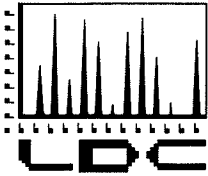


**Appendix D**  
**Data Validation Report**



**LABORATORY DATA CONSULTANTS, INC.**

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

OTIE Solutions  
317 East Main Street  
Ventura, CA 93001  
ATTN: MR. Richard Baldino

August 10, 2009

SUBJECT: Former Raytheon Site, Data Validation

Dear Mr. Baldino,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on July 20, 2009. Attachment 1 is a summary of the samples that were reviewed for each analysis.

**LDC Project # 21179:**

<b><u>SDG #</u></b>	<b><u>Fraction</u></b>
9067, 9068, 310643	Gross Alpha, Gross Alpha & Gross Beta, Radium-226, Radium-228, Isotopic Uranium

The data validation was performed under 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

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

Sincerely,

Erlinda T. Rauto  
Operations Manager/Senior Chemist



**Former Raytheon Site  
Data Validation Reports  
LDC# 21179**

Gross Alpha

*LDC*

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

**Project/Site Name:** Former Raytheon Site  
**Collection Date:** May 26, 2009  
**LDC Report Date:** August 5, 2009  
**Matrix:** Water  
**Parameters:** Gross Alpha  
**Validation Level:** Level III  
**Laboratory:** GPL Laboratories

**Sample Delivery Group (SDG):** 9067

**Sample Identification**

CP-0905015  
CP-0905016  
CP-0905019  
CP-0905020  
CP-0905025  
CP-0905026  
CP-0905007  
CP-0905008  
CP-0905003  
CP-0905004  
CP-0905009  
CP-0905010  
CP-0905011  
CP-0905012  
CP-0905027  
CP-0905019DUP  
CP-0905027DUP

## Introduction

This data review covers 17 water samples listed on the cover sheet. The analyses were per Standard Method 7110C for Gross Alpha.

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:

- 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.

A detector efficiency was determined and a self-absorption curve was generated for each radionuclide of interest.

### 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 CP-0905027 was identified as an equipment blank. No gross alpha was found in this blank.

## IV. Accuracy and Precision Data

### a. Matrix Spike/(Matrix Spike) Duplicates

A matrix spike (MS) analysis was 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 with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
CP-0905027	Gross alpha	No LCS analysis associated with this sample.	LCS analysis required.	None	P

Percent recoveries (%R) were within QC limits.

### 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 CP-0905019 and CP-0905025 and samples CP-0905020 and CP-0905026 were identified as field duplicates. No gross alpha was detected in any of the samples with the following exceptions:

Analyte	Concentration (pCi/L)		RPD
	CP-0905019	CP-0905025	
Gross alpha	20.9	26.9	25

Analyte	Concentration (pCi/L)		RPD
	CP-0905020	CP-0905026	
Gross alpha	17.2	20.1	16



**Former Raytheon Site  
Gross Alpha - Data Qualification Summary - SDG 9067**

<b>SDG</b>	<b>Sample</b>	<b>Analyte</b>	<b>Flag</b>	<b>A or P</b>	<b>Reason</b>
9067	CP-0905027	Gross alpha	None	P	Laboratory control samples

**Former Raytheon Site  
Gross Alpha - Laboratory Blank Data Qualification Summary - SDG 9067**

No Sample Data Qualified in this SDG

**Former Raytheon Site  
Gross Alpha - Field Blank Data Qualification Summary - SDG 9067**

No Sample Data Qualified in this SDG

LDC #: 21179A22a

## VALIDATION COMPLETENESS WORKSHEET

Date: 8-3-09

SDG #: 9067

Level III

Page: 1 of 1

Laboratory: GPL Laboratories

Reviewer: MG

2nd Reviewer: 

METHOD: Gross Alpha (SM7110C)

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: 5-26-09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IVa.	Matrix Spike/(Matrix Spike) Duplicates	A	DUP
IVb.	Laboratory control samples	SW	LCS
V.	Minimum detectable activity (MDA)	A	
VI.	Sample result verification	9mM SW N N	
VII.	Overall assessment of data	A	
VIII.	Field duplicates	SW	D = 3+5, D = 4+6
IX.	Field blanks	ND	EB = 15

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:

all water

1	CP-905015	11	CP-905009	21		31	
2	CP-905016	12	CP-905010	22		32	
3	CP-905019	13	CP-905011	23		33	
4	CP-905020	14	CP-905012	24		34	
5	CP-905025	15	CP-905027	25		35	
6	CP-905026	16	CP-905019DUP	26		36	
7	CP-905007	17	CP-0905027 DUP	27		37	
8	CP-905008	18	PBW1	28		38	
9	CP-905003	19	PBW2	29		39	
10	CP-905004	20		30		40	

Notes: 9mM ID: CP-090\_ \_ \_ \_



LDC #: 21179A22a  
 SDG #: 9067

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

Page: 1 of 1  
 Reviewer: MG  
 2nd reviewer: [Signature]

METHOD: Radiochemistry (Method: SM7110C)

N N/A  
 N N/A

Were field duplicate pairs identified in this SDG?  
 Were target isotopes detected in the field duplicate pairs?

Isotopes	Activity ( pCi/L )		RPD
	3	5	
Alpha	20.9	26.9	25

Isotopes	Activity ( pCi/L )		RPD
	4	6	
Alpha	17.2	20.1	16

Isotopes	Activity ( )		RPD

Isotopes	Activity ( )		RPD

## Laboratory Data Consultants, Inc. Data Validation Report

**Project/Site Name:** Former Raytheon Site  
**Collection Date:** May 27, 2009  
**LDC Report Date:** August 5, 2009  
**Matrix:** Water  
**Parameters:** Gross Alpha  
**Validation Level:** Level III & IV  
**Laboratory:** GPL Laboratories

**Sample Delivery Group (SDG):** 9068

### Sample Identification

CP-0905005  
CP-0905006  
CP-0905001\*\*  
CP-0905002\*\*  
CP-0905023  
CP-0905024  
CP-0905013  
CP-0905014  
CP-0905017  
CP-0905018  
CP-0905021  
CP-0905022  
CP-0905005DUP

\*\*Indicates sample underwent Level IV review

## Introduction

This data review covers 13 water samples listed on the cover sheet. The analyses were per Standard Method 7110C for Gross Alpha.

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 Level IV review. A 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:

- 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.

A detector efficiency was determined and a self-absorption curve was generated for each radionuclide of interest.

### **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 CP-0905028 (analyzed by EPA Method 900.0) was identified as an equipment blank. No gross alpha was found in this blank.

## **IV. Accuracy and Precision Data**

### **a. Matrix Spike/(Matrix Spike) Duplicates**

A matrix spike (MS) analysis was 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.

## **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 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 CP-0905001\*\* and CP-0905023 and samples CP-0905002\*\* and CP-0905024 were identified as field duplicates. No gross alpha was detected in any of the samples with the following exceptions:

Analyte	Concentration (pCi/L)		RPD
	CP-0905001**	CP-0905023	
Gross alpha	35.0	26.3	28

Analyte	Concentration (pCi/L)		RPD
	CP-0905002**	CP-0905024	
Gross alpha	34.9	32.7	7



**Former Raytheon Site  
Gross Alpha - Data Qualification Summary - SDG 9068**

No Sample Data Qualified in this SDG

**Former Raytheon Site  
Gross Alpha - Laboratory Blank Data Qualification Summary - SDG 9068**

No Sample Data Qualified in this SDG

**Former Raytheon Site  
Gross Alpha - Field Blank Data Qualification Summary - SDG 9068**

No Sample Data Qualified in this SDG

LDC #: 21179B22a  
 SDG #: 9068  
 Laboratory: GPL Laboratories

**VALIDATION COMPLETENESS WORKSHEET**  
 Level III/IV

Date: 8-4-09  
 Page: 1 of 1  
 Reviewer: MG  
 2nd Reviewer: ✓

**METHOD:** Gross Alpha (SM7110C)

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: 5-27-09
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
V.	Minimum detectable activity (MDA)	A	
VI.	Sample result verification	A	Not reviewed for Level III validation.
VII.	Overall assessment of data	A	
VIII.	Field duplicates	SW	D = 3+5, D = 4+6
IX.	Field blanks	ND	EB = CP-0905028 (SDG: 9068)

by EPA meth 900.0

Note: A = Acceptable      ND = No compounds detected      D = Duplicate  
 N = Not provided/applicable      R = Rinsate      TB = Trip blank  
 SW = See worksheet      FB = Field blank      EB = Equipment blank

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

1	CP-0905005	11	CP-0905021	21		31	
2	CP-0905006	12	CP-0905022	22		32	
3	CP-0905001**	13	CP-0905005DUP	23		33	
4	CP-0905002**	14	PBW	24		34	
5	CP-0905023	15		25		35	
6	CP-0905024	16		26		36	
7	CP-0905013	17		27		37	
8	CP-0905014	18		28		38	
9	CP-0905017	19		29		39	
10	CP-0905018	20		30		40	

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

LDC #: 21179B22a  
 SDG #: 9068

VALIDATION FINDINGS CHECKLIST

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

Method: Radiochemistry(EPA Method SM7110C )

Validation Area	Yes	No	NA	Findings/Comments
<b>I. Technical holding times</b>				
All technical holding times were met.	✓			
<b>II. Calibration</b>				
Were all instruments and detectors calibration as required?	✓			
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 required frequency and within laboratory control limits?	✓			
<b>III. Blanks</b>				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
<b>IV. Matrix spikes and Duplicates</b>				
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 / <u>Water</u> .		✓		
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.			✓	
Was a duplicate sample analyzed at the required frequency of 5% in this SDG?	✓			
Were all duplicate sample duplicate error ratios (DER) $\leq 1.42$ ?	✓			
<b>V. Laboratory control samples</b>				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%?	✓			
<b>VI. Sample Chemical/Carrier Recovery</b>				
Was a tracer/carrier added to each sample?		✓		
Were tracer/carrier recoveries within the QC limits?			✓	
<b>VII. Regional Quality Assurance and Quality Control</b>				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
<b>VIII. Sample Result Verification</b>				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 21179 B22a  
SDG #: 9068

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.	✓			
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 #: 21179B22a  
 SDG #: 9068

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

Page: 1 of 1  
 Reviewer: MG  
 2nd reviewer: [Signature]

METHOD: Radiochemistry (Method: SM7110C)

Y  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/L )		RPD
	3	5	
Alpha	35.0	26.3	28

Isotopes	Activity ( pCi/L )		RPD
	4	6	
Alpha	34.9	32.7	7

Isotopes	Activity ( )		RPD

Isotopes	Activity ( )		RPD

LDC #: 21179B22a  
 SDG #: 9068

**VALIDATION FINDINGS WORKSHEET**  
**Level IV Recalculation Worksheet**

Page: 1 of 1  
 Reviewer: MG  
 2nd Reviewer: [Signature]

METHOD: Radiochemistry (Method: SM 7110C)

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

$$\%R = \frac{\text{Found}}{\text{True}} \times 100$$

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:

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

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

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated		Reported	Acceptable (Y/N)
					%R or RPD	%R or RPD		
LCS	Laboratory control sample	Alpha	17.2 (pci/L)	15.0 (pci/L)	115	115	115	Y
—	Matrix spike sample	—	—	—	—	—	—	—
13	Duplicate RPD	Alpha	32.1 (pci/L) ± 16.6 (2σ)	30.8 (pci/L) ± 16.0 (2σ)	F/E 0.113	F/E 0.108	F/E 0.108	Y
—	Chemical recovery	—	—	—	—	—	—	—

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.



## Laboratory Data Consultants, Inc. Data Validation Report

**Project/Site Name:** Former Raytheon Site  
**Collection Date:** May 26, 2009  
**LDC Report Date:** August 5, 2009  
**Matrix:** Water  
**Parameters:** Gross Beta  
**Validation Level:** Level III  
**Laboratory:** GPL Laboratories

**Sample Delivery Group (SDG):** 9067

### Sample Identification

CP-0905015  
CP-0905016  
CP-0905019  
CP-0905020  
CP-0905025  
CP-0905026  
CP-0905007  
CP-0905008  
CP-0905003  
CP-0905004  
CP-0905009  
CP-0905010  
CP-0905011  
CP-0905012  
CP-0905027  
CP-0905027DUP



## Introduction

This data review covers 16 water samples listed on the cover sheet. The analyses were per Standard Method 7110C for Gross Beta.

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:

- 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.

A detector efficiency was determined and a self-absorption curve was generated for each radionuclide of interest.

### **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 CP-0905027 was identified as an equipment blank. No gross beta was found in this blank.

## **IV. Accuracy and Precision Data**

### **a. Matrix Spike/(Matrix Spike) Duplicates**

A matrix spike (MS) analysis was 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.

## **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 CP-0905019 and CP-0905025 and samples CP-0905020 and CP-0905026 were identified as field duplicates. No gross beta was detected in any of the samples with the following exceptions:

Analyte	Concentration (pCi/L)		RPD
	CP-0905019	CP-0905025	
Gross beta	18.5	22.9	21

Analyte	Concentration (pCi/L)		RPD
	CP-0905020	CP-0905026	
Gross beta	11.0	8.32	28

**Former Raytheon Site  
Gross Beta - Data Qualification Summary - SDG 9067**

No Sample Data Qualified in this SDG

**Former Raytheon Site  
Gross Beta - Laboratory Blank Data Qualification Summary - SDG 9067**

No Sample Data Qualified in this SDG

**Former Raytheon Site  
Gross Beta - Field Blank Data Qualification Summary - SDG 9067**

No Sample Data Qualified in this SDG

LDC #: 21179A22b  
 SDG #: 9067  
 Laboratory: GPL Laboratories

**VALIDATION COMPLETENESS WORKSHEET**  
 Level III

Date: 8-3-09  
 Page: 1 of 1  
 Reviewer: MG  
 2nd Reviewer: ✓

**METHOD:** Gross Beta (EPA Method 900.0)

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: 5-26-09
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
V.	Minimum detectable activity (MDA)	9MB SWA	
VI.	Sample result verification	↓ SW X N	
VII.	Overall assessment of data	A	
VIII.	Field duplicates	SW	D = 3+5, D = 4+6
IX.	Field blanks	ND	EB = 15

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:  
 all water

1	CP-905015	11	CP-905009	21		31	
2	CP-905016	12	CP-905010	22		32	
3	CP-905019	13	CP-905011	23		33	
4	CP-905020	14	CP-905012	24		34	
5	CP-905025	15	CP-905027	25		35	
6	CP-905026	16	CP-905027DUP	26		36	
7	CP-905007	17	PBW	27		37	
8	CP-905008	18		28		38	
9	CP-905003	19		29		39	
10	CP-905004	20		30		40	

Notes: 9MB ID: CP-090- - - -

LDC #: 21179A226  
 SDG #: 9067

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

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

METHOD: Radiochemistry (Method: 900.0)

Y  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/L )		RPD
	3	5	
Beta	18.5	22.9	21

Isotopes	Activity ( pCi/L )		RPD
	4	6	
Beta	11.0	8.32	28

Isotopes	Activity ( )		RPD

Isotopes	Activity ( )		RPD

**Former Raytheon Site  
Data Validation Reports  
LDC# 21179**

Gross Alpha & Gross Beta

*LDC*

## Laboratory Data Consultants, Inc. Data Validation Report

**Project/Site Name:** Former Raytheon Site  
**Collection Date:** May 27, 2009  
**LDC Report Date:** August 5, 2009  
**Matrix:** Water  
**Parameters:** Gross Alpha & Gross Beta  
**Validation Level:** Level III & IV  
**Laboratory:** GPL Laboratories

**Sample Delivery Group (SDG):** 9068

### Sample Identification

CP-0905005  
CP-0905006  
CP-0905001\*\*  
CP-0905002\*\*  
CP-0905023  
CP-0905024  
CP-0905013  
CP-0905014  
CP-0905017  
CP-0905018  
CP-0905021  
CP-0905022  
CP-0905028\*  
CP-0905028DUP

\*Indicates samples analyzed for Gross Alpha only.

\*\*Indicates sample underwent Level IV review



## Introduction

This data review covers 14 water samples listed on the cover sheet. The analyses were per EPA Method 900.0 for Gross Alpha & Gross Beta.

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 Level IV review. A 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:

- 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.

A detector efficiency was determined and a self-absorption curve was generated for each radionuclide of interest.

### 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 CP-0905028\* was identified as an equipment blank. No gross alpha or gross beta was found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
CP-0905028*	5/27/09	Gross beta	1.25 pCi/L	CP-0905005 CP-0905006 CP-0905001** CP-0905002** CP-0905023 CP-0905024 CP-0905013 CP-0905014 CP-0905017 CP-0905018 CP-0905021 CP-0905022

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
CP-0905023	Gross beta	5.93 pCi/L	5.93U pCi/L
CP-0905024	Gross beta	5.03 pCi/L	5.03U pCi/L

#### IV. Accuracy and Precision Data

##### a. Matrix Spike/(Matrix Spike) Duplicates

A matrix spike (MS) analysis was 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 with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
CP-0905028	Gross alpha	No LCS analysis associated with this sample.	LCS analysis required.	None	P

Percent recoveries (%R) were within QC limits.

#### 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 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 CP-0905001\*\* and CP-0905023 and samples CP-0905002\*\* and CP-0905024 were identified as field duplicates. No gross alpha or gross beta was detected in any of the samples with the following exceptions:

Analyte	Concentration (pCi/L)		RPD
	CP-0905001**	CP-0905023	
Gross beta	6.33	5.93	7

Analyte	Concentration (pCi/L)		RPD
	CP-0905002**	CP-0905024	
Gross beta	6.52	5.03	26

**Former Raytheon Site  
Gross Alpha - Data Qualification Summary - SDG 9068**

SDG	Sample	Analyte	Flag	A or P	Reason
9068	CP-0905028	Gross alpha	None	P	Laboratory control samples

**Former Raytheon Site  
Gross Alpha - Laboratory Blank Data Qualification Summary - SDG 9068**

No Sample Data Qualified in this SDG

**Former Raytheon Site  
Gross Alpha - Field Blank Data Qualification Summary - SDG 9068**

SDG	Sample	Analyte	Modified Final Concentration	A or P
9068	CP-0905023	Gross beta	5.93U pCi/L	A
9068	CP-0905024	Gross beta	5.03U pCi/L	A

LDC #: 21179B22b

## VALIDATION COMPLETENESS WORKSHEET

Date: 8-4-09

SDG #: 9068

Level III/IV

Page: 1 of 1

Laboratory: GPL Laboratories

Reviewer: MG

2nd Reviewer:

METHOD: Gross Alpha &amp; Beta (EPA Method 900.0)

(Alpha for # 13 only ; Beta for all)

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: 5-27-09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IVa.	Matrix Spike/(Matrix Spike) Duplicates	A	DUP
IVb.	Laboratory control samples	SW	LCS
V.	Minimum detectable activity (MDA)	A	
VI.	Sample result verification	A	Not reviewed for Level III validation.
VII.	Overall assessment of data	A	
VIII.	Field duplicates	SW	D = 3+5, D = 4+6
IX.	Field blanks	SW	EB = 13

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

all water

1	CP-0905005	11	CP-0905021	21		31	
2	CP-0905006	12	CP-0905022	22		32	
3	CP-0905001**	13	CP-0905028	23		33	
4	CP-0905002**	14	CP-0905028DUP	24		34	
5	CP-0905023	15	PBW	25		35	
6	CP-0905024	16		26		36	
7	CP-0905013	17		27		37	
8	CP-0905014	18		28		38	
9	CP-0905017	19		29		39	
10	CP-0905018	20		30		40	

Notes:

LDC #: 21179 B226  
 SDG #: 9068

VALIDATION FINDINGS CHECKLIST

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

Method: Radiochemistry (EPA Method 900.0 )

Validation Area	Yes	No	NA	Findings/Comments
<b>i. Technical holding times</b>				
All technical holding times were met.	✓			
<b>ii. Calibration</b>				
Were all instruments and detectors calibration as required?	✓			
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 required frequency and within laboratory control limits?	✓			
<b>iii. Blanks</b>				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
<b>iv. Matrix spikes and Duplicates</b>				
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 / <u>Water</u> .		✓		
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.			✓	
Was a duplicate sample analyzed at the required frequency of 5% in this SDG?	✓			
Were all duplicate sample duplicate error ratios (DER) $\leq 1.42$ ?	✓			
<b>v. Laboratory control samples</b>				
Was an LCS analyzed per analytical batch?		✓		(No Alpha)
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
<b>vi. Sample Chemical/Carrier Recovery</b>				
Was a tracer/carrier added to each sample?		✓		
Were tracer/carrier recoveries within the QC limits?			✓	
<b>vii. Regional Quality Assurance and Quality Control</b>				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
<b>viii. Sample Result Verification</b>				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 21179 B226  
SDG #: 9068

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.	✓			
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 #: 21179B226  
 SDG #: 9068

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

Page: 1 of 1  
 Reviewer: MG  
 2nd reviewer: [Signature]

METHOD: Radiochemistry (Method: 900.0)

N N/A  
 N N/A

Were field duplicate pairs identified in this SDG?  
 Were target isotopes detected in the field duplicate pairs?

Isotopes	Activity ( pCi/L )		RPD
	3	5	
Beta	6.33	5.93	7

Isotopes	Activity ( pCi/L )		RPD
	4	6	
Beta	6.52	5.03	26

Isotopes	Activity ( )		RPD

Isotopes	Activity ( )		RPD

LDC #: 211793226  
 SDG #: 9068

**VALIDATION FINDINGS WORKSHEET**  
**Level IV Recalculation Worksheet**

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

METHOD: Radiochemistry (Method: 900.0)

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

$$\%R = \frac{\text{Found}}{\text{True}} \times 100$$

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:

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

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

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated		Reported		Acceptable (Y/N)
					%R	RPD	%R	RPD	
LCS	Laboratory control sample	Beta	18.2 (pci/L)	17.3 (pci/L)	105		105		Y
-	Matrix spike sample	-	- pci/L	-	-		-		-
14	Duplicate RPD	Beta	1.25 (pci/L) ± 0.851 (2σ)	0.127 (pci/L) ± 0.617 (2σ)	F/E		F/E		Y
-	Chemical recovery	-	-	-	-		2.13		-

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.



**Former Raytheon Site  
Data Validation Reports  
LDC# 21179**

Radium-226

*LDC*

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

**Project/Site Name:** Former Raytheon Site  
**Collection Date:** May 26, 2009  
**LDC Report Date:** August 5, 2009  
**Matrix:** Water  
**Parameters:** Radium-226  
**Validation Level:** Level III  
**Laboratory:** GPL Laboratories

**Sample Delivery Group (SDG):** 9067

**Sample Identification**

CP-0905015  
CP-0905016  
CP-0905019  
CP-0905020  
CP-0905025  
CP-0905026  
CP-0905007  
CP-0905008  
CP-0905003  
CP-0905004  
CP-0905009  
CP-0905010  
CP-0905011  
CP-0905012  
CP-0905027  
CP-0905016DUP  
CP-0905019MS

## Introduction

This data review covers 17 water samples listed on the cover sheet. The analyses were per EPA Method 903.1 for Radium-226.

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 a 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:

- U Indicates the isotope 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 isotope 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 and a self-absorption curve was generated for each radionuclide of interest.

### **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 CP-0905027 was identified as an equipment blank. No radium-226 contaminants were found in this blank.

## **IV. Accuracy and Precision Data**

### **a. Matrix Spike/(Matrix Spike) Duplicate**

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) 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. Chemical Recovery**

Chemical recoveries were not required by the method.

## V. Sample Result Verification

Raw data were not reviewed for this SDG.

## VI. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

## VII. Overall Assessment of Data

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

## VIII. Field Duplicates

Samples CP-0905019 and CP-0905025 and samples CP-0905020 and CP-0905026 were identified as field duplicates. No radium-226 was detected in any of the samples with the following exceptions:

Isotope	Activity (pCi/L)		RPD
	CP-0905019	CP-0905025	
Radium-226	1.27	0.615	69

**Former Raytheon Site  
Radium-226 - Data Qualification Summary - SDG 9067**

No Sample Data Qualified in this SDG

**Former Raytheon Site  
Radium-226 - Laboratory Blank Data Qualification Summary - SDG 9067**

No Sample Data Qualified in this SDG

**Former Raytheon Site  
Radium-226 - Field Blank Data Qualification Summary - SDG 9067**

No Sample Data Qualified in this SDG

**METHOD:** Radium 226 (EPA Method 903.1)

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: 5-26-09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IVa.	Matrix Spike/(Matrix Spike) Duplicates	A	MS/DUP
IVb.	Laboratory control samples	A	LCS
IVc.	Chemical recovery	N	not required
V.	Sample result verification	MA SW * N	
VI.	Minimum detectable activity (MDA)	A	
VII.	Overall assessment of data	A	
VIII.	Field duplicates	SW	D = 3+5, D = 4*6*
XIV.	Field blanks	ND	EB = 15

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:

all water

1	CP-905015	11	CP-905009	21		31	
2	CP-905016	12	CP-905010	22		32	
3	CP-905019	13	CP-905011	23		33	
4	CP-905020	14	CP-905012	24		34	
5	CP-905025	15	CP-905027	25		35	
6	CP-905026	16	CP-905016DUP	26		36	
7	CP-905007	17	CP-905019MS	27		37	
8	CP-905008	18	PBW	28		38	
9	CP-905003	19		29		39	
10	CP-905004	20		30		40	

Notes: MA ID: CP-090\_ \_ \_ \_

LDC #: 21179A29a  
 SDG #: 9067

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

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

METHOD: Radiochemistry (Method: 903.1)

N N/A  
 N N/A

Were field duplicate pairs identified in this SDG?  
 Were target isotopes detected in the field duplicate pairs?

Isotopes	Activity ( pCi/L )		RPD
	3	5	
Ra-226	1.27	0.615	69

Isotopes	Activity ( )		RPD

Isotopes	Activity ( )		RPD

Isotopes	Activity ( )		RPD

## Laboratory Data Consultants, Inc. Data Validation Report

**Project/Site Name:** Former Raytheon Site  
**Collection Date:** May 27, 2009  
**LDC Report Date:** August 5, 2009  
**Matrix:** Water  
**Parameters:** Radium-226  
**Validation Level:** Level III & IV  
**Laboratory:** GPL Laboratories  
**Sample Delivery Group (SDG):** 9068

### Sample Identification

CP-0905005  
CP-0905006  
CP-0905001\*\*  
CP-0905002\*\*  
CP-0905023  
CP-0905024  
CP-0905013  
CP-0905014  
CP-0905017  
CP-0905018  
CP-0905021  
CP-0905022  
CP-0905028  
CP-0905005DUP  
CP-0905006MS

\*\*Indicates sample underwent Level IV review

## Introduction

This data review covers 15 water samples listed on the cover sheet. The analyses were per EPA Method 903.1 for Radium-226.

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 a 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 Level IV review. A 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:

- U Indicates the isotope 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 isotope 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 and a self-absorption curve was generated for each radionuclide of interest.

### 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 CP-0905028 was identified as an equipment blank. No radium-226 contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Isotope	Concentration	Associated Samples
CP-0905028	5/27/09	Radium-226	1.83 pCi/L	CP-0905005 CP-0905006 CP-0905001** CP-0905002** CP-0905023 CP-0905024 CP-0905013 CP-0905014 CP-0905017 CP-0905018 CP-0905021 CP-0905022

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:



Sample	Isotope	Reported Concentration	Modified Final Concentration
CP-0905005	Radium-226	2.04 pCi/L	2.04U pCi/L
CP-0905006	Radium-226	4.44 pCi/L	4.44U pCi/L
CP-0905001**	Radium-226	4.88 pCi/L	4.88U pCi/L
CP-0905002**	Radium-226	5.51 pCi/L	5.51U pCi/L
CP-0905023	Radium-226	5.55 pCi/L	5.55U pCi/L
CP-0905024	Radium-226	6.29 pCi/L	6.29U pCi/L
CP-0905013	Radium-226	1.30 pCi/L	1.30U pCi/L
CP-0905014	Radium-226	0.775 pCi/L	0.775U pCi/L
CP-0905017	Radium-226	2.14 pCi/L	2.14 pCi/L
CP-0905021	Radium-226	1.00 pCi/L	1.00U pCi/L
CP-0905022	Radium-226	0.662 pCi/L	0.662U pCi/L

#### IV. Accuracy and Precision Data

##### a. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) 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. Chemical Recovery

Chemical recoveries were not required by the method.

## V. Sample Result Verification

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

## VI. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

## VII. Overall Assessment of Data

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

## VIII. Field Duplicates

Samples CP-0905001\*\* and CP-0905023 and samples CP-0905002\*\* and CP-0905024 were identified as field duplicates. No radium-226 was detected in any of the samples with the following exceptions:

Isotope	Activity (pCi/L)		RPD
	CP-0905001**	CP-0905023	
Radium-226	4.88	5.55	13

Isotope	Activity (pCi/L)		RPD
	CP-0905002**	CP-0905024	
Radium-226	5.51	6.29	13

**Former Raytheon Site  
Radium-226 - Data Qualification Summary - SDG 9068**

No Sample Data Qualified in this SDG

**Former Raytheon Site  
Radium-226 - Laboratory Blank Data Qualification Summary - SDG 9068**

No Sample Data Qualified in this SDG

**Former Raytheon Site  
Radium-226 - Field Blank Data Qualification Summary - SDG 9068**

SDG	Sample	Isotope	Modified Final Concentration	A or P
9068	CP-0905005	Radium-226	2.04U pCi/L	A
9068	CP-0905006	Radium-226	4.44U pCi/L	A
9068	CP-0905001**	Radium-226	4.88U pCi/L	A
9068	CP-0905002**	Radium-226	5.51 U pCi/L	A
9068	CP-0905023	Radium-226	5.55U pCi/L	A
9068	CP-0905024	Radium-226	6.29U pCi/L	A
9068	CP-0905013	Radium-226	1.30U pCi/L	A
9068	CP-0905014	Radium-226	0.775U pCi/L	A
9068	CP-0905017	Radium-226	2.14 pCi/L	A
9068	CP-0905021	Radium-226	1.00U pCi/L	A
9068	CP-0905022	Radium-226	0.662U pCi/L	A

LDC #: 21179B29a  
 SDG #: 9068  
 Laboratory: GPL Laboratories

**VALIDATION COMPLETENESS WORKSHEET**  
 Level III/IV

Date: 8-4-09  
 Page: 1 of 1  
 Reviewer: MG  
 2nd Reviewer: [Signature]

**METHOD:** Radium 226 (EPA Method 903.1)

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: 5-27-09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IVa.	Matrix Spike/(Matrix Spike) Duplicates	A	MS/DUP
IVb.	Laboratory control samples	A	LCS
IVc.	Chemical recovery	N	not required
V.	Sample result verification	A	Not reviewed for Level III validation.
VI.	Minimum detectable activity (MDA)	A	
VII.	Overall assessment of data	A	
VIII.	Field duplicates	SW	D = 3+5, D = 4+6
XIV.	Field blanks	SW	EB = 13

Note: A = Acceptable      ND = No compounds detected      D = Duplicate  
 N = Not provided/applicable      R = Rinsate      TB = Trip blank  
 SW = See worksheet      FB = Field blank      EB = Equipment blank

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

1	CP-0905005	11	CP-0905021	21		31	
2	CP-0905006	12	CP-0905022	22		32	
3	CP-0905001**	13	CP-0905028	23		33	
4	CP-0905002**	14	CP-0905005DUP	24		34	
5	CP-0905023	15	CP-0905006MS	25		35	
6	CP-0905024	16	PBW	26		36	
7	CP-0905013	17		27		37	
8	CP-0905014	18		28		38	
9	CP-0905017	19		29		39	
10	CP-0905018	20		30		40	

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

LDC #: 21179B29a  
 SDG #: 9068

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2  
 Reviewer: MG  
 2nd Reviewer: [Signature]

Method: Radiochemistry(EPA Method 903.1 )

Validation Area	Yes	No	NA	Findings/Comments
<b>I. Technical holding times</b>				
All technical holding times were met.	✓			
<b>II. Calibration</b>				
Were all instruments and detectors calibration as required?	✓			
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 required frequency and within laboratory control limits?	✓			
<b>III. Blanks</b>				
Were blank analyses performed as required?	✓			
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
<b>IV. Matrix spikes and Duplicates</b>				
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.	✓			
Was a duplicate sample analyzed at the required frequency of 5% in this SDG?	✓			
Were all duplicate sample duplicate error ratios (DER) $\leq 1.42$ ?	✓			
<b>V. Laboratory control samples</b>				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%?	✓			
<b>VI. Sample Chemical/Carrier Recovery</b>				
Was a tracer/carrier added to each sample?		✓		
Were tracer/carrier recoveries within the QC limits?			✓	
<b>VII. Regional Quality Assurance and Quality Control</b>				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
<b>VIII. Sample Result Verification</b>				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

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VALIDATION FINDINGS CHECKLIST

Page: 2 of 2  
Reviewer: MG  
2nd Reviewer: W

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 #: 21179 B29a  
 SDG #: 9068

**VALIDATION FINDINGS WORKSHEET**  
**Field Blanks**

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

METHOD: Radiochemistry (Method: 903.1)

N/A Were field blanks identified in this SDG?  
 N/A Were target isotopes detected in the field blanks?

Blank units: PCi/L Associated sample units: PCi/L

Sampling date: 5-27-09

Field blank type: (circle one) Field Blank / Rinsate (Other: EB)

Associated Samples: 1-12

by gm A  
~~Normalized Absolute Dif~~

Analyte	Blank ID	Blank Action Limit	Sample Identification																				
			1	2	3	4	5	6	7	8	9	11											
Ra-226	1.83	9.15	2.04	4.44	4.88	5.51	5.55	6.09	1.30	0.775	2.14	1.00											

Blank units: PCi/L Associated sample units: PCi/L

Sampling date: 5-27-09

Field blank type: (circle one) Field Blank / Rinsate (Other: EB)

Associated Samples: 1-12

Analyte	Blank ID	Blank Action Limit	Sample Identification																					
			1	2	3	4	5	6	7	8	9	11												
Ra-226	1.83	9.15	1.2	0.662																				

Samples with isotope concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

LDC #: 21179B29a  
 SDG #: 9068

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

Page: 1 of 1  
 Reviewer: MG  
 2nd reviewer: [Signature]

METHOD: Radiochemistry (Method: 903.1)

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

Isotopes	Activity ( pCi/L )		RPD
	3	5	
Ra-226	4.88	5.55	13

Isotopes	Activity ( pCi/L )		RPD
	4	6	
Ra-226	5.51	6.29	13

Isotopes	Activity ( )		RPD

Isotopes	Activity ( )		RPD



LDC #: 21179 B29a  
 SDG #: 9062

**VALIDATION FINDINGS WORKSHEET**  
**Level IV Recalculation Worksheet**

Page: 1 of 1  
 Reviewer: HG  
 2nd Reviewer: [Signature]

METHOD: Radiochemistry (Method: 903.1)

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

$$\%R = \frac{\text{Found} \times 100}{\text{True}}$$

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:

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

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

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated		Reported	Acceptable (Y/N)
					%R or RPD	%R or RPD		
LCS	Laboratory control sample	Ra-226	11.2 (pci/L)	11.2 (pci/L)	100	99.7		Y
15	Matrix spike sample	Ra-226	8.1 (pci/L)	11.2 (pci/L)	72.3	72.1		
14	Duplicate RPD	Ra-226	2.04 (pci/L) ± 0.722 (2σ)	2.37 (pci/L) ± 0.814 (2σ)	F/E	F/E	0.614	
-	Chemical recovery	-	-	-	-	-	-	-

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.



**Former Raytheon Site  
Data Validation Reports  
LDC# 21179**

Radium-228

*LDC*

## Laboratory Data Consultants, Inc. Data Validation Report

**Project/Site Name:** Former Raytheon Site  
**Collection Date:** May 26, 2009  
**LDC Report Date:** August 5, 2009  
**Matrix:** Water  
**Parameters:** Radium-228  
**Validation Level:** Level III  
**Laboratory:** GPL Laboratories

**Sample Delivery Group (SDG):** 9067

### Sample Identification

CP-0905015  
CP-0905016  
CP-0905019  
CP-0905020  
CP-0905025  
CP-0905026  
CP-0905007  
CP-0905008  
CP-0905003  
CP-0905004  
CP-0905009  
CP-0905010  
CP-0905011  
CP-0905012  
CP-0905027  
CP-0905016DUP  
CP-0905019MS

## Introduction

This data review covers 17 water samples listed on the cover sheet. The analyses were per EPA Method 904.0 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 a 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:

- U Indicates the isotope 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 isotope 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 and a self-absorption curve was generated for each radionuclide of interest.

### **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 CP-0905027 was identified as an equipment blank. No radium-228 contaminants were found in this blank.

## **IV. Accuracy and Precision Data**

### **a. Matrix Spike/(Matrix Spike) Duplicate**

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) 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. Chemical Recovery**

All chemical recoveries were within validation criteria.

## V. Sample Result Verification

Raw data were not reviewed for this SDG.

## VI. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

## VII. Overall Assessment of Data

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

## VIII. Field Duplicates

Samples CP-0905019 and CP-0905025 and samples CP-0905020 and CP-0905026 were identified as field duplicates. No radium-228 was detected in any of the samples with the following exceptions:

Isotope	Activity (pCi/L)		RPD
	CP-0905019	CP-0905025	
Radium-228	0.633U	1.08	200

**Former Raytheon Site  
Radium-228 - Data Qualification Summary - SDG 9067**

No Sample Data Qualified in this SDG

**Former Raytheon Site  
Radium-228 - Laboratory Blank Data Qualification Summary - SDG 9067**

No Sample Data Qualified in this SDG

**Former Raytheon Site  
Radium-228 - Field Blank Data Qualification Summary - SDG 9067**

No Sample Data Qualified in this SDG



LDC #: 21179A29b  
 SDG #: 9067  
 Laboratory: GPL Laboratories

**VALIDATION COMPLETENESS WORKSHEET**  
 Level III

Date: 8-3-09  
 Page: 1 of 1  
 Reviewer: MG  
 2nd Reviewer: [Signature]

**METHOD:** Radium 228 (EPA Method 904.0)

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: 5-26-09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IVa.	Matrix Spike/(Matrix Spike) Duplicates	A	MS/DUP
IVb.	Laboratory control samples	A	LCS
IVc.	Chemical recovery	SW	
V.	Sample result verification	gmk SW+N	
VI.	Minimum detectable activity (MDA)	A	
VII.	Overall assessment of data	A	
VIII.	Field duplicates	SW	D = 3*+5, D = 4*+6*
XIV.	Field blanks	ND	EB = 15

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:

all water

1	CP-905015	11	CP-905009	21		31	
2	CP-905016	12	CP-905010	22		32	
3	CP-905019	13	CP-905011	23		33	
4	CP-905020	14	CP-905012	24		34	
5	CP-905025	15	CP-905027	25		35	
6	CP-905026	16	CP-905016DUP	26		36	
7	CP-905007	17	CP-905019MS	27		37	
8	CP-905008	18	PBW	28		38	
9	CP-905003	19		29		39	
10	CP-905004	20		30		40	

Notes: gmk ID: CP-090- - -



LDC #: 21179A296  
 SDG #: 9067

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

Page: 1 of 1  
 Reviewer: MG  
 2nd reviewer: [Signature]

METHOD: Radiochemistry (Method: 904.0)

- 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/L )		RPD
	3	5	
Ra-228	0.633 U	1.08	200

Isotopes	Activity ( )		RPD

Isotopes	Activity ( )		RPD

Isotopes	Activity ( )		RPD