

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 15 Pages

Report No.: 72659

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.
W08045	NFM - AIR	S474675	J8D160403-1	NAQFA1AA	9NAQFA10	8115019
		S474678	J8D160403-2	NAQFC1AA	9NAQFC10	8115019
		S474679	J8D160403-3	NAQFD1AA	9NAQFD10	8115019



Certificate of Analysis

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

May 8, 2018

Attention: Scot Fitzgerald

SAF Number	:	FRC16-05
Date SDG Closed	:	April 16, 2018
Number of Samples	:	Three (3)
Sample Type	:	Filter
SDG Number	:	W08045
Data Deliverable	:	30-Day / Summary

CASE NARRATIVE

I. Introduction

On April 16, 2018, three samples were received at TestAmerica (TARL). Upon receipt, the samples were assigned a laboratory ID number to correspond with the CH2M specific ID.

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

CH2M Hill Plateau Remediation Company
May 8, 2018

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
Ashley L. Worthy
Date: 2018.05.08
12:22:47 -07'00'

Ashley L. Worthy
Project Manager

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 MDL	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.

38D160403

W08045

Mission Support Alliance CHAIN OF CUSTODY FOR ENVIRONMENTAL SURVEILLANCE AIR SAMPLE ANALYSIS		SAF No.: NFM - Air	COC No.: CHPRC 20180411 NFM
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Sample Collector: Felipe Garcia	Company Contact: Craig Perkins	Telephone No.: 509-376-2049	Project Designation: Environmental Surv.	Please refer to laboratory contract scope of work for composite and data deliverable details.
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Possible Sample Hazards: N/A	Field Logbook No./Page No.: N/A	Shipment: Govt Vehicle	Shipped To: Test America	Contract/Project No.: CHPRC Samples
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EDP Code	Analysis	Comments	EDP Code	Analysis	Comments
N482	Beta, Alpha	SAF FRC16-05 NAQFA	N/A	N/A	N/A
N517	Beta, Alpha	SAF FRC16-05 NAQFC	N/A	N/A	N/A
N518	Beta, Alpha	SAF FRC16-05 NAQFD	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A

Chain of Possession, Print First and Last Name, and Sign

Relinquished By/Remove From: Felipe Garcia Felipe Dan 920 4/11/2018	Date/Time: 4/11/2018	Received By/Stored In: 2724 WB locked 2 4/11/2018	Date/Time: 4/11/2018	Special Instructions Bill of Lading Information <input type="radio"/> FedEx <input type="radio"/> UPS <input type="radio"/> Other <input type="radio"/> N/A Tracking No.: HPT Sign/Date: Felipe Dan 4/16/2018 Radiological Survey Report: N-1800294 Reviewed By: <i>[Signature]</i>
Relinquished By/Remove From: 2724 WB locked storage 4/16/2018	Date/Time: 4/16/2018	Received By/Stored In: Felipe Garcia Felipe Dan 4/16/2018	Date/Time: 4/16/2018	
Relinquished By/Remove From: MSH 1435 Felipe Garcia Felipe Dan 4/16/2018	Date/Time: 4/16/2018	Received By/Stored In: B. Jorgenson TARL 4-16-18/1435	Date/Time: 4/16/2018	
Relinquished By/Remove From:	Date/Time:	Received By/Stored In:	Date/Time:	
Relinquished By/Remove From:	Date/Time:	Received By/Stored In:	Date/Time:	

LABORATORY SECTION	Received By: (Print First and Last Name)	Title:	Signature:	Date:
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Page 6 of 15

6 of 15

05/08/2018

REV.0

J8D160403

ABCASH 2 (C02 - Ver 2.0)
Report Date: 4/11/18 12:52

W08045
05/08/2018 Port Alliance e.o.c 2018 REV.0

SAMPLE CUSTODY CHANGE LIST

CUSTODY CHANGE REASON: ES to GEL/TestAmerica

Page 1 of 1
24/11/18
P93JF4
P920F2

Custody Changed By: ~~XXXXXXXXXX~~ Garza, Phil

<u>Sample Number</u>	<u>Location Code</u>	<u>Off Date/Time</u>	<u>Sample Collected by</u>
S474675	N482	04 / 11 / 2018 07:48	Garza, Phil
S474678	N517	04 / 11 / 2018 07:56	Garza, Phil
S474679	N518	04 / 11 / 2018 07:40	Garza, Phil

Total Custody Changes: 3

Delivered to: 222 S PFP GEL TestAmerica MO-285 Other

THE LEADER IN ENVIRONMENTAL TESTING

Date/Time Received: 4-16-18/1435 Container GM Screen Result: (Airlock) 0 cpm Initials: [Signature]
Sample GM Screen Result (Sample Receiving) 0 cpm Initials: [Signature]
Container Alpha Screen Result: (Airlock) 0 cpm Initials: [Signature]
Sample Alpha Screen Result (Sample Receiving) 0 cpm Initials: [Signature]
Client: FLH SDG #: W08045 SAF #: FRC16-05 NA []

Lot Number: J8D160403

Chain of Custody # 20180411CHPRC

Shipping Container ID or Air Bill Number : _____ NA [Signature]

Samples received inside shipping container/cooler/box Yes [] Continue with 1 through 4. Initial appropriate response.
No [Signature] [] 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 [Signature] [] No []
- 6. Number of samples received (Each sample may contain multiple bottles): 3
- 7. Containers received: 3 x filter

- 8. Sample holding times exceeded? NA [] Yes [] No [Signature]
- 9. Samples have: [Signature] tape _____ hazard labels _____ custody seals [Signature] appropriate sample labels
- 10. Matrix: _____ A (FLT, Wipe, Solid, Soil) _____ I (Water) [Signature] S (Air, Niosh 7400) _____ T (Biological, Ni-63)

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

12. Sample pH appropriate for analysis requested Yes [] No [] NA [Signature]
(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 [Signature]

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

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

16. Additional Information: N/A

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

Sample Check-in List completed by Sample Custodian:
Signature: [Signature] Date: 4-16-18

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

No action necessary; process as is
Project Manager [Signature] Date 4-17-18

05/08/2018

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Sample Results Summary

Date: 08-May-18

TestAmerica Inc TARL

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

Report No. : 72659

SDG No: W08045

Batch	Client Id Work Order	Parameter	Result +- CSU (2 s)	Qual	Units	Tracer Yield	MDL	CRDL	RPD
8115019	ALPHA_GPC								
	S474675								
	NAQFA1AA	Alpha	1.35E-06 +- 3.2E-07		JCI/SAMPLI	100%	8.56E-08	1.10E-07	
		Beta	1.04E-05 +- 1.6E-06		JCI/SAMPLI	100%	2.33E-07	1.10E-06	
	S474678								
	NAQFC1AA	Alpha	1.09E-06 +- 2.8E-07		JCI/SAMPLI	100%	8.66E-08	1.10E-07	
		Beta	1.06E-05 +- 1.6E-06		JCI/SAMPLI	100%	2.41E-07	1.10E-06	
	S474679								
	NAQFD1AA	Alpha	8.11E-07 +- 2.3E-07		JCI/SAMPLI	100%	7.00E-08	1.10E-07	
		Beta	1.07E-05 +- 1.6E-06		JCI/SAMPLI	100%	2.24E-07	1.10E-06	
No. of Results:		6							

TestAmerica Inc RPD - Relative Percent Difference.

rptTALRchSaSum
mary2 V5.8.5
A2002

05/08/2018

REV.0

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

Date: 08-May-18

Report No. : 72659

SDG No.: W08045

Table with columns: Batch, Work Order, Parameter, Result +- CSU (2 s), Qual, Units, Tracer Yield, LCS Recovery, Bias, MDL. Rows include ALPHA_GPC, 8115019 BLANK QC, and 8115019 LCS.

FORM I

Date: 08-May-18

SAMPLE RESULTS

Lab Name: TestAmerica Inc
 Lot-Sample No.: J8D160403-2
 Client Sample ID: S474678

SDG: W08045
 Report No.: 72659
 COC No.: FRC16-05

Collection Date: 4/11/2018 7:56:00 AM
 Received Date: 4/16/2018 2:35:00 PM
 Matrix: AIR 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/TotUcert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
Batch: 8115019	ALPHA_GPC				Work Order: NAQFC1AA	Report DB ID: 9NAQFC10						
Alpha	1.09E-06		1.8E-07	2.8E-07	8.66E-08	UCI/SAMPLE	100%	(12.6)	5/2/18 12:00 p	1.0	1.0	GPC29B
Beta	1.06E-05		3.5E-07	1.6E-06	2.41E-07	UCI/SAMPLE	100%	(44.1)	5/2/18 12:00 p	1.0	1.0	GPC29B
								(7.8)		Sample	Sample	
								(13.)		Sample	Sample	

05/08/2018

REV.0

No. of Results: 2 Comments:

12 of 15

FORM II

Date: 08-May-18

BLANK RESULTS

Lab Name: TestAmerica Inc

SDG: W08045

Matrix: AIR

Report No. : 72659

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: 8115019 ALPHA_GPC												
Work Order: NAQJ91AA Report DB ID: NAQJ91AB												
Alpha	4.30E-08	U	5.7E-08	5.8E-08	7.92E-08	UCI/SAMPL	100%	0.54	5/2/18 12:00 p	1.0	1.0	GPC29D
Beta	1.72E-07	U	1.4E-07	1.4E-07	3.51E-08	1.10E-07		(1.5)		Sample	Sample	
					2.30E-07	UCI/SAMPL	100%	0.75	5/2/18 12:00 p	1.0	1.0	GPC29D
					1.11E-07	1.10E-06		(2.4)		Sample	Sample	

No. of Results: 2 Comments:

05/08/2018

REV.0

14 of 15

FORM II
LCS RESULTS

Date: 08-May-18

Lab Name: TestAmerica Inc

SDG: W08045

Matrix: AIR

Report No. : 72659

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: 8115019	ALPHA_GPC												
				Work Order: NAQJ91AC Report DB ID: NAQJ91CS									
Alpha	1.56E-05		4.5E-07	3.1E-06	8.47E-08	UCI/SAMPL	100%	1.80E-05	6.09E-07	87%	5/3/18 10:53 a	1.0	GPC29A
Beta	6.25E-06		3.2E-07	9.9E-07	2.36E-07	UCI/SAMPL	100%	7.36E-06	1.46E-07	85%	5/3/18 10:53 a	1.0	GPC29A
							Rec Limits:	80	120	-0.1		Sample	
							Rec Limits:	80	120	-0.2		Sample	

No. of Results: 2 Comments:

05/08/2018

REV.0

15 of 15