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November 30, 2010

Mr. Michael Neely
CH2M Hill Plateau Remediation Company
P.O. Box 1600
Mail Stop – B6-06
Richland, WA 99352

Reference: **P.O. #33677**
Eberline Analytical S0-05-009-7660, SDG H4228
S0-10-059-7660, SDG H4228

Dear Mr. Neely:

Enclosed is a data report for one water sample designated under SAF No. X10-039 received at Eberline Analytical on May 5, 2010. Results for the originally requested Total Radium analysis were reported on June 2, 2010. This report includes the additionally requested Ra-228 analysis.

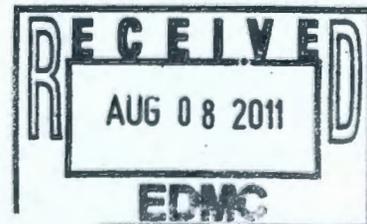
Please call if you have any questions concerning this report.

Sincerely,

N. Joseph Verville
Client Services Manager

NJV/ljb

Enclosure: Data Package



Eberline Analytical
W.O. No. S0-05-009-7660
S0-10-059-7660,

CH2M Hill Plateau Remediation Company
SDG H4228

Case Narrative

Page 1 of 1

1.0 GENERAL

CH2M Hill Plateau Remediation Company (CHPRC) Sample Delivery Group H4228 was composed of one water sample designated under SAF No. X10-039 with a Project Designation of: IU2 IU6DURA, APRIL 2010.

The samples were received as stated on the chain-of-custody documents. Any discrepancies are noted on the Eberline Analytical Sample Receipt Checklist.

The Ra-228 analyses in this SDG were batched, for QC purposes, with water samples from SDG H4220.

2.0 ANALYSIS NOTES

2.1 Total Radium Analysis

The activity for the QC LCS was 81%, which is an acceptable recovery. No other problems were encountered during the course of the analyses.

2.2 Radium-228 Analysis

The results for both the original and duplicate analyses were less than their respective MDA's, therefore no RPD or statistical control limit is calculated. No other problems were encountered during the course of the analyses.

3.0 Case Narrative Certification Statement

"I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data obtained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature."



N. Joseph Verville
Client Services Manager

11/30/10

Date

EBERLINE ANALYTICAL / RICHMOND
 SAMPLE DELIVERY GROUP H4228

SDG 7660
 Contact N. Joseph Verville

Client CHPRC
 Contract No. 33677
 Case no SDG_H4228

S U M M A R Y D A T A S E C T I O N

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VB
 Prepared by _____
N. Joseph Verville
 Reviewed by _____

Lab id EBRLNE
 Protocol CHPRC
 Version Ver 1.0
 Form DVD-TOC
 Version 3.06
 Report date 11/24/10

EBERLINE ANALYTICAL / RICHMOND
 SAMPLE DELIVERY GROUP H4228

SDG 7660
 Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC
 Contract No. 33677
 Case no SDG H4228

ABOUT THE DATA SUMMARY SECTION

The Data Summary Section of a Data Package has all data, in several useful orders, necessary for first level, routine review of the data package for a Sample Delivery Group (SDG). This section follows the Data Package Narrative, which has an overview of the data package and a discussion of special problems. It is followed by the Raw Data Section, which has full details.

The Data Summary Section has several groups of reports:

SAMPLE SUMMARIES

The Sample and QC Summary Reports show all samples, including QC samples, reported in one SDG. These reports cross-reference client and lab sample identifiers.

PREPARATION BATCH SUMMARY

The Preparation Batch Summary Report shows all preparation batches (lab groupings reflecting how work was organized) relevant to the reported SDG with information necessary to check the completeness and consistency of the SDG.

WORK SUMMARY

The Work Summary Report shows all samples and work done on them relevant to the reported SDG.

METHOD BLANKS

The Method Blank Reports, one for each Method Blank relevant to the SDG, show all results and primary supporting information for the blanks.

LAB CONTROL SAMPLES

The Lab Control Sample Reports, one for each Lab Control Sample relevant to the SDG, show all results, recoveries and primary supporting information for these QC samples.

REPORT GUIDES

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SUMMARY DATA SECTION

Page 1

Lab id EBRLNE
 Protocol CHPRC
 Version Ver 1.0
 Form DVD-RG
 Version 3.06
 Report date 11/24/10

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4228

SDG 7660
 Contact N. Joseph Verville

GUIDE, cont.

Client CHPRC
 Contract No. 33677
 Case no SDG H4228

ABOUT THE DATA SUMMARY SECTION

DUPLICATES

The Duplicate Reports, one for each Duplicate and Original sample pair relevant to the SDG, show all results, differences and primary supporting information for these QC samples.

MATRIX SPIKES

The Matrix Spike Reports, one for each Spiked and Original sample pair relevant to the SDG, show all results, recoveries and primary supporting information for these QC samples.

DATA SHEETS

The Data Sheet Reports, one for each client sample in the SDG, show all results and primary supporting information for these samples.

METHOD SUMMARIES

The Method Summary Reports, one for each test used in the SDG, show all results, QC and method performance data for one analyte on one or two pages. (A test is a short code for the method used to do certain work to the client's specification.)

REPORT GUIDES

The Report Guides, one for each of the above groups of reports, have documentation on how to read the associated reports.

Lab id EBRLNE
 Protocol CHPRC
 Version Ver 1.0
 Form DVD-RG
 Version 3.06
 Report date 11/24/10

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4228

LAB SAMPLE SUMMARY

SDG 7660
 Contact N. Joseph Verville

Client CHPRC
 Contract No. 33677
 Case no SDG H4228

LAB SAMPLE ID	CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	SAF NO	CHAIN OF CUSTODY	COLLECTED
S004124-08	Lab Control Sample		WATER		X10-039		
S004124-09	Method Blank		WATER		X10-039		
S004124-10	Duplicate (S004124-02)	HNF-N-506 31/47	WATER		X10-039		04/26/10 10:05
S005009-01	B25053	HNF-N-506 28/91	WATER		X10-039	X10-039-323	04/29/10 08:18
S005009-02	Lab Control Sample		WATER		X10-039		
S005009-03	Method Blank		WATER		X10-039		
S005009-04	Duplicate (S005009-01)	HNF-N-506 28/91	WATER		X10-039		04/29/10 08:18

Lab id EBRLNE
 Protocol CHPRC
 Version Ver 1.0
 Form DVD-LS
 Version 3.06
 Report date 11/24/10

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4228

SDG 7660
 Contact N. Joseph Verville

QC SUMMARY

Client CHPRC
 Contract No. 33677
 Case no SDG H4228

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	SAMPLE SOLIDS AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED	LAB COLL SAMPLE ID	DEPARTMENT SAMPLE ID
7652		Method Blank	WATER				S004124-09	7652-009
		Lab Control Sample	WATER				S004124-08	7652-008
		Duplicate (S004124-02)	WATER	2.020 L		04/28/10 2	S004124-10	7652-010
7660	X10-039-323	B25053	WATER	1.020 L		05/05/10 6	S005009-01	7660-001
		Method Blank	WATER				S005009-03	7660-003
		Lab Control Sample	WATER				S005009-02	7660-002
		Duplicate (S005009-01)	WATER	1.020 L		05/05/10 6	S005009-04	7660-004

QC SUMMARY

Page 1

SUMMARY DATA SECTION

Page 4

Lab id EBRLNE
 Protocol CHPRC
 Version Ver 1.0
 Form DVD-QS
 Version 3.06
 Report date 11/24/10

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4228

SDG 7660
 Contact N. Joseph Verville

PREP BATCH SUMMARY

Client CHPRC
 Contract No. 33677
 Case no SDG H4228

TEST	MATRIX	METHOD	PREPARATION ERROR		PLANCHETS ANALYZED				QUALI-	
			BATCH	2σ %	CLIENT	MORE	RE	BLANK		LCS
Beta Counting										
AC	WATER	Radium 228 in Water	7276-113	10.4	1		1	1	1/0/1	
Gas Proportional Counting										
RAT	WATER	Total Alpha Radium in Water	7251-088	12.8	1		1	1	1/1	

Blank, LCS, Duplicate and Spike planchets are those in the same preparation batch as some Client sample.
 In counts like 'a/b/c', 'a' = QC planchets, 'b' = Originals in this SDG, 'c' = Originals in other SDGs.

Lab id EBRLNE
 Protocol CHPRC
 Version Ver 1.0
 Form DVD-PBS
 Version 3.06
 Report date 11/24/10

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4228

SDG 7660
Contact N. Joseph Verville

LAB WORK SUMMARY

Client CHPRC
Contract No. 33677
Case no SDG H4228

LAB SAMPLE	CLIENT SAMPLE ID	MATRIX	PLANCHET	TEST	SUF- FLX	ANALYZED	REVIEWED	BY	METHOD
COLLECTED	LOCATION								
RECEIVED	CUSTODY	SAF No							
S004124-08	Lab Control Sample		7652-008	AC		11/16/10	11/17/10	BW	Radium 228 in Water
		WATER X10-039							
S004124-09	Method Blank		7652-009	AC		11/16/10	11/17/10	BW	Radium 228 in Water
		WATER X10-039							
S004124-10	Duplicate (S004124-02)		7652-010	AC		11/16/10	11/17/10	BW	Radium 228 in Water
04/26/10	HNF-N-506 31/47	WATER							
04/28/10		X10-039							
S005009-01	B25053		7660-001	AC		11/16/10	11/17/10	BW	Radium 228 in Water
04/29/10	HNF-N-506 28/91	WATER	7660-001	RAT		05/22/10	05/25/10	BW	Total Alpha Radium in Water
05/05/10	X10-039-323	X10-039							
S005009-02	Lab Control Sample		7660-002	RAT		05/24/10	05/25/10	BW	Total Alpha Radium in Water
		WATER X10-039							
S005009-03	Method Blank		7660-003	RAT		05/24/10	05/25/10	BW	Total Alpha Radium in Water
		WATER X10-039							
S005009-04	Duplicate (S005009-01)		7660-004	RAT		05/24/10	05/25/10	BW	Total Alpha Radium in Water
04/29/10	HNF-N-506 28/91	WATER							
05/05/10		X10-039							

COUNTS OF TESTS BY SAMPLE TYPE										
TEST	SAF No	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP SPIKE	TOTAL
AC	X10-039	Radium 228 in Water	RAISO_SEP_GPC		1		1	1	1	4
RAT	X10-039	Total Alpha Radium in Water	RATOT_GPC		1		1	1	1	4
TOTALS					2		2	2	2	8

Lab id EBRLNE
Protocol CHPRC
Version Ver 1.0
Form DVD-LWS
Version 3.06
Report date 11/24/10

EBERLINE ANALYTICAL / RICHMOND
 SAMPLE DELIVERY GROUP H4228

7652-009

Method Blank

METHOD BLANK

SDG <u>7660</u>	Client/Case no <u>CHPRC</u>	SDG <u>H4228</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>S004124-09</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7652-009</u>	Material/Matrix <u>WATER</u>	
	SAF No <u>X10-039</u>	

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Radium 228	15262-20-1	-0.210	1.1	2.78	3.00	U	AC

QC-BLANK #75833

Lab id <u>EBRLNE</u>
Protocol <u>CHPRC</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>11/24/10</u>

EBERLINE ANALYTICAL / RICHMOND
 SAMPLE DELIVERY GROUP H4228

7660-003

Method Blank

METHOD BLANK

SDG <u>7660</u>	Client/Case no <u>CHPRC</u>	SDG <u>H4228</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>S005009-03</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7660-003</u>	Material/Matrix <u>WATER</u>	
	SAF No <u>X10-039</u>	

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Total Radium	ALPHA-RA	0.064	0.13	0.405	1.00	U	RAT

QC-BLANK #73260

Lab id <u>EBERLINE</u>
Protocol <u>CHPRC</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>11/24/10</u>

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4228

7652-008

Lab Control Sample

LAB CONTROL SAMPLE

SDG <u>7660</u>	Client/Case no <u>CHPRC</u>	<u>SDG H4228</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>S004124-08</u>	Client sample id <u>Lab Control Sample</u>	
Dept sample id <u>7652-008</u>	Material/Matrix <u>WATER</u>	
	SAF No <u>X10-039</u>	

ANALYTE	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST	ADDED pCi/L	2σ ERR pCi/L	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Radium 228	14.0	1.6	2.97	3.00	AC		14.2	0.57	99	76-124	80-120

QC-LCS #75832

Lab id <u>EBRLNE</u>
Protocol <u>CHPRC</u>
Version <u>Ver 1.0</u>
Form <u>DVD-LCS</u>
Version <u>3.06</u>
Report date <u>11/24/10</u>

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4228

7660-002

Lab Control Sample

LAB CONTROL SAMPLE

SDG <u>7660</u>	Client/Case no <u>CHPRC</u>	<u>SDG H4228</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>S005009-02</u>	Client sample id <u>Lab Control Sample</u>	
Dept sample id <u>7660-002</u>	Material/Matrix <u>WATER</u>	
	SAP No <u>X10-039</u>	

ANALYTE	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST	ADDED pCi/L	2σ ERR pCi/L	REC %	3σ LIMITS (TOTAL)	PROTOCOL LIMITS
Total Radium	22.6	1.2	0.425	1.00		RAT	27.8	1.1	<u>81</u>	82-118	80-120

QC-LCS #73259

Lab id <u>EBRLNE</u>
Protocol <u>CHPRC</u>
Version <u>Ver 1.0</u>
Form <u>DVD-LCS</u>
Version <u>3.06</u>
Report date <u>11/24/10</u>

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4228

7652-010

B25044

DUPLICATE

SDG <u>7660</u>	Client/Case no <u>CHPRC</u>	<u>SDG H4228</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
DUPLICATE	ORIGINAL	
Lab sample id <u>S004124-10</u>	Lab sample id <u>S004124-02</u>	Client sample id <u>B25044</u>
Dept sample id <u>7652-010</u>	Dept sample id <u>7652-002</u>	Location/Matrix <u>HNF-N-506 31/47</u> <u>WATER</u>
	Received <u>04/28/10</u>	Collected/Volume <u>04/26/10 10:05</u> <u>2.020 L</u>
		Custody/SAF No <u>X10-039-314</u> <u>X10-039</u>

ANALYTE	DUPLICATE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST	ORIGINAL pCi/L	2σ ERR (COUNT)	MDA pCi/L	QUALI- FIERS	RPD %	3σ TOT	DER σ
Radium 228	-0.816	1.8	<u>4.76</u>	3.00	U	AC	1.19	2.0	<u>4.01</u>	U	-		1.5

QC-DUP#2 75834

IU2, IU6DURA, APRIL 2010

DUPLICATES

Page 1

SUMMARY DATA SECTION

Page 11

Lab id <u>EBRLNE</u>
Protocol <u>CHPRC</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DUP</u>
Version <u>3.06</u>
Report date <u>11/24/10</u>

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4228

7660-004

B25053

DUPLICATE

SDG <u>7660</u>	Client/Case no <u>CHPRC</u>	<u>SDG H4228</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
DUPLICATE	ORIGINAL	
Lab sample id <u>S005009-04</u>	Lab sample id <u>S005009-01</u>	Client sample id <u>B25053</u>
Dept sample id <u>7660-004</u>	Dept sample id <u>7660-001</u>	Location/Matrix <u>HNF-N-506 28/91</u> <u>WATER</u>
	Received <u>05/05/10</u>	Collected/Volume <u>04/29/10 08:18</u> <u>1.020 L</u>
		Custody/SAF No <u>X10-039-323</u> <u>X10-039</u>

ANALYTE	DUPLICATE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST	ORIGINAL pCi/L	2σ ERR (COUNT)	MDA pCi/L	QUALI- FIERS	RPD %	3σ TOT	DER σ
Total Radium	0.298	0.16	0.406	1.00	U	RAT	0.367	0.17	0.348		21	109	0.6

QC-DUP#1 73261

IU2 IU6DURA, APRIL 2010

Lab id EBRLNE
Protocol CHPRC
Version Ver 1.0
Form DVD-DUP
Version 3.06
Report date 11/24/10

EBERLINE ANALYTICAL / RICHMOND
 SAMPLE DELIVERY GROUP H4228

7660-001

B25053

DATA SHEET

SDG <u>7660</u>	Client/Case no <u>CHPRC</u>	SDG <u>H4228</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>S005009-01</u>	Client sample id <u>B25053</u>	
Dept sample id <u>7660-001</u>	Location/Matrix <u>HNF-N-506 28/91</u>	<u>WATER</u>
Received <u>05/05/10</u>	Collected/Volume <u>04/29/10 08:18</u>	<u>1.020 L</u>
	Custody/SAF No <u>X10-039-323</u>	<u>X10-039</u>

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALIFIERS	TEST
Total Radium	ALPHA-RA	0.367	0.17	0.348	1.00		RAT
Radium 228	15262-20-1	0	1.2	<u>3.10</u>	3.00	U	AC

IU2 IU6DURA, APRIL 2010

Lab id <u>EBRLNE</u>
Protocol <u>CHPRC</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>11/24/10</u>

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4228

LAB METHOD SUMMARY

RADIUM 228 IN WATER

BETA COUNTING

Test AC Matrix WATER
 SDG 7660
 Contact N. Joseph Verville

Client CHPRC
 Contract No. 33677
 Contract SDG H4228

RESULTS

LAB RAW SUP-
 SAMPLE ID TEST FIX PLANCHET CLIENT SAMPLE ID Radium 228

Preparation batch 7276-113

S004124-08	7652-008	Lab Control Sample	ok
S004124-09	7652-009	Method Blank	U
S004124-10	7652-010	Duplicate (S004124-02)	- U
S005009-01	7660-001	B25053	U

Nominal values and limits from method RDLs (pCi/L) 3.00

METHOD PERFORMANCE

LAB RAW SUP- MDA ALIQ PREP DILU- YIELD EFF COUNT FWHM DRIFT DAYS ANAL-
 SAMPLE ID TEST FIX CLIENT SAMPLE ID pCi/L L FAC TION % % min keV KeV HELD PREPARED YZED DETECTOR

Preparation batch 7276-113 2σ prep error 10.4 % Reference Lab Notebook No. 7276 pg.113

S004124-08	Lab Control Sample	2.97	0.500	76	150	11/16/10	11/16	GRB-201
S004124-09	Method Blank	2.78	0.500	74	150	11/16/10	11/16	GRB-202
S004124-10	Duplicate (S004124-02)	<u>4.76</u>	<u>0.300</u>	76	150	<u>204</u>	11/16/10	11/16 GRB-203
S005009-01	B25053	<u>3.10</u>	0.500	74	150	<u>201</u>	11/16/10	11/16 GRB-232

Nominal values and limits from method 3.00 0.500 40-110 100 180

PROCEDURES REFERENCE RAISO_SEP_GPC
 SPP-062 Sample Aliquoting, rev 1
 DWP-894 Sequential Separation of Actinium-228 and Radium-226 in Drinking Water (>1 Liter Aliquot), rev 5

AVERAGES ± 2 SD MDA 3.40 ± 1.83
 FOR 4 SAMPLES YIELD 75 ± 2

METHOD SUMMARIES
 Page 1
 SUMMARY DATA SECTION
 Page 14

Lab id EBRLNE
 Protocol CHPRC
 Version Ver 1.0
 Form DVD-LMS
 Version 3.06
 Report date 11/24/10

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4228

Test RAT Matrix WATER
 SDG 7660
 Contact N. Joseph Verville

LAB METHOD SUMMARY

TOTAL ALPHA RADIUM IN WATER
 GAS PROPORTIONAL COUNTING

Client CHPRC
 Contract No. 33677
 Contract SDG H4228

RESULTS

LAB	RAW	SUF-		
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	Total Radium
Preparation batch 7251-088				
S005009-01		7660-001	B25053	0.367
S005009-02		7660-002	Lab Control Sample	<u>LOW</u>
S005009-03		7660-003	Method Blank	U
S005009-04		7660-004	Duplicate (S005009-01)	ok U

Nominal values and limits from method RDLs (pCi/L) 1.00

METHOD PERFORMANCE

LAB	RAW	SUF-	MDA	ALIQ	PREP	DILU-	YIELD	EFF	COUNT	FWHM	DRIFT	DAYS	ANAL-		
SAMPLE ID	TEST FIX	CLIENT SAMPLE ID	pCi/L	L	FAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 7251-088 2σ prep error 12.8 % Reference Lab Notebook No. 7251 pg.088															
S005009-01		B25053	0.348	0.200			103	100				23	05/20/10	05/22	GAW-216
S005009-02		Lab Control Sample	0.425	0.200			97	100					05/20/10	05/24	GAW-103
S005009-03		Method Blank	0.405	0.200			97	100					05/20/10	05/24	GAW-105
S005009-04		Duplicate (S005009-01)	0.406	0.200			98	100				25	05/20/10	05/24	GAW-107

Nominal values and limits from method 1.00 0.200 40-110 100 180

PROCEDURES REFERENCE RATOT_GPC
 SPP-062 Sample Aliquoting, rev 1
 CP-880 Total Radium in Water, rev 2

AVERAGES ± 2 SD MDA 0.396 ± 0.067
 FOR 4 SAMPLES YIELD 99 ± 6

Lab id EBRINE
 Protocol CHPRC
 Version Ver 1.0
 Form DVD-LMS
 Version 3.06
 Report date 11/24/10

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4228

SDG 7660
 Contact N. Joseph Verville

R E P O R T G U I D E

Client CHPRC
 Contract No. 33677
 Case no SDG H4228

S A M P L E S U M M A R Y

The Sample and QC Summary Reports show all samples, including QC samples, reported in one Sample Delivery Group (SDG).

The Sample Summary Report fully identifies client samples and gives the corresponding lab sample identification. The QC Summary Report shows at the sample level how the lab organized the samples into batches and generated QC samples. The Preparation Batch and Method Summary Reports show this at the analysis level.

The following notes apply to these reports:

- * LAB SAMPLE ID is the lab's primary identification for a sample.
- * DEPARTMENT SAMPLE ID is an alternate lab id, for example one assigned by a radiochemistry department in a lab.
- * CLIENT SAMPLE ID is the client's primary identification for a sample. It includes any sample preparation done by the client that is necessary to identify the sample.
- * QC BATCH is a lab assigned code that groups samples to be processed and QCed together. These samples should have similar matrices.

QC BATCH is not necessarily the same as SDG, which reflects samples received and reported together.

- * All Lab Control Samples, Method Blanks, Duplicates and Matrix Spikes are shown that QC any of the samples. Due to possible reanalyses, not all results for all these QC samples may be relevant to the SDG. The Lab Control Sample, Method Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.

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 Version 3.06
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PREPARATION BATCH SUMMARY

The Preparation Batch Summary Report shows all preparation batches in one Sample Delivery Group (SDG) with information necessary to check the completeness and consistency of the SDG.

The following notes apply to this report:

- * The preparation batches are shown in the same order as the Method Summary Reports are printed.
- * Only analyses of planchets relevant to the SDG are included.
- * Each preparation batch should have at least one Method Blank and LCS in it to validate client sample results.
- * The QUALIFIERS shown are all qualifiers other than U, J, B, L and H that occur on any analysis in the preparation batch. The Method Summary Report has these qualifiers on a per sample basis.

These qualifiers should be reviewed as follows:

- X Some data has been manually entered or modified. Transcription errors are possible.
- P One or more results are 'preliminary'. The data is not ready for final reporting.
- 2 There were two or more results for one analyte on one planchet imported at one time. The results in DVD may not be the same as on the raw data sheets.

Other lab defined qualifiers may occur. In general, these should be addressed in the SDG narrative.

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WORK SUMMARY

The Work Summary Report shows all samples, including QC samples, and all relevant analyses in one Sample Delivery Group (SDG). This report is often useful as supporting documentation for an invoice.

The following notes apply to this report:

- * TEST is a code for the method used to measure associated analytes. Results and related information for each analyte are on the Data Sheet Report. In special cases, a test code used in the summary data section is not the same as in associated raw data. In this case, both codes are shown on the Work Summary.
- * SUFFIX is the lab's code to distinguish multiple analyses (recounts, reworks, reanalyses) of a fraction of the sample. The suffix indicates which result is being reported. An empty suffix normally identifies the first attempt to analyze the sample.
- * The LAB SAMPLE ID, TEST and SUFFIX uniquely identify all supporting data for a result. The Method Summary Report for each TEST has method performance data, such as yield, for each lab sample id and suffix and procedures used in the method.
- * PLANCHET is an alternate lab identifier for work done for one test. It, combined with the TEST and SUFFIX, may be the best link to raw data.
- * For QC samples, only analyses that directly QC some regular sample are shown. The Lab Control Sample, Method Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.
- * The SAS (Special Analytical Services) Number is a client or lab assigned code that reflects special processing for samples, such as rapid turn around. Counts of tests done are lists by SAS number since it is likely to affect prices.

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DATA SHEET

The Data Sheet Report shows all results and primary supporting information for one client sample or Method Blank. This report corresponds to both the CLP Inorganics and Organics Data Sheet.

The following notes apply to this report:

- * TEST is a code for the method used to measure an analyte. If the TEST is empty, no data is available; the analyte was not analyzed for.
- * The LAB SAMPLE ID and TEST uniquely identify work within the Summary Data Section of a Data Package. The Work Summary and Method Summary Reports further identify raw data that underlies this work.

The Method Summary Report for each TEST has method performance data, such as yield, for each Lab Sample ID and a list of procedures used in the method.

- * ERRORS can be labeled TOTAL or COUNT. TOTAL implies a preparation (non-counting method) error has been added, as square root of sum of squares, to the counting error denoted by COUNT. The preparation errors, which may vary by preparation batch, are shown on the Method Summary Report.
- * A RESULT can be 'N.R.' (Not Reported). This means the lab did this work but chooses not to report it now, possibly because it was reported at another time.
- * When reporting a Method Blank, a RESULT can be 'N.A.' (Not Applicable). This means there is no reported client sample work in the same preparation batch as the Blank's result. This is likely to occur when the Method Blank is associated with reanalyses of selected work for a few samples in the SDG.

The following qualifiers are defined by the DVD system:

- U The RESULT is less than the MDA (Minimum Detectable Activity).

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If the MDA is blank, the ERROR is used as the limit.

- J The RESULT is less than the RDL (Required Detection Limit) and no U qualifier is assigned.
 - B A Method Blank associated with this sample had a result without a U flag and, after correcting for possibly different aliquots, that result is greater than or equal to the MDA for this sample.
- Normally, B is not assigned if U is. When method blank subtraction is shown on this report, B flags are assigned based on the unsubtracted values while U's are assigned based on the subtracted ones. Both flags can be assigned in this case.
- For each sample result, all Method Blank results in the same preparation batch are compared. The Method Summary Report documents this and other QC relationships.
- L Some Lab Control Sample that QC's this sample had a low recovery. The lab can disable assignment of this qualifier.
 - H Similar to 'L' except the recovery was high.
 - P The RESULT is 'preliminary'.
 - X Some data necessary to compute the RESULT, ERROR or MDA was manually entered or modified.
 - 2 There were two or more results available for this analyte. The reported result may not be the same as in the raw data.

Other qualifiers are lab defined. Definitions should be in the SDG narrative.

The following values are underlined to indicate possible problems:

- * An MDA is underlined if it is bigger than its RDL.

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- * An ERROR is underlined if the 1.645 sigma counting error is bigger than both the MDA and the RESULT, implying that the MDA may not be a good estimate of the 'real' minimum detectable activity.
- * A negative RESULT is underlined if it is less than the negative of its 2 sigma counting ERROR.
- * When reporting a Method Blank, a RESULT is underlined if greater than its MDA. If the MDA is blank, the 2 sigma counting error is used in the comparison.

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LAB CONTROL SAMPLE

The Lab Control Sample Report shows all results, recoveries and primary supporting information for one Lab Control Sample.

The following notes apply to this report:

- * All fields in common with the Data Sheet Report have similar usage. Refer to its Report Guide for details.
- * An amount ADDED is the lab's value for the actual amount spiked into this sample with its ERROR an estimate of the error of this amount.

An amount added is underlined if its ratio to the corresponding RDL is outside protocol specified limits.

- * REC (Recovery) is RESULT divided by ADDED expressed as a percent.
- * The first, computed limits for the recovery reflect:
 1. The error of RESULT, including that introduced by rounding the result prior to printing.

If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.
 2. The error of ADDED.
 3. A lab specified, per analyte bias. The bias changes the center of the computed limits.
- * The second limits are protocol defined upper and lower QC limits for the recovery.
- * The recovery is underlined if it is outside either of these ranges.

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DUPLICATE

The Duplicate Report shows all results, differences and primary supporting information for one Duplicate and associated Original sample.

The following notes apply to this report:

- * All fields in common with the Data Sheet Report have similar usage. This applies both to the Duplicate and Original sample data. Refer to the Data Sheet Report Guide for details.

If the Duplicate has data for a TEST and the lab did not do this test to the Original, the Original's RESULTS are underlined.

- * The RPD (Relative Percent Difference) is the absolute value of the difference of the RESULTS divided by their average expressed as a percent.

If both RESULTS are less than their MDAs, no RPD is computed and a '-' is printed.

For an analyte, if the lab did work for both samples but has data for only one, the MDA from the sample with data is used as the other's result in the RPD.

- * The first, computed limit is the sum, as square root of sum of squares, of the errors of the results divided by the average result as a percent, hence the relative error of the difference rather than the error of the relative difference. The errors include those introduced by rounding the RESULTS prior to printing.

If this limit is labeled TOT, it includes the preparation error in the RESULTS. If labeled CNT, it does not.

This value reported for this limit is at most 999.

- * The second limit for the RPD is the larger of:
 1. A fixed percentage specified in the protocol.

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2. A protocol factor (typically 2) times the average MDA as a percent of the average result. This limit applies when the results are close to the MDAs.

- * The RPD is underlined if it is greater than either limit.
- * If specified by the lab, the second limit column is replaced by the Difference Error Ratio (DER), which is the absolute value of the difference of the results divided by the quadratic sum of their one sigma errors, the same errors as used in the first limit.

Except for differences due to rounding, the DER is the same as the RPD divided by the first RPD limit with the limit scaled to 1 sigma.

- * The DER is underlined if it is greater than the sigma factor, typically 2 or 3, shown in the header for the first RPD limit.

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MATRIX SPIKE

The Matrix Spike Report shows all results, recoveries and primary supporting information for one Matrix Spike and associated Original sample.

The following notes apply to this report:

- * All fields in common with the Data Sheet Report have similar usage. This applies both to the Spiked and Original sample data. Refer to the Data Sheet Report Guide for details.

If the Spike has data for a TEST and the lab did not do this test to the Original, the Original's RESULTS are underlined.

- * An amount ADDED is the lab's value for the actual amount spiked into the Spike sample with its ERROR an estimate of the error of this amount.

An amount is underlined if its ratio to the corresponding RDL is outside protocol specified limits.

- * REC (Recovery) is the Spike RESULT minus the Original RESULT divided by ADDED expressed as a percent.

- * The first, computed limits for the recovery reflect:

1. The errors of the two RESULTS, including those introduced by rounding them prior to printing.

If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.

2. The error of ADDED.

3. A lab specified, per analyte bias. The bias changes the center of the computed limits.

- * The second limits are protocol defined upper and lower QC limits

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MATRIX SPIKE

for the recovery.

These limits are left blank if the Original RESULT is more than a protocol defined factor (typically 4) times ADDED. This is a way of accounting for that when the spike is small compared to the amount in the original sample, the recovery is unreliable.

- * The recovery is underlined (out of spec) if it is outside either of these ranges.

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METHOD SUMMARY

The Method Summary Report has two tables. One shows up to five results measured using one method. The other has performance data for the method. There is one report for each TEST, as used on the Data Sheet Report.

The following notes apply to this report:

- * Each table is subdivided into sections, one for each preparation batch. A preparation batch is a group of aliquots prepared at roughly the same time in one work area of the lab using the same method.

There should be Lab Control Sample and Method Blank results in each preparation batch since this close correspondence makes the QC meaningful. Depending on lab policy, Duplicates need not occur in each batch since they QC sample dependencies such as matrix effects.

- * The RAW TEST column shows the test code used in the raw data to identify a particular analysis if it is different than the test code in the header of the report. This occurs in special cases due to method specific details about how the lab labels work.

The Lab Sample or Planchet ID combined with the (Raw) Test Code and Suffix uniquely identify the raw data for each analysis.

- * If a result is less than both its MDA and RDL, it is replaced by just 'U' on this report. If it is greater than or equal to the RDL but less than the MDA, the result is shown with a 'U' flag.

The J and X flags are as on the data sheet.

- * Non-U results for Method Blanks are underlined to indicate possible contamination of other samples in the preparation batch. The Method Blank Report has supporting data.

- * Lab Control Sample and Matrix Spike results are shown as: ok, No data, LOW or HIGH, with the last two underlined. 'No data'

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means no amount ADDED was specified. 'LOW' and 'HIGH' correspond to when the recovery is underlined on the Lab Control Sample or Matrix Spike Report. See these reports for supporting data.

- * Duplicate sample results are shown as: ok, No data, or OUT, with the last two underlined. 'No data' means there was no original sample data found for this duplicate. 'OUT' corresponds to when the RPD is underlined on the Duplicate Report. See this report for supporting data.
 - * If the MDA column is labeled 'MAX MDA', there was more than one result measured by the reported method and the MDA shown is the largest MDA. If not all these results have the same RDL, the MAX MDA reflects only those results with RDL equal to the smallest one.
- MDAs are underlined if greater than the printed RDL.
- * Aliquots are underlined if less than the nominal value specified for the method.
 - * Preparation factors are underlined if greater than the nominal value specified for the method.
 - * Dilution factors are underlined if greater than the nominal value specified for the method.
 - * Residues are underlined if outside the range specified for the method. Residues are not printed if yields are.
 - * Yields, which may be gravimetric, radiometric or some type of recovery depending on the method, are underlined if outside the range specified for the method.
 - * Efficiencies are underlined if outside the range specified for the method. Efficiencies are detector and geometry dependent so this test is only approximate.

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- * Count times are underlined if less than the nominal value specified for the method.
- * Resolutions (as FWHM; Full Width at Half Max) are underlined if greater than the method specified limit.
- * Tracer drifts are underlined if their absolute values are greater than the method specified limit. Tracer drifts are not printed if percent moistures are.
- * Days Held are underlined if greater than the holding time specified in the protocol.
- * Analysis dates are underlined if before their planchet's preparation date or, if a limit is specified, too far after it.

For some methods, ratios as percentages and error estimates for them are computed for pairs of results. A ratio column header like '1+3' means the ratio of the first result column and the third result column.

Ratios are not computed for Lab Control Sample, Method Blank or Matrix Spike results since their matrices are not necessarily similar to client samples'.

The error estimate for a ratio of results from one planchet reflects only counting errors since other errors should be correlated. For a ratio involving different planchets, if QC limits are computed based on total errors, the error for the ratio allows for the preparation errors for the planchets.

The ratio is underlined (out of spec) if the absolute value of its difference from the nominal value is greater than its error estimate. If no nominal value is specified, this test is not done.

For Gross Alpha or Gross Beta results, there may be a column showing the sum of other Alpha or Beta emitters. This sum includes all relevant

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METHOD SUMMARY

results in the DVD database, whether reported or not. Results in the sum are weighted by a particles/decay value specified by the lab for each relevant analyte. Results less than their MDA are not included. No sums are computed for Lab Control, Method Blank or Matrix Spike samples since their various planchets may not be physically related.

If a ratio of total isotopic to Gross Alpha or Beta is shown, the error for the ratio reflects both the error in the Gross result and the sum, as square root of sum of squares, of the errors in the isotopic results.

For total elemental uranium or thorium results, there may be a column showing the total weight computed from associated isotopic results. Ignoring results less than their MDAs, this is a weighted sum of the isotopic results. The weights depend on the molecular weight and half-life of each isotope so as to convert activities (decays) to weight (atoms).

If a ratio of total computed to measured elemental uranium or thorium is shown, the error for the ratio reflects the errors in all the measurements.

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RE: Please hold total radium and Gammall analyses for all SAF X10-107 samples

Widrig, Dana L to: 'jverville@eberlineservices.com'

10/06/2010 03:04 PM

Cc: "Fitzgerald, Scot L", "Ayres, Doris E", "Caraway, Mary Jo",
"Crisp, Bryan D", "Neely, Michael", "Narquis, Clifford T"

History: This message has been replied to.

Joe,

Per our conversation, we erroneously requested total Radium (RATOT_AEAGEA) for the attached SAFs and associated samples which did not include the desired Ra-228 analysis. Scot Fitzgerald will work with you on getting these samples analyzed for Ra-228 by the proper service list RAISO_SEP_GPC at Eberline. Please ensure all future samples associated with these SAFs are also logged and analyzed accordingly. All COCs should be corrected accordingly (signed and dated) and sent or resent to us for our tracking purposes.

As soon as you obtain the requested MDA information we discussed (preferably 1 pCi/L) and the turnaround times you expect, please let Scot know at (509) 373-7495. Please also let us know in writing so we will be able to track this in our systems.

Of course, let me know if there are questions –

Thanks,

Dana L. Widrig
Project Coordinator
CH2MHill Plateau Remediation Company
SMR/SGRP
Ph: (509) 376-2858
Cell: (509) 392-2297

From: Douglas, James G (Jim)

Sent: Wednesday, October 06, 2010 1:55 PM

To: 'jverville@eberlineservices.com'

Cc: Waters-husted, Karen S; Trent, Stephen J; Narbutovskih, Susan M; Widrig, Dana L; Fitzgerald, Scot L

Subject: RE: Please hold total radium and Gammall analyses for all SAF X10-107 samples

Joe:

Thank you for your continued follow-up on this issue.

Please direct future correspondence to our project coordinator Dana Widrig; I'm turning over my participation on this issue to her. Scot Fitzgerald will assist Dana

RED = results received from Eberline

EBERLINE SAMPLES
Total Radium (RATOT_GPC)

APRIL	MAY		JUNE	JULY	AUGUST		SEPTEMBER	
X10-039	X10-053	X10-056	X10-073	X10-081	X10-098	X10-099	X10-107	X10-108
SAMP_NUM	SAMP_NUM							
B24M49	B25923	B259D5	B25NF4	B26535	B26ML6	B26M16	B275D4	B27560
B24M50	B25929		B25NF5	B26541	B26ML7	B26M21	B275D5	
B24M51	B25935			B26547	B26MM7	B26M22	B275F5	
B24M52	B25941			B26548	B26MM8		B275H1	
B24M53	B25947			B26558	B26MN8		B275H7	
B24M54	B25953			B26564	B26MP4		B275J3	
B24M55	B25959			B26570	B26MR4		B275J9	
B24M58	B25965			B26576	B26MR9		B275K5	
B25023	B25971			B265K3	B26MT5		B275L1	
B25025	B25977			B265K9	B26MV1		B275L7	
B25027	B25983			B265L5	B26MV7		B275M3	
B25037	B25989			B265M1	B26MW3		B275M9	
B25038	B25995			B265M7	B26MW9		B275N5	
B25040	B259B1			B265N3	B26MX5		B275P1	
B25042	B259B7			B265N9	B26MY1		B275P7	
B25044	B259C3			B265P5	B26MY7		B275R3	
B25046	B259C9			B265R1	B26N10		B275R9	
B25047				B265R7	B26N16		B275T5	
B25048				B265T3	B26N22		B27620	
B25050				B265T9				
B25052				B265V5				
B25053				B265W1				
B25054				B265W7				
B25055				B265X3				
B25056				B265X9				
B25062				B265Y5				
B25064				B265Y6				
B25065				B26606				
B25066				B26607				
B25067				B26617				
B25068				B26623				
B25069				B26629				
B25070				B26635				
B25071				B26641				
B25072				B26647				
B25073				B26858				
B25074								
B25075								
B25076								
B25077								

CHPRC	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	C.O.C. #	X10-039-323
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Collector AR McIntyre	Contact/Requester Karen Waters-Husted H228 (7660)	Telephone No. 376-4650
SAF No. X10-039	Sampling Origin Hanford Site	Purchase Order/Charge Code 300118ES20
Project Title IU2 IU6DURA, APRIL 2010	Logbook No. HNF-N-506 28191	Ice Chest No. GRP-08-11
Shipped To (Lab) Eberline Services	Method of Shipment Commercial Carrier	Bill of Lading/Air Bill No. 793503447351
Protocol CERCLA	Priority: 45 Days	Offsite Property No.

POSSIBLE SAMPLE HAZARDS/REMARKS
 ** ** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR but are not releasable per DOE Order 5400.5 (1990/1993)

SPECIAL INSTRUCTIONS **Hold Time** **Total Activity Exemption: Yes No**

Do not combine samples from this SAF with other data sets. Need SDG to be stand alone.
 100 Area Generator Knowledge Information Form applies.
 The CACN for all analytical work at WSCF is 300118.
 TICs are required 8260, VOA method.
 Do not combine samples

Sample No.	Filter	*	Date	Time	No/Type Container	Sample Analysis	Holding Time	Preservative
B25053	N	W	4/28/10	0818	1x20-mL P	Activity Scan	6 Months	None
B25053	N	W	↓	↓	1x1000-mL G/P	Total Radium	6 Months	HNO3 to pH <2
<i>36 of 37</i>								
<i>72A 4/28/10</i>								
<i>72B</i>								
<i>72C</i>								
<i>72D</i>								
<i>72E</i>								
<i>72F</i>								
<i>72G</i>								
<i>72H</i>								
<i>72I</i>								
<i>72J</i>								
<i>72K</i>								
<i>72L</i>								
<i>72M</i>								
<i>72N</i>								
<i>72O</i>								
<i>72P</i>								
<i>72Q</i>								
<i>72R</i>								
<i>72S</i>								
<i>72T</i>								
<i>72U</i>								
<i>72V</i>								
<i>72W</i>								
<i>72X</i>								
<i>72Y</i>								
<i>72Z</i>								

Relinquished By AR McIntyre	Sign <i>[Signature]</i>	Date/Time APR 28 2010	Received By SSU-1	Print SSU-1	Sign <i>[Signature]</i>	Date/Time APR 28 2010	Matrix * SF = Soil DS = Drum Solid SO = Sediment DI = Drum Liquid SL = Solid T = Tissue SI = Sludge WI = Wine W = Water L = Liquid O = Oil V = Vegetation A = Air X = Other
Relinquished By SSU-1		Date/Time MAY 03 2010	Received By LD. Wall		Sign <i>[Signature]</i>	Date/Time MAY 03 2010	
Relinquished By LD. Wall		Date/Time MAY 03 2010	Received By FEDEX		Sign <i>[Signature]</i>	Date/Time MAY 03 2010	
Relinquished By CHPRC		Date/Time MAY 03 2010	Received By FEDEX		Sign <i>[Signature]</i>	Date/Time MAY 03 2010	
Relinquished By FEDEX		Date/Time MAY 05 2010	Received By FEDEX		Sign <i>[Signature]</i>	Date/Time MAY 05 2010	
FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)					Disposed By	Date/Time

REVISION 1

REVISION 1
AK 5/5/10



RICHMOND, CA LABORATORY

SAMPLE RECEIPT CHECKLIST

Client: CHPRC City RICHMOND State WA
Date/Time received 05/05/10 0930 CoC No. X10-639-323
Container I.D. No. GRP-08-11 Requested TAT (Days) 45 P.O. Received Yes [] No []

INSPECTION

1. Custody seals on shipping container intact? Yes No [] N/A []
2. Custody seals on shipping container dated & signed? Yes No [] N/A []
3. Custody seals on sample containers intact? Yes No [] N/A []
4. Custody seals on sample containers dated & signed? Yes No [] N/A []
5. Packing material is: Wet [] Dry
6. Number of samples in shipping container: 1 Sample Matrix W
7. Number of containers per sample: Y (Or see CoC _____)
8. Samples are in correct container Yes No []
9. Paperwork agrees with samples? Yes No []
10. Samples have: Tape [] Hazard labels [] Rad labels [] Appropriate sample labels
11. Samples are: In good condition Leaking [] Broken Container [] Missing []
12. Samples are: Preserved Not preserved pH 1/4 Preservative HNO3
13. Describe any anomalies:

14. Was P.M. notified of any anomalies? Yes [] No [] Date _____
15. Inspected by [Signature] Date: 05/05/10 Time: 1020

Customer Sample No.	Beta/Gamma cpm	Ion Chamber mR/hr	Wipe	Customer Sample No.	Beta/Gamma cpm	Ion Chamber mR/hr	wipe
<u>B20053</u>	<u>260</u>						

Ion Chamber Ser. No. _____ Calibration date _____
Alpha Meter Ser. No. _____ Calibration date _____
Beta/Gamma Meter Ser. No. 100482 Calibration date 05 AUG 09