



Thursday, December 10, 2020

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

Re: ALS Workorder: 2011173
Project Name: SURV, November 2020
Project Number: S21-011

Dear Ms. Waters-Husted:

Three water samples were received from CH2M HILL Plateau Remediation Company, on 11/10/2020. The samples were scheduled for the following analyses:

- Gamma Spectroscopy
- Gross Beta
- Isotopic Uranium
- Tritium

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

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

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.

SAMPLE ISSUE RESOLUTION (SIR) REPORT

SIR Number: SIR21-0110
Rev. Number: 0
Date Initiated: 12/09/2020

SAMPLE EVENT INFORMATION

SAF NUM(S): S21-011
LABORATORY: ALS

SAMPLING INFORMATION

NUMBER OF SAMPLES: 1
SAMPLE NUMBERS: B3Y4Y9
SAMPLE MATRIX: WATER
SDG NUM(S): ALS2011173

ISSUE BACKGROUND

CLASS: Laboratory Issue
TYPE: LIMS Issue Encountered
DESCRIPTION: A Duplicate was prepared using one of CHPRC's samples for Gross Beta analysis; however, due to a LIMS reporting issue this information is not populating on the report.

RESOLUTION

PROPOSED RESOLUTION: ALS proposes that we report the data and narrate the duplicate results.

FINAL RESOLUTION: Proposed Resolution accepted.

SUBMITTED BY:

O'BRIEN, KATIE

12/09/2020

ACCEPTED BY:

HEY, BE

12/09/2020

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 2011173

Client Name: CH2M HILL Plateau Remediation Company

Client Project Name: SURV, November 2020

Client Project Number: S21-011

Client PO Number: BOA 74395

| Client Sample Number | Lab Sample Number | COC Number | Matrix | Date Collected | Time Collected |
|----------------------|-------------------|------------|--------|----------------|----------------|
| B3Y4P7 | 2011173-1 | | WATER | 09-Nov-20 | 8:03 |
| B3Y4R0 | 2011173-2 | | WATER | 09-Nov-20 | 8:03 |
| B3Y4Y9 | 2011173-3 | | WATER | 09-Nov-20 | 10:54 |

CH2M Hill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST
2011173

C.O.C.#
S21-011-511
Page 1 of 1

Collector: Jim Lochridge
SAF No.: S21-011
Project Title: SURV, November 2020
Shipped To (Lab): ALS Environmental Ft. Collins
Protocol: SURV
Contact/Requester: Karen Waters-Husted
Sampling Origin: Hanford Site
Logbook No.: HNF-N-506 114
Method of Shipment: Commercial Carrier
Priority: 30 Days
Telephone No.: 509-376-4650
Purchase Order/Charge Code: 300071
Ice Chest No.: 605-418
Bill of Lading/Air Bill No.: 770 3211972
Offsite Property No.: N/A

POSSIBLE SAMPLE HAZARDS/REMARK
 ** ** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1

| Sample No. | Filter | * | Date | Time | No/Type Container | Sample Analysis | Holding Time | Preservative |
|------------|--------|---|-------------|------|-------------------|-----------------|--------------|---------------|
| B3Y4P7 | N | W | NOV 09 2020 | 0803 | 1x250-mL P | SMR_TRITIUM_LSC | 6 Months | None |
| B3Y4P7 | N | W | | | 2x1-L G/P | SMR_COMMON_GEA | 6 Months | HNO3 to pH <2 |
| B3Y4P7 | N | W | NOV 09 2020 | 0803 | 2x1-L G/P | SMR_UISO_AEA | 6 Months | HNO3 to pH <2 |

SPECIAL INSTRUCTIONS
N/A

| Relinquished By | | Received By | |
|---------------------------|-----------|---------------------------|-----------|
| Print First and Last Name | Signature | Print First and Last Name | Signature |
| Jim Lochridge | | Lady Wain FCABRC | |
| | | FEDEX | |
| | | FedEx | |
| | | Letta Rubin | |
| | | | |
| | | | |
| | | | |
| | | | |

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

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

| | | | | | | | |
|---|---|---|-------------|--------------------------|---------------------------------------|---------------------|---------------------|
| CH2M Hill Plateau Remediation Company | | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | | 2011173 | C.O.C.# S21-011-512 Page 1 of 1 | | |
| Collector: Jim Lochridge | Contact/Requester: Karen Waters-Husted | Telephone No.: 509-376-4650 | | | | | |
| SAF No.: S21-011 | Sampling Origin: Hanford Site | Purchase Order/Charge Code: 300071 | | | | | |
| Project Title: SURV, November 2020 | Logbook No.: HNF-N-506 114 | Ice Chest No.: 605-418 | | | | | |
| Shipped To (Lab): ALS Environmental Ft. Collins | Method of Shipment: Commercial Carrier | Bill of Lading/Air Bill No.: 7203249724 | | | | | |
| Protocol: SURV | Priority: 30 Days | Offsite Property No.: N/A | | | | | |
| POSSIBLE SAMPLE HAZARDS/REMARK ** ** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1 | | SPECIAL INSTRUCTIONS N/A | | | | | |
| Sample No. | Filter | Date | Time | No/Type Container | Sample Analysis | Holding Time | Preservative |
| B3Y4R0 2 | N | NOV 09 2020 | 0803 | 1x250-mL P | SMR_TRITIUM_LSC | 6 Months | None |
| B3Y4R0 1 | N | NOV 09 2020 | 1100 | 2x1-L G/P | SMR_COMMON_GEA | 6 Months | HNO3 to pH <2 |
| B3Y4R0 3 | N | NOV 09 2020 | 0803 | 2x1-L G/P | SMR_UIISO_AEA | 6 Months | HNO3 to pH <2 |

| Relinquished By | Received By | Date/Time | Date/Time |
|--|--|-----------|-----------|
| Print First and Last Name: Jim Lochridge Signature: <i>[Signature]</i> Date/Time: NOV 09 2020 0800 | Print First and Last Name: Leah Wall Signature: <i>[Signature]</i> Date/Time: NOV 09 2020 0900 | | |
| Print First and Last Name: Leah Wall Signature: <i>[Signature]</i> Date/Time: NOV 09 2020 1400 | Print First and Last Name: FEDEX Signature: <i>[Signature]</i> Date/Time: NOV 09 2020 1110 | | |

| | | | |
|---------------------------------|---|--------------|------------|
| FINAL SAMPLE DISPOSITION | Disposal Method (e.g., Return to customer, per lab procedure, used in process): | Disposed By: | Date/Time: |
| Printed On: 10/6/2020 | FSR ID = FSR99608 | | |

ORIGIN D-PSCA (509) 373-3580
JANELLE ZUNKER
CH2M
6289 LATAM ST.
RICHLAND WA 99354
UNITED STATES US

SHIP DATE: 09NOV20
ACTWGT: 92.00 LB
CAD: 10706605/INNET/4280
BILL THIRD PARTY

TO JULIE ELLINGSON

ALS GLOBAL
225 COMMERCE DRIVE

FORT COLLINS CO 80524
REF: 30072/GWS418

PO. DEPT.

11-2
6.2

56BJ5BA69B766

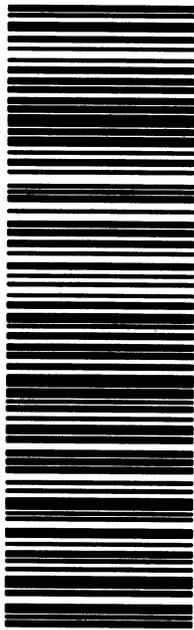


TRK# 7720 3211 9726
0201

TUE - 10 NOV 10:30A
PRIORITY OVERNIGHT
DSR

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JANELLE ZUNKER
CH2M
6289 LATPAH ST.
RICHLAND, WA 99354
UNITED STATES US

SHIP DATE: 09NOV20
ACTWGST: 60.00 LB
CAO: 10706605/IN/ET4290
BILL THIRD PARTY

TO JULIE ELLINGSON

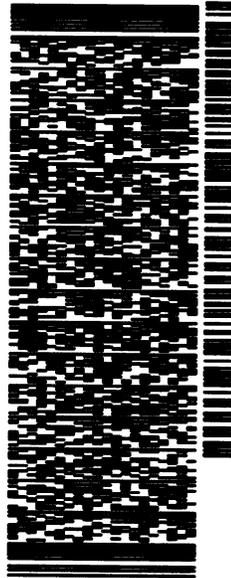
ALS GLOBAL
225 COMMERCE DRIVE

R-2

FORT COLLINS CO 80524
REF: 30072/GWS-800
DEPT:
PO:
NV:
(970) 490-1511

O.2

56B.J5/BA69/B766

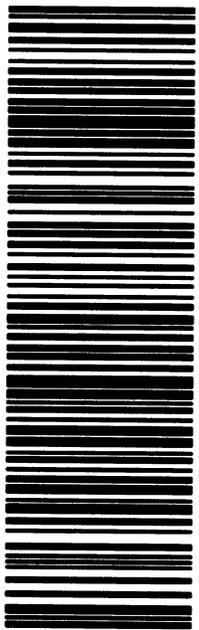


TRK# 7720 2513 1574
0201

TUE - 10 NOV 10:30A
PRIORITY OVERNIGHT
DSR

XH FTCA

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Gamma Spectroscopy Case Narrative

CH2M HILL Plateau Remediation Company

SURV, November 2020 -- S21-011

Work Order Number: 2011173

1. The samples were prepared according to the current revision of SOP739.
2. The samples were analyzed for the presence of gamma emitting radionuclides according to the current revision of SOP713. The analyses were completed on 11/26/2020.
3. The analysis results for these samples are reported in units of pCi/L. The samples were not filtered prior to analysis.
4. Sample volumes were insufficient to allow preparation of a duplicate. A duplicate analysis of sample 2011173-1 was performed in lieu of a prepared duplicate.
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. There are cases where the magnitude of negative activity is greater than the 2σ TPU. Under typical conditions, where background data is normally distributed and analyzed by paired observations, this event is likely to occur at least 2.5% of the time. Review of the data does not indicate a problem with the instrument or reporting systems and results are reported without further qualification.
7. No problems were encountered with either the client's samples or the associated quality control samples. All quality control criteria were met.



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

Jean Anderson
Jean Anderson
Radiochemistry Primary Data Reviewer

12/3/20
Date

Kath M. W.
Radiochemistry Final Data Reviewer

12/10/20
Date

Gamma Spectroscopy Results

PAI 713 Rev 15

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | | | |
|-----------------------|---------------------------|--------------------------|------------------------|
| Lab ID: GS201113-2AMB | Sample Matrix: WATER | Prep Batch: GS201113-2 | Final Aliquot: 1000 ml |
| Library: FANP.LIB | Prep SOP: PAI 739 Rev 13 | QCBatchID: GS201113-2-1 | Result Units: pCi/l |
| | Date Collected: 13-Nov-20 | Run ID: GS201113-2A | File Name: 202193d04 |
| | Date Prepared: 13-Nov-20 | Count Time: 1000 minutes | |
| | Date Analyzed: 26-Nov-20 | | |

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|------------------------|----------|---------------|----|---------------|
| 10198-40-0 | Co-60 | 2.27E+00 +/- 3.72E+00 | 6.17E+00 | | NA | U |
| 10045-97-3 | Cs-137 | 4.35E-01 +/- 3.33E+00 | 5.63E+00 | 1.00E+01 | NA | U |
| 14683-23-9 | Eu-152 | 3.97E+00 +/- 1.95E+01 | 3.31E+01 | | NA | U |
| 15585-10-1 | Eu-154 | 1.78E+00 +/- 1.96E+01 | 3.33E+01 | | NA | U |
| 14391-16-3 | Eu-155 | -3.96E-01 +/- 7.75E+00 | 1.30E+01 | | NA | U |

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TP
 Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
 Y2 - Chemical Yield outside default limits.
 SQ - Spectral quality prevents accurate quantitation.
 SI - Nuclide identification and/or quantitation is tentative.
 TI - Nuclide identification is tentative.
 R - Nuclide has exceeded 8 half-lives.
 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: GSW2011173-1

Gamma Spectroscopy Results

PAI 713 Rev 15

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | | | |
|-------------------------------|----------------------------------|--------------------------------|-------------------------------|
| Lab ID: GS201113-2LCS | Sample Matrix: WATER | Prep Batch: GS201113-2 | Final Aliquot: 1000 ml |
| Library: ANALYTICAL.LI | Prep SOP: PAI 739 Rev 13 | QCBatchID: GS201113-2-1 | Result Units: pCi/l |
| | Date Collected: 13-Nov-20 | Run ID: GS201113-2A | File Name: 200729d02 |
| | Date Prepared: 13-Nov-20 | Count Time: 30 minutes | |
| | Date Analyzed: 26-Nov-20 | | |

| CASNO | Target Nuclide | Results +/- 2s TPU | MDC | Spike Added | % Rec | Control Limits | Lab Qualifier |
|------------|----------------|-----------------------|----------|-------------|-------|----------------|---------------|
| 14596-10-2 | Am-241 | 1.05E+05 +/- 1.24E+04 | 1.65E+03 | 9.920E+04 | 106 | 85 - 115 | |
| 10198-40-0 | Co-60 | 4.33E+04 +/- 5.08E+03 | 1.31E+02 | 4.290E+04 | 101 | 85 - 115 | |
| 10045-97-3 | Cs-137 | 3.89E+04 +/- 4.57E+03 | 1.78E+02 | 3.760E+04 | 104 | 85 - 115 | |

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU
 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

SQ - Spectral quality prevents accurate quantitation.
 SI - Nuclide identification and/or quantitation is tentative.
 TI - Nuclide identification is tentative.
 R - Nuclide has exceeded 8 halfives.

Data Package ID: GSW2011173-1

Gamma Spectroscopy Results

PAI 713 Rev 15

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

Field ID: B3Y4P7

Lab ID: 2011173-1DUP

Library: FANP.LIB

Sample Matrix: WATER

Prep SOP: PAI 739 Rev 13

Date Collected: 09-Nov-20

Date Prepared: 13-Nov-20

Date Analyzed: 20-Nov-20

Prep Batch: GS201113-2

QCBatchID: GS201113-2-1

Run ID: GS201113-2A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 1000 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: 200833d10

| CASNO | Analyte | Sample | | | | Duplicate | | | | DER | DER Lim |
|------------|---------|------------------------|---------|----------|-------|------------------------|---------|----------|-------|-------|---------|
| | | Result +/- | 2 s TPU | MDC | Flags | Result +/- | 2 s TPU | MDC | Flags | | |
| 10198-40-0 | Co-60 | 5.73E+00 +/- 6.41E+00 | | 1.03E+01 | U | 8.93E+00 +/- 4.79E+00 | | 9.84E+00 | U | 0.801 | 3 |
| 10045-97-3 | Cs-137 | 3.64E+00 +/- 5.22E+00 | | 8.64E+00 | U | 2.59E+00 +/- 5.74E+00 | | 9.77E+00 | U | 0.27 | 3 |
| 14683-23-9 | Eu-152 | 1.32E+01 +/- 2.85E+01 | | 4.89E+01 | U | 2.88E+01 +/- 3.07E+01 | | 4.88E+01 | U | 0.745 | 3 |
| 15585-10-1 | Eu-154 | -2.88E+01 +/- 2.67E+01 | | 5.39E+01 | U | -3.48E+01 +/- 2.71E+01 | | 5.69E+01 | U | 0.314 | 3 |
| 14391-16-3 | Eu-155 | 4.03E+00 +/- 1.75E+01 | | 2.99E+01 | U | 5.82E+00 +/- 1.30E+01 | | 2.19E+01 | U | 0.164 | 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

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 half-lives.

G - Sample density differs by more than 15% of LCS density.

Data Package ID: GSW2011173-1

Gamma Spectroscopy Results

PAI 713 Rev 15

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

Field ID: B3Y4P7

Lab ID: 2011173-1DUP

Library: FANP.LIB

Sample Matrix: WATER

Prep SOP: PAI 739 Rev 13

Date Collected: 09-Nov-20

Date Prepared: 13-Nov-20

Date Analyzed: 20-Nov-20

Prep Batch: GS201113-2

QCBatchID: GS201113-2-1

Run ID: GS201113-2A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 1000 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: 200833d10

| CASNO | Analyte | Sample | | | | Duplicate | | | | RPD | RPD Lim |
|------------|---------|------------------------|---------|----------|-------|------------------------|---------|----------|-------|-----|---------|
| | | Result +/- | 2 s TPU | MDC | Flags | Result +/- | 2 s TPU | MDC | Flags | | |
| 10198-40-0 | Co-60 | 5.73E+00 +/- 6.41E+00 | | 1.03E+01 | U | 8.93E+00 +/- 4.79E+00 | | 9.84E+00 | U | NC | 20 |
| 10045-97-3 | Cs-137 | 3.64E+00 +/- 5.22E+00 | | 8.64E+00 | U | 2.59E+00 +/- 5.74E+00 | | 9.77E+00 | U | NC | 20 |
| 14683-23-9 | Eu-152 | 1.32E+01 +/- 2.85E+01 | | 4.89E+01 | U | 2.88E+01 +/- 3.07E+01 | | 4.88E+01 | U | NC | 20 |
| 15585-10-1 | Eu-154 | -2.88E+01 +/- 2.67E+01 | | 5.39E+01 | U | -3.48E+01 +/- 2.71E+01 | | 5.69E+01 | U | NC | 20 |
| 14391-16-3 | Eu-155 | 4.03E+00 +/- 1.75E+01 | | 2.99E+01 | U | 5.82E+00 +/- 1.30E+01 | | 2.19E+01 | U | NC | 20 |

Comments:

Qualifiers/Flags:

+ - Duplicate RPD not within limits.

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

M - Requested MDC not met.

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

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

Abbreviations:

TPU - Total Propagated Uncertainty

BDL - Below Detection Limit

NR - Not Reported

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 half-lives.

G - Sample density differs by more than 15% of LCS density.

Data Package ID: GSW2011173-1

Gamma Spectroscopy Results

PAI 713 Rev 15

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 2011173
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, November 2020 S21-011

| | |
|------------------|-----------|
| Field ID: | B3Y4P7 |
| Lab ID: | 2011173-1 |

Library: FANP.LIB
Analysis ReqCode: SMR_COMMON_

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 13
Date Collected: 09-Nov-20
Date Prepared: 13-Nov-20
Date Analyzed: 20-Nov-20

Prep Batch: GS201113-2
QCBatchID: GS201113-2-1
Run ID: GS201113-2A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 1000 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 200703d02

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|------------------------|----------|---------------|----|---------------|
| 10198-40-0 | Co-60 | 5.73E+00 +/- 6.41E+00 | 1.03E+01 | | NA | U |
| 10045-97-3 | Cs-137 | 3.64E+00 +/- 5.22E+00 | 8.64E+00 | 1E+01 | NA | U |
| 14683-23-9 | Eu-152 | 1.32E+01 +/- 2.85E+01 | 4.89E+01 | | NA | U |
| 15585-10-1 | Eu-154 | -2.88E+01 +/- 2.67E+01 | 5.39E+01 | | NA | U |
| 14391-16-3 | Eu-155 | 4.03E+00 +/- 1.75E+01 | 2.99E+01 | | NA | U |

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TP
 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

SQ - Spectral quality prevents accurate quantitation.
 SI - Nuclide identification and/or quantitation is tentative.
 TI - Nuclide identification is tentative.
 R - Nuclide has exceeded 8 halfives.
 G - Sample density differs by more than 15% of LCS density.

Data Package ID: GSW2011173-1

Gamma Spectroscopy Results

PAI 713 Rev 15

Sample Duplicate Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|-----------|--------------|
| Field ID: | B3Y4P7 |
| Lab ID: | 2011173-1DUP |

Library: FANP.LIB

Sample Matrix: WATER

Prep SOP: PAI 739 Rev 13

Date Collected: 09-Nov-20

Date Prepared: 13-Nov-20

Date Analyzed: 20-Nov-20

Prep Batch: GS201113-2

QCBatchID: GS201113-2-1

Run ID: GS201113-2A

Count Time: 150 minutes

Report Basis: Unfiltered

Final Aliquot: 1000 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: 200833d10

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|------------------------|----------|---------------|----|---------------|
| 10198-40-0 | Co-60 | 8.93E+00 +/- 4.79E+00 | 9.84E+00 | | NA | U |
| 10045-97-3 | Cs-137 | 2.59E+00 +/- 5.74E+00 | 9.77E+00 | 1E+01 | NA | U |
| 14683-23-9 | Eu-152 | 2.88E+01 +/- 3.07E+01 | 4.88E+01 | | NA | U |
| 15585-10-1 | Eu-154 | -3.48E+01 +/- 2.71E+01 | 5.69E+01 | | NA | U |
| 14391-16-3 | Eu-155 | 5.82E+00 +/- 1.30E+01 | 2.19E+01 | | NA | U |

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

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.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halfives.

G - Sample density differs by more than 15% of LCS density.

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: GSW2011173-1

Date Printed:

Thursday, December 03, 2020

ALS -- Fort Collins

LIMS Version: 7.012

Page 1 of 1

Gamma Spectroscopy Results

PAI 713 Rev 15

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 2011173
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, November 2020 S21-011

| | |
|------------------|-----------|
| Field ID: | B3Y4R0 |
| Lab ID: | 2011173-2 |

Library: FANP.LIB
Analysis ReqCode: SMR_COMMON_

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 13
Date Collected: 09-Nov-20
Date Prepared: 13-Nov-20
Date Analyzed: 20-Nov-20

Prep Batch: GS201113-2
QCBatchID: GS201113-2-1
Run ID: GS201113-2A
Count Time: 150 minutes
Report Basis: Unfiltered

Final Aliquot: 1000 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 200832d10

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|------------------------|----------|---------------|----|---------------|
| 10198-40-0 | Co-60 | 7.61E+00 +/- 4.89E+00 | 9.60E+00 | | NA | U |
| 10045-97-3 | Cs-137 | 1.15E+00 +/- 5.35E+00 | 9.36E+00 | 1E+01 | NA | U |
| 14683-23-9 | Eu-152 | -3.01E+00 +/- 2.39E+01 | 4.60E+01 | | NA | U |
| 15585-10-1 | Eu-154 | 1.37E+01 +/- 2.53E+01 | 4.31E+01 | | NA | U |
| 14391-16-3 | Eu-155 | -1.19E+00 +/- 1.14E+01 | 2.00E+01 | | NA | U |

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TP
 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

SQ - Spectral quality prevents accurate quantitation.
 SI - Nuclide identification and/or quantitation is tentative.
 TI - Nuclide identification is tentative.
 R - Nuclide has exceeded 8 halfives.
 G - Sample density differs by more than 15% of LCS density.

Data Package ID: GSW2011173-1

Prep Batch ID: GS201113-2

| | | | |
|---|---------------------------|-----------------------------------|---------------------------------|
| Start Date: 11/13/20 | End Date: 11/30/20 | Concentration Method: NONE | Batch Created By: sdw |
| Start Time: 12:00 | End Time: 12:00 | Extract Method: PAI 73913 | Date Created: 11/13/20 |
| Prep Analyst: Steven D. White | | Initial Volume Units: ml | Time Created: 14:35 |
| Comments: | | Final Volume Units: ml | Validated By: sdw |
| <div style="border: 1px solid black; height: 30px; width: 100%;"></div> | | | Date Validated: 11/17/20 |
| | | | Time Validated: 11:28 |

QC Batch ID: GS201113-2-1

| Lab ID | QC Type | Field ID | Matrix | Date Collected | Initial Wt/Vol | Final Wt/Vol | Cleanup Method | Cleanup DF | Order Number |
|-------------|---------|----------|--------|----------------|----------------|--------------|----------------|------------|--------------|
| GS201113-2A | MB | XXXXXX | WATER | XXXXXX | 1000 | 1000 | NONE | 1 | 2011173 |
| GS201113-2 | LCS | XXXXXX | WATER | XXXXXX | 1000 | 1000 | NONE | 1 | 2011173 |
| 2011173-1 | DUP | B3Y4P7 | WATER | 11/9/2020 | 1000 | 1000 | NONE | 1 | 2011173 |
| 2011173-1 | SMP | B3Y4P7 | WATER | 11/9/2020 | 1000 | 1000 | NONE | 1 | 2011173 |
| 2011173-2 | SMP | B3Y4R0 | WATER | 11/9/2020 | 1000 | 1000 | NONE | 1 | 2011173 |

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 |



Gross Beta Case Narrative

CH2M HILL Plateau Remediation Company

SURV, November 2020 – S21-011

Work Order Number: 2011173

1. This sample was prepared according to the current revision of SOP 702.
2. The sample was analyzed for gross alpha and beta activity by gas flow proportional counting according to the current revision of SOP 724. The analysis was completed on 11/22/2020. Gross alpha results are referenced to ²⁴¹Am. Gross beta results are referenced to ⁹⁰Sr/Y.
3. The analysis results for this sample are reported in units of pCi/L. The sample was not filtered prior to analysis.
4. The matrix spike of sample 2010698-5 is shared for this work order. The matrix spike was performed on a CH2M HILL Plateau Remediation Company sample. The results can be found in the following report.
5. Due to a LIMS reporting issue, the duplicate information was not populating on the report. A CH2M HILL Plateau Remediation Company sample was used as the batch duplicate. Per project manager instructions, the results for this sample/duplicate pair are included:

| | Sample 2010698-3 | | Duplicate 2010698-3DUP | | RP |
|------------|-----------------------|----------|------------------------|----------|----|
| | Result +/- 2 s TPU | MDC | Result +/- 2 s TPU | MDC | |
| Gross Beta | 1.81E+01 +/- 3.52E+02 | 2.11E+00 | 1.64E+01 +/- 2.98E+00 | 2.06E+00 | 10 |

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.

Jean Anderson
Jean Anderson
Radiochemistry Primary Data Reviewer

12/10/20
Date

Kath M. W.
Radiochemistry Final Data Reviewer

12/10/20
Date

Gross Beta by GFPC

PAI 724 Rev 14

Method Blank Results**Lab Name:** ALS -- Fort Collins**Work Order Number:** 2011173**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** SURV, November 2020 S21-011**Lab ID:** AB201119-1MB**Sample Matrix:** WATER**Prep Batch:** AB201119-1**Final Aliquot:** 200 ml**Prep SOP:** PAI 702 Rev 23**QCBatchID:** AB201119-1-4**Result Units:** pCi/l**Date Collected:** 19-Nov-20**Run ID:** AB201119-1B**File Name:** ABA1121A**Date Prepared:** 19-Nov-20**Count Time:** 1000 minutes**Date Analyzed:** 21-Nov-20

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|------------------------|----------|---------------|----|---------------|
| 12587-47-2 | GROSS BETA | -9.75E-02 +/- 7.10E-01 | 1.18E+00 | 4.00E+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: GB2011173-1

Gross Beta by GFPC

PAI 724 Rev 14

Laboratory Control Sample(s)**Lab Name:** ALS -- Fort Collins**Work Order Number:** 2011173**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** SURV, November 2020 S21-011**Lab ID:** AB201119-1LCS**Sample Matrix:** WATER**Prep Batch:** AB201119-1**Final Aliquot:** 200 ml**Prep SOP:** PAI 702 Rev 23**QCBatchID:** AB201119-1-4**Result Units:** pCi/l**Date Collected:** 19-Nov-20**Run ID:** AB201119-1B**File Name:** ABA1121**Date Prepared:** 19-Nov-20**Count Time:** 180 minutes**Date Analyzed:** 21-Nov-20

| CASNO | Target Nuclide | Results +/- 2s TPU | MDC | Spike Added | % Rec | Control Limits | Lab Qualifier |
|------------|----------------|-----------------------|----------|-------------|-------|----------------|---------------|
| 12587-47-2 | GROSS BETA | 2.33E+02 +/- 3.76E+01 | 4.96E+00 | 2.210E+02 | 105 | 86 - 115 | |

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: GB2011173-1

Gross Beta by GFPC

PAI 724 Rev 14

Matrix Spike Results

Lab Name: ALS -- Fort Collins
Work Order Number: 2011173
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, November 2020 S21-011

| | |
|------------------|-------------|
| Field ID: | Shared QC |
| Lab ID: | 2010698-5MS |

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 23
Date Collected: 30-Oct-20
Date Prepared: 19-Nov-20
Date Analyzed: 21-Nov-20

Prep Batch: AB201119-1
QCBatchID: AB201119-1-4
Run ID: AB201119-1B
Count Time: 180 minutes
Report Basis: Unfiltered

Final Aliquot: 130 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: ABA1121

| CASNO | Target Nuclide | Matrix Spike | Sample Results | MDC | Spike Added | % Rec | Control Limits | Lab Qualifier |
|------------|----------------|--------------|----------------|----------|-------------|-------|----------------|---------------|
| 12587-47-2 | GROSS BETA | 3.57E+02 | -1.72E-01 | 7.76E+00 | 3.400E+02 | 105 | 86 - 115 | |

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: GB2011173-1

Gross Beta by GFPC

PAI 724 Rev 14

Matrix Spike Results

Lab Name: ALS -- Fort Collins
Work Order Number: 2011173
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, November 2020 S21-011

| | |
|------------------|--------------|
| Field ID: | Shared QC |
| Lab ID: | 2010698-5MSD |

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 23
Date Collected: 30-Oct-20
Date Prepared: 19-Nov-20
Date Analyzed: 21-Nov-20

Prep Batch: AB201119-1
QCBatchID: AB201119-1-4
Run ID: AB201119-1B
Count Time: 180 minutes
Report Basis: Unfiltered

Final Aliquot: 130 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: ABA1121

| CASNO | Target Nuclide | Matrix Spike | Sample Results | MDC | Spike Added | % Rec | Control Limits | Lab Qualifier |
|------------|----------------|--------------|----------------|----------|-------------|-------|----------------|---------------|
| 12587-47-2 | GROSS BETA | 3.45E+02 | -1.72E-01 | 7.39E+00 | 3.400E+02 | 101 | 86 - 115 | |

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: GB2011173-1

Gross Beta by GFPC

PAI 724 Rev 14

Sample Results**Lab Name:** ALS -- Fort Collins**Work Order Number:** 2011173**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** SURV, November 2020 S21-011

| | |
|------------------|-----------|
| Field ID: | Shared QC |
| Lab ID: | 2010698-5 |

Sample Matrix: WATER**Prep Batch:** AB201119-1**Final Aliquot:** 130 ml**Prep SOP:** PAI 702 Rev 23**QC Batch ID:** AB201119-1-4**Prep Basis:** Unfiltered**Date Collected:** 30-Oct-20**Run ID:** AB201119-1B**Moisture(%):** NA**Date Prepared:** 19-Nov-20**Count Time:** 1000 minutes**Result Units:** pCi/l**Date Analyzed:** 21-Nov-20**Report Basis:** Unfiltered**File Name:** ABA1121A

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|------------------------|----------|---------------|----|---------------|
| 12587-47-2 | GROSS BETA | -1.72E-01 +/- 1.03E+00 | 1.73E+00 | 4E+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.

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: GB2011173-1

Gross Beta by GFPC

PAI 724 Rev 14

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
Work Order Number: 2011173
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, November 2020 S21-011

| | |
|------------------|--------------|
| Field ID: | Shared QC |
| Lab ID: | 2010698-5MSD |

Sample Matrix: WATER
Prep SOP: PAI 702 Rev 23
Date Collected: 30-Oct-20
Date Prepared: 19-Nov-20
Date Analyzed: 21-Nov-20

Prep Batch: AB201119-1
QCBatchID: AB201119-1-4
Run ID: AB201119-1B
Count Time: 180 minutes
Report Basis: Unfiltered

Final Aliquot: 130 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: ABA1121

| CASNO | Analyte | Sample | | | | Duplicate | | | | DER | DER Lim |
|------------|------------|-----------------------|---------|----------|-------|-----------------------|---------|----------|-------|------|---------|
| | | Result +/- | 2 s TPU | MDC | Flags | Result +/- | 2 s TPU | MDC | Flags | | |
| 12587-47-2 | GROSS BETA | 3.57E+02 +/- 5.78E+01 | | 7.76E+00 | | 3.45E+02 +/- 5.57E+01 | | 7.39E+00 | | 0.31 | 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: GB2011173-1

Gross Beta by GFPC

PAI 724 Rev 14

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|-----------|--------------|
| Field ID: | Shared QC |
| Lab ID: | 2010698-5MSD |

Sample Matrix: WATER

Prep SOP: PAI 702 Rev 23

Date Collected: 30-Oct-20

Date Prepared: 19-Nov-20

Date Analyzed: 21-Nov-20

Prep Batch: AB201119-1

QCBatchID: AB201119-1-4

Run ID: AB201119-1B

Count Time: 180 minutes

Report Basis: Unfiltered

Final Aliquot: 130 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: ABA1121

| CASNO | Analyte | Sample | | | | Duplicate | | | | RPD | RPD Lim |
|------------|------------|--------------|----------|----------|-------|--------------|----------|----------|-------|------|---------|
| | | Result +/- | 2 s TPU | MDC | Flags | Result +/- | 2 s TPU | MDC | Flags | | |
| 12587-47-2 | GROSS BETA | 3.57E+02 +/- | 5.78E+01 | 7.76E+00 | | 3.45E+02 +/- | 5.57E+01 | 7.39E+00 | | 4.00 | 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: GB2011173-1

Gross Beta by GFPC

PAI 724 Rev 14

Sample Results**Lab Name:** ALS -- Fort Collins**Work Order Number:** 2011173**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** SURV, November 2020 S21-011

| | |
|------------------|-----------|
| Field ID: | Shared QC |
| Lab ID: | 2010698-3 |

Sample Matrix: WATER**Prep Batch:** AB201119-1**Final Aliquot:** 180 ml**Prep SOP:** PAI 702 Rev 23**QCBatchID:** AB201119-1-4**Prep Basis:** Unfiltered**Date Collected:** 30-Oct-20**Run ID:** AB201119-1B**Moisture(%):** NA**Date Prepared:** 19-Nov-20**Count Time:** 420 minutes**Result Units:** pCi/l**Date Analyzed:** 22-Nov-20**Report Basis:** Unfiltered**File Name:** ABA1122

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|-----------------------|----------|---------------|----|---------------|
| 12587-47-2 | GROSS BETA | 1.81E+01 +/- 3.25E+00 | 2.11E+00 | 4E+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: GB2011173-1

Gross Beta by GFPC

PAI 724 Rev 14

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins
 Work Order Number: 2011173
 Client Name: CH2M HILL Plateau Remediation Company
 ClientProject ID: SURV, November 2020 S21-011

| | |
|-----------|--------------|
| Field ID: | Shared QC |
| Lab ID: | 2010698-3DUP |

Sample Matrix: WATER
 Prep SOP: PAI 702 Rev 23
 Date Collected: 30-Oct-20
 Date Prepared: 19-Nov-20
 Date Analyzed: 22-Nov-20

Prep Batch: AB201119-1
 QCBatchID: AB201119-1-4
 Run ID: AB201119-1B
 Count Time: 420 minutes
 Report Basis: Unfiltered

Final Aliquot: 180 ml
 Prep Basis: Unfiltered
 Moisture(%): NA
 Result Units: pCi/l
 File Name: ABA1122

| CASNO | Analyte | Sample | | | | Duplicate | | | | DER | DER Lim |
|------------|------------|--------------|----------|----------|-------|--------------|----------|----------|-------|-------|---------|
| | | Result +/- | 2 s TPU | MDC | Flags | Result +/- | 2 s TPU | MDC | Flags | | |
| 12587-47-2 | GROSS BETA | 1.81E+01 +/- | 3.25E+00 | 2.11E+00 | | 1.64E+01 +/- | 2.98E+00 | 2.06E+00 | | 0.751 | 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: GB2011173-1

Gross Beta by GFPC

PAI 724 Rev 14

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|-----------|--------------|
| Field ID: | Shared QC |
| Lab ID: | 2010698-3DUP |

Sample Matrix: WATER

Prep SOP: PAI 702 Rev 23

Date Collected: 30-Oct-20

Date Prepared: 19-Nov-20

Date Analyzed: 22-Nov-20

Prep Batch: AB201119-1

QCBatchID: AB201119-1-4

Run ID: AB201119-1B

Count Time: 420 minutes

Report Basis: Unfiltered

Final Aliquot: 180 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: ABA1122

| CASNO | Analyte | Sample | | | | Duplicate | | | | RPD | RPD Lim |
|------------|------------|--------------|----------|----------|-------|--------------|----------|----------|-------|-------|---------|
| | | Result +/- | 2 s TPU | MDC | Flags | Result +/- | 2 s TPU | MDC | Flags | | |
| 12587-47-2 | GROSS BETA | 1.81E+01 +/- | 3.25E+00 | 2.11E+00 | | 1.64E+01 +/- | 2.98E+00 | 2.06E+00 | | 10.00 | 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: GB2011173-1

Gross Beta by GFPC

PAI 724 Rev 14

Sample Results**Lab Name:** ALS -- Fort Collins**Work Order Number:** 2011173**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** SURV, November 2020 S21-011

| | |
|------------------|-----------|
| Field ID: | B3Y4Y9 |
| Lab ID: | 2011173-3 |

Sample Matrix: WATER**Prep Batch:** AB201119-1**Final Aliquot:** 200 ml**Prep SOP:** PAI 702 Rev 23**QC Batch ID:** AB201119-1-4**Prep Basis:** Unfiltered**Date Collected:** 09-Nov-20**Run ID:** AB201119-1B**Moisture(%):** NA**Date Prepared:** 19-Nov-20**Count Time:** 180 minutes**Result Units:** pCi/l**Date Analyzed:** 21-Nov-20**Report Basis:** Unfiltered**File Name:** ABA1121**Analysis ReqCode:** SMR_BETA_GP

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|-----------------------|----------|---------------|----|---------------|
| 12587-47-2 | GROSS BETA | 1.94E+01 +/- 3.64E+00 | 2.57E+00 | 4E+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: GB2011173-1

Prep Batch ID: AB201119-1

| | | | |
|---|---------------------------|-----------------------------------|---------------------------------|
| Start Date: 11/19/20 | End Date: 11/19/20 | Concentration Method: NONE | Batch Created By: mig |
| Start Time: 9:46 | End Time: 9:46 | Extract Method: PAI 70223 | Date Created: 11/19/20 |
| Prep Analyst: Mikenna I. Gapinski | | Initial Volume Units: ml | Time Created: 9:46 |
| Comments: | | Final Volume Units: ml | Validated By: jcp |
| <div style="border: 1px solid black; height: 30px; width: 100%;"></div> | | | Date Validated: 12/07/20 |
| | | | Time Validated: 8:07 |

QC Batch ID: AB201119-1-4

| Lab ID | QC Type | Field ID | Matrix | Date Collected | Initial Wt/Vol | Final Wt/Vol | Cleanup Method | Cleanup DF | Order Number |
|------------|---------|----------|--------|----------------|----------------|--------------|----------------|------------|--------------|
| AB201119-1 | MB | XXXXXX | WATER | XXXXXX | 200 | 200 | NONE | 1 | 2011173 |
| AB201119-1 | LCS | XXXXXX | WATER | XXXXXX | 200 | 200 | NONE | 1 | 2011173 |
| 2010698-5 | MS | XXXXXX | WATER | XXXXXX | 130 | 130 | NONE | 1 | 2011173 |
| 2010698-5 | MSD | XXXXXX | WATER | XXXXXX | 130 | 130 | NONE | 1 | 2011173 |
| 2010698-3 | DUP | XXXXXX | WATER | XXXXXX | 180 | 180 | NONE | 1 | 2011173 |
| 2010698-3 | SMP | XXXXXX | WATER | XXXXXX | 180 | 180 | NONE | 1 | 2011173 |
| 2010698-5 | SMP | XXXXXX | WATER | XXXXXX | 130 | 130 | NONE | 1 | 2011173 |
| 2011173-3 | SMP | B3Y4Y9 | WATER | 11/9/2020 | 200 | 200 | NONE | 1 | 2011173 |

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 |



Isotopic Uranium Case Narrative

CH2M HILL Plateau Remediation Company

SURV, November 2020 -- S21-011

Work Order Number: 2011173

1. The samples were prepared according to the current revisions of SOP 776 and SOP 778.
2. The samples were analyzed for the presence of isotopic uranium according to the current revision of SOP 714. The analyses were completed on 11/24/2020.
3. The duplicate of sample 2011175-2 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.
4. The analysis results for these samples are reported in units of pCi/L. The water samples were not filtered prior to analysis.
5. A laboratory control sample duplicate (LCSD) was prepared to meet another client's duplicate requirements. The LCSD results are included in this package as an additional QC measure.
6. In accordance with project specific instructions, the evaluation threshold for Relative Percent Difference (RPD) has been set at 20%. RPD is defined as:

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

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

7. This analytical method quantifies U-235 alpha activity in a specific region of interest corresponding to emission energies between those of U-234 and U-238. A potential limitation of this method is that measurable amounts of U-234 in the sample may cause a small amount of characteristic activity in the U-235 region of interest due to poorly resolved alpha activity at the boundary between the two regions. To minimize the potential for a high bias in the U-235 analytical results, the U-235 region of interest has been narrowed and limited to a lower energy region. An 85.1% abundance correction has been made to the final U-235 results.



- 8. No anomalous situations were encountered during the preparation or analysis of these samples. All quality control criteria were met.

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

Jean Anderson
Jean Anderson
Radiochemistry Primary Data Reviewer

12/3/20
Date

Kath M. W.
Radiochemistry Final Data Reviewer

12/10/20
Date

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 15

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

Lab ID: AS201118-1MB

Sample Matrix: WATER

Prep Batch: AS201118-1

Final Aliquot: 1000 ml

Prep SOP: PAI 778 Rev 16

QCBatchID: AS201118-1-1

Result Units: pCi/l

Date Collected: 18-Nov-20

Run ID: AS201118-1UR

File Name: Spectrum #1

Date Prepared: 18-Nov-20

Count Time: 360 minutes

Date Analyzed: 24-Nov-20

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|------------------------|----------|---------------|----|---------------|
| 13966-29-5 | U-234 | 9.76E-03 +/- 2.35E-02 | 5.19E-02 | 2.00E-01 | NA | U |
| 15117-96-1 | U-235 | 4.71E-03 +/- 2.71E-02 | 4.05E-02 | 2.00E-01 | NA | U |
| 7440-61-1 | U-238 | -5.01E-04 +/- 2.30E-02 | 4.72E-02 | 2.00E-01 | 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: UR2011173-1

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 15

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

Lab ID: AS201118-1LCS

Sample Matrix: WATER

Prep Batch: AS201118-1

Final Aliquot: 1000 ml

Prep SOP: PAI 778 Rev 16

QCBatchID: AS201118-1-1

Result Units: pCi/l

Date Collected: 18-Nov-20

Run ID: AS201118-1UR

File Name: Spectrum #1

Date Prepared: 18-Nov-20

Count Time: 360 minutes

Date Analyzed: 24-Nov-20

| CASNO | Target Nuclide | Results +/- 2s TPU | MDC | Spike Added | % Rec | Control Limits | Lab Qualifier |
|------------|----------------|-----------------------|----------|-------------|-------|----------------|---------------|
| 13966-29-5 | U-234 | 3.82E+00 +/- 6.84E-01 | 4.00E-02 | 4.350E+00 | 87.8 | 82 - 122 | |
| 7440-61-1 | U-238 | 4.27E+00 +/- 7.58E-01 | 4.75E-02 | 4.520E+00 | 94.5 | 78 - 126 | |

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: UR2011173-1

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 15

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

Lab ID: AS201118-1LCSD

Sample Matrix: WATER

Prep Batch: AS201118-1

Final Aliquot: 1000 ml

Prep SOP: PAI 778 Rev 16

QCBatchID: AS201118-1-1

Result Units: pCi/l

Date Collected: 18-Nov-20

Run ID: AS201118-1UR

File Name: Spectrum #1

Date Prepared: 18-Nov-20

Count Time: 360 minutes

Date Analyzed: 24-Nov-20

| CASNO | Target Nuclide | Results +/- 2s TPU | MDC | Spike Added | % Rec | Control Limits | Lab Qualifier |
|------------|----------------|-----------------------|----------|-------------|-------|----------------|---------------|
| 13966-29-5 | U-234 | 4.24E+00 +/- 7.57E-01 | 3.70E-02 | 4.350E+00 | 97.4 | 82 - 122 | |
| 7440-61-1 | U-238 | 4.67E+00 +/- 8.29E-01 | 4.20E-02 | 4.520E+00 | 103 | 78 - 126 | |

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: UR2011173-1

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 15

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|-----------|----------------|
| Field ID: | |
| Lab ID: | AS201118-1LCSD |

Sample Matrix: WATER

Prep SOP: PAI 778 Rev 16

Date Collected: 18-Nov-20

Date Prepared: 18-Nov-20

Date Analyzed: 24-Nov-20

Prep Batch: AS201118-1

QCBatchID: AS201118-1-1

Run ID: AS201118-1UR

Count Time: 360 minutes

Final Aliquot: 1000 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Spectrum #1

| CASNO | Analyte | Sample | | | | Duplicate | | | | DER | DER Lim |
|------------|---------|-----------------------|---------|----------|-------|-----------------------|---------|----------|-------|-------|---------|
| | | Result +/- | 2 s TPU | MDC | Flags | Result +/- | 2 s TPU | MDC | Flags | | |
| 13966-29-5 | U-234 | 3.82E+00 +/- 6.84E-01 | | 4.00E-02 | | 4.24E+00 +/- 7.57E-01 | | 3.70E-02 | | 0.408 | 3 |
| 7440-61-1 | U-238 | 4.27E+00 +/- 7.58E-01 | | 4.75E-02 | | 4.67E+00 +/- 8.29E-01 | | 4.20E-02 | | 0.353 | 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.

W - DER is greater than Warning Limit of 1.42

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: UR2011173-1

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 15

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|-----------|----------------|
| Field ID: | |
| Lab ID: | AS201118-1LCSD |

Sample Matrix: WATER

Prep SOP: PAI 778 Rev 16

Date Collected: 18-Nov-20

Date Prepared: 18-Nov-20

Date Analyzed: 24-Nov-20

Prep Batch: AS201118-1

QCBatchID: AS201118-1-1

Run ID: AS201118-1UR

Count Time: 360 minutes

Final Aliquot: 1000 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Spectrum #1

| CASNO | Analyte | Sample | | | | Duplicate | | | | RPD | RPD Lim |
|------------|---------|--------------|----------|----------|-------|--------------|----------|----------|-------|-------|---------|
| | | Result +/- | 2 s TPU | MDC | Flags | Result +/- | 2 s TPU | MDC | Flags | | |
| 13966-29-5 | U-234 | 3.82E+00 +/- | 6.84E-01 | 4.00E-02 | | 4.24E+00 +/- | 7.57E-01 | 3.70E-02 | | 10.00 | |
| 7440-61-1 | U-238 | 4.27E+00 +/- | 7.58E-01 | 4.75E-02 | | 4.67E+00 +/- | 8.29E-01 | 4.20E-02 | | 9.00 | |

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: UR2011173-1

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 15

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|------------------|-----------|
| Field ID: | Shared QC |
| Lab ID: | 2011175-2 |

Sample Matrix: WATER

Prep SOP: PAI 778 Rev 16

Date Collected: 09-Nov-20

Date Prepared: 18-Nov-20

Date Analyzed: 24-Nov-20

Prep Batch: AS201118-1

QC Batch ID: AS201118-1-1

Run ID: AS201118-1UR

Count Time: 360 minutes

Report Basis: Unfiltered

Final Aliquot: 500 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Spectrum #1

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|-----------------------|----------|---------------|----|---------------|
| 13966-29-5 | U-234 | 9.15E-01 +/- 2.35E-01 | 5.00E-02 | 2E-01 | NA | |
| 15117-96-1 | U-235 | 8.85E-02 +/- 6.66E-02 | 7.12E-02 | 2E-01 | NA | |
| 7440-61-1 | U-238 | 6.09E-01 +/- 1.78E-01 | 2.46E-02 | 2E-01 | 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: UR2011173-1

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 15

Sample Duplicate Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|-----------|--------------|
| Field ID: | Shared QC |
| Lab ID: | 2011175-2DUP |

Sample Matrix: WATER

Prep SOP: PAI 778 Rev 16

Date Collected: 09-Nov-20

Date Prepared: 18-Nov-20

Date Analyzed: 24-Nov-20

Prep Batch: AS201118-1

QCBatchID: AS201118-1-1

Run ID: AS201118-1UR

Count Time: 360 minutes

Report Basis: Unfiltered

Final Aliquot: 500 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Spectrum #1

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|-----------------------|----------|---------------|----|---------------|
| 13966-29-5 | U-234 | 1.06E+00 +/- 2.69E-01 | 8.86E-02 | 2E-01 | NA | |
| 15117-96-1 | U-235 | 7.45E-03 +/- 4.29E-02 | 6.41E-02 | 2E-01 | NA | U |
| 7440-61-1 | U-238 | 5.81E-01 +/- 1.79E-01 | 5.45E-02 | 2E-01 | 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.

W - DER is greater than Warning Limit of 1.42

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: UR2011173-1

Date Printed:

Thursday, December 03, 2020

ALS -- Fort Collins

LIMS Version: 7.012

Page 1 of 1

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 15

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|-----------|--------------|
| Field ID: | Shared QC |
| Lab ID: | 2011175-2DUP |

Sample Matrix: WATER

Prep SOP: PAI 778 Rev 16

Date Collected: 09-Nov-20

Date Prepared: 18-Nov-20

Date Analyzed: 24-Nov-20

Prep Batch: AS201118-1

QCBatchID: AS201118-1-1

Run ID: AS201118-1UR

Count Time: 360 minutes

Final Aliquot: 500 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Spectrum #1

| CASNO | Analyte | Sample | | | | Duplicate | | | | DER | DER Lim |
|------------|---------|--------------|----------|----------|-------|--------------|----------|----------|-------|-------|---------|
| | | Result +/- | 2 s TPU | MDC | Flags | Result +/- | 2 s TPU | MDC | Flags | | |
| 13966-29-5 | U-234 | 9.15E-01 +/- | 2.35E-01 | 5.00E-02 | | 1.06E+00 +/- | 2.69E-01 | 8.86E-02 | | 0.41 | 3 |
| 15117-96-1 | U-235 | 8.85E-02 +/- | 6.66E-02 | 7.12E-02 | | 7.45E-03 +/- | 4.29E-02 | 6.41E-02 | U | 1.02 | 3 |
| 7440-61-1 | U-238 | 6.09E-01 +/- | 1.78E-01 | 2.46E-02 | | 5.81E-01 +/- | 1.79E-01 | 5.45E-02 | | 0.113 | 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.

W - DER is greater than Warning Limit of 1.42

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: UR2011173-1

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 15

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|-----------|--------------|
| Field ID: | Shared QC |
| Lab ID: | 2011175-2DUP |

Sample Matrix: WATER

Prep SOP: PAI 778 Rev 16

Date Collected: 09-Nov-20

Date Prepared: 18-Nov-20

Date Analyzed: 24-Nov-20

Prep Batch: AS201118-1

QCBatchID: AS201118-1-1

Run ID: AS201118-1UR

Count Time: 360 minutes

Final Aliquot: 500 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Spectrum #1

| CASNO | Analyte | Sample | | | | Duplicate | | | | RPD | RPD Lim |
|------------|---------|--------------|----------|----------|-------|--------------|----------|----------|-------|-------|---------|
| | | Result +/- | 2 s TPU | MDC | Flags | Result +/- | 2 s TPU | MDC | Flags | | |
| 13966-29-5 | U-234 | 9.15E-01 +/- | 2.35E-01 | 5.00E-02 | | 1.06E+00 +/- | 2.69E-01 | 8.86E-02 | | 15.00 | 20 |
| 15117-96-1 | U-235 | 8.85E-02 +/- | 6.66E-02 | 7.12E-02 | | 7.45E-03 +/- | 4.29E-02 | 6.41E-02 | U | NC | 20 |
| 7440-61-1 | U-238 | 6.09E-01 +/- | 1.78E-01 | 2.46E-02 | | 5.81E-01 +/- | 1.79E-01 | 5.45E-02 | | 5.00 | 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: UR2011173-1

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 15

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|------------------|-----------|
| Field ID: | B3Y4P7 |
| Lab ID: | 2011173-1 |

Sample Matrix: WATER

Prep SOP: PAI 778 Rev 16

Date Collected: 09-Nov-20

Date Prepared: 18-Nov-20

Date Analyzed: 24-Nov-20

Prep Batch: AS201118-1

QC Batch ID: AS201118-1-1

Run ID: AS201118-1UR

Count Time: 360 minutes

Report Basis: Unfiltered

Final Aliquot: 500 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Spectrum #1

Analysis ReqCode: SMR_UISO_AEA

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|-----------------------|----------|---------------|----|---------------|
| 13966-29-5 | U-234 | 7.87E+00 +/- 1.37E+00 | 2.46E-02 | 2E-01 | NA | |
| 15117-96-1 | U-235 | 4.92E-01 +/- 1.65E-01 | 2.90E-02 | 2E-01 | NA | |
| 7440-61-1 | U-238 | 8.02E+00 +/- 1.40E+00 | 6.86E-02 | 2E-01 | 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: UR2011173-1

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 15

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|------------------|-----------|
| Field ID: | B3Y4R0 |
| Lab ID: | 2011173-2 |

Sample Matrix: WATER

Prep SOP: PAI 778 Rev 16

Date Collected: 09-Nov-20

Date Prepared: 18-Nov-20

Date Analyzed: 24-Nov-20

Prep Batch: AS201118-1

QC Batch ID: AS201118-1-1

Run ID: AS201118-1UR

Count Time: 360 minutes

Report Basis: Unfiltered

Final Aliquot: 500 ml

Prep Basis: Unfiltered

Moisture(%): NA

Result Units: pCi/l

File Name: Spectrum #1

Analysis ReqCode: SMR_UISO_AEA

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|-----------------------|----------|---------------|----|---------------|
| 13966-29-5 | U-234 | 8.44E+00 +/- 1.52E+00 | 1.20E-01 | 2E-01 | NA | |
| 15117-96-1 | U-235 | 4.31E-01 +/- 1.69E-01 | 8.89E-02 | 2E-01 | NA | |
| 7440-61-1 | U-238 | 7.45E+00 +/- 1.35E+00 | 6.25E-02 | 2E-01 | 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: UR2011173-1

Prep Batch ID: AS201118-1

| | | | |
|---|---------------------------|-----------------------------------|---------------------------------|
| Start Date: 11/18/20 | End Date: 11/30/20 | Concentration Method: NONE | Batch Created By: sdw |
| Start Time: 12:00 | End Time: 12:00 | Extract Method: PAI 77816 | Date Created: 11/18/20 |
| Prep Analyst: Steven D. White | | Initial Volume Units: ml | Time Created: 14:40 |
| | | Final Volume Units: ml | Validated By: sdw |
| Comments: | | | Date Validated: 11/18/20 |
| LCSD Required per PM's Lab Notes for Work Order 2011147 | | | Time Validated: 16:33 |

QC Batch ID: AS201118-1-1

| Lab ID | QC Type | Field ID | Matrix | Date Collected | Initial Wt/Vol | Final Wt/Vol | Cleanup Method | Cleanup DF | Order Number |
|------------|---------|----------|--------|----------------|----------------|--------------|----------------|------------|--------------|
| AS201118-1 | MB | XXXXXX | WATER | XXXXXX | 1000 | 1000 | NONE | 1 | 2011173 |
| AS201118-1 | LCS | XXXXXX | WATER | XXXXXX | 1000 | 1000 | NONE | 1 | 2011173 |
| AS201118-1 | LCSD | XXXXXX | WATER | XXXXXX | 1000 | 1000 | NONE | 1 | 2011175 |
| 2011175-2 | DUP | XXXXXX | WATER | XXXXXX | 500 | 500 | NONE | 1 | 2011175 |
| 2011173-1 | SMP | B3Y4P7 | WATER | 11/9/2020 | 500 | 500 | NONE | 1 | 2011173 |
| 2011173-2 | SMP | B3Y4R0 | WATER | 11/9/2020 | 500 | 500 | NONE | 1 | 2011173 |
| 2011175-1 | SMP | XXXXXX | WATER | XXXXXX | 500 | 500 | NONE | 1 | 2011175 |
| 2011175-2 | SMP | XXXXXX | WATER | XXXXXX | 500 | 500 | NONE | 1 | 2011175 |

QC Types

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



Tritium Case Narrative

CH2M HILL Plateau Remediation Company

SURV, November 2020 -- S21-011

Work Order Number: 2011173

1. The samples were prepared according to the current revision of SOP 700.
2. The samples were analyzed for the presence of tritium according to the current revision of SOP 704. The analyses were completed on 11/29/2020.
3. The duplicate of sample 2011101-1 and the matrix spike and matrix spike duplicate of sample 2011106-1 are shared for this work order. The duplicate and the matrix spikes were performed on CH2M HILL Plateau Remediation Company samples and the results are acceptable. The results can be found in the following report.
4. The analysis results for the samples are reported in units of pCi/L. The samples were not filtered prior to analysis.
5. In accordance with project specific instructions, the evaluation threshold for Relative Percent Difference (RPD) has been set at 20%. RPD is defined as:

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

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

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



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

Jean Anderson
Jean Anderson
Radiochemistry Primary Data Reviewer

12/3/20
Date

Kath M. W.
Radiochemistry Final Data Reviewer

12/10/20
Date

Tritium by Liquid Scintillation

PAI 704 Rev 13

Method Blank Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

Lab ID: 3H201123-2MB

Sample Matrix: WATER

Prep Batch: 3H201123-2

Final Aliquot: 10.0 ml

Prep SOP: PAI 700 Rev 15

QCBatchID: 3H201123-2-1

Result Units: pCi/l

Date Collected: 23-Nov-20

Run ID: 3H201123-2A

File Name: B60_13_112701

Date Prepared: 23-Nov-20

Count Time: 90 minutes

Date Analyzed: 29-Nov-20

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|------------------------|----------|---------------|----|---------------|
| 10028-17-8 | H-3 | -9.25E+01 +/- 1.86E+02 | 3.17E+02 | 4.00E+02 | NA | U |

Comments:**Qualifiers/Flags:**

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

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

DL - Decision Level

Data Package ID: H32011173-1

Tritium by Liquid Scintillation

PAI 704 Rev 13

Laboratory Control Sample(s)**Lab Name:** ALS -- Fort Collins**Work Order Number:** 2011173**Client Name:** CH2M HILL Plateau Remediation Company**ClientProject ID:** SURV, November 2020 S21-011**Lab ID:** 3H201123-2LCS**Sample Matrix:** WATER**Prep Batch:** 3H201123-2**Final Aliquot:** 9.84 ml**Prep SOP:** PAI 700 Rev 15**QCBatchID:** 3H201123-2-1**Result Units:** pCi/l**Date Collected:** 23-Nov-20**Run ID:** 3H201123-2A**File Name:** B60_13_112701**Date Prepared:** 23-Nov-20**Count Time:** 90 minutes**Date Analyzed:** 29-Nov-20

| CASNO | Target Nuclide | Results +/- 2s TPU | MDC | Spike Added | % Rec | Control Limits | Lab Qualifier |
|------------|----------------|-----------------------|----------|-------------|-------|----------------|---------------|
| 10028-17-8 | H-3 | 1.54E+04 +/- 2.38E+03 | 3.22E+02 | 1.550E+04 | 99.6 | 80 - 120 | |

Comments:**Qualifiers/Flags:**

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

Abbreviations:

TPU - Total Propagated Uncertainty
 MDC - Minimum Detectable Concentration

Data Package ID: H32011173-1

Tritium by Liquid Scintillation

PAI 704 Rev 13

Matrix Spike Results

Lab Name: ALS -- Fort Collins
Work Order Number: 2011173
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, November 2020 S21-011

| | |
|------------------|-------------|
| Field ID: | Shared QC |
| Lab ID: | 2011101-1MS |

Sample Matrix: WATER
Prep SOP: PAI 700 Rev 15
Date Collected: 05-Nov-20
Date Prepared: 23-Nov-20
Date Analyzed: 28-Nov-20

Prep Batch: 3H201123-2
QCBatchID: 3H201123-2-1
Run ID: 3H201123-2A
Count Time: 90 minutes
Report Basis: Unfiltered

Final Aliquot: 9.84 ml
Prep Basis: Unfiltered
Moisture(%): 100.000
Result Units: pCi/l
File Name: B60_13_112701

Analysis ReqCode: SMR_TRITIUM_L

| CASNO | Target Nuclide | Matrix Spike | Sample Results | MDC | Spike Added | % Rec | Control Limits | Lab Qualifier |
|------------|----------------|--------------|----------------|----------|-------------|-------|----------------|---------------|
| 10028-17-8 | H-3 | 1.33E+04 | -2.85E+01 | 3.23E+02 | 1.550E+04 | 85.6 | 75 - 125 | |

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: H32011173-1

Tritium by Liquid Scintillation

PAI 704 Rev 13

Matrix Spike Results

Lab Name: ALS -- Fort Collins
Work Order Number: 2011173
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, November 2020 S21-011

| | |
|------------------|--------------|
| Field ID: | Shared QC |
| Lab ID: | 2011101-1MSD |

Sample Matrix: WATER
Prep SOP: PAI 700 Rev 15
Date Collected: 05-Nov-20
Date Prepared: 23-Nov-20
Date Analyzed: 28-Nov-20

Prep Batch: 3H201123-2
QCBatchID: 3H201123-2-1
Run ID: 3H201123-2A
Count Time: 90 minutes
Report Basis: Unfiltered

Final Aliquot: 9.84 ml
Prep Basis: Unfiltered
Moisture(%): 100.000
Result Units: pCi/l
File Name: B60_13_112701

Analysis ReqCode: SMR_TRITIUM_L

| CASNO | Target Nuclide | Matrix Spike | Sample Results | MDC | Spike Added | % Rec | Control Limits | Lab Qualifier |
|------------|----------------|--------------|----------------|----------|-------------|-------|----------------|---------------|
| 10028-17-8 | H-3 | 1.40E+04 | -2.85E+01 | 3.23E+02 | 1.550E+04 | 90.0 | 75 - 125 | |

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: H32011173-1

Tritium by Liquid Scintillation

PAI 704 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|-----------|-----------|
| Field ID: | Shared QC |
| Lab ID: | 2011101-1 |

Sample Matrix: WATER

Prep Batch: 3H201123-2

Final Aliquot: 10.0 ml

Prep SOP: PAI 700 Rev 15

QCBatchID: 3H201123-2-1

Prep Basis: Unfiltered

Date Collected: 05-Nov-20

Run ID: 3H201123-2A

Moisture(%): 100.000

Date Prepared: 23-Nov-20

Count Time: 90 minutes

Result Units: pCi/l

Date Analyzed: 28-Nov-20

Report Basis: Unfiltered

File Name: B60_13_112701

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|------------------------|----------|---------------|----|---------------|
| 10028-17-8 | H-3 | -2.85E+01 +/- 1.88E+02 | 3.18E+02 | 4E+02 | NA | U |

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: H32011173-1

Tritium by Liquid Scintillation

PAI 704 Rev 13

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|-----------|--------------|
| Field ID: | Shared QC |
| Lab ID: | 2011101-1MSD |

Sample Matrix: WATER

Prep SOP: PAI 700 Rev 15

Date Collected: 05-Nov-20

Date Prepared: 23-Nov-20

Date Analyzed: 28-Nov-20

Prep Batch: 3H201123-2

QCBatchID: 3H201123-2-1

Run ID: 3H201123-2A

Count Time: 90 minutes

Report Basis: Unfiltered

Final Aliquot: 9.84 ml

Prep Basis: Unfiltered

Moisture(%): 100.000

Result Units: pCi/l

File Name: B60_13_112701

| CASNO | Analyte | Sample | | | | Duplicate | | | | DER | DER Lim |
|------------|---------|--------------|----------|----------|-------|--------------|----------|----------|-------|------|---------|
| | | Result +/- | 2 s TPU | MDC | Flags | Result +/- | 2 s TPU | MDC | Flags | | |
| 10028-17-8 | H-3 | 1.33E+04 +/- | 2.06E+03 | 3.23E+02 | | 1.40E+04 +/- | 2.16E+03 | 3.23E+02 | | 0.23 | 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.

W - DER is greater than Warning Limit of 1.42

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: H32011173-1

Tritium by Liquid Scintillation

PAI 704 Rev 13

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|-----------|--------------|
| Field ID: | Shared QC |
| Lab ID: | 2011101-1MSD |

Sample Matrix: WATER

Prep SOP: PAI 700 Rev 15

Date Collected: 05-Nov-20

Date Prepared: 23-Nov-20

Date Analyzed: 28-Nov-20

Prep Batch: 3H201123-2

QCBatchID: 3H201123-2-1

Run ID: 3H201123-2A

Count Time: 90 minutes

Report Basis: Unfiltered

Final Aliquot: 9.84 ml

Prep Basis: Unfiltered

Moisture(%): 100.000

Result Units: pCi/l

File Name: B60_13_112701

| CASNO | Analyte | Sample | | | | Duplicate | | | | RPD | RPD Lim |
|------------|---------|--------------|----------|----------|-------|--------------|----------|----------|-------|------|---------|
| | | Result +/- | 2 s TPU | MDC | Flags | Result +/- | 2 s TPU | MDC | Flags | | |
| 10028-17-8 | H-3 | 1.33E+04 +/- | 2.06E+03 | 3.23E+02 | | 1.40E+04 +/- | 2.16E+03 | 3.23E+02 | | 5.00 | 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: H32011173-1

Tritium by Liquid Scintillation

PAI 704 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|------------------|-----------|
| Field ID: | Shared QC |
| Lab ID: | 2011106-1 |

Sample Matrix: WATER

Prep Batch: 3H201123-2

Final Aliquot: 10.0 ml

Prep SOP: PAI 700 Rev 15

QCBatchID: 3H201123-2-1

Prep Basis: Unfiltered

Date Collected: 05-Nov-20

Run ID: 3H201123-2A

Moisture(%): 100.000

Date Prepared: 23-Nov-20

Count Time: 90 minutes

Result Units: pCi/l

Date Analyzed: 28-Nov-20

Report Basis: Unfiltered

File Name: B60_13_112701

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|-----------------------|----------|---------------|----|---------------|
| 10028-17-8 | H-3 | 8.47E+02 +/- 2.47E+02 | 3.18E+02 | 4E+02 | 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: H32011173-1

Tritium by Liquid Scintillation

PAI 704 Rev 13

Sample Duplicate Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | | | |
|-----------------------------|----------------------------------|---------------------------------|---------------------------------|
| Field ID: Shared QC | Sample Matrix: WATER | Prep Batch: 3H201123-2 | Final Aliquot: 10.0 ml |
| Lab ID: 2011106-1DUP | Prep SOP: PAI 700 Rev 15 | QCBatchID: 3H201123-2-1 | Prep Basis: Unfiltered |
| | Date Collected: 05-Nov-20 | Run ID: 3H201123-2A | Moisture(%): 100.000 |
| | Date Prepared: 23-Nov-20 | Count Time: 90 minutes | Result Units: pCi/l |
| | Date Analyzed: 28-Nov-20 | Report Basis: Unfiltered | File Name: B60_13_112701 |

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|-----------------------|----------|---------------|----|---------------|
| 10028-17-8 | H-3 | 8.97E+02 +/- 2.52E+02 | 3.18E+02 | 4E+02 | 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.
- W - DER is greater than Warning Limit of 1.42

- 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: H32011173-1

Date Printed:

Thursday, December 03, 2020

ALS -- Fort Collins

LIMS Version: 7.012

Page 1 of 1

Tritium by Liquid Scintillation

PAI 704 Rev 13

Duplicate Sample Results (DER)

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|-----------|--------------|
| Field ID: | Shared QC |
| Lab ID: | 2011106-1DUP |

Sample Matrix: WATER

Prep SOP: PAI 700 Rev 15

Date Collected: 05-Nov-20

Date Prepared: 23-Nov-20

Date Analyzed: 28-Nov-20

Prep Batch: 3H201123-2

QCBatchID: 3H201123-2-1

Run ID: 3H201123-2A

Count Time: 90 minutes

Report Basis: Unfiltered

Final Aliquot: 10.0 ml

Prep Basis: Unfiltered

Moisture(%): 100.000

Result Units: pCi/l

File Name: B60_13_112701

| CASNO | Analyte | Sample | | | | Duplicate | | | | DER | DER Lim |
|------------|---------|--------------|----------|----------|-------|--------------|----------|----------|-------|-------|---------|
| | | Result +/- | 2 s TPU | MDC | Flags | Result +/- | 2 s TPU | MDC | Flags | | |
| 10028-17-8 | H-3 | 8.47E+02 +/- | 2.47E+02 | 3.18E+02 | | 8.97E+02 +/- | 2.52E+02 | 3.18E+02 | | 0.141 | 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.

W - DER is greater than Warning Limit of 1.42

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: H32011173-1

Tritium by Liquid Scintillation

PAI 704 Rev 13

Duplicate Sample Results (RPD)

Lab Name: ALS -- Fort Collins
Work Order Number: 2011173
Client Name: CH2M HILL Plateau Remediation Company
ClientProject ID: SURV, November 2020 S21-011

| | |
|------------------|--------------|
| Field ID: | Shared QC |
| Lab ID: | 2011106-1DUP |

| | | |
|----------------------------------|---------------------------------|---------------------------------|
| Sample Matrix: WATER | Prep Batch: 3H201123-2 | Final Aliquot: 10.0 ml |
| Prep SOP: PAI 700 Rev 15 | QCBatchID: 3H201123-2-1 | Prep Basis: Unfiltered |
| Date Collected: 05-Nov-20 | Run ID: 3H201123-2A | Moisture(%): 100.000 |
| Date Prepared: 23-Nov-20 | Count Time: 90 minutes | Result Units: pCi/l |
| Date Analyzed: 28-Nov-20 | Report Basis: Unfiltered | File Name: B60_13_112701 |

| CASNO | Analyte | Sample | | | | Duplicate | | | | RPD | RPD Lim |
|------------|---------|--------------|----------|----------|-------|--------------|----------|----------|-------|-----|---------|
| | | Result +/- | 2 s TPU | MDC | Flags | Result +/- | 2 s TPU | MDC | Flags | | |
| 10028-17-8 | H-3 | 8.47E+02 +/- | 2.47E+02 | 3.18E+02 | | 8.97E+02 +/- | 2.52E+02 | 3.18E+02 | | 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: H32011173-1

Tritium by Liquid Scintillation

PAI 704 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|------------------|-----------|
| Field ID: | B3Y4P7 |
| Lab ID: | 2011173-1 |

Sample Matrix: WATER

Prep Batch: 3H201123-2

Final Aliquot: 10.0 ml

Prep SOP: PAI 700 Rev 15

QCBatchID: 3H201123-2-1

Prep Basis: Unfiltered

Date Collected: 09-Nov-20

Run ID: 3H201123-2A

Moisture(%): 100.000

Date Prepared: 23-Nov-20

Count Time: 90 minutes

Result Units: pCi/l

Analysis ReqCode: SMR_TRITIUM_L

Date Analyzed: 28-Nov-20

Report Basis: Unfiltered

File Name: B60_13_112701

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|-----------------------|----------|---------------|----|---------------|
| 10028-17-8 | H-3 | 5.51E+03 +/- 8.90E+02 | 3.18E+02 | 4E+02 | 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: H32011173-1

Tritium by Liquid Scintillation

PAI 704 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins

Work Order Number: 2011173

Client Name: CH2M HILL Plateau Remediation Company

ClientProject ID: SURV, November 2020 S21-011

| | |
|------------------|-----------|
| Field ID: | B3Y4R0 |
| Lab ID: | 2011173-2 |

Sample Matrix: WATER

Prep SOP: PAI 700 Rev 15

Date Collected: 09-Nov-20

Date Prepared: 23-Nov-20

Date Analyzed: 28-Nov-20

Prep Batch: 3H201123-2

QCBatchID: 3H201123-2-1

Run ID: 3H201123-2A

Count Time: 90 minutes

Report Basis: Unfiltered

Final Aliquot: 10.0 ml

Prep Basis: Unfiltered

Moisture(%): 100.000

Result Units: pCi/l

File Name: B60_13_112701

Analysis ReqCode: SMR_TRITIUM_L

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Requested MDC | DL | Lab Qualifier |
|------------|----------------|-----------------------|----------|---------------|----|---------------|
| 10028-17-8 | H-3 | 5.72E+03 +/- 9.21E+02 | 3.18E+02 | 4E+02 | 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: H32011173-1

Prep Batch ID: 3H201123-2

| | | | |
|--|---|---|--|
| Start Date: 11/23/20 Start Time: 11:25 Prep Analyst: Reilly G. Stockton | End Date: 11/23/20 End Time: 11:25 | Concentration Method: NONE Extract Method: PAI 70015 Initial Volume Units: ml Final Volume Units: ml | Batch Created By: rgs Date Created: 11/23/20 Time Created: 11:27 Validated By: rgs Date Validated: 11/24/20 Time Validated: 13:08 |
|--|---|---|--|

Comments:

QC Batch ID: 3H201123-2-1

| Lab ID | QC Type | Field ID | Matrix | Date Collected | Initial Wt/Vol | Final Wt/Vol | Cleanup Method | Cleanup DF | Order Number |
|---------------|---------|----------|--------|----------------|----------------|--------------|----------------|------------|--------------|
| 3H201123-2 | MB | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011101 |
| 3H201123-2CB1 | MB | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011101 |
| 3H201123-2CB2 | MB | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011101 |
| 3H201123-2CB3 | MB | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011101 |
| 3H201123-2 | LCS | XXXXXX | WATER | XXXXXX | 30 | 9.8361 | NONE | 1 | 2011101 |
| 2011101-1 | MS | XXXXXX | WATER | XXXXXX | 30 | 9.8361 | NONE | 1 | 2011101 |
| 2011101-1 | MSD | XXXXXX | WATER | XXXXXX | 30 | 9.8361 | NONE | 1 | 2011101 |
| 2011106-1 | DUP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011106 |
| 2011101-1 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011101 |
| 2011101-2 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011101 |
| 2011101-3 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011101 |
| 2011101-4 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011101 |
| 2011102-1 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011102 |
| 2011106-1 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011106 |
| 2011150-1 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011150 |
| 2011155-1 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011155 |
| 2011173-1 | SMP | B3Y4P7 | WATER | 11/9/2020 | 30 | 10 | NONE | 1 | 2011173 |
| 2011173-2 | SMP | B3Y4R0 | WATER | 11/9/2020 | 30 | 10 | NONE | 1 | 2011173 |
| 2011174-1 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011174 |
| 2011175-1 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011175 |
| 2011175-2 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011175 |
| 2011175-3 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011175 |
| 2011225-2 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011225 |
| 2011225-5 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011225 |
| 2011285-2 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011285 |
| 2011313-1 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011313 |
| 2011313-2 | SMP | XXXXXX | WATER | XXXXXX | 30 | 10 | NONE | 1 | 2011313 |

Prep Batch ID: 3H201123-2

| | | | |
|---|--------------------|----------------------------|--------------------------|
| Start Date: 11/23/20 | End Date: 11/23/20 | Concentration Method: NONE | Batch Created By: rgs |
| Start Time: 11:25 | End Time: 11:25 | Extract Method: PAI 70015 | Date Created: 11/23/20 |
| Prep Analyst: Reilly G. Stockton | | Initial Volume Units: ml | Time Created: 11:27 |
| <u>Comments:</u> | | Final Volume Units: ml | Validated By: rgs |
| <div style="border: 1px solid black; height: 30px; width: 100%;"></div> | | | Date Validated: 11/24/20 |
| | | | Time Validated: 13:08 |

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 | |