AUXIER & ASSOCIATES, INC.

PAP-KAN

1428

STANDARD LEVEL IV
REPORT OF ANALYSIS

WORK ORDER #15-10128-OR

October 30, 2015

EBERLINE ANALYTICAL/OAK RIDGE LABORATORY
OAK RIDGE, TN

TABLE OF CONTENTS

Eberline Services – Oak Ridge Laboratory

LABORATORY DATA SUPPORT CHECKLIST

MP-001-3

Eberline Services Work Order # 15 - 10128

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

Date for Partial	Initials	Date	Initials	Checklist Items
		10-21-15	JED	Sample Log-In
		10/23/15	EJT	Data Compilation
		10-29-15	MLT	First Technical Data Review
		10/29/15	MSA	Second Technical Data Review
		10/28/15	EJT	Data Entry/Electronic Deliverable
		10/28/15	EJT	Case Narrative
		10/30/15	KBS	Electronic Deliverable Proof
		10/30/15	MSA	Samples Analyzed within Holding Time Yes? X No?
		10/30/15	MSA	QA/QC Review
		10/23/15	EJT	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: _____ 10/30/15

Laboratory Manager Date

Copy No. _____

Radiochemistry Services

SECTION I

CHAIN OF CUSTODY
&
pH CHECK SHEET

Chain of Custody Record

№ 7256

Eberline Services
601 Scarboro Road
Oak Ridge, TN 37830
(865) 481-0683 Phone • (865) 483-4621 Fax

EBERLINE SERVICES

Project Name: PAP/KAN	Project Number: 1428
Send Report To: Cecilia Green/Auxier	Sampler (Print Name):
Address:	Sampler (Print Name):
9821 Cogdill Rd Suite I	Shipment Method: Federal Express
Knoxville TN 37932	Airbill Number:
Phone: 865-675-3669	Laboratory Receiving:
Fax: 865-675-3677	

REC'D OCT 12 2015

~~15-10065~~ Feb 10-21-15

15-10128

Page ___ of ___

Purchase Order #: _____

Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers	Total Suspended Solids (TSS)	Total Dissolved Solids	Gross Alpha	Gross Beta	Isotopic Uranium	Isotopic Thallium	Comments, Special Instructions, etc.	Lab Sample ID (to be completed by lab)
4 KC91-159-L	9/26/15	9:25	Water	1	X	X	X	X	X	X	Analyze TSS & TDS	
5 KC91-159-U	9/26/15	10:10	Water	1	X	X	X	X	X	X	contact cecilia	
6 MW-008-L	9/22/15	10:57	Water	1	X	X	X	X	X	X	Filter as directed	
7 KC-90-137-U	9/26/15	12:05	Water	1	X	X	X	X	X	X	Analyse GA+GB	
8 KC90-137-L	9/26/15	12:40	Water	1	X	X	X	X	X	X	contact cecilia	
9 RB-01-09/21/15	9/21/15	11:20	Water	1	X	X	X	X	X	X	Proceed as directed	

date is 09/21/15 on sample container label. est 10/21/15

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
[signature]	Fedex	10/5/15	15:47
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
[signature]	[signature]	10-12-15	1235
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:

Sample Custodian Remarks (Completed By Laboratory):

QA/QC Level	Turnaround
Level I ☐	Routine ☑
Level II ☐	24 Hour ☐
Level III ☐	1 Week ☐
Other ☐	Other _____

Sample Receipt	
Total # Containers Received?	
COC Seals Present?	
COC Seals Intact?	
Received Containers Intact?	
Temperature?	

59665

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	**15-10128**
Lab Deadline	**10/26/2015**
Analysis	**GaGbT_ThSr - Level 4**
Sample Matrix	**Water**

Comments

Re-log of 15-10065 all fractions

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	37	NN1.1
05	36	NN1.1
06	36	NN1.1
07	35	NN1.1
08	32	NN1.1
09	36	NN1.1

	Location (circle one)	Initials	Date
Received by	[✓ Sample Storage] Rough Prep Prep Separations Count Room	MA	22OCT15
Relinquished by	Sample Storage Rough Prep Prep Separations Count Room	MA	22OCT15 0845
Received by	Sample Storage Rough Prep Prep Separations [✓ Count Room]	C	10/22 0847
Relinquished by	Sample Storage Rough Prep Prep Separations [✓ Count Room]	VB	10/22/15 1516
Received by	[✓ Sample Storage] Rough Prep Prep Separations Count Room		
Relinquished by	Sample Storage Rough Prep Prep Separations Count Room		
Received by	Sample Storage Rough Prep Prep Separations Count Room		
Relinquished by	Sample Storage Rough Prep Prep Separations Count Room		
Received by	Sample Storage Rough Prep Prep Separations Count Room		
Relinquished by	Sample Storage Rough Prep Prep Separations Count Room		
Received by	Sample Storage Rough Prep Prep Separations Count Room		
Relinquished by	Sample Storage Rough Prep Prep Separations Count Room		
Received by	Sample Storage Rough Prep Prep Separations Count Room		
Relinquished by	Sample Storage Rough Prep Prep Separations Count Room		

Printed: 10/21/2015 12:11 PM

EBERLINE SERVICES

Sample Receiving Report
(Volumes, pH, & CPM)

Internal Work Order
15-10128
Received By
JBAILEY

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	NN1.1		
02	BLANK	0		WA	NN1.1		
03	DUP	0		WA	NN1.1		
04	KC91-159-L ✓	1		WA	NN1.1	3.76	37
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	37
05	KC91-159-U ✓	1		WA	NN1.1	3.76	36
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	36
06	OW-008-L ✓	1		WA	NN1.1	3.76	36
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	36
07	KC-90-137-U ✓	1		WA	NN1.1	3.76	35
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	35
08	KC90-137-L ✓	1		WA	NN1.1	3.76	32
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	32
09	RB-01-09 21 15 ✓	1		WA	NN1.1	0.75	36
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	0.7500	36

✓ EJS 10/21/15

Received by: _____ Date: 10-21-15

SECTION II

SAMPLE ACKNOWLEDGEMENT

Client Name	Contract/PO	Project Type	Date Received	Required Turnaround Days	Eberline Services Work Order
Auxier & Associates, Inc.	PAP-KAN	Environmental	10/21/2015	3	15-10128
Project Name	**Client WO**	**Sample Disp**	**Lab Deadline**	**Internal Deadline**	**Client Deadline**
PAP-KAN	1428 PAP-KAN	W	10/26/2015	10/26/2015	10/26/2015

Internal ID	Client ID	Sample Date	Matrix	Storage	GaGbT																								Ttl
01	LCS	10/21/15	WA	NN1.1	X																							1
02	BLANK	10/21/15	WA	NN1.1	X																							1
03	DUP	10/21/15	WA	NN1.1	X																							1
04	KC91-159-L	09/26/15 09:25	WA	NN1.1	X																							1
05	KC91-159-U	09/26/15 10:10	WA	NN1.1	X																							1
06	OW-008-L	09/22/15 10:51	WA	NN1.1	X																							1
07	KC-90-137-U	09/26/15 12:05	WA	NN1.1	X																							1
08	KC90-137-L	09/26/15 12:40	WA	NN1.1	X																							1
09	RB-01-09 21 15	09/21/15 11:20	WA	NN1.1	X																							1
																												0
																												0
																												0
																												0
																												0
																												0
																												0
																												0
																												0
																												0
																												0
				Totals Per Analysis (non QA samples)	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

EBERLINE SERVICES

Sample Log In Report

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830

Voice: (865) 481-0683
Fax: (865) 483-4621

Invoice
Accounts Payable
Auxier & Associates, Inc.
9821 Cogdill Drive #1
Knoxville, TN 37932
Voice 865-675-3669
Fax 865-675-3677

Contact
Harvey Cohen
Voice 301-718-8900
Fax 301-718-8909

Report Data
Cecilia Greene
Auxier & Associates, Inc.
9821 Cogdill Road, Suite 1
Knoxville, TN 37830
Voice 865-675-3669
Fax 865-675-3677

Printed: 10/21/2015 12:11 PM

Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST
MP-001-2

WORK ORDER # 15 - 10128

SAMPLE MATRIX/MATRICES:

(CIRCLE ~~ONE OR~~ BOTH)

(AQUEOUS) NON-AQUEOUS

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

WERE SAMPLES:

Received in good condition?	(Y)	N	
If aqueous, properly preserved	(Y)	N	N/A

WERE CHAIN OF CUSTODY SEALS:

Present on outside of package?	(Y)	N
Unbroken on outside of package?	(Y)	N
Present on samples?	(Y)	N
Unbroken on samples?	(Y)	N
Was chain of custody present upon sample receipt?	(Y)	N

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

REMARKS: _____

SIGNATURE: James E Saulsbury DATE: 10-21-15

SECTION III

CASE NARRATIVE

EBERLINE SERVICES

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

EBS-OR-39887

October 30, 2015

Cecilia Greene
USA ENV LP/Auxier & Associates, Inc.
9821 Cogdill Road, Suite 1
Knoxville, TN 37932

CASE NARRATIVE
Work Order# 15-10128-OR

SAMPLE RECEIPT

This work order contains six water samples received 10/12/2015 and re-logged at the client's request 10/21/2015. These samples were analyzed for Gross Alpha/Beta.

CLIENT ID	LAB ID	CLIENT ID	LAB ID
KC91-159-L	15-10128-04	KC-90-137-U	15-10128-07
KC91-159-U	15-10128-05	KC90-137-L	15-10128-08
OW-008-L	15-10128-06	RB-01-09 21 15	15-10128-09

ANALYTICAL METHODS

Gross Alpha/Beta was analyzed using EPA Method 900.0 Modified.

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 ALPHA & BETA

Samples were prepared by evaporation of representative volumetric aliquots acidified with HNO_3. 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 ALPHA & BETA CONTINUED

Samples demonstrated acceptable results for all Gross Alpha and Beta analyses. The Gross Alpha and Beta method blank demonstrated results slightly greater than the detection limit. In each case blank results were background equivalent. Results for the Gross Alpha and Beta duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Gross Alpha and 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.

M.R. McDougall
Laboratory Manager

Date: 10/30/2015

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

Eberline Analytical
Final Report of Analysis

Report To:
Cecilia Greene
Auxier & Associates, Inc.
9821 Cogdill Road, Suite 1
Knoxville, TN 37830

Work Order Details:
SDG: 15-10128
Purchase Order: PAP-KAN
Analysis Category: ENVIRONMENTAL
Sample Matrix: WA

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	CV	Report Units
15-10128-01	LCS	KNOWN	10/21/15 00:00	10/21/2015	10/22/2015	15-10128	Gross Alpha	EPA 900.0 Modified	2.68E+02	1.15E+01				pCi/l
15-10128-01	LCS	SPIKE	10/21/15 00:00	10/21/2015	10/22/2015	15-10128	Gross Alpha	EPA 900.0 Modified	2.80E+02	3.74E+00	3.09E+01	1.87E-01	1.92E-01	pCi/l
15-10128-02	MBL	BLANK	10/21/15 00:00	10/21/2015	10/22/2015	15-10128	Gross Alpha	EPA 900.0 Modified	5.40E-01	2.05E-01	2.13E-01	2.84E-01	2.81E-01	pCi/l
15-10128-03	DUP	KC91-159-L	09/26/15 09:25	10/21/2015	10/22/2015	15-10128	Gross Alpha	EPA 900.0 Modified	6.37E+00	3.09E+00	3.17E+00	4.78E+00	1.54E+00	pCi/l
15-10128-04	DO	KC91-159-L	09/26/15 09:25	10/21/2015	10/22/2015	15-10128	Gross Alpha	EPA 900.0 Modified	8.93E+00	3.33E+00	3.47E+00	4.38E+00	1.37E+00	pCi/l
15-10128-05	TRG	KC91-159-U	09/26/15 10:10	10/21/2015	10/22/2015	15-10128	Gross Alpha	EPA 900.0 Modified	8.38E+00	3.47E+00	3.58E+00	5.15E+00	1.72E+00	pCi/l
15-10128-06	TRG	OW-008-L	09/22/15 10:51	10/21/2015	10/22/2015	15-10128	Gross Alpha	EPA 900.0 Modified	5.37E+00	2.19E+00	2.26E+00	3.02E+00	5.66E-01	pCi/l
15-10128-07	TRG	KC-90-137-U	09/26/15 12:05	10/21/2015	10/22/2015	15-10128	Gross Alpha	EPA 900.0 Modified	9.87E+00	2.57E+00	2.78E+00	2.50E+00	4.56E-01	pCi/l
15-10128-08	TRG	KC90-137-L	09/26/15 12:40	10/21/2015	10/22/2015	15-10128	Gross Alpha	EPA 900.0 Modified	3.72E+00	1.76E+00	1.81E+00	2.70E+00	6.31E-01	pCi/l
15-10128-09	TRG	RB-01-09 21 15	09/21/15 11:20	10/21/2015	10/22/2015	15-10128	Gross Alpha	EPA 900.0 Modified	1.33E-01	5.52E-01	5.53E-01	1.27E+00	1.25E+00	pCi/l
15-10128-01	LCS	KNOWN	10/21/15 00:00	10/21/2015	10/22/2015	15-10128	Gross Beta	EPA 900.0 Modified	2.92E+02	8.75E+00				pCi/l
15-10128-01	LCS	SPIKE	10/21/15 00:00	10/21/2015	10/22/2015	15-10128	Gross Beta	EPA 900.0 Modified	2.77E+02	3.13E+00	3.84E+01	6.50E-01	1.62E+00	pCi/l
15-10128-02	MBL	BLANK	10/21/15 00:00	10/21/2015	10/22/2015	15-10128	Gross Beta	EPA 900.0 Modified	9.45E-01	2.70E-01	3.00E-01	4.45E-01	7.94E-01	pCi/l
15-10128-03	DUP	KC91-159-L	09/26/15 09:25	10/21/2015	10/22/2015	15-10128	Gross Beta	EPA 900.0 Modified	6.79E+00	3.03E+00	3.17E+00	5.57E+00	9.38E+00	pCi/l
15-10128-04	DO	KC91-159-L	09/26/15 09:25	10/21/2015	10/22/2015	15-10128	Gross Beta	EPA 900.0 Modified	1.21E+01	3.76E+00	4.12E+00	6.72E+00	1.34E+01	pCi/l
15-10128-05	TRG	KC91-159-U	09/26/15 10:10	10/21/2015	10/22/2015	15-10128	Gross Beta	EPA 900.0 Modified	1.12E+01	4.10E+00	4.38E+00	7.59E+00	1.69E+01	pCi/l
15-10128-06	TRG	OW-008-L	09/22/15 10:51	10/21/2015	10/22/2015	15-10128	Gross Beta	EPA 900.0 Modified	6.07E+00	1.91E+00	2.08E+00	3.39E+00	5.94E+00	pCi/l
15-10128-07	TRG	KC-90-137-U	09/26/15 12:05	10/21/2015	10/22/2015	15-10128	Gross Beta	EPA 900.0 Modified	8.06E+00	1.84E+00	2.15E+00	2.96E+00	4.60E+00	pCi/l
15-10128-08	TRG	KC90-137-L	09/26/15 12:40	10/21/2015	10/22/2015	15-10128	Gross Beta	EPA 900.0 Modified	5.15E+00	1.51E+00	1.67E+00	2.59E+00	4.12E+00	pCi/l
15-10128-09	TRG	RB-01-09 21 15	09/21/15 11:20	10/21/2015	10/22/2015	15-10128	Gross Beta	EPA 900.0 Modified	6.42E-01	1.12E+00	1.13E+00	2.33E+00	4.66E+00	pCi/l

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original; CV=Critical Value

SECTION V

ANALYTICAL STANDARDS

Am-4

ANALYTICS

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

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'Brie Beverly
K. O. Beverly, Radiochemist

Q A APPROVED: D M. Mc 4-26-96

EBERLINE SERVICES | **QUALITY CONTROL PROGRAM**
MP-009

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

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

Date: 8/5/2015 0:00
Solution Reference #: Analytics 52094-416
Solution #: A/B-7 (alpha)

Principal Radionuclide	Half Life, Years	Half Life, Days
^{241}Americium	4.322E+02	1.579E+05

Radionuclide of Interest: ^{241}Am
Parent Solution Conc.: 1.19E+04 dpm/ml

Reference Date: 3/19/1996 0:00

Chemical Composition of Standard Solution
$^{241}AmCl_3$ in 1M HCL

Dilution Instructions:

Dilution Solvent Used: 1 M HNO_3

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

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 4, 2016

Verified & Approved By: _____ Date: 8/5/15

QC Approval: _____ Date: 8/5/15

Sr-12
13 uln

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

*Notes and references are on pages 5 and 6.

EBERLINE SERVICES

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)

QCP-009-1-A

Solution Reference #: NIST 4234A

Date: 8/5/2015 0:00

Solution #: A/B-7 (beta)

Principal Radionuclide	Half Life, Years	Half Life, Days
^{90}Strontium	2.878E+01	1.051E+04

Radionuclide of Interest: ^{90}Sr

Parent Solution Conc.: 1.52E+06 dpm/ml

Reference Date: 3/13/1995 0:00

The beta activity of solution reflects the original ^{90}Strontium concentration and an equal concentration of ^{90}Yttrium.

Chemical Composition of Standard Solution

$^{90}SrCl_2$ in 1 M HCl

Dilution Instructions:

Dilution Solvent Used: 1 M HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	0.5000	ml
Total Activity:	7.5764E+05	dpm
Final Volume:	1000.00	ml

Final Activity Concentration: 7.5764E+02 dpm/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 4, 2016

Verified & Approved By _____ Date: 08/05/15

QC Approval _____ Date: 8/5/15

SECTION VI

QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
15-10128	GaGbT_ThSr	1	pCi	l	Auxier & Associates, Inc.

Laboratory Control Sample

Analyte		LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
GROSS ALPHA_TH		104.81%	11.00%	100.00%	4.30%	2.68E+02	1.15E+01	2.80E+02	3.09E+01	A/B-07	5.96E+02	4.30E+00	9.97E-01
GROSS BETA_SR		95.04%	13.86%	100.00%	3.00%	2.92E+02	8.75E+00	2.77E+02	3.84E+01	A/B-07	6.49E+02	3.00E+00	9.97E-01

Matrix Spike

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)*

Replicate Sample

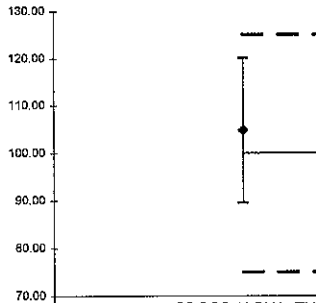
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
GROSS ALPHA_TH	1.07	33.40	8.93E+00	3.47E+00	6.37E+00	3.17E+00
GROSS BETA_SR	1.99	56.04	1.21E+01	4.12E+00	6.79E+00	3.17E+00

QC Summary

LCS Relative Bias	*LCS % R*		*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
1.05	OK				NA	OK
0.95	OK				NA	OK

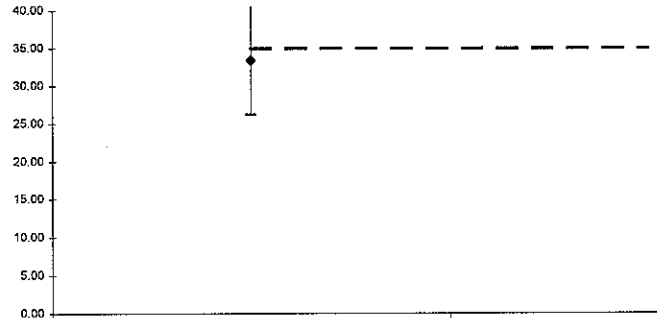
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
15-10128	GaGbT_ThSr	1	pCi	l	Auxier & Associates, Inc.

LCS % Recovery



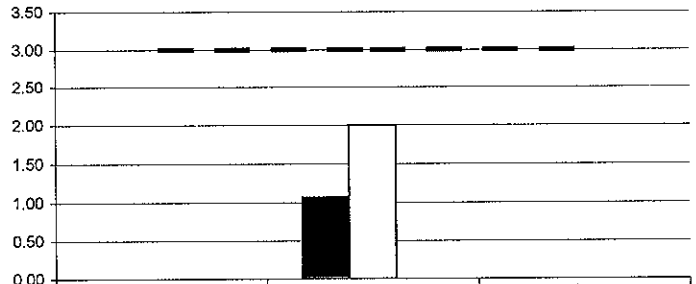
	GROSS ALPHA_TH	GROSS BETA_SR
Lower Error	89.50	78.17
Upper Error	120.11	111.90
%R	104.81	95.04
LCL	75	75
Mean	100	100
UCL	125	125

Replicate Sample RPD



	GROSS ALPHA_TH	GROSS BETA_SR
Lower Error	40.64	66.86
Upper Error	26.16	45.22
RPD	33.40	56.04
CL	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
GROSS ALPHA_TH	0.00	1.07	0.00
GROSS BETA_SR	0.00	1.99	0.00
	0.00	0.00	0.00
UCL	3	3	3

No Matrix Spike

SECTION VII

LABORATORY TECHNICIAN'S NOTES & RUNLOGS

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	15-10128
Analysis Code	GaGbT_ThSr
Run Number	1

#	Date	Dept	User	Notes
1	10/22/15 03:40	PREP	MHIGHTOWER	Aliquots based on previous TDS (15-10065).
2	10/22/15 03:40	PREP	MHIGHTOWER	Aliquoted samples, dried, nitrated, transferred to tared planchets, dried, flamed, re-weighed, and submitted to count room

MH 22OCT15

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
15-10128	
Analysis Code	Run
GaGbT_ThSr	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
016403D12	Nitric Acid	3N	MHIGHTOWER	10/22/2015

CB4110 RED

Date	Sample #	Client	Time	Time	Analyst	Test
10/15	GF Fec	LAB	0506		LAB	
10/15	Blank	LAB	0542		LAB	
10/15	1510007SY(1-4,16)	Ucon	0708		SRSoly	
10/15	1510081AD(2-7)	Parsons	0717		LAB	
10/15	1510054 RH(2-6)	USA	0938		RHB	
10/16/15	Daily Bkgd	Lab	0609	1 HR		AC
10/16	EFF 1020	LAB	0624		LAB	
10/16	Blank 1020	LAB	0710		LAB	
10/16	1510073NP(1-4)	Ucon	0847		NP222	
10/16	1510074NP(1-7)	Ucon	0857		NP222	
10/16	1510078SY(2-4)	DOE	0921		SRSoly	
10/16	1510078RH(2-4)	SLOFND	0959		RHB	
10/16	1510030RH(6)	SLOFND	0959		RHB	
10/16	1508151RH(2-4)	Ucon	1010		RHB	
10/20	1509078SY(1)	DOE	1101		SRSoly	
10/20	1509078SY(2-9)	DOE	1239		SRSoly	
10/20/16	RA-SD Rect-(1-5)	Lab	1219	15 min	Ra	KB
10/21	GF Fec	LAB	0518		LAB	
10/21	Blank	LAB	0554		LAB	
10/21	1508056SY(1-6)	DOE	0737		SRSoly	
10/21	1509150RH(1-7)	Accutest	0944		RHB	
10/21	1510001PB(1-7)	Searay	1714		Pb210	
10/22	GF Fec	LAB	0515		LAB	
10/22	Blank	LAB	0550		LAB	
10/22	1510057NP(1-3,5,6)	TM Rept.	0823		NP222	
10/22	1510058NP(1,5)	Weston	0852		NP222	
10/22	1510115R(1-5)	Ucon	0850		SR201	
10/22	1510128AD(2-4)	Anadex	0950		LAB	
10/22	1510002RH(2-6)	Accutest	1055		RHB	
10/22	1510021RH(2-4)	Ucon	1133		RHB	
~~10/22~~	~~1510128AD(1)~~	~~Anadex~~		2 hr	LAB	
10/22	1510128AD(7-8)	Anadex	1700		LAB	
10/22	1510128ABL(1,6)	Anadex	1714		LAB	

CB4110 Aqua

Date	Sample ID	Client	Prep Date/Time	Time	Analyzed	Ref
10/22	1510058NPL(2)	Unitech	08:22	1	NP22	[illegible]
10/22	1510128ABC(1)	Aucier	09:22	2	AB	[illegible]

SECTION VIII

ANALYTICAL DATA (GROSS ALPHA/BETA)

15-10128
GaGbT_ThSr
Run 1

Work Order	15-10128
Analysis Code	GaGbT_ThSr
Run	1
Date Received	10/21/2015
Lab Deadline	10/26/2015
Client	Auxier & Associates, Inc.
Project	PAP-KAN
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	EPA 900.0 Modified
Instrument Type	Alpha/Beta GPC
Radiometric Tracer	
Radiometric Sol#	
Tracer Act (dpm/g)	
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		10/21/15 00:00	1.0000E+00
02	MBL	BLANK		10/21/15 00:00	1.0000E+00
03	DUP	KC91-159-L	37	09/26/15 09:25	1.0000E-01
04	DO	KC91-159-L	37	09/26/15 09:25	1.0000E-01
05	TRG	KC91-159-U	36	09/26/15 10:10	1.0000E-01
06	TRG	OW-008-L	36	09/22/15 10:51	2.0000E-01
07	TRG	KC-90-137-U	35	09/26/15 12:05	2.0000E-01
08	TRG	KC90-137-L	32	09/26/15 12:40	2.0000E-01
09	TRG	RB-01-09 21 15	36	09/21/15 11:20	2.0000E-01

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

15-10128
GaGbT_ThSr
Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS				0.00		7.4705	7.4706	0.0001			1.00	1.00
02	MBL				0.00		7.5769	7.5771	0.0002			1.00	1.00
03	DUP				0.00		7.4772	7.5208	0.0436			1.00	1.00
04	DO				0.00		7.6245	7.6687	0.0442			1.00	1.00
05	TRG				0.00		7.5947	7.6374	0.0427			1.00	1.00
06	TRG				0.00		7.5991	7.6639	0.0648			1.00	1.00
07	TRG				0.00		7.5919	7.6583	0.0664			1.00	1.00
08	TRG				0.00		7.5961	7.6517	0.0556			1.00	1.00
09	TRG				0.00		7.5569	7.5593	0.0024			1.00	1.00

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

15-10128
GaGbT_ThSr
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			10/22/15 04:13	MHIGHTOWER				
02	MBL			10/22/15 04:13	MHIGHTOWER				
03	DUP			10/22/15 04:13	MHIGHTOWER				
04	DO			10/22/15 04:13	MHIGHTOWER				
05	TRG			10/22/15 04:13	MHIGHTOWER				
06	TRG			10/22/15 04:13	MHIGHTOWER				
07	TRG			10/22/15 04:13	MHIGHTOWER				
08	TRG			10/22/15 04:13	MHIGHTOWER				
09	TRG			10/22/15 04:13	MHIGHTOWER				

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Preliminary Data Report & Analytical Calculations

Work Order: 15-10128-GaGbT-1

Client: Auxier & Associates, Inc.
Eberline Services Work Order: 15-10128
Analysis Code: GaGbT
Run: 1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	GROSS ALPHA	LCS	LCS	pCi/l	2.80E+02	3.74E+00	1.87E-01	2.68E+02	104.81	OK		OK	
02	GROSS ALPHA	MBL	BLANK	pCi/l	5.40E-01	2.05E-01	2.84E-01					OK	OK
03	GROSS ALPHA	DUP	KC91-159-L	pCi/l	6.37E+00	3.09E+00	4.78E+00				NA	OK	
04	GROSS ALPHA	DO	KC91-159-L	pCi/l	8.93E+00	3.33E+00	4.38E+00					OK	
05	GROSS ALPHA	TRG	KC91-159-U	pCi/l	8.38E+00	3.47E+00	5.15E+00					INV	
06	GROSS ALPHA	TRG	OW-008-L	pCi/l	5.37E+00	2.19E+00	3.02E+00					OK	
07	GROSS ALPHA	TRG	KC-90-137-U	pCi/l	9.87E+00	2.57E+00	2.50E+00					OK	
08	GROSS ALPHA	TRG	KC90-137-L	pCi/l	3.72E+00	1.76E+00	2.70E+00					OK	
09	GROSS ALPHA	TRG	RB-01-09 21 15	pCi/l	1.33E-01	5.52E-01	1.27E+00					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 15-10128-GaGbT-1

Client: Auxier & Associates, Inc.
Eberline Services Work Order: 15-10128
Analysis Code: GaGbT
Run: 1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	GROSS ALPHA	LCS	10/21/15 00:00	1.00E+00	0.00	0.00	0.00	1.00		
02	GROSS ALPHA	MBL	10/21/15 00:00	1.00E+00	0.00	0.00	0.00	1.00		
03	GROSS ALPHA	DUP	09/26/15 09:25	1.00E-01	0.00	0.00	0.00	1.76		
04	GROSS ALPHA	DO	09/26/15 09:25	1.00E-01	0.00	0.00	0.00	1.77		
05	GROSS ALPHA	TRG	09/26/15 10:10	1.00E-01	0.00	0.00	0.00	1.73		
06	GROSS ALPHA	TRG	09/22/15 10:51	2.00E-01	0.00	0.00	0.00	2.29		
07	GROSS ALPHA	TRG	09/26/15 12:05	2.00E-01	0.00	0.00	0.00	2.33		
08	GROSS ALPHA	TRG	09/26/15 12:40	2.00E-01	0.00	0.00	0.00	2.06		
09	GROSS ALPHA	TRG	09/21/15 11:20	2.00E-01	0.00	0.00	0.00	1.00		

Preliminary Data Report & Analytical Calculations

Work Order: 15-10128-GaGbT-1

Client: Auxier & Associates, Inc.
Eberline Services Work Order: 15-10128
Analysis Code: GaGbT
Run: 1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	GROSS ALPHA	LCS	10/22/15 11:13		LB4110A	G2	120	21567	0.033333333	0.2886
02	GROSS ALPHA	MBL	10/22/15 07:30		LB4110A	F2	120	50	0.083333333	0.2778
03	GROSS ALPHA	DUP	10/22/15 07:30		LB4110A	F4	120	38	0.083333333	0.2895
04	GROSS ALPHA	DO	10/22/15 07:32		LB4110A	A2	120	47	0.066666667	0.2903
05	GROSS ALPHA	TRG	10/22/15 07:32		LB4110A	A3	120	49	0.1	0.2872
06	GROSS ALPHA	TRG	10/22/15 11:13		LB4110A	G4	120	42	0.066666667	0.2722
07	GROSS ALPHA	TRG	10/22/15 11:00		LB4110A	E2	120	73	0.05	0.2968
08	GROSS ALPHA	TRG	10/22/15 11:00		LB4110A	E3	120	39	0.083333333	0.3007
09	GROSS ALPHA	TRG	10/22/15 11:00		LB4110A	E4	120	10	0.066666667	0.2825

Preliminary Data Report & Analytical Calculations

Work Order: 15-10128-GaGbT-1

Client: Auxier & Associates, Inc.
Eberline Services Work Order: 15-10128
Analysis Code: GaGbT
Run: 1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	GROSS BETA	LCS	LCS	pCi/l	2.77E+02	3.13E+00	6.50E-01	2.92E+02	95.04	OK		OK	
02	GROSS BETA	MBL	BLANK	pCi/l	9.45E-01	2.70E-01	4.45E-01					OK	OK
03	GROSS BETA	DUP	KC91-159-L	pCi/l	6.79E+00	3.03E+00	5.57E+00				NA	INV	
04	GROSS BETA	DO	KC91-159-L	pCi/l	1.21E+01	3.76E+00	6.72E+00					INV	
05	GROSS BETA	TRG	KC91-159-U	pCi/l	1.12E+01	4.10E+00	7.59E+00					INV	
06	GROSS BETA	TRG	OW-008-L	pCi/l	6.07E+00	1.91E+00	3.39E+00					OK	
07	GROSS BETA	TRG	KC-90-137-U	pCi/l	8.06E+00	1.84E+00	2.96E+00					OK	
08	GROSS BETA	TRG	KC90-137-L	pCi/l	5.15E+00	1.51E+00	2.59E+00					OK	
09	GROSS BETA	TRG	RB-01-09 21 15	pCi/l	6.42E-01	1.12E+00	2.33E+00					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 15-10128-GaGbT-1

Client: Auxier & Associates, Inc.
Eberline Services Work Order: 15-10128
Analysis Code: GaGbT
Run: 1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	GROSS BETA	LCS	10/21/15 00:00	1.00E+00	0.00	0.00	0.00	1.00		
02	GROSS BETA	MBL	10/21/15 00:00	1.00E+00	0.00	0.00	0.00	1.00		
03	GROSS BETA	DUP	09/26/15 09:25	1.00E-01	0.00	0.00	0.00	1.09		
04	GROSS BETA	DO	09/26/15 09:25	1.00E-01	0.00	0.00	0.00	1.10		
05	GROSS BETA	TRG	09/26/15 10:10	1.00E-01	0.00	0.00	0.00	1.09		
06	GROSS BETA	TRG	09/22/15 10:51	2.00E-01	0.00	0.00	0.00	1.14		
07	GROSS BETA	TRG	09/26/15 12:05	2.00E-01	0.00	0.00	0.00	1.15		
08	GROSS BETA	TRG	09/26/15 12:40	2.00E-01	0.00	0.00	0.00	1.12		
09	GROSS BETA	TRG	09/21/15 11:20	2.00E-01	0.00	0.00	0.00	1.00		

Preliminary Data Report & Analytical Calculations

Work Order: 15-10128-GaGbT-1

Client: Auxier & Associates, Inc.
Eberline Services Work Order: 15-10128
Analysis Code: GaGbT
Run: 1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff	A to B, Cor
01	GROSS BETA	LCS	10/22/15 11:13		LB4110A	G2	120	40871	1.616666667	0.4758	294.2765342
02	GROSS BETA	MBL	10/22/15 07:30		LB4110A	F2	120	227	0.766666667	0.486	1.786083333
03	GROSS BETA	DUP	10/22/15 07:30		LB4110A	F4	120	212	1.016666667	0.4858	1.686423333
04	GROSS BETA	DO	10/22/15 07:32		LB4110A	A2	120	332	1.483333333	0.4835	2.667418333
05	GROSS BETA	TRG	10/22/15 07:32		LB4110A	A3	120	367	1.866666667	0.4765	2.954861667
06	GROSS BETA	TRG	10/22/15 11:13		LB4110A	G4	120	308	1.35	0.4781	2.477976667
07	GROSS BETA	TRG	10/22/15 11:00		LB4110A	E2	120	327	1.05	0.4871	2.570848333
08	GROSS BETA	TRG	10/22/15 11:00		LB4110A	E3	120	260	1	0.531575394	2.084311667
09	GROSS BETA	TRG	10/22/15 11:00		LB4110A	E4	120	138	1	0.526582251	1.15

Count Room Report
Client: Auxier Associates, Inc.

15-10128-GaGbT_ThSr-1 (pCi/l) in WA
Tracer ID:

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	10/21/15 00:00	1.0000				0.00	1.00	1.00
02	MBL	BLANK	10/21/15 00:00	1.0000				0.00	1.00	1.00
03	DUP	KC91-159-L	09/26/15 09:25	0.1000				0.00	1.00	1.00
04	DO	KC91-159-L	09/26/15 09:25	0.1000				0.00	1.00	1.00
05	TRG	KC91-159-U	09/26/15 10:10	0.1000				0.00	1.00	1.00
06	TRG	OW-008-L	09/22/15 10:51	0.2000				0.00	1.00	1.00
07	TRG	KC-90-137-U	09/26/15 12:05	0.2000				0.00	1.00	1.00
08	TRG	KC90-137-L	09/26/15 12:40	0.2000				0.00	1.00	1.00
09	TRG	RB-01-09 21 15	09/21/15 11:20	0.2000				0.00	1.00	1.00

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 10/22/2015 4:13 AM

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
15-10128	1	GaGbT_ThSr	10/22/2015 4:12	MHIGHTOWER	MH	

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	*Sol #*	*Activity dpm/g*	*Solution Date*	*Approx Addition*	*Volume Used (g)*	*Volume Used (g)*	*Volume Used (g)*	*Volume Used (g)*	*Known pCi*	*Error Estimate*	*Added pCi*	*Error Estimate*	*Known pCi*	*Error Estimate*	*Added pCi*	*Error Estimate*
Am-241	A/B-07	595.990	10/22/2015	**0.790**	**0.9968**				267.60	11.507	0.00	0.000	0.00	0.000	0.00	0.000
SrY-90	A/B-07	649.300	10/22/2015	**0.850**	**0.9968**				291.54	8.746	0.00	0.000	0.00	0.000	0.00	0.000
Tc-99 MS	Tc-2a	22043.636	7/5/2014	0.1												

Tracers

fraction	*Isotope*	*Sol #*	*Activity dpm/g*	*Solution Date*	*Volume Used (g)*	*Approx Addition*

Balance Printer Tapes

Tracer

LCS

Matrix Spike

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 10/22/2015 3:37 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
15-10128	1	GaGbT_ThSr	liters	10/26/2015	MHIGHTOWER

Lab Fraction	Auxier & Associates, Inc. Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	KC91-159-L	DUP					1.0000E-01	1.0000E-01				
04	KC91-159-L	DO					1.0000E-01	1.0000E-01				
05	KC91-159-U	TRG					1.0000E-01	1.0000E-01				
06	OW-008-L	TRG					2.0000E-01	2.0000E-01				
07	KC-90-137-U	TRG					2.0000E-01	2.0000E-01				
08	KC90-137-L	TRG					2.0000E-01	2.0000E-01				
09	RB-01-09 21 15	TRG					2.0000E-01	2.0000E-01				

Comments	

Technician: MH Date: 10/22/15

Eberline Services - Oak Ridge
Version 1.0 9/1999

Gravimetric Worksheet

Printed: 10/22/2015 8:45 AM

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
15-10128	1	GaGbT_ThSr			MHIGHTOWER

TRetec Fraction	Auxier & Associates, Inc. Client ID	Sample Type	Carrier Data	Filter Data			Gravimetric
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	% Recovery
01	LCS	LCS		7.4705	7.4706	0.0001	
02	BLANK	MBL		7.5769	7.5771	0.0002	
03	DUP	DUP		7.4772	7.5208	0.0436	
04	KC91-159-L	DO		7.6245	7.6687	0.0442	
05	KC91-159-U	TRG		7.5947	7.6374	0.0427	
06	OW-008-L	TRG		7.5991	7.6639	0.0648	
07	KC-90-137-U	TRG		7.5919	7.6583	0.0664	
08	KC90-137-L	TRG		7.5961	7.6517	0.0556	
09	RB-01-09 21 15	TRG		7.5569	7.5593	0.0024	

Technician: MH Date: 10/22/15

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
G2	1510128-01	21567	40871	120	1410	10/22/2015 1:13:58 PM
G4	1510128-06	42	308	120	1410	10/22/2015 1:13:58 PM

10/22/15
105

(R) 10/22/15 LCG

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
F1	1510128-01	9	175	120	1410	10/22/2015 9:30:17 AM
F2	1510128-02	50	227	120	1410	10/22/2015 9:30:17 AM
F4	1510128-03	38	212	120	1410	10/22/2015 9:30:17 AM
A2	1510128-04	47	332	120	1410	10/22/2015 9:32:14 AM
A3	1510128-05	49	367	120	1410	10/22/2015 9:32:14 AM
E2	1510128-07	73	327	120	1410	10/22/2015 1:00:28 PM
E3	1510128-08	39	260	120	1410	10/22/2015 1:00:28 PM
E4	1510128-09	10	138	120	1410	10/22/2015 1:00:28 PM

Eberline Analytical
Oak Ridge Laboratory

GPC Detector Report
(ALL Backgrounds)

Printed: 10/22/2015 9:14 AM

10/22

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	10/20/2015	10/22/2015	2.33E-01	P	-1.11E-01	1.00E-01	3.11E-01
LB4110A - A2	Alpha	10/20/2015	10/22/2015	6.67E-02	P	-3.46E-02	7.33E-02	1.81E-01
LB4110A - A3	Alpha	10/20/2015	10/22/2015	1.00E-01	P	6.62E-02	1.13E-01	1.60E-01
LB4110A - A4	Alpha	10/20/2015	10/22/2015	6.67E-02	P	3.19E-02	1.20E-01	2.08E-01
LB4110A - B1	Alpha	10/20/2015	10/22/2015	8.33E-02	P	1.98E-02	1.23E-01	2.27E-01
LB4110A - B2	Alpha	10/20/2015	10/22/2015	1.17E-01	P	8.41E-02	1.03E-01	1.23E-01
LB4110A - B3	Alpha	10/20/2015	10/22/2015	5.00E-02	P	-1.23E-02	1.17E-01	2.46E-01
LB4110A - B4	Alpha	10/20/2015	10/22/2015	1.17E-01	P	-9.90E-02	9.67E-02	2.92E-01
LB4110A - C1	Alpha	10/20/2015	10/22/2015	2.83E-01	P	-9.17E-02	1.37E-01	3.65E-01
LB4110A - C2	Alpha	10/20/2015	10/22/2015	2.33E-01	P	-4.83E-02	1.80E-01	4.08E-01
LB4110A - C3	Alpha	10/20/2015	10/22/2015	2.83E-01	P	-6.07E-02	1.50E-01	3.61E-01
LB4110A - C4	Alpha	10/20/2015	10/22/2015	2.00E-01	P	-1.20E-01	7.33E-02	2.67E-01
LB4110A - D1	Alpha	10/20/2015	10/22/2015	6.67E-02	P	4.31E-02	1.20E-01	1.97E-01
LB4110A - D2	Alpha	10/20/2015	10/22/2015	1.00E-01	P	4.15E-02	1.07E-01	1.72E-01
LB4110A - D3	Alpha	10/20/2015	10/22/2015	3.33E-02	P	-1.02E-01	8.67E-02	2.75E-01
LB4110A - D4	Alpha	10/20/2015	10/22/2015	1.67E-02	P	-1.25E-02	7.67E-02	1.66E-01
LB4110R - E1	Alpha	10/20/2015	10/22/2015	2.00E-01	P	-1.49E-01	1.25E-01	3.99E-01
LB4110R - E2	Alpha	10/20/2015	10/22/2015	5.00E-02	P	1.13E-02	4.17E-02	7.21E-02
LB4110R - E3	Alpha	10/20/2015	10/22/2015	8.33E-02	P	-2.26E-01	2.00E-01	6.26E-01
LB4110R - E4	Alpha	10/20/2015	10/22/2015	6.67E-02	P	-4.96E-02	4.17E-02	1.33E-01
LB4110R - F1	Alpha	10/20/2015	10/22/2015	6.67E-02	P	6.67E-02	6.67E-02	6.67E-02
LB4110R - F2	Alpha	10/20/2015	10/22/2015	8.33E-02	P	-1.15E-01	1.58E-01	4.32E-01
LB4110R - F3	Alpha	10/20/2015	10/22/2015	2.83E-01	P	2.83E-01	2.83E-01	2.83E-01
LB4110R - F4	Alpha	10/20/2015	10/22/2015	8.33E-02	P	5.86E-03	6.67E-02	1.27E-01
LB4110R - G1	Alpha	10/20/2015	10/22/2015	3.67E-01	F	-9.82E-02	2.67E-01	6.32E-01
LB4110R - G2	Alpha	10/20/2015	10/22/2015	3.33E-02	P	-7.70E-02	7.50E-02	2.27E-01
LB4110R - G3	Alpha	10/20/2015	10/22/2015	3.33E-01	F	2.95E-01	3.25E-01	3.55E-01
LB4110R - G4	Alpha	10/20/2015	10/22/2015	6.67E-02	P	6.67E-02	6.67E-02	6.67E-02

GPC Detector Report
(ALL Backgrounds)

10/22

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	10/20/2015	10/22/2015	1.58E+00	P	9.96E-01	1.44E+00	1.88E+00
LB4110A - A2	Beta	10/20/2015	10/22/2015	1.48E+00	P	7.67E-01	1.44E+00	2.11E+00
LB4110A - A3	Beta	10/20/2015	10/22/2015	1.87E+00	P	9.41E-01	1.68E+00	2.42E+00
LB4110A - A4	Beta	10/20/2015	10/22/2015	6.13E+00	F	4.81E+00	5.59E+00	6.37E+00
LB4110A - B1	Beta	10/20/2015	10/22/2015	1.75E+00	P	1.55E+00	1.76E+00	1.98E+00
LB4110A - B2	Beta	10/20/2015	10/22/2015	1.67E+00	P	8.70E-01	1.43E+00	2.00E+00
LB4110A - B3	Beta	10/20/2015	10/22/2015	1.17E+00	P	9.70E-01	1.53E+00	2.10E+00
LB4110A - B4	Beta	10/20/2015	10/22/2015	1.50E+00	P	1.05E+00	1.77E+00	2.48E+00
LB4110A - C1	Beta	10/20/2015	10/22/2015	1.68E+00	P	1.12E+00	1.48E+00	1.83E+00
LB4110A - C2	Beta	10/20/2015	10/22/2015	1.32E+00	P	8.16E-01	1.38E+00	1.95E+00
LB4110A - C3	Beta	10/20/2015	10/22/2015	2.43E+00	F	4.79E-01	1.66E+00	2.84E+00
LB4110A - C4	Beta	10/20/2015	10/22/2015	1.27E+00	P	1.22E+00	1.29E+00	1.36E+00
LB4110A - D1	Beta	10/20/2015	10/22/2015	1.65E+00	P	9.55E-01	1.50E+00	2.04E+00
LB4110A - D2	Beta	10/20/2015	10/22/2015	5.15E+00	F	3.68E+00	4.74E+00	5.80E+00
LB4110A - D3	Beta	10/20/2015	10/22/2015	4.20E+00	F	3.07E+00	5.22E+00	7.37E+00
LB4110A - D4	Beta	10/20/2015	10/22/2015	7.55E+00	F	3.05E+00	9.16E+00	1.53E+01
LB4110R - E1	Beta	10/20/2015	10/22/2015	1.52E+00	P	8.97E-01	1.38E+00	1.87E+00
LB4110R - E2	Beta	10/20/2015	10/22/2015	1.05E+00	P	9.34E-01	1.03E+00	1.12E+00
LB4110R - E3	Beta	10/20/2015	10/22/2015	1.00E+00	P	-3.24E-01	1.50E+00	3.32E+00
LB4110R - E4	Beta	10/20/2015	10/22/2015	1.00E+00	P	5.35E-01	9.00E-01	1.26E+00
LB4110R - F1	Beta	10/20/2015	10/22/2015	1.45E+00	P	8.69E-01	1.33E+00	1.78E+00
LB4110R - F2	Beta	10/20/2015	10/22/2015	7.67E-01	P	-2.27E-01	1.14E+00	2.51E+00
LB4110R - F3	Beta	10/20/2015	10/22/2015	1.92E+00	P	7.16E-01	1.66E+00	2.60E+00
LB4110R - F4	Beta	10/20/2015	10/22/2015	1.02E+00	P	7.08E-01	1.13E+00	1.56E+00
LB4110R - G1	Beta	10/20/2015	10/22/2015	1.72E+00	P	1.41E+00	1.65E+00	1.89E+00
LB4110R - G2	Beta	10/20/2015	10/22/2015	1.62E+00	P	1.37E+00	1.71E+00	2.04E+00
LB4110R - G3	Beta	10/20/2015	10/22/2015	1.58E+00	P	1.21E+00	1.73E+00	2.24E+00
LB4110R - G4	Beta	10/20/2015	10/22/2015	1.35E+00	P	5.36E-01	1.18E+00	1.81E+00

Eberline Analytical
Oak Ridge Laboratory

GPC Detector Report
(ALL Efficiencies)

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	10/20/2015	10/22/2015	0.2314	P	0.2283	0.2320	0.2358
LB4110A - A2	Alpha	10/20/2015	10/22/2015	0.2112	P	0.2008	0.2127	0.2246
LB4110A - A3	Alpha	10/20/2015	10/22/2015	0.1998	P	0.1898	0.1969	0.2040
LB4110A - A4	Alpha	10/20/2015	10/22/2015	0.2257	P	0.2207	0.2247	0.2286
LB4110A - B1	Alpha	10/20/2015	10/22/2015	0.2154	P	0.2046	0.2115	0.2185
LB4110A - B2	Alpha	10/20/2015	10/22/2015	0.2150	P	0.2112	0.2191	0.2269
LB4110A - B3	Alpha	10/20/2015	10/22/2015	0.2400	P	0.2278	0.2365	0.2453
LB4110A - B4	Alpha	10/20/2015	10/22/2015	0.2325	P	0.2190	0.2272	0.2353
LB4110A - C1	Alpha	10/20/2015	10/22/2015	0.2069	P	0.2000	0.2070	0.2141
LB4110A - C2	Alpha	10/20/2015	10/22/2015	0.2223	P	0.1984	0.2184	0.2384
LB4110A - C3	Alpha	10/20/2015	10/22/2015	0.2506	P	0.2291	0.2492	0.2692
LB4110A - C4	Alpha	10/20/2015	10/22/2015	0.2205	P	0.2083	0.2170	0.2257
LB4110A - D1	Alpha	10/20/2015	10/22/2015	0.2151	P	0.2117	0.2202	0.2288
LB4110A - D2	Alpha	10/20/2015	10/22/2015	0.2421	P	0.2342	0.2410	0.2478
LB4110A - D3	Alpha	10/20/2015	10/22/2015	0.2510	P	0.2466	0.2571	0.2677
LB4110A - D4	Alpha	10/20/2015	10/22/2015	0.1948	P	0.1936	0.1945	0.1954
LB4110R - E1	Alpha	10/20/2015	10/22/2015	0.2342	P	0.2318	0.2337	0.2356
LB4110R - E2	Alpha	10/20/2015	10/22/2015	0.2090	P	0.2011	0.2120	0.2229
LB4110R - E3	Alpha	10/20/2015	10/22/2015	0.2124	P	0.2119	0.2126	0.2132
LB4110R - E4	Alpha	10/20/2015	10/22/2015	0.2447	P	0.2405	0.2462	0.2520
LB4110R - F1	Alpha	10/20/2015	10/22/2015	0.1910	P	0.1869	0.1926	0.1982
LB4110R - F2	Alpha	10/20/2015	10/22/2015	0.1988	P	0.1980	0.1991	0.2002
LB4110R - F3	Alpha	10/20/2015	10/22/2015	0.2407	P	0.2366	0.2399	0.2431
LB4110R - F4	Alpha	10/20/2015	10/22/2015	0.2219	P	0.2139	0.2202	0.2266
LB4110R - G1	Alpha	10/20/2015	10/22/2015	0.2052	P	0.1855	0.2009	0.2163
LB4110R - G2	Alpha	10/20/2015	10/22/2015	0.2043	P	0.2008	0.2056	0.2105
LB4110R - G3	Alpha	10/20/2015	10/22/2015	0.2296	P	0.2216	0.2279	0.2341
LB4110R - G4	Alpha	10/20/2015	10/22/2015	0.2029	P	0.2012	0.2026	0.2039

Eberline Analytical
Oak Ridge Laboratory

GPC Detector Report
(ALL Efficiencies)

Printed: 10/22/2015 9:15 AM

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	10/20/2015	10/22/2015	0.5518	P	0.5401	0.5537	0.5674
LB4110A - A2	Beta	10/20/2015	10/22/2015	0.4747	P	0.4684	0.4821	0.4959
LB4110A - A3	Beta	10/20/2015	10/22/2015	0.4729	P	0.4643	0.4718	0.4793
LB4110A - A4	Beta	10/20/2015	10/22/2015	0.5335	P	0.5306	0.5398	0.5491
LB4110A - B1	Beta	10/20/2015	10/22/2015	0.5369	P	0.5225	0.5316	0.5408
LB4110A - B2	Beta	10/20/2015	10/22/2015	0.5240	P	0.5040	0.5235	0.5430
LB4110A - B3	Beta	10/20/2015	10/22/2015	0.5906	P	0.5596	0.5837	0.6078
LB4110A - B4	Beta	10/20/2015	10/22/2015	0.5564	P	0.5410	0.5548	0.5686
LB4110A - C1	Beta	10/20/2015	10/22/2015	0.5076	P	0.4569	0.4917	0.5264
LB4110A - C2	Beta	10/20/2015	10/22/2015	0.5255	P	0.4850	0.5250	0.5650
LB4110A - C3	Beta	10/20/2015	10/22/2015	0.6194	P	0.5750	0.6164	0.6578
LB4110A - C4	Beta	10/20/2015	10/22/2015	0.5501	P	0.5151	0.5358	0.5566
LB4110A - D1	Beta	10/20/2015	10/22/2015	0.6565	P	0.6518	0.6614	0.6709
LB4110A - D2	Beta	10/20/2015	10/22/2015	0.6313	P	0.6273	0.6375	0.6478
LB4110A - D3	Beta	10/20/2015	10/22/2015	0.6250	P	0.6143	0.6381	0.6620
LB4110A - D4	Beta	10/20/2015	10/22/2015	0.4764	P	0.4661	0.4763	0.4865
LB4110R - E1	Beta	10/20/2015	10/22/2015	0.5562	P	0.5546	0.5569	0.5592
LB4110R - E2	Beta	10/20/2015	10/22/2015	0.5162	P	0.5080	0.5145	0.5209
LB4110R - E3	Beta	10/20/2015	10/22/2015	0.5107	P	0.5106	0.5107	0.5108
LB4110R - E4	Beta	10/20/2015	10/22/2015	0.6073	P	0.5940	0.6124	0.6308
LB4110R - F1	Beta	10/20/2015	10/22/2015	0.4813	P	0.4673	0.4783	0.4893
LB4110R - F2	Beta	10/20/2015	10/22/2015	0.4799	P	0.4573	0.4751	0.4929
LB4110R - F3	Beta	10/20/2015	10/22/2015	0.6102	P	0.5590	0.5992	0.6394
LB4110R - F4	Beta	10/20/2015	10/22/2015	0.5488	P	0.5129	0.5411	0.5693
LB4110R - G1	Beta	10/20/2015	10/22/2015	0.4705	P	0.4371	0.4633	0.4894
LB4110R - G2	Beta	10/20/2015	10/22/2015	0.5066	P	0.5006	0.5053	0.5100
LB4110R - G3	Beta	10/20/2015	10/22/2015	0.5694	P	0.5060	0.5558	0.6055
LB4110R - G4	Beta	10/20/2015	10/22/2015	0.5101	P	0.4941	0.5066	0.5192

10/22