

LABORATORY DATA CONSULTANTS, INC.

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ERM 2525 Natomas Park Drive, Suite 350

Sacramento, CA 95833

ATTN: Ms. Maria Barajas-Albalawi

SUBJECT: BRC Parcel A & B, Data Validation

Dear Ms. Barajas-Albalawi

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on October 10, 2007. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 17587:

SDG#	<u>Fraction</u>
F7I060299, F7I070122, F7I100119	Radium-226 & Radium-228, Isotopic Uranium & Isotopic Thorium

The data validation was performed under EPA Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

Please feel free to contact us if you have any questions.

Sincerely,

Erlinda T. Rauto

Operations Manager/Senior Chemist

October 19, 2007

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BRC Parcel A & B Data Validation Reports LDC# 17587

Radium-226 & Radium-228

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Parcel 4A & 4B

Collection Date:

September 5, 2007

LDC Report Date:

October 16, 2007

Matrix:

Soil

Parameters:

Radium-226 & Radium-228

Validation Level:

EPA Level III

Laboratory:

TestAmerica

Sample Delivery Group (SDG): F71060299

Sample Identification

TSB-AR-01-0'

TSB-AR-01-0'-Dup

TSB-AR-01-10'

TSB-AR-02-0'

TSB-AR-02-10'

TSB-AR-04-0'

TSB-AR-04-10'

TSB-AR-05-0'

TSB-AR-05-10'

TSB-AR-07-0'

TSB-AR-07-10'

TSB-AR-04-0'DUP

Introduction

This data review covers 12 soil samples listed on the cover sheet. The analyses were per EPA Method 901.1/RICH Method RC5017 for Radium-226 and Radium-228.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined for each detector and each radionuclide.

Self absorption factors were determined for each sample when applicable.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within laboratory control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. Blank results contained less than the minimum detectable activity (MDA).

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Relative percent differences (RPD) were within QC limits.

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

c. Chemical Recovery

All chemical recoveries were within validation criteria.

V. Minimum Detectable Activity

All minimum detectable activities met required detection limits.

VI. Sample Result Verification

Raw data were not reviewed for this SDG.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

Samples TSB-AR-01-0' and TSB-AR-01-0'-Dup were identified as field duplicates. No radium-226 or radium-228 was detected in any of the samples with the following exceptions:

	Activit	y (pCi/g)				
Isotope	TSB-AR-01-0'	TSB-AR-01-0'-Dup	RPD (Limits)	Flag	A or P	
Radium-226	1.08	0.959	12 (≤50)	-	-	
Radium-228	1.75	1.50	15 (≤50)	-	-	

BRC Parcel 4A & 4B Radium-226 & Radium-228 - Data Qualification Summary - SDG F7I060299

No Sample Data Qualified in this SDG

BRC Parcel 4A & 4B Radium-226 & Radium-228 - Laboratory Blank Data Qualification Summary - SDG F7I060299

No Sample Data Qualified in this SDG

BRC Parcel 4A & 4B Radium-226 & Radium-228 - Field Blank Data Qualification Summary - SDG F7I060299

No Sample Data Qualified in this SDG

SDG #: F7I060299 aboratory: Test America					Level III	WORKSHEE		Date: <u>10 - 10 - 0</u> Page: <u>1</u> of <u>1</u> Reviewer: <u>M</u>
γη. { METI								2nd Reviewer: 0/Method RICH=RC5005)
	samples listed below we ation findings worksheet		ewed for ea	ch of the	following validat	ion areas. Valida	ation findi	ngs are noted in attached
	Validatio	n Area				Cor	nments	
I.	Technical holding times			Α	Sampling dates:	9-5-07	٠	
lla.	Initial calibration			Α				
lib.	Calibration verification			Α				
111.	Blanks			A				
IVa.	Matrix Spike/(Matrix Spike	e) Duplic	ates	Α	DUP			
IVb.	Laboratory control sample	es		A	LCS			
IVc.	Chemical recovery			A				
V.	Sample result verification		N					
VI.	Minimum dectectable acti	A)	A	•				
VII.	Overall assessment of da	Overall assessment of data						
VIII.	Field duplicates			SW	D=1+2			
ΧIV	Field blanks			N				
lote: /alidal	A = Acceptable N = Not provided/applicat SW = See worksheet ted Samples:	ole	R = Rin		ds detected	D = Duplicate TB = Trip blank EB = Equipment b	olank	
1	TSB-AR-01-0'	11	TSB-AR-07-1	0'	21		31	
2	TSB-AR-01-0'-Dup	12	TSB-AR-04-0	DUP	22		32	
3	TSB-AR-01-10'	13	PBS		23		33	
4	TSB-AR-02-0'	14			24		34	
5	TSB-AR-02-10'	15			25		35	
6	TSB-AR-04-0'	16			26		36	
7	TSB-AR-04-10'	17			27		37	
8	TSB-AR-05-0'	18			28		38	
9	TSB-AR-05-10'	19			29		39	
10	TSB-AR-07-0'	20			30		40	

LDC #: 17587A 29 SDG #: F71060299

VALIDATION FINDINGS WORKSHEET Field Duplicates

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901.1 RICH-RC-5017) METHOD: Radiochemistry (Method:

(Y) N N/A

Were field duplicate pairs identified in this SDG?

	Activity (pci/g)	
Isotopes		2	RPD
Ra-226	1.08	0.959	12 (450)
Ra-226 Ra-228	1.75	1.50	15 ()
	Activity (.)	
Isotopes			RPD
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	Activity ()	=
Isotopes			RPD
	Activity ()	
Isotopes			RPD
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Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Parcel 4A & 4B

Collection Date:

September 6, 2007

LDC Report Date:

October 16, 2007

Matrix:

Soil/Water

Parameters:

Radium-226 & Radium-228

Validation Level:

EPA Level III

Laboratory:

TestAmerica

Sample Delivery Group (SDG): F71070122

Sample Identification

TSB-AR-08-0'

TSB-AR-08-10'

TSB-AR-11-0'

TSB-AR-11-0'-Dup

TSB-AR-11-10'

TSB-AR-14-0'

TSB-AR-14-10'

TSB-AR-13-0'

TSB-AR-13-10'

TSB-AR-10-0'

TSB-AR-10-10'

TSB-AR-9-0'

TSB-AR-9-10'

TSB-AR-12-0'

TSB-AR-12-10'

TSB-AR-3-0'

TSB-AR-3-10'

RINSATE 1

TSB-AR-13-0'DUP

Introduction

This data review covers 18 soil samples and one water sample listed on the cover sheet. The analyses were per EPA Method 901.1/RICH Method RC5017 for soil samples for Radium-226 and Radium-228, EPA Method 903.1/RICH Method RC5005 for water samples for Radium-226, and EPA Method 904.0/RICH Method RC5005 for water samples for Radium-228.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
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- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined for each detector and each radionuclide.

Self absorption factors were determined for each sample when applicable.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within laboratory control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. Blank results contained less than the minimum detectable activity (MDA).

Sample "RINSATE 1" was identified as a rinsate. No radium-226 or radium-228 was found in this blank.

IV. Accuracy and Precision Data

a. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Relative percent differences (RPD) were within QC limits.

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

c. Chemical Recovery

All chemical recoveries were within validation criteria.

V. Minimum Detectable Activity

All minimum detectable activities met required detection limits.

VI. Sample Result Verification

Raw data were not reviewed for this SDG.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

Samples TSB-AR-11-0' and TSB-AR-11-0'-Dup were identified as field duplicates. No radium-226 or radium-228 was detected in any of the samples with the following exceptions:

	Activity		
Isotope	TSB-AR-11-0'	TSB-AR-11-0'-Dup	RPD (Limits)
Radium-226	0.926	1.01	9 (≤50)
Radium-228	1.82	1.97	8 (≤50)

BRC Parcel 4A & 4B Radium-226 & Radium-228 - Data Qualification Summary - SDG F7I070122

No Sample Data Qualified in this SDG

BRC Parcel 4A & 4B Radium-226 & Radium-228 - Laboratory Blank Data Qualification Summary - SDG F7I070122

No Sample Data Qualified in this SDG

BRC Parcel 4A & 4B Radium-226 & Radium-228 - Field Blank Data Qualification Summary - SDG F7I070122

No Sample Data Qualified in this SDG

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Lapor	atory: Test America	1:	-12/		228 /50	a an	/	2104-Dr-50-71		Reviewer: MG 2nd Reviewer:		
Wat	-ery	(iun	- +26	, Kadium	708 (EP)	4 70 	(4/	Watery		2nd Reviewer: 0/Method RICH-RC5005		
METH	IOD: Radium 226 (EF	PAM	letho	d 903.1/Met	hod RICH	I-RC	5005)	Radium 228 (EPA	Method 904	0/Method RICH-RC5005		
	amples listed below v tion findings workshe			ewed for ea	ch of the	follov	ving v	alidation areas. Va	lidation findi	ngs are noted in attached		
	Validat	Area			Comments							
I.	Technical holding times	<u>. </u>			A	San	npling c	lates: 9-6-0	7			
lla.	Initial calibration				A							
llb.	Calibration verification				A							
III.	Blanks				A							
IVa.	Matrix Spike/(Matrix Spi	ke) [Duplica	ates	Α	I	9UP					
IVb.	Laboratory control samp	oles			A	L	_cs					
IVc.	Chemical recovery											
V.	Sample result verification	Sample result verification										
VI.	Minimum dectectable a	Minimum dectectable activity (MDA)										
VII.	Overall assessment of o	data			Α							
VIII.	Field duplicates				SW	I) ~ 3	+4				
XIV	Field blanks				ND	R= 18						
lote: ⁄alidate	A = Acceptable N = Not provided/applic SW = See worksheet ed Samples:	able		R = Rins	o compound sate eld blank	ls dete	ected	D = Duplicate TB = Trip blank EB = Equipme				
	TSB-AR-08-0'	S	11	TSB-AR-10-1	0'	S	21 9	PBW	31			
2	TSB-AR-08-10'		12	TSB-AR-9-0'			22		32			
3	TSB-AR-11-0'	Ш	13	TSB-AR-9-10			23		33			
4	TSB-AR-11-0'-Dup	\coprod	14	TSB-AR-12-0			24		34			
5	TSB-AR-11-10'	Ш	15	TSB-AR-12-1	0'		25		35			
3	TSB-AR-14-0'	Ш	16	TSB-AR-3-0'			26		36			
7	TSB-AR-14-10'	Ш	17	TSB-AR-3-10		1	27		37			
в	TSB-AR-13-0'		18 ^J	RINSATE 1		W	28		38			
9	TSB-AR-13-10'	Ш	19	TSB-AR-13-0	DUP	S	29		39			
10	TSB-AR-10-0'	1	20 (PBS			30		40			

LDC #: 17587B29 SDG #: F7T070122

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	/of/
Reviewer:_	MG
and reviewer.	1

			2nd reviewer:
IOD: Radiochemistry (Method:	see over)	
N/A Were field duplicate pa	irs identified in this SDG?		
N/A Were target isotopes de	etected in the field duplicate	pairs?	
		oC: /	
	i i	Ci/q,	_
Isotopes	3	4	RPD
Ra-226	0.926	1.01	9 (= 50)
Ra-228	1.82	1.97	8 (1)
			•.
	Activity (
Isotopes			RPD
	Activity ()	
Isotopes			RPD
	Activity () :	·
Isotopes			RPD

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Parcel 4A and 4B

Collection Date:

September 7, 2007

LDC Report Date:

October 16, 2007

Matrix:

Soil/Water

Parameters:

Radium-226 & Radium-228

Validation Level:

EPA Level III & IV

Laboratory:

Test America

Sample Delivery Group (SDG): F7I100119

Sample Identification

RINSATE 2

TSB-AR-06-0'

TSB-AR-06-0'-Dup

TSB-AR-06-10'

TSB-AJ-01-0'

TSB-AJ-01-10'**

TSB-AJ-02-0'**

TSB-AJ-02-0'-Dup**

TSB-AJ-02-10'**

TSB-AJ-03-0'**

TSB-AJ-03-10'**

TSB-BJ-06-0'**

TSB-BJ-06-10'**

TSB-BJ-01-0'**

TSB-BJ-01-10'**

TSB-BJ-02-0'**

TSB-BJ-02-10'**

TSB-BR-06-0'**

TSB-BR-06-10'**

TSB-AR-06-0'DUP

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 19 soil samples and one water sample listed on the cover sheet. The analyses were per EPA Method 901.1/RICH Method RC5017 for soil samples for Radium-226 and Radium-228, EPA Method 903.1/RICH Method RC5005 for water samples for Radium-226, and EPA Method 904.0/RICH Method RC5005 for water samples for Radium-228.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined for each detector and each radionuclide.

Self absorption factors were determined for each sample when applicable.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within laboratory control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. Blank results contained less than the minimum detectable activity (MDA).

Sample "RINSATE 2" was identified as a rinsate. No radium-226 or radium-228 was found in this blank.

IV. Accuracy and Precision Data

a. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

c. Chemical Recovery

All chemical recoveries were within validation criteria.

V. Minimum Detectable Activity

All minimum detectable activities met required detection limits.

VI. Sample Result Verification

All sample result verifications were acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

Samples TSB-AR-06-0' and TSB-AR-06-0'-Dup and samples TSB-AJ-02-0'** and TSB-AJ-02-0'-Dup** were identified as field duplicates. No radium-226 or radium-228 was detected in any of the samples with the following exceptions:

	Activity		
Isotope	TSB-AR-06-0'	TSB-AR-06-0'-Dup	RPD (Limits)
Radium-226	0.955	1.05	9 (≤50)
Radium-228	1.73	1.79	3 (≤50)

	Activit				
Isotope	TSB-AJ-02-0'**	TSB-AJ-02-0'-Dup**	RPD (Limits)		
Radium-226	1.19	1.08	10 (≤50)		
Radium-228	1.78	1.96	10 (≤50)		

BRC Parcel 4A and 4B Radium-226 & Radium-228 - Data Qualification Summary - SDG F7I100119

No Sample Data Qualified in this SDG

BRC Parcel 4A and 4B Radium-226 & Radium-228 - Laboratory Blank Data Qualification Summary - SDG F7I100119

No Sample Data Qualified in this SDG

BRC Parcel 4A and 4B Radium-226 & Radium-228 - Field Blank Data Qualification Summary - SDG F7I100119

No Sample Data Qualified in this SDG

LDC :	#: 17587C29	_ VA	ALIDATIO	N COMP	PLE.	TEN	ESS WORKSHE	ET	Date: 10 - 11-0
	#: <u>F7l100119</u>			L	eve	111/1	/		Page: 1_of_1
Labor	atory: Test America		_ ,		A) 1	10	(0.1 00 -0.7)		Reviewer: MG
50	atory: <u>lest America</u> il: Radium - 226, R ter	adiu	m-228 (EPA 9	01.1	/ K	16H-KC-3017)		2nd Reviewer:
METI	HOD: Radium 226 (EPA	Metho	d 903.1/Met	hod RICH	-RC	5005)	Radium 228 (EPA Me	ethod 904	.0/Method RICH-RC5005)
									·
	amples listed below we tion findings worksheets		ewed for ea	ch of the f	ollow	ing v	alidation areas. Valid	ation find	ings are noted in attached
vanue	aon maings worksheet	J .							
	Validatio	n Area					Coi	mments	
I.	Technical holding times			A	Sam	pling o	α -		
lla.	Initial calibration			À					
IIb.	Calibration verification			A					
III.	Blanks			A					
IVa.	Matrix Spike/(Matrix Spike)) Duplic	ates	Α	D	UP			
IVb.	Laboratory control sample:	s		A	L	.cs			
IVc.	Chemical recovery			A					
V.	/. Sample result verification			Α	Not	review	ed for Level III validation.		
VI.	I. Minimum dectectable activity (MDA)			Α					
VII.	Overall assessment of data			A			*** *** * **** **** **** **** **** **** ****		
VIII.	. Field duplicates			SW	D	=2+	D=7+8		
XIV	Field blanks			ND	<u> </u>	=			
	A = Acceptable N = Not provided/applicab SW = See worksheet ed Samples: ** Indicates sar		R = Rin: FB = Fie	eld blank		ected	D = Duplicate TB = Trip blank EB = Equipment	blank	,
12	RINSATE 2	/ 11	TSB-AJ-03-10)'**	S	21 1	PBS	31	
2	TSB-AR-06-0'	12	TSB-BJ-06-0'	**		22 7	PBW	32	
3	TSB-AR-06-0'-Dup	13	TSB-BJ-06-10)'**		23		33	
4	TSB-AR-06-10'	14	TSB-BJ-01-0'	**	\perp	24		34	
5	TSB-AJ-01-0'	15	TSB-BJ-01-10)'** 		25		35	
6	TSB-AJ-01-10'**	16	TSB-BJ-02-0'	**		26		36	
7	TSB-AJ-02-0'**	17	TSB-BJ-02-10)'**	-	27		37	
8	TSB-AJ-02-0'-Dup**	18	TSB-BR-06-0	**		28		38	
9	TSB-AJ-02-10'**	19	TSB-BR-06-1	0'**		29		39	

Notes:_				

TSB-AR-06-0'DUP

40

TSB-AJ-03-0'**

LDC #: 17587 C29 SDG #: F7 I 100119

VALIDATION FINDINGS CHECKLIST

Page: / of 2 Reviewer: MG 2nd Reviewer: _ ____

Method:Radiochemistry(EPA Method See cover)

			 	
Validation Area	Yes	No	NA	Findings/Comments
I, Technical holding times				
All technical holding times were met.	//			
II. Calibration	.,			
Were all instruments and detectors calibration as required?	1			
Were NIST traceable standards used for all calibrations?				!
Was the check source identified by activity and radionuclide?	1			·
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?				
III. Blanks				
Were blank analyses performed as required?	1			-
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		/		
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	,	/		
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	,			
Nas a duplicate sample anaylzed at the required frequency of 5% in this SDG?	V.			
Were all duplicate sample duplicate error rations (DER) <u><1.427</u> . つ 58				
/ Laboratory control samples				
Vas an LCS analyzed per analytical batch?	<u> </u>			
Vere the LCS percent recoveries (%R) and relative percent difference (RPD) vithin the 75-125%	V			·
l: Sample Chemical/Carrier Recovery				
las a tracer/carrier added to each sample?	<u> </u>			Water only
/ere tracer/carrier recoveries within the QC limits?	$\sqrt{}$			
II: Regional Quality Assurance and Quality Control				
ere performance evaluation (PE) samples performed?				
ere the performance evaluation (PE) samples within the acceptance limits?				
II. Sample Result Verification				
ere activities adjusted to reflect all sample dilutions and dry weight factors oplicable to level IV validation?	/			
ere the Minimum Detectable Activities (MDA) < RL?	/			

LDC #: 17587 C 29 SDG #: F7 I 10 O 119

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: MG
2nd Reviewer: ____

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			
X. Field:duplicates				
Field duplicate pairs were identified in this SDG.	/			į.
Target analytes were detected in the field duplicates.	/			
XI; Field blanks				
Field blanks were identified in this SDG.	/			
Target analytes were detected in the field blanks.		/		

LDC #: 17587C29 SDG #: F7I 100 119

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	of
Reviewer:	MC
2nd reviewer:	1~

METHOD: Radiochemistry (Method: See cover

N N/A ON N/A Were field duplicate pairs identified in this SDG?

Were target isotopes detected in the field duplicate pairs?

	Activity (oci/q,	÷
Isotopes	2	3	RPD
Ra-226	0.955	1.05	9 (450)
Ra-228	1.73	1.79	3 ()
			·

	Activity (pci/g.)	
Isotopes	7	8	RPD
. Ra-226	1.19	1.08	10 (±50)
Ra-208	1.78	1.96	10 (1)

	Activity ()	
Isotopes		RPD
		·

·	Activity ()	
Isotopes		RPD
		·

F71100119 LDC #: 17587C39 SDG #:

VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

of Page: 2nd Reviewer: Reviewer:

1.

METHOD: Radiochemistry (Method:___

see cover

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

%R = Found x 100 True

Where,

Found = activity of each analyte measured in the analysis of the sample. True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

S = Original sample activity D = Duplicate sample activity Where,

RPD = $\frac{|S-D_i|}{(S+D)/2} \times 100$

				<u></u>	Recalculated	Reported	
Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	%R or RPD	%R or RPD	Acceptable (Y/N)
	Laboratory control sample						
527		Cs-137	8.33 (PC:/4)	33 (Pcifg) 8.13 (Pcifg)	(02	103	>-
	Matrix spike sample						
		1	ì	1	1		-
Ç	Duplicate RPD	c	1	10.1	RERZ	RERZ	
0 P.		Ka-338	(pci/g)	(pci/q) (pci/q) (pci/q)	9.0	9.0	>
	Chemical recovery			i			
)	1	1	l	1	

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC	#:_[17587629
		F7T100119

CF = %R, Self-absorbance, abundance, ect.

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	of1
Reviewer:	MG
2nd reviewer:	10

$\frac{\partial DG}{\partial t} \frac{\pi}{\partial t} \frac{\partial T}{\partial t} \partial T$	Campie Calcalation Vermeation	reviewel
METHOD: Radiochemistry (Method:_	see cover	2nd reviewer:
N N/A Have results been re	l questions answered "N". Not applicable que ported and calculated correctly? calibrated range of the instruments?	estions are identified as "N/A".
Analyte results for # 6 Ra- and verified using the following equat		ted with a positive detect were recalculated
Activity =	Recalculation:	
(cpm - bckgrd cpm) (2.22)(E)(Vol)(CF)	0881/1000)	1.482 PCi/a
$E = Efficiency Vol = Volume$ $(\partial.\partial \partial) (O.O)$	3562) (0.4630) (53.10g)	1.482 PCi/g

#	Sample ID	Analyte	Reported Concentration	Calculated Concentration (PC:/g)	Acceptable (Y/N)	
	6	. Ra-226	1.48	1.48	Y	
		Ra-228	. 1.85	1.84		
		1 0		1		
2	11	Ra-236	0.955	0.956		
		Ra-228	1.70	1.68	•	
			•			
		'				
					·	
	,					
					and the second	

BRC Parcel A & B Data Validation Reports LDC# 17587

Isotopic Uranium & Isotopic Thorium



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Parcel 4A & 4B

Collection Date:

September 5, 2007

LDC Report Date:

October 16, 2007

Matrix:

Soil

Parameters:

Isotopic Uranium & Isotopic Thorium

Validation Level:

EPA Level III

Laboratory:

TestAmerica

Sample Delivery Group (SDG): F71060299

Sample Identification

TSB-AR-01-0'

TSB-AR-01-0'-Dup

TSB-AR-01-10'

TSB-AR-02-0'

TSB-AR-02-10'

TSB-AR-04-0'

TSB-AR-04-10'

TSB-AR-05-0'

TSB-AR-05-10'

TSB-AR-07-0'

TSB-AR-07-10'

TSB-AR-04-0'DUP

Introduction

This data review covers 12 soil samples listed on the cover sheet. The analyses were per Method RICH-RC5067 for Isotopic Uranium and Method RICH-RC5087 for Isotopic Thorium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined for each radionuclide of interest.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. Blank results contained less than the minimum detectable activity (MDA).

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

c. Tracer Recovery

All tracer recoveries were within validation criteria.

V. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

VI. Sample Result Verification

All sample result verifications were acceptable.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

Samples TSB-AR-01-0' and TSB-AR-01-0'-Dup were identified as field duplicates. No isotopic uranium or isotopic thorium was detected in any of the samples with the following exceptions:

	Activit	y (pCi/g)				
Isotope	TSB-AR-01-0'	TSB-AR-01-0'-Dup	RPD (Limits)	Difference (Limits)	Flag	A or P
Th-228	1.65	1.58	4 (≤50)	-	-	-
Th-230	1.44	1.03	33 (≤50)	-	-	-
Th-232	1.49	1.54	3 (≤50)	-	-	-
U-233/234	0.702	0.788	-	0.09 pCi/g (≤0.6)	-	-
U-235/236	0.0214	0.0217	-	0.0003 pCi/g(≤0.6)	-	-
U-238	0.412	0.470	-	0.06 pCi/g (≤0.6)		-

BRC Parcel 4A & 4B Isotopic Uranium & Isotopic Thorium - Data Qualification Summary - SDG F7I060299

No Sample Data Qualified in this SDG

BRC Parcel 4A & 4B Isotopic Uranium & Isotopic Thorium - Laboratory Blank Data Qualification Summary - SDG F7I060299

No Sample Data Qualified in this SDG

BRC Parcel 4A & 4B Isotopic Uranium & Isotopic Thorium - Field Blank Data Qualification Summary - SDG F7I060299

No Sample Data Qualified in this SDG

DC			LIDATIO			WORKSHEET	Date: 10-10-
	#:F7I060299 ratory:_Test America	· · · · · · · · · · · · · · · · · · ·	_		Level III		Page: <u> of </u>
abo	ratory. <u>Test America</u>		_				2nd Reviewer:
	Q _l	n9					
1ET	HOD: Isotopic Uranium	•	Wethod 908	Method F	RICH-RC5067),I:	sotopic Thorium (Metho	od RICH-RC-5087)
	·	•			•		,
	samples listed below we ation findings worksheel		ewed for ea	ch of the t	following validati	ion areas. Validation fir	ndings are noted in attache
	<u> </u>						
, , , , , , , , , , , , , , , , , , ,	Validatio	n Area	1			Comments	
· I.	Technical holding times			Α	Sampling dates:	9-5-07	
lla.				A			
IIb.				A	- N		
111.				A			
lVa		e) Duplic	ates	A	DUP		
lVa				A	LCS		
٧.				A			
VI.		Minimum Detectable Activity (MDA)		À			
VII.				N			
VIII				A			
IX.				SW	D = 1+2		
X	Field blanks						
_4	A A		ND - N		ll-444	D - Divellente	
ote:	A = Acceptable N = Not provided/applical	ole	R = Rin		is detected	D = Duplicate TB = Trip blank	
	SW = See worksheet		FB = Fi	eld blank		EB = Equipment blank	
	ted Samples:						
1	TSB-AR-01-0'	11	TSB-AR-07-1	0'	21	31	
2	TSB-AR-01-0'-Dup	12	TSB-AR-04-0	DUP	22	32	
3 :	TSB-AR-01-10'	13	PB5		23	33	
4	TSB-AR-02-0'	14			24	34	
5	TSB-AR-02-10'	15			25	35	
6	TSB-AR-04-0'	16			26	36	
7	TSB-AR-04-10'	17			27	37	
3	TSB-AR-05-0'	18			28	38	
9	TSB-AR-05-10'	19			29	39	
10	TSB-AR-07-0'	20			30	40	
otes						•	

LDC #: 17587A59 SDG #: F7T060299

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: 1 of 1
Reviewer: 6
2nd reviewer: 1

METHOD: Radiochemistry (Method: RICH-RC-5067 / RICH-)RC-5087

N N/A

 N N/A

 N N/A

Were field duplicate pairs identified in this SDG?

Were target isotopes detected in the field duplicate pairs?

	Activity (
Isotopes	1	2	RPD
Th-228	1.65	1.58	4 (=50)
Th-230	1.44	1.03	33 ()
Th-232	1.49	1.54	3 ()

	Activity (pci/g)	by di	by difference				
Isotopes		2	RPD RPD					
U-233/234	0.702	0.788	0.09 PC:/4	(= 0.6 pci/g				
U-235/236	0.0214	0.0217	0.0003	(
U-238	0.412	0.470	0.06					
·								

	Activity ()	
Isotopes			RPD
·			
·			

	Activity ()	·
Isotopes			RPD

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Parcel 4A & 4B

Collection Date:

September 6, 2007

LDC Report Date:

October 16, 2007

Matrix:

Soil/Water

Parameters:

Isotopic Uranium & Isotopic Thorium

Validation Level:

EPA Level III

Laboratory:

TestAmerica

Sample Delivery Group (SDG): F71070122

Sample Identification

TSB-AR-08-0'

TSB-AR-08-10'

TSB-AR-11-0'

TSB-AR-11-0'-Dup

TSB-AR-11-10'

TSB-AR-14-0'

TSB-AR-14-10'

TSB-AR-13-0'

TSB-AR-13-10'

TSB-AR-10-0'

TSB-AR-10-10'

TSB-AR-9-0'

TSB-AR-9-10'

TSB-AR-12-0'

TSB-AR-12-10'

TSB-AR-3-0'

TSB-AR-3-10'

RINSATE 1

TSB-AR-13-0'DUP

RINSATE 1DUP

Introduction

This data review covers 18 soil samples and 2 water samples listed on the cover sheet. The analyses were per Method RICH-RC5067 for Isotopic Uranium and Method RICH-RC5087 for Isotopic Thorium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined for each radionuclide of interest.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. Blank results contained less than the minimum detectable activity (MDA).

Sample "RINSATE 1" was identified as a rinsate. No isotopic uranium or isotopic thorium was found in this blank.

IV. Accuracy and Precision Data

a. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RER2 (Limits)	Flag	A or P
RINSATE 1DUP (All water samples in SDG F7I070122)	Thorium-228	2.9 (≤2.58)	J (all detects) UJ (all non-detects)	А

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

c. Tracer Recovery

All tracer recoveries were within validation criteria.

V. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

VI. Sample Result Verification

Raw data were not reviewed for this SDG.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

Samples TSB-AR-11-0' and TSB-AR-11-0'-Dup were identified as field duplicates. No isotopic uranium or isotopic thorium was detected in any of the samples with the following exceptions:

	Activit	y (pCi/g)				
Isotope	TSB-AR-11-0'	TSB-AR-11-0'-Dup	RPD (Limits)	Difference (Limits)	Flag	A or P
Thorium-228	1.85	2.07	11 (≤50)	-	-	-
Thorium-230	1.06	1.36	25 (≤50)	-	-	-
Thorium-232	1.35	1.62	18 (≤50)	-	-	-
Uranium-233/234	0.305	0.348	-	0.04 pCi/g (≤0.6)	-	-
Uranium-235/236	0.0137U	0.0217	-	0.008 pCi/g (≤0.6)		
Uranium-238	0.205	0.260	-	0.06 pCi/g (≤0.6)	-	-

BRC Parcel 4A & 4B Isotopic Uranium & Isotopic Thorium - Data Qualification Summary - SDG F7I070122

SDG	Sample	Compound	Flag	A or P	Reason
F7l070122	RINSATE 1	Thorium-228	J (all detects) UJ (all non-detects)	А	Matrix spike/Matrix spike duplicates (RER2)

BRC Parcel 4A & 4B

Isotopic Uranium & Isotopic Thorium - Laboratory Blank Data Qualification Summary - SDG F7I070122

No Sample Data Qualified in this SDG

BRC Parcel 4A & 4B Isotopic Uranium & Isotopic Thorium - Field Blank Data Qualification Summary - SDG F7I070122

No Sample Data Qualified in this SDG

	Validation	Validation Area				Comments							
·1. ·	Technical holding times	A											
lla.	Initial calibration	Α											
IIb.	Calibration verification	A											
III.	Blanks			· A									
√a.	Matrix Spike/(Matrix Spike)	Matrix Spike/(Matrix Spike) Duplicates				U P		-					
√a.	Laboratory control samples	A	L	c S									
V.	Tracer Recovery			Α									
∕I.	Minimum Detectable Activity	y (MD/	A)	Α									
/11.	Sample result verification	ample result verification											
/ .	Cverall assessment of data	Α			-								
Χ.	Field duplicates	SW	\mathcal{I}	= 3-	+ 4								
x	Field blanks	ND	F	2 = 12	8								
e: idate	A = Acceptable N = Not provided/applicable SW = See worksheet ed Samples:	:	R = Rins	o compound sate eld blank	s dete	ected	D = Duplica TB = Trip bl EB = Equip	ank					
Ī	TSB-AR-08-0' S	11	TSB-AR-10-1	0'	S	21	PBS	31					
1	TSB-AR-08-10'	12	TSB-AR-9-0'		-	22)	PB M	32					
	TSB-AR-11-0'	13	TSB-AR-9-10			23		33					
	TSB-AR-11-0'-Dup	14	TSB-AR-12-0			24		34					
	TSB-AR-11-10'	15	TSB-AR-12-1	ים'		25		35					
	TSB-AR-14-0'	16	TSB-AR-3-0'			26		36					
	TSB-AR-14-10'	17	TSB-AR-3-10		1	27		37					
-	TSB-AR-13-0'	18	RINSATE 1		W	28		38					
Т	TSB-AR-13-10'	19	TSB-AR-13-0	(۲۱ _{۱۱} ۷) DUP	S	29		39					
			RINSATE 1D		W				1				

_ VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 10-10-07

Page: 1 of 1 Reviewer: MG

2nd Reviewer:

LDC #: 17587B59

SDG #: F71070122

Laboratory: Test America

17587859 FTIOTOIRA LDC #: SDG #:

VALIDATION FINDINGS WORKSHEET

Duplicate Analysis

Page: __of_ Reviewer: 16

METHOD: Radiochemistry (Method; RCパ・RC-SOGT/RICM・RC-Sag7)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". N/A

Were all duplicate sample duplicate error ratio (DER) \leq 1.42? DER= $\frac{|Act_1-Act_2|}{2^{-1/2}}$ Was a duplicate sample analyzed the required frequency of 5% in this SDG? (N)N/A

Act = sample activity $\delta = 1$ sigma error

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

	Out lift out of		1/00/0										
	Associated Samples	all water											
0.00	KOLA DER (Limits)	3.9 (= 2.58)											
	Isotope	T4-338	·										
	Matrix	water											
	Duplicate ID	30											
	#	<u> </u>										1	

Comments:

DUP.35.DOC

Version 1.0 (3/2/2000)

LDC #: 17587B59 SDG #: F71070122

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:of1
Reviewer: MG
2nd reviewer:
(~

METHOD: Radiochemistry (Method: RICH-RC-5067/RICH-RC-) 5087

Y)N N/A

Were field duplicate pairs identified in this SDG?

Were target isotopes detected in the field duplicate pairs?

	Activity (pci/g)	
Isotopes	3	4	RPD
Tn-228	1.85	7.07	11 (= 50)
Th-230	1.06	1.36	25 ()
Tn-232	1-35	1.62	18 ()

	Activity ((ci/q)	by difference				
Isotopes	3	4	RPD				
U-233/234	0.305	0.348	0.04 PCi/q (= 0.6 PCi/g)				
0-235/236	0.0137 U	0.0217	0.009 ()				
U-238	0.205	0.260	0.06 ()				

	Activity ()	
Isotopes		RPD

	Activity ()	·
Isotopes			RPD
		·	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

BRC Parcel 4A & 4B

Collection Date:

September 7, 2007

LDC Report Date:

October 16, 2007

Matrix:

Soil/Water

Parameters:

Isotopic Uranium & Isotopic Thorium

TSB-AR-06-0'-DupDUP TSB-AR-06-10'DUP

Validation Level:

EPA Level III & IV

Laboratory:

Test America

Sample Delivery Group (SDG): F7I100119

Sample Identification

RINSATE 2

TSB-AR-06-0'

TSB-AR-06-0'-Dup

TSB-AR-06-10'

TSB-AJ-01-0'

TSB-AJ-01-10'**

TSB-AJ-02-0'**

TSB-AJ-02-0'-Dup**

TSB-AJ-02-10'**

TSB-AJ-03-0'**

TSB-AJ-03-10'**

TSB-BJ-06-0'**

TSB-BJ-06-10'**

TSB-BJ-01-0'**

TSB-BJ-01-10'**

TSB-BJ-02-0'**

TSB-BJ-02-10'**

TSB-BR-06-0'**

TSB-BR-06-10'**

RINSATE 2DUP

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 20 soil samples and 2 water samples listed on the cover sheet. The analyses were per Method RICH-RC5067 for Isotopic Uranium and Method RICH-RC5087 for Isotopic Thorium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined for each radionuclide of interest.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. Blank results contained less than the minimum detectable activity (MDA).

Sample "RINSATE 2" was identified as a rinsate. No isotopic uranium or isotopic thorium was found in this blank.

IV. Accuracy and Precision Data

a. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

c. Tracer Recovery

All tracer recoveries were within validation criteria.

V. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

VI. Sample Result Verification

All sample result verifications were acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

Samples TSB-AR-06-0' and TSB-AR-06-0'-Dup and samples TSB-AJ-02-0'** and TSB-AJ-02-0'-Dup** were identified as field duplicates. No isotopic uranium or isotopic thorium was detected in any of the samples with the following exceptions:

	Activit	y (pCi/g)				
Isotope	TSB-AR-06-0'	TSB-AR-06-0'-Dup	RPD (Limits)	Difference (Limits)	Flag	A or P
Thorium-228	1.19	1.37	14 (≤50)	-	-	-
Thorium-230	0.973	0.950	2 (≤50)	-	-	-
Thorium-232	1.58	1.54	3 (≤50)	-	-	-
Uranium-233/234	0.246	0.356	-	0.11 pCi/g (≤0.6)	-	-
Uranium-238	0.240	0.265	-	0.02 pCi/g (≤0.6)	-	-

	Activit	y (pCi/g)				
Isotope	TSB-AJ-02-0'**	TSB-AJ-02-0'-Dup**	RPD (Limits)	Difference (Limits)	Flag	A or P
Thorium-228	1.29	1.71	28 (≤50)	-	-	<u>-</u>
Thorium-230	0.983	0,982	0 (≤50)	-	-	•
Thorium-232	1.38	1.36	1 (≤50)	-	-	-
Uranium-233/234	0.341	0.365	-	0.02 pCi/g (≤0.6)	-	-

	Activi	ty (pCi/g)					
Isotope	TSB-AJ-02-0'**	TSB-AJ-02-0'-Dup**	RPD (Limits)	Difference (Limits)	Flag	A or P	
Uranium-238	0.272	0.318	-	0.05 pCi/g (≤0.6)	_	-	

BRC Parcel 4A & 4B

Isotopic Uranium & Isotopic Thorium - Data Qualification Summary - SDG F7I100119

No Sample Data Qualified in this SDG

BRC Parcel 4A & 4B

Isotopic Uranium & Isotopic Thorium - Laboratory Blank Data Qualification Summary - SDG F7I100119

No Sample Data Qualified in this SDG

BRC Parcel 4A & 4B Isotopic Uranium & Isotopic Thorium - Field Blank Data Qualification Summary - SDG F7I100119

No Sample Data Qualified in this SDG

SDG #: F7I100119 Laboratory: Test America				L	eve		/			Page: <u>l_of_l</u> Reviewer: <u>MG</u> 2nd Reviewer:		
84 - T:	IOD: loctonic Hermin	//	9h/	•	/ 5.4 - 4l 1. D		DOS	207) Is at a sis Th		4.41	L DIOLL DO SOOT	
MEI	HOD: Isotopic Uraniu	ım (EPA I	vietnoa 900/	Wethod R	ICH-	RC50	J67),Isotopic In	orium (I	vietno	od RICH-RC-5087)	
	amples listed below tion findings worksho			ewed for ea	ch of the f	ollow	ing v	alidation areas.	Validatio	on fin	dings are noted in attached	
	Valida	tion	Area			Comments						
··· I.	Technical holding time	s			Α	Sam	pling o	lates: 9-7-0				
lla.	Initial calibration				Α							
IIb.	Calibration verification				Α				e.			
III.	Blanks				Α							
IVa.	Matrix Spike/(Matrix Sp	oike)	Duplic	ates	Α	Di	٩ر					
IVa.	Laboratory control sam	nples			Ą	L	cs					
V.	Tracer Recovery				A							
VI.	I. Minimum Detectable Activity (MDA)			A								
VII.	II. Sample result verification			Α	Not	Not reviewed for Level III validation.						
VIII.	Overall assessment of	data			Α							
IX.	Field duplicates				SW	_)=2	+3 D=7	+8			
<u> x</u>	Field blanks				ND	1	R=					
Note:	A = Acceptable N = Not provided/appli SW = See worksheet ed Samples: ** Indicates			R = Rins FB = Fie	eld blank		ected	D = Duplica TB = Trip b EB = Equip	lank	ık		
			pic un	1	validation			,				
12	RINSATE 2	W	11	TSB-AJ-03-10)'**	S	21	(τ TSB-AR-06-0'-Dup		31		
2	TSB-AR-06-0'	5	12	TSB-BJ-06-0'	**		22	TSB-AR-06-10'DU	<u> </u>	32		
3	TSB-AR-06-0'-Dup	1	13	TSB-BJ-06-10)'**	_	23 [.P.B.S.		33		
4	TSB-AR-06-10'	\bot	14	TSB-BJ-01-0"	**	\perp	24	PBW		34		
5	TSB-AJ-01-0'	\perp	15	TSB-BJ-01-10)'**	_	25			35		
6	TSB-AJ-01-10'**	_	16	TSB-BJ-02-0'	**		26			36		
7	TSB-AJ-02-0'**	_	17	TSB-BJ-02-10)'**		27			37		
8	TSB-AJ-02-0'-Dup**	\downarrow	18	TSB-BR-06-0	**		28		·- · · · · ·	38		
9	TSB-AJ-02-10'**	1	19	TSB-BR-06-1	0'** (Th,U)	1	29			39		
10_	TSB-AJ-03-0'**	4	20	RINSATE 2DI	UP (' ",u)	W	30			40		

VALIDATION COMPLETENESS WORKSHEET

Level III/IV

Date: 10-11-07

Notes:_

LDC #: 17587C59

LDC #: 17587C59 SDG #: F7I100119

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: MG
2nd Reviewer: V

Method: Radiochemistry (EPA Method RICH-RC-5067) RICH-RC-5087

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	1			
li. Calibration				
Were all instruments and detectors calibration as required?	1			
Were NIST traceable standards used for all calibrations?	. /			
Was the check source identified by activity and radionuclide?	/			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	1			
III. Blanks				
Were blank analyses performed as required?	1			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		/		
V. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water		V		
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	-		/	
Vas a duplicate sample anayized at the required frequency of 5% in this SDG?	/			
Vere all duplicate sample duplicate error rations (DER) ≤1.427. 2.58	1./			
Laboratory control samples				
/as an LCS analyzed per analytical batch?	1/			
ere the LCS percent recoveries (%R) and relative percent difference (RPD)				
Sample Chemical/Carrier Recovery				
as a tracer/carrier added to each sample?	1			
ere tracer/carrier recoveries within the QC limits?	1			·
I: Regional Quality Assurance and Quality Control				
ere performance evaluation (PE) samples performed?				
ere the performance evaluation (PE) samples within the acceptance limits?				
II, Sample Result Verification				
ere activities adjusted to reflect all sample dilutions and dry weight factors plicable to level IV validation?				
ere the Minimum Detectable Activities (MDA) < RL?	/			

LDC #: 17587 C59 SDG #: F7X100119

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2 Reviewer: 46 2nd Reviewer: 4

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			
X Field duplicates				
Field duplicate pairs were identified in this SDG.	/			-
Target analytes were detected in the field duplicates.	/			
XI: Field blanks				
Field blanks were identified in this SDG.	/			
Target analytes were detected in the field blanks.				

LDC #: 17587C59 SDG #: F75100119

VALIDATION FINDINGS WORKSHEET <u>Field Duplicates</u>

Page:_	of1_
Reviewer:_	MG
2nd reviewer:	

METHOD: Radiochemistry (Method: RICH-RC-5067/RICH-RC-5087

N N/A

Were field duplicate pairs identified in this SDG?

Were target isotopes detected in the field duplicate pairs?

	Activity (cila,	
Isotopes	2	3	RPD
Tn-228	1.19	1.37	14 (=50)
Th- 230	0.973	0.950	2 ())
Tn-232	1.58	1.54	3 (↓)
·			

	Activity (pci/q)	by difference			
Isotopes	2	3	RI	2D -		
U-233/234	0.246	0.356	0.11 Pci/q	(= 0.6 PCi/4		
U-238	0.340	0.265	0.02 1	(+		

	Activity (pcilg,	
Isotopes	7	8	RPD
Tu-228	1.29	1.71	28 (≤ 50)
Th-230	0.983	0.982	0 ()
Th-232	1.38	1.36	(()
Jr.			

Activity (PC /q)		by difference	
7	8	APD	
0.341	0.365	0.0 2 PC i/g (= 0.6 PCi/4	
0.272	0.318	0.05 1 (1	
	7 0.341	7 8 0.341 0.365	

F72100119 LDC #: 17587C59 SDG #:

VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page: Reviewer:_

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2nd Reviewer:_

METHOD: Radiochemistry (Method: RICH - RC-5067/ RICH - RC-5087

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

Found = activity of each analyte measured in the analysis of the sample. True = activity of each analyte in the source. Where,

%R = Found x 100

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

Where, RPD = $\frac{|S-D|}{(S+D)/2} \times 100$

S = Original sample activity D = Duplicate sample activity

					Recalculated	Reported	
Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	%R or RPD	%R or RPD	Acceptable (Y/N)
	Laboratory control sample						
527		Th-230	(pisy) TC.6	.27 (Pil) 3.38 (Pily)	001	66	>
	Matrix spike sample						
		1.	l			ł	i
	Duplicate RPD				RERZ	RERZ	
22		U-938	10.480 (PCig) 20.512 (10) (PCig)	0.512 (PC.G)	h.0	7.0	>
	Chemical recovery			ſ			
9		Tn-334	677, 53 (epm) 845.51 (dpm)	845.51 (dpm)	80	& O	→

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 17587C59 SDG #: F7 I100119

CF = %R, Self-absorbance, abundance, ect.

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	_/of/
Reviewer:_	re
2nd reviewer:	-

METHOD: Radiochemistry (Method: RICH-RC-5067/RICH-RG-5087

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Have results been reported and calculated correctly?

Are results within the calibrated range of the instruments? (\hat{Y}) N N/A

Analyte results for # 6, Tn-232 _____reported with a positive detect were recalculated and verified using the following equation: Activity = Recalculation: $\frac{(81/200.2) - (1/1000.02)}{(2.22)(0.19908)(1.03g)(0.80)} = 1.108 \text{ pci/g}$ (cpm - bckgrd cpm) (2.22)(E)(Vol)(CF) E = Efficiency Vol = Volume

#	Sample ID	Analyte	Reported Concentration (pc / /q)	Calculated Concentration (PCi/q)	Acceptable (Y/N)
	6	Tn-228	1.16	1.16	Y
		Th-230	. 1.92	1.92	İ
	·	Th-232	1.11	1.11	
		U-233/234	0.912	0.914	
		U- 235/236	0.0258	0.0259	
		U-238	0.519	0.520	
2	11	Tu-228	. 1.61	1.61	
		Tn-230	1.25	1.24	
		Th-232	1.50	1.50	
		U-233/274	0.914	0.915	
		U-235/236	0.0409	0.0409	
		U - 238	0.561	0.562	J
·					
		· ·			

Note:	