

SAF-RC-240
100N Groundwater Sample Collection
Supporting
100-N-85 Characterization Borehole
FINAL DATA PACKAGE

COMPLETE COPY OF DATA PACKAGE TO:

Kathy Wendt

H4-21

KW 3/12/15
INITIAL/DATE

COMMENTS:

SDG X0096

SAF-RC-240

Rad only

Chem only

Rad & Chem

Complete

Partial

Sample Location: C9410 - I-011 Filtered & Unfiltered

WASHINGTON CLOSURE HANFORD

SAF: RC-240, SDG: X0096

**STANDARD LEVEL IV
REPORT OF ANALYSIS**

WORK ORDER #15-02068-OR

March 12, 2015

**EBERLINE ANALYTICAL/OAK RIDGE LABORATORY
OAK RIDGE, TN**

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**Eberline Services – Oak Ridge Laboratory
LABORATORY DATA SUPPORT CHECKLIST**

MP-001-3

Eberline Services Work Order # 15 - 02068

The checklist items listed below are to be initialed by appropriate staff upon completion/verification.

Date for Partial	Initials	Date	Initials	Checklist Items
		2/12/15	KC	Sample Log-In
		2/13/15	Uln	Data Compilation
		2-20-15	MLT	First Technical Data Review
		2/22/15	[Signature]	Second Technical Data Review
		3/2/15	[Signature]	Data Entry/Electronic Deliverable
		3/2/15	[Signature]	Case Narrative
		3/2/15	[Signature]	Electronic Deliverable Proof
		3/2/15	[Signature]	Samples Analyzed within Holding Time Yes? <input checked="" type="checkbox"/> No? <input type="checkbox"/>
		3/2/15	[Signature]	QA/QC Review
		2/13/15	[Signature]	Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

Technical/Clerical Corrections, Signatures Needed, Problems, Etc	Date/Initials

Date package approved by:

[Signature]
for Laboratory Manager

3/11/15
Date

Copy No. _____

Radiochemistry Services

SECTION I
CHAIN OF CUSTODY
& pH CHECK

5/lbs

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-240-005	PAGE 1 OF 1
COLLECTOR D.L. Floyd/CHPRC	COMPANY CONTACT SUMNER, LC	TELEPHONE NO. 376-3922	PROJECT COORDINATOR KESSNER, JH	PRICE CODE 7K	DATA TURNAROUND 15 Days / 45 Days
SAMPLING LOCATION C9410, I-011 UNFILTERED	PROJECT DESIGNATION 100-N-85 Characterization Borehole - Water	ACTUAL SAMPLE DEPTH 74.9	SAF NO. RC-240	AIR QUALITY <input type="checkbox"/>	METHOD OF SHIPMENT FEDERAL EXPRESS
ICE CHEST NO. CWS-297	FIELD NO. 9887-69	OFFSITE PROPERTY NO. 5410	COA 303630	BILL OF LADING/AIR BILL NO. 7728 8943 1038	
SHIPPED TO Eberline Services Oak Ridge					

MATRIX* A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS *Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.	PRESERVATION HNO3 to pH <2	HOLDING TIME 6 Months	TYPE OF CONTAINER G/P	NO. OF CONTAINER(S) 1	VOLUME 500ml	SAMPLE ANALYSIS Gross Beta:
SPECIAL HANDLING AND/OR STORAGE		SAMPLE DATE FEB 11 2015	SAMPLE TIME 0934				
SAMPLE NO. B30C08	MATRIX* WATER						

15-02068
REC'D FEB 12 2015

X0096
02/12/15

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM D.L. Floyd/CHPRC	DATE/TIME FEB 11 2015 1055	RECEIVED BY/STORED IN <i>[Signature]</i>	DATE/TIME FEB 11 2015 1055
RELINQUISHED BY/REMOVED FROM M.A. White/CHPRC	DATE/TIME FEB 11 2015 1400	RECEIVED BY/STORED IN FEDEX	DATE/TIME
RELINQUISHED BY/REMOVED FROM Fed Ex	DATE/TIME	RECEIVED BY/STORED IN <i>[Signature]</i>	DATE/TIME 2/12/15 900
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

SPECIAL INSTRUCTIONS
** It is critical to ensure that the correct TAT and price code is marked on each COC.** The field NCOs prior to purging the well for sample collection, will use a transparent bailer to collect a grab sample to evaluate the presence of an oil sheen. They are to record their observations, along with any odors detected on the Field Sampling Report provided.** The RCCC acknowledges that the analytical holding time for Nitrate, Nitrite, and Phosphate by EPA methods 300.0 or 0956 will not be met. Include sampling location (drilling ID) on the COC. TRVL-15-016

TRVL-15-016

CH2MHill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-240-001	PAGE 1 OF 1
COLLECTOR D.L. Floyd/CHPRC	COMPANY CONTACT SUMNER, LC	TELEPHONE NO. 376-3922	PROJECT COORDINATOR KESSNER, JH	PRICE CODE 7K	DATA TURNAROUND 15 Days / 45 Days
SAMPLING LOCATION C9410, I-011 FILTERED	PROJECT DESIGNATION 100-N-85 Characterization Borehole - Water	ACTUAL SAMPLE DEPTH 74.9'	SAF NO. RC-240	AIR QUALITY	
ICE CHEST NO. CWS-297	FIELD LOGBOOK NO. MNF-N-507-S-69		COA 303630	METHOD OF SHIPMENT FEDERAL EXPRESS	ORIGINAL
SHIPPED TO Eberline Services Oak Ridge	OFFSITE PROPERTY NO. 5410		BILL OF LADING/AIR BILL NO. 7028 8943 1038		

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS	PRESERVATION	HNO3 to pH
A=Air	*Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.	HOLDING TIME	<2
DL=Drum		TYPE OF CONTAINER	6 Months
Liquids		NO. OF CONTAINER(S)	G/P
DS=Drum		VOLUME	1
Solids		SAMPLE ANALYSIS	500mL
L=Liquid		SAMPLE DATE	Gross Beta;
O=Oil		SAMPLE TIME	
S=Soil			
SE=Sediment			
T=Tissue			
V=Vegetation			
W=Water			
WT=Wipe			
X=Other			
SPECIAL HANDLING AND/OR STORAGE			
SAMPLE NO. 5	MATRIX* WATER		
B30C03		FEB 11 2015 0929	✓

REC'D FEB 12 2015

15-02068

X0096
Eyr 02/12/15

FILTER

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM D.L. Floyd/CHPRC	DATE/TIME FEB 11 2015 1055	RECEIVED BY/STORED IN M.A. White/CHPRC	DATE/TIME FEB 11 2015 1055	** It is critical to ensure that the correct TAT and price code is marked on each COC.** The field NCOs prior to purging the well for sample collection, will use a transparent bailer to collect a grab sample to evaluate the presence of an oil sheen. They are to record their observations, along with any odors detected on the Field Sampling Report provided.** The RCCC acknowledges that the analytical holding time for Nitrate, Nitrite, and Phosphate by EPA methods 300.0 or 0956 will not be met. Include sampling location (drilling ID) on the COC. TRVL-15-016	
RELINQUISHED BY/REMOVED FROM M.A. White/CHPRC	DATE/TIME FEB 11 2015 1400	RECEIVED BY/STORED IN Kester Coulter	DATE/TIME 2/12/15 900	FILTER 15- 016	
RELINQUISHED BY/REMOVED FROM FedEx	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME		
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME		

	Sample Receiving Report (Volumes, pH, & CPM)	Internal Work Order
		15-02068
		Received By
		KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max	
01	LCS	0		WA	PP1.3			
02	BLANK	0		WA	PP1.3			
03	DUP	0		WA	PP1.3			
04	B30C08 ✓	1		WA	PP1.3	0.50	39	
				Container Number	pH Orig	pH Final	Volume (L)	CPM
				1	<2	<2	0.5000	39
05	B30C03 ✓	1		WA	PP1.3	0.50	36	
				Container Number	pH Orig	pH Final	Volume (L)	CPM
				1	<2	<2	0.5000	36

✓
KC
02/12/15

Received by: *Kristina Coulston* Date: *2/12/15*

SECTION II
SAMPLE ACKNOWLEDGEMENT



STANDARD OPERATING PROCEDURE

Sample Receiving

MP-001, Rev. 13
Effective: 10/31/13
Page 13 of 15

Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST MP-001-2

WORK ORDER # 15-02068

SAMPLE MATRIX/MATRICES:

(CIRCLE ONE OR BOTH)

AQUEOUS NON-AQUEOUS

(CIRCLE EITHER YES, NO, OR N/A)

WERE SAMPLES:

Received in good condition?	<input checked="" type="radio"/>	N	
If aqueous, properly preserved	<input checked="" type="radio"/>	N	N/A

WERE CHAIN OF CUSTODY SEALS:

Present on outside of package?	<input checked="" type="radio"/>	N
Unbroken on outside of package?	<input checked="" type="radio"/>	N
Present on samples?	<input checked="" type="radio"/>	N
Unbroken on samples?	<input checked="" type="radio"/>	N
Was chain of custody present upon sample receipt?	<input checked="" type="radio"/>	N

IF THE RESPONSE TO ANY OF THE ABOVE IS **NO**, A DISCREPANT SAMPLE RECEIPT REPORT (DSR) HAS BEEN ISSUED.

REMARKS: _____

SIGNATURE: Kristen Coulston DATE: 2/12/15

SECTION III
CASE NARRATIVE



EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD
OAK RIDGE, TENNESSEE 37830
PHONE (865) 481-0683
FAX (865) 483-4621

EBS-OR-38694

March 11, 2015

Joan Kessner
Washington Closure Hanford
2620 Fermi Avenue
Richland, WA 99354

CASE NARRATIVE
SAF: RC-240, SDG: X0096
Work Order # 15-02068-OR

SAMPLE RECEIPT

This work order contains two water samples received 02/12/2015. Both samples were analyzed for Gross Beta.

<u>CLIENT ID</u>	<u>LAB ID</u>
B30C08	15-02068-04
B30C03	15-02068-05

ANALYTICAL METHODS

Gross Beta was performed using EPA Method 900.0 Modified.

Laboratory qualifier is as follows:

U - Result is less than or equal to MDA.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

Minimum Detectable Activity (MDA) values for data represented in this report are sample-specific. MDA measurements are determined based on factors and conditions including instrument settings, aliquot size, and matrix type.

GROSS BETA

Samples were prepared by evaporation of representative volumetric aliquots acidified with HNO₃. Reduced samples were then transferred to steel planchets for final evaporation to dryness and flaming. Samples were then counted on a gas proportional counter. Results were corrected as required for inherent self-absorption based on residual mass present.

ANALYTICAL RESULTS CONTINUED

GROSS BETA CONTINUED

Samples demonstrated acceptable results for all Gross Beta analyses. The Gross Beta method blank demonstrated an acceptable result. Results for the Gross Beta duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Gross Beta laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.



for M.R. McDougall
Laboratory Manager

Date: 3/11/2015

Eberline Analytical wants and encourages your feedback regarding our performance providing radioanalytical services. Please visit <http://www.eberlineservices.com/client.htm> to provide us with feedback on our services.

SECTION IV
ANALYTICAL RESULTS SUMMARY

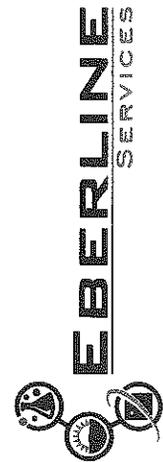
Joan Kessner
 Washington Closure Hanford
 2620 Fermi Avenue
 Richland, WA 99354

SAF: RC-240
 SDG: X0096
 Work Order: 15-02068
 Date Received: 02/12/2015
 Matrix: Water

Final Report of Analysis
 Page: 1 of 1
 3/12/2015

<u>Sample Number</u>	<u>Lab Sample ID</u>	<u>QC Type</u>	<u>Date Analyzed</u>	<u>Method Name</u>	<u>CAS Number</u>	<u>Isotope</u>	<u>Result</u>	<u>2-Sigma Counting Error</u>	<u>Total Propagated Uncertainty</u>	<u>MDA</u>	<u>Lab Qualifier</u>	<u>Analysis Units</u>
NA	15-02068-01	LCS	2/13/2015	900.0_ALPHABETA_GPC	12587-47-2	Gross Beta	284.916	6.22	39.86	0.86		pCi/l
NA	15-02068-02	BLK	2/13/2015	900.0_ALPHABETA_GPC	12587-47-2	Gross Beta	-0.031	0.24	0.24	0.53	U	pCi/l
B30C08	15-02068-03	DUP	2/13/2015	900.0_ALPHABETA_GPC	12587-47-2	Gross Beta	16.947	4.85	5.39	8.52		pCi/l
B30C08	15-02068-04		2/13/2015	900.0_ALPHABETA_GPC	12587-47-2	Gross Beta	16.570	4.76	5.28	8.38		pCi/l
B30C03	15-02068-05		2/13/2015	900.0_ALPHABETA_GPC	12587-47-2	Gross Beta	12.217	3.72	4.08	6.70		pCi/l

000016



EBERLINE
 SERVICES

EBERLINE ANALYTICAL CORPORATION
 601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

SECTION V
ANALYTICAL STANDARD

ANALYTICS

QA/QC REVIEWED
Date 4/30/96 Initials WT

Am-4

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

52094-416

Am-241 10 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared gravimetrically from a calibrated master liquid radionuclide solution source. The master source was calibrated by liquid scintillation counting.

ANALYTICS maintains traceability to the National Institute of Standards and Technology through Measurements Assurance Programs as described in USNRC Reg. Guide 4.15, Revision 1.

ISOTOPE:	Am-241
ACTIVITY (dps):	1.975 E+05
HALF-LIFE:	432.2 years
CALIBRATION DATE:	March 19, 1996 12:00 EST
TOTAL ERROR:	3.0%
SYSTEMATIC ERROR:	2.37%
RANDOM ERROR:	0.63%

10.01177 grams of solution 1M HCl.

P O NUMBER OR3830, Item 1

SOURCE PREPARED BY:

Kare O'Brien Beverly
K. O. Beverly, Radiochemist

Q A APPROVED:

DM. Maly 4-26-96



QUALITY CONTROL PROGRAM
R009

Rev.8; 1/10/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION (RE-CERTIFICATION)

Solution Reference # Analytics 52094-416 Date 9/2/2014 0:00
Solution # A/B-7 (alpha)

Principal Radionuclide	Half Life, Years	Half Life, Days
²⁴¹ Americium	<u>4.322E+02</u>	<u>1.579E+05</u>

Radionuclide of Interest ²⁴¹Am Reference Date 3/19/1996 0:00
Parent Solution Conc. 1.19E+04 dpm/ml

Chemical Composition of Standard Solution
²⁴¹AmCl₃ in 1M HCL

Dilution Instructions: Dilution Solvent Used 1 M HNO₃

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 60.0000 ml
Total Activity: 7.1100E+05 dpm
Final Volume: 1000.00 ml
Final Activity Concentration: 7.1100E+02 dpm/ml

NOTES:

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: August 15, 2015

Verified & Approved By: [Signature]

Date: 9/2/14

QC Approval: [Signature]

Date: 9/2/14



National Institute of Standards & Technology

Certificate

Standard Reference Material 4234A Strontium-90 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive strontium-90 chloride, non-radioactive strontium chloride, non-radioactive yttrium chloride, and hydrochloric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of beta-particle counting instruments and for the monitoring of radiochemical procedures.

Radiological Hazard

The SRM ampoule contains strontium-90 with a total activity of approximately 13 MBq. Strontium-90 decays by beta-particle emission to yttrium-90, which also decays by beta-particle emission. None of the beta particles escape from the SRM ampoule. The beta particles emitted from strontium-90 and yttrium-90 produce bremsstrahlung photons with energies up to 2 MeV. Most of these photons escape from the SRM ampoule and can represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. Appropriate shielding and/or distance should be used to minimize personnel exposure. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains hydrochloric acid (HCl) with a concentration of 1 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least March 2005.

The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) both because of the radioactivity and because of the strong acid.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, J.M.R. Hutchinson, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas of the Radioactivity Group and D.B. Golas, Nuclear Energy Institute Research Associate.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by N.M. Trahey.

Gaithersburg, Maryland 20899
May 1995 (Text only revised November 1997)

Thomas E. Gills, Chief
Standard Reference Materials Program



QUALITY CONTROL PROGRAM
QCP-009

Rev.7: 9/29/99
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION (RE-CERTIFICATION)

Solution Reference # QCP-009-1-A Date 9/2/2014 0:00
NIST 4234A Solution # A/B-7 (beta)

Principal Radionuclide	Half Life, Years	Half Life, Days
⁹⁰ Sr	2.878E+01	1.051E+04

Radionuclide of Interest ⁹⁰Sr Reference Date 3/13/1995 0:00
Parent Solution Conc. 1.52E+06 dpm/ml

The beta activity of solution reflects the original ⁹⁰Sr concentration and an equal concentration of ⁹⁰Yttrium.

Chemical Composition of Standard Solution
⁹⁰SrCl₂ in 1 M HCl

Dilution Instructions: Dilution Solvent Used 1 M HNO₃

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: <u>0.5000</u> ml	Final Activity Concentration: <u>7.5764E+02</u> dpm/ml
Total Activity: <u>7.5764E+05</u> dpm	
Final Volume: <u>1000.00</u> ml	

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

NOTES:

Expiration Date: August 15, 2015

Verified & Approved By [Signature]

Date: 09/02/14

QC Approval [Signature]

Date: 9/2/14

SECTION VI
QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
15-02068	GaGbT_ThSr	1	pCi	I	Washington Closure Hanford

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
GROSS BETA_SR	0.60	95.82%	13.99%	100.00%	3.89%	2.97E+02	1.16E+01	2.85E+02	3.99E+01	A/B-07	5.97E+02	4.30E+00	1.00E+00

Matrix Spike Duplicate

Analyte	Normalized Difference	MS Actual % Rec	Expected MS Result	Expected MS Uncert	Actual MS Result	Actual MS CSU	Sample Result	Sample CSU	Sample Aliquot	Standard ID	Standard ACT (dpm)	Standard Error %	Standard Added (g)
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!									

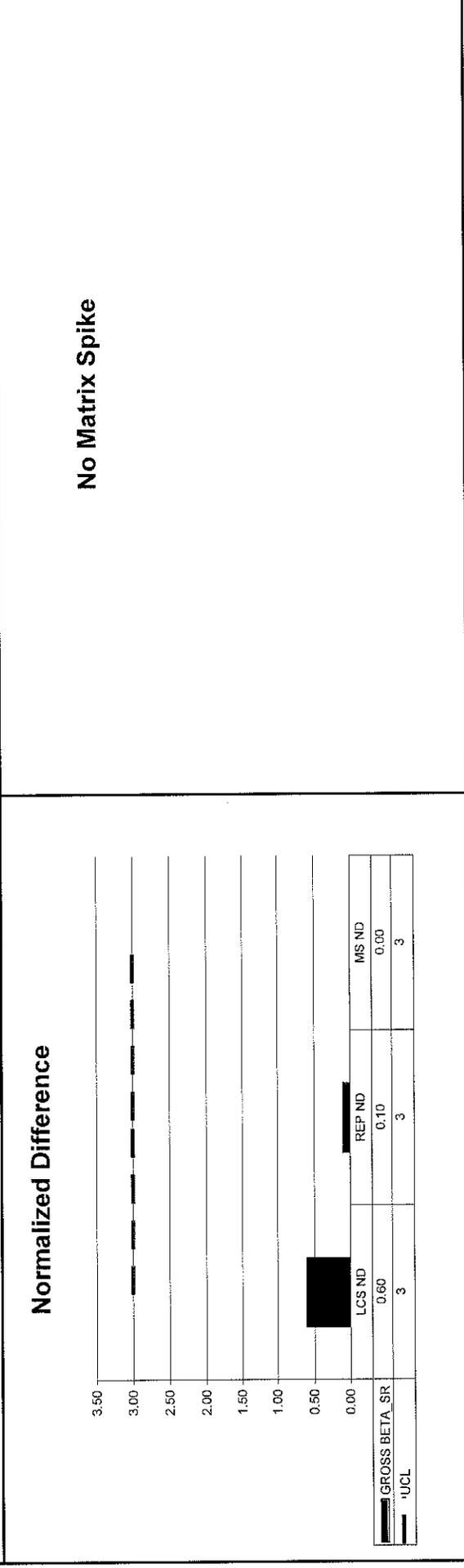
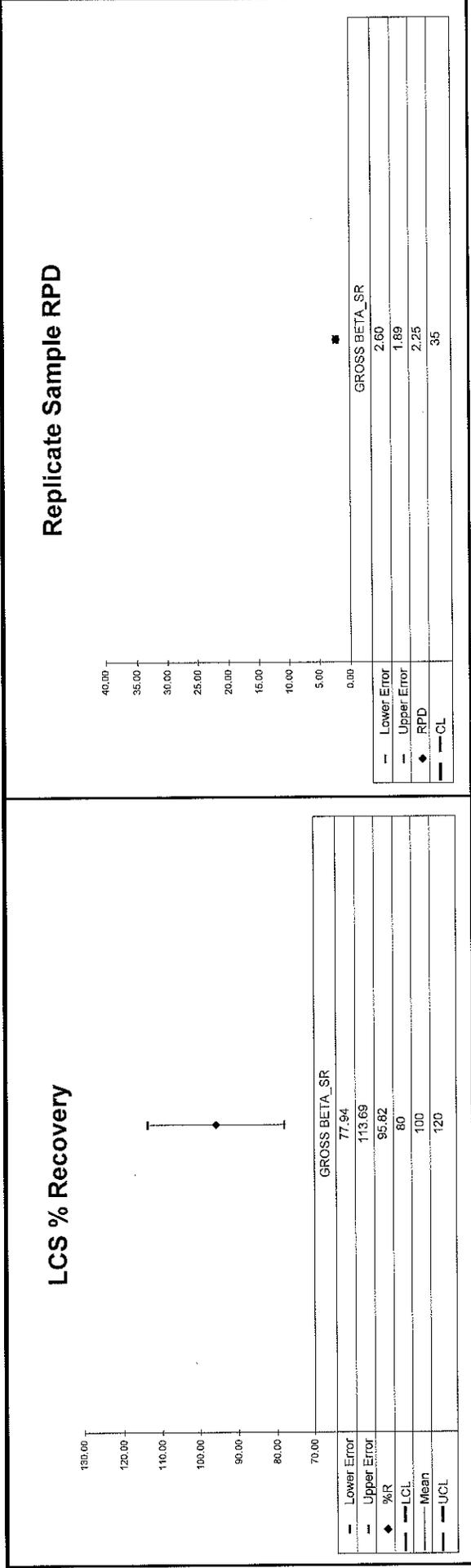
Replicate Sample

Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
GROSS BETA_SR	0.10	2.25	1.66E+01	5.28E+00	1.69E+01	5.39E+00	0.96	OK	OK			NA	OK

QC Summary

Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
GROSS BETA_SR	0.10	2.25	1.66E+01	5.28E+00	1.69E+01	5.39E+00	0.96	OK	OK			NA	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
15-02068	GaGbT_ThSr	1	pCi	I	Washington Closure Hanford



SECTION VII
LABORATORY TECHNICIAN'S NOTES

 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	15-02068
		Analysis Code	GaGbT_ThSr
		Run Number	1

#	Date	Dept	User	Notes
1	02/13/15 06:24	PREP	MHIGHTOWER	Ran TDS/TSS to determine aliquot. Aliquoted samples, dried, nitrated, transferred to tared planchets, dried, flamed, re-weighed, and submitted to count room

MH 13 FEB 15

 <p>Reagents Used in an Analysis</p>		Internal Work Order			
		15-02068			
		Analysis Code		Run	
		GaGbT_ThSr		1	
Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded	
015780D01	Nitric Acid	3N	MHIGHTOWER	2/13/2015	

CP4110160

Date	Account	Client	Time	OT	Amount	Fee
2/12	Expac	LAB	0510	7	LAB	✓
2/12	Buexpac	LAB	0547	6	LAB	✓
2/12	150117BRL(1-4)	TEL	0844	2	LAB	✓
2/12	1502027M(1-4)	Enviro.	0847	2	LAB	✓
2/12	1501105JL(5-15)	SCDHCC	1050	2	LAB	✓
2/12	Expac	LAB	0509	7	LAB	✓
2/12	Buexpac	LAB	0541	6	LAB	✓
2/12	1502005MPL(1-4)	UACW	0802	10	LAB	✓
2/12	150117LRAL(1-4)	PLP, Serv	0815	2	LAB	✓
2/12	1501156RAL(1-4)	UCO	0816	2	LAB	✓
2/12	1501166RAL(2-4)	UCO	0819	2	LAB	✓
2/12	150206BAP(2-5)	Washington	1102	2	LAB	✓
2/12	150206BAP(1-5) + 8-26	Washington	1102	7	LAB	✓
2/12	1502060AP(1-4)	Enviro.	1102	2	LAB	✓
2/12	1502060AP(1-5)	Enviro	1212	2	LAB	✓

SECTION VIII
ANALYTICAL DATA (GROSS BETA)

Internal Work Order		Run	Analysis Code		Date	Technician		Technician Initials		Witness Initials		
15-02068		1	GaGbT_ThSr		2/13/2015 6:27	MHIGHTOWER		MM				
LCS & Matrix Spikes												
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	LCS Volume Used (g)	MS Volume Used (g)	LCSD Volume Used (g)	MSD Volume Used (g)	LCS Known pCi	MS Error Estimate	LCSD Error Estimate	MSD Error Estimate
Am-241	A/B-07	596.650	2/13/2015	0.790	0.9999				268.73	11.556	0.00	0.00
SrY-90	A/B-07	660.203	2/13/2015	0.830	0.9999				297.36	8.921	0.00	0.00
TC-99 MS		C-2a	2/13/2014	0.1								
Tracers												
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition	Tracer					LCS
							Matrix Spike					

AG
2/2/15
(R)

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
A1	1502068-02	4	124	120	1400	2/13/15 13:01
A2	1502068-03	25	286	120	1400	2/13/15 13:01
A3	1502068-04	25	291	120	1400	2/13/15 13:01
A4	1502068-05	23	322	120	1400	2/13/15 13:01

AG
2/13/15
(R)

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
B3	1502068-01	5695	10983	30	1400	2/13/15 11:31

GPC Detector Report
(ALL Backgrounds)

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Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	2/13/2015	8.33E-02	P	-1.91E+01	2.36E-01	1.96E+01
LB4110A - A2	Alpha	11/18/2007	2/13/2015	6.67E-02	P	-1.62E+01	2.13E-01	1.66E+01
LB4110A - A3	Alpha	11/18/2007	2/13/2015	8.33E-02	P	-1.58E+01	1.86E-01	1.61E+01
LB4110A - A4	Alpha	11/18/2007	2/13/2015	5.00E-02	P	-1.67E+01	1.98E-01	1.71E+01
LB4110A - B1	Alpha	11/18/2007	2/13/2015	1.00E-01	P	-9.05E-02	7.23E-02	2.35E-01
LB4110A - B2	Alpha	11/18/2007	2/13/2015	1.17E-01	P	-7.04E-02	7.38E-02	2.18E-01
LB4110A - B3	Alpha	11/18/2007	2/13/2015	8.33E-02	P	-6.24E-02	5.58E-02	1.74E-01
LB4110A - B4	Alpha	11/18/2007	2/13/2015	1.67E-02	P	-1.27E-01	7.69E-02	2.81E-01
LB4110A - C1	Alpha	11/18/2007	2/13/2015	0.00E+00	P	-1.35E-01	8.78E-02	3.11E-01
LB4110A - C2	Alpha	11/18/2007	2/13/2015	1.67E-02	P	-1.64E-01	7.93E-02	3.22E-01
LB4110A - C3	Alpha	11/18/2007	2/13/2015	6.67E-02	P	-1.60E-01	9.31E-02	3.46E-01
LB4110A - C4	Alpha	11/18/2007	2/13/2015	6.67E-02	P	-6.47E-02	6.91E-02	2.03E-01
LB4110A - D1	Alpha	11/18/2007	2/13/2015	3.33E-02	P	-5.43E-02	7.93E-02	2.13E-01
LB4110A - D2	Alpha	11/18/2007	2/13/2015	0.00E+00	P	-6.86E-02	6.01E-02	1.89E-01
LB4110A - D3	Alpha	11/18/2007	2/13/2015	1.67E-02	P	-5.10E-02	6.64E-02	1.84E-01
LB4110A - D4	Alpha	11/18/2007	2/13/2015	3.33E-02	P	-6.61E-02	6.94E-02	2.05E-01
LB4110R - A1	Alpha	11/24/2006	2/13/2015	6.67E-02	P	-9.12E-02	9.75E-02	2.86E-01
LB4110R - A2	Alpha	11/24/2006	2/13/2015	0.00E+00	P	-8.42E-02	7.18E-02	2.28E-01
LB4110R - A3	Alpha	11/24/2006	2/13/2015	3.33E-02	P	-6.95E-02	8.17E-02	2.33E-01
LB4110R - A4	Alpha	11/24/2006	2/13/2015	8.33E-02	P	-5.14E-02	6.90E-02	1.89E-01
LB4110R - B1	Alpha	11/24/2006	2/13/2015	8.33E-02	P	-8.82E-02	6.17E-02	2.12E-01
LB4110R - B2	Alpha	11/24/2006	2/13/2015	0.00E+00	P	-6.79E-02	6.00E-02	1.88E-01
LB4110R - B3	Alpha	11/24/2006	2/13/2015	6.67E-02	P	-6.51E-02	7.18E-02	2.09E-01
LB4110R - B4	Alpha	11/24/2006	2/13/2015	1.67E-02	P	-6.03E-02	6.81E-02	1.97E-01
LB4110R - C1	Alpha	11/24/2006	2/13/2015	6.67E-02	P	-7.44E-02	7.23E-02	2.19E-01
LB4110R - C2	Alpha	11/24/2006	2/13/2015	3.33E-02	P	-7.45E-02	6.72E-02	2.09E-01
LB4110R - C3	Alpha	11/24/2006	2/13/2015	6.67E-02	P	-8.11E-02	8.39E-02	2.49E-01
LB4110R - C4	Alpha	11/24/2006	2/13/2015	3.33E-02	P	-5.95E-02	7.77E-02	2.15E-01
LB4110R - D1	Alpha	11/24/2006	11/1/2014	0.00E+00	P	-1.06E-01	6.70E-02	2.40E-01
LB4110R - D2	Alpha	11/24/2006	11/1/2014	0.00E+00	P	-8.23E-02	6.65E-02	2.15E-01
LB4110R - D3	Alpha	11/24/2006	11/1/2014	0.00E+00	P	-8.71E-02	6.63E-02	2.20E-01
LB4110R - D4	Alpha	11/24/2006	11/1/2014	0.00E+00	P	-8.04E-02	7.08E-02	2.22E-01
LB5100 - 1	Alpha	7/10/2006	10/26/2007	5.00E-02	P	-1.56E-02	9.58E-02	2.07E-01

GPC Detector Report
(ALL Backgrounds)

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	2/13/2015	1.37E+00	P	-2.59E+02	6.89E+00	2.72E+02
LB4110A - A2	Beta	11/18/2007	2/13/2015	1.35E+00	P	-2.70E+01	2.66E+00	3.23E+01
LB4110A - A3	Beta	11/18/2007	2/13/2015	1.70E+00	P	-4.48E+01	2.54E+00	4.99E+01
LB4110A - A4	Beta	11/18/2007	2/13/2015	6.87E+00	F	-2.84E+01	3.97E+00	3.64E+01
LB4110A - B1	Beta	11/18/2007	2/13/2015	1.92E+00	P	-9.29E+00	2.97E+00	1.52E+01
LB4110A - B2	Beta	11/18/2007	2/13/2015	1.62E+00	P	-6.73E+00	1.89E+00	1.05E+01
LB4110A - B3	Beta	11/18/2007	2/13/2015	1.40E+00	P	-3.55E-01	1.41E+00	3.17E+00
LB4110A - B4	Beta	11/18/2007	2/13/2015	1.27E+00	P	-6.69E+00	1.90E+00	1.05E+01
LB4110A - C1	Beta	11/18/2007	2/13/2015	1.58E+00	P	-4.76E+00	1.99E+00	8.74E+00
LB4110A - C2	Beta	11/18/2007	2/13/2015	1.25E+00	P	3.85E-01	1.28E+00	2.17E+00
LB4110A - C3	Beta	11/18/2007	2/13/2015	1.23E+00	P	4.47E-01	1.53E+00	2.61E+00
LB4110A - C4	Beta	11/18/2007	2/13/2015	1.45E+00	P	-1.57E+00	1.96E+00	5.50E+00
LB4110A - D1	Beta	11/18/2007	2/13/2015	1.43E+00	P	-2.21E+00	2.46E+00	7.13E+00
LB4110A - D2	Beta	11/18/2007	2/13/2015	5.62E+00	F	-3.80E+00	2.09E+00	7.97E+00
LB4110A - D3	Beta	11/18/2007	2/13/2015	2.10E+00	F	5.34E-01	4.23E+00	7.93E+00
LB4110A - D4	Beta	11/18/2007	2/13/2015	5.55E+00	F	-7.54E+00	2.09E+00	1.17E+01
LB4110R - A1	Beta	11/24/2006	2/13/2015	1.07E+00	P	-5.53E+01	3.26E+00	6.18E+01
LB4110R - A2	Beta	11/24/2006	2/13/2015	1.20E+00	P	-4.37E+01	1.92E+00	4.75E+01
LB4110R - A3	Beta	11/24/2006	2/13/2015	1.23E+00	P	-4.05E+01	2.50E+00	4.55E+01
LB4110R - A4	Beta	11/24/2006	2/13/2015	1.48E+00	P	-4.03E+01	2.01E+00	4.43E+01
LB4110R - B1	Beta	11/24/2006	2/13/2015	1.40E+00	P	-4.25E+01	1.92E+00	4.63E+01
LB4110R - B2	Beta	11/24/2006	2/13/2015	2.08E+00	F	-4.75E+01	3.41E+00	5.43E+01
LB4110R - B3	Beta	11/24/2006	2/13/2015	1.33E+00	P	-4.23E+01	2.44E+00	4.72E+01
LB4110R - B4	Beta	11/24/2006	2/13/2015	1.02E+00	P	-4.26E+01	1.81E+00	4.62E+01
LB4110R - C1	Beta	11/24/2006	2/13/2015	1.08E+00	P	-4.25E+01	2.68E+00	4.79E+01
LB4110R - C2	Beta	11/24/2006	2/13/2015	1.63E+00	P	-4.24E+01	2.54E+00	4.74E+01
LB4110R - C3	Beta	11/24/2006	2/13/2015	1.40E+00	P	-4.28E+01	2.34E+00	4.75E+01
LB4110R - C4	Beta	11/24/2006	2/13/2015	1.37E+00	P	-4.84E+01	2.69E+00	5.37E+01
LB4110R - D1	Beta	11/24/2006	11/1/2014	0.00E+00	P	-4.36E+01	5.31E+00	5.43E+01
LB4110R - D2	Beta	11/24/2006	11/1/2014	0.00E+00	P	-4.67E+01	1.79E+00	5.03E+01
LB4110R - D3	Beta	11/24/2006	11/1/2014	0.00E+00	P	-5.02E+01	5.28E+00	6.07E+01
LB4110R - D4	Beta	11/24/2006	11/1/2014	0.00E+00	P	-4.64E+01	2.13E+00	5.07E+01
LB5100 - 1	Beta	7/10/2006	10/26/2007	4.52E+00	F	-3.19E-01	1.58E+00	3.48E+00

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GPC Detector Report
(ALL Efficiencies)

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	2/13/2015	0.2302	P	0.0138	0.2192	0.4246
LB4110A - A2	Alpha	11/18/2007	2/13/2015	0.2038	P	-0.0233	0.1793	0.3820
LB4110A - A3	Alpha	11/18/2007	2/13/2015	0.1985	P	-0.0447	0.1706	0.3859
LB4110A - A4	Alpha	11/18/2007	2/13/2015	0.2320	P	-0.0237	0.1914	0.4066
LB4110A - B1	Alpha	11/18/2007	2/13/2015	0.2258	P	0.1955	0.2234	0.2513
LB4110A - B2	Alpha	11/18/2007	2/13/2015	0.2094	P	0.1883	0.2185	0.2487
LB4110A - B3	Alpha	11/18/2007	2/13/2015	0.2339	P	0.1390	0.2327	0.3263
LB4110A - B4	Alpha	11/18/2007	2/13/2015	0.2252	P	0.2057	0.2340	0.2624
LB4110A - C1	Alpha	11/18/2007	2/13/2015	0.2135	P	0.1978	0.2198	0.2419
LB4110A - C2	Alpha	11/18/2007	2/13/2015	0.2222	P	0.1992	0.2249	0.2506
LB4110A - C3	Alpha	11/18/2007	2/13/2015	0.2424	P	0.2243	0.2487	0.2732
LB4110A - C4	Alpha	11/18/2007	2/13/2015	0.2206	P	0.1984	0.2248	0.2513
LB4110A - D1	Alpha	11/18/2007	2/13/2015	0.2150	P	0.1798	0.2299	0.2800
LB4110A - D2	Alpha	11/18/2007	2/13/2015	0.2434	P	0.2020	0.2554	0.3088
LB4110A - D3	Alpha	11/18/2007	2/13/2015	0.2596	P	0.2059	0.2609	0.3158
LB4110A - D4	Alpha	11/18/2007	2/13/2015	0.1893	P	0.1492	0.1971	0.2449
LB4110R - A1	Alpha	11/24/2006	2/13/2015	0.2292	P	0.2004	0.2375	0.2745
LB4110R - A2	Alpha	11/24/2006	2/13/2015	0.2094	P	0.1847	0.2183	0.2519
LB4110R - A3	Alpha	11/24/2006	2/13/2015	0.2169	P	0.1923	0.2228	0.2533
LB4110R - A4	Alpha	11/24/2006	2/13/2015	0.2409	P	0.2132	0.2444	0.2756
LB4110R - B1	Alpha	11/24/2006	2/13/2015	0.2119	P	0.1691	0.2221	0.2751
LB4110R - B2	Alpha	11/24/2006	2/13/2015	0.1949	P	0.1641	0.2135	0.2628
LB4110R - B3	Alpha	11/24/2006	2/13/2015	0.2343	P	0.1951	0.2427	0.2903
LB4110R - B4	Alpha	11/24/2006	2/13/2015	0.2064	P	0.1784	0.2277	0.2770
LB4110R - C1	Alpha	11/24/2006	2/13/2015	0.2019	P	0.1795	0.2136	0.2476
LB4110R - C2	Alpha	11/24/2006	2/13/2015	0.2132	P	0.1895	0.2225	0.2555
LB4110R - C3	Alpha	11/24/2006	2/13/2015	0.2275	P	0.2033	0.2377	0.2722
LB4110R - C4	Alpha	11/24/2006	2/13/2015	0.1996	P	0.1774	0.2190	0.2607
LB4110R - D1	Alpha	11/24/2006	11/1/2014	0.0000	W	-0.0281	0.1904	0.4089
LB4110R - D2	Alpha	11/24/2006	11/1/2014	0.0000	W	-0.0314	0.2165	0.4644
LB4110R - D3	Alpha	11/24/2006	11/1/2014	0.0000	W	-0.0308	0.2127	0.4562
LB4110R - D4	Alpha	11/24/2006	11/1/2014	0.0000	W	-0.0260	0.1714	0.3689
LB5100 - 1	Alpha	7/10/2006	10/26/2007	0.3368	P	0.3332	0.3455	0.3578

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GPC Detector Report
(ALL Efficiencies)

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Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	2/13/2015	0.5600	P	0.2483	0.5628	0.8773
LB4110A - A2	Beta	11/18/2007	2/13/2015	0.4556	P	0.1958	0.4676	0.7393
LB4110A - A3	Beta	11/18/2007	2/13/2015	0.4848	P	0.1333	0.4637	0.7942
LB4110A - A4	Beta	11/18/2007	2/13/2015	0.5717	P	0.1837	0.5045	0.8254
LB4110A - B1	Beta	11/18/2007	2/13/2015	0.5566	P	0.4676	0.5336	0.5997
LB4110A - B2	Beta	11/18/2007	2/13/2015	0.5192	P	0.4683	0.5270	0.5858
LB4110A - B3	Beta	11/18/2007	2/13/2015	0.5844	P	0.3404	0.5432	0.7460
LB4110A - B4	Beta	11/18/2007	2/13/2015	0.5560	P	0.4960	0.5561	0.6162
LB4110A - C1	Beta	11/18/2007	2/13/2015	0.5414	P	0.4376	0.5123	0.5869
LB4110A - C2	Beta	11/18/2007	2/13/2015	0.5543	P	0.4010	0.5170	0.6330
LB4110A - C3	Beta	11/18/2007	2/13/2015	0.6261	P	0.5268	0.5984	0.6700
LB4110A - C4	Beta	11/18/2007	2/13/2015	0.5698	P	0.4534	0.5340	0.6145
LB4110A - D1	Beta	11/18/2007	2/13/2015	0.6985	P	0.3832	0.5689	0.7547
LB4110A - D2	Beta	11/18/2007	2/13/2015	0.6686	P	0.4368	0.5938	0.7508
LB4110A - D3	Beta	11/18/2007	2/13/2015	0.6672	P	0.4827	0.6169	0.7511
LB4110A - D4	Beta	11/18/2007	2/13/2015	0.4909	P	0.3537	0.4719	0.5902
LB4110R - A1	Beta	11/24/2006	2/13/2015	0.5684	P	0.4830	0.5702	0.6574
LB4110R - A2	Beta	11/24/2006	2/13/2015	0.5290	P	0.4248	0.5118	0.5988
LB4110R - A3	Beta	11/24/2006	2/13/2015	0.5351	P	0.4578	0.5385	0.6193
LB4110R - A4	Beta	11/24/2006	2/13/2015	0.6038	P	0.5111	0.5958	0.6804
LB4110R - B1	Beta	11/24/2006	2/13/2015	0.5343	P	0.4287	0.5389	0.6491
LB4110R - B2	Beta	11/24/2006	2/13/2015	0.4969	P	0.4085	0.5160	0.6236
LB4110R - B3	Beta	11/24/2006	2/13/2015	0.6145	P	0.4828	0.5958	0.7088
LB4110R - B4	Beta	11/24/2006	2/13/2015	0.5289	P	0.4423	0.5471	0.6520
LB4110R - C1	Beta	11/24/2006	2/13/2015	0.4970	P	0.4147	0.5013	0.5879
LB4110R - C2	Beta	11/24/2006	2/13/2015	0.5289	P	0.4348	0.5355	0.6361
LB4110R - C3	Beta	11/24/2006	2/13/2015	0.5791	P	0.4835	0.5744	0.6654
LB4110R - C4	Beta	11/24/2006	2/13/2015	0.5202	P	0.4328	0.5258	0.6188
LB4110R - D1	Beta	11/24/2006	11/1/2014	0.0000	W	-0.0678	0.4553	0.9785
LB4110R - D2	Beta	11/24/2006	11/1/2014	0.0000	W	-0.0756	0.5116	1.0989
LB4110R - D3	Beta	11/24/2006	11/1/2014	0.0000	W	-0.0736	0.4969	1.0674
LB4110R - D4	Beta	11/24/2006	11/1/2014	0.0000	W	-0.0630	0.4090	0.8811
LB5100 - 1	Beta	7/10/2006	10/26/2007	0.4428	F	0.4555	0.4731	0.4906