



Friday, August 10, 2018

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

Re: ALS Workorder: 1807239
Project Name: PERFORMANCE ASSESSMENT, JULY 2
Project Number: A18-007

Dear Ms. Waters-Husted:

Two water samples were received from CH2M HILL Plateau Remediation Company, on 7/13/2018. The samples were scheduled for the following analyses:

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: 1807239

Client Name: CH2M HILL Plateau Remediation Company

Client Project Name: PERFORMANCE ASSESSMENT, JULY 2

Client Project Number: A18-007

Client PO Number: BOA 54854

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
B3JV05	1807239-1		WATER	11-Jul-18	13:05
B3JM97	1807239-2		WATER	11-Jul-18	10:42

CH2M Hill Plateau Remediation Company		1807239		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C.# A18-007-068		
Collector: WILLIAM COLLINS CHPRC		Contact/Requester: Karen Waters-Husted		Telephone No.: 509-376-4650		Page 1 of 1		
SAF No.: A18-007		Sampling Origin: Hanford Site		Purchase Order/Charge Code: 300071				
Project Title: PERFORMANCE ASSESSMENT, JULY 2		Logbook No.: HNF-N-506 - 10/64		Ice Chest No.: GWS-001				
Shipped To (Lab): ALS Environmental Ft. Collins		Method of Shipment: Commercial Carrier		Bill of Lading/Air Bill No.: 77269112 0346				
Protocol: Monitoring		Priority: 30 Days		Offsite Property No.: 9682				
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	*	Time	Date	No/Type Container	Sample Analysis	Holding Time	Preservative
B3JV05	N	W	1305	7-11-18	1x500-mL G/P	TC99_SEP_LSC: COMMON	6 Months	HCl to pH <2

Relinquished By: WILLIAM COLLINS CHPRC	Signature	JUL 11 2018	Date/Time	Received By: SSU-1	Signature	JUL 11 2018	Date/Time	Matrix * S = Soil SE = Sediment SO = Solid SL = Sludge W = Water O = Oil A = Air DS = Drum Solids DL = Drum Liquids T = Tissue WI = Wipe L = Liquid V = Vegetation X = Other
Relinquished By: SSU-1	Signature	JUL 12 2018	Date/Time	Received By: Christina Aguilar CHPRC	Signature	JUL 12 2018	Date/Time	
Relinquished By: Christina Aguilar CHPRC	Signature	JUL 12 2018	Date/Time	Received By: FEDEX	Signature	JUL 12 2018	Date/Time	
Relinquished By: Fedex	Signature	JUL 12 2018	Date/Time	Received By: Cainey Lloyd	Signature	7-13-18	Date/Time	
FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process):			Disposed By:		Date/Time:		

1807239

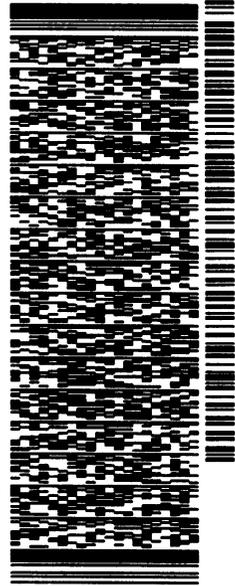
AMB

ORIGIN:DPSCA (509) 528-9426
LESLY WALL
CH2M
6267 LATAH ST.
6269 LATAH ST.
RICHLAND WA 99354
UNITED STATES US

SHIP DATE: 12 JUL 18
ACTWGT: 13.00 LB
CAD: 107066051/MNET3980
BILL THIRD PARTY

TO JULIE ELLINGSON
ALS GLOBAL
225 COMMERCE DRIVE

FORT COLLINS CO 80524
(970) 480-1511
NAV
REF: PTR9382/COOLER/RWS-001
DEPT

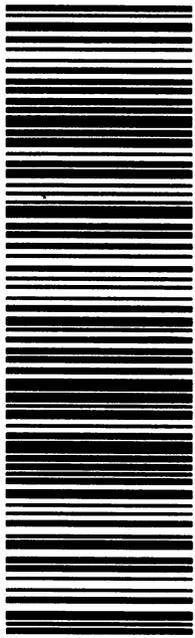


TRK# 7726 9112 0346
0201

FRI - 13 JUL 10:30A
PRIORITY OVERNIGHT
DSR

XH FTCA

CO-US DEN
80524



552.026532/DCA5

Handwritten signature/initials

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Metals

Case Narrative

CH2M HILL Plateau Remediation Company

PERFORMANCE ASSESSMENT, JULY 2 – A18-007

Work Order Number: 1807239

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

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

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

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

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



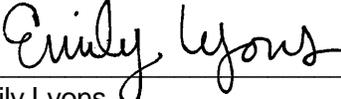
- The interference check samples associated with Method 6020A were analyzed.
6. Matrix specific quality control procedures.

Sample 1807318-1 was designated as the quality control sample for this analysis. Results for the shared quality control samples are included at the client's request.

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

- A matrix spike and matrix spike duplicate were digested and analyzed with this batch. All acceptance criteria for accuracy were met.
 - A serial dilution was analyzed with this ICP batch. All acceptance criteria were met.
7. It is a standard practice that samples for ICP-MS are analyzed at a dilution. The 10X factor can be considered an artifact of the prep and does not indicate a secondary dilution and is therefore not flagged as a dilution.

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



Emily Lyons
Inorganics Primary Data Reviewer

8/10/18
Date



Inorganics Final Data Reviewer

8/10/18
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.

Total Recoverable URANIUM**Method SW6020A****Sample Results****Lab Name:** ALS -- Fort Collins**Client Name:** CH2M HILL Plateau Remediation Company**Client Project ID:** PERFORMANCE ASSESSMENT, JULY 2 A18-007**Work Order Number:** 1807239**Final Volume:** 50 ml**Reporting Basis:** As Received**Matrix:** WATER**Analyst:** Brent A. Stanfield**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
B3JM97	1807239-2	7/11/2018	7/26/2018	08/01/2018	N/A	10	3	0.1	0.0049		50 ml

Comments:

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

Data Package ID: *IM1807239-1***Date Printed:** Friday, August 10, 2018**ALS -- Fort Collins**

Page 1 of 1

LIMS Version: 6.868

ICPMS Metals

Method SW6020A

Method Blank

Lab Name: ALS -- Fort Collins

Work Order Number: 1807239

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: PERFORMANCE ASSESSMENT, JULY 2 A18-007

Lab ID: IP180726-10MB

Sample Matrix: WATER

% Moisture: N/A

Date Collected: N/A

Date Extracted: 26-Jul-18

Date Analyzed: 01-Aug-18

Prep Batch: IP180726-10

QCBatchID: IP180726-10-5

Run ID: IM180801-10A2

Cleanup: NONE

Basis: N/A

File Name: 076SMPL_

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
7440-61-1	URANIUM	10	0.03	B	0.1	0.0049

Data Package ID: IM1807239-1

ICPMS Metals

Method SW6020A

Laboratory Control Sample

Lab Name: ALS -- Fort Collins

Work Order Number: 1807239

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: PERFORMANCE ASSESSMENT, JULY 2 A18-007

Lab ID: IM180726-10LCS

Sample Matrix: WATER

Prep Batch: IP180726-10

Sample Aliquot: 50 ml

% Moisture: N/A

QCBatchID: IP180726-10-5

Final Volume: 50 ml

Date Collected: N/A

Run ID: IM180801-10A2

Result Units: UG/L

Date Extracted: 07/26/2018

Cleanup: NONE

Clean DF: 1

Date Analyzed: 08/01/2018

Basis: N/A

Prep Method: SW3005A

File Name: 077SMPL_

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
7440-61-1	URANIUM	10	9.34	0.1		93	80 - 120%

Data Package ID: *IM1807239-1*

ICPMS Metals**Method SW6020A****Matrix Spike And Matrix Spike Duplicate****Lab Name:** ALS -- Fort Collins**Work Order Number:** 1807239**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** PERFORMANCE ASSESSMENT, JULY 2 A18-007**Field ID:** SHARED QC**LabID:** 1807318-1MS**Sample Matrix:** WATER**% Moisture:** N/A**Date Collected:** 16-Jul-18**Date Extracted:** 26-Jul-18**Date Analyzed:** 01-Aug-18**Prep Method:** SW3005 Rev A**Prep Batch:** IP180726-10**QCBatchID:** IP180726-10-5**Run ID:** IM180801-10A2**Cleanup:** NONE**Basis:** As Received**Sample Aliquot:** 50 ml**Final Volume:** 50 ml**Result Units:** UG/L**File Name:** 081SMPL_

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
7440-61-1	URANIUM	2.9		12.5		0.1	10	96	75 - 125%

Field ID: SHARED QC**LabID:** 1807318-1MSD**Sample Matrix:** WATER**% Moisture:** N/A**Date Collected:** 16-Jul-18**Date Extracted:** 26-Jul-18**Date Analyzed:** 01-Aug-18**Prep Method:** SW3005 Rev A**Prep Batch:** IP180726-10**QCBatchID:** IP180726-10-5**Run ID:** IM180801-10A2**Cleanup:** NONE**Basis:** As Received**Sample Aliquot:** 50 ml**Final Volume:** 50 ml**Result Units:** UG/L**File Name:** 082SMPL_

CASNO	Target Analyte	MSD Result	MSD Qual	Spike Added	MSD % Rec.	Reporting Limit	RPD Limit	RPD
7440-61-1	URANIUM	12.3		10	94	0.1	20	2

Data Package ID: IM1807239-1

Prep Batch ID: IP180726-10

Start Date: 07/26/18	End Date: 07/26/18	Concentration Method: NONE	Batch Created By: ajl2
Start Time: 10:31	End Time: 18:00	Extract Method: SW3005A	Date Created: 07/26/18
Prep Analyst: Amanda J. Lynn		Initial Volume Units: ml	Time Created: 10:31
Comments:		Final Volume Units: ml	Validated By: ajl2
<div style="border: 1px solid black; height: 30px; width: 100%;"></div>			Date Validated: 07/26/18
			Time Validated: 11:12

QC Batch ID: IP180726-10-5

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
IP180726-10	MB	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1807318
IM180726-10	LCS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1807318
1807318-1	MS	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1807318
1807318-1	MSD	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1807318
1807239-2	SMP	B3JM97	WATER	7/11/2018	50	50	NONE	1	1807239
1807318-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1807318
1807467-1	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1807467
1807467-2	SMP	XXXXXX	WATER	XXXXXX	50	50	NONE	1	1807467

QC Types

CAR	Carrier reference sample	DUP	Laboratory Duplicate
LCS	Laboratory Control Sample	LCSD	Laboratory Control Sample Duplicat
MB	Method Blank	MS	Laboratory Matrix Spike
MSD	Laboratory Matrix Spike Duplicate	REP	Sample replicate
RVS	Reporting Level Verification Standar	SMP	Field Sample
SYS	Sample Yield Spike		



Technetium-99

Case Narrative

CH2M HILL Plateau Remediation Company

PERFORMANCE ASSESSMENT, JULY 2 – A18-007

Work Order Number: 1807239

1. The sample was prepared according to the current revision of SOP 755, with procedure modifications outlined in QASS #378635 and #378636.
2. This sample was analyzed for the presence of ⁹⁹Tc according to the current revision of SOP 704. The analysis was completed on 08/02/2018.
3. The analysis results for this sample are reported in units of pCi/L. The sample was not filtered prior to analysis.
4. The duplicate of sample 1807157-3 is shared for this work order. The duplicate was performed on a CH2M HILL Plateau Remediation Company sample. The results can be found in the following report.
5. In accordance with project specific instructions, the evaluation threshold for Relative Percent Difference (RPD) has been set at 20%. RPD is defined as:

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

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

6. No anomalous situations were encountered during the preparation or analysis of 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.

Jean Anderson
Jean Anderson
Radiochemistry Primary Data Reviewer

8/9/18
Date

Kath M. O.
Radiochemistry Final Data Reviewer

8/10/18
Date

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 11

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1807239

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: PERFORMANCE ASSESSMENT, JULY 2 A18-007

Lab ID: TC180717-2MB	Sample Matrix: WATER	Prep Batch: TC180717-2	Final Aliquot: 250 ml
	Prep SOP: PAI 755 Rev 12	QCBatchID: TC180717-2-3	Result Units: pCi/l
	Date Collected: 18-Jul-18	Run ID: TC180717-2A	File Name: Q024201N.001
	Date Prepared: 18-Jul-18	Count Time: 117.964 minutes	
	Date Analyzed: 02-Aug-18		

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
14133-76-7	Tc-99	3.12E+00 +/- 2.09E+00	3.29E+00	2.00E+01	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Tc-99m	9.290E+03	8.80E+03	Pci	94.7	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.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

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

DL - Decision Level

Data Package ID: TC1807239-1

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 11

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1807239

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: PERFORMANCE ASSESSMENT, JULY 2 A18-007

Lab ID: TC180717-2LCS	Sample Matrix: WATER	Prep Batch: TC180717-2	Final Aliquot: 250 ml
	Prep SOP: PAI 755 Rev 12	QCBatchID: TC180717-2-3	Result Units: pCi/l
	Date Collected: 18-Jul-18	Run ID: TC180717-2A	File Name: Q161601N.001
	Date Prepared: 18-Jul-18	Count Time: 29.1274 minutes	
	Date Analyzed: 02-Aug-18		

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14133-76-7	Tc-99	9.54E+02 +/- 1.53E+02	6.77E+00	9.110E+02	105	75 - 125	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Tc-99m	9.290E+03	8.74E+03	Pci	94.1	40 - 110 %	

Comments:

Qualifiers/Flags:

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

Abbreviations:

TPU - Total Propagated Uncertainty
 MDC - Minimum Detectable Concentration

Data Package ID: TC1807239-1

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 11

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 1807239

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: PERFORMANCE ASSESSMENT, JULY 2 A18-007

Lab ID: TC180717-2LCSD

Sample Matrix: WATER

Prep Batch: TC180717-2

Final Aliquot: 250 ml

Prep SOP: PAI 755 Rev 12

QCBatchID: TC180717-2-3

Result Units: pCi/l

Date Collected: 18-Jul-18

Run ID: TC180717-2A

File Name: Q171701N.001

Date Prepared: 18-Jul-18

Count Time: 29.1106 minutes

Date Analyzed: 02-Aug-18

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14133-76-7	Tc-99	1.03E+03 +/- 1.65E+02	7.56E+00	9.110E+02	113	75 - 125	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Tc-99m	9.290E+03	7.82E+03	Pci	84.2	40 - 110 %	

Comments:

Qualifiers/Flags:

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

Abbreviations:

TPU - Total Propagated Uncertainty
 MDC - Minimum Detectable Concentration

Data Package ID: TC1807239-1

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 11

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 1807239

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: PERFORMANCE ASSESSMENT, JULY 2 A18-007

Field ID:	Shared QC
Lab ID:	1807157-3DUP

Sample Matrix: WATER

Prep SOP: PAI 755 Rev 12

Date Collected: 10-Jul-18

Date Prepared: 18-Jul-18

Date Analyzed: 01-Aug-18

Prep Batch: TC180717-2

QCBatchID: TC180717-2-3

Run ID: TC180717-2A

Count Time: 58.7298 minutes

Final Aliquot: 250 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Q030301N.001

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
14133-76-7	Tc-99	1.05E+00 +/-	2.69E+00	4.47E+00	U	1.23E+00 +/-	2.96E+00	4.91E+00	U	0.0941	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: TC1807239-1

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 11

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1807239

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: PERFORMANCE ASSESSMENT, JULY 2 A18-007

Field ID:	Shared QC
Lab ID:	1807157-3

Sample Matrix: WATER

Prep SOP: PAI 755 Rev 12

Date Collected: 10-Jul-18

Date Prepared: 18-Jul-18

Date Analyzed: 01-Aug-18

Prep Batch: TC180717-2

QCBatchID: TC180717-2-3

Run ID: TC180717-2A

Count Time: 58.7298 minutes

Report Basis: Unfiltered

Final Aliquot: 250 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Q020201N.001

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
14133-76-7	Tc-99	1.05E+00 +/- 2.69E+00	4.47E+00	2E+01	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Tc-99m	9.290E+03	9.05E+03	Pci	97.4	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.

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

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: TC1807239-1

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 11

Sample Duplicate Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1807239

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: PERFORMANCE ASSESSMENT, JULY 2 A18-007

Field ID:	Shared QC
Lab ID:	1807157-3DUP

Sample Matrix: WATER

Prep SOP: PAI 755 Rev 12

Date Collected: 10-Jul-18

Date Prepared: 18-Jul-18

Date Analyzed: 01-Aug-18

Prep Batch: TC180717-2

QCBatchID: TC180717-2-3

Run ID: TC180717-2A

Count Time: 58.7298 minutes

Report Basis: Unfiltered

Final Aliquot: 250 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Q030301N.001

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
14133-76-7	Tc-99	1.23E+00 +/- 2.96E+00	4.91E+00	2E+01	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Tc-99m	9.290E+03	8.61E+03	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.

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

M - The requested MDC was not met.

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

D - DER is greater than Control Limit of 3

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: TC1807239-1

Date Printed:

Wednesday, August 08, 2018

ALS -- Fort Collins

LIMS Version: 6.870

Page 1 of 1

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 11

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins

Work Order Number: 1807239

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: PERFORMANCE ASSESSMENT, JULY 2 A18-007

Field ID:	Shared QC
Lab ID:	1807157-3DUP

Sample Matrix: WATER

Prep SOP: PAI 755 Rev 12

Date Collected: 10-Jul-18

Date Prepared: 18-Jul-18

Date Analyzed: 01-Aug-18

Prep Batch: TC180717-2

QCBatchID: TC180717-2-3

Run ID: TC180717-2A

Count Time: 58.7298 minutes

Final Aliquot: 250 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Q030301N.001

CASNO	Analyte	Sample				Duplicate				RPD	RPD Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
14133-76-7	Tc-99	1.05E+00 +/-	2.69E+00	4.47E+00	U	1.23E+00 +/-	2.96E+00	4.91E+00	U	NC	20

Comments:

Qualifiers/Flags:

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

Abbreviations:

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

Data Package ID: TC1807239-1

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 11

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 1807239
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: PERFORMANCE ASSESSMENT, JULY 2 A18-007

Field ID:	
Lab ID:	TC180717-2LCSD

Sample Matrix: WATER
Prep SOP: PAI 755 Rev 12
Date Collected: 18-Jul-18
Date Prepared: 18-Jul-18
Date Analyzed: 02-Aug-18
Prep Batch: TC180717-2
QCBatchID: TC180717-2-3
Run ID: TC180717-2A
Count Time: 29.1106 minutes
Final Aliquot: 250 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: Q171701N.001

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
14133-76-7	Tc-99	9.54E+02 +/-	1.53E+02	6.77E+00		1.03E+03 +/-	1.65E+02	7.56E+00		0.651	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: TC1807239-1

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 11

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins

Work Order Number: 1807239

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: PERFORMANCE ASSESSMENT, JULY 2 A18-007

Field ID:	
Lab ID:	TC180717-2LCSD

Sample Matrix: WATER
 Prep SOP: PAI 755 Rev 12
 Date Collected: 18-Jul-18
 Date Prepared: 18-Jul-18
 Date Analyzed: 02-Aug-18

Prep Batch: TC180717-2
 QCBatchID: TC180717-2-3
 Run ID: TC180717-2A
 Count Time: 29.1106 minutes

Final Aliquot: 250 ml
 Prep Basis: Unfiltered
 Moisture(%): NA
 Result Units: pCi/l
 File Name: Q171701N.001

CASNO	Analyte	Sample				Duplicate				RPD	RPD Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
14133-76-7	Tc-99	9.54E+02 +/-	1.53E+02	6.77E+00		1.03E+03 +/-	1.65E+02	7.56E+00		7.00	20

Comments:

Qualifiers/Flags:

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

Abbreviations:

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

Data Package ID: TC1807239-1

Technetium-99 by Liquid Scintillation

PAI 704_Tc99 Rev 11

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 1807239

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: PERFORMANCE ASSESSMENT, JULY 2 A18-007

Field ID:	B3JV05
Lab ID:	1807239-1

Sample Matrix: WATER

Prep SOP: PAI 755 Rev 12

Date Collected: 11-Jul-18

Date Prepared: 18-Jul-18

Date Analyzed: 02-Aug-18

Prep Batch: TC180717-2

QCBatchID: TC180717-2-3

Run ID: TC180717-2A

Count Time: 58.7298 minutes

Report Basis: Unfiltered

Final Aliquot: 250 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Q141401N.001

Analysis ReqCode: TC99_SEP_LSC

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
14133-76-7	Tc-99	9.63E+00 +/- 3.36E+00	4.56E+00	2E+01	NA	LT

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Tc-99m	9.290E+03	8.99E+03	Pci	96.8	40 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: TC1807239-1

Prep Batch ID: TC180717-2

Start Date: 07/18/18

End Date: 07/18/18

Concentration Method: NONE

Batch Created By: nrb

Start Time: 10:29

End Time: 10:29

Extract Method: PAI 75512

Date Created: 07/17/18

Prep Analyst: Nikki R. Brooks

Initial Volume Units: ml

Time Created: 10:29

Comments:

Final Volume Units: ml

Validated By: nrb

Quantulus batch. LCSD prepped per client protocol.

Date Validated: 07/19/18

Time Validated: 9:40

QC Batch ID: TC180717-2-3

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
TC180717-2	MB	XXXXXX	WATER	XXXXXX	250	250	NONE	1	1807157
TC180717-2CB1	MB	XXXXXX	WATER	XXXXXX	250	250	NONE	1	1807157
TC180717-2CB2	MB	XXXXXX	WATER	XXXXXX	250	250	NONE	1	1807157
TC180717-2CB3	MB	XXXXXX	WATER	XXXXXX	250	250	NONE	1	1807157
TC180717-2	LCS	XXXXXX	WATER	XXXXXX	250	250	NONE	1	1807157
TC180717-2	LCSD	XXXXXX	WATER	XXXXXX	250	250	NONE	1	1807157
1807157-3	DUP	XXXXXX	WATER	XXXXXX	250	250	NONE	1	1807157
1807157-3	SMP	XXXXXX	WATER	XXXXXX	250	250	NONE	1	1807157
1807239-1	SMP	B3JV05	WATER	7/11/2018	250	250	NONE	1	1807239

QC Types

CAR	Carrier reference sample	DUP	Laboratory Duplicate
LCS	Laboratory Control Sample	LCSD	Laboratory Control Sample Duplicat
MB	Method Blank	MS	Laboratory Matrix Spike
MSD	Laboratory Matrix Spike Duplicate	REP	Sample replicate
RVS	Reporting Level Verification Standar	SMP	Field Sample
SYS	Sample Yield Spike		

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.

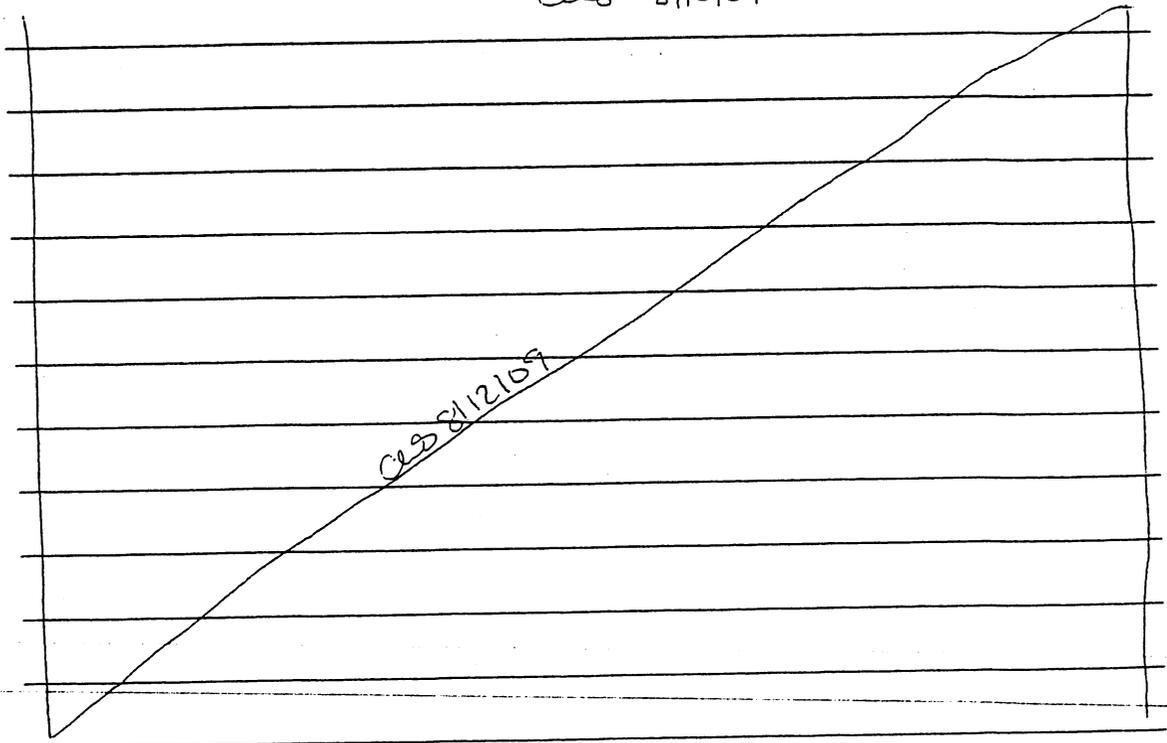
cls 8/12/09

6/21/09

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

cls 8/12/09

cls 8/12/09



TECHNICIAN/ANALYST Crystal Shearer

DATE 8/12/09

DEPARTMENT MANAGER [Signature]

DATE 8/12/09

378635

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

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.

028812109

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 Tc99m 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.

028812109

028812109

Attach vendor label on the right side of page -

028812109

Rx# 632326
 Date Ordered: 18Jul2018
 Date/Time Prepared: 19Jul2018 01:43 MT
ALS LABORATORY GROUP
 225 COMMERCE DR
 FORT COLLINS CO 80524-2762
 1 0359 Fort Collins



CAUTION
RADIOACTIVE MATERIALS

Patient : Source
Product : Tc - 99m Sodium Pertechnetate Unit Dose mCi (AI)
Disp Amt : 0.50 mCi
Calibration: 19Jul2018 10:00 MT

Not for Human Use For Calibration Use Only
 Indication **Calibration**
 Dispense Date: 19Jul2018 Lot#: E18200-0033 Price(eat): N/A
 Use By: 20Jul2018 01:43 MT Physician: Charles Orchard, RSO NPT:
 Notes NDC: RPh: B.Young

Ordered Amount: 0.50 mCi
 Volume: 10.00 mL
 Conc: 0.05 mCi/mL

Caution: Federal law prohibits dispensing without a prescription - Rx only. At Tc-99m drugs are below 3.15 uCi of Mo-99 mCi of Tc-99m at 90d.

TECHNICIAN/ANALYST Crystal Sheffer

DATE 8/12/09

DEPARTMENT MANAGER Jiffy Z

DATE 8/12/09

378636