



**LABORATORY DATA CONSULTANTS, INC.**

7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

ERM  
2525 Natomas Park Drive, Suite 350  
Sacramento, CA 95833  
ATTN: Ms. Maria Barajas-Albalawi

October 24, 2007

SUBJECT: BRC Parcel 4A & 4B, Data Validation

Dear Ms. Barajas-Albalawi

Enclosed are the final validation reports for the fractions listed below. This SDG was received on October 12, 2007. Attachment 1 is a summary of the samples that were reviewed for each analysis.

**LDC Project # 17606:**

<b><u>SDG #</u></b>	<b><u>Fraction</u></b>
F71110234	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



**BRC Parcel 4A & 4B  
Data Validation Reports  
LDC# 17606**

Radium-226 & Radium-228

**INDC**

**Laboratory Data Consultants, Inc.  
Data Validation Report**

**Project/Site Name:** BRC Parcel 4A & 4B  
**Collection Date:** September 10, 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):** F7I110234

**Sample Identification**

RINSATE 3  
TSB-BR-05-0'  
TSB-BR-05-10'  
TSB-BR-04-0'  
TSB-BR-04-0'(FD)  
TSB-BR-04-10'  
TSB-BJ-03-0'  
TSB-BJ-03-0'(FD)  
TSB-BJ-03-10'  
TSB-BJ-05-0'  
TSB-BJ-05-10'  
TSB-BR-01-0'  
TSB-BR-01-10'  
TSB-BJ-04-0'  
TSB-BJ-04-10'  
TSB-BR-02-0'  
TSB-BR-02-10'  
TSB-BR-03-0'  
TSB-BR-03-10'  
TSB-BR-05-0'DUP

## 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.

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.
- UU 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 3" 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-BR-04-0' and TSB-BR-04-0'(FD) and samples TSB-BJ-03-0' and TSB-BJ-03-0'(FD) were identified as field duplicates. No radium-226 or radium-228 was detected in any of the samples with the following exceptions:

Isotope	Activity (pCi/g)		RPD (Limits)
	TSB-BR-04-0'	TSB-BR-04-0'(FD)	
Radium-226	0.896	1.00	11 ( $\leq 50$ )
Radium-228	1.74	1.95	11 ( $\leq 50$ )

Isotope	Activity (pCi/g)		RPD (Limits)
	TSB-BJ-03-0'	TSB-BJ-03-0'(FD)	
Radium-226	0.857	0.975	13 ( $\leq 50$ )
Radium-228	1.69	1.76	4 ( $\leq 50$ )

**BRC Parcel 4A & 4B  
Radium-226 & Radium-228 - Data Qualification Summary - SDG F7I110234**

No Sample Data Qualified in this SDG

**BRC Parcel 4A & 4B  
Radium-226 & Radium-228 - Laboratory Blank Data Qualification Summary - SDG  
F7I110234**

No Sample Data Qualified in this SDG

**BRC Parcel 4A & 4B  
Radium-226 & Radium-228 - Field Blank Data Qualification Summary - SDG  
F7I110234**

No Sample Data Qualified in this SDG



LDC #: 17606A29

**VALIDATION COMPLETENESS WORKSHEET**

Date: 10-13-07

SDG #: F71110234

Level III

Page: 1 of 1

Laboratory: Test America

Reviewer: MG

2nd Reviewer: h

Soil: Radium-226, Radium-228 (EPA 901.1/RICH-RC-5017)

*only* **METHOD:** <sup>water</sup> Radium 226 (EPA Method 903.1/Method RICH-RC5005) <sup>water</sup> Radium 228 (EPA Method 904.0/Method RICH-RC5005)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9-10-07
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IVa.	Matrix Spike/(Matrix Spike) Duplicates	A	DUP
IVb.	Laboratory control samples	A	LCS
IVc.	Chemical recovery	A	
V.	Sample result verification	N	
VI.	Minimum detectable activity (MDA)	A	
VII.	Overall assessment of data	A	
VIII.	Field duplicates	SW	D = 4+5, D = 7+8
XIV.	Field blanks	ND	R=1

Note: A = Acceptable  
N = Not provided/applicable  
SW = See worksheet

ND = No compounds detected  
R = Rinsate  
FB = Field blank

D = Duplicate  
TB = Trip blank  
EB = Equipment blank

## Validated Samples:

1	RINSATE 3	W	11	TSB-BJ-05-10'	S	21	PBW	31	
2	TSB-BR-05-0'	S	12	TSB-BR-01-0'		22	PBS	32	
3	TSB-BR-05-10'		13	TSB-BR-01-10'		23		33	
4	TSB-BR-04-0'		14	TSB-BJ-04-0'		24		34	
5	TSB-BR-04-0'(FD)		15	TSB-BJ-04-10'		25		35	
6	TSB-BR-04-10'		16	TSB-BR-02-0'		26		36	
7	TSB-BJ-03-0'		17	TSB-BR-02-10'		27		37	
8	TSB-BJ-03-0'(FD)		18	TSB-BR-03-0'		28		38	
9	TSB-BJ-03-10'		19	TSB-BR-03-10'		29		39	
10	TSB-BJ-05-0'		20	TSB-BR-05-0'DUP		30		40	

Notes:

LDC #: 17606A29  
 SDG #: FTI10234

**VALIDATION FINDINGS WORKSHEET**  
**Field Duplicates**

Page: 1 of 1  
 Reviewer: MG  
 2nd reviewer: L

METHOD: Radiochemistry (Method: see cover)

- N N/A Were field duplicate pairs identified in this SDG?  
 N N/A Were target isotopes detected in the field duplicate pairs?

Isotopes	Activity ( pCi/g )		RPD
	4	5	
Ra-226	0.896	1.00	11 (≤50)
Ra-228	1.74	1.95	11 (↓)

Isotopes	Activity ( pCi/g )		RPD
	7	8	
Ra-226	0.857	0.975	13 (≤50)
Ra-228	1.69	1.76	4 (↓)

Isotopes	Activity ( )		RPD

Isotopes	Activity ( )		RPD

**BRC Parcel 4A & 4B  
Data Validation Reports  
LDC# 17606**

Isotopic Uranium & Isotopic Thorium

UDC

## Laboratory Data Consultants, Inc. Data Validation Report

**Project/Site Name:** BRC Parcel 4A & 4B  
**Collection Date:** September 10, 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):** F71110234

### Sample Identification

RINSATE 3	TSB-BR-05-0'MS
TSB-BR-05-0'	TSB-BR-05-0'DUP
TSB-BR-05-10'	
TSB-BR-04-0'	
TSB-BR-04-0'(FD)	
TSB-BR-04-10'	
TSB-BJ-03-0'	
TSB-BJ-03-0'(FD)	
TSB-BJ-03-10'	
TSB-BJ-05-0'	
TSB-BJ-05-10'	
TSB-BR-01-0'	
TSB-BR-01-10'	
TSB-BJ-04-0'	
TSB-BJ-04-10'	
TSB-BR-02-0'	
TSB-BR-02-10'	
TSB-BR-03-0'	
TSB-BR-03-10'	
RINSATE 3DUP	

## 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.

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.
- UU 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 3" 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) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Isotope	%R (Limits)	Flag	A or P
TSB-BR-05-0'MS (All soil samples in SDG F71110234)	U-235/236	190.96 (40-160)	J+ (all detects)	A

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 with the following exceptions:

Sample ID	Isotope	%R (Limits)	Affected Isotopes	Flag	A or P
TSB-BJ-05-0'	Th-234	16 (20-115)	Th-228 Th-230 Th-232	J- (all detects) UJ (all non-detects)	A

**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-BR-04-0' and TSB-BR-04-0'(FD) and samples TSB-BJ-03-0' and TSB-BJ-03-0'(FD) were identified as field duplicates. No isotopic uranium or isotopic thorium was detected in any of the samples with the following exceptions:

Isotope	Activity (pCi/g)		RPD (Limits)	Difference (Limits)	Flag	A or P
	TSB-BR-04-0'	TSB-BR-04-0'(FD)				
Thorium-228	1.74	0.0167U	-	1.72 pCi/g ( $\leq 0.10$ )	J (all detects) UJ (all non-detects)	A
Thorium-230	1.26	0.308	-	0.95 pCi/g ( $\leq 0.10$ )	J (all detects) UJ (all non-detects)	A
Thorium-232	2.36	0.00U	-	2.36 pCi/g ( $\leq 0.10$ )	J (all detects) UJ (all non-detects)	A
Uranium-233/234	0.326	0.343	-	0.02 pCi/g ( $\leq 0.6$ )	-	-

Isotope	Activity (pCi/g)		RPD (Limits)	Difference (Limits)	Flag	A or P
	TSB-BR-04-0'	TSB-BR-04-0'(FD)				
Uranium-235/236	0.00571U	0.0215	-	0.02 pCi/g ( $\leq 0.6$ )	-	-
Uranium-238	0.253	0.186	-	0.07 pCi/g ( $\leq 0.6$ )	-	-

Isotope	Activity (pCi/g)		RPD (Limits)	Difference (Limits)	Flag	A or P
	TSB-BJ-03-0'	TSB-BJ-03-0'(FD)				
Thorium-228	1.32	2.13	47 ( $\leq 50$ )	-	-	-
Thorium-230	1.09	1.08	1 ( $\leq 50$ )	-	-	-
Thorium-232	1.45	1.74	18 ( $\leq 50$ )	-	-	-
Uranium-233/234	0.280	0.264	-	0.02 pCi/g ( $\leq 0.6$ )	-	-
Uranium-235/236	0.00590U	0.0184	-	0.01 pCi/g ( $\leq 0.6$ )	-	-
Uranium-238	0.253	0.309	-	0.06 pCi/g ( $\leq 0.6$ )	-	-



**BRC Parcel 4A & 4B**

**Isotopic Uranium & Isotopic Thorium - Data Qualification Summary - SDG F7I110234**

SDG	Sample	Isotope	Flag	A or P	Reason
F7I110234	TSB-BR-05-0' TSB-BR-05-10' TSB-BR-04-0' TSB-BR-04-0'(FD) TSB-BR-04-10' TSB-BJ-03-0' TSB-BJ-03-0'(FD) TSB-BJ-03-10' TSB-BJ-05-0' TSB-BJ-05-10' TSB-BR-01-0' TSB-BR-01-10' TSB-BJ-04-0' TSB-BJ-04-10' TSB-BR-02-0' TSB-BR-02-10' TSB-BR-03-0' TSB-BR-03-10'	U-235/236	J+ (all detects)	A	Matrix spike analysis (%R)
F7I110234	TSB-BJ-05-0'	Th-228 Th-230 Th-232	J- (all detects) UJ (all non-detects)	A	Tracer recovery (%R)
F7I110234	TSB-BR-04-0' TSB-BR-04-0'(FD)	Th-228 Th-230 Th-232	J (all detects) UJ (all non-detects)	A	Field duplicates (RPD)

**BRC Parcel 4A & 4B**

**Isotopic Uranium & Isotopic Thorium - Laboratory Blank Data Qualification Summary - SDG F7I110234**

No Sample Data Qualified in this SDG

**BRC Parcel 4A & 4B**

**Isotopic Uranium & Isotopic Thorium - Field Blank Data Qualification Summary - SDG F7I110234**

No Sample Data Qualified in this SDG

LDC #: 17606A59

**VALIDATION COMPLETENESS WORKSHEET**

Date: 10-13-07

SDG #: F71110234

Level III

Page: 1 of 1

Laboratory: Test America

Reviewer: MG

2nd Reviewer:                     

*mk*

**METHOD:** Isotopic Uranium (EPA Method 909/Method RICH-RC5067), Isotopic Thorium (Method RICH-RC-5087)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

Validation Area			Comments
I.	Technical holding times	A	Sampling dates: 9-10-07
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IVa.	Matrix Spike/(Matrix Spike) Duplicates	SW	MS/DUP
IVa.	Laboratory control samples	A	LCS
V.	Tracer Recovery	SW	
VI.	Minimum Detectable Activity (MDA)	A	
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	D=4+5, D=7+8
X.	Field blanks	ND	R=1

Note: A = Acceptable  
N = Not provided/applicable  
SW = See worksheet

ND = No compounds detected  
R = Rinsate  
FB = Field blank

D = Duplicate  
TB = Trip blank  
EB = Equipment blank

Validated Samples: \*\* Indicates sample underwent Level IV validation

1	RINSATE 3	W	11	TSB-BJ-05-10'	S	21	TSB-BR-05-0'MS <sup>(Th,U)</sup>	S	31
2	TSB-BR-05-0'	S	12	TSB-BR-01-0'		22	TSB-BR-05-0'DUP <sup>(Th,U)</sup>	↓	32
3	TSB-BR-05-10'		13	TSB-BR-01-10'		23	PBW		33
4	TSB-BR-04-0'		14	TSB-BJ-04-0'		24	PBS		34
5	TSB-BR-04-0'(FD)		15	TSB-BJ-04-10'		25			35
6	TSB-BR-04-10'		16	TSB-BR-02-0'		26			36
7	TSB-BJ-03-0'		17	TSB-BR-02-10'		27			37
8	TSB-BJ-03-0'(FD)		18	TSB-BR-03-0'		28			38
9	TSB-BJ-03-10'		19	TSB-BR-03-10'		29			39
10	TSB-BJ-05-0'	↓	20	RINSATE 3DUP <sup>(Th,U)</sup>	W	30			40

Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_





VALIDATION FINDINGS WORKSHEET  
Field Duplicates

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

N N/A  
 Y N N/A

Were field duplicate pairs identified in this SDG?

Were target isotopes detected in the field duplicate pairs?

Isotopes	Activity ( pCi/g )		Qual parent & dup only by difference RPD
	4	5	
Th-228	1.74	0.0167 U	1.72 pCi/g ( $\leq 0.10$ pCi/g) J/US/A
Th-230	1.26	0.308	0.95 ↓ ( ↓ ) ↓
Th-232	2.36	0.00 U	2.36 ↓ ( ↓ ) ↓

Isotopes	Activity ( pCi/g )		by difference -RPD-
	4	5	
U-233/234	0.326	0.343	0.02 pCi/g ( $\leq 0.60$ pCi/g)
U-235/236	0.00571 U	0.0215	0.02 ↓ ( ↓ )
U-238	0.253	0.186	0.07 ↓ ( ↓ )

Isotopes	Activity ( pCi/g )		RPD
	7	8	
Th-228	1.32	2.13	47 ( $\leq 50$ )
Th-230	1.09	1.08	1 ( ↓ )
Th-232	1.45	1.74	18 ( ↓ )

Isotopes	Activity ( pCi/g )		by difference RPD
	7	8	
U-233/234	0.280	0.264	0.02 pCi/g ( $\leq 0.60$ pCi/g)
U-235/236	0.00590 U	0.0184	0.01 ↓ ( ↓ )
U-238	0.253	0.309	0.06 ↓ ( ↓ )