

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 13 Pages*

Report No.: 72250

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.
W07956		S471304	J7K300403-1	NAJ6N1AA	9NAJ6N10	7347015



## Certificate of Analysis

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

December 29, 2017

Attention: Scot Fitzgerald

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SAF Number	:	F16-050
Date SDG Closed	:	November 30, 2017
Number of Samples	:	One (1)
Sample Type	:	Filter
SDG Number	:	W07956
Data Deliverable	:	30-Day / Summary

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### CASE NARRATIVE

#### **I. Introduction**

On November 30, 2017, 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

CH2M Hill Plateau Remediation Company  
December 29, 2017

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#### 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:

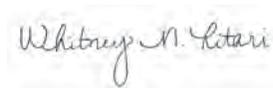
No analytical or quality issues were noted. The sample result and associated batch QC results are within contractual requirements.

###### 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: 2017.12.29  
11:39:44 -08'00'

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Whitney Ritari  
Project Manager

**SAMPLE ISSUE RESOLUTION (SIR) REPORT**

**SIR Number:** SIR18-0238  
**Rev. Number:** 0  
**Date Initiated:** 12/06/2017

**SAMPLE EVENT INFORMATION**

**SAF NUM(S):** F16-050  
**LABORATORY:** TARL

**SAMPLING INFORMATION**

**NUMBER OF SAMPLES:** 1  
**SAMPLE NUMBERS:** S471304  
**SAMPLE MATRIX:** OTHER SOLID  
**SDG NUM(S):**

**ISSUE BACKGROUND**

**CLASS:** Sample Management Issues  
**TYPE:** Sample Number Correction  
**DESCRIPTION:** The 324 Facility Chain of Custody sample number is 32401-1711. This is a facility specific sample ID. The results need to be reported back with an ABCASH ID.

**RESOLUTION**

**PROPOSED RESOLUTION:** Please report the results for 32401-1711 back using the ABCASH ID of S471304.

**FINAL RESOLUTION:****SUBMITTED BY:**

DOUGLAS, JG

12/06/2017

**ACCEPTED BY:**

Ritari, WM

12/29/2017

### 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

<b>Action Lev</b>	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.
<b>Batch</b>	The QC preparation batch number that relates laboratory samples to QC samples that were prepared and analyzed together.
<b>Bias</b>	Defined by the equation (Result/Expected)-1 as defined by ANSI N13.30.
<b>COC No</b>	Chain of Custody Number assigned by the Client or TestAmerica.
<b>Count Error (#s)</b>	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.
<b>CSU (#s) <i>u<sub>c</sub> Combined Standard Uncert.</i></b>	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<sub>c</sub> the combined standard uncertainty</i> . The uncertainty is absolute and in the same units as the result.
<b>(#s), Coverage Factor</b>	The coverage factor defines the width of the confidence interval, 1, 2 or 3 standard deviations.
<b>CRDL (RL)</b>	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)
<b>Lc</b>	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.
<b>Lot-Sample No</b>	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.
<b>MDC MDA MDL</b>	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.
<b>Primary Detector</b>	The instrument identifier associated with the analysis of the sample aliquot.
<b>Ratio U-234/U-238</b>	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.
<b>Rst/MDC</b>	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.
<b>Rst/TotUcert</b>	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.
<b>Report DB No</b>	Sample Identifier used by the report system. The number is based upon the first five digits of the <b>Work Order</b> Number.
<b>RER</b>	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.
<b>SDG</b>	Sample Delivery Group Number assigned by the Client or assigned by TestAmerica upon sample receipt.
<b>Sum Rpt Alpha Spec Rst(s)</b>	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.
<b>Work Order</b>	The LIMS software assign test specific identifier.
<b>Yield</b>	The recovery of the tracer added to the sample such as Pu-242 used to trace a Pu-239/40 method.

J7K300403

W07956

324 FACILITY

EFFLUENT SAMPLING CHAIN-OF-CUSTODY STACK PARTICULATE SAMPLES

Company: CHPRC

Company Contact: Dan Johnson, 376-0291

Analysis Request: Gross Alpha/Beta

Unique Sample Number	Sample Point ID	EDP Code	On			Off			Vacuum (wg)	Flow Rate (cfm)	Vacuum (wg)	Comments
			Date	Time	Flow Rate (cfm)	Vacuum (wg)	Date	Time				
32401-1711	ESP-324-01-S	F025	10/31/17	0810	2.1	25	11-30-17	0815	2.2	2.6	NASGN	

Sample Collected By: Tom Reisenauer

Print Name

*[Signature]*

Signature

0018832

HID #

Relinquished By: Tom Reisenauer

Print Name

*[Signature]*

Signature

11-30-17

Date

0855

Time

Received By: B. Jorgenson

Print Name

*[Signature]*

Signature

11-30-17

Date

0855

Time

Relinquished By: \_\_\_\_\_

Print Name

Signature

HID #

Date

Time

Received By: \_\_\_\_\_

Print Name

Signature

HID #

Date

Time

Relinquished By: \_\_\_\_\_

Print Name

Signature

HID #

Date

Time

LABORATORY FINAL SAMPLE DISPOSAL METHOD: \_\_\_\_\_



By: \_\_\_\_\_

Print Name

Signature

Date

Time

Date/Time Received: 11-30-17 10855 Container GM Screen Result: (Airlock) 0 cpm Initials BJ  
Sample GM Screen Result (Sample Receiving) 0 cpm Initials BJ

Client: FLH SDG #: WJ07956 SAF #: \_\_\_\_\_ NA BJ

Lot Number: J7K300403

Chain of Custody # NIA

Shipping Container ID or Air Bill Number : \_\_\_\_\_ NA BJ

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

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

Item 5 through 16 for samples. Initial appropriate response.

- 5. Chain of Custody record present? Yes BJ [ ] No [ ]
- 6. Number of samples received (Each sample may contain multiple bottles): 1
- 7. Containers received: 1 x filter

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

11. Samples: BJ 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 BJ [ ]  
(If acidification is necessary go to pH area & document sample ID, initial pH, amount of HNO<sub>3</sub> added and pH after addition on table)
- 13. Were any anomalies identified in sample receipt? Yes [ ] No BJ [ ]
- 14. Description of anomalies (include sample numbers): NA BJ [ ]

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

16. Additional Information: Envelope handed straight from client

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

Sample Check-in List completed by Sample Custodian:  
Signature: B. Jorgenson Date: 11-30-17

Client Notification needed? Yes [ ] No BJ [ ] Date: \_\_\_\_\_  
By: \_\_\_\_\_  
Person contacted: \_\_\_\_\_

[ ] No action necessary; process as is  
Project Manager Susan Jett Date 12-1-17

December 29, 2017

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Sample Results Summary

Date: 29-Dec-17

TestAmerica Inc TARL

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

Report No. : 72250

SDG No: W07956

Batch	Client Id Work Order	Parameter	Result +- CSU ( 2 s)	Qual	Units	Tracer Yield	MDL	CRDL	RPD
7347015	ALPHA_GPC								
	<b>S471304</b>								
	NAJ6N1AA	Alpha	2.56E-08 +- 5.9E-08	U	JCI/SAMPLI	100%	8.50E-08	1.10E-07	
		Beta	1.70E-07 +- 1.7E-07	U	JCI/SAMPLI	100%	2.49E-07	1.10E-06	
	No. of Results: 2								

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

Date: 29-Dec-17

Report No. : 72250

SDG No.: W07953

Batch	Work Order	Parameter	Result +- CSU ( 2 s)	Qual	Units	Tracer Yield	LCS Recovery	Bias	MDL
<b>ALPHA_GPC</b>									
7347015 BLANK QC,									
	NAKQ11AA	Alpha	5.29E-08 +- 7.4E-08	U	DI/SAMPLI	100%			1.06E-07
		Beta	1.81E-07 +- 1.6E-07	U	DI/SAMPLI	100%			2.39E-07
7347015 LCS,									
	NAKQ11AC	Alpha	1.57E-05 +- 6.3E-06		DI/SAMPLI	100%	87%	-0.1	1.04E-07
		Beta	6.08E-06 +- 2.3E-06		DI/SAMPLI	100%	82%	-0.2	2.57E-07
<b>No. of Results: 4</b>									

TestAmerica Inc Bias - (Result/Expected)-1 as defined by ANSI N13.30.  
 rptSTLRchQcSummary V5.8.5 A2002 U Qual - Analyzed for but not detected above limiting criteria, Mdc/Mda/Mdl, Total Uncert, RDL or not identified by gamma scan software.

**FORM I**

Date: 29-Dec-17

**SAMPLE RESULTS**

Lab Name: TestAmerica Inc  
 Lot-Sample No.: J7K300403-1  
 Client Sample ID: S471304

SDG: W07956  
 Report No.: 72250  
 COC No.: S18-011-469

Collection Date: 11/30/2017 8:15:00 AM  
 Received Date: 11/30/2017 8:55:00 AM  
 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: 7347015	ALPHA_GPC											
			Work Order: NAJ6N1AA Report DB ID: 9NAJ6N10									
Alpha	2.56E-08	U	5.8E-08	5.9E-08	8.50E-08	UCI/SAMPLE	100%	0.3	12/18/17 06:32 p	1.0	1.0	GPC29C
Beta	1.70E-07	U	1.5E-07	1.7E-07	2.49E-07	UCI/SAMPLE	100%	0.68	12/18/17 06:32 p	1.0	1.0	GPC29C
								(2.1)		g	g	

No. of Results: 2      Comments:

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TestAmerica Inc MDC|MDA,Lc - Detection, Decision Level based on instrument background or blank, adjusted by the sample Efficiency, Yield, and Volume.  
 rptSTLRLchSample U Qual - Analyzed for but not detected above limiting criteria, Mdc/Mda/Mdl, Total Uncert, RDL or not identified by gamma scan software.  
 V5.8.5 A2002

FORM II

Date: 29-Dec-17

BLANK RESULTS

Lab Name: TestAmerica Inc

SDG: W07953

Matrix: AIR

Report No.: 72250

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: 7347015 ALPHA_GPC												
Work Order: NAKQ11AA Report DB ID: NAKQ11AB												
Alpha	5.29E-08	U	7.1E-08	7.4E-08	1.06E-07	UCI/SAMPL	100%	0.5	12/19/17 11:57 a	1.0	1.0	GPC29A
Beta	1.81E-07	U	1.5E-07	1.6E-07	4.83E-08	1.10E-07		(1.4)		9	9	
					2.39E-07	UCI/SAMPL	100%	0.76	12/19/17 11:57 a	1.0	1.0	GPC29A
					1.16E-07	1.10E-06		(2.2)		9	9	

No. of Results: 2 Comments:

December 29, 2017

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**FORM II  
LCS RESULTS**

Date: 29-Dec-17

Lab Name: TestAmerica Inc

SDG: W07953

Matrix: AIR

Report No. : 72250

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: 7347015	ALPHA_GPC					Work Order: NAKQ11AC							
Alpha	1.57E-05		4.5E-07	6.3E-06	1.04E-07	UCI/SAMPL	100%	1.80E-05	6.09E-07	87%	12/19/17 11:57 a	1.0	GPC29B
Beta	6.08E-06		3.3E-07	2.3E-06	2.57E-07	UCI/SAMPL	100%	7.43E-06	1.48E-07	82%	12/19/17 11:57 a	1.0	GPC29B
							Rec Limits:			-0.1		g	
							Rec Limits:			-0.2		g	

No. of Results: 2      Comments:

December 29, 2017

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