



Wednesday, October 30, 2019

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

Re: ALS Workorder: 1909493
Project Name: AQUIFER TUBES, OCTOBER 2019
Project Number: X20-001

Dear Ms. Waters-Husted:

Seven water samples were received from CH2M HILL Plateau Remediation Company, on 9/25/2019. The samples were scheduled for the following analyses:

Inorganics

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,

A handwritten signature in black ink, appearing to read 'Katie M. O'Brien', with a long horizontal flourish extending to the right.

ALS Environmental
Katie M. O'Brien
Project Manager

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

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1909493

Client Name: CH2M HILL Plateau Remediation Company

Client Project Name: AQUIFER TUBES, OCTOBER 2019

Client Project Number: X20-001

Client PO Number: BOA 54854

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
B3RPR3	1909493-1		WATER	24-Sep-19	9:45
B3RRC9	1909493-2		WATER	24-Sep-19	9:45
B3RPK4	1909493-3		WATER	24-Sep-19	8:23
B3RPK0	1909493-4		WATER	24-Sep-19	8:23
B3RPK6	1909493-5		WATER	24-Sep-19	8:41
B3RPT3	1909493-6		WATER	24-Sep-19	9:12
B3RPR5	1909493-7		WATER	24-Sep-19	9:28

CH2M Hill Plateau Remediation Company **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** C.O.C.# **X20-001-034**
 69 lbs. *lamin3* Page 1 of 1

Collector: Juan Aguilar /CI/PRC **Contact/Requester:** Karen Waters-Husted **Telephone No.:** 509-376-4650
SAF No.: X20-001 **Sampling Origin:** Hanford Site **Purchase Order/Charge Code:** 303064
Project Title: AQUIFER TUBES, OCTOBER 2019 **Logbook No.:** HNF-N-506 -103/44 **Ice Chest No.:** GWS-401
Shipped To (Lab): ALS Environmental Ft. Collins **Method of Shipment:** Commercial Carrier **Bill of Lading/Air Bill No.:** 7783 2577/810
Protocol: SURV **Priority:** 30 Days **Offsite Property No.:** 11249

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
B3RRP3	1	W	9-24-19	0945	1x500-mL G/P	6020_METALS_ICPMS: Arsenic (1); 6020_METALS_ICPMS: Chromium (1)	6 Months	HNO3 to pH <2
B3RRC9	2	W	9-24-19	0945	1x500-mL G/P	6020_METALS_ICPMS: Arsenic (1); 6020_METALS_ICPMS: Chromium (1)	6 Months	HNO3 to pH <2
B3RRC9	↓	W	9-24-19	0945	2x1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2

Relinquished By		Received By	
Print First and Last Name	Signature	Print First and Last Name	Signature
Juan Aguilar /CI/PRC	<i>[Signature]</i>	Troy Bacon	<i>[Signature]</i>
Troy Bacon /CI/PRC	<i>[Signature]</i>	FEDEX	FEDEX
		Troy Messer	<i>[Signature]</i>

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

Printed On 8/26/2019 FSR ID = FSR83660 A-6004-842 (REV 3)

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C. # X20-001-058	Page 1 of 1
Collector: Juan Aguilar /CHPRC		Contact/Requester: Karen Waters-Husted		Telephone No.: 509-376-4650	
SAF No.: X20-001		Sampling Origin: Hanford Site		Purchase Order/Charge Code: 303064	
Project Title: AQUIFER TUBES, OCTOBER 2019		Logbook No.: HNF-N-506-103/44		Ice Chest No.: GWS-401	
Shipped To (Lab): ALS Environmental Ft. Collins		Method of Shipment: Commercial Carrier		Bill of Lading/Air Bill No.: 7763 2577 1810	
Protocol: SURV		Priority: 30 Days		Offsite Property No.: 11649	
POSSIBLE SAMPLE HAZARDS/REMARK		SPECIAL INSTRUCTIONS			
** ** 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		N/A			
Sample No. 5	Filter * N	Date 9-24-19	Time 0841	No/Type Container 2x1-L G/P	Sample Analysis SRISO_SEP_PRECIP_GPC: COMMON
B3RPK6		Holding Time 6 Months		Preservative HNO3 to pH <2	

Relinquished By		Received By		Matrix *	
Print First and Last Name	Signature	Print First and Last Name	Signature	S	SE
Juan Aguilar /CHPRC		Troy Bacon /CHPRC		S = Soil	SE = Sediment
Troy Bacon /CHPRC		Troy Bacon /CHPRC		SO = Solid	SO = Solid
				SL = Sludge	SL = Sludge
				W = Water	W = Water
				O = Oil	O = Oil
				A = Air	A = Air
				DS = Drum Solids	DS = Drum Solids
				DL = Drum Liquids	DL = Drum Liquids
				T = Tissue	T = Tissue
				WI = Wipe	WI = Wipe
				L = Liquid	L = Liquid
				V = Vegetation	V = Vegetation
				X = Other	X = Other

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process):	Disposed By:
Printed On 8/26/2019	FSR ID = FSR83683	A-6004-842 (REV 3)

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C.# X20-001-035 Page 1 of 1	
Collector: Juan Aguilar CHPRC	Contact/Requester: Karen Waters-Husted	Telephone No.: 509-376-4650	<i>Waters</i>		
SAF No.: X20-001	Sampling Origin: Hanford Site	Purchase Order/Charge Code: 303064			
Project Title: AQUIFER TUBES, OCTOBER 2019	Logbook No.: HNF-N-506 -103164	Ice Chest No.: GWS-401	<i>Waters</i>		
Shipped To (Lab): ALS Environmental Ft. Collins	Method of Shipment: Commercial Carrier	Bill of Lading/Air Bill No.: 711025771810			
Protocol: SURV	Priority: 30 Days	Offsite Property No.: 11649	<i>Waters</i>		
POSSIBLE SAMPLE HAZARDS/REMARK ** ** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1					
SPECIAL INSTRUCTIONS N/A			<i>Waters</i>		
Sample Analysis SRISO_SEP_PRECIP_GPC: COMMON					
Sample No.: B3RPR5 7	Filter: N	Time: 9:24-19 0928	No/Type Container: 2x1-L G/P	Holding Time: 6 Months	Preservative: HNO3 to pH <2

Relinquished By		Received By		Matrix *	
Print First and Last Name	Signature	Print First and Last Name	Signature	S = Soil	DS = Drum Solids
Juan Aguilar CHPRC	<i>Juan Aguilar</i>	Troy Bacon CHPRC	<i>Troy Bacon</i>	SE = Sediment	DL = Drum Liquids
Troy Bacon CHPRC	<i>Troy Bacon</i>	FEDEX	FEDEX	SO = Solid	T = Tissue
		Tyler M... ..	<i>Tyler M...</i>	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:

ORIGIN D/FSCA (500) 531-0450
TROY BACON
CH2M
6267 LATIHA ST.
RICHLAND, WA 99352
UNITED STATES US

SHIP DATE: 24SEP19
ACTWGHT: 69.00 LB
CAID: 10706605/INNET14160
BILL THIRD PARTY

11649

TO JULIE ELLINGSON
ALS GLOBAL-FORT COLLINS
225 COMMERCE DR

FORT COLLINS CO 80524
(970) 400-1511
REF: PTR#11649

12-2
2.4

567J19D0405A2

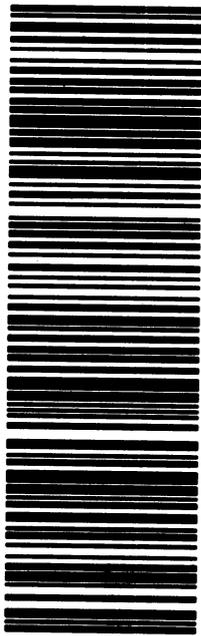


TRK# 7763 2577 1810
0201

WED - 25 SEP 10:30A
PRIORITY OVERNIGHT
DSR

XH FTCA

CO-US DEN 80524



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Inorganics Case Narrative

CH2M HILL Plateau Remediation Company AQUIFER TUBES, OCTOBER 2019 -- X20-001

Work Order Number: 1909493

1. The sample was prepared for analysis based on Environmental Monitoring Systems Laboratory (EMSL) Rev 2.1 procedures.
2. The sample was analyzed following EMSL procedures for the current revisions of the following SOPs and methods:

<u>Analyte</u>	<u>Method</u>	<u>SOP #</u>
Chloride	300.0 Revision 2.1	1113
Fluoride	300.0 Revision 2.1	1113
Nitrate as N	300.0 Revision 2.1	1113
Nitrite as N	300.0 Revision 2.1	1113
Sulfate	300.0 Revision 2.1	1113

3. All standards and solutions were used within their recommended shelf life.
4. The sample was prepared and analyzed within the established hold time for this analysis with the exception of nitrate as N and nitrite as N.

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

5. General quality control procedures.
 - n A preparation (method) blank, laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) were prepared and analyzed with the sample in each preparation batch.
 - n The method blank associated with each batch was below the reporting limit for the requested analytes. Sample results have been compared to the blank results and are flagged as appropriate. Nitrite as N and sulfate were detected above the MDL.
 - n All laboratory control sample criteria were met.



- n All initial and continuing calibration blanks were below the reporting limit for the requested analytes.
 - n All initial and continuing calibration verifications were within the acceptance criteria for the requested analytes.
6. Matrix specific quality control procedures.

Sample 1909493-6 was designated as the quality control sample for the chloride, nitrate as N, nitrite as N and sulfate analysis (batch IC1909226-1). Sample 1909561-3 was designated as the quality control sample for the fluoride analysis (batch IC191001-1). 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.

- n A matrix spike (MS) was prepared and analyzed with each batch. All guidance criteria for precision and accuracy were met.
7. It is a standard practice that samples for CHPRC on the ion chromatograph are analyzed at a dilution. The 2X factor can be considered an artifact of the prep and does not indicate a secondary dilution and is therefore not flagged as a dilution.
8. 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.



Megan Johnstone
Inorganics Primary Data Reviewer

10/29/19
Date



Kath M. W.
Inorganics Final Data Reviewer

10/30/19
Date



Inorganic Data Reporting Qualifiers

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

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

Ion Chromatography

Method EPA300.0 Revision 2.1

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909493
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Field ID: B3RPT3</td> </tr> <tr> <td style="padding: 2px;">Lab ID: 1909493-6</td> </tr> </table>	Field ID: B3RPT3	Lab ID: 1909493-6	<p>Sample Matrix: WATER % Moisture: N/A Date Collected: 24-Sep-19 Date Extracted: 26-Sep-19 Date Analyzed: 26-Sep-19 Prep Method: NONE</p>	<p>Prep Batch: IC191001-1 QCBatchID: IC191001-1-1 Run ID: IC191001-1A3 Cleanup: NONE Basis: As Received File Name: 191001IC3LIMS</p>	<p>Analyst: Lainey M. Lloyd Sample Aliquot: 5 ml Final Volume: 5 ml Result Units: MG/L Clean DF: 1</p>
Field ID: B3RPT3					
Lab ID: 1909493-6					

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
16984-48-8	FLUORIDE AnalysisTime: 19:15	2	0.06	U	0.2	0.06
16887-00-6	CHLORIDE AnalysisTime: 15:10	2	11		0.4	0.12
14797-65-0	NITRITE AS N AnalysisTime: 15:10	2	0.27	C	0.2	0.06
14797-55-8	NITRATE AS N AnalysisTime: 15:10	2	2.7		0.4	0.12
14808-79-8	SULFATE AnalysisTime: 15:10	2	47		2	0.6

Fluoride analysis date 10/1/19

Data Package ID: IC1909493-1

Ion Chromatography

Method EPA300.0 Revision 2.1

Method Blank

Lab Name: ALS -- Fort Collins

Work Order Number: 1909493

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: IC190926-1MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 26-Sep-19

Date Analyzed: 26-Sep-19

Prep Batch: IC190926-1

QCBatchID: IC190926-1-1

Run ID: IC190926-1a2

Cleanup: NONE

Basis: N/A

File Name: 190926IC3LIMS

Sample Aliquot: 5 ml

Final Volume: 5 ml

Result Units: MG/L

Clean DF: 1

CASNO	Target Analyte	DF	Result	Result Qualifier	Reporting Limit	MDL
16887-00-6	CHLORIDE	1	0.06	U	0.2	0.06
14797-65-0	NITRITE AS N	1	0.092	B	0.1	0.03
14797-55-8	NITRATE AS N	1	0.06	U	0.2	0.06
14808-79-8	SULFATE	1	0.38	B	1	0.3

Data Package ID: IC1909493-1

Ion Chromatography

Method EPA300.0 Revision 2.1

Method Blank

Lab Name: ALS -- Fort Collins

Work Order Number: 1909493

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: IC191001-1MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 01-Oct-19

Date Analyzed: 01-Oct-19

Prep Batch: IC191001-1

QCBatchID: IC191001-1-1

Run ID: IC191001-1A3

Cleanup: NONE

Basis: N/A

File Name: 191001IC3LIMS

Sample Aliquot: 5 ml

Final Volume: 5 ml

Result Units: MG/L

Clean DF: 1

CASNO	Target Analyte	DF	Result	Result Qualifier	Reporting Limit	MDL
16984-48-8	FLUORIDE	1	0.031	B	0.1	0.03

Data Package ID: IC1909493-1

Ion Chromatography

Method EPA300.0 Revision 2.1

Laboratory Control Sample and Laboratory Control Sample Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1909493

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: IC190926-1LCS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 09/26/2019

Date Analyzed: 09/26/2019

Prep Method: NONE

Prep Batch: IC190926-1

QCBatchID: IC190926-1-1

Run ID: IC190926-1a2

Cleanup: NONE

Basis: N/A

File Name: 190926IC3LIMS

Sample Aliquot: 5 ml

Final Volume: 5 ml

Result Units: MG/L

Clean DF: 1

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
16887-00-6	CHLORIDE	10	9.96	0.2		100	90 - 110%
14797-65-0	NITRITE AS N	5	5.07	0.1		101	90 - 110%
14797-55-8	NITRATE AS N	10	9.75	0.2		98	90 - 110%
14808-79-8	SULFATE	50	48.6	1		97	90 - 110%

Lab ID: IC190926-1LCSD

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 09/26/2019

Date Analyzed: 09/26/2019

Prep Method: NONE

Prep Batch: IC190926-1

QCBatchID: IC190926-1-1

Run ID: IC190926-1a2

Cleanup: NONE

Basis: N/A

File Name: 190926IC3LIMS

Sample Aliquot: 5 ml

Final Volume: 5 ml

Result Units: MG/L

Clean DF: 1

CASNO	Target Analyte	Spike Added	LCSD Result	Reporting Limit	Result Qualifier	LCSD % Rec.	RPD Limit	RPD
16887-00-6	CHLORIDE	10	9.93	0.2		99	15	0
14797-65-0	NITRITE AS N	5	5.02	0.1		100	15	1
14797-55-8	NITRATE AS N	10	9.78	0.2		98	15	0
14808-79-8	SULFATE	50	48.7	1		97	15	0

Data Package ID: IC1909493-1

Ion Chromatography

Method EPA300.0 Revision 2.1

Laboratory Control Sample and Laboratory Control Sample Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1909493

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: IC191001-1LCS	Sample Matrix: WATER % Moisture: N/A Date Collected: N/A Date Extracted: 10/01/2019 Date Analyzed: 10/01/2019 Prep Method: NONE	Prep Batch: IC191001-1 QCBatchID: IC191001-1-1 Run ID: IC191001-1A3 Cleanup: NONE Basis: N/A File Name: 191001IC3LIMS	Sample Aliquot: 5 ml Final Volume: 5 ml Result Units: MG/L Clean DF: 1
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CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
16984-48-8	FLUORIDE	5	4.95	0.1		99	90 - 110%

Lab ID: IC191001-1LCSD	Sample Matrix: WATER % Moisture: N/A Date Collected: N/A Date Extracted: 10/01/2019 Date Analyzed: 10/01/2019 Prep Method: NONE	Prep Batch: IC191001-1 QCBatchID: IC191001-1-1 Run ID: IC191001-1A3 Cleanup: NONE Basis: N/A File Name: 191001IC3LIMS	Sample Aliquot: 5 ml Final Volume: 5 ml Result Units: MG/L Clean DF: 1
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CASNO	Target Analyte	Spike Added	LCSD Result	Reporting Limit	Result Qualifier	LCSD % Rec.	RPD Limit	RPD
16984-48-8	FLUORIDE	5	4.77	0.1		95	15	4

Data Package ID: IC1909493-1

Ion Chromatography

Method EPA300.0 Revision 2.1

Matrix Spike

Lab Name: ALS -- Fort Collins

Work Order Number: 1909493

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	B3RPT3
LabID:	1909493-6MS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 24-Sep-19

Date Extracted: 26-Sep-19

Date Analyzed: 26-Sep-19

Prep Batch: IC190926-1

QCBatchID: IC190926-1-1

Run ID: IC190926-1a2

Cleanup: NONE

Basis: As Received

Sample Aliquot: 5 ml

Final Volume: 5 ml

Result Units: MG/L

File Name: 190926IC3LIMS

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
16887-00-6	CHLORIDE	11		20.7		0.4	10	98	85 - 115%
14797-65-0	NITRITE AS N	0.27	C	4.49		0.2	4	105	85 - 115%
14797-55-8	NITRATE AS N	2.7		12.7		0.4	10	100	85 - 115%
14808-79-8	SULFATE	47		83.6		2	40	93	85 - 115%

Data Package ID: IC1909493-1

Ion Chromatography

Method EPA300.0 Revision 2.1

Matrix Spike

Lab Name: ALS -- Fort Collins

Work Order Number: 1909493

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	SHARED QC
LabID:	1909561-3MS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 26-Sep-19

Date Extracted: 01-Oct-19

Date Analyzed: 01-Oct-19

Prep Batch: IC191001-1

QCBatchID: IC191001-1-1

Run ID: IC191001-1A3

Cleanup: NONE

Basis: As Received

Sample Aliquot: 5 ml

Final Volume: 5 ml

Result Units: MG/L

File Name: 191001IC3LIMS

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
16984-48-8	FLUORIDE	0.34	C	3.73		0.2	4	85	85 - 115%

Data Package ID: IC1909493-1

Prep Batch ID: IC190926-1

Start Date: 09/26/19	End Date: 09/26/19	Concentration Method: NONE	Batch Created By: kjs
Start Time: 14:00	End Time: 17:00	Extract Method: NONE	Date Created: 09/26/19
Prep Analyst: Lainey M. Lloyd		Initial Volume Units: ml	Time Created: 17:21
Comments:		Final Volume Units: ml	Validated By: kjs
<div style="border: 1px solid black; height: 30px; width: 100%;"></div>			Date Validated: 09/30/19
			Time Validated: 15:50

QC Batch ID: IC190926-1-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
IC190926-1	MB	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909493
IC190926-1	LCS	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909493
IC190926-1	LCSD	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909493
1909493-6	MS	B3RPT3	WATER	9/24/2019	5	5	NONE	1	1909493
1909537-1	MS	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909537
1909489-1	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909489
1909489-2	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909489
1909493-6	SMP	B3RPT3	WATER	9/24/2019	5	5	NONE	1	1909493
1909534-1	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909534
1909534-10	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909534
1909534-2	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909534
1909534-3	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909534
1909534-4	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909534
1909534-5	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909534
1909534-6	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909534
1909534-7	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909534
1909534-8	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909534
1909534-9	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909534
1909537-1	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909537

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: IC191001-1

Start Date: 10/01/19	End Date: 10/01/19	Concentration Method: NONE	Batch Created By: kjs
Start Time: 13:30	End Time: 16:00	Extract Method: NONE	Date Created: 10/01/19
Prep Analyst: Lainey M. Lloyd		Initial Volume Units: ml	Time Created: 13:32
Comments:		Final Volume Units: ml	Validated By: lml
samples re-preped, some analytes out of hold. LL			Date Validated: 10/03/19
			Time Validated: 7:56

QC Batch ID: IC191001-1-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
IC191001-1	MB	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909481
IC191001-1	LCS	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909481
IC191001-1	LCSD	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909481
1909481-11	MS	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909481
1909561-3	MS	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909561
1909272-20	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909272
1909272-26	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909272
1909272-31	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909272
1909274-2	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909274
1909402-11	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909402
1909402-28	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909402
1909402-3	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909402
1909414-10	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909414
1909414-2	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909414
1909457-1	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909457
1909481-11	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909481
1909481-3	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909481
1909489-1	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909489
1909489-2	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909489
1909493-6	SMP	B3RPT3	WATER	9/24/2019	5	5	NONE	1	1909493
1909537-1	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909537
1909561-1	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909561
1909561-2	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909561
1909561-3	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909561

Prep Batch ID: IC191001-1

Start Date: 10/01/19	End Date: 10/01/19	Concentration Method: NONE	Batch Created By: kjs
Start Time: 13:30	End Time: 16:00	Extract Method: NONE	Date Created: 10/01/19
Prep Analyst: Lainey M. Lloyd		Initial Volume Units: ml	Time Created: 13:32
Comments:		Final Volume Units: ml	Validated By: lml
samples re-preped, some analytes out of hold. LL			Date Validated: 10/03/19
			Time Validated: 7:56

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

AQUIFER TUBES, OCTOBER 2019 -- X20-001

Work Order Number: 1909493

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

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

2. Analysis by ICP-MS followed method 6020B and the current revision of SOP 827.
3. All standards and solutions are NIST traceable and were used within their recommended shelf life.
4. The samples were prepared and analyzed within the established hold time.

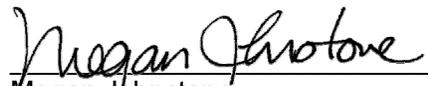
All in house quality control procedures were followed, as described below.

5. General quality control procedures.
 - A preparation (method) blank and laboratory control sample were digested and analyzed with the samples in this digestion batch.
 - The preparation (method) blank associated with this digestion batch was below the reporting limit for the requested analyte. Sample results have been compared to the blank results and are flagged as appropriate.
 - All laboratory control sample criteria were met.
 - All initial and continuing calibration blanks were below the reporting limit for the requested analyte.
 - All initial and continuing calibration verifications were within the acceptance criteria for the requested analyte.



- The interference check samples associated with Method 6020B were analyzed.
6. Matrix specific quality control procedures.
- Sample 1909440-2 was designated as the quality control sample for this analysis. Results for the shared quality control samples are included at the client's request.
- Similarity of matrix and therefore relevance of the QC results should not be automatically inferred for any sample other than the native sample selected for QC.
- A matrix spike and matrix spike duplicate were digested and analyzed with this batch. All acceptance criteria for accuracy and precision were met.
 - A serial dilution was analyzed with this ICP batch. All acceptance criteria were met with.
7. It is a standard practice that samples for ICP-MS are analyzed at a dilution. The 10X factor can be considered an artifact of the prep and does not indicate a secondary dilution and is therefore not flagged as a dilution.

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



Megan Johnstone
Inorganics Primary Data Reviewer

10/21/19
Date



Keith M. W.
Inorganics Final Data Reviewer

10/28/19
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 $\leq 20X$ the blank concentration.
 - D - Analyte was reported at a secondary dilution factor, typically $DF > 1$ (i.e., the primary preparation required dilution to either bring the analyte within the calibration range or to minimize interference). Required for organics/wetchem if the sample was diluted.

Dissolved ARSENIC**Method SW6020B****Sample Results**

Lab Name: ALS -- Fort Collins
Client Name: CH2M HILL Plateau Remediation Company
Client Project ID: AQUIFER TUBES, OCTOBER 2019 X20-001
Work Order Number: 1909493 **Final Volume:** 50 ml
Reporting Basis: As Received **Matrix:** WATER
Analyst: Nicole C. Chirban **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
B3RPR3	1909493-1	9/24/2019	10/10/2019	10/16/2019	N/A	10	2.4	2	0.39		50 ml

Comments:

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

Data Package ID: *IM1909493-1*

Dissolved CHROMIUM**Method SW6020B****Sample Results**

Lab Name: ALS -- Fort Collins
Client Name: CH2M HILL Plateau Remediation Company
Client Project ID: AQUIFER TUBES, OCTOBER 2019 X20-001
Work Order Number: 1909493 **Final Volume:** 50 ml
Reporting Basis: As Received **Matrix:** WATER
Analyst: Nicole C. Chirban **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
B3RPR3	1909493-1	9/24/2019	10/10/2019	10/16/2019	N/A	10	4.2	10	0.46	B	50 ml
B3RPK4	1909493-3	9/24/2019	10/10/2019	10/16/2019	N/A	10	1.1	10	0.46	B	50 ml

Comments:

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

Data Package ID: *im1909493-1*

Total Recoverable ARSENIC

Method SW6020B

Sample Results

Lab Name: ALS -- Fort Collins
Client Name: CH2M HILL Plateau Remediation Company
Client Project ID: AQUIFER TUBES, OCTOBER 2019 X20-001
Work Order Number: 1909493 **Final Volume:** 50 ml
Reporting Basis: As Received **Matrix:** WATER
Analyst: Nicole C. Chirban **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
B3RRC9	1909493-2	9/24/2019	10/10/2019	10/16/2019	N/A	10	2.4	2	0.39		50 ml

Comments:

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

Data Package ID: *IM1909493-1*

Total Recoverable CHROMIUM

Method SW6020B

Sample Results

Lab Name: ALS -- Fort Collins
Client Name: CH2M HILL Plateau Remediation Company
Client Project ID: AQUIFER TUBES, OCTOBER 2019 X20-001
Work Order Number: 1909493 **Final Volume:** 50 ml
Reporting Basis: As Received **Matrix:** WATER
Analyst: Nicole C. Chirban **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
B3RRC9	1909493-2	9/24/2019	10/10/2019	10/16/2019	N/A	10	4.3	10	0.46	B	50 ml
B3RPK0	1909493-4	9/24/2019	10/10/2019	10/16/2019	N/A	10	1.1	10	0.46	B	50 ml

Comments:

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

Data Package ID: *im1909493-1*

ICPMS Metals

Method SW6020B

Method Blank

Lab Name: ALS -- Fort Collins

Work Order Number: 1909493

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: IP191010-2MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 10-Oct-19

Date Analyzed: 16-Oct-19

Prep Batch: IP191010-2

QCBatchID: IP191010-2-6

Run ID: IM191016-10A7

Cleanup: NONE

Basis: N/A

File Name: 017SMPL_

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
7440-38-2	ARSENIC	10	0.39	U	2	0.39
7440-47-3	CHROMIUM	10	0.46	U	10	0.46

Data Package ID: IM1909493-1

ICPMS Metals

Method SW6020B

Laboratory Control Sample

Lab Name: ALS -- Fort Collins

Work Order Number: 1909493

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: IM191010-2LCS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 10/10/2019

Date Analyzed: 10/16/2019

Prep Method: SW3005A

Prep Batch: IP191010-2

QCBatchID: IP191010-2-6

Run ID: IM191016-10A7

Cleanup: NONE

Basis: N/A

File Name: 018SMPL_

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
7440-38-2	ARSENIC	100	97.9	2		98	80 - 120%
7440-47-3	CHROMIUM	500	487	10		97	80 - 120%

Data Package ID: *IM1909493-1*

ICPMS Metals

Method SW6020B

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1909493

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID: SHARED QC
LabID: 1909440-2MS

Sample Matrix: WATER
 % Moisture: N/A
 Date Collected: 20-Sep-19
 Date Extracted: 10-Oct-19
 Date Analyzed: 16-Oct-19
 Prep Method: SW3005 Rev A

Prep Batch: IP191010-2
 QCBatchID: IP191010-2-6
 Run ID: IM191016-10A7
 Cleanup: NONE
 Basis: As Received

Sample Aliquot: 50 ml
 Final Volume: 50 ml
 Result Units: UG/L
 File Name: 030SMPL_

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
7440-38-2	ARSENIC	0.39	U	94.8		2	100	95	75 - 125%
7440-47-3	CHROMIUM	1	B	483		10	500	96	75 - 125%

Field ID: SHARED QC
LabID: 1909440-2MSD

Sample Matrix: WATER
 % Moisture: N/A
 Date Collected: 20-Sep-19
 Date Extracted: 10-Oct-19
 Date Analyzed: 16-Oct-19
 Prep Method: SW3005 Rev A

Prep Batch: IP191010-2
 QCBatchID: IP191010-2-6
 Run ID: IM191016-10A7
 Cleanup: NONE
 Basis: As Received

Sample Aliquot: 50 ml
 Final Volume: 50 ml
 Result Units: UG/L
 File Name: 031SMPL_

CASNO	Target Analyte	MSD Result	MSD Qual	Spike Added	MSD % Rec.	Reporting Limit	RPD Limit	RPD
7440-38-2	ARSENIC	95.3		100	95	2	20	0
7440-47-3	CHROMIUM	485		500	97	10	20	0

Data Package ID: IM1909493-1

Prep Batch ID: IP191010-2

Start Date: 10/10/19	End Date: 10/10/19	Concentration Method: NONE	Batch Created By: jml
Start Time: 10:56	End Time: 18:00	Extract Method: SW3005A	Date Created: 10/10/19
Prep Analyst: Jill M. Latelle		Initial Volume Units: ml	Time Created: 10:56
Comments:		Final Volume Units: ml	Validated By: jml
			Date Validated: 10/10/19
			Time Validated: 11:54

QC Batch ID: IP191010-2-6

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
IP191010-2	MB	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909440
IM191010-2	LCS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909440
1909440-2	MS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909440
1909440-2	MSD	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909440
1909440-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909440
1909493-1	SMP	B3RPR3	WATER	9/24/2019	50	50	NONE	1	1909493
1909493-2	SMP	B3RRC9	WATER	9/24/2019	50	50	NONE	1	1909493

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: IP191010-2

Start Date: 10/10/19	End Date: 10/10/19	Concentration Method: NONE	Batch Created By: jml
Start Time: 10:56	End Time: 18:00	Extract Method: SW3005A	Date Created: 10/10/19
Prep Analyst: Jill M. Latelle		Initial Volume Units: ml	Time Created: 10:56
Comments:		Final Volume Units: ml	Validated By: jml
			Date Validated: 10/10/19
			Time Validated: 11:54

QC Batch ID: IP191010-2-7

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
IP191010-2	MB	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909440
IM191010-2	LCS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909440
1909440-2	MS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909440
1909440-2	MSD	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909440
1909440-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909440
1909493-3	SMP	B3RPK4	WATER	9/24/2019	50	50	NONE	1	1909493
1909493-4	SMP	B3RPK0	WATER	9/24/2019	50	50	NONE	1	1909493

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

AQUIFER TUBES, OCTOBER 2019 – X20-001

Work Order Number: 1909493

1. The samples were prepared according to the current revision of SOP 707.
2. The samples were analyzed for the presence of ⁹⁰Sr according to the current revision of SOP 724. The analyses were completed on 10/13/2019.
3. Total radio-strontium is reported as ⁹⁰Sr. The presence of other radioisotopes of strontium may cause positive bias in the measured strontium concentration.
4. The analysis results for the 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:

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

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
Pik Yee Yuen
Radiochemistry Primary Data Reviewer

10/21/19
Date

Kath M. A.
Radiochemistry Final Data Reviewer

10/22/19
Date

Strontium-90 by GFPC

PAI 724 Rev 13

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1909493

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: SR191009-1MB

Sample Matrix: WATER
 Prep SOP: PAI 707 Rev 15
 Date Collected: 09-Oct-19
 Date Prepared: 09-Oct-19
 Date Analyzed: 13-Oct-19

Prep Batch: SR191009-1
 QCBatchID: SR191009-1-1
 Run ID: SR191009-1A
 Count Time: 90 minutes

Final Aliquot: 994 ml
 Result Units: pCi/l
 File Name: SRC1013A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10098-97-2	Sr-90	1.06E-01 +/- 2.85E-01	6.43E-01	1.00E+00	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.040E+03	9.62E+02	ug	92.6	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: SR1909493-1

Strontium-90 by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)**Lab Name:** ALS -- Fort Collins**Work Order Number:** 1909493**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** AQUIFER TUBES, OCTOBER 2019 X20-001**Lab ID:** SR191009-1LCS

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 09-Oct-19
Date Prepared: 09-Oct-19
Date Analyzed: 13-Oct-19

Prep Batch: SR191009-1
QCBatchID: SR191009-1-1
Run ID: SR191009-1A
Count Time: 30 minutes

Final Aliquot: 994 ml
Result Units: pCi/l
File Name: SRC1013

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
10098-97-2	Sr-90	1.26E+01 +/- 3.24E+00	1.08E+00	1.150E+01	109	75 - 125	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.040E+03	9.21E+02	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.
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: SR1909493-1

Strontium-90 by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909493
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: SR191009-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 09-Oct-19
Date Prepared: 09-Oct-19
Date Analyzed: 13-Oct-19

Prep Batch: SR191009-1
QCBatchID: SR191009-1-1
Run ID: SR191009-1A
Count Time: 30 minutes

Final Aliquot: 994 ml
Result Units: pCi/l
File Name: SRC1013

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
10098-97-2	Sr-90	1.13E+01 +/- 2.94E+00	1.14E+00	1.150E+01	97.5	75 - 125	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.040E+03	8.98E+02	ug	86.4	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: SR1909493-1

Strontium-90 by GFPC

PAI 724 Rev 13

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909493
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	
Lab ID:	SR191009-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 09-Oct-19
Date Prepared: 09-Oct-19
Date Analyzed: 13-Oct-19

Prep Batch: SR191009-1
QCBatchID: SR191009-1-1
Run ID: SR191009-1A
Count Time: 30 minutes

Final Aliquot: 994 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC1013

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
10098-97-2	Sr-90	1.26E+01 +/-	3.24E+00	1.08E+00		1.13E+01 +/-	2.94E+00	1.14E+00		0.612	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: SR1909493-1

Strontium-90 by GFPC

PAI 724 Rev 13

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909493
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	
Lab ID:	SR191009-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 09-Oct-19
Date Prepared: 09-Oct-19
Date Analyzed: 13-Oct-19

Prep Batch: SR191009-1
QCBatchID: SR191009-1-1
Run ID: SR191009-1A
Count Time: 30 minutes

Final Aliquot: 994 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC1013

CASNO	Analyte	Sample				Duplicate				RPD	RPD Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
10098-97-2	Sr-90	1.26E+01 +/-	3.24E+00	1.08E+00		1.13E+01 +/-	2.94E+00	1.14E+00		11.00	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: SR1909493-1

Strontium-90 by GFPC

PAI 724 Rev 13

Sample Results**Lab Name:** ALS -- Fort Collins**Work Order Number:** 1909493**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	B3RRC9
Lab ID:	1909493-2

Sample Matrix: WATER**Prep SOP:** PAI 707 Rev 15**Date Collected:** 24-Sep-19**Date Prepared:** 09-Oct-19**Date Analyzed:** 13-Oct-19**Prep Batch:** SR191009-1**QCBatchID:** SR191009-1-1**Run ID:** SR191009-1A**Count Time:** 90 minutes**Report Basis:** Unfiltered**Final Aliquot:** 994 ml**Prep Basis:** Unfiltered**Moisture(%):** NA**Result Units:** pCi/l**File Name:** SRC1013A**Analysis ReqCode:** SRISO_SEP_PR

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10098-97-2	Sr-90	-9.29E-02 +/- 2.44E-01	5.84E-01	1E+00	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.240E+03	1.19E+03	ug	96.0	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: SR1909493-1

Strontium-90 by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909493
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	B3RPK6
Lab ID:	1909493-5

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 24-Sep-19
Date Prepared: 09-Oct-19
Date Analyzed: 13-Oct-19

Prep Batch: SR191009-1
QCBatchID: SR191009-1-1
Run ID: SR191009-1A
Count Time: 90 minutes
Report Basis: Unfiltered

Final Aliquot: 994 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC1013A

Analysis ReqCode: SRISO_SEP_PR

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10098-97-2	Sr-90	-2.81E-02 +/- 2.86E-01	6.69E-01	1E+00	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.130E+03	1.02E+03	ug	90.4	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: SR1909493-1

Strontium-90 by GFPC

PAI 724 Rev 13

Sample Results**Lab Name:** ALS -- Fort Collins**Work Order Number:** 1909493**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	B3RPR5
Lab ID:	1909493-7

Sample Matrix: WATER**Prep SOP:** PAI 707 Rev 15**Date Collected:** 24-Sep-19**Date Prepared:** 09-Oct-19**Date Analyzed:** 13-Oct-19**Prep Batch:** SR191009-1**QCBatchID:** SR191009-1-1**Run ID:** SR191009-1A**Count Time:** 90 minutes**Report Basis:** Unfiltered**Final Aliquot:** 994 ml**Prep Basis:** Unfiltered**Moisture(%):** NA**Result Units:** pCi/l**File Name:** SRC1013A**Analysis ReqCode:** SRISO_SEP_PR

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10098-97-2	Sr-90	3.40E-02 +/- 2.58E-01	5.94E-01	1E+00	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.200E+03	1.15E+03	ug	96.4	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: SR1909493-1

Prep Batch ID: SR191009-1

Start Date: 10/09/19	End Date: 10/09/19	Concentration Method: NONE	Batch Created By: jxh
Start Time: 8:19	End Time: 8:19	Extract Method: PAI 70715	Date Created: 10/09/19
Prep Analyst: Jirushaya Hantula		Initial Volume Units: ml	Time Created: 8:39
Comments:		Final Volume Units: ml	Validated By: jxh
<div style="border: 1px solid black; height: 30px; width: 100%;"></div>			Date Validated: 10/11/19
			Time Validated: 13:03

QC Batch ID: SR191009-1-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
SR191009-1	CAR	XXXXXX	WATER	XXXXXX	1000	1000	NONE	1	1909373
SR191009-1	MB	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909373
SR191009-1	LCS	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909373
SR191009-1	LCSD	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909493
1909373-1	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909373
1909375-1	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909375
1909375-3	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909375
1909375-5	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909375
1909383-6	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909383
1909383-9	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909383
1909419-6	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909419
1909419-8	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909419
1909419-9	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909419
1909441-1	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909441
1909493-2	SMP	B3RRC9	WATER	9/24/2019	1000	994.01	NONE	1	1909493
1909493-5	SMP	B3RPK6	WATER	9/24/2019	1000	994.01	NONE	1	1909493
1909493-7	SMP	B3RPR5	WATER	9/24/2019	1000	994.01	NONE	1	1909493
1909538-1	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909538
1909538-6	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909538

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