Monday, June 25, 2018

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

Re: ALS Workorder: 1805616
Project Name: SURV, May 2018
Project Number: S18-005

Dear Ms. Waters-Husted:

One water sample was received from CH2M HILL Plateau Remediation Company, on 5/30/2018. The sample was scheduled for the following analysis:

Strontium-90

The results for these analyses are contained in the enclosed reports.

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

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

We certify that theis data package is in compliance with the SOW, both technically and for completeness, including a full description of, explanation of, and corrective actions for, an 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: 1805616
Client Name: CH2M HILL Plateau Remediation Company
Client Project Name: SURV, May 2018
Client Project Number: S18-005
Client PO Number: BOA 54854

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
B3J5F6	1805616-1		WATER	29-May-18	9:50

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. # S18-005-698
		Page 1 of 1

Collector:	Malcom Chunn CHPRC	**Contact/Requester:**	Karen Waters-Husted	**Telephone No.:**	509-376-4650 1805610
SAF No.:	S18-005	**Sampling Origin:**	Hanford Site	**Purchase Order/Charge Code:**	300071
Project Title:	SURV, May 2018	**Logbook No.:**	HNF-N-506 -100132	**Ice Chest No.:**	GWS-1653
Shipped To (Lab):	ALS Environmental Ft. Collins	**Method of Shipment**	Commercial Carrier	**Bill of Lading/Air Bill No.:**	7723 4385 9713
Protocol	SURV	**Priority:**	30 Days	**Offsite Property No.:**	9492

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
B3J5F6	N	W	5-29-18	0950	2x1-L G/P	SRISO_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2

06/25/2018

Relinquished By: Malcom Chunn CHPRC — Print First and Last Name	Signature: MRC	MAY 29 2018 1000 — Date/Time	Received By: Christina Aguilar /CHPRC — Print First and Last Name; Signature: Cm G; MAY 29 2018 1010 — Date/Time
Relinquished By: Christina Aguilar /CHPRC — Print First and Last Name	Signature: Cm G	MAY 29 2018 1035 — Date/Time	Received By: Janelle Zunker CHPRC — Print First and Last Name; Signature: JZ; MAY 29 2018 1035 — Date/Time
Relinquished By: Janelle Zunker CHPRC — Print First and Last Name	Signature: JZ	MAY 29 2018 1400 — Date/Time	Received By: FEDEX — Print First and Last Name; Signature; Date/Time
Relinquished By: FEDEX — Print First and Last Name	Signature	Date/Time	Received By: KELI-JEAN SMITH — Print First and Last Name; Signature; 5-30-18 1015 — Date/Time

Matrix *

S = Soil	DS = Drum Solids
SE = Sediment	DL = Drum Liquid
SO = Solid	T = Tissue
SL = Sludge	WI = Wipe
W = Water	L = Liquid
O = Oil	V = Vegetation
A = Air	X = Other

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

REV.0

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: CHPRC Workorder No: 1805616

Project Manager: KMO Initials: KD Date: 5.30.18

1. Does this project require any special handling in addition to standard ALS procedures?			YES	NO
2. Are custody seals on shipping containers intact?	NONE		YES	NO
3. Are Custody seals on sample containers intact?	NONE		YES	NO
4. Is there a COC (Chain-of-Custody) present or other representative documents?			YES	NO
5. Are the COC and bottle labels complete and legible?			YES	NO
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)			YES	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF		YES	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A		YES	NO
9. Are all aqueous non-preserved samples pH 4-9?	N/A		YES	NO
10. Is there sufficient sample for the requested analyses?			YES	NO
11. Were all samples placed in the proper containers for the requested analyses?			YES	NO
12. Are all samples within holding times for the requested analyses?			YES	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)			YES	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ____ < green pea ____ > green pea	N/A		YES	NO
15. Do any water samples contain sediment? Amount of sediment: ____ dusting ____ moderate ____ heavy	N/A	Amount	YES	NO
16. Were the samples shipped on ice?			YES	NO
17. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY		YES	NO

Cooler #:	1							
Temperature (°C):	5.2							
No. of custody seals on cooler:	2							
DOT Survey/ Acceptance Information — External µR/hr reading:	10							
Background µR/hr reading:	12							

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

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

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

Project Manager Signature / Date: [signature] 5/31/18

Form 201r25.xls
(02/12/2018)

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

1805416

ORIGIN ID:PSCA (509) 373-3580
JANELLE ZUNKER
CH2M
6269 LATAH ST.
RICHLAND, WA 99354
UNITED STATES US

SHIP DATE: 29MAY18
ACTWGT: 17.00 LB
CAD: 107066051/INET3980

BILL THIRD PARTY

TO JULIE ELLINGSON
ALS GLOBAL
225 COMMERCE DRIVE
FORT COLLINS CO 80524
(970) 490-1511
REF: 9492
INV:
PO:
DEPT:

552J2/782B/DCA5

FedEx Express

J1811180126flu

WED - 30 MAY 10:30A
PRIORITY OVERNIGHT
DSR
80524
DEN
CO-US

TRK# 0201 7723 4385 9713

XH FTCA

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

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Strontium-90

Case Narrative

CH2M HILL Plateau Remediation Company

SURV, May 2018 – S18-005

Work Order Number: 1805616

1. This sample was prepared according to the current revision of SOP 707.

2. This sample was analyzed for the presence of ^{90}Sr according to the current revision of SOP 724. The analysis was completed on 06/13/2018.

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

4. The analysis results for this sample are reported in units of pCi/L. The sample was not filtered prior to analysis.

5. Sample volume was insufficient to allow preparation of a duplicate. A laboratory control sample duplicate (LCSD) was prepared in lieu of a client sample duplicate.

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

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

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

7. No anomalous situations were encountered during the preparation and analysis of 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 — 6/15/18

Jean Anderson
Radiochemistry Primary Data Reviewer

Date

6/25/18

Radiochemistry Final Data Reviewer

Date

Strontium-90 by GFPC

PAI 724 Rev 12

Method Blank Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1805616
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, May 2018 S18-005

Lab ID: SR180608-1MB

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 14
Date Collected: 08-Jun-18
Date Prepared: 08-Jun-18
Date Analyzed: 13-Jun-18

Prep Batch: SR180608-1
QCBatchID: SR180608-1-2
Run ID: SR180608-1A
Count Time: 120 minutes

Final Aliquot: 995 ml
Result Units: pCi/l
File Name: SRC0613B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10098-97-2	Sr-90	2.03E-01 +/- 2.42E-01	5.13E-01	1.00E+00	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.060E+03	1.02E+03	ug	96.2	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: *SR1805616-1*

Strontium-90 by GFPC

PAI 724 Rev 12

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins
Work Order Number: 1805616
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, May 2018 S18-005

Lab ID: SR180608-1LCS

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 14
Date Collected: 08-Jun-18
Date Prepared: 08-Jun-18
Date Analyzed: 13-Jun-18

Prep Batch: SR180608-1
QCBatchID: SR180608-1-2
Run ID: SR180608-1A
Count Time: 100 minutes

Final Aliquot: 995 ml
Result Units: pCi/l
File Name: SRC0613A

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
10098-97-2	Sr-90	1.10E+01 +/- 2.68E+00	6.31E-01	1.070E+01	103	75 - 125	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.090E+03	9.92E+02	ug	91.3	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: *SR1805616-1*

Strontium-90 by GFPC

PAI 724 Rev 12

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins
Work Order Number: 1805616
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, May 2018 S18-005

Lab ID: SR180608-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 14
Date Collected: 08-Jun-18
Date Prepared: 08-Jun-18
Date Analyzed: 13-Jun-18

Prep Batch: SR180608-1
QCBatchID: SR180608-1-2
Run ID: SR180608-1A
Count Time: 100 minutes

Final Aliquot: 995 ml
Result Units: pCi/l
File Name: SRC0613A

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
10098-97-2	Sr-90	1.03E+01 +/- 2.50E+00	5.66E-01	1.070E+01	96.0	75 - 125	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.060E+03	1.00E+03	ug	94.5	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: *SR1805616-1*

Strontium-90 by GFPC

PAI 724 Rev 12

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 1805616
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, May 2018 S18-005

Field ID:
Lab ID: SR180608-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 14
Date Collected: 08-Jun-18
Date Prepared: 08-Jun-18
Date Analyzed: 13-Jun-18

Prep Batch: SR180608-1
QCBatchID: SR180608-1-2
Run ID: SR180608-1A
Count Time: 100 minutes

Final Aliquot: 995 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC0613A

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/- 2 s TPU		MDC	Flags	Result +/- 2 s TPU		MDC	Flags		
10098-97-2	Sr-90	1.10E+01	+/- 2.68E+00	6.31E-01		1.03E+01	+/- 2.50E+00	5.66E-01		0.396	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: *SR1805616-1*

Strontium-90 by GFPC

PAI 724 Rev 12

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins
Work Order Number: 1805616
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, May 2018 S18-005

Field ID:
Lab ID: SR180608-1LCSD

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 14
Date Collected: 08-Jun-18
Date Prepared: 08-Jun-18
Date Analyzed: 13-Jun-18

Prep Batch: SR180608-1
QCBatchID: SR180608-1-2
Run ID: SR180608-1A
Count Time: 100 minutes

Final Aliquot: 995 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC0613A

CASNO	Analyte	Sample				Duplicate				RPD	RPD Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
10098-97-2	Sr-90	1.10E+01	+/- 2.68E+00	6.31E-01		1.03E+01	+/- 2.50E+00	5.66E-01		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: *SR1805616-1*

Strontium-90 by GFPC

PAI 724 Rev 12

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1805616
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, May 2018 S18-005

Field ID: B3J5F6
Lab ID: 1805616-1

Analysis ReqCode: SRISO_SEP_PR

Sample Matrix: WATER
Prep SOP: PAI 707 Rev 14
Date Collected: 29-May-18
Date Prepared: 08-Jun-18
Date Analyzed: 13-Jun-18

Prep Batch: SR180608-1
QCBatchID: SR180608-1-2
Run ID: SR180608-1A
Count Time: 100 minutes
Report Basis: Unfiltered

Final Aliquot: 995 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: SRC0613

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
10098-97-2	Sr-90	9.19E-01 +/- 3.69E-01	5.52E-01	1E+00	NA	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
STRONTIUM	1.270E+03	1.26E+03	ug	99.1	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.

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: *SR1805616-1*

Prep Batch ID: SR180608-1

Start Date: 06/08/18
Start Time: 10:42
Prep Analyst: Reilly G. Stockton

End Date: 06/08/18
End Time: 10:42

Concentration Method: NONE
Extract Method: PAI 70714
Initial Volume Units: ml
Final Volume Units: ml

Batch Created By: rgs
Date Created: 06/08/18
Time Created: 10:42
Validated By: rgs
Date Validated: 06/13/18
Time Validated: 8:35

Comments:

QC Batch ID: SR180608-1-2

Lab ID	QC Type	Field ID	Matrix	Date Collected	Initial Wt/Vol	Final Wt/Vol	Cleanup Method	Cleanup DF	Order Number
SR180608-1	CAR	XXXXXX	WATER	XXXXXX	1000	1000	NONE	1	1805616
SR180608-1	MB	XXXXXX	WATER	XXXXXX	1000	994.50	NONE	1	1805616
SR180608-1	LCS	XXXXXX	WATER	XXXXXX	1000	994.50	NONE	1	1805616
SR180608-1	LCSD	XXXXXX	WATER	XXXXXX	1000	994.50	NONE	1	1805616
1805616-1	SMP	B3J5F6	WATER	5/29/2018	1000	994.50	NONE	1	1805616
1805654-1	SMP	XXXXXX	WATER	XXXXXX	1000	994.50	NONE	1	1805654
1805654-2	SMP	XXXXXX	WATER	XXXXXX	1000	994.50	NONE	1	1805654
1806061-1	SMP	XXXXXX	WATER	XXXXXX	1000	994.50	NONE	1	1806061

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		