TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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

TestAmerica Job ID: 160-28110-1
TestAmerica Sample Delivery Group: SL2855
Client Project/Site: I18-006

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

Attn: Mr. Scot Fitzgerald

Authorized for release by:
5/18/2018 4:28:21 PM

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

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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Job ID: 160-28110-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

CH2MHill Plateau Remediation Company
P.O. Box 1600
Richland, Washington 99352
May 18, 2018
Attention: Scot Fitzgerald

SDG	: SL2855
Number of Samples	: 1 sample
Sample Matrix	: Water
Data Deliverable	: Summary
Date SDG Closed	: October 7, 2017

II. Introduction

On May 18, 1 sample was 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: I18-006

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.

Job ID: 160-28110-1 (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: 363888

Due to the high concentration of Tritium, the matrix spike (MS) for preparation batch 160-363888 and analytical batch 160-364073 could not be evaluated for accuracy. The associated laboratory control sample (LCS) met acceptance criteria.

Technetium-99

Prep Batch: 364634

Insufficient sample volume was available to perform a sample duplicate (DUP). A laboratory control sample duplicate (LCS/LCSD) was preformed to display batch precision.

The detection goal was not met for the following sample due to a shortened count time attributed to high activity: B3HL94 (160-28110-1). Analytical results are reported with the detection limit achieved.

We certify that this data package is in compliance with the SOW, both technically and for completeness, including a full description of,

Job ID: 160-28110-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

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: 160-28110-1
SDG Number: SL2855

Login Number: 28110
List Number: 1
Creator: Daniels, Brian J

List Source: TestAmerica St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= 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 <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

366165

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. # I18-006-104
		Page 1 of 1

Collector:	Roger Friesz Jr. /CHPRC SL2855	**Contact/Requester:**	Karen Waters-Husted	**Telephone No.:**	509-376-4650
SAF No.:	I18-006	**Sampling Origin:**	Hanford Site	**Purchase Order/Charge Code:**	300071
Project Title:	AEA, MARCH 2018	**Logbook No.:**	HNF-N-506-99-34	**Ice Chest No.:**	GWS-237 ~~237~~ 11.2.18 237
Shipped To (Lab):	TestAmerica St. Louis	**Method of Shipment**	Commercial Carrier	**Bill of Lading/Air Bill No.:**	7721 3529931
Protocol	SURV	**Priority:**	30 Days	**Offsite Property No.:**	9378

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
B3HL94	N	W	4-30-18	1000	1x250-mL P	906.0_TRITIUM_LSC: COMMON	6 Months	None
B3HL94	N	W	4-30-18	1000	1x500-mL G/P	TC99_SEP_LSC: COMMON	6 Months	HNO3 to pH <2

05/18/2018

	Print First and Last Name	Signature	Date/Time
Relinquished By:	Roger Friesz Jr. /CHPRC		APR 30 2018 1050
Received By:	Tim Calloway /CHPRC		APR 30 2018 1050
Relinquished By:	Tim Calloway /CHPRC		APR 30 2018 1400
Received By:	FEDEX		
Relinquished By:	FEDEX		
Received By:			5/1/18 0900
Relinquished By:			
Received By:			

Matrix *

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

REV.0

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

Printed On 1/15/2018 FSR ID = FSR57136 A-6004-842 (REV 3)

IMPORTANT!
FedEx is closely monitoring the winter storms across portions of the U.S. Learn More

FedEx® Tracking

772113529931

Ship date:
Mon 4/30/2018

Richland, WA US

Delivered
Signed for by: B.DANIELS

Actual delivery:
Tue 5/01/2018 8:50 am

EARTH CITY, MO US

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

Client: CH2M Hill Plateau Remediation Company
Project/Site: I18-006

TestAmerica Job ID: 160-28110-1
SDG: SL2855

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	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)

Method Summary

Client: CH2M Hill Plateau Remediation Company
Project/Site: I18-006

TestAmerica Job ID: 160-28110-1
SDG: SL2855

Method	Method Description	Protocol	Laboratory
906.0	Tritium, Total (LSC)	EPA	TAL SL
TC-02-RC	Technetium-99 (LSC)	DOE	TAL SL
Ext_Chrom_LSC	Preparation, Extraction Chromatography	None	TAL SL
LSC_Dist_Susp	Distillation and Suspension (LSC)	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

Sample Summary

Client: CH2M Hill Plateau Remediation Company
Project/Site: I18-006

TestAmerica Job ID: 160-28110-1
SDG: SL2855

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-28110-1	B3HL94	Water	04/30/18 10:00	05/01/18 09:00

Client: CH2M Hill Plateau Remediation Company
Project/Site: I18-006

TestAmerica Job ID: 160-28110-1
SDG: SL2855

Method: 906.0 - Tritium, Total (LSC)

Client Sample ID: B3HL94
Date Collected: 04/30/18 10:00
Date Received: 05/01/18 09:00

Lab Sample ID: 160-28110-1
Matrix: Water

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tritium	3080		364	454	500	288	pCi/L	05/03/18 17:35	05/04/18 06:23	1

Method: TC-02-RC - Technetium-99 (LSC)

Client Sample ID: B3HL94
Date Collected: 04/30/18 10:00
Date Received: 05/01/18 09:00

Lab Sample ID: 160-28110-1
Matrix: Water

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium-99	3220		48.5	313	3.00	5.72	pCi/L	05/08/18 20:01	05/14/18 01:34	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tc-99m	*63.4*		*30 - 105*	*05/08/18 20:01*	*05/14/18 01:34*	*1*

Method: 906.0 - Tritium, Total (LSC)

Lab Sample ID: MB 160-363888/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 364073 — **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 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 364073 — **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-F-2-C MS — **Client Sample ID: Matrix Spike**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 364073 — **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-F-1-C DU — **Client Sample ID: Duplicate**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 364073 — **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: TC-02-RC - Technetium-99 (LSC)

Lab Sample ID: MB 160-364634/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 365880 — **Prep Batch: 364634**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium-99	-1.08	U	0.974	0.980	3.00	1.72	pCi/L	05/08/18 20:01	05/13/18 22:15	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tc-99m	*98.2*		*30 - 105*	*05/08/18 20:01*	*05/13/18 22:15*	*1*

Lab Sample ID: LCS 160-364634/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 365880 — **Prep Batch: 364634**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Technetium-99			30.9	31.20		3.49	3.00	1.75	pCi/L	101	80 - 120		

Method: TC-02-RC - Technetium-99 (LSC) (Continued)

Lab Sample ID: LCS 160-364634/2-A
Matrix: Water
Analysis Batch: 365880

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 364634

Tracer	LCS %Yield	LCS Qualifier	Limits
Tc-99m	95.5		30 - 105

Lab Sample ID: LCSD 160-364634/3-A
Matrix: Water
Analysis Batch: 365880

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 364634

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RPD	RPD Limit
Technetium-99			30.9	32.45		3.61	3.00	1.78	pCi/L	105	80 - 120	4	20

Tracer	LCSD %Yield	LCSD Qualifier	Limits
Tc-99m	94.4		30 - 105

QC Association Summary

Client: CH2M Hill Plateau Remediation Company
Project/Site: I18-006

TestAmerica Job ID: 160-28110-1
SDG: SL2855

Rad

Prep Batch: 363888

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-28110-1	B3HL94	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-F-2-C MS	Matrix Spike	Total/NA	Water	LSC_Dist_Susp	
160-28111-F-1-C DU	Duplicate	Total/NA	Water	LSC_Dist_Susp	

Prep Batch: 364634

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-28110-1	B3HL94	Total/NA	Water	Ext_Chrom_LSC	
MB 160-364634/1-A	Method Blank	Total/NA	Water	Ext_Chrom_LSC	
LCS 160-364634/2-A	Lab Control Sample	Total/NA	Water	Ext_Chrom_LSC	
LCSD 160-364634/3-A	Lab Control Sample Dup	Total/NA	Water	Ext_Chrom_LSC	

Tracer/Carrier Summary

Client: CH2M Hill Plateau Remediation Company
Project/Site: I18-006

TestAmerica Job ID: 160-28110-1
SDG: SL2855

Method: TC-02-RC - Technetium-99 (LSC)

Matrix: Water

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)							
Lab Sample ID	Client Sample ID	Tc-99m (30-105)							
160-28110-1	B3HL94	63.4							
LCS 160-364634/2-A	Lab Control Sample	95.5							
LCSD 160-364634/3-A	Lab Control Sample Dup	94.4							
MB 160-364634/1-A	Method Blank	98.2							

Tracer/Carrier Legend

Tc-99m = Tc-99m