



Ft. Collins, Colorado

LIMS Version: 6.912

Page 1 of 1

Tuesday, October 15, 2019

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

Re: ALS Workorder: 1909242
Project Name: SURV, September 2019
Project Number: S19-009

Dear Ms. Waters-Husted:

Eight water samples were received from CH2M HILL Plateau Remediation Company, on 9/13/2019. The samples were scheduled for the following analyses:

Gross Alpha
Inorganics
Metals
Technetium-99

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: 1909242

Client Name: CH2M HILL Plateau Remediation Company

Client Project Name: SURV, September 2019

Client Project Number: S19-009

Client PO Number: BOA 54854

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
B3R7D8	1909242-1		WATER	11-Sep-19	9:36
B3R7D4	1909242-2		WATER	11-Sep-19	9:36
B3R7C2	1909242-3		WATER	11-Sep-19	11:00
B3R7V1	1909242-4		WATER	12-Sep-19	10:41
B3R775	1909242-5		WATER	12-Sep-19	8:51
B3R771	1909242-6		WATER	12-Sep-19	8:51
B3R780	1909242-7		WATER	12-Sep-19	10:41
B3R7M3	1909242-8		WATER	12-Sep-19	9:04

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C.# S19-009-021
Roger Frazier Jr. CHPRC		Telephone No.: 509-376-4650		Page 1 of 1
Collector:	Karen Waters-Husted	Purchase Order/Charge Code: 300071		
SAF No.:	S19-009	Purchase Order/Charge Code: 300071		
Project Title:	SURV, September 2019	Ice Chest No.: GWS-061		
Shipped To (Lab):	ALS Environmental Ft. Collins	Bill of Lading/Air Bill No.: 776222389187		
Protocol:	CERCLA	Offsite Property No.: 11583		
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	Sample Analysis	Holding Time	Preservative
B3R7D8	1	Y	9-11-19	0936	1x500-mL G/P	6010_METALS_ICP: COMMON	6 Months	HNO3 to pH <2
B3R7D4	2	N	9-11-19	0936	1x500-mL G/P	6010_METALS_ICP: COMMON	6 Months	HNO3 to pH <2
B3R7D4	↓	N	9-11-19	0936	1x1-L P	9310_ALPHABETA_GPC: Gross Alpha	6 Months	HNO3 to pH <2

Relinquished By		Received By	
Print First and Last Name	Signature	Print First and Last Name	Signature
Roger Frazier Jr. CHPRC		Janelle Zunker CHPRC	
Janelle Zunker CHPRC		SSU-1	
SSU-1		Janelle Zunker CHPRC	
Janelle Zunker CHPRC		FEDEX	
		EMILY LYONS	

Print First and Last Name	Signature	Date/Time	Matrix *
Roger Frazier Jr. CHPRC		SEP 11 2019 1030	S = Soil SE = Sediment SO = Solid SL = Sludge W = Water A = Air
Janelle Zunker CHPRC		SEP 11 2019 1130	DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other
SSU-1		SEP 12 2019 1400	
Janelle Zunker CHPRC		SEP 12 2019 0950	

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process):	Date/Time:
Printed On 7/20/2019	Disposed By:	

FSR ID = FSR82759 A-6004-842 (REV 3)

<p>CH2M Hill Plateau Remediation Company</p>		<p>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST 1909242</p>		<p>C.O.C. # S19-009-020</p> <p>Page 1 of 1</p>
<p>Collector: Roger Frieschler /CHPRC</p>	<p>Contact/Requester: Karen Waters-Husted</p>	<p>Telephone No.: 509-376-4650</p>	<p>Purchase Order/Charge Code: 300071</p>	
<p>SAF No.: S19-009</p>	<p>Sampling Origin: Hanford Site</p>	<p>Logbook No.: HNF-N-506-109-37</p>	<p>Ice Chest No.: GWS-061</p>	<p>Bill of Lading/Air Bill No.: 7762 2238 9187</p>
<p>Project Title: SURV, September 2019</p>	<p>Method of Shipment: Commercial Carrier</p>	<p>Priority: 30 Days</p>	<p>Offsite Property No.: 1583</p>	
<p>Shipped To (Lab): ALS Environmental Ft. Collins</p>	<p>SPECIAL INSTRUCTIONS N/A</p>	<p>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</p>		
<p>Protocol: CERCLA</p>	<p>Sample Analysis</p>	<p>Holding Time: 14 Days</p>	<p>Preservative: Cool <=6C</p>	
<p>Sample No. Filter * B3R7C2 3 N</p>	<p>Time 9-11-19 100</p>	<p>No/Type Container 1x250-mL G/P</p>	<p>2320_AKALINITY: COMMON</p>	

Relinquished By		Received By		Matrix *	
Print First and Last Name	Signature	Print First and Last Name	Signature	S = Soil	DS = Drum Solids
<p>CHPRC</p>		<p>SSU-1</p>	<p>SSU-1</p>	<p>SE = Sediment</p>	<p>DL = Drum Liquids</p>
<p>SSU-1</p>		<p>Janelle Zunker CHPRC</p>	<p>FEDEX</p>	<p>SO = Solid</p>	<p>T = Tissue</p>
<p>Janelle Zunker CHPRC</p>		<p>FEDEX</p>	<p>FEDEX</p>	<p>SL = Sludge</p>	<p>WI = Wipe</p>
				<p>W = Water</p>	<p>L = Liquid</p>
				<p>O = Oil</p>	<p>V = Vegetation</p>
				<p>A = Air</p>	<p>X = Other</p>
<p>FINAL SAMPLE DISPOSITION</p>	<p>Disposal Method (e.g., Return to customer, per lab procedure, used in process):</p>	<p>Disposed By:</p>	<p>Date/Time:</p>		

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C.# S19-009-300 Page 1 of 1
CH2MHill Plateau Remediation Company		
Collector: Den King CHPRC	Contact/Requester: Karen Waters-Husted	Telephone No.: 505-376-4650
SAF No.: S19-009	Sampling Origin: Hanford Site	Purchase Order/Charge Code: 300071
Project Title: SURV, September 2019	Logbook No.: HNF-N-506 112/1a	Ice Chest No.: GUS-384
Shipped To (Lab): ALS Environmental Ft. Collins	Method of Shipment Commercial Carrier	Bill of Lading/Air Bill No.: 77628517468
Protocol: CERCLA	Priority: 30 Days	Offsite Property No.: 11590
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 * B3R7V1 4 N	Time SEP 12 2019 1041	Sample Analysis 300.0_ANIONS_IC: COMMON
No/Type Container 1x125-mL P	Holding Time 48 Hours	Preservative Cool <=6C

Relinquished By		Received By		Matrix *	
Print First and Last Name	Signature	Date/Time	Signature	S = Soil	DS = Drum Solids
Den King CHPRC	<i>[Signature]</i>	SEP 12 2019 1400	<i>[Signature]</i>	SE = Sediment	DL = Drum Liquids
Jeff Lucas / CHPRC	<i>[Signature]</i>	SEP 12 2019 1400	<i>[Signature]</i>	T = Tissue	WI = Wipe
			<i>[Signature]</i>	SL = Sludge	L = Liquid
			<i>[Signature]</i>	W = Water	V = Vegetation
			<i>[Signature]</i>	O = Oil	X = Other
			<i>[Signature]</i>	A = Air	

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process):
Printed On 7/20/2019	Disposed By:

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C.# S19-009-050 Page 1 of 1			
Collector: Dan King CHPRC	Contact/Requester: Karen Waters-Husted	Telephone No.: 509-376-4650					
SAF No.: S19-009	Sampling Origin: Hanford Site	Purchase Order/Charge Code: 300071					
Project Title: SURV, September 2019	Logbook No.: HNF-N-506 112 / 12	Ice Chest No.: GWS-384					
Shipped To (Lab): ALS Environmental Ft. Collins	Method of Shipment: Commercial Carrier	Bill of Lading/Air Bill No.: 77622851 7468					
Protocol: CERCLA	Priority: 30 Days	Offsite Property No.: 11590					
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
B3R780	N	SEP 12 2019	1041	1x500-mL G/P	6020_METALS_ICPMS: Uranium (1)	6 Months	HNO3 to pH <2
B3R780	N	SEP 12 2019	1041	1x500-mL G/P	TC99_SEP_LSC: COMMON	6 Months	HNO3 to pH <2

Relinquished By		Received By	
Print First and Last Name Dan King CHPRC	Signature <i>D. King</i>	Print First and Last Name Jeff Lucas CHPRC	Signature <i>Jeff Lucas</i>
Date/Time SEP 12 2019	Date/Time SEP 12 2019	Date/Time SEP 12 2019	Date/Time SEP 12 2019
Time 1041	Time 1400	Time 0913	Time 0952
Matrix *		Matrix *	
S = Soil	DS = Drum Solids	S = Soil	DS = Drum Solids
SE = Sediment	DL = Drum Liquids	SE = Sediment	DL = Drum Liquids
SO = Solid	T = Tissue	SO = Solid	T = Tissue
SL = Sludge	WI = Wipe	SL = Sludge	WI = Wipe
W = Water	L = Liquid	W = Water	L = Liquid
O = Oil	V = Vegetation	O = Oil	V = Vegetation
A = Air	X = Other	A = Air	X = Other
Disposal Method (e.g., Return to customer, per lab procedure, used in process):		Disposed By:	
		Emily Lyons 09.13.19	
FINAL SAMPLE DISPOSITION		Date/Time:	



ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: CHPRC
Project Manager: KMO

Workorder No: 1909242
Initials: TEM Date: 9/13/19

1. Are airbills / shipping documents present and/or removable?		DROP OFF	<input checked="" type="radio"/> YES	<input type="radio"/> NO
2. Are custody seals on shipping containers intact?		NONE	<input checked="" type="radio"/> YES	<input type="radio"/> NO *
3. Are custody seals on sample containers intact?		NONE	<input checked="" type="radio"/> YES	<input type="radio"/> NO *
4. Is there a COC (chain-of-custody) present?			<input checked="" type="radio"/> YES	<input type="radio"/> NO *
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)			<input checked="" type="radio"/> YES	<input type="radio"/> NO *
6. Are short-hold samples present?			<input type="radio"/> YES	<input checked="" type="radio"/> NO
7. Are all samples within holding times for the requested analyses?			<input checked="" type="radio"/> YES	<input type="radio"/> NO *
8. Were all sample containers received intact? (not broken or leaking)			<input checked="" type="radio"/> YES	<input type="radio"/> NO *
9. Is there sufficient sample for the requested analyses?			<input checked="" type="radio"/> YES	<input type="radio"/> NO *
10. Are all samples in the proper containers for the requested analyses?			<input checked="" type="radio"/> YES	<input type="radio"/> NO *
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)		N/A	<input checked="" type="radio"/> YES	<input type="radio"/> NO *
12. Are all aqueous non-preserved samples pH 4-9?		N/A	<input checked="" type="radio"/> YES	<input type="radio"/> 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)		<input checked="" type="radio"/> N/A	<input type="radio"/> YES	<input type="radio"/> NO
14. Were the samples shipped on ice?			<input checked="" type="radio"/> YES	<input type="radio"/> NO
15. Were cooler temperatures measured at 0.1-6.0°C?	IR gun used*:		<input checked="" type="radio"/> #3	<input type="radio"/> #4
	Cooler #:	<u>11583</u>	<u>11590</u>	
	Temperature (°C):	<u>4.2</u>	<u>0.3</u>	
	No. of custody seals on cooler:	<u>2</u>	<u>2</u>	
	External µR/hr reading:	<u>13</u>	<u>13</u>	
	Background µR/hr reading:	<u>13</u>		
Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? YES / NO / NA (If no, see Form 008.)				

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

All client bottle ID's vs ALS lab ID's double-checked by: TEM
If applicable, was the client contacted? YES / NO / NA Contact: _____ Date/Time: _____
Project Manager Signature / Date: [Signature] 9/14/19

1909242

ORIGIN ID: PSCA (509) 531-0450
TROY BACON
C12M
6287 LATAH ST.
RICHLAND, WA 99352
UNITED STATES US

SHIP DATE: 12SEP19
ACTWGT: 89.00 LB
CAD: 107066051/NET14160
BILL THIRD PARTY

TO JULIE ELLINGSON
ALS GLOBAL-FORT COLLINS
225 COMMERCE DR

13-2

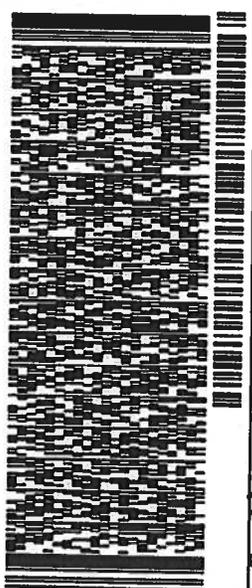
FORT COLLINS CO 80524
REF: P1R471583

4.2

PO. DEPT. 11583

11583

567J19D0405A2



TRK# 7762 2238 9187
0201

FRI - 13 SEP 10:30A

PRIORITY OVERNIGHT

DSR

XH FTCA

80524
CO-US DEN



After printing this label:

1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.

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

1909242

1909242

ORIGIN ID: PSCA (509) 531-0450
TROY BACON
CH2M
6287 LATPAH ST.
RICHLAND, WA 99352
UNITED STATES US

SHIP DATE: 12SEP19
ACT WGT: 12.00 LB
CAD: 10/066051INMET4160
BILL THIRD PARTY

11590

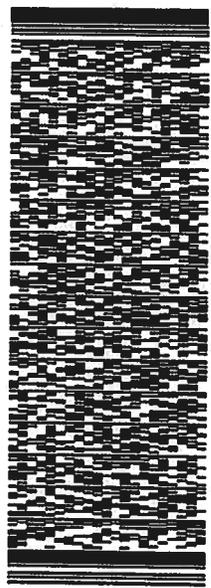
TO JULIE ELLINGSON
ALS GLOBAL-FORT COLLINS
225 COMMERCE DR

13-2

FORT COLLINS CO 80524
(970) 490-1511
REF: PTR#11930
PO DEPT:

0.3

567J19D0405A2

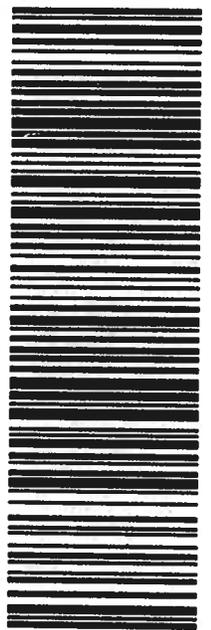


TRK# 7762 2851 7468
0201

FRI - 13 SEP 10:30A
PRIORITY OVERNIGHT
DSR

XH FTCA

80524
CO-US DEN



After printing this label:

1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.

2. Fold the printed page along the horizontal line.

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

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.

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

LA09242



Gross Alpha Case Narrative

CH2M HILL Plateau Remediation Company

SURV, September 2019 – S19-009

Work Order Number: 1909242

1. The sample was prepared according to the current revision of SOP 702.
2. The sample was analyzed for gross alpha activity by gas flow proportional counting according to the current revision of SOP 724. The analysis was completed on 10/06/2019. Gross alpha results are referenced to ²⁴¹Am.
3. The analysis results for the sample are reported in units of pCi/L. The sample was not filtered prior to analysis.
4. The duplicate of sample 1909427-1 and the matrix spikes of sample 1909559-1 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.
5. In accordance with project specific instructions, the evaluation threshold for Relative Percent Difference (RPD) has been set at 20%. RPD is defined as:

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

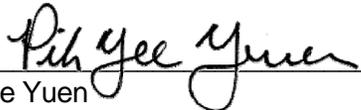
Where: S = sample activity result and D = duplicate activity result. RPD is not evaluated for sample/duplicate pairs where the reported activity is less than 5 times the sample specific MDC, as indicated with an "NC" on the Duplicate Sample Results (RPD) page.

6. The requested detection limit for shared QC sample 1909427-1 was not achieved. The reported activity exceeds the achieved MDC. Results are submitted without further qualification. The results are flagged with an "X" flag on the final report.



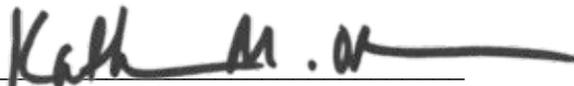
7. No further anomalous situations were encountered during the preparation or analysis of this sample. All quality control criteria were met.

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



Pik Yee Yuen
Radiochemistry Primary Data Reviewer

10/9/19
Date



Kathleen M. O.
Radiochemistry Final Data Reviewer

10/15/19
Date

Gross Alpha by GFPC

PAI 724 Rev 13

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Lab ID: AB191002-1MB	Sample Matrix: WATER	Prep Batch: AB191002-1	Final Aliquot: 200 ml
	Prep SOP: PAI 702 Rev 22	QCBatchID: AB191002-1-1	Result Units: pCi/l
	Date Collected: 02-Oct-19	Run ID: AB191002-1A	File Name: ABA1006B
	Date Prepared: 02-Oct-19	Count Time: 1000 minutes	
	Date Analyzed: 06-Oct-19		

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
12587-46-1	GROSS ALPHA	2.92E-01 +/- 4.47E-01	7.37E-01	3.00E+00	NA	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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: GA1909242-1

Gross Alpha by GFPC

PAI 724 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Lab ID: AB191002-1LCS	Sample Matrix: WATER	Prep Batch: AB191002-1	Final Aliquot: 200 ml
	Prep SOP: PAI 702 Rev 22	QCBatchID: AB191002-1-1	Result Units: pCi/l
	Date Collected: 02-Oct-19	Run ID: AB191002-1A	File Name: ABA1005B
	Date Prepared: 02-Oct-19	Count Time: 30 minutes	
	Date Analyzed: 05-Oct-19		

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
12587-46-1	GROSS ALPHA	2.67E+02 +/- 4.82E+01	6.82E+00	2.320E+02	115	72 - 130	

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: GA1909242-1

Gross Alpha by GFPC

PAI 724 Rev 13

Matrix Spike Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	Shared QC
Lab ID:	1909559-1MS

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 22
Date Collected: 26-Sep-19
Date Prepared: 02-Oct-19
Date Analyzed: 05-Oct-19

Prep Batch: AB191002-1
QCBatchID: AB191002-1-1
Run ID: AB191002-1A
Count Time: 30 minutes
Report Basis: As Received

Final Aliquot: 200 ml
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/l
File Name: ABA1005B

Analysis ReqCode: 9310_ALPHABET

CASNO	Target Nuclide	Matrix Spike	Sample Results	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
12587-46-1	GROSS ALPHA	2.67E+02	1.35E+01	7.85E+00	2.320E+02	110	72 - 130	

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: GA1909242-1

Gross Alpha by GFPC

PAI 724 Rev 13

Matrix Spike Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	Shared QC
Lab ID:	1909559-1MSD

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 22
Date Collected: 26-Sep-19
Date Prepared: 02-Oct-19
Date Analyzed: 05-Oct-19

Prep Batch: AB191002-1
QCBatchID: AB191002-1-1
Run ID: AB191002-1A
Count Time: 30 minutes
Report Basis: As Received

Final Aliquot: 200 ml
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/l
File Name: ABA1005B

Analysis ReqCode: 9310_ALPHABET

CASNO	Target Nuclide	Matrix Spike	Sample Results	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
12587-46-1	GROSS ALPHA	2.85E+02	1.35E+01	7.08E+00	2.320E+02	117	72 - 130	

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: GA1909242-1

Gross Alpha by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	Shared QC
Lab ID:	1909559-1

Sample Matrix: WATER	Prep Batch: AB191002-1	Final Aliquot: 200 ml
Prep SOP: PAI 702 Rev 22	QCBatchID: AB191002-1-1	Prep Basis: Unfiltered
Date Collected: 26-Sep-19	Run ID: AB191002-1A	Moisture(%): NA
Date Prepared: 02-Oct-19	Count Time: 150 minutes	Result Units: pCi/l
Date Analyzed: 05-Oct-19	Report Basis: Unfiltered	File Name: ABA1005C

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
12587-46-1	GROSS ALPHA	1.35E+01 +/- 3.41E+00	2.47E+00	3E+00	NA	

Comments:

Qualifiers/Flags:

- U - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
- Y2 - Chemical Yield outside default limits.
- 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: GA1909242-1

Gross Alpha by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	Shared QC
Lab ID:	1909559-1

Sample Matrix: WATER	Prep Batch: AB191002-1	Final Aliquot: 200 ml
Prep SOP: PAI 702 Rev 22	QCBatchID: AB191002-1-1	Prep Basis: Unfiltered
Date Collected: 26-Sep-19	Run ID: AB191002-1A	Moisture(%): NA
Date Prepared: 02-Oct-19	Count Time: 150 minutes	Result Units: pCi/l
Date Analyzed: 05-Oct-19	Report Basis: Unfiltered	File Name: ABA1005C

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
12587-46-1	GROSS ALPHA	1.35E+01 +/- 3.41E+00	2.47E+00	3E+00	NA	

Comments:

Qualifiers/Flags:

- U - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
- Y2 - Chemical Yield outside default limits.
- 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: GA1909242-1

Gross Alpha by GFPC

PAI 724 Rev 13

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	Shared QC
Lab ID:	1909559-1MSD

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 22
Date Collected: 26-Sep-19
Date Prepared: 02-Oct-19
Date Analyzed: 05-Oct-19

Prep Batch: AB191002-1
QC Batch ID: AB191002-1-1
Run ID: AB191002-1A
Count Time: 30 minutes
Report Basis: As Received

Final Aliquot: 200 ml
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/l
File Name: ABA1005B

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
12587-46-1	GROSS ALPHA	2.67E+02 +/-	4.90E+01	7.85E+00		2.85E+02 +/-	5.17E+01	7.08E+00		0.509	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.
- 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: GA1909242-1

Gross Alpha by GFPC

PAI 724 Rev 13

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	Shared QC
Lab ID:	1909559-1MSD

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 22
Date Collected: 26-Sep-19
Date Prepared: 02-Oct-19
Date Analyzed: 05-Oct-19

Prep Batch: AB191002-1
QCBatchID: AB191002-1-1
Run ID: AB191002-1A
Count Time: 30 minutes
Report Basis: As Received

Final Aliquot: 200 ml
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/l
File Name: ABA1005B

CASNO	Analyte	Sample				Duplicate				RPD	RPD Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
12587-46-1	GROSS ALPHA	2.67E+02 +/-	4.90E+01	7.85E+00		2.85E+02 +/-	5.17E+01	7.08E+00		7.00	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: GA1909242-1

Gross Alpha by GFPC

PAI 724 Rev 13

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	Shared QC
Lab ID:	1909427-1DUP

Sample Matrix: WATER	Prep Batch: AB191002-1	Final Aliquot: 150 ml
Prep SOP: PAI 702 Rev 22	QCBatchID: AB191002-1-1	Prep Basis: As Received
Date Collected: 18-Sep-19	Run ID: AB191002-1A	Moisture(%): NA
Date Prepared: 02-Oct-19	Count Time: 480 minutes	Result Units: pCi/l
Date Analyzed: 06-Oct-19	Report Basis: As Received	File Name: ABA1006A

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
12587-46-1	GROSS ALPHA	7.29E+00 +/- 2.32E+00		3.01E+00	X	6.09E+00 +/- 2.09E+00		2.78E+00		0.771	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.

- 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: GA1909242-1

Gross Alpha by GFPC

PAI 724 Rev 13

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	Shared QC
Lab ID:	1909427-1DUP

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 22
Date Collected: 18-Sep-19
Date Prepared: 02-Oct-19
Date Analyzed: 06-Oct-19

Prep Batch: AB191002-1
QCBatchID: AB191002-1-1
Run ID: AB191002-1A
Count Time: 480 minutes
Report Basis: As Received

Final Aliquot: 150 ml
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/l
File Name: ABA1006A

CASNO	Analyte	Sample				Duplicate				RPD	RPD Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
12587-46-1	GROSS ALPHA	7.29E+00 +/-	2.32E+00	3.01E+00	X	6.09E+00 +/-	2.09E+00	2.78E+00		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: GA1909242-1

Gross Alpha by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	Shared QC
Lab ID:	1909427-1

Sample Matrix: WATER	Prep Batch: AB191002-1	Final Aliquot: 150 ml
Prep SOP: PAI 702 Rev 22	QCBatchID: AB191002-1-1	Prep Basis: Unfiltered
Date Collected: 18-Sep-19	Run ID: AB191002-1A	Moisture(%): NA
Date Prepared: 02-Oct-19	Count Time: 480 minutes	Result Units: pCi/l
Date Analyzed: 06-Oct-19	Report Basis: Unfiltered	File Name: ABA1006A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
12587-46-1	GROSS ALPHA	7.29E+00 +/- 2.32E+00	3.01E+00	3E+00	NA	X

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: GA1909242-1

Gross Alpha by GFPC

PAI 724 Rev 13

Sample Duplicate Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	Shared QC
Lab ID:	1909427-1DUP

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 22
Date Collected: 18-Sep-19
Date Prepared: 02-Oct-19
Date Analyzed: 06-Oct-19

Prep Batch: AB191002-1
QCBatchID: AB191002-1-1
Run ID: AB191002-1A
Count Time: 480 minutes
Report Basis: As Received

Final Aliquot: 150 ml
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/l
File Name: ABA1006A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
12587-46-1	GROSS ALPHA	6.09E+00 +/- 2.09E+00	2.78E+00	3E+00	NA	

Comments:

Qualifiers/Flags:

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

- D - DER is greater than Control Limit of 2.13

Abbreviations:

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

Data Package ID: GA1909242-1

Date Printed:

Tuesday, October 08, 2019

ALS -- Fort Collins

LIMS Version: 6.912

Page 1 of 1

Gross Alpha by GFPC

PAI 724 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	B3R7D4
Lab ID:	1909242-2

Sample Matrix: WATER	Prep Batch: AB191002-1	Final Aliquot: 200 ml
Prep SOP: PAI 702 Rev 22	QCBatchID: AB191002-1-1	Prep Basis: Unfiltered
Date Collected: 11-Sep-19	Run ID: AB191002-1A	Moisture(%): NA
Date Prepared: 02-Oct-19	Count Time: 480 minutes	Result Units: pCi/l
Date Analyzed: 06-Oct-19	Report Basis: Unfiltered	File Name: ABA1006A

Analysis ReqCode: 9310_ALPHABET

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
12587-46-1	GROSS ALPHA	2.23E+00 +/- 9.97E-01	1.44E+00	3E+00	NA	

Comments:

Qualifiers/Flags:

- U - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
- Y2 - Chemical Yield outside default limits.
- 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: GA1909242-1



Inorganics

Case Narrative

CH2M HILL Plateau Remediation Company

SURV, September 2019 -- S19-009

Work Order Number: 1909242

1. The samples were prepared for analysis based on Environmental Monitoring Systems Laboratory (EMSL) Rev 2.1 procedures and Standard Methods for the Examination of Water and Wastewater, 20th Edition 1998 procedures.
2. The samples were analyzed following EMSL and Standard Method procedures for the current revisions of the following SOPs and methods:

<u>Analyte</u>	<u>Method</u>	<u>SOP #</u>
Alkalinity	SM2320B	1106
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 samples were prepared and analyzed within the established hold time for this analysis.

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

5. General quality control procedures.
 - A preparation (method) blank, laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) were prepared and analyzed with the samples in each applicable preparation batch.
 - 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. Chloride, nitrite as N, orthophosphate as P, and sulfate were detected above the MDL.



- All laboratory control sample criteria were met with the exception of bromide and orthophosphate as P. The recoveries are within client's acceptance of 20%.
- All initial and continuing calibration blanks were below the reporting limit for the requested analytes.
- All initial and continuing calibration verifications were within the acceptance criteria for the requested analytes.

6. Matrix specific quality control procedures.

Sample 1909232-2 was designated as the quality control sample for the total alkalinity analysis. Sample 1909241-11 was designated as the quality control sample for the anion analysis. Results for the shared quality control samples from the batch are included at the client's request.

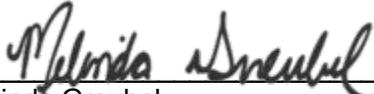
Similarity of matrix and therefore relevance of the QC results should not be automatically inferred for any sample other than the native sample selected for QC.

- A matrix spike (MS) was prepared and analyzed with this batch. All guidance criteria for precision and accuracy were met.
 - A sample duplicate was prepared and analyzed with the total alkalinity batch. All guidance criteria for precision were met.
7. Reduced aliquots were taken of sample 1909242-3 for the total alkalinity analysis. Reporting limits were elevated accordingly.

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.



Melinda Greubel
Inorganics Primary Data Reviewer

10/9/19
Date



Keith M. O.
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.

- 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.

TOTAL ALKALINITY As CaCO₃**Method SM2320B****Sample Results**

Lab Name: ALS -- Fort Collins
Client Name: CH2M HILL Plateau Remediation Company
Client Project ID: SURV, September 2019 S19-009
Work Order Number: 1909242 **Final Volume:** 100 ml
Reporting Basis: As Received **Matrix:** WATER
Prep Method: NONE **Result Units:** MG/L
Analyst: Lisa M. Champagne

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	RptLimit/ LOQ/LOD	Flag	Sample Aliquot
B3R7C2	1909242-3	09/11/2019	09/23/2019	09/23/2019	N/A	1	150	20		25 ml

Comments:

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

Data Package ID: AK1909242-1

Ion Chromatography

Method EPA300.0 Revision 2.1

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Field ID:	B3R7V1
Lab ID:	1909242-4

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 12-Sep-19

Date Extracted: 13-Sep-19

Date Analyzed: 13-Sep-19

Prep Method: NONE

Prep Batch: IC190913-2

QCBatchID: IC190913-2-1

Run ID: IC190913-1A3

Cleanup: NONE

Basis: As Received

File Name: 190913IC3LIMS

Analyst: Lainey M. Lloyd

Sample Aliquot: 5 ml

Final Volume: 5 ml

Result Units: MG/L

Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
16984-48-8	FLUORIDE AnalysisTime: 23:59	2	0.32		0.2	0.06
16887-00-6	CHLORIDE AnalysisTime: 23:59	2	21		0.4	0.12
14797-65-0	NITRITE AS N AnalysisTime: 23:59	2	0.19	BC	0.2	0.06
14797-55-8	NITRATE AS N AnalysisTime: 23:59	2	21		0.4	0.12
14808-79-8	SULFATE AnalysisTime: 23:59	2	36		2	0.6

Data Package ID: IC1909242-1

Ion Chromatography

Method EPA300.0 Revision 2.1

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Field ID:	B3R7M3
Lab ID:	1909242-8

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 12-Sep-19

Date Extracted: 13-Sep-19

Date Analyzed: 14-Sep-19

Prep Method: NONE

Prep Batch: IC190913-2

QCBatchID: IC190913-2-1

Run ID: IC190913-1A3

Cleanup: NONE

Basis: As Received

File Name: 190913IC3LIMS

Analyst: Lainey M. Lloyd

Sample Aliquot: 5 ml

Final Volume: 5 ml

Result Units: MG/L

Clean DF: 1

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
16984-48-8	FLUORIDE AnalysisTime: 00:12	2	0.06	U	0.2	0.06
16887-00-6	CHLORIDE AnalysisTime: 00:12	2	11		0.4	0.12
14797-65-0	NITRITE AS N AnalysisTime: 00:12	2	0.24	C	0.2	0.06
24959-67-9	BROMIDE AnalysisTime: 00:12	2	0.17	B	0.4	0.12
14797-55-8	NITRATE AS N AnalysisTime: 00:12	2	26		0.4	0.12
14265-44-2	ORTHOPHOSPHATE AS P AnalysisTime: 00:12	2	2.4	C	1	0.3
14808-79-8	SULFATE AnalysisTime: 00:12	2	46		2	0.6

Data Package ID: IC1909242-1

TOTAL ALKALINITY AS CaCO₃**Method SM2320B****Method Blank****Lab Name:** ALS -- Fort Collins**Work Order Number:** 1909242**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** SURV, September 2019 S19-009**Lab ID:** AK190923-2MB**Sample Matrix:** WATER**% Moisture:** N/A**Prep Batch:** AK190923-2**QC Batch ID:** AK190923-2-1**Run ID:** AK190923-1A1**Cleanup:** NONE**Basis:** N/A**Sample Aliquot:** 100 ml**Final Volume:** 100 ml**Result Units:** UG/L

Lab ID	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	RptLimit/ LOQ	Flag
AK190923-2MB	9/23/2019	09/23/2019	N/A	1	5000	5000	U

Comments:

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

Data Package ID: AK1909242-1

TOTAL ALKALINITY AS CaCO₃**Method SM2320B****Laboratory Control Sample****Lab Name:** ALS -- Fort Collins**Work Order Number:** 1909242**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** SURV, September 2019 S19-009**Lab ID:** AK190923-2LCS**Sample Matrix:** WATER**% Moisture:** N/A**Date Collected:** N/A**Date Extracted:** 09/23/2019**Date Analyzed:** 09/23/2019**Prep Batch:** AK190923-2**QCBatchID:** AK190923-2-1**Run ID:** AK190923-1A1**Cleanup:** NONE**Basis:** N/A**Sample Aliquot:** 100 ml**Final Volume:** 100 ml**Result Units:** UG/L

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
3812-32-6	TOTAL ALKALINITY AS CaCO ₃	100000	105000	5000		105	85 - 115

Data Package ID: AK1909242-1

TOTAL ALKALINITY AS CaCO₃**Method SM2320B****Duplicate Sample Results****Lab Name:** ALS -- Fort Collins**Work Order Number:** 1909242**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** SURV, September 2019 S19-009**Reporting Basis:** As Received**Sample Aliquot:** 25 ml**Final Volume:** 100ml**Matrix:** WATER**Result Units:** MG/L

Client Sample ID	Lab ID	Date Prepared	Date Analyzed	Dilution Factor	Duplicate Result	Dup Qual	Sample Result	Samp Qual	Reporting Limit	RPD	RPD Limit
SHARED QC	1909232-2D	09/23/2019	09/23/2019	1	113		110		20	1	15

Comments:

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

Data Package ID: AK1909242-1

Prep Batch ID: AK190923-2

Start Date: 09/23/19	End Date: 09/23/19	Concentration Method: NONE	Batch Created By: lmc
Start Time: 10:00	End Time: 14:55	Extract Method: NONE	Date Created: 09/23/19
Prep Analyst: Lisa M. Champagne		Initial Volume Units: ml	Time Created: 14:55
<u>Comments:</u>		Final Volume Units: ml	Validated By: lmc
<div style="border: 1px solid black; height: 30px; width: 100%;"></div>			Date Validated: 09/24/19
			Time Validated: 12:10

QC Batch ID: AK190923-2-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
AK190923-2	MB	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909232
AK190923-2	LCS	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909232
1909232-2	DUP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909232
1909394-1	DUP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909394
1909217-1	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909217
1909217-4	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909217
1909217-5	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909217
1909217-6	SMP	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909217
1909217-9	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909217
1909232-2	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909232
1909232-4	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909232
1909232-5	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909232
1909245-10	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909245
1909245-11	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909245
1909245-3	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909245
1909394-1	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909394
1909394-2	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909394
1909394-3	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909394
1909394-4	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909394
1909394-5	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909394
1909394-6	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909394
1909394-7	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909394
1909394-8	SMP	XXXXXX	WATER	XXXXXX	25	100	NONE	1	1909394

Prep Batch ID: AK190923-2

Start Date: 09/23/19	End Date: 09/23/19	Concentration Method: NONE	Batch Created By: lmc
Start Time: 10:00	End Time: 14:55	Extract Method: NONE	Date Created: 09/23/19
Prep Analyst: Lisa M. Champagne		Initial Volume Units: ml	Time Created: 14:55
Comments:		Final Volume Units: ml	Validated By: lmc
<div style="border: 1px solid black; height: 30px; width: 100%;"></div>			Date Validated: 09/24/19
			Time Validated: 12:10

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: AK190923-2

Start Date: 09/23/19	End Date: 09/23/19	Concentration Method: NONE	Batch Created By: lmc
Start Time: 10:00	End Time: 14:55	Extract Method: NONE	Date Created: 09/23/19
Prep Analyst: Lisa M. Champagne		Initial Volume Units: ml	Time Created: 14:55
Comments:		Final Volume Units: ml	Validated By: lmc
<div style="border: 1px solid black; height: 30px; width: 100%;"></div>			Date Validated: 09/24/19
			Time Validated: 12:10

QC Batch ID: AK190923-2-2

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
AK190923-2	MB	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909242
AK190923-2	LCS	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909242
1909242-3	SMP	B3R7C2	WATER	9/11/2019	25	100	NONE	1	1909242

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

Ion Chromatography

Method EPA300.0 Revision 2.1

Method Blank

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Lab ID: IC190913-2MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 13-Sep-19

Date Analyzed: 13-Sep-19

Prep Batch: IC190913-2

QCBatchID: IC190913-2-1

Run ID: IC190913-1A3

Cleanup: NONE

Basis: N/A

File Name: 190913IC3LIMS

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	0.03	U	0.1	0.03
16887-00-6	CHLORIDE	1	0.16	B	0.2	0.06
14797-65-0	NITRITE AS N	1	0.063	B	0.1	0.03
24959-67-9	BROMIDE	1	0.06	U	0.2	0.06
14797-55-8	NITRATE AS N	1	0.06	U	0.2	0.06
14265-44-2	ORTHOPHOSPHATE AS P	1	0.26	B	0.5	0.15
14808-79-8	SULFATE	1	0.32	B	1	0.3

Data Package ID: IC1909242-1

Ion Chromatography

Method EPA300.0 Revision 2.1

Laboratory Control Sample and Laboratory Control Sample Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Lab ID: IC190913-2LCS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 09/13/2019

Date Analyzed: 09/13/2019

Prep Method: NONE

Prep Batch: IC190913-2

QCBatchID: IC190913-2-1

Run ID: IC190913-1A3

Cleanup: NONE

Basis: N/A

File Name: 190913IC3LIMS

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
16984-48-8	FLUORIDE	5	4.57	0.1		91	90 - 110%
16887-00-6	CHLORIDE	10	9.27	0.2		93	90 - 110%
14797-65-0	NITRITE AS N	5	5.02	0.1		100	90 - 110%
24959-67-9	BROMIDE	10	8.88	0.2	N	89	90 - 110%
14797-55-8	NITRATE AS N	10	9.03	0.2		90	90 - 110%
14265-44-2	ORTHOPHOSPHATE AS P	10	8.74	0.5	N	87	90 - 110%
14808-79-8	SULFATE	50	45.8	1		92	90 - 110%

Lab ID: IC190913-2LCSD

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 09/13/2019

Date Analyzed: 09/14/2019

Prep Method: NONE

Prep Batch: IC190913-2

QCBatchID: IC190913-2-1

Run ID: IC190913-1A3

Cleanup: NONE

Basis: N/A

File Name: 190913IC3LIMS

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
16984-48-8	FLUORIDE	5	4.82	0.1		96	15	5
16887-00-6	CHLORIDE	10	9.61	0.2		96	15	4
14797-65-0	NITRITE AS N	5	5.24	0.1		105	15	4
24959-67-9	BROMIDE	10	9.21	0.2		92	15	4
14797-55-8	NITRATE AS N	10	9.54	0.2		95	15	6
14265-44-2	ORTHOPHOSPHATE AS P	10	9.74	0.5		97	15	11
14808-79-8	SULFATE	50	48.1	1		96	15	5

Data Package ID: IC1909242-1

Ion Chromatography

Method EPA300.0 Revision 2.1

Matrix Spike

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Field ID:	SHARED QC
LabID:	1909241-11MS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 12-Sep-19

Date Extracted: 13-Sep-19

Date Analyzed: 13-Sep-19

Prep Batch: IC190913-2

QCBatchID: IC190913-2-1

Run ID: IC190913-1A3

Cleanup: NONE

Basis: As Received

Sample Aliquot: 5 ml

Final Volume: 5 ml

Result Units: MG/L

File Name: 190913IC3LIMS

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
16984-48-8	FLUORIDE	0.085	B	4.25		0.2	4	104	85 - 115%
16887-00-6	CHLORIDE	0.67	C	10.7		0.4	10	100	85 - 115%
14797-65-0	NITRITE AS N	0.2	U	4.46		0.2	4	111	85 - 115%
24959-67-9	BROMIDE	400	U	9410		400	10000	94	85 - 115%
14797-55-8	NITRATE AS N	0.4	U	10.5		0.4	10	105	85 - 115%
14265-44-2	ORTHOPHOSPHATE AS P	1000	U	3610		1000	4000	90	85 - 115%
14808-79-8	SULFATE	11		49		2	40	94	85 - 115%

Data Package ID: IC1909242-1

Prep Batch ID: IC190913-2

Start Date: 09/13/19	End Date: 09/13/19	Concentration Method: NONE	Batch Created By: kjs
Start Time: 14:50	End Time: 15:00	Extract Method: NONE	Date Created: 09/13/19
Prep Analyst: Keli J. Smith		Initial Volume Units: ml	Time Created: 14:51
Comments:		Final Volume Units: ml	Validated By: lml
<div style="border: 1px solid black; height: 30px; width: 100%;"></div>			Date Validated: 09/17/19
			Time Validated: 9:24

QC Batch ID: IC190913-2-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
IC190913-2	MB	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909241
IC190913-2	LCS	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909241
IC190913-2	LCSD	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909241
1909241-11	MS	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909241
1909241-11	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909241
1909241-12	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909241
1909241-13	SMP	XXXXXX	WATER	XXXXXX	5	5	NONE	1	1909241
1909242-4	SMP	B3R7V1	WATER	9/12/2019	5	5	NONE	1	1909242
1909242-8	SMP	B3R7M3	WATER	9/12/2019	5	5	NONE	1	1909242

QC Types

CAR	Carrier reference sample	DLS	Detection Limit Standard
DUP	Laboratory Duplicate	LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicat	LODV	Limit of Detection Verification
LOQV	Limit of Quantitation Verification	MB	Method Blank
MS	Laboratory Matrix Spike	MSD	Laboratory Matrix Spike Duplicate
REP	Sample replicate	RVS	Reporting Level Verification Standar
SMP	Field Sample	SYS	Sample Yield Spike



Metals

Case Narrative

CH2M HILL Plateau Remediation Company

SURV, September 2019 -- S19-009

Work Order Number: 1909242

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

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

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

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

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

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

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



- The interference check samples and high standard read-backs associated with Method 6010D were within acceptance criteria.
- The interference check samples associated with Method 6020B were analyzed.

6. Matrix specific quality control procedures.

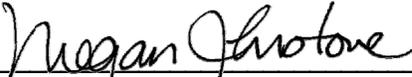
Sample 1909242-1 was designated as the quality control sample for the ICP Trace analysis. Samples 1909242-5 and -7 were designated as the quality control samples for the ICPMS analysis.

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

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

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

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



Megan Johnstone
Inorganics Primary Data Reviewer

10/10/19
Date



Kath M. O.
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 ICP Metals

Method SW6010D

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Field ID:	B3R7D8
Lab ID:	1909242-1

Sample Matrix: WATER
 % Moisture: N/A
 Date Collected: 11-Sep-19
 Date Extracted: 02-Oct-19
 Date Analyzed: 03-Oct-19
 Prep Method: SW3005 Rev A

Prep Batch: IP191002-1
 QCBatchID: IP191002-1-2
 Run ID: IT191003-1A3
 Cleanup: NONE
 Basis: As Received
 File Name: 191003A.

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

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
7440-36-0	ANTIMONY	1	0.75	U	20	0.75
7440-38-2	ARSENIC	1	19		10	0.46
7440-39-3	BARIUM	1	8.6	B	20	2.6
7440-43-9	CADMIUM	1	0.11	U	5	0.11
7440-70-2	CALCIUM	1	8500		1000	210
7440-47-3	CHROMIUM	1	3.6	B	10	2.4
7440-48-4	COBALT	1	0.19	U	10	0.19
7440-50-8	COPPER	1	0.51	U	8	0.51
7439-89-6	IRON	1	30	U	50	30
7439-95-4	MAGNESIUM	1	1800		750	89
7439-96-5	MANGANESE	1	0.49	U	5	0.49
7440-02-0	NICKEL	1	1.7	B	20	1.1
7440-09-7	POTASSIUM	1	3900		1000	130
7440-22-4	SILVER	1	0.73	U	10	0.73
7440-23-5	SODIUM	1	87000		500	38
7440-62-2	VANADIUM	1	50		10	0.43
7440-66-6	ZINC	1	0.62	U	20	0.62

Data Package ID: IT1909242-1

Date Printed: Thursday, October 10, 2019

ALS -- Fort Collins

Page 1 of 2

LIMS Version: 6.912

Total Recoverable ICP Metals

Method SW6010D

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Field ID:	B3R7D4
Lab ID:	1909242-2

Sample Matrix: WATER
 % Moisture: N/A
 Date Collected: 11-Sep-19
 Date Extracted: 02-Oct-19
 Date Analyzed: 03-Oct-19
 Prep Method: SW3005 Rev A

Prep Batch: IP191002-1
 QCBatchID: IP191002-1-2
 Run ID: IT191003-1A3
 Cleanup: NONE
 Basis: As Received
 File Name: 191003A.

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

CASNO	Target Analyte	Dilution Factor	Result	Result Qualifier	Reporting Limit	MDL
7440-36-0	ANTIMONY	1	0.75	U	20	0.75
7440-38-2	ARSENIC	1	17		10	0.46
7440-39-3	BARIUM	1	8.9	B	20	2.6
7440-43-9	CADMIUM	1	0.11	U	5	0.11
7440-70-2	CALCIUM	1	8700		1000	210
7440-47-3	CHROMIUM	1	7.5	B	10	2.4
7440-48-4	COBALT	1	0.19	U	10	0.19
7440-50-8	COPPER	1	0.51	U	8	0.51
7439-89-6	IRON	1	35	B	50	30
7439-95-4	MAGNESIUM	1	1800		750	89
7439-96-5	MANGANESE	1	0.89	B	5	0.49
7440-02-0	NICKEL	1	4.3	B	20	1.1
7440-09-7	POTASSIUM	1	4000		1000	130
7440-22-4	SILVER	1	0.73	U	10	0.73
7440-23-5	SODIUM	1	87000		500	38
7440-62-2	VANADIUM	1	50		10	0.43
7440-66-6	ZINC	1	0.62	U	20	0.62

Data Package ID: IT1909242-1

Date Printed: Thursday, October 10, 2019

ALS -- Fort Collins

Page 2 of 2

LIMS Version: 6.912

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

Lab Name: ALS -- Fort Collins
Client Name: CH2M HILL Plateau Remediation Company
Client Project ID: SURV, September 2019 S19-009
Work Order Number: 1909242 **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
B3R775	1909242-5	9/12/2019	10/2/2019	10/09/2019	N/A	10	14	10	0.46		50 ml

Comments:

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

Data Package ID: *IM1909242-1*

Total Recoverable CHROMIUM

Method SW6020B

Sample Results

Lab Name: ALS -- Fort Collins

Client Name: CH2M HILL Plateau Remediation Company

Client Project ID: SURV, September 2019 S19-009

Work Order Number: 1909242

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
B3R771	1909242-6	9/12/2019	10/2/2019	10/10/2019	N/A	10	15	10	0.46		50 ml

Comments:

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

Data Package ID: *IM1909242-1*

Total Recoverable URANIUM**Method SW6020B****Sample Results****Lab Name:** ALS -- Fort Collins**Client Name:** CH2M HILL Plateau Remediation Company**Client Project ID:** SURV, September 2019 S19-009**Work Order Number:** 1909242**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
B3R780	1909242-7	9/12/2019	10/2/2019	10/10/2019	N/A	10	2.1	0.1	0.0049		50 ml

Comments:

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

Data Package ID: *IM1909242-1*

ICP Metals

Method SW6010D

Method Blank

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Lab ID: IP191002-1MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 02-Oct-19

Date Analyzed: 03-Oct-19

Prep Batch: IP191002-1

QCBatchID: IP191002-1-2

Run ID: IT191003-1A3

Cleanup: NONE

Basis: N/A

File Name: 191003A.

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
7440-36-0	ANTIMONY	1	1.3	B	20	0.75
7440-38-2	ARSENIC	1	0.46	U	10	0.46
7440-39-3	BARIUM	1	2.6	U	20	2.6
7440-43-9	CADMIUM	1	0.11	U	5	0.11
7440-70-2	CALCIUM	1	210	U	1000	210
7440-47-3	CHROMIUM	1	2.4	U	10	2.4
7440-48-4	COBALT	1	0.19	U	10	0.19
7440-50-8	COPPER	1	0.51	U	8	0.51
7439-89-6	IRON	1	30	U	50	30
7439-95-4	MAGNESIUM	1	89	U	750	89
7439-96-5	MANGANESE	1	0.49	U	5	0.49
7440-02-0	NICKEL	1	1.1	U	20	1.1
7440-09-7	POTASSIUM	1	160	B	1000	130
7440-22-4	SILVER	1	0.73	U	10	0.73
7440-23-5	SODIUM	1	120	B	500	38
7440-62-2	VANADIUM	1	0.43	U	10	0.43
7440-66-6	ZINC	1	0.62	U	20	0.62

Data Package ID: IT1909242-1

Date Printed: Thursday, October 10, 2019

ALS -- Fort Collins

Page 1 of 1

LIMS Version: 6.912

ICP Metals

Method SW6010D

Laboratory Control Sample

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Lab ID: IP191002-1LCS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 10/02/2019

Date Analyzed: 10/03/2019

Prep Method: SW3005A

Prep Batch: IP191002-1

QCBatchID: IP191002-1-2

Run ID: IT191003-1A3

Cleanup: NONE

Basis: N/A

File Name: 191003A.

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
7440-36-0	ANTIMONY	500	494	20		99	80 - 120%
7440-38-2	ARSENIC	1000	996	10		100	80 - 120%
7440-39-3	BARIUM	1000	994	20		99	80 - 120%
7440-43-9	CADMIUM	50	48.3	5		97	80 - 120%
7440-70-2	CALCIUM	40000	39300	1000		98	80 - 120%
7440-47-3	CHROMIUM	200	200	10		100	80 - 120%
7440-48-4	COBALT	500	501	10		100	80 - 120%
7440-50-8	COPPER	250	251	8		100	80 - 120%
7439-89-6	IRON	1000	963	50		96	80 - 120%
7439-95-4	MAGNESIUM	40000	40600	750		101	80 - 120%
7439-96-5	MANGANESE	500	502	5		100	80 - 120%
7440-02-0	NICKEL	500	492	20		98	80 - 120%
7440-09-7	POTASSIUM	40000	39400	1000		98	80 - 120%
7440-22-4	SILVER	100	102	10		102	80 - 120%
7440-23-5	SODIUM	40000	42300	500		106	80 - 120%
7440-62-2	VANADIUM	500	481	10		96	80 - 120%
7440-66-6	ZINC	500	496	20		99	80 - 120%

Data Package ID: IT1909242-1

Date Printed: Thursday, October 10, 2019

ALS -- Fort Collins

Page 1 of 1

LIMS Version: 6.912

ICP Metals

Method SW6010D

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Field ID: B3R7D8
LabID: 1909242-1MS

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 11-Sep-19

Date Extracted: 02-Oct-19

Date Analyzed: 03-Oct-19

Prep Method: SW3005 Rev A

Prep Batch: IP191002-1

QC BatchID: IP191002-1-2

Run ID: IT191003-1A3

Cleanup: NONE

Basis: As Received

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: UG/L

File Name: 191003A.

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
7440-36-0	ANTIMONY	0.75	U	494		20	500	99	80 - 120%
7440-38-2	ARSENIC	19		1020		10	1000	100	80 - 120%
7440-39-3	BARIUM	8.6	B	1010		20	1000	100	80 - 120%
7440-43-9	CADMIUM	0.11	U	48.2		5	50	96	80 - 120%
7440-70-2	CALCIUM	8500		47700		1000	40000	98	80 - 120%
7440-47-3	CHROMIUM	3.6	B	204		10	200	100	80 - 120%
7440-48-4	COBALT	0.19	U	499		10	500	100	80 - 120%
7440-50-8	COPPER	0.51	U	253		8	250	101	80 - 120%
7439-89-6	IRON	30	U	1140		50	1000	114	80 - 120%
7439-95-4	MAGNESIUM	1800		42100		750	40000	101	80 - 120%
7439-96-5	MANGANESE	0.49	U	500		5	500	100	80 - 120%
7440-02-0	NICKEL	1.7	B	491		20	500	98	80 - 120%
7440-09-7	POTASSIUM	3900		47800		1000	40000	110	80 - 120%
7440-22-4	SILVER	0.73	U	101		10	100	101	80 - 120%
7440-23-5	SODIUM	87000		133000		500	40000	115	80 - 120%
7440-62-2	VANADIUM	50		529		10	500	96	80 - 120%
7440-66-6	ZINC	0.62	U	495		20	500	99	80 - 120%

Data Package ID: IT1909242-1

ICP Metals

Method SW6010D

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Field ID: B3R7D8
LabID: 1909242-1MSD

Sample Matrix: WATER

% Moisture: N/A

Date Collected: 11-Sep-19

Date Extracted: 02-Oct-19

Date Analyzed: 03-Oct-19

Prep Method: SW3005 Rev A

Prep Batch: IP191002-1

QC BatchID: IP191002-1-2

Run ID: IT191003-1A3

Cleanup: NONE

Basis: As Received

Sample Aliquot: 50 ml

Final Volume: 50 ml

Result Units: UG/L

File Name: 191003A.

CASNO	Target Analyte	MSD Result	MSD Qual	Spike Added	MSD % Rec.	Reporting Limit	RPD Limit	RPD
7440-36-0	ANTIMONY	495		500	99	20	20	0
7440-38-2	ARSENIC	1030		1000	101	10	20	1
7440-39-3	BARIUM	1010		1000	100	20	20	0
7440-43-9	CADMIUM	48.8		50	98	5	20	1
7440-70-2	CALCIUM	48100		40000	99	1000	20	1
7440-47-3	CHROMIUM	204		200	100	10	20	0
7440-48-4	COBALT	502		500	100	10	20	1
7440-50-8	COPPER	254		250	102	8	20	0
7439-89-6	IRON	978		1000	98	50	20	15
7439-95-4	MAGNESIUM	42500		40000	102	750	20	1
7439-96-5	MANGANESE	502		500	100	5	20	1
7440-02-0	NICKEL	494		500	99	20	20	1
7440-09-7	POTASSIUM	47900		40000	110	1000	20	0
7440-22-4	SILVER	101		100	101	10	20	1
7440-23-5	SODIUM	132000		40000	112	500	20	1
7440-62-2	VANADIUM	531		500	96	10	20	0
7440-66-6	ZINC	513		500	103	20	20	4

Data Package ID: IT1909242-1

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
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 Batch ID: IP191002-1-2

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
IP191002-1	LCS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909242
1909242-1	MS	B3R7D8	WATER	9/11/2019	50	50	NONE	1	1909242
1909242-1	MSD	B3R7D8	WATER	9/11/2019	50	50	NONE	1	1909242
1909242-1	SMP	B3R7D8	WATER	9/11/2019	50	50	NONE	1	1909242
1909242-2	SMP	B3R7D4	WATER	9/11/2019	50	50	NONE	1	1909242

QC Types

CAR	Carrier reference sample	DLS	Detection Limit Standard
DUP	Laboratory Duplicate	LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicat	LODV	Limit of Detection Verification
LOQV	Limit of Quantitation Verification	MB	Method Blank
MS	Laboratory Matrix Spike	MSD	Laboratory Matrix Spike Duplicate
REP	Sample replicate	RVS	Reporting Level Verification Standar
SMP	Field Sample	SYS	Sample Yield Spike

ICPMS Metals

Method SW6020B

Method Blank

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

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: IM191009-20A3

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
7440-61-1	URANIUM	10	0.0049	U	0.1	0.0049

Data Package ID: IM1909242-1

ICPMS Metals

Method SW6020B

Laboratory Control Sample

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

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: IM191009-20A3

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%
7440-61-1	URANIUM	10	8.84	0.1		88	80 - 120%

Data Package ID: *IM1909242-1*

ICPMS Metals

Method SW6020B

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Field ID: B3R775
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: IM191009-20A3
 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: B3R775
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: IM191009-20A3
 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: IM1909242-1

ICPMS Metals

Method SW6020B

Matrix Spike And Matrix Spike Duplicate

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Field ID: B3R780
LabID: 1909242-7MS

Sample Matrix: WATER
 % Moisture: N/A
 Date Collected: 12-Sep-19
 Date Extracted: 02-Oct-19
 Date Analyzed: 10-Oct-19
 Prep Method: SW3005 Rev A

Prep Batch: IP191002-1
 QCBatchID: IP191002-1-3
 Run ID: IM191009-20A3
 Cleanup: NONE
 Basis: As Received

Sample Aliquot: 50 ml
 Final Volume: 50 ml
 Result Units: UG/L
 File Name: 250SMPL_

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
7440-61-1	URANIUM	2.1		10.8		0.1	10	88	75 - 125%

Field ID: B3R780
LabID: 1909242-7MSD

Sample Matrix: WATER
 % Moisture: N/A
 Date Collected: 12-Sep-19
 Date Extracted: 02-Oct-19
 Date Analyzed: 10-Oct-19
 Prep Method: SW3005 Rev A

Prep Batch: IP191002-1
 QCBatchID: IP191002-1-3
 Run ID: IM191009-20A3
 Cleanup: NONE
 Basis: As Received

Sample Aliquot: 50 ml
 Final Volume: 50 ml
 Result Units: UG/L
 File Name: 251SMPL_

CASNO	Target Analyte	MSD Result	MSD Qual	Spike Added	MSD % Rec.	Reporting Limit	RPD Limit	RPD
7440-61-1	URANIUM	11.1		10	90	0.1	20	3

Data Package ID: IM1909242-1

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
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 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	B3R775	WATER	9/12/2019	50	50	NONE	1	1909242
1909242-5	MSD	B3R775	WATER	9/12/2019	50	50	NONE	1	1909242
1909242-5	SMP	B3R775	WATER	9/12/2019	50	50	NONE	1	1909242
1909242-6	SMP	B3R771	WATER	9/12/2019	50	50	NONE	1	1909242
1909375-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909375
1909375-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909375
1909375-6	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1909375
1909375-7	SMP	XXXXXX	WATER	XXXXXX	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
			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

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
			Date Validated: 10/02/19
			Time Validated: 10:39

QC Batch ID: IP191002-1-3

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
1909242-7	MS	B3R780	WATER	9/12/2019	50	50	NONE	1	1909242
1909242-7	MSD	B3R780	WATER	9/12/2019	50	50	NONE	1	1909242
1909242-7	SMP	B3R780	WATER	9/12/2019	50	50	NONE	1	1909242

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



Technetium-99

Case Narrative

CH2M HILL Plateau Remediation Company

SURV, September 2019 – S19-009

Work Order Number: 1909242

1. The sample was prepared according to the current revision of SOP 755, with procedure modifications outlined in QASS 378635 and 378636.
2. The sample was analyzed for the presence of ⁹⁹Tc according to the current revision of SOP 704. The analysis was completed on 10/08/2019.
3. The analysis results for the sample are reported in units of pCi/L. The sample was not filtered prior to analysis.
4. The duplicate of sample 1909245-11 is shared for this work order. The duplicate was performed on a CH2M HILL Plateau Remediation Company sample and the results are acceptable. The results can be found in the following report.
5. In accordance with project specific instructions, the evaluation threshold for Relative Percent Difference (RPD) has been set at 20%. RPD is defined as:

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

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

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



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

Pik Yee Yuen
Pik Yee Yuen
Radiochemistry Primary Data Reviewer

10/9/19
Date

Kath M. O.
Radiochemistry Final Data Reviewer

10/15/19
Date

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 12

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Lab ID: TC191002-2MB	Sample Matrix: WATER	Prep Batch: TC191002-2	Final Aliquot: 250 ml
	Prep SOP: PAI 755 Rev 12	QCBatchID: TC191002-2-1	Result Units: pCi/l
	Date Collected: 02-Oct-19	Run ID: TC191002-2A	File Name: Z20191007_1030
	Date Prepared: 02-Oct-19	Count Time: 30 minutes	
	Date Analyzed: 08-Oct-19		

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
14133-76-7	Tc-99	-1.07E-01 +/- 1.15E+00	2.11E+00	2.00E+01	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Tc-99m	3.540E+04	3.52E+04	Pci	99.4	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.

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: TC1909242-1

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 12

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Lab ID: TC191002-2LCS	Sample Matrix: WATER	Prep Batch: TC191002-2	Final Aliquot: 250 ml
	Prep SOP: PAI 755 Rev 12	QCBatchID: TC191002-2-1	Result Units: pCi/l
	Date Collected: 02-Oct-19	Run ID: TC191002-2A	File Name: Z20191007_1030
	Date Prepared: 02-Oct-19	Count Time: 30 minutes	
	Date Analyzed: 08-Oct-19		

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14133-76-7	Tc-99	9.15E+02 +/- 1.47E+02	2.30E+00	9.110E+02	100	75 - 125	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Tc-99m	3.540E+04	3.28E+04	Pci	92.7	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: TC1909242-1

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 12

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	Shared QC
Lab ID:	1909245-11DUP

Sample Matrix: WATER
Prep SOP: PAI 755 Rev 12
Date Collected: 11-Sep-19
Date Prepared: 02-Oct-19
Date Analyzed: 07-Oct-19

Prep Batch: TC191002-2
QC Batch ID: TC191002-2-1
Run ID: TC191002-2A
Count Time: 30 minutes
Report Basis: Unfiltered

Final Aliquot: 100 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: Z20191007_1030

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
14133-76-7	Tc-99	2.85E+02 +/-	4.80E+01	6.01E+00		2.60E+02 +/-	4.40E+01	5.80E+00		0.745	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: TC1909242-1

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 12

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	Shared QC
Lab ID:	1909245-11DUP

Sample Matrix: WATER
Prep SOP: PAI 755 Rev 12
Date Collected: 11-Sep-19
Date Prepared: 02-Oct-19
Date Analyzed: 07-Oct-19

Prep Batch: TC191002-2
QCBatchID: TC191002-2-1
Run ID: TC191002-2A
Count Time: 30 minutes
Report Basis: Unfiltered

Final Aliquot: 100 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: Z20191007_1030

CASNO	Analyte	Sample				Duplicate				RPD	RPD Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
14133-76-7	Tc-99	2.85E+02 +/-	4.80E+01	6.01E+00		2.60E+02 +/-	4.40E+01	5.80E+00		9.00	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: TC1909242-1

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 12

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1909242

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, September 2019 S19-009

Field ID:	Shared QC
Lab ID:	1909245-11

Sample Matrix: WATER

Prep SOP: PAI 755 Rev 12

Date Collected: 11-Sep-19

Date Prepared: 02-Oct-19

Date Analyzed: 07-Oct-19

Prep Batch: TC191002-2

QCBatchID: TC191002-2-1

Run ID: TC191002-2A

Count Time: 30 minutes

Report Basis: Unfiltered

Final Aliquot: 100 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Z20191007_1030

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
14133-76-7	Tc-99	2.85E+02 +/- 4.80E+01	6.01E+00	2E+01	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Tc-99m	3.540E+04	3.15E+04	Pci	89.1	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: TC1909242-1

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 12

Sample Duplicate Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	Shared QC
Lab ID:	1909245-11DUP

Sample Matrix: WATER
Prep SOP: PAI 755 Rev 12
Date Collected: 11-Sep-19
Date Prepared: 02-Oct-19
Date Analyzed: 07-Oct-19

Prep Batch: TC191002-2
QCBatchID: TC191002-2-1
Run ID: TC191002-2A
Count Time: 30 minutes
Report Basis: Unfiltered

Final Aliquot: 100 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: Z20191007_1030

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
14133-76-7	Tc-99	2.60E+02 +/- 4.40E+01	5.80E+00	2E+01	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Tc-99m	3.540E+04	3.29E+04	Pci	93.1	40 - 110 %	

Comments:

Qualifiers/Flags:

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

- D - DER is greater than Control Limit of 3

Abbreviations:

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

Data Package ID: TC1909242-1

Date Printed:

Wednesday, October 09, 2019

ALS -- Fort Collins

Page 1 of 1

LIMS Version: 6.912

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 12

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1909242
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, September 2019 S19-009

Field ID:	B3R780
Lab ID:	1909242-7

Sample Matrix: WATER	Prep Batch: TC191002-2	Final Aliquot: 100 ml
Prep SOP: PAI 755 Rev 12	QCBatchID: TC191002-2-1	Prep Basis: Unfiltered
Date Collected: 12-Sep-19	Run ID: TC191002-2A	Moisture(%): NA
Date Prepared: 02-Oct-19	Count Time: 30 minutes	Result Units: pCi/l
Date Analyzed: 07-Oct-19	Report Basis: Unfiltered	File Name: Z20191007_1030

Analysis ReqCode: TC99_SEP_LSC

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
14133-76-7	Tc-99	3.43E+02 +/- 5.71E+01	5.70E+00	2E+01	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Tc-99m	3.540E+04	3.39E+04	Pci	95.7	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: TC1909242-1

Prep Batch ID: TC191002-2

Start Date: 10/02/19	End Date: 10/02/19	Concentration Method: NONE	Batch Created By: jcp
Start Time: 10:07	End Time: 10:07	Extract Method: PAI 75512	Date Created: 10/02/19
Prep Analyst: John C. Petrovic		Initial Volume Units: ml	Time Created: 10:08
Comments:		Final Volume Units: ml	Validated By: jcp
			Date Validated: 10/03/19
			Time Validated: 10:02

QC Batch ID: TC191002-2-1

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
TC191002-2	MB	XXXXXX	WATER	XXXXXX	250	250	NONE	1	1909245
TC191002-2CB1	MB	XXXXXX	WATER	XXXXXX	250	250	NONE	1	1909245
TC191002-2CB2	MB	XXXXXX	WATER	XXXXXX	250	250	NONE	1	1909245
TC191002-2CB3	MB	XXXXXX	WATER	XXXXXX	250	250	NONE	1	1909245
TC191002-2	LCS	XXXXXX	WATER	XXXXXX	250	250	NONE	1	1909245
1909245-11	DUP	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909245
1909241-15	SMP	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909241
1909242-7	SMP	B3R780	WATER	9/12/2019	100	100	NONE	1	1909242
1909245-10	SMP	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909245
1909245-11	SMP	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909245
1909245-3	SMP	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909245
1909245-8	SMP	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909245
1909305-2	SMP	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909305
1909373-1	SMP	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909373
1909378-3	SMP	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909378
1909382-1	SMP	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909382
1909382-2	SMP	XXXXXX	WATER	XXXXXX	100	100	NONE	1	1909382

QC Types

CAR	Carrier reference sample		DLS	Detection Limit Standard	
DUP	Laboratory Duplicate		LCS	Laboratory Control Sample	
LCSD	Laboratory Control Sample Duplicat		LODV	Limit of Detection Verification	
LOQV	Limit of Quantitation Verification		MB	Method Blank	
MS	Laboratory Matrix Spike		MSD	Laboratory Matrix Spike Duplicate	
REP	Sample replicate		RVS	Reporting Level Verification Standar	
SMP	Field Sample		SYS	Sample Yield Spike	

ALS Laboratory Group - Fort Collins

QUALITY ASSURANCE SUMMARY SHEET

PAR W.O. # / BATCH General
 TEST Tc99
 METHOD Prep
 SOP/REV (PREP) 755
 SOP/REV (ANAL) _____

Briefly document any QA or other problems or deviations associated with the analysis of samples. Problems could result from: log-in, color, odor, dilution, consistency, scheduling, equipment, or instrumentation, or may include documentation of minor deviations necessary due to unique DQO's or sample characteristics.

0288112109

Tc99^m 711.2613.17 was used as a tracer for this batch. It has a half-life of 6 hours and therefore must be delivered the day of prep and diluted to a working level solution. The procedure noted below is standard for all Tc99^m dilutions.

1. Open the Pb shielded container and carefully remove the vial containing the Tc99^m primary standard.
2. Withdraw a 1 mL aliquot of the Tc99^m primary standard from the vial using a 10 mL syringe fitted with a hypodermic needle. Dispense the aliquot into a disposable beaker that contains ~100 mL of DI water. Cap and mix well. This intermediate solution is a 1/100x dilution of the primary standard.
3. Using a 10 mL syringe, transfer 10 mL of the intermediate solution prepared in step 2 into a disposable beaker that contains ~70 mL of DI water. Cap and mix well. This working standard solution is a 1/800x dilution of the primary standard.

0288112109

0288112109

Attach vendor label

Rx# 817907
 CardinalHealth
 CARDINAL HEALTH 414, LLC
 DENVER
 10400 48TH AVE, STE B
 DENVER CO 80239
 303.373.0579

Date Ordered : 02Oct2019
 Date/Time Prepared : 03Oct2019 00:58 MT
ALS LABORATORY GROUP
 225 COMMERCE DR
 FORT COLLINS CO 80524-2762
1 0430 Fort Collins

Safetrac 


CAUTION

RADIOACTIVE MATERIALS

Patient : **SOURCE, Tc99m**
 Product : Tc-99m **Sodium Pertechnetate Unit Dose mCi (No)**
 Disp Amt : **0.55 mCi**
 Calibration : **03Oct2019 08:00 MT**
 Patient ID : _____
 Ordered Amount : 0.50 mCi
 Volume : 10.00 mL
 Conc : 0.06 mCi/mL

Source - Not for Human Use For Calibration Use Only
 Indication : **Point Source mCi**
 Dispense Date : 03Oct2019 Lot# : E19276-0027 Price(est) : N/A
 Use By : 04Oct2019 00:58 MT Physician : Charles Orchard, RSO NPT : _____
 Notes NDC : _____ RPh : A.Worthem



Caution: Federal law prohibits dispensing without a prescription - Rx only All Tc-99m drugs are below 0.15 uCi of Mo-99/mCi of Tc-99m at BUD.

TECHNICIAN/ANALYST Crystal Shreffler

DATE 8/12/09

DEPARTMENT MANAGER Jelly Z

DATE 8/12/09

378636

FORM 302r6.doc (4/22/04)

ALS Laboratory Group - Fort Collins

QUALITY ASSURANCE SUMMARY SHEET

PAR W.O. # / BATCH Generic
 TEST Tc99
 METHOD Prep
 SOP/REV (PREP) 755
 SOP/REV (ANAL) _____

Briefly document any QA or other problems or deviations associated with the analysis of samples. Problems could result from: log-in, color, odor, dilution, consistency, scheduling, equipment, or instrumentation, or may include documentation of minor deviations necessary due to unique DQO's or sample characteristics.

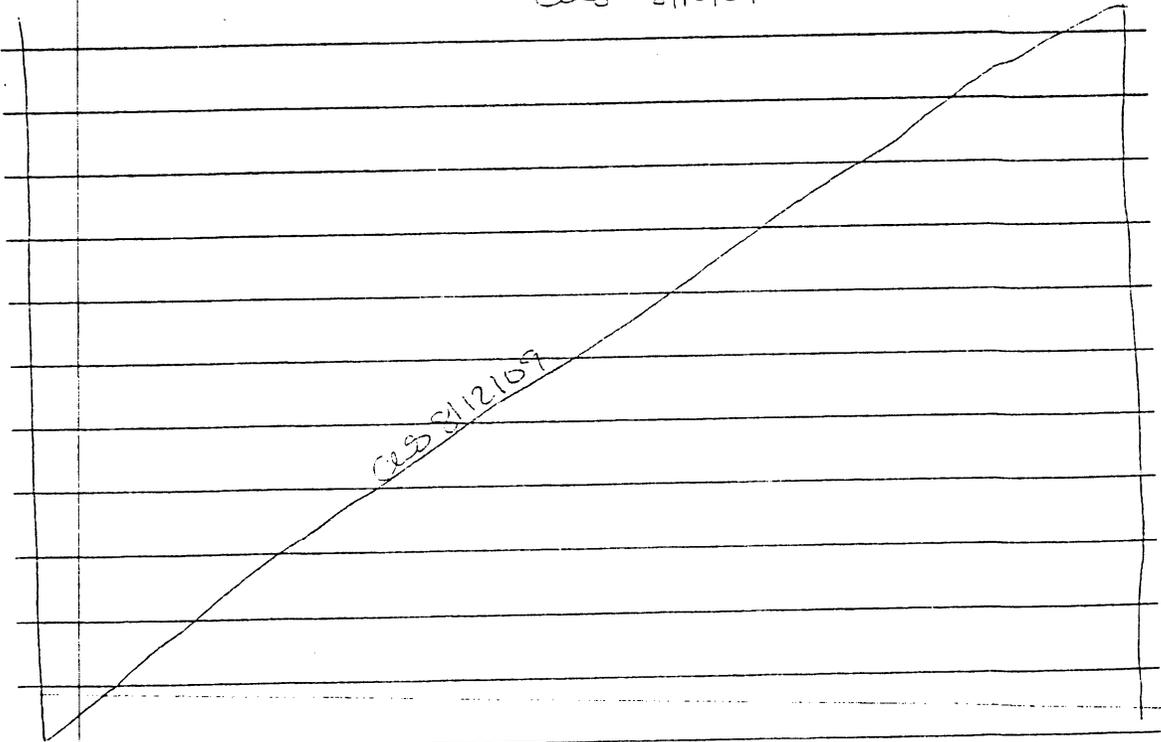
cus 8/12/09

cus 8/12/09

Due to possible matrix interference, a ferric hydroxide precipitation was performed on all samples per SOP 755, section 8.2.10

cus 8/12/09

cus 8/12/09



cus 8/12/09

TECHNICIAN/ANALYST Crystal Sheaffer

DATE 8/12/09

DEPARTMENT MANAGER [Signature]

DATE 8/12/09

378635

FORM 302r6.doc (4/22/04)