

TestAmerica

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-28111-1

TestAmerica Sample Delivery Group: SL2856
Client Project/Site: F18-026

For:

CH2M Hill Plateau Remediation Company
PO BOX 1600, MS H8-41
Richland, Washington 99352

Attn: Mr. Scot Fitzgerald



Authorized for release by:
5/14/2018 3:38:09 PM

Jayna Awalt, Project Manager II
(314)298-8566
jayna.awalt@testamericainc.com



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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Client: CH2M Hill Plateau Remediation Company
Project/Site: F18-026

TestAmerica Job ID: 160-28111-1
SDG: SL2856

Job ID: 160-28111-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

CH2MHill Plateau Remediation Company
P.O. Box 1600
Richland, Washington 99352
May 14, 2018
Attention: Scot Fitzgerald

| | |
|-------------------|---------------|
| SDG | : SL2856 |
| Number of Samples | : 2 samples |
| Sample Matrix | : Water |
| Data Deliverable | : Summary |
| Date SDG Closed | : May 1, 2018 |

II. Introduction

On May 1, 2 samples were received by TestAmerica - St. Louis for analysis. The samples were received within temperature criteria. See the COC and receipt checklists for documentation of any variations on receipt conditions and temperature. Upon receipt, samples were given laboratory Ids to correspond with specific client Ids. Please refer to the Sample Summary sheets attached to this case narrative. This report is incomplete without the narrative.

The following SAFs are associated with this SDG: F18-026

III. Analytical Results/ Methodology

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits. All results are based upon samples as they were received, i.e. wet weight, unless otherwise noted on the data sheets. See the attached Methods Summary Form for the methods used in this SDG.

MS/MSD/Dup analysis was done per the client requirements. Analytical batches that did not contain matrix QC were analyzed with an LCS/LCS duplicate.

Note: For Metals analyses, per standard practice, all 6020 water and soil samples are initially prepared at 2x dilution. This standard dilution does not affect reporting limits as MDL studies are also prepared in the same manner. These dilutions do not necessitate a narrative note; however, they are flagged "D" due to a limitation in the LIMS.

For solid matrices, all Metals analyses (including Hg) use a Standard Reference Material for the Laboratory Control Sample (LCS). Certificate for this source material may be obtained from TASL.

For Anion analysis, samples have been started at a 2x dilution per CHPRC direction. The samples are flagged accordingly with a "D" flag if sample concentration is above the MDL/RL. Non-conformance will be included in the below section only if dilution is greater than 2x.

For WTPH methods, the lab utilizes method 8015B. Per CHPRC direction, the method name in the electronic data has been modified to read WTPH in the place of 8015B.

Per CHPRC direction, due to the short hold times for Nitrate, Nitrite and Phosphate by IC (48 hours) as well as pH analysis (24 hours), a SIR request is not needed when samples are run outside 1x hold but within 2x hold. A narrative comment will be included below if a sample is run outside the lab-specified hold time for waters.

For extractable and volatile organic analyses, several analytes are considered poor performers and will not meet CHPRC QC limits. Per CHPRC direction, the lab's statistical limits have been reported. Excursions outside these statistical limits will include a non-conformance in the sections below.

Client: CH2M Hill Plateau Remediation Company
Project/Site: F18-026

TestAmerica Job ID: 160-28111-1
SDG: SL2856

Job ID: 160-28111-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

IV. Definitions

| | |
|--------|--|
| QCBLK- | Quality Control Blank, Method Blank |
| QCLCS- | Quality Control Laboratory Control Sample, Blank Spike |
| DUP- | Laboratory Duplicate |
| MS- | Matrix Spike |
| MSD- | Matrix Spike Duplicate |

The term "Detection Limit" used in the analytical data report refers to either the lab's standard reporting limits or contractually required reporting limits, whichever is applicable.

The following data qualifiers may be applicable to the results in this report, as appropriate.

- **B** - For inorganic analyses, the sample result is greater than the MDL but less than the RL.
- **B** - For organic analyses, Method Blank contamination. The Method Blank contains the target analyte above the MDL/RL and Method Blank is greater than 5% of the sample concentration.
- **B** - For inorganics and radiochemistry, Method Blank reported above the MDC/MDL.
- **J** - For organic analyses, the sample is estimated and less than the RL. If on Method Blank, indicates Method Blank contamination.
- **C** - For inorganic analyses, Method Blank contamination. The Method Blank contains the target analyte at a concentration above the MDL/RL and Method Blank concentration is greater than 5% of the sample concentration.
- **D** - For all analyses, the sample result was obtained from the analysis of a dilution. For ICPMS Metals analyses, per standard practice, all samples are initially prepared at a 2x dilution. This standard dilution does not affect reporting limits as MDL studies are also prepared in the same manner and will not be narrated below. Only dilutions above 2x will be narrated and considered a true dilution for these samples.
- **N** - For inorganics, rad and GC analyses, the spike/spike duplicate recoveries are outside QC limits.
- **T** - For GCMS analyses, the spike/spike duplicate recoveries are outside QC limits.
- **o** - For all analyses, the LCS (LCSD) recoveries are outside QC limits.
- **P** - For organic analyses (PCB/Pests only), the aroclor target analyte has greater than 25% difference for detected concentrations between the two GC columns.
- **X**- Organics and Anions IC - Sample concentration over calibration and/or surrogate recovery outside QC limits.
- **X**- Inorganics - The analyte present in the original sample is > 4x the spike concentration.
- **X**- Radiochemistry - Carrier or Tracer recovery is outside limits.
- **Z**- Sample was prepped or analyzed beyond the specified sample holding time.
- **y** - RPD is outside established limits.

Tritium

Prep Batch: 364073

Due to the high concentration of Tritium, the matrix spike (MS) for preparation batch 160-363888 could not be evaluated for accuracy. The associated laboratory control sample (LCS) met acceptance criteria.

Gamma Spec

Prep Batch: 363498

The client has requested RPD be reported as precision criteria. The RPD tends to "inflate" at low sample activity (near and below the MDC) due to the high relative uncertainty of the measurements. At low activity the RER (relative error ratio) or DER (duplicate error ratio) are better indicators. The laboratory typically uses a dual criterion: either the RER is ≤ 1 or the RPD $\leq 40\%$ (or 30%, depending upon the matrix). The following samples did not meet the RPD criteria; however, the RER is within limits demonstrating good replicate precision. B3J6F8 (160-28111-1), B3J6H4 (160-28111-2) and (160-28111-E-1-B DU)

Strontium

Client: CH2M Hill Plateau Remediation Company
Project/Site: F18-026

TestAmerica Job ID: 160-28111-1
SDG: SL2856

Job ID: 160-28111-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

Prep Batch: 364881

The client has requested RPD be reported as precision criteria. The RPD tends to “inflate” at low sample activity (near and below the MDC) due to the high relative uncertainty of the measurements. At low activity the RER (relative error ratio) or DER (duplicate error ratio) are better indicators. The laboratory typically uses a dual criterion: either the RER is ≤ 1 or the RPD $\leq 40\%$ (or 30%, depending upon the matrix). The following samples did not meet the RPD criteria; however, the RER is within limits demonstrating good replicate precision.

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 signature on this report.

Reviewed and approved:

Jayna Awalt
St. Louis Project Manager



Login Sample Receipt Checklist

Client: CH2M Hill Plateau Remediation Company

Job Number: 160-28111-1

SDG Number: SL2856

Login Number: 28111

List Number: 1

Creator: Daniels, Brian J

List Source: TestAmerica St. Louis

| Question | Answer | Comment |
|---|--------|---------|
| Radioactivity wasn't checked or is \leq background as measured by a survey meter. | True | |
| The cooler's custody seal, if present, is intact. | True | |
| Sample custody seals, if present, are intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | N/A | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | 18.0 |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| Is the Field Sampler's name present on COC? | True | |
| There are no discrepancies between the containers received and the COC. | True | |
| Samples are received within Holding Time (excluding tests with immediate HTs) | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| Sample Preservation Verified. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4"). | N/A | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Residual Chlorine Checked. | N/A | |

| | | | | | |
|--|-----------------------|--|--|--------------------|-------------|
| CH2MHill Plateau Remediation Company | | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | | F18-026-064 | PAGE 1 OF 1 |
| COLLECTOR | Daniel King CHPRC | COMPANY CONTACT | LYNCH, SA | TELEPHONE NO. | 373-5586 |
| SAMPLING LOCATION | C9920, I-009 | PROJECT DESIGNATION | 100-KR-4 Long Term & Interim Action Monitoring - Water | | |
| ICE CHEST NO. | GWS-7277237 6-95 | FIELD LOGBOOK NO. | HNF-N-645 6-95 | | |
| SHIPPED TO | TestAmerica St. Louis | OFFSITE PROPERTY NO. | 9378 | | |
| PROJECT COORDINATOR | | SAF NO. | | METHOD OF SHIPMENT | |
| LYNCH, SA | | F18-026 | | ORIGINAL | |
| PURCHASE ORDER/CHARGE CODE | | 304762 | | FEDERAL EXPRESS | |
| BILL OF LADING/AIR BILL NO. 7721 1392 9931 | | | | | |

| | | | | |
|--|---|--|--|--------------------------|
| MATRIX* A=Air DL=Drum L=Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other | POSSIBLE SAMPLE HAZARDS/REMARKS *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. | PRESERVATION HNO3 to pH <2 None HNO3 to pH <2 | HNO3 to pH <2 None HNO3 to pH <2 | |
| | HOLDING TIME 6 Months | HOLDING TIME 6 Months | HOLDING TIME 6 Months | HOLDING TIME 6 Months |
| | TYPE OF CONTAINER G/P | TYPE OF CONTAINER P | TYPE OF CONTAINER G/P | TYPE OF CONTAINER G/P |
| | NO. OF CONTAINER(S) 4 | NO. OF CONTAINER(S) 1 | NO. OF CONTAINER(S) 1 | NO. OF CONTAINER(S) 1 |
| VOLUME 1L | VOLUME 250mL | VOLUME 250mL | VOLUME 1L | |
| SPECIAL HANDLING AND/OR STORAGE N/A | SAMPLE ANALYSIS SEE ITEM (1) IN SPECIAL INSTRUCTIONS | SAMPLE ANALYSIS 906.0 TRITIUM LSC COMMON (Tritium); | SAMPLE ANALYSIS 906.0 TRITIUM LSC COMMON (Tritium); | |
| SAMPLE NO. 0B316F8 | FILTERED No | MATRIX* WATER | SAMPLE DATE APR 30 2018 | SAMPLE TIME 0901 |



| | | | | |
|---|-------------------------------|--|--------------------------|--|
| CHAIN OF POSSESSION RELINQUISHED BY/REMOVED FROM Daniel King CHPRC | DATE/TIME APR 30 2018 1000 | SIGN/PRINT NAMES RECEIVED BY/STORED IN Tim Callaway CHPRC | DATE/TIME APR 30 2018 | SPECIAL INSTRUCTIONS TRVL-18-102 (1) GAMMA_GS: COMMON {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; |
| Daniel King CHPRC | DATE/TIME APR 30 2018 1400 | SIGN/PRINT NAMES RECEIVED BY/STORED IN Tim Callaway CHPRC | DATE/TIME APR 30 2018 | SPECIAL INSTRUCTIONS TRVL-18-102 (1) GAMMA_GS: COMMON {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; |
| Daniel King CHPRC | DATE/TIME APR 30 2018 | SIGN/PRINT NAMES RECEIVED BY/STORED IN Tim Callaway CHPRC | DATE/TIME APR 30 2018 | SPECIAL INSTRUCTIONS TRVL-18-102 (1) GAMMA_GS: COMMON {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; |
| Daniel King CHPRC | DATE/TIME APR 30 2018 | SIGN/PRINT NAMES RECEIVED BY/STORED IN Tim Callaway CHPRC | DATE/TIME APR 30 2018 | SPECIAL INSTRUCTIONS TRVL-18-102 (1) GAMMA_GS: COMMON {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; |

| | | | | | |
|---------------------------------------|--------|---|------------------------------|--------------------------------------|---------------------------------------|
| CH2M Hill Plateau Remediation Company | | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | | F18-026-069 | PAGE 1 OF 1 |
| COLLECTOR Daniel King CHPRC | 922856 | COMPANY CONTACT LYNCH, SA | TELEPHONE NO. 373-5586 | PROJECT COORDINATOR LYNCH, SA | REQUIRED TAT 15 Days |
| SAMPLING LOCATION C9920, I-009 DUP | | PROJECT DESIGNATION 100-KR-4 Long Term & Interim Action Monitoring - Water | ACTUAL SAMPLE DEPTH 71.83 | SAF NO. F18-026 | ORIGINAL |
| ICE CHEST NO. GWS 7377237 | | FIELD LOGBOOK NO. HNF-N-645 6-95 | | PURCHASE ORDER/CHARGE CODE 304762 | METHOD OF SHIPMENT FEDERAL EXPRESS |
| SHIPPED TO TestAmerica St. Louis | | OFFSITE PROPERTY NO. 9378 | | BILL OF LADING/AIR BILL NO. 7721 | 1352 9931 |

| MATRIX* | POSSIBLE SAMPLE HAZARDS/ REMARKS | PRESERVATION | HNO3 to pH | None | HNO3 to pH |
|---|---|---------------------|--------------------------------------|--------------------------------------|---|
| A=Air DL=Drum L=Liquid DS=Drum S=Solid L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WT=Wide X=Other | *Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1. | | <2 | 6 Months | <2 |
| | | HOLDING TIME | 6 Months | 6 Months | 6 Months |
| | | TYPE OF CONTAINER | G/P | P | G/P |
| | | NO. OF CONTAINER(S) | 4 | 1 | 1 |
| | | VOLUME | 1L | 250mL | 1L |
| | | SAMPLE ANALYSIS | SEE ITEM (1) IN SPECIAL INSTRUCTIONS | 906.0 TRITIUM USE: COMMON (Tritium); | SRTOT_SEP_PR EQUIP_GP: COMMON (Total beta radioisotom); |

0 of 19

| CHAIN OF POSSESSION | RELINQUISHED BY/REMOVED FROM | DATE/TIME | SIGN/ PRINT NAMES | RECEIVED BY/STORED IN | DATE/TIME |
|----------------------|------------------------------|------------------|-----------------------|-----------------------|-----------|
| Daniel King CHPRC | D.K.K. | APR 30 2018 1000 | Tim Callaway CHPRC | APR 30 2018 1000 | 1000 |
| | Tim Callaway CHPRC | APR 30 2018 1400 | FEDEX | FEDEX | |
| | | | B. J. Brandon | APR 30 2018 | |

SPECIAL INSTRUCTIONS
TRVL-18-102
(1) GAMMA_GS: COMMON {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155};

| | | | |
|--------------------------|-----------------|-------------|-----------|
| FINAL SAMPLE DISPOSITION | DISPOSAL METHOD | DISPOSED BY | DATE/TIME |
| | | | |



05/11/2018



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Actual delivery:

Tue 5/01/2018 8:50 am

EARTH CITY, MO US

Delivered

Signed for by: B.DANIELS

Travel History

| Date/Time | Activity | Location |
|------------------------------|------------------------------------|----------------|
| - 5/01/2018 - Tuesday | | |
| 8:50 am | Delivered | EARTH CITY, MO |
| 7:16 am | On FedEx vehicle for delivery | EARTH CITY, MO |
| 7:11 am | At local FedEx facility | EARTH CITY, MO |
| 5:23 am | At destination sort facility | BERKELEY, MO |
| 4:36 am | Departed FedEx location | MEMPHIS, TN |
| 12:47 am | Arrived at FedEx location | MEMPHIS, TN |
| - 4/30/2018 - Monday | | |
| 4:49 pm | Left FedEx origin facility | PASCO, WA |
| 2:57 pm | Picked up | PASCO, WA |
| 1:16 pm | Shipment information sent to FedEx | |

Shipment Facts

| | | | |
|---------------------------------|---|---------------------------|---------------------------|
| Tracking Number | 772113529931 | Service | FedEx Priority Overnight |
| Weight | 36 lbs / 16.33 kgs | Signature services | Direct signature required |
| Delivered To | Shipping/Receiving | Total pieces | 1 |
| Total shipment weight | 36 lbs / 16.33 kgs | Terms | Third Party |
| Shipper reference | 9378 | Packaging | Your Packaging |
| Special handling section | Deliver Weekday, Additional Handling Surcharge, Direct Signature Required | Standard transit | 5/01/2018 by 10:30 am |

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Client: CH2M Hill Plateau Remediation Company
Project/Site: F18-026

TestAmerica Job ID: 160-28111-1
SDG: SL2856

Qualifiers

Rad

| Qualifier | Qualifier Description |
|-----------|---|
| U | Result is less than the sample detection limit. |
| y | Duplicate analysis not within control limits. |

Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|----------------|---|
| α | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CNF | Contains No Free Liquid |
| DER | Duplicate Error Ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL | Detection Limit (DoD/DOE) |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision Level Concentration (Radiochemistry) |
| EDL | Estimated Detection Limit (Dioxin) |
| LOD | Limit of Detection (DoD/DOE) |
| LOQ | Limit of Quantitation (DoD/DOE) |
| MDA | Minimum Detectable Activity (Radiochemistry) |
| MDC | Minimum Detectable Concentration (Radiochemistry) |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| NC | Not Calculated |
| ND | Not Detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC | Quality Control |
| RER | Relative Error Ratio (Radiochemistry) |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F18-026

TestAmerica Job ID: 160-28111-1
 SDG: SL2856

| Method | Method Description | Protocol | Laboratory |
|---------------|--|----------|------------|
| 906.0 | Tritium, Total (LSC) | EPA | TAL SL |
| GA-01-R | Cesium-137 & Other Gamma Emitters (GS) | DOE | TAL SL |
| SR-03-RC | Total Beta Strontium (GFPC) | DOE | TAL SL |
| Fill_Geo-0 | Fill Geometry, No In-Growth | None | TAL SL |
| LSC_Dist_Susp | Distillation and Suspension (LSC) | None | TAL SL |
| PrecSep_0 | Preparation, Precipitate Separation | None | TAL SL |

Protocol References:

- DOE = U.S. Department of Energy
- EPA = US Environmental Protection Agency
- None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Client: CH2M Hill Plateau Remediation Company
Project/Site: F18-026

TestAmerica Job ID: 160-28111-1
SDG: SL2856

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---------------|------------------|--------|----------------|----------------|
| 160-28111-1 | B3J6F8 | Water | 04/30/18 09:01 | 05/01/18 09:00 |
| 160-28111-2 | B3J6H4 | Water | 04/30/18 09:01 | 05/01/18 09:00 |

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05/14/2018
Client Sample Results

REV. 0

Client: CH2M Hill Plateau Remediation Company
Project/Site: F18-026

TestAmerica Job ID: 160-28111-1
SDG: SL2856

Method: 906.0 - Tritium, Total (LSC)

Client Sample ID: B3J6F8
Date Collected: 04/30/18 09:01
Date Received: 05/01/18 09:00

Lab Sample ID: 160-28111-1
Matrix: Water

| Analyte | Result | Qualifier | Count Uncert. (2σ+/-) | Total Uncert. (2σ+/-) | RL | MDC | Unit | Prepared | Analyzed | Dil Fac |
|---------|--------|-----------|-----------------------------|-----------------------------|-----|-----|-------|----------------|----------------|---------|
| Tritium | 27600 | | 1010 | 2630 | 500 | 302 | pCi/L | 05/03/18 17:35 | 05/04/18 03:22 | 1 |

Client Sample ID: B3J6H4
Date Collected: 04/30/18 09:01
Date Received: 05/01/18 09:00

Lab Sample ID: 160-28111-2
Matrix: Water

| Analyte | Result | Qualifier | Count Uncert. (2σ+/-) | Total Uncert. (2σ+/-) | RL | MDC | Unit | Prepared | Analyzed | Dil Fac |
|---------|--------|-----------|-----------------------------|-----------------------------|-----|-----|-------|----------------|----------------|---------|
| Tritium | 28300 | | 1020 | 2690 | 500 | 300 | pCi/L | 05/03/18 17:35 | 05/04/18 04:08 | 1 |

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Client Sample ID: B3J6F8
Date Collected: 04/30/18 09:01
Date Received: 05/01/18 09:00

Lab Sample ID: 160-28111-1
Matrix: Water

| Analyte | Result | Qualifier | Count Uncert. (2σ+/-) | Total Uncert. (2σ+/-) | RL | MDC | Unit | Prepared | Analyzed | Dil Fac |
|--------------|--------|-----------|-----------------------------|-----------------------------|------|------|-------|----------------|----------------|---------|
| Cesium-137 | 2.25 | U | 7.05 | 7.06 | 15.0 | 8.49 | pCi/L | 05/01/18 17:32 | 05/06/18 16:56 | 1 |
| Cobalt-60 | 0.901 | U | 2.50 | 2.50 | | 10.6 | pCi/L | 05/01/18 17:32 | 05/06/18 16:56 | 1 |
| Europium-152 | 13.0 | U | 11.0 | 11.1 | | 41.8 | pCi/L | 05/01/18 17:32 | 05/06/18 16:56 | 1 |
| Europium-154 | 8.24 | U | 11.5 | 11.6 | | 79.3 | pCi/L | 05/01/18 17:32 | 05/06/18 16:56 | 1 |
| Europium-155 | 0.000 | U | 10.2 | 10.2 | | 35.1 | pCi/L | 05/01/18 17:32 | 05/06/18 16:56 | 1 |

Client Sample ID: B3J6H4
Date Collected: 04/30/18 09:01
Date Received: 05/01/18 09:00

Lab Sample ID: 160-28111-2
Matrix: Water

| Analyte | Result | Qualifier | Count Uncert. (2σ+/-) | Total Uncert. (2σ+/-) | RL | MDC | Unit | Prepared | Analyzed | Dil Fac |
|--------------|--------|-----------|-----------------------------|-----------------------------|------|------|-------|----------------|----------------|---------|
| Cesium-137 | 3.08 | U | 5.51 | 5.51 | 15.0 | 9.16 | pCi/L | 05/01/18 17:32 | 05/06/18 21:15 | 1 |
| Cobalt-60 | 3.65 | U | 7.03 | 7.04 | | 7.80 | pCi/L | 05/01/18 17:32 | 05/06/18 21:15 | 1 |
| Europium-152 | 13.2 | U | 25.2 | 25.3 | | 37.2 | pCi/L | 05/01/18 17:32 | 05/06/18 21:15 | 1 |
| Europium-154 | 0.828 | U | 1.70 | 1.70 | | 82.4 | pCi/L | 05/01/18 17:32 | 05/06/18 21:15 | 1 |
| Europium-155 | 3.17 | U | 10.6 | 10.6 | | 30.7 | pCi/L | 05/01/18 17:32 | 05/06/18 21:15 | 1 |

Method: SR-03-RC - Total Beta Strontium (GFPC)

Client Sample ID: B3J6F8
Date Collected: 04/30/18 09:01
Date Received: 05/01/18 09:00

Lab Sample ID: 160-28111-1
Matrix: Water

| Analyte | Result | Qualifier | Count Uncert. (2σ+/-) | Total Uncert. (2σ+/-) | RL | MDC | Unit | Prepared | Analyzed | Dil Fac |
|-----------------|---------------|------------------|-----------------------------|-----------------------------|------|-------|-------|-----------------|-----------------|----------------|
| Strontium 89/90 | 0.0269 | U | 0.0946 | 0.0947 | 2.00 | 0.166 | pCi/L | 05/09/18 20:16 | 05/13/18 17:49 | 1 |
| Carrier | %Yield | Qualifier | Limits | | | | | Prepared | Analyzed | Dil Fac |
| Sr Carrier | 94.9 | | 40 - 110 | | | | | 05/09/18 20:16 | 05/13/18 17:49 | 1 |

TestAmerica St. Louis

05/14/2018
Client Sample Results

REV. 0

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F18-026

TestAmerica Job ID: 160-28111-1
 SDG: SL2856

Method: SR-03-RC - Total Beta Strontium (GFPC)

Client Sample ID: B3J6H4
Date Collected: 04/30/18 09:01
Date Received: 05/01/18 09:00

Lab Sample ID: 160-28111-2
Matrix: Water

| Analyte | Result | Qualifier | Count Uncert. (2σ+/-) | Total Uncert. (2σ+/-) | RL | MDC | Unit | Prepared | Analyzed | Dil Fac |
|-----------------|---------|-----------|-----------------------------|-----------------------------|------|-------|-------|----------------|----------------|---------|
| Strontium 89/90 | 0.00425 | U | 0.0923 | 0.0923 | 2.00 | 0.167 | pCi/L | 05/09/18 20:16 | 05/13/18 17:49 | 1 |
| Carrier | %Yield | Qualifier | Limits | | | | | Prepared | Analyzed | Dil Fac |
| Sr Carrier | 89.3 | | 40 - 110 | | | | | 05/09/18 20:16 | 05/13/18 17:49 | 1 |

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05/14/2018
QC Sample Results

REV. 0

Client: CH2M Hill Plateau Remediation Company
Project/Site: F18-026

TestAmerica Job ID: 160-28111-1
SDG: SL2856

Method: 906.0 - Tritium, Total (LSC)

Lab Sample ID: MB 160-363888/1-A
Matrix: Water
Analysis Batch: 364073

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 363888

| Analyte | MB Result | MB Qualifier | Count Uncert. (2σ+/-) | Total Uncert. (2σ+/-) | RL | MDC | Unit | Prepared | Analyzed | Dil Fac |
|---------|-----------|--------------|-----------------------|-----------------------|-----|-----|-------|----------------|----------------|---------|
| Tritium | 94.14 | U | 171 | 172 | 500 | 291 | pCi/L | 05/03/18 17:35 | 05/04/18 02:15 | 1 |

Lab Sample ID: LCS 160-363888/2-A
Matrix: Water
Analysis Batch: 364073

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 363888

| Analyte | Spike Added | LCS Result | LCS Qual | Total Uncert. (2σ+/-) | RL | MDC | Unit | %Rec | %Rec. Limits |
|---------|-------------|------------|----------|-----------------------|-----|-----|-------|------|--------------|
| Tritium | 2750 | 2837 | | 429 | 500 | 284 | pCi/L | 103 | 80 - 120 |

Lab Sample ID: 160-28111-2 MS
Matrix: Water
Analysis Batch: 364073

Client Sample ID: B3J6H4
Prep Type: Total/NA
Prep Batch: 363888

| Analyte | Sample Result | Sample Qual | Spike Added | MS Result | MS Qual | Total Uncert. (2σ+/-) | RL | MDC | Unit | %Rec | %Rec. Limits |
|---------|---------------|-------------|-------------|-----------|---------|-----------------------|-----|-----|-------|------|--------------|
| Tritium | 28300 | | 2760 | 29450 | | 2780 | 500 | 284 | pCi/L | 41 | 75 - 125 |

Lab Sample ID: 160-28111-1 DU
Matrix: Water
Analysis Batch: 364073

Client Sample ID: B3J6F8
Prep Type: Total/NA
Prep Batch: 363888

| Analyte | Sample Result | Sample Qual | DU Result | DU Qual | Total Uncert. (2σ+/-) | RL | MDC | Unit | RPD | RPD Limit |
|---------|---------------|-------------|-----------|---------|-----------------------|-----|-----|-------|-----|-----------|
| Tritium | 27600 | | 27730 | | 2630 | 500 | 286 | pCi/L | 0.7 | 20 |

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-363498/1-A
Matrix: Water
Analysis Batch: 364167

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 363498

| Analyte | MB Result | MB Qualifier | Count Uncert. (2σ+/-) | Total Uncert. (2σ+/-) | RL | MDC | Unit | Prepared | Analyzed | Dil Fac |
|--------------|-----------|--------------|-----------------------|-----------------------|------|------|-------|----------------|----------------|---------|
| Cesium-137 | 0.494 | U | 6.06 | 6.06 | 15.0 | 10.7 | pCi/L | 05/01/18 17:32 | 05/06/18 18:10 | 1 |
| Cobalt-60 | 0.631 | U | 9.81 | 9.81 | | 11.2 | pCi/L | 05/01/18 17:32 | 05/06/18 18:10 | 1 |
| Europium-152 | 4.624 | U | 13.1 | 13.1 | | 40.2 | pCi/L | 05/01/18 17:32 | 05/06/18 18:10 | 1 |
| Europium-154 | 0.392 | U | 0.797 | 0.798 | | 92.3 | pCi/L | 05/01/18 17:32 | 05/06/18 18:10 | 1 |
| Europium-155 | -1.55 | U | 16.9 | 16.9 | | 26.5 | pCi/L | 05/01/18 17:32 | 05/06/18 18:10 | 1 |

Lab Sample ID: LCS 160-363498/2-A
Matrix: Water
Analysis Batch: 364168

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 363498

| Analyte | Spike Added | LCS Result | LCS Qual | Total Uncert. (2σ+/-) | RL | MDC | Unit | %Rec | %Rec. Limits |
|---------------|-------------|------------|----------|-----------------------|------|-----|-------|------|--------------|
| Americium-241 | 136000 | 134800 | | 15600 | | 356 | pCi/L | 99 | 80 - 120 |
| Cesium-137 | 45700 | 44250 | | 4430 | 15.0 | 112 | pCi/L | 97 | 80 - 120 |

TestAmerica St. Louis

Client: CH2M Hill Plateau Remediation Company
Project/Site: F18-026

TestAmerica Job ID: 160-28111-1
SDG: SL2856

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-363498/2-A
Matrix: Water
Analysis Batch: 364168

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 363498

| Analyte | Spike Added | LCS Result | LCS Qual | Total Uncert. (2σ+/-) | RL | MDC | Unit | %Rec | %Rec. Limits |
|-----------|-------------|------------|----------|-----------------------|----|------|-------|------|--------------|
| Cobalt-60 | 33900 | 32690 | | 3230 | | 73.0 | pCi/L | 96 | 80 - 120 |

Lab Sample ID: 160-28111-1 DU
Matrix: Water
Analysis Batch: 364269

Client Sample ID: B3J6F8
Prep Type: Total/NA
Prep Batch: 363498

| Analyte | Sample Result | Sample Qual | DU Result | DU Qual | Total Uncert. (2σ+/-) | RL | MDC | Unit | RPD | RPD Limit |
|--------------|---------------|-------------|-----------|---------|-----------------------|------|------|-------|-----|-----------|
| Cesium-137 | 2.25 | U | -5.37 | U y | 9.35 | 15.0 | 15.6 | pCi/L | 489 | 30 |
| Cobalt-60 | 0.901 | U | 4.479 | U y | 3.87 | | 6.34 | pCi/L | 133 | 30 |
| Europium-152 | 13.0 | U | 9.386 | U y | 17.6 | | 39.2 | pCi/L | 32 | 30 |
| Europium-154 | 8.24 | U | 22.36 | U y | 34.0 | | 81.6 | pCi/L | 92 | 30 |
| Europium-155 | 0.000 | U | -9.86 | U y | 20.2 | | 32.1 | pCi/L | 200 | 30 |

Method: SR-03-RC - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-364881/11-A
Matrix: Water
Analysis Batch: 365381

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 364881

| Analyte | MB Result | MB Qualifier | Count Uncert. (2σ+/-) | Total Uncert. (2σ+/-) | RL | MDC | Unit | Prepared | Analyzed | Dil Fac |
|-----------------|-----------|--------------|-----------------------|-----------------------|------|-------|-------|----------------|----------------|---------|
| Strontium 89/90 | -0.0377 | U | 0.0653 | 0.0654 | 2.00 | 0.126 | pCi/L | 05/09/18 20:16 | 05/13/18 17:50 | 1 |
| Carrier | MB %Yield | MB Qualifier | Limits | | | | | Prepared | Analyzed | Dil Fac |
| Sr Carrier | 98.2 | | 40 - 110 | | | | | 05/09/18 20:16 | 05/13/18 17:50 | 1 |

Lab Sample ID: LCS 160-364881/1-A
Matrix: Water
Analysis Batch: 365381

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 364881

| Analyte | Spike Added | LCS Result | LCS Qual | Total Uncert. (2σ+/-) | RL | MDC | Unit | %Rec | %Rec. Limits |
|-----------------|-------------|---------------|----------|-----------------------|------|-------|-------|------|--------------|
| Strontium 89/90 | 11.0 | 9.824 | | 0.823 | 2.00 | 0.175 | pCi/L | 89 | 80 - 120 |
| Carrier | LCS %Yield | LCS Qualifier | Limits | | | | | | |
| Sr Carrier | 96.8 | | 40 - 110 | | | | | | |

Lab Sample ID: 160-28111-1 DU
Matrix: Water
Analysis Batch: 365381

Client Sample ID: B3J6F8
Prep Type: Total/NA
Prep Batch: 364881

| Analyte | Sample Result | Sample Qual | DU Result | DU Qual | Total Uncert. (2σ+/-) | RL | MDC | Unit | RPD | RPD Limit |
|-----------------|---------------|-------------|-----------|---------|-----------------------|------|-------|-------|-----|-----------|
| Strontium 89/90 | 0.0269 | U | -0.0429 | U y | 0.0914 | 2.00 | 0.174 | pCi/L | 872 | 20 |

05/14/2018
QC Sample Results

REV. 0

Client: CH2M Hill Plateau Remediation Company
Project/Site: F18-026

TestAmerica Job ID: 160-28111-1
SDG: SL2856

Method: SR-03-RC - Total Beta Strontium (GFPC) (Continued)

Lab Sample ID: 160-28111-1 DU
Matrix: Water
Analysis Batch: 365381

Client Sample ID: B3J6F8
Prep Type: Total/NA
Prep Batch: 364881

| <i>Carrier</i> | <i>%Yield</i> | <i>DU DU</i> <i>Qualifier</i> | <i>Limits</i> |
|-------------------|---------------|----------------------------------|---------------|
| <i>Sr Carrier</i> | 87.9 | | 40 - 110 |

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Client: CH2M Hill Plateau Remediation Company
 Project/Site: F18-026

TestAmerica Job ID: 160-28111-1
 SDG: SL2856

Rad

Prep Batch: 363498

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|--------------------|--------------------|-----------|--------|------------|------------|
| 160-28111-1 | B3J6F8 | Total/NA | Water | Fill_Geo-0 | |
| 160-28111-2 | B3J6H4 | Total/NA | Water | Fill_Geo-0 | |
| MB 160-363498/1-A | Method Blank | Total/NA | Water | Fill_Geo-0 | |
| LCS 160-363498/2-A | Lab Control Sample | Total/NA | Water | Fill_Geo-0 | |
| 160-28111-1 DU | B3J6F8 | Total/NA | Water | Fill_Geo-0 | |

Prep Batch: 363888

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|--------------------|--------------------|-----------|--------|---------------|------------|
| 160-28111-1 | B3J6F8 | Total/NA | Water | LSC_Dist_Susp | |
| 160-28111-2 | B3J6H4 | Total/NA | Water | LSC_Dist_Susp | |
| MB 160-363888/1-A | Method Blank | Total/NA | Water | LSC_Dist_Susp | |
| LCS 160-363888/2-A | Lab Control Sample | Total/NA | Water | LSC_Dist_Susp | |
| 160-28111-2 MS | B3J6H4 | Total/NA | Water | LSC_Dist_Susp | |
| 160-28111-1 DU | B3J6F8 | Total/NA | Water | LSC_Dist_Susp | |

Prep Batch: 364881

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|--------------------|--------------------|-----------|--------|-----------|------------|
| 160-28111-1 | B3J6F8 | Total/NA | Water | PrecSep_0 | |
| 160-28111-2 | B3J6H4 | Total/NA | Water | PrecSep_0 | |
| MB 160-364881/11-A | Method Blank | Total/NA | Water | PrecSep_0 | |
| LCS 160-364881/1-A | Lab Control Sample | Total/NA | Water | PrecSep_0 | |
| 160-28111-1 DU | B3J6F8 | Total/NA | Water | PrecSep_0 | |



05/14/2018
Tracer/Carrier Summary

REV. 0

Client: CH2M Hill Plateau Remediation Company
Project/Site: F18-026

TestAmerica Job ID: 160-28111-1
SDG: SL2856

Method: SR-03-RC - Total Beta Strontium (GFPC)

Matrix: Water

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

| Lab Sample ID | Client Sample ID | Sr Carrier (40-110) | |
|----------------------|-------------------------|--------------------------------|--|
| 160-28111-1 | B3J6F8 | 94.9 | |
| 160-28111-1 DU | B3J6F8 | 87.9 | |
| 160-28111-2 | B3J6H4 | 89.3 | |
| LCS 160-364881/1-A | Lab Control Sample | 96.8 | |
| MB 160-364881/11-A | Method Blank | 98.2 | |

Tracer/Carrier Legend

Sr Carrier = Sr Carrier

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