date Collected: 16-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 09-Sep-19

Prep Batch: C190906-1
QCBatchID: C190906-1-1
Run ID: C190906-1A
Count Time: 120 minutes
Report Basis: Unfiltered

Final Aliquot: 2.50 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: B60_05_090901

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
14762-75-5	C-14	2.19E+01 +/- 2.92E+02	4.87E+02	5E+02	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.

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 3

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: *C1908446-1*

Date Printed: Tuesday, September 17, 2019

ALS -- Fort Collins

LIMS Version: 6.909

Carbon-14 by Liquid Scintillation

PAI 704 Rev 12

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PXB3
Lab ID: 1908446-13

Analysis ReqCode: C14_LSC: COM

Sample Matrix: WATER
Prep SOP: PAI 772 Rev 6
Date Collected: 16-Aug-19
Date Prepared: 06-Sep-19
Date Analyzed: 10-Sep-19

Prep Batch: C190906-1
QCBatchID: C190906-1-1
Run ID: C190906-1A
Count Time: 120 minutes
Report Basis: Unfiltered

Final Aliquot: 2.50 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: B60_05_090901

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
14762-75-5	C-14	1.32E+02 +/- 2.95E+02	4.87E+02	5E+02	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.

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: *C1908446-1*

Prep Batch ID: C190906-1

Start Date: 09/06/19
Start Time: 8:48
Prep Analyst: Mikenna I. Gapinski

End Date: 09/06/19
End Time: 8:48

Concentration Method: NONE
Extract Method: PAI 7726
Initial Volume Units: ml
Final Volume Units: ml

Batch Created By: mig
Date Created: 09/06/19
Time Created: 8:48
Validated By: mig
Date Validated: 09/06/19
Time Validated: 14:58

Comments:

QC Batch ID: C190906-1-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
C190906-1	MB	XXXXXX	WATER	XXXXXX	25	2.5	NONE	1	1908376
C190906-1CB1	MB	XXXXXX	WATER	XXXXXX	25	2.5	NONE	1	1908376
C190906-1CB2	MB	XXXXXX	WATER	XXXXXX	25	2.5	NONE	1	1908376
C190906-1CB3	MB	XXXXXX	WATER	XXXXXX	25	2.5	NONE	1	1908376
C190906-1	LCS	XXXXXX	WATER	XXXXXX	25	2.5	NONE	1	1908376
1908541-3	MS	XXXXXX	WATER	XXXXXX	25	2.5	NONE	1	1908541
1908541-3	MSD	XXXXXX	WATER	XXXXXX	25	2.5	NONE	1	1908541
1908446-9	DUP	B3PX07	WATER	8/16/2019	25	2.5	NONE	1	1908446
1908376-13	SMP	XXXXXX	WATER	XXXXXX	25	2.5	NONE	1	1908376
1908446-13	SMP	B3PXB3	WATER	8/16/2019	25	2.5	NONE	1	1908446
1908446-9	SMP	B3PX07	WATER	8/16/2019	25	2.5	NONE	1	1908446
1908541-3	SMP	XXXXXX	WATER	XXXXXX	25	2.5	NONE	1	1908541

QC Types

CAR	Carrier reference sample	DLS	Detection Limit Standard	
DUP	Laboratory Duplicate	LCS	Laboratory Control Sample	
LCSD	Laboratory Control Sample Duplicat	LODV	Limit of Detection Verification	
LOQV	Limit of Quantitation Verification	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

SURV, August 2019 – S19-008

Work Order Number: 1908446

1. The samples were prepared according to the current revision of SOP739.

2. The samples were analyzed for the presence of gamma emitting radionuclides according to the current revision of SOP713. The analyses were completed on 09/13/2019.

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

4. Sample volumes were insufficient to allow preparation of a duplicate. A duplicate analysis of sample 1908446-12 was performed in lieu of a prepared duplicate.

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

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

   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 samples 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 — 9/19/19

Pik Yee Yuen
Radiochemistry Primary Data Reviewer

Date

9/19/19

Radiochemistry Final Data Reviewer

Date

Gamma Spectroscopy Results

PAI 713 Rev 14

Method Blank Results

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: GS190909-3MB
Library: FANP.LIB

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 12
Date Collected: 09-Sep-19
Date Prepared: 09-Sep-19
Date Analyzed: 13-Sep-19

Prep Batch: GS190909-3
QCBatchID: GS190909-3-1
Run ID: GS190909-3A
Count Time: 1000 minutes

Final Aliquot: 1000 ml
Result Units: pCi/l
File Name: 190892d09

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10198-40-0	Co-60	7.94E-02 +/- 2.63E+00	4.56E+00		NA	U
10045-97-3	Cs-137	7.21E-01 +/- 2.54E+00	4.27E+00	1.00E+01	NA	U
14683-23-9	Eu-152	9.07E+00 +/- 1.39E+01	2.30E+01		NA	U
15585-10-1	Eu-154	2.65E+00 +/- 1.51E+01	2.56E+01		NA	U
14391-16-3	Eu-155	2.16E+00 +/- 4.17E+00	6.90E+00		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.

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: *GSW1908446-1*

Gamma Spectroscopy Results

PAI 713 Rev 14

Laboratory Control Sample(s)

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: GS190909-3LCS

Library: ANALYTICAL.LI

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 12
Date Collected: 09-Sep-19
Date Prepared: 09-Sep-19
Date Analyzed: 11-Sep-19

Prep Batch: GS190909-3
QCBatchID: GS190909-3-1
Run ID: GS190909-3A
Count Time: 30 minutes

Final Aliquot: 1000 ml
Result Units: pCi/l
File Name: 191376d03

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14596-10-2	Am-241	1.04E+05 +/- 1.23E+04	1.83E+03	1.010E+05	102	85 - 115	
10198-40-0	Co-60	4.06E+04 +/- 4.77E+03	1.52E+02	4.080E+04	99.6	85 - 115	
10045-97-3	Cs-137	3.85E+04 +/- 4.53E+03	2.24E+02	3.800E+04	101	85 - 115	

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.
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: *GSW1908446-1*

Gamma Spectroscopy Results

PAI 713 Rev 14

Duplicate Sample Results (DER)

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PX98
Lab ID: 1908446-12DUP
Library: FANP.LIB

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 12
Date Collected: 16-Aug-19
Date Prepared: 09-Sep-19
Date Analyzed: 12-Sep-19

Prep Batch: GS190909-3
QCBatchID: GS190909-3-1
Run ID: GS190909-3A
Count Time: 270 minutes
Report Basis: Unfiltered

Final Aliquot: 1000 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 190868d07

CASNO	Analyte	Sample			Duplicate			DER	DER Lim
		Result +/- 2 s TPU	MDC	Flags	Result +/- 2 s TPU	MDC	Flags		
10198-40-0	Co-60	8.33E+00 +/- 4.64E+00	9.32E+00	U	5.05E+00 +/- 4.20E+00	9.24E+00	U	1.05	3
10045-97-3	Cs-137	-3.69E+00 +/- 4.72E+00	8.42E+00	U	-1.88E+00 +/- 4.96E+00	8.87E+00	U	0.529	3
14683-23-9	Eu-152	-9.76E+00 +/- 2.82E+01	5.06E+01	U	-6.26E+00 +/- 2.61E+01	4.77E+01	U	0.182	3
15585-10-1	Eu-154	-1.65E+01 +/- 2.75E+01	4.95E+01	U	-1.44E+01 +/- 2.71E+01	4.98E+01	U	0.107	3
14391-16-3	Eu-155	7.74E+00 +/- 1.20E+01	1.97E+01	U	3.28E+00 +/- 1.54E+01	2.60E+01	U	0.457	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: *GSW1908446-1*

Gamma Spectroscopy Results

PAI 713 Rev 14

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PX98
Lab ID: 1908446-12DUP
Library: FANP.LIB

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 12
Date Collected: 16-Aug-19
Date Prepared: 09-Sep-19
Date Analyzed: 12-Sep-19

Prep Batch: GS190909-3
QCBatchID: GS190909-3-1
Run ID: GS190909-3A
Count Time: 270 minutes
Report Basis: Unfiltered

Final Aliquot: 1000 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 190868d07

CASNO	Analyte	Sample			Duplicate			RPD	RPD Lim
		Result +/- 2 s TPU	MDC	Flags	Result +/- 2 s TPU	MDC	Flags		
10198-40-0	Co-60	8.33E+00 +/- 4.64E+00	9.32E+00	U	5.05E+00 +/- 4.20E+00	9.24E+00	U	NC	20
10045-97-3	Cs-137	-3.69E+00 +/- 4.72E+00	8.42E+00	U	-1.88E+00 +/- 4.96E+00	8.87E+00	U	NC	20
14683-23-9	Eu-152	-9.76E+00 +/- 2.82E+01	5.06E+01	U	-6.26E+00 +/- 2.61E+01	4.77E+01	U	NC	20
15585-10-1	Eu-154	-1.65E+01 +/- 2.75E+01	4.95E+01	U	-1.44E+01 +/- 2.71E+01	4.98E+01	U	NC	20
14391-16-3	Eu-155	7.74E+00 +/- 1.20E+01	1.97E+01	U	3.28E+00 +/- 1.54E+01	2.60E+01	U	NC	20

Comments:

Qualifiers/Flags:

+ - Duplicate RPD not within limits.
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: *GSW1908446-1*

Gamma Spectroscopy Results

PAI 713 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PX98
Lab ID: 1908446-12
Library: FANP.LIB
Analysis ReqCode: GAMMA_GS: CO

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 12
Date Collected: 16-Aug-19
Date Prepared: 09-Sep-19
Date Analyzed: 11-Sep-19

Prep Batch: GS190909-3
QCBatchID: GS190909-3-1
Run ID: GS190909-3A
Count Time: 500 minutes
Report Basis: Unfiltered

Final Aliquot: 1000 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 191973d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10198-40-0	Co-60	8.33E+00 +/- 4.64E+00	9.32E+00		NA	U
10045-97-3	Cs-137	-3.69E+00 +/- 4.72E+00	8.42E+00	1E+01	NA	U
14683-23-9	Eu-152	-9.76E+00 +/- 2.82E+01	5.06E+01		NA	U
15585-10-1	Eu-154	-1.65E+01 +/- 2.75E+01	4.95E+01		NA	U
14391-16-3	Eu-155	7.74E+00 +/- 1.20E+01	1.97E+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.

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: *GSW1908446-1*

Gamma Spectroscopy Results

PAI 713 Rev 14

Sample Duplicate Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PX98
Lab ID: 1908446-12DUP
Library: FANP.LIB

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 12
Date Collected: 16-Aug-19
Date Prepared: 09-Sep-19
Date Analyzed: 12-Sep-19

Prep Batch: GS190909-3
QCBatchID: GS190909-3-1
Run ID: GS190909-3A
Count Time: 270 minutes
Report Basis: Unfiltered

Final Aliquot: 1000 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 190868d07

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10198-40-0	Co-60	5.05E+00 +/- 4.20E+00	9.24E+00		NA	U
10045-97-3	Cs-137	-1.88E+00 +/- 4.96E+00	8.87E+00	1E+01	NA	U
14683-23-9	Eu-152	-6.26E+00 +/- 2.61E+01	4.77E+01		NA	U
15585-10-1	Eu-154	-1.44E+01 +/- 2.71E+01	4.98E+01		NA	U
14391-16-3	Eu-155	3.28E+00 +/- 1.54E+01	2.60E+01		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.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but thereported activity is greater than the reported 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.

D - DER is greater than Control Limit of 3

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

Data Package ID: *GSW1908446-1*

Date Printed: Tuesday, September 17, 2019

ALS -- Fort Collins
LIMS Version: 6.909

Gamma Spectroscopy Results

PAI 713 Rev 14

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PXB3
Lab ID: 1908446-13
Library: FANP.LIB
Analysis ReqCode: GAMMA_GS: CO

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 12
Date Collected: 16-Aug-19
Date Prepared: 09-Sep-19
Date Analyzed: 12-Sep-19

Prep Batch: GS190909-3
QCBatchID: GS190909-3-1
Run ID: GS190909-3A
Count Time: 270 minutes
Report Basis: Unfiltered

Final Aliquot: 1000 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 190992d08

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10198-40-0	Co-60	-4.47E+00 +/- 4.58E+00	9.01E+00		NA	U
10045-97-3	Cs-137	-1.98E+00 +/- 3.99E+00	7.27E+00	1E+01	NA	U
14683-23-9	Eu-152	-1.05E+01 +/- 2.37E+01	4.44E+01		NA	U
15585-10-1	Eu-154	9.04E+00 +/- 2.33E+01	3.99E+01		NA	U
14391-16-3	Eu-155	6.81E+00 +/- 8.03E+00	1.31E+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.

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: *GSW1908446-1*

Prep Batch ID: GS190909-3

Start Date: 09/09/19
Start Time: 11:01
Prep Analyst: Alex H. Jouney

End Date: 09/09/19
End Time: 11:01

Concentration Method: NONE
Extract Method: PAI 73912
Initial Volume Units: ml
Final Volume Units: ml

Batch Created By: jmk
Date Created: 09/09/19
Time Created: 11:01
Validated By: smg
Date Validated: 09/09/19
Time Validated: 14:51

Comments:

QC Batch ID: GS190909-3-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
GS190909-3	MB	XXXXXX	WATER	XXXXXX	1000	1000	NONE	1	1908446
GS190909-3	LCS	XXXXXX	WATER	XXXXXX	1000	1000	NONE	1	1908446
1908446-12	DUP	B3PX98	WATER	8/16/2019	1000	1000	NONE	1	1908446
1908446-12	SMP	B3PX98	WATER	8/16/2019	1000	1000	NONE	1	1908446
1908446-13	SMP	B3PXB3	WATER	8/16/2019	1000	1000	NONE	1	1908446

QC Types

CAR	Carrier reference sample	DLS	Detection Limit Standard
DUP	Laboratory Duplicate	LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicat	LODV	Limit of Detection Verification
LOQV	Limit of Quantitation Verification	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

ALS -- Fort Collins

LIMS Version: 6.909

Date Printed: Tuesday, September 17, 2019

GC/MS Volatiles

Case Narrative

CH2M HILL Plateau Remediation Company

SURV, August 2019 – S19-008

Work Order Number: 1908446

1. These samples were prepared according to SW-846, 3rd Edition procedures. Specifically, the water samples were prepared using purge and trap procedures based on Method 5030C.

2. The samples were analyzed using GC/MS with an RTX-624, RTX-VMS, or equivalent capillary column according to the current revision of SOP 525 based on SW-846 Method 8260. All positive results were quantitated against the initial calibration standards using the internal standard technique. The identification of positive results was achieved by a comparison of the retention time and mass spectrum of the sample versus the daily calibration standard.

3. All initial calibration criteria were met.

4. All initial calibrations are verified by comparing a second source standard calibration verification (ICV) against the calibration curve. All criteria for initial calibration verification were met.

5. Per the guidance in methods 8000 and 8260, all compounds in each of the daily (continuing) calibration verifications had sufficient response to support accurate quantitation of the data included in this report.

6. Methylene chloride, acetone and 2-butanone are common laboratory contaminants. In order to minimize the levels of these compounds detected in the gc/ms analysis, ALS has designated its volatile laboratory as a restricted access area. In addition, the laboratory has been equipped with a dedicated, air intake and exhaust system that operates under positive pressure in order to minimize cross contamination of these compounds. Due to fluctuations in ambient laboratory conditions, reported sample values for common laboratory contaminants may be due to lab contamination even if the compound in question is not detected in the associated method blank.

   All method blank criteria were met.

7. All laboratory control sample and laboratory control sample duplicate recoveries and RPDs were within the acceptance criteria.

8. Sample 1908446-10 was designated as the quality control sample for this analysis. 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.

   All matrix spike and matrix spike duplicate recoveries and RPDs were within acceptance criteria.

9. The samples were analyzed within the established holding time.

10. All surrogate recoveries were within acceptance criteria.

11. All internal standard recoveries were within acceptance criteria.

12. Manual integrations are performed when needed to provide consistent and defensible data following the guidelines in the current revision of SOP 939.

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.

Mindy Norton 9/10/19

Mindy Norton
Organics Primary Data Reviewer

Date

9/15/19

Organics Final Data Reviewer

Date

ALS
Data Qualifier Flags
Organics

U or ND:	**This flag indicates that the compound was analyzed for but not detected.**
J:	**This flag indicates an estimated value. This flag is used as follows : (1) when estimating a concentration for tentatively identified compounds (TICs) where a 1:1 response is assumed; (2) when the mass spectral and retention time data indicate the presence of a compound that meets the volatile and semivolatile GC/MS identification criteria, and the result is less than the reporting limit (RL) but greater than the method detection limit (MDL); (3) when the retention time data indicate the presence of a compound that meets the GC identification criteria, and the result is less than the RL but greater than the MDL; and (4) the reported value is estimated.**
B:	**This flag is used when the analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user. This flag shall be used for a tentatively identified compound (TIC) as well as for a positively identified target compound.**
E:	**This flag identifies compounds whose concentration exceeds the upper level of the calibration range.**
A:	**This flag indicates that a tentatively identified compound is a suspected aldol-condensation product.**
X:	**This flag indicates that the analyte was diluted below an accurate quantitation level.**
***:**	**This flag indicates that a spike recovery is equal to or outside the control criteria used.**
+:	**This flag indicates that the relative percent difference (RPD) equals or exceeds the control criteria.**

GC/MS Volatiles

Method SW8260_25C

Method Blank

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: VL190821-3MB

Sample Matrix: WATER
% Moisture: N/A
Date Collected: N/A
Date Extracted: 21-Aug-19
Date Analyzed: 21-Aug-19

Prep Batch: VL190821-3
QCBatchID: VL190821-3-1
Run ID: VL190821-3A
Cleanup: NONE
Basis: N/A
File Name: C88485

Sample Aliquot: 10 ml
Final Volume: 10 ml
Result Units: UG/L
Clean DF: 1

CASNO	Target Analyte	DF	Result	Result Qualifier	Reporting Limit	MDL
75-01-4	VINYL CHLORIDE	1	0.15	U	1	0.15
75-35-4	1,1-DICHLOROETHENE	1	0.3	U	1	0.3
67-64-1	ACETONE	1	3	U	10	3
75-15-0	CARBON DISULFIDE	1	0.3	U	1	0.3
75-09-2	METHYLENE CHLORIDE	1	0.34	U	1	0.34
75-34-3	1,1-DICHLOROETHANE	1	0.3	U	1	0.3
78-93-3	2-BUTANONE	1	3	U	10	3
67-66-3	CHLOROFORM	1	0.3	U	1	0.3
71-55-6	1,1,1-TRICHLOROETHANE	1	0.3	U	1	0.3
56-23-5	CARBON TETRACHLORIDE	1	0.15	U	1	0.15
107-06-2	1,2-DICHLOROETHANE	1	0.15	U	1	0.15
71-43-2	BENZENE	1	0.3	U	1	0.3
79-01-6	TRICHLOROETHENE	1	0.5	U	1	0.5
108-10-1	4-METHYL-2-PENTANONE	1	3	U	10	3
108-88-3	TOLUENE	1	0.3	U	1	0.3
79-00-5	1,1,2-TRICHLOROETHANE	1	0.3	U	1	0.3
127-18-4	TETRACHLOROETHENE	1	0.3	U	1	0.3
108-90-7	CHLOROBENZENE	1	0.3	U	1	0.3
100-41-4	ETHYLBENZENE	1	0.3	U	1	0.3
1330-20-7	TOTAL XYLENES	1	1	U	1	

Data Package ID: *VL1908446-1*

GC/MS Volatiles

Method SW8260_25C

Method Blank

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: VL190821-3MB

Sample Matrix: WATER
% Moisture: N/A
Date Collected: N/A
Date Extracted: 21-Aug-19
Date Analyzed: 21-Aug-19

Prep Batch: VL190821-3
QCBatchID: VL190821-3-1
Run ID: VL190821-3A
Cleanup: NONE
Basis: N/A
File Name: C88485

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

CASNO	Target Analyte	DF	Result	Result Qualifier	Reporting Limit	MDL

Surrogate Recovery

CASNO	Surrogate Analyte	Result	Flag	Spike Amount	Percent Recovery	Control Limits
460-00-4	4-BROMOFLUOROBENZENE	25.4		25	101	85 - 115
1868-53-7	DIBROMOFLUOROMETHANE	25.3		25	101	84 - 118
2037-26-5	TOLUENE-D8	25		25	100	85 - 115

Data Package ID: *VL1908446-1*

GC/MS Volatiles

Method SW8260_25C

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PXL9
Lab ID: 1908446-3

Analysis ReqCode: 8260_VOA_GCM

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 21-Aug-19
Date Analyzed: 21-Aug-19
Prep Method: SW5030 Rev C

Prep Batch: VL190821-3
QCBatchID: VL190821-3-1
Run ID: VL190821-3A
Cleanup: NONE
Basis: As Received
File Name: C88486

Analyst: Joe Kostelnik
Sample Aliquot: 10 ml
Final Volume: 10 ml
Result Units: UG/L
Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
75-01-4	VINYL CHLORIDE	1	0.15	U	1	0.15
75-35-4	1,1-DICHLOROETHENE	1	0.3	U	1	0.3
67-64-1	ACETONE	1	3	U	10	3
75-15-0	CARBON DISULFIDE	1	0.3	U	1	0.3
75-09-2	METHYLENE CHLORIDE	1	0.6	J	1	0.34
75-34-3	1,1-DICHLOROETHANE	1	0.3	U	1	0.3
78-93-3	2-BUTANONE	1	3	U	10	3
67-66-3	CHLOROFORM	1	0.3	U	1	0.3
71-55-6	1,1,1-TRICHLOROETHANE	1	0.3	U	1	0.3
56-23-5	CARBON TETRACHLORIDE	1	0.15	U	1	0.15
107-06-2	1,2-DICHLOROETHANE	1	0.15	U	1	0.15
71-43-2	BENZENE	1	0.3	U	1	0.3
79-01-6	TRICHLOROETHENE	1	0.5	U	1	0.5
108-10-1	4-METHYL-2-PENTANONE	1	3	U	10	3
108-88-3	TOLUENE	1	0.3	U	1	0.3
79-00-5	1,1,2-TRICHLOROETHANE	1	0.3	U	1	0.3
127-18-4	TETRACHLOROETHENE	1	0.3	U	1	0.3
108-90-7	CHLOROBENZENE	1	0.3	U	1	0.3
100-41-4	ETHYLBENZENE	1	0.3	U	1	0.3
1330-20-7	TOTAL XYLENES	1	1	U	1	

Data Package ID: *VL1908446-1*

GC/MS Volatiles

Method SW8260_25C

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PXL9
Lab ID: 1908446-3

Analysis ReqCode: 8260_VOA_GCM

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 21-Aug-19
Date Analyzed: 21-Aug-19
Prep Method: SW5030 Rev C

Prep Batch: VL190821-3
QCBatchID: VL190821-3-1
Run ID: VL190821-3A
Cleanup: NONE
Basis: As Received
File Name: C88486

Analyst: Joe Kostelnik
Sample Aliquot: 1 ml
Final Volume: 1 ml
Result Units: UG/L
Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL

Surrogate Recovery

CASNO	Surrogate Analyte	Result	Flag	Spike Amount	Percent Recovery	Control Limits
460-00-4	4-BROMOFLUOROBENZENE	25.8		25	103	85 - 115
1868-53-7	DIBROMOFLUOROMETHANE	25.4		25	102	84 - 118
2037-26-5	TOLUENE-D8	25.2		25	101	85 - 115

Data Package ID: *VL1908446-1*

GC/MS Volatiles

Method SW8260_25C

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PXM0
Lab ID: 1908446-4

Analysis ReqCode: 8260_VOA_GCM

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 21-Aug-19
Date Analyzed: 21-Aug-19
Prep Method: SW5030 Rev C

Prep Batch: VL190821-3
QCBatchID: VL190821-3-1
Run ID: VL190821-3A
Cleanup: NONE
Basis: As Received
File Name: C88487

Analyst: Joe Kostelnik
Sample Aliquot: 10 ml
Final Volume: 10 ml
Result Units: UG/L
Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
75-01-4	VINYL CHLORIDE	1	0.15	U	1	0.15
75-35-4	1,1-DICHLOROETHENE	1	0.3	U	1	0.3
67-64-1	ACETONE	1	3	U	10	3
75-15-0	CARBON DISULFIDE	1	0.3	U	1	0.3
75-09-2	METHYLENE CHLORIDE	1	0.34	U	1	0.34
75-34-3	1,1-DICHLOROETHANE	1	0.3	U	1	0.3
78-93-3	2-BUTANONE	1	3	U	10	3
67-66-3	CHLOROFORM	1	0.53	J	1	0.3
71-55-6	1,1,1-TRICHLOROETHANE	1	0.3	U	1	0.3
56-23-5	CARBON TETRACHLORIDE	1	0.15	U	1	0.15
107-06-2	1,2-DICHLOROETHANE	1	0.15	U	1	0.15
71-43-2	BENZENE	1	0.3	U	1	0.3
79-01-6	TRICHLOROETHENE	1	0.5	U	1	0.5
108-10-1	4-METHYL-2-PENTANONE	1	3	U	10	3
108-88-3	TOLUENE	1	0.3	U	1	0.3
79-00-5	1,1,2-TRICHLOROETHANE	1	0.3	U	1	0.3
127-18-4	TETRACHLOROETHENE	1	0.3	U	1	0.3
108-90-7	CHLOROBENZENE	1	0.3	U	1	0.3
100-41-4	ETHYLBENZENE	1	0.3	U	1	0.3
1330-20-7	TOTAL XYLENES	1	1	U	1	

Data Package ID: *VL1908446-1*

GC/MS Volatiles

Method SW8260_25C

Sample Results

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PXM0
Lab ID: 1908446-4

Analysis ReqCode: **8260_VOA_GCM**

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 21-Aug-19
Date Analyzed: 21-Aug-19
Prep Method: SW5030 Rev C

Prep Batch: VL190821-3
QCBatchID: VL190821-3-1
Run ID: VL190821-3A
Cleanup: NONE
Basis: As Received
File Name: C88487

Analyst: Joe Kostelnik
Sample Aliquot: 1 ml
Final Volume: 1 ml
Result Units: UG/L
Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL

Surrogate Recovery

CASNO	Surrogate Analyte	Result	Flag	Spike Amount	Percent Recovery	Control Limits
460-00-4	4-BROMOFLUOROBENZENE	25.8		25	103	85 - 115
1868-53-7	DIBROMOFLUOROMETHANE	25.4		25	101	84 - 118
2037-26-5	TOLUENE-D8	25.1		25	100	85 - 115

Data Package ID: *VL1908446-1*

GC/MS Volatiles

Method SW8260_25C

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PWW4
Lab ID: 1908446-5

Analysis ReqCode: 8260_VOA_GCM

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 21-Aug-19
Date Analyzed: 21-Aug-19
Prep Method: SW5030 Rev C

Prep Batch: VL190821-3
QCBatchID: VL190821-3-1
Run ID: VL190821-3A
Cleanup: NONE
Basis: As Received
File Name: C88488

Analyst: Joe Kostelnik
Sample Aliquot: 10 ml
Final Volume: 10 ml
Result Units: UG/L
Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
75-01-4	VINYL CHLORIDE	1	0.15	U	1	0.15
75-35-4	1,1-DICHLOROETHENE	1	0.3	U	1	0.3
67-64-1	ACETONE	1	3	U	10	3
75-15-0	CARBON DISULFIDE	1	0.3	U	1	0.3
75-09-2	METHYLENE CHLORIDE	1	0.34	U	1	0.34
75-34-3	1,1-DICHLOROETHANE	1	0.3	U	1	0.3
78-93-3	2-BUTANONE	1	3	U	10	3
67-66-3	CHLOROFORM	1	0.37	J	1	0.3
71-55-6	1,1,1-TRICHLOROETHANE	1	0.3	U	1	0.3
56-23-5	CARBON TETRACHLORIDE	1	0.15	U	1	0.15
107-06-2	1,2-DICHLOROETHANE	1	0.15	U	1	0.15
71-43-2	BENZENE	1	0.3	U	1	0.3
79-01-6	TRICHLOROETHENE	1	5.9		1	0.5
108-10-1	4-METHYL-2-PENTANONE	1	3	U	10	3
108-88-3	TOLUENE	1	0.3	U	1	0.3
79-00-5	1,1,2-TRICHLOROETHANE	1	0.3	U	1	0.3
127-18-4	TETRACHLOROETHENE	1	0.3	U	1	0.3
108-90-7	CHLOROBENZENE	1	0.3	U	1	0.3
100-41-4	ETHYLBENZENE	1	0.3	U	1	0.3
1330-20-7	TOTAL XYLENES	1	1	U	1	

Data Package ID: *VL1908446-1*

GC/MS Volatiles

Method SW8260_25C

Sample Results

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PWW4
Lab ID: 1908446-5

Analysis ReqCode: **8260_VOA_GCM**

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 21-Aug-19
Date Analyzed: 21-Aug-19
Prep Method: SW5030 Rev C

Prep Batch: VL190821-3
QCBatchID: VL190821-3-1
Run ID: VL190821-3A
Cleanup: NONE
Basis: As Received
File Name: C88488

Analyst: Joe Kostelnik
Sample Aliquot: 1 ml
Final Volume: 1 ml
Result Units: UG/L
Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL

Surrogate Recovery

CASNO	Surrogate Analyte	Result	Flag	Spike Amount	Percent Recovery	Control Limits
460-00-4	4-BROMOFLUOROBENZENE	25.4		25	102	85 - 115
1868-53-7	DIBROMOFLUOROMETHANE	24.8		25	99	84 - 118
2037-26-5	TOLUENE-D8	25.4		25	101	85 - 115

Data Package ID: *VL1908446-1*

GC/MS Volatiles

Method SW8260_25C

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PWH4
Lab ID: 1908446-8

Analysis ReqCode: 8260_VOA_GCM

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 21-Aug-19
Date Analyzed: 21-Aug-19
Prep Method: SW5030 Rev C

Prep Batch: VL190821-3
QCBatchID: VL190821-3-1
Run ID: VL190821-3A
Cleanup: NONE
Basis: As Received
File Name: C88489

Analyst: Joe Kostelnik
Sample Aliquot: 10 ml
Final Volume: 10 ml
Result Units: UG/L
Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
75-01-4	VINYL CHLORIDE	1	0.15	U	1	0.15
75-35-4	1,1-DICHLOROETHENE	1	0.3	U	1	0.3
67-64-1	ACETONE	1	3	U	10	3
75-15-0	CARBON DISULFIDE	1	0.3	U	1	0.3
75-09-2	METHYLENE CHLORIDE	1	0.34	U	1	0.34
75-34-3	1,1-DICHLOROETHANE	1	0.3	U	1	0.3
78-93-3	2-BUTANONE	1	3	U	10	3
67-66-3	CHLOROFORM	1	0.34	J	1	0.3
71-55-6	1,1,1-TRICHLOROETHANE	1	0.3	U	1	0.3
56-23-5	CARBON TETRACHLORIDE	1	0.15	U	1	0.15
107-06-2	1,2-DICHLOROETHANE	1	0.15	U	1	0.15
71-43-2	BENZENE	1	0.3	U	1	0.3
79-01-6	TRICHLOROETHENE	1	6.7		1	0.5
108-10-1	4-METHYL-2-PENTANONE	1	3	U	10	3
108-88-3	TOLUENE	1	0.3	U	1	0.3
79-00-5	1,1,2-TRICHLOROETHANE	1	0.3	U	1	0.3
127-18-4	TETRACHLOROETHENE	1	0.3	U	1	0.3
108-90-7	CHLOROBENZENE	1	0.3	U	1	0.3
100-41-4	ETHYLBENZENE	1	0.3	U	1	0.3
1330-20-7	TOTAL XYLENES	1	1	U	1	

Data Package ID: *VL1908446-1*

GC/MS Volatiles

Method SW8260_25C

Sample Results

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PWH4
Lab ID: 1908446-8

Analysis ReqCode: **8260_VOA_GCM**

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 21-Aug-19
Date Analyzed: 21-Aug-19
Prep Method: SW5030 Rev C

Prep Batch: VL190821-3
QCBatchID: VL190821-3-1
Run ID: VL190821-3A
Cleanup: NONE
Basis: As Received
File Name: C88489

Analyst: Joe Kostelnik
Sample Aliquot: 1 ml
Final Volume: 1 ml
Result Units: UG/L
Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL

Surrogate Recovery

CASNO	Surrogate Analyte	Result	Flag	Spike Amount	Percent Recovery	Control Limits
460-00-4	4-BROMOFLUOROBENZENE	25.4		25	101	85 - 115
1868-53-7	DIBROMOFLUOROMETHANE	25.2		25	101	84 - 118
2037-26-5	TOLUENE-D8	24.6		25	98	85 - 115

Data Package ID: *VL1908446-1*

GC/MS Volatiles

Method SW8260_25C

Sample Results

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID:	B3PX12
Lab ID:	1908446-10

Analysis ReqCode: **8260_VOA_GCM**

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 21-Aug-19
Date Analyzed: 21-Aug-19
Prep Method: SW5030 Rev C

Prep Batch: VL190821-3
QCBatchID: VL190821-3-3
Run ID: VL190821-3A
Cleanup: NONE
Basis: As Received
File Name: C88490

Analyst: Joe Kostelnik
Sample Aliquot: 10 ml
Final Volume: 10 ml
Result Units: UG/L
Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
75-09-2	METHYLENE CHLORIDE	1	0.34	U	1	0.34
67-66-3	CHLOROFORM	1	0.3	U	1	0.3
56-23-5	CARBON TETRACHLORIDE	1	0.15	U	1	0.15
79-01-6	TRICHLOROETHENE	1	0.5	U	1	0.5

Surrogate Recovery

CASNO	Surrogate Analyte	Result	Flag	Spike Amount	Percent Recovery	Control Limits
460-00-4	4-BROMOFLUOROBENZENE	25.2		25	101	85 - 115
1868-53-7	DIBROMOFLUOROMETHANE	25.1		25	100	84 - 118
2037-26-5	TOLUENE-D8	25		25	100	85 - 115

Data Package ID: *VL1908446-1*

GC/MS Volatiles

Method SW8260_25C

Laboratory Control Sample and Laboratory Control Sample Duplicate

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: VL190821-3LCS

Sample Matrix: WATER
% Moisture: N/A
Date Collected: N/A
Date Extracted: 08/21/2019
Date Analyzed: 08/21/2019
Prep Method: SW5030C

Prep Batch: VL190821-3
QCBatchID: VL190821-3-1
Run ID: VL190821-3A
Cleanup: NONE
Basis: N/A
File Name: C88482

Sample Aliquot: 10 ml
Final Volume: 10 ml
Result Units: UG/L
Clean DF: 1

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
75-01-4	VINYL CHLORIDE	10	9.62	1		96	72 - 123%
75-35-4	1,1-DICHLOROETHENE	10	9.46	1		95	77 - 119%
67-64-1	ACETONE	40	32.1	10		80	62 - 142%
75-15-0	CARBON DISULFIDE	10	10.1	1		101	76 - 121%
75-09-2	METHYLENE CHLORIDE	10	9.56	1		96	71 - 130%
75-34-3	1,1-DICHLOROETHANE	10	10.5	1		105	83 - 119%
78-93-3	2-BUTANONE	40	38	10		95	70 - 135%
67-66-3	CHLOROFORM	10	10.4	1		104	82 - 119%
71-55-6	1,1,1-TRICHLOROETHANE	10	11.5	1		115	80 - 120%
56-23-5	CARBON TETRACHLORIDE	10	11.9	1		119	77 - 122%
107-06-2	1,2-DICHLOROETHANE	10	10.4	1		104	74 - 128%
71-43-2	BENZENE	10	10.4	1		104	83 - 117%
79-01-6	TRICHLOROETHENE	10	10.6	1		106	83 - 117%
108-10-1	4-METHYL-2-PENTANONE	40	35.7	10		89	73 - 125%
108-88-3	TOLUENE	10	10.4	1		104	82 - 113%
79-00-5	1,1,2-TRICHLOROETHANE	10	10.1	1		101	78 - 116%
127-18-4	TETRACHLOROETHENE	10	10.9	1		109	84 - 117%
108-90-7	CHLOROBENZENE	10	10.3	1		103	81 - 113%
100-41-4	ETHYLBENZENE	10	10.4	1		104	81 - 113%
179601-23-	M+P-XYLENE	20	21	1		105	82 - 115%
95-47-6	O-XYLENE	10	10.2	1		102	81 - 115%

Data Package ID: *VL1908446-1*

GC/MS Volatiles

Method SW8260_25C

Laboratory Control Sample and Laboratory Control Sample Duplicate

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: VL190821-3LCSD

Sample Matrix: WATER
% Moisture: N/A
Date Collected: N/A
Date Extracted: 08/21/2019
Date Analyzed: 08/21/2019
Prep Method: SW5030C

Prep Batch: VL190821-3
QCBatchID: VL190821-3-1
Run ID: VL190821-3A
Cleanup: NONE
Basis: N/A
File Name: C88483

Sample Aliquot: 10 ml
Final Volume: 10 ml
Result Units: UG/L
Clean DF: 1

CASNO	Target Analyte	Spike Added	LCSD Result	Reporting Limit	Result Qualifier	LCSD % Rec.	RPD Limit	RPD
75-01-4	VINYL CHLORIDE	10	9.62	1		96	20	0
75-35-4	1,1-DICHLOROETHENE	10	9.5	1		95	20	0
67-64-1	ACETONE	40	33.8	10		84	30	5
75-15-0	CARBON DISULFIDE	10	9.65	1		96	20	5
75-09-2	METHYLENE CHLORIDE	10	9.19	1		92	20	4
75-34-3	1,1-DICHLOROETHANE	10	10.2	1		102	20	3
78-93-3	2-BUTANONE	40	37.1	10		93	30	2
67-66-3	CHLOROFORM	10	10.1	1		101	20	3
71-55-6	1,1,1-TRICHLOROETHANE	10	10.9	1		109	20	5
56-23-5	CARBON TETRACHLORIDE	10	11.6	1		116	20	3
107-06-2	1,2-DICHLOROETHANE	10	10.5	1		105	20	1
71-43-2	BENZENE	10	9.92	1		99	20	4
79-01-6	TRICHLOROETHENE	10	10.4	1		104	20	2
108-10-1	4-METHYL-2-PENTANONE	40	34.1	10		85	30	5
108-88-3	TOLUENE	10	9.94	1		99	20	4
79-00-5	1,1,2-TRICHLOROETHANE	10	9.58	1		96	20	6
127-18-4	TETRACHLOROETHENE	10	10.8	1		108	20	1
108-90-7	CHLOROBENZENE	10	10.3	1		103	20	0
100-41-4	ETHYLBENZENE	10	10.2	1		102	20	2
179601-23-	M+P-XYLENE	20	20.3	1		102	20	3
95-47-6	O-XYLENE	10	9.8	1		98	20	4

Data Package ID: *VL1908446-1*

GC/MS Volatiles

Method SW8260_25C

Laboratory Control Sample and Laboratory Control Sample Duplicate

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Surrogate Recovery LCS/LCSD

CASNO	Target Analyte	Spike Added	LCS % Rec.	LCS Flag	LCSD % Rec.	LCSD Flag	Control Limits
460-00-4	4-BROMOFLUOROBENZENE	25	99		104		85 - 115
1868-53-7	DIBROMOFLUOROMETHANE	25	105		99		84 - 118
2037-26-5	TOLUENE-D8	25	99		98		85 - 115

Data Package ID: *VL1908446-1*

GC/MS Volatiles

Method SW8260_25C

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PX12
LabID: 1908446-10MS

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 21-Aug-19
Date Analyzed: 21-Aug-19
Prep Method: SW5030 Rev C

Prep Batch: VL190821-3
QCBatchID: VL190821-3-3
Run ID: VL190821-3A
Cleanup: NONE
Basis: As Received

Sample Aliquot: 10 ml
Final Volume: 10 ml
Result Units: UG/L
File Name: C88491

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
75-09-2	METHYLENE CHLORIDE	0.34	U	9.28		1	10	93	71 - 130%
67-66-3	CHLOROFORM	0.3	U	9.95		1	10	100	82 - 119%
56-23-5	CARBON TETRACHLORIDE	0.15	U	11.8		1	10	118	77 - 122%
79-01-6	TRICHLOROETHENE	0.5	U	9.97		1	10	100	83 - 117%

Field ID: B3PX12
LabID: 1908446-10MSD

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 21-Aug-19
Date Analyzed: 21-Aug-19
Prep Method: SW5030 Rev C

Prep Batch: VL190821-3
QCBatchID: VL190821-3-3
Run ID: VL190821-3A
Cleanup: NONE
Basis: As Received

Sample Aliquot: 10 ml
Final Volume: 10 ml
Result Units: UG/L
File Name: C88492

CASNO	Target Analyte	MSD Result	MSD Qual	Spike Added	MSD % Rec.	Reporting Limit	RPD Limit	RPD
75-09-2	METHYLENE CHLORIDE	8.5		10	85	1	20	9
67-66-3	CHLOROFORM	9.28		10	93	1	20	7
56-23-5	CARBON TETRACHLORIDE	10.8		10	108	1	20	8
79-01-6	TRICHLOROETHENE	9.54		10	95	1	20	4

Surrogate Recovery MS/MSD

CASNO	Target Analyte	Spike Added	MS % Rec.	MS Flag	MSD % Rec.	MSD Flag	Control Limits
460-00-4	4-BROMOFLUOROBENZENE	25	99		102		85 - 115
1868-53-7	DIBROMOFLUOROMETHANE	25	105		103		84 - 118
2037-26-5	TOLUENE-D8	25	102		101		85 - 115

Data Package ID: *VL1908446-1*

Prep Batch ID: VL190821-3

Start Date: 08/21/19
Start Time: 14:45
Prep Analyst: Joe Kostelnik

End Date: 08/21/19
End Time: 22:18

Concentration Method: NONE
Extract Method: SW5030C
Initial Volume Units: ml
Final Volume Units: ml

Batch Created By: JXK
Date Created: 08/22/19
Time Created: 7:51
Validated By: JXK
Date Validated: 08/22/19
Time Validated: 16:19

Comments:

QC Batch ID: VL190821-3-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
VL190821-3	MB	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1908446
VL190821-3	LCS	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1908446
VL190821-3	LCSD	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1908446
1908446-3	SMP	B3PXL9	WATER	8/16/2019	10	10	NONE	1	1908446
1908446-4	SMP	B3PXM0	WATER	8/16/2019	10	10	NONE	1	1908446
1908446-5	SMP	B3PWW4	WATER	8/16/2019	10	10	NONE	1	1908446
1908446-8	SMP	B3PWH4	WATER	8/16/2019	10	10	NONE	1	1908446

QC Types

CAR	Carrier reference sample	DLS	Detection Limit Standard	
DUP	Laboratory Duplicate	LCS	Laboratory Control Sample	
LCSD	Laboratory Control Sample Duplicat	LODV	Limit of Detection Verification	
LOQV	Limit of Quantitation Verification	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	

ALS -- Fort Collins

LIMS Version: 6.907

Date Printed: Tuesday, September 10, 2019

Prep Batch ID: VL190821-3

Start Date: 08/21/19
Start Time: 14:45
Prep Analyst: Joe Kostelnik

End Date: 08/21/19
End Time: 22:18

Concentration Method: NONE
Extract Method: SW5030C
Initial Volume Units: ml
Final Volume Units: ml

Batch Created By: JXK
Date Created: 08/22/19
Time Created: 7:51
Validated By: JXK
Date Validated: 08/22/19
Time Validated: 16:19

Comments:

QC Batch ID: VL190821-3-3

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
VL190821-3	MB	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1908446
VL190821-3	LCS	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1908446
VL190821-3	LCSD	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1908446
1908446-10	MS	B3PX12	WATER	8/16/2019	10	10	NONE	1	1908446
1908446-10	MSD	B3PX12	WATER	8/16/2019	10	10	NONE	1	1908446
1908446-10	SMP	B3PX12	WATER	8/16/2019	10	10	NONE	1	1908446

QC Types

CAR	Carrier reference sample		DLS	Detection Limit Standard
DUP	Laboratory Duplicate		LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicat		LODV	Limit of Detection Verification
LOQV	Limit of Quantitation Verification		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

Metals

Case Narrative

CH2M HILL Plateau Remediation Company

SURV, August 2019 -- S19-008

Work Order Number: 1908446

1. 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.

   For analysis by Cold Vapor AA (CVAA), the samples were digested following method 7470A and the current revision of SOP 812.

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

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

   Analysis by CVAA followed method 7470A and the current revision of SOP 812.

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

4. The samples were prepared and analyzed within the established hold time.

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

5. General quality control procedures.

   - A preparation (method) blank and laboratory control sample were digested and analyzed with the samples in each digestion batch.
   - The preparation (method) blank associated with this digestion batch was below the reporting limit for the requested analytes. Sample results have been compared to the blank results and are flagged as appropriate. Sodium, aluminum, chromium, lead, manganese and tin 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 with the exception of CCB10 for uranium. The samples bracketed by this CCB contained more than ten times the concentration of uranium that was detected in the CCB, so no further action was taken.
- 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 6010D were within acceptance criteria.
- The interference check samples associated with Method 6020B were analyzed.

6. Matrix specific quality control procedures.

   Sample 1908495-4 was designated as the quality control sample for the mercury analysis. Sample 1908464-1 was designated as the quality control sample for the ICP Trace and ICPMS analyses. Results for the shared quality control samples are included at the client's request.

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

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

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

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

Megan Johnstone — 9/16/19

Megan Johnstone
Inorganics Primary Data Reviewer

Date

Inorganics Final Data Reviewer — 9/16/19

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 SW6010D

Sample Results

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PX12
Lab ID: 1908446-10

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 29-Aug-19
Date Analyzed: 30-Aug-19
Prep Method: SW3005 Rev A

Prep Batch: IP190829-3
QCBatchID: IP190829-3-2
Run ID: IT190830-1A4
Cleanup: NONE
Basis: As Received
File Name: 190830A.

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

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
7440-42-8	BORON	1	39	B	50	36
7440-70-2	CALCIUM	1	77000		1000	210
7439-89-6	IRON	1	93		50	30
7439-95-4	MAGNESIUM	1	24000		750	89
7440-09-7	POTASSIUM	1	9400		1000	130
7440-23-5	SODIUM	1	38000		500	38
7440-62-2	VANADIUM	1	17		10	0.43

Data Package ID: *it1908446-1*

Dissolved ICP Metals

Method SW6010D

Sample Results

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PX15
Lab ID: 1908446-11

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 29-Aug-19
Date Analyzed: 30-Aug-19
Prep Method: SW3005 Rev A

Prep Batch: IP190829-3
QCBatchID: IP190829-3-2
Run ID: IT190830-1A4
Cleanup: NONE
Basis: As Received
File Name: 190830A.

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

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
7440-42-8	BORON	1	38	B	50	36
7440-70-2	CALCIUM	1	110000		1000	210
7439-89-6	IRON	1	30	U	50	30
7439-95-4	MAGNESIUM	1	34000		750	89
7440-09-7	POTASSIUM	1	11000		1000	130
7440-23-5	SODIUM	1	45000		500	38
7440-62-2	VANADIUM	1	16		10	0.43

Data Package ID: *it1908446-1*

Dissolved ICPMS Metals

Method SW6020B

Sample Results

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PXK3
Lab ID: 1908446-1

Analysis ReqCode: **6020_METALS_I**

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 29-Aug-19
Date Analyzed: 05-Sep-19
Prep Method: SW3005 Rev A

Prep Batch: IP190829-3
QCBatchID: IP190829-3-1
Run ID: IM190905-10A4
Cleanup: NONE
Basis: As Received
File Name: 098SMPL_

Analyst: Nicole C. Chirban
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
7440-47-3	CHROMIUM	10	6.7	BC	10	0.46

Data Package ID: *im1908446-1*

Total Recoverable ICPMS Metals

Method SW6020B

Sample Results

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PYL0
Lab ID: 1908446-2

Analysis ReqCode: **6020_METALS_I**

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 29-Aug-19
Date Analyzed: 05-Sep-19
Prep Method: SW3005 Rev A

Prep Batch: IP190829-3
QCBatchID: IP190829-3-1
Run ID: IM190905-10A4
Cleanup: NONE
Basis: As Received
File Name: 099SMPL_

Analyst: Nicole C. Chirban
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
7440-47-3	CHROMIUM	10	7	BC	10	0.46

Data Package ID: *im1908446-1*

Total Recoverable ICPMS Metals

Method SW6020B

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PX12
Lab ID: 1908446-10

Analysis ReqCode: 6020_METALS_I

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 29-Aug-19
Date Analyzed: 05-Sep-19
Prep Method: SW3005 Rev A

Prep Batch: IP190829-3
QCBatchID: IP190829-3-4
Run ID: IM190905-10A4
Cleanup: NONE
Basis: As Received
File Name: 100SMPL_

Analyst: Nicole C. Chirban
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	U	100	10
7440-36-0	ANTIMONY	10	0.12	U	1	0.12
7440-38-2	ARSENIC	10	5.4		2	0.39
7440-39-3	BARIUM	10	56		5	0.56
7440-41-7	BERYLLIUM	10	0.054	U	0.5	0.054
7440-43-9	CADMIUM	10	0.083	U	2	0.083
7440-47-3	CHROMIUM	10	31	C	10	0.46
7440-48-4	COBALT	10	0.35	B	5	0.11
7440-50-8	COPPER	10	1.2	B	8	0.32
7439-92-1	LEAD	10	0.66	BC	2	0.079
7439-96-5	MANGANESE	10	2	BC	5	0.36
7439-98-7	MOLYBDENUM	10	6.8		2	0.079
7440-02-0	NICKEL	10	19	B	20	0.92
7782-49-2	SELENIUM	10	5.1	B	10	0.65
7440-22-4	SILVER	10	0.07	B	0.5	0.029
7440-24-6	STRONTIUM	10	430		5	0.32
7440-28-0	THALLIUM	10	0.0041	U	0.1	0.0041
7440-29-1	THORIUM	10	0.016	U	0.2	0.016
7440-31-5	TIN	10	0.53	BC	10	0.12
7440-61-1	URANIUM	10	18		0.1	0.0049
7440-66-6	ZINC	10	1.4	U	100	1.4

Data Package ID: *im1908446-1*

Dissolved ICPMS Metals

Method SW6020B

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PX15
Lab ID: 1908446-11

Analysis ReqCode: 6020_METALS_I

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 16-Aug-19
Date Extracted: 29-Aug-19
Date Analyzed: 05-Sep-19
Prep Method: SW3005 Rev A

Prep Batch: IP190829-3
QCBatchID: IP190829-3-4
Run ID: IM190905-10A4
Cleanup: NONE
Basis: As Received
File Name: 101SMPL_

Analyst: Nicole C. Chirban
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	U	100	10
7440-36-0	ANTIMONY	10	0.16	B	1	0.12
7440-38-2	ARSENIC	10	5.6		2	0.39
7440-39-3	BARIUM	10	68		5	0.56
7440-41-7	BERYLLIUM	10	0.054	U	0.5	0.054
7440-43-9	CADMIUM	10	0.083	U	2	0.083
7440-47-3	CHROMIUM	10	28	C	10	0.46
7440-48-4	COBALT	10	0.73	B	5	0.11
7440-50-8	COPPER	10	0.45	B	8	0.32
7439-92-1	LEAD	10	0.63	BC	2	0.079
7439-96-5	MANGANESE	10	0.94	BC	5	0.36
7439-98-7	MOLYBDENUM	10	7.1		2	0.079
7440-02-0	NICKEL	10	23		20	0.92
7782-49-2	SELENIUM	10	5.6	B	10	0.65
7440-22-4	SILVER	10	0.08	B	0.5	0.029
7440-24-6	STRONTIUM	10	620		5	0.32
7440-28-0	THALLIUM	10	0.0041	U	0.1	0.0041
7440-29-1	THORIUM	10	0.016	U	0.2	0.016
7440-31-5	TIN	10	0.47	BC	10	0.12
7440-61-1	URANIUM	10	17		0.1	0.0049
7440-66-6	ZINC	10	1.4	U	100	1.4

Data Package ID: *im1908446-1*

Dissolved MERCURY

Method SW7470A

Sample Results

Lab Name: **ALS -- Fort Collins**
Client Name: CH2M HILL Plateau Remediation Company
Client Project ID: SURV, August 2019 S19-008
Work Order Number: 1908446 **Final Volume:** 20 ml
Reporting Basis: As Received **Matrix:** WATER
Analyst: Alicia F. Sowell **Result Units:** UG/L

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	RptLimit/ LOQ/LOD	MDL/DL	Flag	Sample Aliquot
B3PX15	1908446-11	8/16/2019	9/9/2019	09/11/2019	N/A	1	0.06	0.2	0.06	U	20 ml

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *hg1908446-1*

Total MERCURY

Method SW7470A

Sample Results

Lab Name: **ALS -- Fort Collins**
Client Name: CH2M HILL Plateau Remediation Company
Client Project ID: SURV, August 2019 S19-008
Work Order Number: 1908446 **Final Volume:** 20 ml
Reporting Basis: As Received **Matrix:** WATER
Analyst: Alicia F. Sowell **Result Units:** UG/L

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	RptLimit/ LOQ/LOD	MDL/DL	Flag	Sample Aliquot
B3PX12	1908446-10	8/16/2019	9/9/2019	09/11/2019	N/A	1	0.06	0.2	0.06	U	20 ml

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *hg1908446-1*

ICP Metals

Method SW6010D
Method Blank

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: IP190829-3MB

Sample Matrix: WATER
% Moisture: N/A
Date Collected: N/A
Date Extracted: 29-Aug-19
Date Analyzed: 30-Aug-19

Prep Batch: IP190829-3
QCBatchID: IP190829-3-2
Run ID: IT190830-1A4
Cleanup: NONE
Basis: N/A
File Name: 190830A.

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

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

Data Package ID: *it1908446-1*

ICP Metals

Method SW6010D

Laboratory Control Sample

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: IP190829-3LCS

Sample Matrix: WATER
% Moisture: N/A
Date Collected: N/A
Date Extracted: 08/29/2019
Date Analyzed: 08/30/2019
Prep Method: SW3005A

Prep Batch: IP190829-3
QCBatchID: IP190829-3-2
Run ID: IT190830-1A4
Cleanup: NONE
Basis: N/A
File Name: 190830A.

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	1010	50		101	80 - 120%
7440-70-2	CALCIUM	40000	38600	1000		96	80 - 120%
7439-89-6	IRON	1000	942	50		94	80 - 120%
7439-95-4	MAGNESIUM	40000	39900	750		100	80 - 120%
7440-09-7	POTASSIUM	40000	39900	1000		100	80 - 120%
7440-23-5	SODIUM	40000	41700	500		104	80 - 120%
7440-62-2	VANADIUM	500	481	10		96	80 - 120%

Data Package ID: *it1908446-1*

ICP Metals

Method SW6010D

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: SHARED QC
LabID: 1908464-1MS

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 19-Aug-19
Date Extracted: 29-Aug-19
Date Analyzed: 30-Aug-19
Prep Method: SW3005 Rev A

Prep Batch: IP190829-3
QCBatchID: IP190829-3-2
Run ID: IT190830-1A4
Cleanup: NONE
Basis: As Received

Sample Aliquot: 50 ml
Final Volume: 50 ml
Result Units: UG/L
File Name: 190830A.

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
7440-42-8	BORON	44	B	1060		50	1000	102	80 - 120%
7440-70-2	CALCIUM	48000		87100		1000	40000	99	80 - 120%
7439-89-6	IRON	30	U	955		50	1000	96	80 - 120%
7439-95-4	MAGNESIUM	14000		53900		750	40000	101	80 - 120%
7440-09-7	POTASSIUM	7500		48700		1000	40000	103	80 - 120%
7440-23-5	SODIUM	29000		66800		500	40000	94	80 - 120%
7440-62-2	VANADIUM	17		495		10	500	96	80 - 120%

Field ID: SHARED QC
LabID: 1908464-1MSD

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 19-Aug-19
Date Extracted: 29-Aug-19
Date Analyzed: 30-Aug-19
Prep Method: SW3005 Rev A

Prep Batch: IP190829-3
QCBatchID: IP190829-3-2
Run ID: IT190830-1A4
Cleanup: NONE
Basis: As Received

Sample Aliquot: 50 ml
Final Volume: 50 ml
Result Units: UG/L
File Name: 190830A.

CASNO	Target Analyte	MSD Result	MSD Qual	Spike Added	MSD % Rec.	Reporting Limit	RPD Limit	RPD
7440-42-8	BORON	1060		1000	102	50	20	0
7440-70-2	CALCIUM	87100		40000	99	1000	20	0
7439-89-6	IRON	950		1000	95	50	20	1
7439-95-4	MAGNESIUM	53800		40000	100	750	20	0
7440-09-7	POTASSIUM	48300		40000	102	1000	20	1
7440-23-5	SODIUM	66000		40000	92	500	20	1
7440-62-2	VANADIUM	492		500	95	10	20	1

Data Package ID: *it1908446-1*

Prep Batch ID: IP190829-3

Start Date: 08/29/19
Start Time: 10:27
Prep Analyst: Jill M. Latelle

End Date: 08/29/19
End Time: 18:00

Concentration Method: NONE
Extract Method: SW3005A
Initial Volume Units: ml
Final Volume Units: ml

Batch Created By: jml
Date Created: 08/29/19
Time Created: 10:27
Validated By: jml
Date Validated: 08/29/19
Time Validated: 11:02

Comments:

QC Batch ID: IP190829-3-2

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
IP190829-3	MB	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
IP190829-3	LCS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-1	MS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-1	MSD	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908446-10	SMP	B3PX12	WATER	8/16/2019	50	50	NONE	1	1908446
1908446-11	SMP	B3PX15	WATER	8/16/2019	50	50	NONE	1	1908446
1908464-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908541-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908541
1908541-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908541

QC Types

CAR	Carrier reference sample	DLS	Detection Limit Standard
DUP	Laboratory Duplicate	LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicat	LODV	Limit of Detection Verification
LOQV	Limit of Quantitation Verification	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 SW6020B

Method Blank

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: IP190829-3MB

Sample Matrix: WATER
% Moisture: N/A
Date Collected: N/A
Date Extracted: 29-Aug-19
Date Analyzed: 05-Sep-19

Prep Batch: IP190829-3
QCBatchID: IP190829-3-4
Run ID: IM190905-10A4
Cleanup: NONE
Basis: N/A
File Name: 094SMPL_

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	18	B	100	10
7440-36-0	ANTIMONY	10	0.12	U	1	0.12
7440-38-2	ARSENIC	10	0.39	U	2	0.39
7440-39-3	BARIUM	10	0.56	U	5	0.56
7440-41-7	BERYLLIUM	10	0.054	U	0.5	0.054
7440-43-9	CADMIUM	10	0.083	U	2	0.083
7440-47-3	CHROMIUM	10	1.8	B	10	0.46
7440-48-4	COBALT	10	0.11	U	5	0.11
7440-50-8	COPPER	10	0.32	U	8	0.32
7439-92-1	LEAD	10	0.94	B	2	0.079
7439-96-5	MANGANESE	10	0.63	B	5	0.36
7439-98-7	MOLYBDENUM	10	0.079	U	2	0.079
7440-02-0	NICKEL	10	0.92	U	20	0.92
7782-49-2	SELENIUM	10	0.65	U	10	0.65
7440-22-4	SILVER	10	0.029	U	0.5	0.029
7440-24-6	STRONTIUM	10	0.32	U	5	0.32
7440-28-0	THALLIUM	10	0.0041	U	0.1	0.0041
7440-29-1	THORIUM	10	0.016	U	0.2	0.016
7440-31-5	TIN	10	0.77	B	10	0.12
7440-61-1	URANIUM	10	0.0049	U	0.1	0.0049
7440-66-6	ZINC	10	1.4	U	100	1.4

Data Package ID: *im1908446-1*

ICPMS Metals

Method SW6020B

Laboratory Control Sample

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: IM190829-3LCS

Sample Matrix: WATER
% Moisture: N/A
Date Collected: N/A
Date Extracted: 08/29/2019
Date Analyzed: 09/05/2019
Prep Method: SW3005A

Prep Batch: IP190829-3
QCBatchID: IP190829-3-4
Run ID: IM190905-10A4
Cleanup: NONE
Basis: N/A
File Name: 095SMPL_

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	4450	100		89	80 - 120%
7440-36-0	ANTIMONY	30	30.4	1		101	80 - 120%
7440-38-2	ARSENIC	100	90.7	2		91	80 - 120%
7440-39-3	BARIUM	100	98	5		98	80 - 120%
7440-41-7	BERYLLIUM	50	51.4	0.5		103	80 - 120%
7440-43-9	CADMIUM	30	31.5	2		105	80 - 120%
7440-47-3	CHROMIUM	500	475	10		95	80 - 120%
7440-48-4	COBALT	100	96.2	5		96	80 - 120%
7440-50-8	COPPER	1000	942	8		94	80 - 120%
7439-92-1	LEAD	50	48.2	2		96	80 - 120%
7439-96-5	MANGANESE	100	92.5	5		93	80 - 120%
7439-98-7	MOLYBDENUM	100	99.8	2		100	80 - 120%
7440-02-0	NICKEL	500	492	20		98	80 - 120%
7782-49-2	SELENIUM	100	102	10		102	80 - 120%
7440-22-4	SILVER	10	10.1	0.5		101	80 - 120%
7440-24-6	STRONTIUM	100	102	5		102	80 - 120%
7440-28-0	THALLIUM	2	1.88	0.1		94	80 - 120%
7440-29-1	THORIUM	10	9.91	0.2		99	80 - 120%
7440-31-5	TIN	500	525	10		105	80 - 120%
7440-61-1	URANIUM	10	9.16	0.1		92	80 - 120%
7440-66-6	ZINC	2000	1940	100		97	80 - 120%

Data Package ID: *im1908446-1*

ICPMS Metals

Method SW6020B

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: SHARED QC
LabID: 1908464-1MS

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 19-Aug-19
Date Extracted: 29-Aug-19
Date Analyzed: 05-Sep-19
Prep Method: SW3005 Rev A

Prep Batch: IP190829-3
QCBatchID: IP190829-3-4
Run ID: IM190905-10A4
Cleanup: NONE
Basis: As Received

Sample Aliquot: 50 ml
Final Volume: 50 ml
Result Units: UG/L
File Name: 106SMPL_

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
7429-90-5	ALUMINUM	10	U	4280		100	5000	86	75 - 125%
7440-36-0	ANTIMONY	0.14	B	30.2		1	30	100	75 - 125%
7440-38-2	ARSENIC	5.3		94.6		2	100	89	75 - 125%
7440-39-3	BARIUM	48		148		5	100	100	75 - 125%
7440-41-7	BERYLLIUM	0.054	U	49.3		0.5	50	99	75 - 125%
7440-43-9	CADMIUM	0.083	U	31.1		2	30	104	75 - 125%
7440-47-3	CHROMIUM	4.5	BC	469		10	500	93	75 - 125%
7440-48-4	COBALT	0.2	B	93.3		5	100	93	75 - 125%
7440-50-8	COPPER	0.32	U	923		8	1000	92	75 - 125%
7439-92-1	LEAD	0.63	BC	47.9		2	50	95	75 - 125%
7439-96-5	MANGANESE	0.7	BC	91.6		5	100	91	75 - 125%
7439-98-7	MOLYBDENUM	6.1		106		2	100	100	75 - 125%
7440-02-0	NICKEL	2.6	B	476		20	500	95	75 - 125%
7782-49-2	SELENIUM	5.1	B	105		10	100	100	75 - 125%
7440-22-4	SILVER	0.029	U	10.1		0.5	10	101	75 - 125%
7440-24-6	STRONTIUM	250		341		5	100	95	75 - 125%
7440-28-0	THALLIUM	0.0041	U	1.85		0.1	2	93	75 - 125%
7440-29-1	THORIUM	0.02	B	9.83		0.2	10	98	75 - 125%
7440-31-5	TIN	0.47	BC	521		10	500	104	75 - 125%
7440-61-1	URANIUM	13		21.7		0.1	10	90	75 - 125%
7440-66-6	ZINC	1.4	U	1880		100	2000	94	75 - 125%

Data Package ID: *im1908446-1*

ICPMS Metals

Method SW6020B

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: SHARED QC
LabID: 1908464-1MSD

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 19-Aug-19
Date Extracted: 29-Aug-19
Date Analyzed: 05-Sep-19
Prep Method: SW3005 Rev A

Prep Batch: IP190829-3
QCBatchID: IP190829-3-4
Run ID: IM190905-10A4
Cleanup: NONE
Basis: As Received

Sample Aliquot: 50 ml
Final Volume: 50 ml
Result Units: UG/L
File Name: 107SMPL_

CASNO	Target Analyte	MSD Result	MSD Qual	Spike Added	MSD % Rec.	Reporting Limit	RPD Limit	RPD
7429-90-5	ALUMINUM	4270		5000	85	100	20	0
7440-36-0	ANTIMONY	29.9		30	99	1	20	1
7440-38-2	ARSENIC	94.4		100	89	2	20	0
7440-39-3	BARIUM	146		100	98	5	20	1
7440-41-7	BERYLLIUM	49.1		50	98	0.5	20	0
7440-43-9	CADMIUM	30.5		30	102	2	20	2
7440-47-3	CHROMIUM	472		500	93	10	20	1
7440-48-4	COBALT	93.4		100	93	5	20	0
7440-50-8	COPPER	908		1000	91	8	20	2
7439-92-1	LEAD	47.4		50	94	2	20	1
7439-96-5	MANGANESE	91.9		100	91	5	20	0
7439-98-7	MOLYBDENUM	106		100	100	2	20	0
7440-02-0	NICKEL	480		500	95	20	20	1
7782-49-2	SELENIUM	102		100	97	10	20	2
7440-22-4	SILVER	9.83		10	98	0.5	20	3
7440-24-6	STRONTIUM	343		100	97	5	20	1
7440-28-0	THALLIUM	1.87		2	94	0.1	20	1
7440-29-1	THORIUM	9.91		10	99	0.2	20	1
7440-31-5	TIN	527		500	105	10	20	1
7440-61-1	URANIUM	21.5		10	89	0.1	20	1
7440-66-6	ZINC	1870		2000	94	100	20	0

Data Package ID: *im1908446-1*

Prep Batch ID: IP190829-3

Start Date: 08/29/19
Start Time: 10:27
Prep Analyst: Jill M. Latelle

End Date: 08/29/19
End Time: 18:00

Concentration Method: NONE
Extract Method: SW3005A
Initial Volume Units: ml
Final Volume Units: ml

Batch Created By: jml
Date Created: 08/29/19
Time Created: 10:27
Validated By: jml
Date Validated: 08/29/19
Time Validated: 11:02

Comments:

QC Batch ID: IP190829-3-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
IP190829-3	MB	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
IM190829-3	LCS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-1	MS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-1	MSD	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908446-1	SMP	B3PXK3	WATER	8/16/2019	50	50	NONE	1	1908446
1908446-2	SMP	B3PYL0	WATER	8/16/2019	50	50	NONE	1	1908446
1908464-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-10	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-3	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-4	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-5	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-6	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-7	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-8	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-9	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464

QC Types

CAR	Carrier reference sample	DLS	Detection Limit Standard	
DUP	Laboratory Duplicate	LCS	Laboratory Control Sample	
LCSD	Laboratory Control Sample Duplicat	LODV	Limit of Detection Verification	
LOQV	Limit of Quantitation Verification	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	

Prep Batch ID: IP190829-3

Start Date: 08/29/19
Start Time: 10:27
Prep Analyst: Jill M. Latelle

End Date: 08/29/19
End Time: 18:00

Concentration Method: NONE
Extract Method: SW3005A
Initial Volume Units: ml
Final Volume Units: ml

Batch Created By: jml
Date Created: 08/29/19
Time Created: 10:27
Validated By: jml
Date Validated: 08/29/19
Time Validated: 11:02

Comments:

QC Batch ID: IP190829-3-4

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
IP190829-3	MB	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
IM190829-3	LCS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-1	MS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-1	MSD	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908446-10	SMP	B3PX12	WATER	8/16/2019	50	50	NONE	1	1908446
1908446-11	SMP	B3PX15	WATER	8/16/2019	50	50	NONE	1	1908446
1908464-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908464-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908464
1908541-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908541
1908541-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1908541

QC Types

CAR	Carrier reference sample	DLS	Detection Limit Standard
DUP	Laboratory Duplicate	LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicat	LODV	Limit of Detection Verification
LOQV	Limit of Quantitation Verification	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

Mercury

Method SW7470A

Method Blank

Lab Name: **ALS -- Fort Collins**
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: HG190909-3MB

Sample Matrix: WATER
% Moisture: N/A
Date Collected: N/A
Date Extracted: 09-Sep-19
Date Analyzed: 11-Sep-19

Prep Batch: HG190909-3
QCBatchID: HG190909-3-1
Run ID: HG190911-2A2
Cleanup: NONE
Basis: N/A
File Name: HG190911-2

Sample Aliquot: 2 ml
Final Volume: 20 ml
Result Units: UG/L
Clean DF: 1

CASNO	Target Analyte	DF	Result	Result Qualifier	Reporting Limit	MDL
7439-97-6	MERCURY	1	0.6	U	2	0.6

Data Package ID: *hg1908446-1*

Mercury

Method SW7470A

Laboratory Control Sample

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: HG190909-3LCS

Sample Matrix: WATER
% Moisture: N/A
Date Collected: N/A
Date Extracted: 09/09/2019
Date Analyzed: 09/11/2019
Prep Method: METHOD

Prep Batch: HG190909-3
QCBatchID: HG190909-3-1
Run ID: HG190911-2A2
Cleanup: NONE
Basis: N/A
File Name: HG190911-2

Sample Aliquot: 2 ml
Final Volume: 20 ml
Result Units: UG/L
Clean DF: 1

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
7439-97-6	MERCURY	10	9.95	2		99	80 - 120%

Data Package ID: *hg1908446-1*

Mercury

Method SW7470A

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: SHARED QC
LabID: 1908495-4MS

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 20-Aug-19
Date Extracted: 09-Sep-19
Date Analyzed: 11-Sep-19
Prep Method: METHOD

Prep Batch: HG190909-3
QCBatchID: HG190909-3-1
Run ID: HG190911-2A2
Cleanup: NONE
Basis: As Received

Sample Aliquot: 20 ml
Final Volume: 20 ml
Result Units: UG/L
File Name: HG190911-2

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
7439-97-6	MERCURY	0.2	B	2.3		0.2	2	105	80 - 120%

Field ID: SHARED QC
LabID: 1908495-4MSD

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 20-Aug-19
Date Extracted: 09-Sep-19
Date Analyzed: 11-Sep-19
Prep Method: METHOD

Prep Batch: HG190909-3
QCBatchID: HG190909-3-1
Run ID: HG190911-2A2
Cleanup: NONE
Basis: As Received

Sample Aliquot: 20 ml
Final Volume: 20 ml
Result Units: UG/L
File Name: HG190911-2

CASNO	Target Analyte	MSD Result	MSD Qual	Spike Added	MSD % Rec.	Reporting Limit	RPD Limit	RPD
7439-97-6	MERCURY	2.3		2	105	0.2	20	0

Data Package ID: *hg1908446-1*

Prep Batch ID: HG190909-3

Start Date: 09/09/19
Start Time: 12:00
Prep Analyst: Alicia F. Sowell

End Date: 09/09/19
End Time: 18:00

Concentration Method: NONE
Extract Method: METHOD
Initial Volume Units: ml
Final Volume Units: ml

Batch Created By: AFS
Date Created: 09/09/19
Time Created: 12:00
Validated By: AFS
Date Validated: 09/11/19
Time Validated: 12:24

Comments:

QC Batch ID: HG190909-3-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
HG190909-3	MB	XXXXXX	WATER	XXXXXX	2	20	NONE	1	1908365
HG190909-3	LCS	XXXXXX	WATER	XXXXXX	2	20	NONE	1	1908365
1908365-8	MS	XXXXXX	WATER	XXXXXX	20	20	NONE	1	1908365
1908495-4	MS	XXXXXX	WATER	XXXXXX	20	20	NONE	1	1908495
1908365-8	MSD	XXXXXX	WATER	XXXXXX	20	20	NONE	1	1908365
1908495-4	MSD	XXXXXX	WATER	XXXXXX	20	20	NONE	1	1908495
1908365-14	SMP	XXXXXX	WATER	XXXXXX	20	20	NONE	1	1908365
1908365-16	SMP	XXXXXX	WATER	XXXXXX	20	20	NONE	1	1908365
1908365-18	SMP	XXXXXX	WATER	XXXXXX	20	20	NONE	1	1908365
1908365-5	SMP	XXXXXX	WATER	XXXXXX	20	20	NONE	1	1908365
1908365-8	SMP	XXXXXX	WATER	XXXXXX	20	20	NONE	1	1908365
1908446-10	SMP	B3PX12	WATER	8/16/2019	20	20	NONE	1	1908446
1908446-11	SMP	B3PX15	WATER	8/16/2019	20	20	NONE	1	1908446
1908495-2	SMP	XXXXXX	WATER	XXXXXX	20	20	NONE	1	1908495
1908495-3	SMP	XXXXXX	WATER	XXXXXX	20	20	NONE	1	1908495
1908495-4	SMP	XXXXXX	WATER	XXXXXX	20	20	NONE	1	1908495
1908495-5	SMP	XXXXXX	WATER	XXXXXX	20	20	NONE	1	1908495
1908742-1	SMP	XXXXXX	WATER	XXXXXX	20	20	NONE	1	1908742
1909018-1	SMP	XXXXXX	WATER	XXXXXX	2	20	NONE	1	1909018

QC Types

CAR	Carrier reference sample	DLS	Detection Limit Standard	
DUP	Laboratory Duplicate	LCS	Laboratory Control Sample	
LCSD	Laboratory Control Sample Duplicat	LODV	Limit of Detection Verification	
LOQV	Limit of Quantitation Verification	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

SURV, August 2019 – S19-008

Work Order Number: 1908446

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

2. The samples were analyzed for the presence of ^{90}Sr according to the current revision of SOP 724. The analyses were completed on 09/06/2019.

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

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

5. 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.

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

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

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

7. No anomalous situations were encountered during the preparation and analysis of these 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 — 9/19/19

Pik Yee Yuen
Radiochemistry Primary Data Reviewer

Date

9/19/19

Radiochemistry Final Data Reviewer

Date

Strontium-90 by GFPC

PAI 724 Rev 13

Method Blank Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: SR190904-1MB

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 04-Sep-19
Date Prepared: 04-Sep-19
Date Analyzed: 06-Sep-19

Prep Batch: SR190904-1
QCBatchID: SR190904-1-1
Run ID: SR190904-1A
Count Time: 90 minutes

Final Aliquot: 994 ml
Result Units: pCi/l
File Name: SRC0906A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10098-97-2	Sr-90	-1.02E-02 +/- 3.29E-01	7.69E-01	1.00E+00	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.010E+03	8.86E+02	ug	87.9	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.

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: *SR1908446-1*

Strontium-90 by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: SR190904-1LCS

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 04-Sep-19
Date Prepared: 04-Sep-19
Date Analyzed: 06-Sep-19

Prep Batch: SR190904-1
QCBatchID: SR190904-1-1
Run ID: SR190904-1A
Count Time: 90 minutes

Final Aliquot: 994 ml
Result Units: pCi/l
File Name: SRC0906A

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
10098-97-2	Sr-90	1.15E+01 +/- 2.83E+00	8.25E-01	1.160E+01	99.0	75 - 125	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.010E+03	9.07E+02	ug	89.9	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.
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: *SR1908446-1*

Strontium-90 by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Lab ID: SR190904-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 04-Sep-19
Date Prepared: 04-Sep-19
Date Analyzed: 06-Sep-19

Prep Batch: SR190904-1
QCBatchID: SR190904-1-1
Run ID: SR190904-1A
Count Time: 90 minutes

Final Aliquot: 994 ml
Result Units: pCi/l
File Name: SRC0906A

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
10098-97-2	Sr-90	1.20E+01 +/- 2.95E+00	8.21E-01	1.160E+01	104	75 - 125	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.010E+03	8.47E+02	ug	84.0	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.
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: *SR1908446-1*

Strontium-90 by GFPC

PAI 724 Rev 13

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID:
Lab ID: SR190904-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 04-Sep-19
Date Prepared: 04-Sep-19
Date Analyzed: 06-Sep-19

Prep Batch: SR190904-1
QCBatchID: SR190904-1-1
Run ID: SR190904-1A
Count Time: 90 minutes

Final Aliquot: 994 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC0906A

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
10098-97-2	Sr-90	1.15E+01	+/- 2.83E+00	8.25E-01		1.20E+01	+/- 2.95E+00	8.21E-01		0.255	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: *SR1908446-1*

Strontium-90 by GFPC

PAI 724 Rev 13

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID:
Lab ID: SR190904-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 04-Sep-19
Date Prepared: 04-Sep-19
Date Analyzed: 06-Sep-19

Prep Batch: SR190904-1
QCBatchID: SR190904-1-1
Run ID: SR190904-1A
Count Time: 90 minutes

Final Aliquot: 994 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC0906A

CASNO	Analyte	Sample				Duplicate				RPD	RPD Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
10098-97-2	Sr-90	1.15E+01	+/- 2.83E+00	8.25E-01		1.20E+01	+/- 2.95E+00	8.21E-01		4.00	20

Comments:

Qualifiers/Flags:

+ - Duplicate RPD not within limits.
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: *SR1908446-1*

Strontium-90 by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PYL0
Lab ID: 1908446-2

Analysis ReqCode: SRISO_SEP_PR

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 16-Aug-19
Date Prepared: 04-Sep-19
Date Analyzed: 06-Sep-19

Prep Batch: SR190904-1
QCBatchID: SR190904-1-1
Run ID: SR190904-1A
Count Time: 90 minutes
Report Basis: Unfiltered

Final Aliquot: 994 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC0906

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10098-97-2	Sr-90	9.48E+00 +/- 2.35E+00	7.16E-01	1E+00	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.300E+03	1.23E+03	ug	95.0	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.

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: *SR1908446-1*

Strontium-90 by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PWX3
Lab ID: 1908446-6

Analysis ReqCode: SRISO_SEP_PR

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 16-Aug-19
Date Prepared: 04-Sep-19
Date Analyzed: 06-Sep-19

Prep Batch: SR190904-1
QCBatchID: SR190904-1-1
Run ID: SR190904-1A
Count Time: 90 minutes
Report Basis: Unfiltered

Final Aliquot: 994 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC0906

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10098-97-2	Sr-90	4.93E-02 +/- 3.45E-01	7.96E-01	1E+00	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.010E+03	8.78E+02	ug	87.1	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.

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: *SR1908446-1*

Strontium-90 by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1908446
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, August 2019 S19-008

Field ID: B3PWX4
Lab ID: 1908446-7

Analysis ReqCode: SRISO_SEP_PR

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 16-Aug-19
Date Prepared: 04-Sep-19
Date Analyzed: 06-Sep-19

Prep Batch: SR190904-1
QCBatchID: SR190904-1-1
Run ID: SR190904-1A
Count Time: 90 minutes
Report Basis: Unfiltered

Final Aliquot: 994 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC0906

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10098-97-2	Sr-90	1.56E+00 +/- 5.85E-01	8.23E-01	1E+00	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.310E+03	1.16E+03	ug	88.7	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.

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: *SR1908446-1*

Prep Batch ID: SR190904-1

Start Date: 09/04/19
Start Time: 13:31
Prep Analyst: Jirushaya Hantula

End Date: 09/04/19
End Time: 13:31

Concentration Method: NONE
Extract Method: PAI 70715
Initial Volume Units: ml
Final Volume Units: ml

Batch Created By: JXH
Date Created: 09/04/19
Time Created: 13:31
Validated By: jxh
Date Validated: 09/05/19
Time Validated: 16:55

Comments:

QC Batch ID: SR190904-1-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
SR190904-1	CAR	XXXXXX	WATER	XXXXXX	1000	1000	NONE	1	1908446
SR190904-1	MB	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1908446
SR190904-1	LCS	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1908446
SR190904-1	LCSD	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1908487
1908446-2	SMP	B3PYL0	WATER	8/16/2019	1000	994.01	NONE	1	1908446
1908446-6	SMP	B3PWX3	WATER	8/16/2019	1000	994.01	NONE	1	1908446
1908446-7	SMP	B3PWX4	WATER	8/16/2019	1000	994.01	NONE	1	1908446
1908463-3	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1908463
1908463-6	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1908463
1908487-2	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1908487
1908487-3	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1908487
1908494-3	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1908494
1908494-5	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1908494
1908495-1	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1908495
1908495-6	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1908495

QC Types

CAR	Carrier reference sample	DLS	Detection Limit Standard	
DUP	Laboratory Duplicate	LCS	Laboratory Control Sample	
LCSD	Laboratory Control Sample Duplicat	LODV	Limit of Detection Verification	
LOQV	Limit of Quantitation Verification	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	