

JUNE 21, 2016

Analytical Data Package Prepared For
CH2M Hill Plateau Remediation

Radiochemical Analysis By
TestAmerica Inc

2800 G.W. Way, Richland Wa, 99354, (509)-375-3131.

Assigned Laboratory Code: TARL

Data Package Contains 14 Pages

Report No.: 68798

Results in this report relate only to the sample(s) analyzed.

SDG No.	Order No.	Client Sample ID (List Order)	Lot-Sa No.	Work Order	Report DB ID	Batch No.
W07499	F16-050	S978427	J6F030433-1	M8P581AA	9M8P5810	6165048



Certificate of Analysis

CH2M Hill Plateau Remediation Company
P.O. Box 1600
Mail Stop – R3-60
Richland, WA 99352

June 20, 2016

Attention: Scot Fitzgerald

SAF Number	:	F16-050
Date SDG Closed	:	May 31, 2016
Number of Samples	:	One (1)
Sample Type	:	Filter
SDG Number	:	W07499
Data Deliverable	:	30-Day / Summary

CASE NARRATIVE

I. Introduction

On May 31, 2016, one sample was received at TestAmerica (TARL). Upon receipt, the sample was assigned a laboratory ID number to correspond with the CH2M specific ID. The facility COC sample ID number was changed to an ABCASH ID. For more information refer to the SIR that is attached to this report.

II. Sample Receipt

The sample was received in good condition and no anomalies were noted during check-in.

III. Analytical Results/Methodology

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information, analytical results and the appropriate associated statistical errors.

The requested analyses were:

Gas Proportional Counting
Gross Alpha by method RL-GPC-001
Gross Beta by method RL-GPC-001

IV. Quality Control

The analytical results for each analysis performed includes a minimum of one laboratory control sample (LCS), one method (reagent) blank, and one duplicate sample analysis. Any exceptions have been noted in the "Comments" section.

QC and sample results are reported in the same units.

V. Comments

Gas Proportional Counting

Gross Alpha by method RL-GPC-001:

No analytical or quality issues were noted. The sample result and associated batch QC results are within contractual requirements.

Gross Beta by method RL-GPC-001:

No analytical or quality issues were noted. The sample result and associated batch QC results are within contractual requirements.

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.

Reviewed and approved:


Digitally signed by Whitney
Ritari
Date: 2016.06.20 16:14:27
-07'00'

Whitney Ritari
Project Manager

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SAMPLE ISSUE RESOLUTION

SIR NUM SIR16-411
REV NUM 0
DATE INITIATED 6/9/2016

SAMPLE EVENT INFORMATION

SAF NUM(S) F16-050
OPERABLE UNIT(S)
PROJECT(S) 324 Bldg
SAMPLE EVENT TITLE(S) 324 Building Stack Air Filters
LABORATORY TestAmerica Incorporated, Richland

SAMPLING INFORMATION

NUMBER OF SAMPLES 1
SAMPLE NUMBERS S978427
SAMPLE MATRIX OTHER SOLID
COLLECTION DATE 5/31/2016 - 5/31/2016
SDG NUM W07499

ISSUE BACKGROUND

CLASS General Sample Management Direction
TYPE Sample Number Correction
DESCRIPTION The 324 Facility Chain of Custody sample number is 32401-1605. This is a facility specific sample ID. The results need to be reported back with an ABCASH ID.

DISPOSITION

DESCRIPTION Please report results back using the ABCASH ID of S978427.
JUSTIFICATION Final Disposition:

SUBMITTED BY: Heather Medley DATE: 06/09/2016
ACCEPTED BY: Whitney Ritari DATE: 06/14/2016

Drinking Water Method Cross References

DRINKING WATER ASTM METHOD CROSS REFERENCES		
Referenced Method	Isotope(s)	TestAmerica Richland's SOP No.
EPA 901.1	Cs-134, I-131	RL-GAM-001
EPA 900.0	Alpha & Beta	RL-GPC-001
EPA 00-02	Gross Alpha (Coprecipitation)	RL-GPC-002
EPA 903.0	Total Alpha Radium (Ra-226)	RL-RA-002
EPA 903.1	Ra-226	RL-RA-001
EPA 904.0	Ra-228	RL-RA-001
EPA 905.0	Sr-89/90	RL-GPC-003
ASTM D5174	Uranium	RL-KPA-003
EPA 906.0	Tritium	RL-LSC-005

Results in this report relate only to the sample(s) analyzed.

Uncertainty Estimation

TestAmerica Richland has adopted the internationally accepted approach to estimating uncertainties described in "NIST Technical Note 1297, 1994 Edition". The approach, "Law of Propagation of Errors", involves the identification of all variables in an analytical method which are used to derive a result. These variables are related to the analytical result (R) by some functional relationship, $R = \text{constants} * f(x,y,z,\dots)$. The components (x,y,z) are evaluated to determine their contribution to the overall method uncertainty. The individual component uncertainties (u_i) are then combined using a statistical model that provides the most probable overall uncertainty value. All component uncertainties are categorized as type A, evaluated by statistical methods, or type B, evaluated by other means. Uncertainties not included in the components, such as sample homogeneity, are combined with the component uncertainty as the square root of the sum-of-the-squares of the individual uncertainties. The uncertainty associated with the derived result is the combined uncertainty (u_c) multiplied by the coverage factor (1,2, or 3).

When three or more sample replicates are used to derive the analytical result, the type A uncertainty is the standard deviation of the mean value (S/\sqrt{n}), where S is the standard deviation of the derived results. The type B uncertainties are all other random or non-random components that are not included in the standard deviation.

The derivation of the general "Law of Propagation of Errors" equations and specific example are available on request.

Report Definitions

Action Lev	An agreed upon activity level used to trigger some action when the final result is greater than or equal to the Action Level. Often the Action Level is related to the Decision Limit.
Batch	The QC preparation batch number that relates laboratory samples to QC samples that were prepared and analyzed together.
Bias	Defined by the equation (Result/Expected)-1 as defined by ANSI N13.30.
COC No	Chain of Custody Number assigned by the Client or TestAmerica.
Count Error (#s)	Poisson counting statistics of the gross sample count and background. The uncertainty is absolute and in the same units as the result. For Liquid Scintillation Counting (LSC) the batch blank count is the background.
CSU (#s) <i>u_c Combined Standard Uncert.</i>	All known uncertainties associated with the preparation and analysis of the sample are propagated to give a measure of the uncertainty associated with the result, <i>u_c the combined standard uncertainty</i> . The uncertainty is absolute and in the same units as the result.
(#s), Coverage Factor	The coverage factor defines the width of the confidence interval, 1, 2 or 3 standard deviations.
CRDL (RL)	Contractual Required Detection Limit as defined in the Client's Statement Of Work or TestAmerica "default" nominal detection limit. Often referred to the reporting level (RL)
Lc	Decision Level based on instrument background or blank, adjusted by the Efficiency, Chemical Yield, and Volume associated with the sample. The Type I error probability is approximately 5%. $Lc = (1.645 * \sqrt{2 * (BkgrndCnt / BkgrndCntMin) / SCntMin}) * (ConvFct / (Eff * Yld * Abn * Vol) * IngrFct)$. For LSC methods the batch blank is used as a measure of the background variability. Lc cannot be calculated when the background count is zero.
Lot-Sample No	The number assigned by the LIMS software to track samples received on the same day for a given client. The sample number is a sequential number assigned to each sample in the Lot.
MDC MDA	Detection Level based on instrument background or blank, adjusted by the Efficiency, Chemical Yield, and Volume with a Type I and II error probability of approximately 5%. $MDC = (4.65 * \sqrt{(BkgrndCnt / BkgrndCntMin) / SCntMin} + 2.71 / SCntMin) * (ConvFct / (Eff * Yld * Abn * Vol) * IngrFct)$. For LSC methods the batch blank is used as a measure of the background variability.
Primary Detector	The instrument identifier associated with the analysis of the sample aliquot.
Ratio U-234/U-238	The U-234 result divided by the U-238 result. The U-234/U-238 ratio for natural uranium in NIST SRM 4321C is 1.038.
Rst/MDC	Ratio of the Result to the MDC. A value greater than 1 may indicate activity above background at a high level of confidence. Caution should be used when applying this factor and it should be used in concert with the qualifiers associated with the result.
Rst/TotUcert	Ratio of the Result to the Total Uncertainty. If the uncertainty has a coverage factor of 2 a value greater than 1 may indicate activity above background at approximately the 95% level of confidence assuming a two-sided confidence interval. Caution should be used when applying this factor and it should be used in concert with the qualifiers associated with the result.
Report DB No	Sample Identifier used by the report system. The number is based upon the first five digits of the Work Order Number.
RER	The equation Replicate Error Ratio = $(S - D) / [\sqrt{TPUs^2 + TPUD^2}]$ as defined by ICPT BOA where S is the original sample result, D is the result of the duplicate, TPUs is the total uncertainty of the original sample and TPUD is the total uncertainty of the duplicate sample.
SDG	Sample Delivery Group Number assigned by the Client or assigned by TestAmerica upon sample receipt.
Sum Rpt Alpha Spec Rst(s)	The sum of the reported alpha spec results for tests derived from the same sample excluding duplicate result where the results are in the same units.
Work Order	The LIMS software assign test specific identifier.
Yield	The recovery of the tracer added to the sample such as Pu-242 used to trace a Pu-239/40 method.

324 FACILITY
EFFLUENT SAMPLING CHAIN-OF-CUSTODY
STACK PARTICULATE SAMPLES

Company: WCH
Company Contact: Dan Johnson, 727-5258 Analysis Request: Gross Alpha/Beta

Unique Sample Number	Sample Point ID	EDP Code	On			Off			Comments		
			Date	Time	Flow Rate (cfm)	Vacuum ("wg)	Date	Time		Flow Rate (cfm)	Vacuum ("wg)
3201-1005	ESP-324-01-S	F025	4-28-16	0820	2.1	20	5-31-16	0830	2.2	14	ms858

Sample Collected By: [Signature] / 0010832 / 0010832
Signature HID#

Relinquished By: [Signature] / 0010832 / 0010832
Signature HID#

Received By: [Signature] / 0010832 / 0010832
Signature HID#

Relinquished By: _____ / _____ / _____
Signature HID#

Received By: _____ / _____ / _____
Signature HID#

Relinquished By: _____ / _____ / _____
Signature HID#

Received By: _____ / _____ / _____
Signature HID#

Relinquished By: _____ / _____ / _____
Signature HID#

Date: 5-31-16 Time: 0920

Date: 5/31/16 Time: 0920

Date: _____ Time: _____

LABORATORY FINAL SAMPLE DISPOSAL METHOD: _____ By: _____ Date: _____ Time: _____

WCH-FS-223 (05/15/2014)



J6F030433
WCH0499
Due 6-22-16

THE LEADER IN ENVIRONMENTAL TESTING

Date/Time Received: 5/31/16 0920 Container GM Screen Result: (Airlock) 0 cpm Initials AA
Sample GM Screen Result (Sample Receiving) 0 cpm Initials AA

Client: WETHPRE SDG #: W07499 SAF #: F14-050 NA []

Lot Number: JLF030433

Chain of Custody # N/A

Shipping Container ID or Air Bill Number : _____ NA AA

Samples received inside shipping container/cooler/box Yes [] Continue with 1 through 4. Initial appropriate response.
No AA Go to 5, add comment to #16.

- 1. Custody Seals on shipping container intact? Yes [] No [] No Custody Seal []
- 2. Custody Seals dated and signed? Yes [] No [] No Custody Seal []
- 3. Cooler temperature: _____ °C NA []
- 4. Vermiculite/packing materials is NA [] Wet [] Dry []

Item 5 through 16 for samples. Initial appropriate response.

5. Chain of Custody record present? Yes AA [] No []

6. Number of samples received (Each sample may contain multiple bottles): 1

7. Containers received: 1 x Bi-Hex

8. Sample holding times exceeded? NA AA [] Yes [] No []

9. Samples have: _____ tape _____ hazard labels _____ custody seals AA appropriate sample labels

10. Matrix: _____ A (FLT, Wipe, Solid, Soil) _____ I (Water) AA S (Air, Niosh 7400) _____ T (Biological, Ni-63)

11. Samples: AA are in good condition _____ are leaking _____ are broken
_____ have air bubbles (Only for samples requiring no head space) _____ Other

12. Sample pH appropriate for analysis requested Yes [] No [] NA AA
(If acidification is necessary go to pH area & document sample ID, initial pH, amount of HNO₃ added and pH after addition on table)

13. Were any anomalies identified in sample receipt? Yes [] No AA []

14. Description of anomalies (include sample numbers): NA AA []

15. Sample Location, Sample Collector Listed on COC? * Yes [] No AA []
*For documentation only. No corrective action needed.

16. Additional Information: HAND CARRIED ENVELOPE

[] Client/Courier denied temperature check. [] Client/Courier unpack cooler.

Sample Check-in List completed by Sample Custodian:
Signature: J. Anderson Date: 5/31/16

Client Notification needed? Yes [] No AA [] Date: _____
By: _____
Person contacted: _____

AA No action necessary; process as is
Project Manager Whitney Petani Date 6/7/16

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Sample Results Summary

Date: 20-Jun-16

TestAmerica Inc TARL

Ordered by Method, Batch No., Client Sample ID.

Report No. : 68798

SDG No: W07499

Batch	Client Id Work Order	Parameter	Result +- CSU (2 s)	Qual	Units	Tracer Yield	MDL	CRDL	RPD
6165048	ALPHA_GPC								
	S978427								
	M8P581AA	Alpha	3.43E-08 +- 6.6E-08	U	UCI/SA	100%	9.62E-08	1.00E-13	
		Beta	2.27E-07 +- 1.6E-07	U	UCI/SA	100%	2.47E-07	1.00E-13	
	S978427 DUP								
	M8P581AC	Alpha	-4.54E-08 +- 6.4E-08	U	UCI/SA	100%	1.06E-07	1.00E-13	-1435.0
		Beta	2.57E-07 +- 1.6E-07		UCI/SA	100%	2.49E-07	1.00E-13	12.4
	No. of Results:	4							

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QC Results Summary
TestAmerica Inc TARL
Ordered by Method, Batch No, QC Type,.

Date: 20-Jun-16

Report No. : 68798

SDG No.: W07499

Batch	Work Order	Parameter	Result +- CSU (2 s)	Qual	Units	Tracer Yield	LCS Recovery	Bias	MDL
ALPHA_GPC									
6165048	BLANK QC,								
	M8Q5X1AA	Alpha	2.42E-08 +- 5.5E-08	U	UCI/SA	100%			8.00E-08
		Beta	1.25E-09 +- 1.4E-07	U	UCI/SA	100%			2.34E-07
6165048	LCS,								
	M8Q5X1AC	Alpha	1.63E-05 +- 3.2E-06		UCI/SA	100%	90%	-0.1	8.32E-08
		Beta	6.44E-06 +- 1.0E-06		UCI/SA	100%	86%	-0.1	2.94E-07
No. of Results: 4									

FORM I

Date: 20-Jun-16

SAMPLE RESULTS

Lab Name: TestAmerica Inc
 Lot-Sample No.: J6F030433-1
 Client Sample ID: S978427

SDG: W07499
 Report No.: 68798
 COC No.:

Collection Date: 5/31/2016 8:30:00 AM
 Received Date: 5/31/2016 9:20:00 AM
 Matrix: FILTER

Ordered by Client Sample ID, Batch No.

Parameter	Result	Qual	Count Error (2 s)	CSU (2 s)	MDL, Action Lev	Rpt Unit, Lc	Yield CRDL(RL)	Rst/MDL, Rst/TotUcert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
Batch: 6165048	ALPHA_GPC				Work Order: M8P581AA	Report DB ID: 9M8P5810						
Alpha	3.43E-08	U	6.5E-08	6.6E-08	9.62E-08 UCI/SA	4.40E-08	100% 1.00E-13	0.36 (1.)	6/15/16 11:19 a	1.0	1.0	GPC29A
Beta	2.27E-07	U	1.5E-07	1.6E-07	2.47E-07 UCI/SA	1.20E-07	100% 1.00E-13	0.92 (2.9)	6/15/16 11:19 a	1.0	1.0	GPC29A

No. of Results: 2 Comments:

JUNE 21, 2016

FORM II

Date: 20-Jun-16

DUPLICATE RESULTS

Lab Name: TestAmerica Inc
 Lot-Sample No.: J6F030433-1
 Client Sample ID: S978427 DUP

SDG: W07499
 Report No.: 68798
 COC No.:

Collection Date: 5/31/2016 8:30:00 AM
 Received Date: 5/31/2016 9:20:00 AM
 Matrix: FILTER

Parameter	Result, Orig Rst	Qual	Count Error (2 s)	CSU (2 s)	MDL, Action Lev	Rpt Unit, CRDL	Yield	Rst/MDL, Rst/TotUcert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
Batch: 6165048	ALPHA_GPC								Orig Sa DB ID: 9M8P5810			
Alpha	-4.54E-08	U	6.4E-08	6.4E-08	1.06E-07	UCI/SA	100%	-0.43	6/14/16 05:27 p	1.0	1.0	GPC29B
Beta	3.43E-08	U	RPD 1.6E-07	RPD -1435.0	2.49E-07	1.00E-13	100%	-(1.4)	6/14/16 05:27 p	Sample	Sample	GPC29B
	2.57E-07	U	1.6E-07	1.6E-07	2.49E-07	UCI/SA	100%	(1.)	6/14/16 05:27 p	1.0	1.0	GPC29B
	2.27E-07	U	RPD 12.4	RPD 12.4		1.00E-13		(3.2)		Sample	Sample	

No. of Results: 2 Comments:

JUNE 21, 2016

FORM II

Date: 20-Jun-16

BLANK RESULTS

Lab Name: TestAmerica Inc

SDG: W07499

Matrix: FILTER

Report No. : 68798

Parameter	Result	Qual	Count Error (2 s)	CSU (2 s)	MDL, Lc	Rpt Unit, CRDL	Yield	Rst/MDL, Rst/TotUcert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
Batch: 6165048 ALPHA_GPC												
Work Order: M8Q5X1AA Report DB ID: M8Q5X1AB												
Alpha	2.42E-08	U	5.4E-08	5.5E-08	8.00E-08	UCI/SA	100%	0.3	6/14/16 05:27 p	1.0	1.0	GPC29C
Beta	1.25E-09	U	1.4E-07	1.4E-07	3.59E-08	1.00E-13	100%	0.89	6/14/16 05:27 p	Sample	Sample	GPC29C
					2.34E-07	UCI/SA	100%	0.01		Sample	1.0	GPC29C
					1.14E-07	1.00E-13		0.02		Sample	Sample	

No. of Results: 2 Comments:

JUNE 21, 2016

FORM II
LCS RESULTS

Date: 20-Jun-16

Lab Name: TestAmerica Inc

SDG: W07499

Matrix: FILTER

Report No. : 68798

Parameter	Result	Qual	Count Error (2 s)	CSU (2 s)	MDL	Report Unit	Yield	Expected	Expected Uncert	Recovery, Bias	Analysis, Prep Date	Aliquot Size	Primary Detector
Batch: 6165048	ALPHA_GPC												
			Work Order: M8Q5X1AC Report DB ID: M8Q5X1CS										
Alpha	1.63E-05		4.6E-07	3.2E-06	8.32E-08	UCI/SA	100%	1.80E-05	6.09E-07	90%	6/14/16 05:27 p	1.0	GPC29D
Beta	6.44E-06		3.4E-07	1.0E-06	2.94E-07	UCI/SA	100%	7.51E-06	1.49E-07	86%	6/14/16 05:27 p	1.0	GPC29D
							Rec Limits:	80	120	-0.1		Sample	
							Rec Limits:	80	120	-0.1		Sample	

No. of Results: 2 Comments:

JUNE 21, 2016