



Thursday, October 17, 2019

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

Re: ALS Workorder: 1909375
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 9/18/2019. The samples were scheduled for the following analyses:

- GC/MS Volatiles
- Metals
- Strontium-90
- Tritium

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. 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: 1909375

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
B3RNT9	1909375-1		WATER	16-Sep-19	9:02
B3RNV4	1909375-2		WATER	16-Sep-19	9:02
B3RNV6	1909375-3		WATER	16-Sep-19	10:03
B3RNV2	1909375-4		WATER	16-Sep-19	11:18
B3RPW7	1909375-5		WATER	16-Sep-19	11:38
B3RPX9	1909375-6		WATER	16-Sep-19	11:56
B3RPX4	1909375-7		WATER	16-Sep-19	11:56

CH2MHill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C.# X20-001-041	
Collector: Mike Esparza <small>CHPRC</small>		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-506 103/62		Ice Chest No.: GWS 109	
Shipped To (Lab): ALS Environmental Ft. Collins		Method of Shipment Commercial Carrier		Bill of Lading/Air Bill No.: 762 5807 88 48	
Protocol: SURV		Priority: 30 Days		Offsite Property No.: 11603	

Sample No.	Filter	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B3RNT9	N	SEP 16 2019	0621	1x500-mL G/P	6020_METALS_ICPMS: Chromium (1)	6 Months	HNO3 to pH <2
B3RNT9	N	SEP 16 2019	1	2x1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2
B3RNV4	Y	SEP 16 2019	0602	1x500-mL G/P	6020_METALS_ICPMS: Chromium (1)	6 Months	HNO3 to pH <2

SPECIAL INSTRUCTIONS
N/A

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

Relinquished By		Received By	
Print First and Last Name	Signature	Print First and Last Name	Signature
Mike Esparza CHPRC	<i>Mike Esparza</i>	Janelle Zunker CHPRC	<i>Janelle Zunker</i>
Janelle Zunker CHPRC	<i>Janelle Zunker</i>	SSU-1	<i>SSU-1</i>
SSU-1	<i>SSU-1</i>	Janelle Zunker CHPRC	<i>Janelle Zunker</i>
Janelle Zunker CHPRC	<i>Janelle Zunker</i>	FEDFX	<i>FEDFX</i>
	<i>FEDFX</i>	Erik Evans	<i>Erik Evans</i>

Disposal Method (e.g., Return to customer, per lab procedure, used in process):

Disposed By: _____ Date/Time: _____

Printed On: 8/26/2019 FSR ID = FSR83666 A-6004-842 (REV 3)

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C.# X20-001-042
		1909375		Page 1 of 1
Collector:	Milke Esparza /CHPRC	Contact/Requester:	Karen Waters-Husted	
SAF No.:	X20-001	Sampling Origin:	Hanford Site	
Project Title:	AQUIFER TUBES, OCTOBER 2019	Logbook No.:	HNF-N-506 / 03/62	
Shipped To (Lab):	ALS Environmental Ft. Collins	Method of Shipment:	Commercial Carrier	
Protocol:	SURV	Priority:	30 Days	
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.	Filter	Date	Time	No/Type Container
B3RNV6	N	SEP 16 2019	003	2x1-L G/P
B3RNV6	N	SEP 16 2019	1003	1x250-mL P
		Sample Analysis		Holding Time
		SRISO_SEP_PRECIP_GPC: COMMON		6 Months
		TRITIUM_DIST_LSC: COMMON		6 Months
				Preservative
				HNO3 to pH <2
				None

Relinquished By		Received By		Matrix *	
Print First and Last Name	Signature	Print First and Last Name	Signature	S	DS = Drum Solids
Milke Esparza /CHPRC	<i>[Signature]</i>	Janelle Zunker CHPRC	<i>[Signature]</i>	SE = Sediment	DL = Drum Liquids
Janelle Zunker CHPRC	<i>[Signature]</i>	SSU-1	<i>[Signature]</i>	SO = Solid	T = Tissue
SSU-1	<i>[Signature]</i>	Janelle Zunker CHPRC	<i>[Signature]</i>	SL = Sludge	WI = Wipe
Janelle Zunker CHPRC	<i>[Signature]</i>	FEDEX	<i>[Signature]</i>	SW = Water	L = Liquid
FEDEX	<i>[Signature]</i>	Erik Evans	<i>[Signature]</i>	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:
4 of 6			

Printed On 8/26/2019 FSR ID = FSR83667 A-6004-842 (REV 3)

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C.# X20-001-043	
Mike Esparza JCHPRC		Telephone No.: 509-376-4650		Page 1 of 1	
Collector:	X20-001	Contact/Requester:	Karen Waters-Husted	Purchase Order/Charge Code: 303064	
SAF No.:	AQUIFER TUBES, OCTOBER 2019	Sampling Origin:	Hanford Site	Ice Chest No.: 605-109	
Project Title:	ALS Environmental Ft. Collins	Logbook No.:	HNF-N-506 103/62	Bill of Lading/Air Bill No.: 776258078848	
Shipped To (Lab):	SURV	Method of Shipment:	Commercial Carrier	Offsite Property No.: 11603	
Protocol:	SPECIAL INSTRUCTIONS N/A				
Sample No.:	B3RNV2	Filter:	N	Time:	SEP 16 2019 1118
No/Type Container:	5x40-mL aGs*	8260_VOA_GCMS:	COMMON	Sample Analysis:	Holding Time: 14 Days
Preservative:	HCl or H2SO4 to pH <2 / COOL <=6C				

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

Print First and Last Name	Signature	Date/Time	Print First and Last Name	Signature	Date/Time	Matrix *
Mike Esparza JCHPRC	<i>Mike Esparza</i>	SEP 16 2019 1230	Janelle Zunker CHPRC	<i>Janelle Zunker</i>	SEP 16 2019 1230	S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air
Janelle Zunker CHPRC	<i>Janelle Zunker</i>	SEP 16 2019 1330	SSU-1	SSU-1	SEP 16 2019 1330	DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other
SSU-1	<i>Janelle Zunker</i>	SEP 17 2019 0630	Janelle Zunker CHPRC	<i>Janelle Zunker</i>	SEP 17 2019 0630	
Janelle Zunker CHPRC	<i>Janelle Zunker</i>	SEP 17 2019 1400	FEDEX	FEDEX	SEP 17 2019 1400	
	FEDEX		Eric Evans	<i>Eric Evans</i>	SEP 17 2019 1400	

Disposal Method (e.g., Return to customer, per lab procedure, used in process):

Disposed By: _____ Date/Time: _____

Printed On: 8/26/2019 FSR ID = FSR83668 A-6004-842 (REV 3)

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 1909375		C.O.C.# X20-001-045 Page 1 of 1
Collector: Mike Esparza /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 / 63/62	Ice Chest No.: <i>QDS-109</i>		
Shipped To (Lab): ALS Environmental Ft. Collins	Method of Shipment: Commercial Carrier	Bill of Lading/Air Bill No.: 776258078848		
Protocol: SURV	Priority: 30 Days	Offsite Property No.: <i>11630</i>		
POSSIBLE SAMPLE HAZARDS/REMARK ** ** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1		SPECIAL INSTRUCTIONS N/A		
Sample No.	Filter	Date	Time	No/Type Container
6	Y	SEP 16 2019	1156	1x500-mL G/P
7	N	SEP 16 2019	1156	1x500-mL G/P
		Sample Analysis		Holding Time
		6020_METALS_ICPMS: Chromium (1)		6 Months
		6020_METALS_ICPMS: Chromium (1)		6 Months
				Preservative
				HNO3 to pH <2
				HNO3 to pH <2

Relinquished By		Received By	
Print First and Last Name	Signature	Print First and Last Name	Signature
Mike Esparza /CHPRC	<i>[Signature]</i>	Janelle Zunker CHPRC	<i>[Signature]</i>
Janelle Zunker CHPRC	<i>[Signature]</i>	SSU-1	<i>[Signature]</i>
SSU-1	<i>[Signature]</i>	Janelle Zunker CHPRC	<i>[Signature]</i>
Janelle Zunker CHPRC	<i>[Signature]</i>	FEDEX	<i>[Signature]</i>
	<i>[Signature]</i>	Erik Evans	<i>[Signature]</i>

Print First and Last Name	Signature	Date/Time	Date/Time	Matrix *
Mike Esparza /CHPRC	<i>[Signature]</i>	SEP 16 2019	SEP 16 2019	S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air
Janelle Zunker CHPRC	<i>[Signature]</i>	SEP 16 2019	SEP 16 2019	DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other
SSU-1	<i>[Signature]</i>	SEP 17 2019	SEP 17 2019	
Janelle Zunker CHPRC	<i>[Signature]</i>	SEP 17 2019	SEP 17 2019	
	<i>[Signature]</i>	SEP 17 2019	SEP 17 2019	

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process):	Disposed By:	Date/Time:
Printed On 8/26/2019			

FSR ID = FSR83670 A-6004-842 (REV 3)



ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: CHPRC

Workorder No: 1909375

Project Manager: KMO

Initials: EE

Date: 9/19/19

1. Are airbills / shipping documents present and/or removable?		DROP OFF	<input checked="" type="checkbox"/> YES	NO			
2. Are custody seals on shipping containers intact?		NONE	<input checked="" type="checkbox"/> YES	NO *			
3. Are custody seals on sample containers intact?		NONE	<input checked="" type="checkbox"/> YES	NO *			
4. Is there a COC (chain-of-custody) present?			<input checked="" type="checkbox"/> YES	NO *			
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)			<input checked="" type="checkbox"/> YES	NO *			
6. Are short-hold samples present?			YES	<input checked="" type="checkbox"/> NO			
7. Are all samples within holding times for the requested analyses?			<input checked="" type="checkbox"/> YES	NO *			
8. Were all sample containers received intact? (not broken or leaking)			<input checked="" type="checkbox"/> YES	NO *			
9. Is there sufficient sample for the requested analyses?			<input checked="" type="checkbox"/> YES	NO *			
10. Are all samples in the proper containers for the requested analyses?			<input checked="" type="checkbox"/> YES	NO *			
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)		N/A	<input checked="" type="checkbox"/> YES	NO *			
12. Are all aqueous non-preserved samples pH 4-9?		N/A	<input checked="" type="checkbox"/> 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	<input checked="" type="checkbox"/> YES	NO			
14. Were the samples shipped on ice?			<input checked="" type="checkbox"/> YES	NO			
15. Were cooler temperatures measured at 0.1-6.0°C?	IR gun used*:	#1	#3	#4	RAD ONLY	<input checked="" type="checkbox"/> YES	NO
Cooler #: <u>1</u>							
Temperature (°C): <u>0.9</u>							
No. of custody seals on cooler: <u>2</u>							
External µR/hr reading: <u>13</u>							
Background µR/hr reading: <u>13</u>							
Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? <input checked="" type="checkbox"/> 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.

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: [Signature] 9/20/19

1909375

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

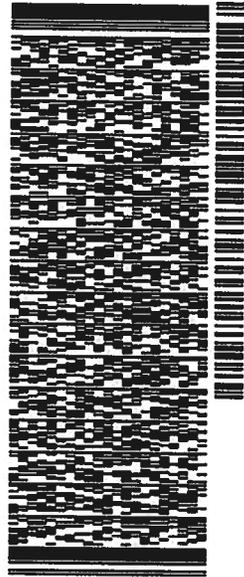
SHIP DATE: 17SEP19
ACT WGT: 66.00 LB
CAD: 10705655/INET/4160
BILL THIRD PARTY

TO JULIE ELLINGSON
ALS GLOBAL-FORT COLLINS
225 COMMERCE DR

FORT COLLINS CO 80524
(970) 490-1511
RE: P7841503
DEPT:

13-2
0.9°

567J19D0405A2



TRK# 7762 5807 8848
0201

WED - 18 SEP 10:30A
PRIORITY OVERNIGHT
DSR

XH FTCA

80524
CO-US DEN



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GC/MS Volatiles Case Narrative

CH2M HILL Plateau Remediation Company

AQUIFER TUBES, OCTOBER 2019 - X20-001

Work Order Number: 1909375

1. The sample was prepared according to SW-846, 3rd Edition procedures. Specifically, the water sample was prepared using purge and trap procedures based on Method 5030C.
2. The sample was 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 1909374-1 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.

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

9. The sample was 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
Mindy Norton
Organics Primary Data Reviewer

10/10/19
Date

Kath M. W.
Organics Final Data Reviewer

10/15/19
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: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: VL190924-6MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 24-Sep-19

Date Analyzed: 24-Sep-19

Prep Batch: VL190924-5

QCBatchID: VL190924-5-3

Run ID: VL190924-5A

Cleanup: NONE

Basis: N/A

File Name: D73503

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: VL1909375-1

Date Printed: Thursday, October 10, 2019

ALS -- Fort Collins

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LIMS Version: 6.912

GC/MS Volatiles

Method SW8260_25C

Method Blank

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: VL190924-6MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 24-Sep-19

Date Analyzed: 24-Sep-19

Prep Batch: VL190924-5

QCBatchID: VL190924-5-3

Run ID: VL190924-5A

Cleanup: NONE

Basis: N/A

File Name: D73503

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
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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	25.3		25	101	84 - 118
2037-26-5	TOLUENE-D8	25.2		25	101	85 - 115

Data Package ID: VL1909375-1

GC/MS Volatiles

Method SW8260_25C

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID: B3RWNW2

Lab ID: 1909375-4

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 16-Sep-19

Date Extracted: 24-Sep-19

Date Analyzed: 24-Sep-19

Prep Method: SW5030 Rev C

Prep Batch: VL190924-5

QCBatchID: VL190924-5-3

Run ID: VL190924-5A

Cleanup: NONE

Basis: As Received

File Name: D73508

Analyst: Cory C. Lewis

Sample Aliquot: 10 ml

Final Volume: 10 ml

Result Units: UG/L

Clean DF: 1

Analysis ReqCode: 8260_VOA_GCM

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	0.3	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: VL1909375-1

Date Printed: Thursday, October 10, 2019

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GC/MS Volatiles

Method SW8260_25C

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID: B3RWN2	Sample Matrix: WATER	Prep Batch: VL190924-5	Analyst: Cory C. Lewis
Lab ID: 1909375-4	% Moisture: N/A	QCBatchID: VL190924-5-3	Sample Aliquot: 1 ml
Analysis ReqCode: 8260_VOA_GCM	Date Collected: 16-Sep-19	Run ID: VL190924-5A	Final Volume: 1 ml
	Date Extracted: 24-Sep-19	Cleanup: NONE	Result Units: UG/L
	Date Analyzed: 24-Sep-19	Basis: As Received	Clean DF: 1
	Prep Method: SW5030 Rev C	File Name: D73508	

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
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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	25.7		25	103	84 - 118
2037-26-5	TOLUENE-D8	24.9		25	100	85 - 115

Data Package ID: VL1909375-1

GC/MS Volatiles**Method SW8260_25C****Laboratory Control Sample and Laboratory Control Sample Duplicate**

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: VL190924-6LCS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 09/24/2019

Date Analyzed: 09/24/2019

Prep Method: SW5030C

Prep Batch: VL190924-5

QCBatchID: VL190924-5-3

Run ID: VL190924-5A

Cleanup: NONE

Basis: N/A

File Name: D73497

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	10.4	1		104	72 - 123%
75-35-4	1,1-DICHLOROETHENE	10	9.93	1		99	77 - 119%
67-64-1	ACETONE	40	40	10		100	62 - 142%
75-15-0	CARBON DISULFIDE	10	10.5	1		105	76 - 121%
75-09-2	METHYLENE CHLORIDE	10	10.2	1		102	71 - 130%
75-34-3	1,1-DICHLOROETHANE	10	10.4	1		104	83 - 119%
78-93-3	2-BUTANONE	40	37.3	10		93	70 - 135%
67-66-3	CHLOROFORM	10	10.6	1		106	82 - 119%
71-55-6	1,1,1-TRICHLOROETHANE	10	10.4	1		104	80 - 120%
56-23-5	CARBON TETRACHLORIDE	10	10.9	1		109	77 - 122%
107-06-2	1,2-DICHLOROETHANE	10	9.9	1		99	74 - 128%
71-43-2	BENZENE	10	10.3	1		103	83 - 117%
79-01-6	TRICHLOROETHENE	10	10.3	1		103	83 - 117%
108-10-1	4-METHYL-2-PENTANONE	40	37.3	10		93	73 - 125%
108-88-3	TOLUENE	10	9.98	1		100	82 - 113%
79-00-5	1,1,2-TRICHLOROETHANE	10	10	1		100	78 - 116%
127-18-4	TETRACHLOROETHENE	10	10.1	1		101	84 - 117%
108-90-7	CHLOROBENZENE	10	9.87	1		99	81 - 113%
100-41-4	ETHYLBENZENE	10	10	1		100	81 - 113%
179601-23-	M+P-XYLENE	20	20.3	1		102	82 - 115%
95-47-6	O-XYLENE	10	9.71	1		97	81 - 115%

Data Package ID: VL1909375-1

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GC/MS Volatiles**Method SW8260_25C****Laboratory Control Sample and Laboratory Control Sample Duplicate**

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: VL190924-6LCSD

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 09/24/2019

Date Analyzed: 09/24/2019

Prep Method: SW5030C

Prep Batch: VL190924-5

QC Batch ID: VL190924-5-3

Run ID: VL190924-5A

Cleanup: NONE

Basis: N/A

File Name: D73498

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	10.4	1		104	20	1
75-35-4	1,1-DICHLOROETHENE	10	10.1	1		101	20	2
67-64-1	ACETONE	40	41.9	10		105	30	5
75-15-0	CARBON DISULFIDE	10	10.8	1		108	20	2
75-09-2	METHYLENE CHLORIDE	10	10.4	1		104	20	2
75-34-3	1,1-DICHLOROETHANE	10	10.5	1		105	20	1
78-93-3	2-BUTANONE	40	39	10		97	30	4
67-66-3	CHLOROFORM	10	10.7	1		107	20	1
71-55-6	1,1,1-TRICHLOROETHANE	10	10.5	1		105	20	0
56-23-5	CARBON TETRACHLORIDE	10	11.2	1		112	20	3
107-06-2	1,2-DICHLOROETHANE	10	10.1	1		101	20	2
71-43-2	BENZENE	10	10.4	1		104	20	2
79-01-6	TRICHLOROETHENE	10	10.4	1		104	20	0
108-10-1	4-METHYL-2-PENTANONE	40	39.9	10		100	30	7
108-88-3	TOLUENE	10	10.2	1		102	20	2
79-00-5	1,1,2-TRICHLOROETHANE	10	10.4	1		104	20	4
127-18-4	TETRACHLOROETHENE	10	10.3	1		103	20	2
108-90-7	CHLOROBENZENE	10	10.1	1		101	20	3
100-41-4	ETHYLBENZENE	10	10.2	1		102	20	2
179601-23-	M+P-XYLENE	20	20.4	1		102	20	0
95-47-6	O-XYLENE	10	10	1		100	20	3

Data Package ID: VL1909375-1

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GC/MS Volatiles

Method SW8260_25C

Laboratory Control Sample and Laboratory Control Sample Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

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	100		102		85 - 115
1868-53-7	DIBROMOFLUOROMETHANE	25	103		103		84 - 118
2037-26-5	TOLUENE-D8	25	99		100		85 - 115

Data Package ID: VL1909375-1

GC/MS Volatiles

Method SW8260_25C

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID: SHARED QC

LabID: 1909374-1MS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 16-Sep-19

Date Extracted: 24-Sep-19

Date Analyzed: 24-Sep-19

Prep Method: SW5030 Rev C

Prep Batch: VL190924-5

QCBatchID: VL190924-5-3

Run ID: VL190924-5A

Cleanup: NONE

Basis: As Received

Sample Aliquot: 10 ml

Final Volume: 10 ml

Result Units: UG/L

File Name: D73518

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
75-01-4	VINYL CHLORIDE	0.15	U	11.3		1	10	113	72 - 123%
75-35-4	1,1-DICHLOROETHENE	0.3	U	10.8		1	10	108	77 - 119%
67-64-1	ACETONE	3	U	40.2		10	40	100	62 - 142%
75-15-0	CARBON DISULFIDE	0.3	U	11.3		1	10	113	76 - 121%
75-09-2	METHYLENE CHLORIDE	4		14		1	10	100	71 - 130%
75-34-3	1,1-DICHLOROETHANE	0.3	U	11		1	10	110	83 - 119%
78-93-3	2-BUTANONE	3	U	35.8		10	40	89	70 - 135%
67-66-3	CHLOROFORM	0.3	U	10.8		1	10	108	82 - 119%
71-55-6	1,1,1-TRICHLOROETHANE	0.3	U	11.1		1	10	111	80 - 120%
56-23-5	CARBON TETRACHLORIDE	0.15	U	11.4		1	10	114	77 - 122%
107-06-2	1,2-DICHLOROETHANE	0.15	U	10.4		1	10	104	74 - 128%
71-43-2	BENZENE	0.3	U	11		1	10	110	83 - 117%
79-01-6	TRICHLOROETHENE	0.5	U	11		1	10	110	83 - 117%
108-10-1	4-METHYL-2-PENTANONE	3	U	36.6		10	40	92	73 - 125%
108-88-3	TOLUENE	0.3	U	10.6		1	10	106	82 - 113%
79-00-5	1,1,2-TRICHLOROETHANE	0.3	U	10.4		1	10	104	78 - 116%
127-18-4	TETRACHLOROETHENE	0.3	U	10.8		1	10	108	84 - 117%
108-90-7	CHLOROBENZENE	0.3	U	10.5		1	10	105	81 - 113%
100-41-4	ETHYLBENZENE	0.3	U	10.7		1	10	107	81 - 113%

Data Package ID: VL1909375-1

GC/MS Volatiles

Method SW8260_25C

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID: SHARED QC

LabID: 1909374-1MSD

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 16-Sep-19

Date Extracted: 24-Sep-19

Date Analyzed: 24-Sep-19

Prep Method: SW5030 Rev C

Prep Batch: VL190924-5

QCBatchID: VL190924-5-3

Run ID: VL190924-5A

Cleanup: NONE

Basis: As Received

Sample Aliquot: 10 ml

Final Volume: 10 ml

Result Units: UG/L

File Name: D73519

CASNO	Target Analyte	MSD Result	MSD Qual	Spike Added	MSD % Rec.	Reporting Limit	RPD Limit	RPD
75-01-4	VINYL CHLORIDE	10.9		10	109	1	20	4
75-35-4	1,1-DICHLOROETHENE	10.5		10	105	1	20	3
67-64-1	ACETONE	42.1		40	105	10	30	5
75-15-0	CARBON DISULFIDE	11		10	110	1	20	3
75-09-2	METHYLENE CHLORIDE	13.8		10	99	1	20	1
75-34-3	1,1-DICHLOROETHANE	10.7		10	107	1	20	3
78-93-3	2-BUTANONE	37.8		40	95	10	30	6
67-66-3	CHLOROFORM	10.8		10	108	1	20	0
71-55-6	1,1,1-TRICHLOROETHANE	10.9		10	109	1	20	2
56-23-5	CARBON TETRACHLORIDE	11.4		10	114	1	20	0
107-06-2	1,2-DICHLOROETHANE	10.4		10	104	1	20	0
71-43-2	BENZENE	10.7		10	107	1	20	3
79-01-6	TRICHLOROETHENE	10.8		10	108	1	20	2
108-10-1	4-METHYL-2-PENTANONE	41.1		40	103	10	30	11
108-88-3	TOLUENE	10.9		10	109	1	20	3
79-00-5	1,1,2-TRICHLOROETHANE	11		10	110	1	20	5
127-18-4	TETRACHLOROETHENE	11.6		10	116	1	20	7
108-90-7	CHLOROBENZENE	10.3		10	103	1	20	2
100-41-4	ETHYLBENZENE	10.2		10	102	1	20	5

Data Package ID: VL1909375-1

GC/MS Volatiles

Method SW8260_25C

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

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	95		100		85 - 115
1868-53-7	DIBROMOFLUOROMETHANE	25	105		105		84 - 118
2037-26-5	TOLUENE-D8	25	99		106		85 - 115

Data Package ID: VL1909375-1

Prep Batch ID: VL190924-5

Start Date: 09/24/19	End Date: 09/25/19	Concentration Method: NONE	Batch Created By: CCL
Start Time: 13:19	End Time: 0:16	Extract Method: SW5030C	Date Created: 09/24/19
Prep Analyst: Cory C. Lewis		Initial Volume Units: ml	Time Created: 12:29
Comments:		Final Volume Units: ml	Validated By: CCL
<div style="border: 1px solid black; height: 30px; width: 100%;"></div>			Date Validated: 09/30/19
			Time Validated: 11:14

QC Batch ID: VL190924-5-3

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
VL190924-6	MB	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1909374
VL190924-6	LCS	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1909374
VL190924-6	LCSD	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1909374
1909374-1	MS	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1909374
1909374-1	MSD	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1909374
1909374-1	SMP	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1909374
1909375-4	SMP	B3RNW2	WATER	9/16/2019	10	10	NONE	1	1909375
1909419-3	SMP	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1909419
1909431-1	SMP	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1909431
1909431-2	SMP	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1909431
1909431-3	SMP	XXXXXX	WATER	XXXXXX	10	10	NONE	1	1909431

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: 1909375

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.

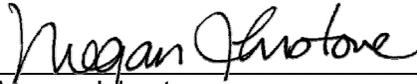
All in house quality control procedures were followed, as described below.

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 1909242-5 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

10/11/19
Date



Inorganics Final Data Reviewer

10/15/19
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 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: 1909375 **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
B3RNV4	1909375-2	9/16/2019	10/2/2019	10/10/2019	N/A	10	1	10	0.46	B	50 ml
B3RPX9	1909375-6	9/16/2019	10/2/2019	10/10/2019	N/A	10	1.8	10	0.46	B	50 ml

Comments:

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

Data Package ID: *IM1909375-1*

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: 1909375 **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
B3RNT9	1909375-1	9/16/2019	10/2/2019	10/10/2019	N/A	10	1.2	10	0.46	B	50 ml
B3RPX4	1909375-7	9/16/2019	10/2/2019	10/10/2019	N/A	10	1.8	10	0.46	B	50 ml

Comments:

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

Data Package ID: *IM1909375-1*

ICPMS Metals

Method SW6020B

Method Blank

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: IP191002-1MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 02-Oct-19

Date Analyzed: 09-Oct-19

Prep Batch: IP191002-1

QCBatchID: IP191002-1-1

Run ID: IM191009-20A4

Cleanup: NONE

Basis: N/A

File Name: 238SMPL_

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
7440-47-3	CHROMIUM	10	0.46	U	10	0.46

Data Package ID: IM1909375-1

ICPMS Metals

Method SW6020B

Laboratory Control Sample

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: IM191002-1LCS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 10/02/2019

Date Analyzed: 10/09/2019

Prep Method: SW3005A

Prep Batch: IP191002-1

QCBatchID: IP191002-1-1

Run ID: IM191009-20A4

Cleanup: NONE

Basis: N/A

File Name: 239SMPL_

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
7440-47-3	CHROMIUM	500	484	10		97	80 - 120%

Data Package ID: *IM1909375-1*

ICPMS Metals

Method SW6020B

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID: SHARED QC
LabID: 1909242-5MS

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 12-Sep-19
Date Extracted: 02-Oct-19
Date Analyzed: 09-Oct-19
Prep Method: SW3005 Rev A
Prep Batch: IP191002-1
QCBatchID: IP191002-1-1
Run ID: IM191009-20A4
Cleanup: NONE
Basis: As Received
Sample Aliquot: 50 ml
Final Volume: 50 ml
Result Units: UG/L
File Name: 242SMPL_

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
7440-47-3	CHROMIUM	14		492		10	500	96	75 - 125%

Field ID: SHARED QC
LabID: 1909242-5MSD

Sample Matrix: WATER
% Moisture: N/A
Date Collected: 12-Sep-19
Date Extracted: 02-Oct-19
Date Analyzed: 09-Oct-19
Prep Method: SW3005 Rev A
Prep Batch: IP191002-1
QCBatchID: IP191002-1-1
Run ID: IM191009-20A4
Cleanup: NONE
Basis: As Received
Sample Aliquot: 50 ml
Final Volume: 50 ml
Result Units: UG/L
File Name: 243SMPL_

CASNO	Target Analyte	MSD Result	MSD Qual	Spike Added	MSD % Rec.	Reporting Limit	RPD Limit	RPD
7440-47-3	CHROMIUM	492		500	96	10	20	0

Data Package ID: *IM1909375-1*

Prep Batch ID: IP191002-1

Start Date: 10/02/19	End Date: 10/02/19	Concentration Method: NONE	Batch Created By: jml
Start Time: 9:08	End Time: 18:00	Extract Method: SW3005A	Date Created: 10/02/19
Prep Analyst: Jill M. Latelle		Initial Volume Units: ml	Time Created: 9:08
<u>Comments:</u>		Final Volume Units: ml	Validated By: jml
<div style="border: 1px solid black; height: 30px; width: 100%;"></div>			Date Validated: 10/02/19
			Time Validated: 10:39

QC Batch ID: IP191002-1-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
IP191002-1	MB	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909242
IM191002-1	LCS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909242
1909242-5	MS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909242
1909242-5	MSD	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909242
1909242-5	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909242
1909242-6	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909242
1909375-1	SMP	B3RNT9	WATER	9/16/2019	50	50	NONE	1	1909375
1909375-2	SMP	B3RNV4	WATER	9/16/2019	50	50	NONE	1	1909375
1909375-6	SMP	B3RPX9	WATER	9/16/2019	50	50	NONE	1	1909375
1909375-7	SMP	B3RPX4	WATER	9/16/2019	50	50	NONE	1	1909375
1909383-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909383
1909383-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909383
1909383-7	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909383
1909383-8	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909383
1909419-10	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909419
1909419-11	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909419
1909419-4	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909419
1909419-5	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909419
1909419-6	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909419
1909419-7	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909419

Prep Batch ID: IP191002-1

Start Date: 10/02/19	End Date: 10/02/19	Concentration Method: NONE	Batch Created By: jml
Start Time: 9:08	End Time: 18:00	Extract Method: SW3005A	Date Created: 10/02/19
Prep Analyst: Jill M. Latelle		Initial Volume Units: ml	Time Created: 9:08
Comments:		Final Volume Units: ml	Validated By: jml
<div style="border: 1px solid black; height: 30px; width: 100%;"></div>			Date Validated: 10/02/19
			Time Validated: 10:39

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: 1909375

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

10/16/19
Date

Kath M. W.
Radiochemistry Final Data Reviewer

10/17/19
Date

Strontium-90 by GFPC

PAI 724 Rev 13

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: SR191009-1MB

Sample Matrix: WATER

Prep Batch: SR191009-1

Final Aliquot: 994 ml

Prep SOP: PAI 707 Rev 15

QCBatchID: SR191009-1-1

Result Units: pCi/l

Date Collected: 09-Oct-19

Run ID: SR191009-1A

File Name: SRC1013A

Date Prepared: 09-Oct-19

Count Time: 90 minutes

Date Analyzed: 13-Oct-19

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.

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: SR1909375-1

Strontium-90 by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: SR191009-1LCS	Sample Matrix: WATER	Prep Batch: SR191009-1	Final Aliquot: 994 ml
	Prep SOP: PAI 707 Rev 15	QCBatchID: SR191009-1-1	Result Units: pCi/l
	Date Collected: 09-Oct-19	Run ID: SR191009-1A	File Name: SRC1013
	Date Prepared: 09-Oct-19	Count Time: 30 minutes	
	Date Analyzed: 13-Oct-19		

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: SR1909375-1

Strontium-90 by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)**Lab Name:** ALS -- Fort Collins**Work Order Number:** 1909375**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
QC Batch ID: 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: SR1909375-1

Strontium-90 by GFPC

PAI 724 Rev 13

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
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: SR1909375-1

Strontium-90 by GFPC

PAI 724 Rev 13

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
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: SR1909375-1

Strontium-90 by GFPC

PAI 724 Rev 13

Sample Results**Lab Name:** ALS -- Fort Collins**Work Order Number:** 1909375**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	B3RNT9
Lab ID:	1909375-1

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 16-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	2.30E-01 +/- 2.64E-01	5.62E-01	1E+00	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.110E+03	1.02E+03	ug	91.9	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.

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: SR1909375-1

Strontium-90 by GFPC

PAI 724 Rev 13

Sample Results**Lab Name:** ALS -- Fort Collins**Work Order Number:** 1909375**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	B3RNV6
Lab ID:	1909375-3

Sample Matrix: WATER**Prep SOP:** PAI 707 Rev 15**Date Collected:** 16-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	4.02E-01 +/- 2.96E-01	5.86E-01	1E+00	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.270E+03	1.16E+03	ug	91.5	40 - 110 %	

Comments:**Qualifiers/Flags:**

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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: SR1909375-1

Strontium-90 by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	B3RPW7
Lab ID:	1909375-5

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 15
Date Collected: 16-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	1.14E-01 +/- 2.69E-01	6.05E-01	1E+00	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.120E+03	1.01E+03	ug	90.7	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: SR1909375-1

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	B3RNT9	WATER	9/16/2019	1000	994.01	NONE	1	1909375
1909375-3	SMP	B3RNV6	WATER	9/16/2019	1000	994.01	NONE	1	1909375
1909375-5	SMP	B3RPW7	WATER	9/16/2019	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	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909493
1909493-5	SMP	XXXXXX	WATER	XXXXXX	1000	994.01	NONE	1	1909493
1909493-7	SMP	XXXXXX	WATER	XXXXXX	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



Tritium Case Narrative

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

Work Order Number: 1909375

1. The samples were prepared according to the current revision of SOP 700.
2. The samples were analyzed for the presence of tritium according to the current revision of SOP 704. The analyses were completed on 10/12/2019.
3. The duplicate of sample 1909419-1 and the matrix spikes of sample 1909437-2 are shared for this work order. The duplicate and matrix spikes were performed on CH2M HILL Plateau Remediation Company samples and the results are acceptable. The results can be found in the following report.
4. The analysis results for these samples are reported in units of pCi/L. The samples were not filtered prior to analysis.
5. In accordance with project specific instructions, the evaluation threshold for Relative Percent Difference (RPD) has been set at 20%. RPD is defined as:

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

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

6. No anomalous situations were encountered during the preparation or 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

10/16/19
Date

Kath M. W.
Radiochemistry Final Data Reviewer

10/17/19
Date

Tritium by Liquid Scintillation

PAI 704 Rev 12

Method Blank Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: 3H191009-1MB	Sample Matrix: WATER	Prep Batch: 3H191009-1	Final Aliquot: 10.0 ml
	Prep SOP: PAI 700 Rev 15	QCBatchID: 3H191009-1-1	Result Units: pCi/l
	Date Collected: 09-Oct-19	Run ID: 3H191009-1A	File Name: B60_19_101101
	Date Prepared: 09-Oct-19	Count Time: 180 minutes	
	Date Analyzed: 12-Oct-19		

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10028-17-8	H-3	6.74E+01 +/- 1.29E+02	2.12E+02	4.00E+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: H31909375-1

Tritium by Liquid Scintillation

PAI 704 Rev 12

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Lab ID: 3H191009-1LCS	Sample Matrix: WATER	Prep Batch: 3H191009-1	Final Aliquot: 9.84 ml
	Prep SOP: PAI 700 Rev 15	QCBatchID: 3H191009-1-1	Result Units: pCi/l
	Date Collected: 09-Oct-19	Run ID: 3H191009-1A	File Name: B60_04_101201
	Date Prepared: 09-Oct-19	Count Time: 90 minutes	
	Date Analyzed: 12-Oct-19		

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
10028-17-8	H-3	1.66E+04 +/- 2.56E+03	3.07E+02	1.650E+04	101	80 - 120	

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: H31909375-1

Tritium by Liquid Scintillation

PAI 704 Rev 12

Matrix Spike Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	Shared QC
Lab ID:	1909437-2MS

Sample Matrix: WATER
Prep SOP: PAI 700 Rev 15
Date Collected: 20-Sep-19
Date Prepared: 09-Oct-19
Date Analyzed: 12-Oct-19

Prep Batch: 3H191009-1
QCBatchID: 3H191009-1-1
Run ID: 3H191009-1A
Count Time: 90 minutes
Report Basis: Unfiltered

Final Aliquot: 9.84 ml
Prep Basis: Unfiltered
Moisture(%): 100.000
Result Units: pCi/l
File Name: B60_04_101201

Analysis ReqCode: TRITIUM_DIST_L

CASNO	Target Nuclide	Matrix Spike	Sample Results	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
10028-17-8	H-3	1.77E+04	1.91E+02	3.08E+02	1.650E+04	106	80 - 120	

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: H31909375-1

Tritium by Liquid Scintillation

PAI 704 Rev 12

Matrix Spike Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID: Shared QC Lab ID: 1909437-2MSD	Sample Matrix: WATER Prep SOP: PAI 700 Rev 15 Date Collected: 20-Sep-19 Date Prepared: 09-Oct-19 Date Analyzed: 12-Oct-19	Prep Batch: 3H191009-1 QCBatchID: 3H191009-1-1 Run ID: 3H191009-1A Count Time: 90 minutes Report Basis: Unfiltered	Final Aliquot: 9.84 ml Prep Basis: Unfiltered Moisture(%): 100.000 Result Units: pCi/l File Name: B60_04_101201
---	--	---	--

Analysis ReqCode: TRITIUM_DIST_L

CASNO	Target Nuclide	Matrix Spike	Sample Results	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
10028-17-8	H-3	1.53E+04	1.91E+02	3.08E+02	1.650E+04	91.2	80 - 120	

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: H31909375-1

Tritium by Liquid Scintillation

PAI 704 Rev 12

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	Shared QC
Lab ID:	1909437-2

Sample Matrix: WATER	Prep Batch: 3H191009-1	Final Aliquot: 10.0 ml
Prep SOP: PAI 700 Rev 15	QCBatchID: 3H191009-1-1	Prep Basis: Unfiltered
Date Collected: 20-Sep-19	Run ID: 3H191009-1A	Moisture(%): 100.000
Date Prepared: 09-Oct-19	Count Time: 90 minutes	Result Units: pCi/l
Date Analyzed: 12-Oct-19	Report Basis: Unfiltered	File Name: B60_04_101201

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10028-17-8	H-3	1.91E+02 +/- 1.88E+02	3.03E+02	4E+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: H31909375-1

Tritium by Liquid Scintillation

PAI 704 Rev 12

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	Shared QC
Lab ID:	1909437-2MSD

Sample Matrix: WATER
Prep SOP: PAI 700 Rev 15
Date Collected: 20-Sep-19
Date Prepared: 09-Oct-19
Date Analyzed: 12-Oct-19

Prep Batch: 3H191009-1
QCBatchID: 3H191009-1-1
Run ID: 3H191009-1A
Count Time: 90 minutes
Report Basis: Unfiltered

Final Aliquot: 9.84 ml
Prep Basis: Unfiltered
Moisture(%): 100.000
Result Units: pCi/l
File Name: B60_04_101201

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
10028-17-8	H-3	1.77E+04 +/-	2.73E+03	3.08E+02		1.53E+04 +/-	2.36E+03	3.08E+02		0.676	2.13

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.
- W - DER is greater than Warning Limit of 1.42
- D - DER is greater than Control Limit of 2.13
- 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: H31909375-1

Tritium by Liquid Scintillation

PAI 704 Rev 12

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	Shared QC
Lab ID:	1909437-2MSD

Sample Matrix: WATER	Prep Batch: 3H191009-1	Final Aliquot: 9.84 ml
Prep SOP: PAI 700 Rev 15	QCBatchID: 3H191009-1-1	Prep Basis: Unfiltered
Date Collected: 20-Sep-19	Run ID: 3H191009-1A	Moisture(%): 100.000
Date Prepared: 09-Oct-19	Count Time: 90 minutes	Result Units: pCi/l
Date Analyzed: 12-Oct-19	Report Basis: Unfiltered	File Name: B60_04_101201

CASNO	Analyte	Sample				Duplicate				RPD	RPD Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
10028-17-8	H-3	1.77E+04 +/- 2.73E+03		3.08E+02		1.53E+04 +/- 2.36E+03		3.08E+02		15.00	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: H31909375-1

Tritium by Liquid Scintillation

PAI 704 Rev 12

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	Shared QC
Lab ID:	1909419-1DUP

Sample Matrix: WATER
 Prep SOP: PAI 700 Rev 15
 Date Collected: 19-Sep-19
 Date Prepared: 09-Oct-19
 Date Analyzed: 12-Oct-19

Prep Batch: 3H191009-1
 QCBatchID: 3H191009-1-1
 Run ID: 3H191009-1A
 Count Time: 90 minutes
 Report Basis: Unfiltered

Final Aliquot: 10.0 ml
 Prep Basis: Unfiltered
 Moisture(%): 100.000
 Result Units: pCi/l
 File Name: B60_04_101201

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
10028-17-8	H-3	1.24E+02 +/-	1.84E+02	3.03E+02	U	6.29E+01 +/-	1.82E+02	3.03E+02	U	0.234	2.13

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.
- W - DER is greater than Warning Limit of 1.42
- D - DER is greater than Control Limit of 2.13
- 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: H31909375-1

Tritium by Liquid Scintillation

PAI 704 Rev 12

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins

Work Order Number: 1909375

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	Shared QC
Lab ID:	1909419-1DUP

Sample Matrix: WATER
 Prep SOP: PAI 700 Rev 15
 Date Collected: 19-Sep-19
 Date Prepared: 09-Oct-19
 Date Analyzed: 12-Oct-19

Prep Batch: 3H191009-1
 QCBatchID: 3H191009-1-1
 Run ID: 3H191009-1A
 Count Time: 90 minutes
 Report Basis: Unfiltered

Final Aliquot: 10.0 ml
 Prep Basis: Unfiltered
 Moisture(%): 100.000
 Result Units: pCi/l
 File Name: B60_04_101201

CASNO	Analyte	Sample				Duplicate				RPD	RPD Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
10028-17-8	H-3	1.24E+02 +/-	1.84E+02	3.03E+02	U	6.29E+01 +/-	1.82E+02	3.03E+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: H31909375-1

Tritium by Liquid Scintillation

PAI 704 Rev 12

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	Shared QC
Lab ID:	1909419-1

Sample Matrix: WATER
Prep SOP: PAI 700 Rev 15
Date Collected: 19-Sep-19
Date Prepared: 09-Oct-19
Date Analyzed: 12-Oct-19

Prep Batch: 3H191009-1
QCBatchID: 3H191009-1-1
Run ID: 3H191009-1A
Count Time: 90 minutes
Report Basis: Unfiltered

Final Aliquot: 10.0 ml
Prep Basis: Unfiltered
Moisture(%): 100.000
Result Units: pCi/l
File Name: B60_04_101201

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10028-17-8	H-3	1.24E+02 +/- 1.84E+02	3.03E+02	4E+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: H31909375-1

Tritium by Liquid Scintillation

PAI 704 Rev 12

Sample Duplicate Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	Shared QC
Lab ID:	1909419-1DUP

Sample Matrix: WATER
Prep SOP: PAI 700 Rev 15
Date Collected: 19-Sep-19
Date Prepared: 09-Oct-19
Date Analyzed: 12-Oct-19

Prep Batch: 3H191009-1
QCBatchID: 3H191009-1-1
Run ID: 3H191009-1A
Count Time: 90 minutes
Report Basis: Unfiltered

Final Aliquot: 10.0 ml
Prep Basis: Unfiltered
Moisture(%): 100.000
Result Units: pCi/l
File Name: B60_04_101201

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10028-17-8	H-3	6.29E+01 +/- 1.82E+02	3.03E+02	4E+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.
- W - DER is greater than Warning Limit of 1.42

- D - DER is greater than Control Limit of 2.13

Abbreviations:

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

Data Package ID: H31909375-1

Date Printed:

Tuesday, October 15, 2019

ALS -- Fort Collins

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LIMS Version: 6.912

Tritium by Liquid Scintillation

PAI 704 Rev 12

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	B3RNV6
Lab ID:	1909375-3

Sample Matrix: WATER
Prep SOP: PAI 700 Rev 15
Date Collected: 16-Sep-19
Date Prepared: 09-Oct-19
Date Analyzed: 11-Oct-19

Prep Batch: 3H191009-1
QCBatchID: 3H191009-1-1
Run ID: 3H191009-1A
Count Time: 90 minutes
Report Basis: Unfiltered

Final Aliquot: 10.0 ml
Prep Basis: Unfiltered
Moisture(%): 100.000
Result Units: pCi/l
File Name: B60_04_101101

Analysis ReqCode: TRITIUM_DIST_L

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10028-17-8	H-3	2.03E+02 +/- 1.88E+02	3.03E+02	4E+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: H31909375-1

Tritium by Liquid Scintillation

PAI 704 Rev 12

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909375
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: AQUIFER TUBES, OCTOBER 2019 X20-001

Field ID:	B3RPW7
Lab ID:	1909375-5

Sample Matrix: WATER	Prep Batch: 3H191009-1	Final Aliquot: 10.0 ml
Prep SOP: PAI 700 Rev 15	QCBatchID: 3H191009-1-1	Prep Basis: Unfiltered
Date Collected: 16-Sep-19	Run ID: 3H191009-1A	Moisture(%): 100.000
Date Prepared: 09-Oct-19	Count Time: 90 minutes	Result Units: pCi/l
Date Analyzed: 11-Oct-19	Report Basis: Unfiltered	File Name: B60_04_101101

Analysis ReqCode: TRITIUM_DIST_L

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10028-17-8	H-3	2.10E+01 +/- 1.81E+02	3.03E+02	4E+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: H31909375-1

Prep Batch ID: 3H191009-1

Start Date: 10/09/19	End Date: 10/09/19	Concentration Method: NONE	Batch Created By: rgs
Start Time: 10:01	End Time: 10:01	Extract Method: PAI 70015	Date Created: 10/09/19
Prep Analyst: Reilly G. Stockton		Initial Volume Units: ml	Time Created: 10:03
Comments:		Final Volume Units: ml	Validated By: rgs
<input type="text"/>			Date Validated: 10/10/19
			Time Validated: 8:18

QC Batch ID: 3H191009-1-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
3H191009-1	MB	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909375
3H191009-1CB1	MB	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909375
3H191009-1CB2	MB	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909375
3H191009-1CB3	MB	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909375
3H191009-1	LCS	XXXXXX	WATER	XXXXXX	30	9.8361	NONE	1	1909375
1909437-2	MS	XXXXXX	WATER	XXXXXX	30	9.8361	NONE	1	1909437
1909437-2	MSD	XXXXXX	WATER	XXXXXX	30	9.8361	NONE	1	1909437
1909419-1	DUP	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909419
1909375-3	SMP	B3RNV6	WATER	9/16/2019	30	10	NONE	1	1909375
1909375-5	SMP	B3RPW7	WATER	9/16/2019	30	10	NONE	1	1909375
1909378-1	SMP	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909378
1909378-2	SMP	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909378
1909378-5	SMP	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909378
1909383-10	SMP	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909383
1909383-5	SMP	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909383
1909419-1	SMP	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909419
1909419-2	SMP	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909419
1909419-6	SMP	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909419
1909437-2	SMP	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909437
1909437-3	SMP	XXXXXX	WATER	XXXXXX	30	10	NONE	1	1909437

Prep Batch ID: 3H191009-1

Start Date: 10/09/19	End Date: 10/09/19	Concentration Method: NONE	Batch Created By: rgs
Start Time: 10:01	End Time: 10:01	Extract Method: PAI 70015	Date Created: 10/09/19
Prep Analyst: Reilly G. Stockton		Initial Volume Units: ml	Time Created: 10:03
Comments:		Final Volume Units: ml	Validated By: rgs
			Date Validated: 10/10/19
			Time Validated: 8:18

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