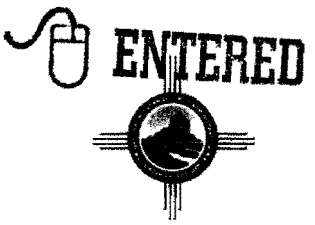
Off site



Los Alamos
NATIONAL LABORATORY
EST. 1943
Environmental Programs
P.O. Box 1663, MS M991
Los Alamos, New Mexico 87545
(505) 606-2337/FAX (505) 665-1812

National Nuclear Security Administration
Los Alamos Site Office, MS A316
Environmental Restoration Program
Los Alamos, New Mexico 87544
(505) 667-4255/FAX (505) 606-2132

Date: DEC 07 2011
Refer To: EP2011-0376

Mr. Brian Snyder, Water Division Director
Acting Public Utilities Division Director
Sangre de Cristo Water Division
City of Santa Fe
801 West San Mateo
P.O. Box 909
Santa Fe, New Mexico 87504

Subject: Los Alamos National Laboratory Sitewide Monitoring Program Drinking Water Results for the City of Santa Fe Buckman Water Supply Wells

Dear Mr. Snyder:

This report, prepared by Los Alamos National Laboratory (the Laboratory), provides the analytical results from the August 31, 2011, sampling of the City of Santa Fe's Buckman water supply well Nos. 1, 6, and 8 for tritium. All results were below the U.S. Environmental Protection Agency maximum contaminant levels.

Routine monitoring of select Buckman water supply wells is conducted in accordance with the April 22, 2010, sampling and analysis plan cooperatively developed between the Laboratory and the City of Santa Fe staff. Under this plan, Buckman well Nos. 1, 6, and 8 will be sampled quarterly by the Laboratory: twice per year for radionuclides, general inorganics, metals, and organics; and twice per year for tritium.

The attached CD contains the following items: (1) analytical laboratory data packages and (2) an Excel file of the analytical results with a glossary of laboratory qualifier codes, secondary validation codes, and secondary validation reason codes. The analytical results are as follows.

Tritium: Tritium was not detected in the samples collected on August 31, 2011, or in the samples collected on May 17, 2011. Results from the samples collected on March 14, 2011, included tritium detections in two of the three water-supply wells sampled. In recent discussions with your staff, the Laboratory has stated it is working with its contract analytical laboratory to reevaluate all low-level tritium analyses to determine results affected by calculation errors. This reevaluation is complete and has resulted in corrections to the previously reported tritium results from samples collected from the Buckman wells including those collected on March 14, 2011 sampling. The Laboratory intends to upload the corrected results into the RACER database but only after discussing with your staff and explaining the process that was undertaken and the results of the reevaluation.

In summary, all results presented in this report are below EPA MCLs.
If you have questions, please contact Steve Paris at (505) 606-0915 (smparis@lanl.gov) or Woody Woodworth at (505) 665-5820 (lance.woodworth@nnsa.doe.gov).

Sincerely,

Michael J. Graham, Associate Director
Environmental Programs
Los Alamos National Laboratory

Sincerely,

George J. Rael, Assistant Manager
Environmental Projects Office
Los Alamos Site Office

MG/GR/CD/SP/DR:sm

Enclosure: CD with the following items:
(1) Analytical laboratory data packages
(2) Excel file of analytical data and glossary of laboratory qualification codes, secondary validation codes, and secondary validation reason codes (LA-UR-11-6489)

Cy: (w/enc.)
Laurie King, EPA Region 6, Dallas, TX
Alex Puglisi, City of Santa Fe, 801 West San Mateo, Santa Fe, NM 87505
Claudia Borchert, City of Santa Fe, 801 West San Mateo, Santa Fe, NM 87505
Michael Gonzales, City of Santa Fe, 801 West San Mateo, Santa Fe, NM 87505
John Kieling, NMED-HWB, 2905 Rodeo Park Drive East, Building 1, Santa Fe, NM 87505
Margaret Ryan, NMED-DWB, P.O. Box 5469, Santa Fe, NM 87502
Steve Yanicak, NMED-DOE-OB, MS M894
Hai Shen, DOE-LASO, MS A316
Cheryl Rodriquez, DOE-LASO, MS A316
Woody Woodworth, DOE-LASO, MS A316
Gene Turner, DOE-LASO, MS A316
Neil Weber, San Ildefonso Pueblo
Steve Paris, EP-CAP, MS M992
Suzanne Coyne, IRM-DCS, MS M992
William Alexander, EP-BPS, MS M992
RPF, MS M707 (electronic copy)
Public Reading Room, MS M992 (hard copy)

Cy: (w/o enc.)
Tom Skibitski, NMED-OB, Santa Fe, NM (date-stamped letter emailed)
Annette Russell, DOE-LASO, MS A316 (date-stamped letter emailed)
Michael B. Mallory, PADOPS, A102 (date-stamped letter emailed)
Mike Brandt, ADESHQ, MS K491 (date-stamped letter emailed)
Mike Saladen, ENV-RCRA, MS K490 (date-stamped letter emailed)
Danny Katzman, EP-ET, MS M992 (date-stamped letter emailed)
David B. Rogers, EP-EI, MS M992 (date-stamped letter emailed)
Steve Paris, EP-CAP, MS M992 (date-stamped letter emailed)
Craig Douglass, EP-CAP, MS M992 (date-stamped letter emailed)
Dave McInroy, EP-CAP, MS M992 (date-stamped letter emailed)
Michael J. Graham, ADEP, MS M991 (date-stamped letter emailed)

****
*** TX REPORT ***
****

TRANSMISSION OK

TX/RX NO	6227
DESTINATION TEL #	89554280
DESTINATION ID	
ST. TIME	12/07 10:02
TIME USE	00'41
PAGES SENT	3
RESULT	OK

√ called & confirmed receipt of fax 12/7/11 Saundra M.

Los Alamos National Laboratory
Environmental Programs
Area Fax: (505) 667-5801

Deliverables Compliance Team

FAX

TO:	Brian Snyder	FR:	Saundra Martinez
FAX #	955-4280	PH:	665-6771
# PAGES:	3 total pages including cover sheet	DATE:	December 7, 2011

RE: LANL Sitewide Monitoring Program Drinking Water Results for the City of Santa Fe Buckman Water Supply Wells

Comments:

If you have any questions, please contact me.
The original with the CD is in the mail.

Thank you.
Saundra

Note for Saundra/Vanessa. Call to confirm receipt of fax 955-4201

Definitions for Other Codes

Fld Qc Type Code	Fld Qc Type Desc
EQB	Equipment Rinsate Blank
FB	Field Blank
FD	Field Duplicate
FR	Field Rinsate
FS	Field Split
FTB	Field Trip Blank
FTR	Field Triplicate
INB	Equipment blank taken during installation and not assoc with a sampling event
ITB	Trip blank taken during installation and not assoc with a sampling event
NA	Not Applicable
PEB	Performance Evaluation Blank
PEK	Performance Evaluation Known
RES	Resample
SS	Special sampling event, data unique
SS-EQB	Equipment Blank of special sampling event, data unique
SS-FB	Field Blank of special sampling event, data unique
SS-FD	Field Duplicate of special sampling event, data unique
SS-FTB	Field Trip Blank of special sampling event, data unique

Fld Prep Code	Fld Prep Desc
F	Filtered
UF	Unfiltered

Anyl Suite Code	Anyl Suite Desc
ANION	ANION
DIOX/FUR	Dioxin and Furans
DRO	Diesel Range Organics
GAMMA	Gamma Spectroscopy
GAMMA_SPEC	GAMMA_SPEC
GENINORG	General Inorganics
GRO	Gasoline Range Organics
GROSSAB	GROSSAB
HERB	Herbicides
HEXP	High Explosives
INORGANIC	Inorganics
ISOTOPE	Isotopes Ratios
METALS	Metals
PCB	PCB
PCB_CONG	PCB Congeners
PEST	PEST
PEST/PCB	Pesticide and PCBs
PESTPCB	Pesticides/PCBs
RAD	Radiochemistry (Not Gamma)
SVOA	Semivolatiles Organics
SVOC	SVOC
VOA	Volatile Organics
VOC	Volatile Organic Compounds

Lab Sample Type Code	Lab Sample Type Desc
CS	Client Sample
DL	Dilution
DUP	Duplicate
RE	Reanalysis
REDL	Reanalysis Dilution
REDP	Reanalysis Duplicate
RI	Reissue
TRP	Triplicate

Fld Matrix Code	Fld Matrix Desc
WG	Ground Water
WM	Snowmelt
WP	Persistent Flow
WS	Base Flow
WT	Storm Runoff

Lab Code	Lab Desc
ALTC	Alta Analytical Lab Incorporated
ARSL	American Radiation Services - Primary
C-INC	Los Alamos National Laboratory-Isotope and Nuclear chemistry divison
COAST	Coastal Science Lab
CST	LANL Chemical Sciences & Technology
EESG	Environmental Sciences Division
ESE	Environmental Sciences & Engineering, Inc., Gainesville, FL
FLD	Measurement taken in Field
GEL	General Engineering Laboratories, Inc.
GELC	General Engineering Laboratories, Inc., Charleston, SC.
GEO	Geochron Lab
HENV	JCNNM
HUFFMAN	Huffman
KA	KEMRON
LVLI	LVLI
PARA	Paragon Analytics, Inc.
PEC	Pacific EcoRisk Laboratories
QESL	Quanterra Environmental Services, St. Louis, MO
QST	QST Environmental, Newberry, FL
RECRAP	RECRA Labnet, Lionville, PA
RFWC	Roy F. Weston, West Chester, PA
SGSW	Paradigm
SILENS	Stable Isotopes Laboratory
STL2	Severn Trent Laboratories - Richland, Historical
STLA	Severn Trent - Los Angeles
STR	Severn Trent Laboratories - Richland
STSL	Severn Trent Laboratories, Inc., St. Louis
SwRI	Southwest Research Institute
UAZ	University of Arizona
UIL	University of Illinios
UMTL	University of Miami Tritium Lab

ARS INTERNATIONAL

2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Request Number: 11-3383

ARS INTERNATIONAL

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 11-3383

Original COC

Wednesday, August 31, 2011

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 11-3383C

REQUEST NUMBER: 11-3383

LOS ALAMOS

NATIONAL LABORATORY

ATTN: Danny Coleman

American Radiation Services - Primary

1726 Wooddale Court

Baton Rouge, LA 70806

LAB REQUEST COMMENTS:

TURNAROUND/REPORT DUE: 9/30/2011

TURNAROUND REQ'D: 30

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman1-11-26862	1	POLY	WSP-LL-H-3	None	WG
Buckman1-11-26863	1	POLY	WSP-LL-H-3	None	WG
Buckman1-11-26864	1	POLY	WSP-LL-H-3	None	WG
Buckman06-11-26865	1	POLY	WSP-LL-H-3	None	WG
Buckman08-11-26866	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:	**Date**	**Time**	**Received By:**	**Date**	**Time**
Signature			Signature		
Signature	8/31/11	1400	9-1-11	08:55	
Signature			Signature		
Signature			Signature		

Received for DISPOSAL By: **Date** **Time** **Remarks:**

Signature

Wednesday, August 31, 2011 REQUEST NUMBER: 11-3383

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

These Samples are on:
LANL Request Number:11-3383
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples
according to the schedule indicated:

SHIP DATE: 8/31/2011
TURNAROUND/REPORT DUE: 9/30/2011
TURNAROUND REQ'D: 30 Days

RAD SCREENING: Not Required
LAB REQUEST COMMENTS:

LANL ER SMO CONTACT:
Signature:

PRIORITY	METHOD CODE	CNTNR	SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	SPECIAL INSTRUCTIONS
	Generic:Low_Level_Tritium	1	Buckman1-11-26862	WG	8/31/2011	
		1	Buckman1-11-26863	WG	8/31/2011	
		1	Buckman1-11-26864	WG	8/31/2011	
		1	Buckman06-11-26865	WG	8/31/2011	
		1	Buckman08-11-26866	WG	8/31/2011	

Final Page of REQUEST NUMBER 11-3383

ARS INTERNATIONAL

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 11-3383

Case Narrative

ARS INTERNATIONAL

2609 North River Road • Port Allen, Louisiana 70767
1 (800) 401-4277 • Fax (225) 381-2996

October 11, 2011

LANL
Keith Greene
PO Box 1663 MS M992
Los Alamos, NM 87545

Request Number: **11-3383**
LANL Sample ID: **Buckman1-11-26862; Buckman1-11-26863; Buckman1-11-26864; Buckman06- 11-26865; Buckman08-11-26866.**

Dear Mr. Greene;

On September 1, 2011, ARS International received five (5) water samples to be analyzed for Low Level Tritium.

The samples underwent enrichment and were counted using the appropriate counting equipment and QA/QC for this type of analysis. Results of the analysis and QA/QC are attached in the data package.

The client and QA/QC samples were counted with a count time sufficient to meet quality control parameters for counting equipment and were within acceptance criteria and statistical sound detection limits.

If you have any questions please do not hesitate to call at 225.381.2991 or email LANL@amrad.com.

Sincerely,

Laboratory Management
ARS International

ARS INTERNATIONAL
2609 North River Road • Port Allen, Louisiana 70767
1 (800) 401-4277 • Fax (225) 381-2996

COVER PAGE

PROJECT SAMPLE IDENTIFICATION
CROSS-REFERENCE
TO ARS SAMPLE LABORATORY IDs
Subcontract (LANL Agreement Number) 63641-001-10

Request Number	LANL PROJECT SAMPLE ID NUMBER	American Radiation Services SAMPLE ID NUMBER(S)
11-3383	Buckman1-11-26862	ARS1-11-01918-001
11-3383	Buckman1-11-26863	ARS1-11-01918-002
11-3383	Buckman1-11-26864	ARS1-11-01918-003
11-3383	Buckman06-11-26865	ARS1-11-01918-004
11-3383	Buckman08-11-26866	ARS1-11-01918-005

ANALYTICAL METHODS
Tritium analyses were performed using **ARS-040 Tritium Assay in Water Samples Using Electrolytic Enrichment.**

ANALYTICAL RESULTS
The result data that are flagged with "U" indicate that the activity is below the MDC.

American Radiation Services Project Manager/Laboratory Director's Comments:
"I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this sample data package and the computer-readable EDD, as applicable, submitted on diskette or by modem, has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature."

"I certify that this electronic image and all hardcopies produced from this image accurately represent the data and is in compliance with the LANL specific requirements, both technically and for completeness, other than the conditions detailed above or in the sample data package narrative. Release, by submission through email, the data contained in this electronic image and the computer-readable EDD (as applicable), has been authorized by the Laboratory Manager/Technical Director or the Manager's designee."

Eugene Mullyan — Signature
Laboratory Management, ARS International — Title
10-12-11 — Date

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

1 (800) 401-4277 FAX (225) 381-2996

ARS Sample Delivery Group:	ARS1-11-01918	**Request or PO Number:**	11-3383
Client Sample ID:	Buckman1-11-26862	**ARS Sample ID:**	ARS1-11-01918-001
Sample Collection Date:	08/31/11	**Date Received:**	09/01/11
Sample Matrix:	Aqueous	**Report Date:**	10/11/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	-0.060	0.220	0.750	0.360	U	TU	ARS-040	10/07/11 00:58	RU	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

Notes: *American Radiation Services, Inc. assumes no liability for the use or interpretation of any analytical results provided other than the cost of the analysis itself. Reproduction of this report in less than full requires the written consent of the American Radiation Services, Inc.*

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ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

1 (800) 401-4277 FAX (225) 381-2996

ARS Sample Delivery Group:	ARS1-11-01918	**Request or PO Number:**	11-3383
Client Sample ID:	Buckman1-11-26863	**ARS Sample ID:**	ARS1-11-01918-002
Sample Collection Date:	08/31/11	**Date Received:**	09/01/11
Sample Matrix:	Aqueous	**Report Date:**	10/11/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	2.240	0.430	0.740	0.360		TU	ARS-040	10/07/11 05:09	RU	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

Notes: *American Radiation Services, Inc. assumes no liability for the use or interpretation of any analytical results provided other than the cost of the analysis itself. Reproduction of this report in less than full requires the written consent of the American Radiation Services, Inc.*

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ARS INTERNATIONAL
2609 North River Road, Port Allen, Louisiana 70767
1 (800) 401-4277 FAX (225) 381-2996

ARS Sample Delivery Group:	ARS1-11-01918	**Request or PO Number:**	11-3383
Client Sample ID:	Buckman1-11-26864	**ARS Sample ID:**	ARS1-11-01918-003
Sample Collection Date:	08/31/11	**Date Received:**	09/01/11
Sample Matrix:	Aqueous	**Report Date:**	10/11/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	-0.040	0.190	0.640	0.310	U	TU	ARS-040	10/07/11 09:20	RU	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

LELAP Certificate# 01949 NELAP Certificate # E87558

ARS INTERNATIONAL
2609 North River Road, Port Allen, Louisiana 70767
1 (800) 401-4277 FAX (225) 381-2996

ARS Sample Delivery Group:	ARS1-11-01918	**Request or PO Number:**	11-3383
Client Sample ID:	Buckman06-11-26865	**ARS Sample ID:**	ARS1-11-01918-004
Sample Collection Date:	08/31/11	**Date Received:**	09/01/11
Sample Matrix:	Aqueous	**Report Date:**	10/11/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	-0.220	0.210	0.720	0.350	U	TU	ARS-040	10/07/11 13:31	RU	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

LELAP Certificate# 01949 NELAP Certificate # E87558

ARS INTERNATIONAL
2609 North River Road, Port Allen, Louisiana 70767
1 (800) 401-4277 FAX (225) 381-2996

ARS Sample Delivery Group:	ARS1-11-01918	**Request or PO Number:**	11-3383
Client Sample ID:	Buckman08-11-26866	**ARS Sample ID:**	ARS1-11-01918-005
Sample Collection Date:	08/31/11	**Date Received:**	09/01/11
Sample Matrix:	Aqueous	**Report Date:**	10/11/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.420	0.230	0.730	0.350	U	TU	ARS-040	10/07/11 17:42	RU	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

LELAP Certificate# 01949 NELAP Certificate # E87558

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QC Results Report

Sample Delivery Group: ARS1-11-01918
Date Received: 9/1/2011

Laboratory Control Sample Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1s)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Percent Recovery (%)	LCS Acceptance Range
ARS1-B11-03362	LCS	H3	6.990	1.100	0.770	6.995		TU	ARS-040	10/5/11 11:17	RU	100	75%-125%

Blank Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1s)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date/Time	Analysis Technician
ARS1-B11-03362	MBL	H3	-0.190	0.210	0.710	NA	U	TU	ARS-040	10/5/11 19:40	RU

Sample RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER AcceptanceRange
ARS1-B11-03362	LCSD	H3	6.990	1.100	6.900	1.090		TU	ARS-040	10/5/11 15:29	RU	0.04	< 1

Sample DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER AcceptanceRange
ARS1-B11-03362	LCSD	H3	6.990	1.100	6.900	1.090		TU	ARS-040	10/5/11 15:29	RU	0.12	< 3

Susan Reese
Project Manager Review

LELAP Certificate# 01949 NELAP Certificate # E87558

LANL

ARS Batch Number: ARS1-B11 - 03662

Enter these Values for LCS

		Report Name	Field Name on the Report
Current ACT	5.3082	Standards Report	ACT at Date Above (dpm/g)
NetWt	5.0576	LCS Report	NetWt
Aliquot	0.5368	Tritium Enrichment Data	Gross Sample Added/1000

Enter these Values for LCSD

		Report Name	Field Name on the Report
Current ACT	5.3082	Standards Report	ACT at Date Above (dpm/g)
NetWt	5.0412	LCS Report	NetWt
Aliquot	0.5172	Tritium Enrichment Data	Gross Sample Added/1000

Expected Value Calculations

LANL

ARS Batch Number: ARS1-B11 - 03662

LCS	**CALCULATED EXPECTED VALUE**	=	22.528			
			Range	18.023	-	27.034
LCSD	**CALCULATED EXPECTED VALUE**	=	23.306			
			Range	18.645	-	27.967

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Samples

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	ARS1-11-01860; 1917; 1918; 1919
ARS Batch ID Number	ARS1-B11-03362

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8.978E-01
b	-9.611E-01

lambda	1.5403E-04	ACF (def. = 1)	1
Syserror (%)	15%	Reporting Units	TU
Coverage Factor	1	UCF	7.151
		Aliquot must be entered in liters!!	

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standerd Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
ARS1-B11-03362-01	536.76	2.00	17.26	2.052	15.21	0.0283	27.59	4.297	1.198	352.65	0.2368	0.01003	L	10/11/2010	10/5/2011	240	240	0.946191	6.99	0.34	0.34	1.10	0.77	0.37	TU
ARS1-B11-03362-02	517.18	2.04	17.03	2.093	14.94	0.0289	27.08	4.161	1.198	346.4	0.2333	0.01004	L	10/11/2010	10/5/2011	240	240	0.946191	6.90	0.35	0.35	1.09	0.79	0.38	TU
ARS1-B11-03362-03	548.08	2.06	17.09	2.114	14.98	0.0273	28.56	1.106	1.198	346.34	0.2332	0.01002	L	10/4/2011	10/5/2011	240	240	0.999833	-0.19	0.21	0.21	0.21	0.71	0.34	TU
ARS1-B11-03362-04	548.23	2.00	16.77	2.052	14.72	0.0268	29.05	3.449	1.198	345.05	0.2325	0.01005	L	8/18/2011	10/5/2011	240	240	0.992621	4.67	0.29	0.29	0.76	0.71	0.34	TU
ARS1-B11-03362-05	531.93	2.01	16.79	2.062	14.73	0.0277	28.20	1.242	1.198	348.84	0.2346	0.00993	L	8/19/2011	10/6/2011	240	240	0.992621	0.09	0.22	0.22	0.22	0.73	0.35	TU
ARS1-B11-03362-06	512.61	2.06	16.87	2.114	14.76	0.0288	27.17	1.131	1.198	345.54	0.2328	0.00990	L	8/11/2011	10/6/2011	240	240	0.991399	-0.15	0.22	0.22	0.22	0.77	0.37	TU
ARS1-B11-03362-07	532.15	2.08	16.86	2.134	14.73	0.0277	28.22	1.239	1.198	346.01	0.2331	0.01004	L	8/30/2011	10/6/2011	240	240	0.994304	0.09	0.21	0.21	0.22	0.72	0.35	TU
ARS1-B11-03362-08	532.60	2.00	17.23	2.052	15.18	0.0285	27.43	1.082	1.198	349.91	0.2352	0.01008	L	8/30/2011	10/6/2011	240	240	0.994304	-0.25	0.21	0.21	0.21	0.74	0.36	TU
ARS1-B11-03362-09	532.85	2.06	17.06	2.114	14.95	0.0280	27.85	1.118	1.198	348.83	0.2346	0.01001	L	8/30/2011	10/6/2011	240	240	0.994304	-0.17	0.21	0.21	0.21	0.73	0.35	TU
ARS1-B11-03362-10	523.35	2.06	17.09	2.114	14.98	0.0286	27.32	1.171	1.198	343.84	0.2318	0.01004	L	8/31/2011	10/7/2011	240	240	0.994304	-0.06	0.22	0.22	0.22	0.75	0.36	TU
ARS1-B11-03362-11	533.79	2.01	17.25	2.062	15.19	0.0285	27.47	2.227	1.198	347.89	0.2341	0.01003	L	8/31/2011	10/7/2011	240	240	0.994304	2.24	0.26	0.26	0.43	0.74	0.36	TU
ARS1-B11-03362-12	538.95	2.04	15.36	2.093	13.27	0.0246	31.58	1.179	1.198	350.76	0.2357	0.01003	L	8/31/2011	10/7/2011	240	240	0.994304	-0.04	0.19	0.19	0.19	0.64	0.31	TU
ARS1-B11-03362-13	547.27	2.03	16.92	2.083	14.84	0.0271	28.78	1.095	1.198	340.66	0.2301	0.01005	L	8/31/2011	10/7/2011	240	240	0.994304	-0.22	0.21	0.21	0.21	0.72	0.35	TU
ARS1-B11-03362-14	543.12	2.00	17.25	2.052	15.20	0.0280	27.92	1.392	1.198	346.77	0.2335	0.01003	L	8/31/2011	10/7/2011	240	240	0.994304	0.42	0.22	0.22	0.23	0.73	0.35	TU
ARS1-B11-03362-17	537.94	2.02	17.13	2.073	15.06	0.0280	27.91	1.230	1.198	341.77	0.2307	0.00996	L	8/29/2011	10/7/2011	240	240	0.993998	0.07	0.22	0.22	0.22	0.75	0.36	TU
ARS1-B11-03362-18	539.29	2.01	17.28	2.062	15.22	0.0282	27.69	1.204	1.198	348.75	0.2346	0.01004	L	8/29/2011	10/8/2011	240	240	0.993845	0.01	0.22	0.22	0.22	0.73	0.35	TU

Reviewed: SDA 10-10-11

Reviewed: 10-11-11 VJM

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	ARS1-11-01860; 1917; 1918; 1919
ARS Batch ID Number	ARS1-B11-03362

Enrichment Factor Curve coeff. Power y = a * x^b	
a	8.978E-01
b	-9.611E-01

lambda	1.5403E-04	ACF (def. = 1)	1
Syserror (%)	15%	Reporting Units	pCi
Coverage Factor	1	UCF	2.22

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
ARS1-B11-03362-01	536.76	2.00	17.26	2.052	15.21	0.0283	27.59	4.297	1.198	352.65	0.2368	0.01003	L	10/11/2010	10/5/2011	240	240	0.946191	22.52	1.10	1.10	3.55	2.47	1.19	pCi/L
ARS1-B11-03362-02	517.18	2.04	17.03	2.093	14.94	0.0289	27.08	4.161	1.198	346.4	0.2333	0.01004	L	10/11/2010	10/5/2011	240	240	0.946191	22.24	1.12	1.12	3.52	2.55	1.23	pCi/L
ARS1-B11-03362-03	548.08	2.06	17.09	2.114	14.98	0.0273	28.56	1.106	1.198	346.34	0.2332	0.01002	L	10/4/2011	10/5/2011	240	240	0.999833	-0.62	0.66	0.66	0.67	2.30	1.11	pCi/L
ARS1-B11-03362-04	548.23	2.00	16.77	2.052	14.72	0.0268	29.05	3.449	1.198	345.05	0.2325	0.01005	L	8/18/2011	10/5/2011	240	240	0.992621	15.05	0.93	0.93	2.44	2.27	1.10	pCi/L
ARS1-B11-03362-05	531.93	2.01	16.79	2.062	14.73	0.0277	28.20	1.242	1.198	348.84	0.2346	0.00993	L	8/19/2011	10/6/2011	240	240	0.992621	0.30	0.70	0.70	0.70	2.35	1.14	pCi/L
ARS1-B11-03362-06	512.61	2.06	16.87	2.114	14.76	0.0288	27.17	1.131	1.198	345.54	0.2328	0.00990	L	8/11/2011	10/6/2011	240	240	0.991399	-0.49	0.71	0.71	0.72	2.47	1.19	pCi/L
ARS1-B11-03362-07	532.15	2.08	16.86	2.134	14.73	0.0277	28.22	1.239	1.198	346.01	0.2331	0.01004	L	8/30/2011	10/6/2011	240	240	0.994304	0.28	0.69	0.69	0.69	2.33	1.13	pCi/L
ARS1-B11-03362-08	532.60	2.00	17.23	2.052	15.18	0.0285	27.43	1.082	1.198	349.91	0.2352	0.01008	L	8/30/2011	10/6/2011	240	240	0.994304	-0.81	0.68	0.68	0.69	2.37	1.14	pCi/L
ARS1-B11-03362-09	532.85	2.06	17.06	2.114	14.95	0.0280	27.85	1.118	1.198	348.83	0.2346	0.01001	L	8/30/2011	10/6/2011	240	240	0.994304	-0.55	0.68	0.68	0.69	2.36	1.14	pCi/L
ARS1-B11-03362-10	523.35	2.06	17.09	2.114	14.98	0.0286	27.32	1.171	1.198	343.84	0.2318	0.01004	L	8/31/2011	10/7/2011	240	240	0.994304	-0.19	0.71	0.71	0.71	2.42	1.17	pCi/L
ARS1-B11-03362-11	533.79	2.01	17.25	2.062	15.19	0.0285	27.47	2.227	1.198	347.89	0.2341	0.01003	L	8/31/2011	10/7/2011	240	240	0.994304	7.23	0.84	0.84	1.37	2.39	1.15	pCi/L
ARS1-B11-03362-12	538.95	2.04	15.36	2.093	13.27	0.0246	31.58	1.179	1.198	350.76	0.2357	0.01003	L	8/31/2011	10/7/2011	240	240	0.994304	-0.12	0.60	0.60	0.60	2.06	1.00	pCi/L
ARS1-B11-03362-13	547.27	2.03	16.92	2.083	14.84	0.0271	28.78	1.095	1.198	340.66	0.2301	0.01005	L	8/31/2011	10/7/2011	240	240	0.994304	-0.70	0.67	0.67	0.67	2.31	1.12	pCi/L
ARS1-B11-03362-14	543.12	2.00	17.25	2.052	15.20	0.0280	27.92	1.392	1.198	346.77	0.2335	0.01003	L	8/31/2011	10/7/2011	240	240	0.994304	1.34	0.72	0.72	0.75	2.36	1.14	pCi/L
ARS1-B11-03362-17	537.94	2.02	17.13	2.073	15.06	0.0280	27.91	1.230	1.198	341.77	0.2307	0.00996	L	8/29/2011	10/7/2011	240	240	0.993998	0.23	0.71	0.71	0.71	2.40	1.16	pCi/L
ARS1-B11-03362-18	539.29	2.01	17.28	2.062	15.22	0.0282	27.69	1.204	1.198	348.75	0.2346	0.01004	L	8/29/2011	10/8/2011	240	240	0.993845	0.04	0.70	0.70	0.70	2.36	1.14	pCi/L

Reviewed: SMR 10-10-11

Reviewed: 10-11-11
VJM

QC Evaluation

Method: ARS-040
Batch ID: ARS1-B11-03362
SDG's: ARS1-11-01860; 1917; 1918; 1919

LCS	22.5200	**CSU (2s)**	3.5500
LCSD	22.2400	**CSU-D (2s)**	3.5200

DER = $\frac{\text{abs(LSC-LSCD)}}{\text{sqr((2s CSU/2)^2)+((2s CSU-D/2)^2) } \textit{at 1 sigma}}$ = **< 3**

DER $\frac{0.28}{2.499645}$ = 0.112016 **< 3**

% RPD= $\frac{\text{ABS(LCS - LSCD)}}{\text{(LCS+LCSD)/2}}$ * 100 = **< 25%**

%RPD $\frac{0.28}{22.38}$ *100 = 1.251117 **< 25%**

The *RPD* shall be less than 25% or other client-applied criteria

RER= $\frac{\text{abs((LCS-LCSD))}}{\text{(CSU)+(CSD) } \textit{at 2 sigma}}$ = **<1** ***<--LANL Requirement***

RER = $\frac{0.28}{7.0700}$ 0.03960396 **<1**

Blank Information

	Act	CSU(2s)	MDA	Act>MDA
AM-241				
U-234				
U-235				
U-238				
Pu-238				
Pu-239/240				
Th-228				
Th-230				
Th-232				
H3	-0.62	0.67	2.3	
Ra-226				
Ra-228				
Total U				
Pb-210				
Po-209				
Sr-90				
TC-99				
NI-63				

*MDA should be below RDL
*Blank activity must be below MDA
*Blank activity must be < 1.65*CSU (DOE only)

ACT = -0.62
CSU = 0.67
Is ACT<1.65*CSU? **YES**

2609 North River Road • Port Allen, Louisiana 70767
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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

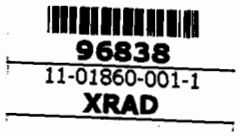
Laboratory Records

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B11-03362**

					Method	**ARS-054**	**Analysis**	**LSC-A-022**	**Matrix**	**AQ**
					Description	**Low Level Tritium by Electrolytic Enrichment**				
ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B11-03362-01	LCS	B-12428								
ARS1-B11-03362-02	LCSD	B-12429								
ARS1-B11-03362-03	MBL									
ARS1-B11-03362-04	TRG				**ARS1-11-01860**	001	1	CAMO-11-24698	STD	09/20/11
ARS1-B11-03362-05	TRG				**ARS1-11-01860**	002	1	CAMO-11-24703	STD	09/20/11
ARS1-B11-03362-06	TRG				**ARS1-11-01860**	003	1	CAMO-11-24650	STD	09/20/11
ARS1-B11-03362-07	TRG				**ARS1-11-01917**	001	1	CALA-11-26771	STD	09/27/11
ARS1-B11-03362-08	TRG				**ARS1-11-01917**	002	1	CALA-11-26774	STD	09/27/11
ARS1-B11-03362-09	TRG				**ARS1-11-01917**	003	1	CALA-11-26783	STD	09/27/11
ARS1-B11-03362-10	TRG				**ARS1-11-01918**	001	1	Buckman1-11-26862	STD	09/27/11
ARS1-B11-03362-11	TRG				**ARS1-11-01918**	002	1	Buckman1-11-26863	STD	09/27/11
ARS1-B11-03362-12	TRG				**ARS1-11-01918**	003	1	Buckman1-11-26864	STD	09/27/11
ARS1-B11-03362-13	TRG				**ARS1-11-01918**	004	1	Buckman06-11-26865	STD	09/27/11
ARS1-B11-03362-14	TRG				**ARS1-11-01918**	005	1	Buckman08-11-26866	STD	09/27/11
ARS1-B11-03362-17	TRG				**ARS1-11-01919**	003	1	CAPU-11-26380	STD	09/27/11
ARS1-B11-03362-18	TRG				**ARS1-11-01919**	004	1	CAPU-11-26381	STD	09/27/11



LCS Report
Analytical Batch: ARS1-B11-03362

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-12428	ARS1-B11-03362	ARS1-B11-03362-01	B-H3	S-0247	H-3	5	2.401427384	13.4244	18.482	5.0576	BSTEFFENS	9/7/2011			
B-12429	ARS1-B11-03362	ARS1-B11-03362-02	B-H3	S-0247	H-3	5	2.401427384	13.3287	18.3699	5.0412	BSTEFFENS	9/7/2011			

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
10098	ARS1-B11-03362	ARS1-B11-03362-01		10.03	g					RUSEY	10/04/2011 15:59:40
10099	ARS1-B11-03362	ARS1-B11-03362-02		10.04	g					RUSEY	10/04/2011 15:59:40
10100	ARS1-B11-03362	ARS1-B11-03362-03		10.02	g					RUSEY	10/04/2011 15:59:41
10101	ARS1-B11-03362	ARS1-B11-03362-04	CAMO-11-24698	10.05	g	96838				RUSEY	10/04/2011 15:59:41
10102	ARS1-B11-03362	ARS1-B11-03362-05	CAMO-11-24703	9.93	g	96842				RUSEY	10/04/2011 15:59:41
10103	ARS1-B11-03362	ARS1-B11-03362-06	CAMO-11-24650	9.9	g	96846				RUSEY	10/04/2011 15:59:41
10104	ARS1-B11-03362	ARS1-B11-03362-07	CALA-11-26771	10.04	g	96849				RUSEY	10/04/2011 15:59:41
10105	ARS1-B11-03362	ARS1-B11-03362-08	CALA-11-26774	10.08	g	96852				RUSEY	10/04/2011 15:59:41
10106	ARS1-B11-03362	ARS1-B11-03362-09	CALA-11-26783	10.01	g	96856				RUSEY	10/04/2011 15:59:41
10107	ARS1-B11-03362	ARS1-B11-03362-10	Buckman1-11-26862	10.04	g	96859				RUSEY	10/04/2011 15:59:42
10108	ARS1-B11-03362	ARS1-B11-03362-11	Buckman1-11-26863	10.03	g	96861				RUSEY	10/04/2011 15:59:42
10109	ARS1-B11-03362	ARS1-B11-03362-12	Buckman1-11-26864	10.03	g	96862				RUSEY	10/04/2011 15:59:42
10110	ARS1-B11-03362	ARS1-B11-03362-13	Buckman06-11-26865	10.05	g	96863				RUSEY	10/04/2011 15:59:42
10111	ARS1-B11-03362	ARS1-B11-03362-14	Buckman08-11-26866	10.03	g	96864				RUSEY	10/04/2011 15:59:42
10112	ARS1-B11-03362	ARS1-B11-03362-17	CAPU-11-26380	9.96	g	96865				RUSEY	10/04/2011 15:59:42
10113	ARS1-B11-03362	ARS1-B11-03362-18	CAPU-11-26381	10.04	g	96866				RUSEY	10/04/2011 15:59:42

Tritium Enrichment Data

Procedures: **ARS-040**

Date: 9/8/2011

ARS File ID Numbers: ARS1-11-01860; -01917; -01918; -01919

ARS Batch ID: ARS1-B11-03362

		Vf								Aliquot					
	A Batch ID:	Gross Sample Recovered	Enrichment factor	Cryo-Distil Flask #	Tare Wt Cryo-distil flask	Gross Wt flask + Sample	Recovered Water	Tare Weight of LSC Vial	Vial + Sample	Net Sample	*Wt of Vial, Sample& Dead Water Filler If used*	*Net Dead Water Added*	Tare Wt b/f Cocktail	Gross Wt Vial + Sample + Cocktail	Net Wt of Cocktail Added
1	ARS1-B11-03362-01	**17.26**	31.10	N/A	115.43	129.20	13.77	6.46	16.49	**10.03**	**0.00**	**0.00**	16.49	27.11	10.62
2	ARS1-B11-03362-02	**17.03**	30.37	N/A	103.70	114.64	10.94	6.62	16.66	**10.04**	**0.00**	**0.00**	16.66	27.10	10.44
3	ARS1-B11-03362-03	**17.09**	32.07	N/A	113.07	124.25	11.18	6.58	16.60	**10.02**	**0.00**	**0.00**	16.60	26.78	10.18
4	ARS1-B11-03362-04	**16.77**	32.69	N/A	121.28	132.25	10.97	6.49	16.54	**10.05**	**0.00**	**0.00**	16.54	27.19	10.65
5	ARS1-B11-03362-05	**16.79**	31.68	N/A	112.00	122.11	10.11	6.57	16.50	**9.93**	**16.58**	**0.08**	16.58	27.28	10.70
6	ARS1-B11-03362-06	**16.87**	30.39	N/A	102.88	112.92	10.04	6.40	16.30	**9.90**	**16.49**	**0.19**	16.49	27.14	10.65
7	ARS1-B11-03362-07	**16.86**	31.56	N/A	108.76	119.36	10.60	6.52	16.56	**10.04**	**0.00**	**0.00**	16.56	27.22	10.66
8	ARS1-B11-03362-08	**17.23**	30.91	N/A	113.40	123.92	10.52	6.48	16.56	**10.08**	**0.00**	**0.00**	16.56	27.24	10.68
9	ARS1-B11-03362-09	**17.06**	31.23	N/A	99.08	112.03	12.95	6.50	16.51	**10.01**	**0.00**	**0.00**	16.51	27.18	10.67
10	ARS1-B11-03362-10	**17.09**	30.62	N/A	117.60	130.35	12.75	6.43	16.47	**10.04**	**0.00**	**0.00**	16.47	27.15	10.68
11	ARS1-B11-03362-11	**17.25**	30.94	N/A	91.34	103.99	12.65	6.52	16.55	**10.03**	**0.00**	**0.00**	16.55	27.17	10.62
12	ARS1-B11-03362-12	**15.36**	35.09	N/A	103.07	116.47	13.40	6.55	16.58	**10.03**	**0.00**	**0.00**	16.58	27.24	10.66
13	ARS1-B11-03362-13	**16.92**	32.34	N/A	109.20	121.75	12.55	6.55	16.60	**10.05**	**0.00**	**0.00**	16.60	27.21	10.61
14	ARS1-B11-03362-14	**17.25**	31.49	N/A	109.00	119.82	10.82	6.58	16.61	**10.03**	**0.00**	**0.00**	16.61	27.27	10.66
15	ARS1-B11-03362-17	**17.13**	31.40	N/A	94.61	104.59	9.98	6.45	16.41	**9.96**	**16.49**	**0.08**	16.49	27.14	10.65
16	ARS1-B11-03362-18	**17.28**	31.21	N/A	109.40	120.26	10.86	6.56	16.60	**10.04**	**0.00**	**0.00**	16.60	27.27	10.67
17		**0.00**	--				0.00			**0.00**		**0.00**			0.00
18		**0.00**	--				0.00			**0.00**		**0.00**			0.00
19		**0.00**	--				0.00			**0.00**		**0.00**			0.00
20		**0.00**	--				0.00			**0.00**		**0.00**			0.00
21		**0.00**	--				0.00			**0.00**		**0.00**			0.00
22		**0.00**	--				0.00			**0.00**		**0.00**			0.00
23		**0.00**	--				0.00			**0.00**		**0.00**			0.00
24		**0.00**	--				0.00			**0.00**		**0.00**			0.00
25		**0.00**	--				0.00			**0.00**		**0.00**			0.00
26		**0.00**	--				0.00			**0.00**		**0.00**			0.00
27		**0.00**	--				0.00			**0.00**		**0.00**			0.00
28		**0.00**	--				0.00			**0.00**		**0.00**			0.00
29		**0.00**	--				0.00			**0.00**		**0.00**			0.00

Chemist Signature 10-4-11

Tritium Enrichment Data

Procedures: **ARS-040**

Date: 9/8/2011

ARS File ID Numbers: ARS1-11-01860; -01917; -01918; -01919

ARS Batch ID: ARS1-B11-03362

	A Batch ID:	Enrichment Cell No.	Tare Wt of Electrolysis Cell & Electrodes	Tare Wt Reservoir	mi Wt Na_2O_2	Gross Weight of Sample Reservoir	Vi Gross Sample Added	Electrolysis Start Date & Time	Start AMP	Start Bath C°	Electolysis End Date & Time	End Bath C°	End Wt of Cell + Resv. + Sample
1	ARS1-B11-03362-01	97	332.47	196.12	2.00	732.88	536.76	9-8-11 0800	5.00	2.0	9-29-11 1345	2.0	545.85
2	ARS1-B11-03362-02	28	332.65	216.22	2.04	733.40	517.18	9-8-11 0802	5.00	2.0	9-28-11 1322	2.0	565.90
3	ARS1-B11-03362-03	N/A	333.88	197.53	2.06	745.61	548.08	9-8-11 0803	5.00	2.0	9-27-11 1346	2.0	548.50
4	ARS1-B11-03362-04	78	326.40	205.99	2.00	754.22	548.23	9-8-11 0915	5.00	2.0	9-26-11 1157	2.0	549.16
5	ARS1-B11-03362-05	N/A	324.03	201.29	2.01	733.22	531.93	9-8-11 0916	5.00	2.0	9-28-11 1546	2.0	542.11
6	ARS1-B11-03362-06	38	334.50	214.55	2.06	727.16	512.61	9-8-11 0917	5.00	2.0	9-27-11 1125	2.0	565.92
7	ARS1-B11-03362-07	64	331.45	193.05	2.08	725.20	532.15	9-8-11 1000	5.00	2.0	9-30-11 0758	2.0	541.36
8	ARS1-B11-03362-08	68	336.30	223.00	2.00	755.60	532.60	9-8-11 1001	5.00	2.0	9-28-11 0811	2.0	576.53
9	ARS1-B11-03362-09	98	327.77	207.30	2.06	740.15	532.85	9-8-11 1002	5.00	2.0	9-28-11 1051	2.0	552.13
10	ARS1-B11-03362-10	42	331.49	179.68	2.06	703.03	523.35	9-8-11 1141	5.00	2.0	9-29-11 1106	2.0	528.26
11	ARS1-B11-03362-11	25	325.96	197.27	2.01	731.06	533.79	9-8-11 1142	5.00	2.0	9-26-11 1536	2.0	540.48
12	ARS1-B11-03362-12	89	333.33	206.76	2.04	745.71	538.95	9-8-11 1143	5.00	2.0	9-28-11 1534	2.0	555.45
13	ARS1-B11-03362-13	11	331.39	209.86	2.03	757.13	547.27	9-8-11 1519	5.00	2.0	9-29-11 1345	2.0	558.17
14	ARS1-B11-03362-14	N/A	327.61	207.74	2.00	750.86	543.12	9-8-11 1520	5.00	2.0	9-30-11 0759	2.0	552.60
15	ARS1-B11-03362-17	N/A	343.98	203.92	2.02	741.86	537.94	9-8-11 1521	5.00	2.0	9-28-11 0740	2.0	565.03
16	ARS1-B11-03362-18	55	332.23	199.53	2.01	738.82	539.29	9-8-11 1522	5.00	2.0	9-29-11 1010	2.0	549.04
17							0.00						
18							0.00						
19							0.00						
20							0.00						
21							0.00						
22							0.00						
23							0.00						
24							0.00						
25							0.00						
26							0.00						
27							0.00						
28							0.00						
29							0.00						

Chemist Signature: 10-4-11

Assay Definition-

Assay Description:
LLH3 Assay in DPM Mode

Assay Type: DPM (Single)
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_3\20111005_0657
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_3\20111005_0657\20111005_0657.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_3\20111005_0657\LLH3.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_3\20111005_0657\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3_3.lsa

Count Conditions-

Nuclide: Low Level H3
   Quench Indicator: tSIE/AEC
   External Std Terminator (sec): 0.5 2s%
   Pre-Count Delay (min): 0.00
Quench Set:
   Low Energy: ARS LL H3
Count Time (min): 240.00
Count Mode: Low Level
Assay Count Cycles: 1 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

Background Subtract: Off
Low CPM Threshold: Off
2 Sigma % Terminator: On - Any Region

Regions	LL	UL	2Sigma % Terminator
A	2.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

Static Controller: On Luminescence Correction: Off
Colored Samples: Off Heterogeneity Monitor: Off
Coincidence Time (nsec): 18 Delay Before Burst (nsec): 75

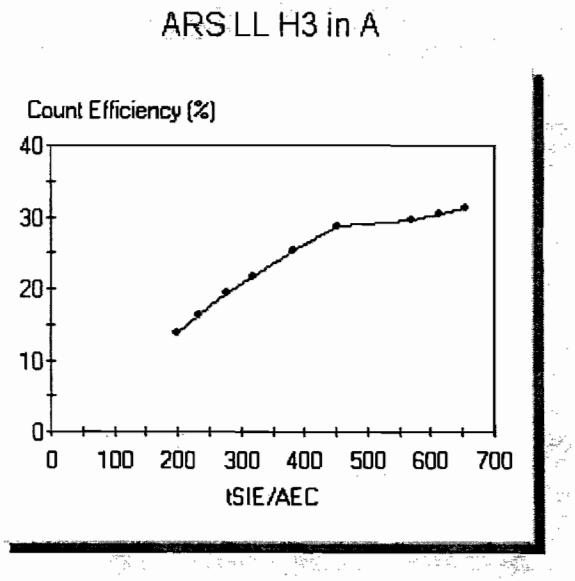
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

27 of 76
A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 11/19/2010
Date Modified:
ARS LL H3 in A

tSIE/AEC	Count Efficiency (%)
655.11	31.16
613.27	30.29
569.42	29.56
454.14	28.64
383.12	25.38
318.52	21.77
280.21	19.43
235.97	16.27
199.12	13.89

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
10	1	BACKGROUND	240.00	1.198	5.24	337.74	22.84	10/5/2011	7:06:42 AM	
10	2	B11-03362-01	240.00	4.297	18.15	352.65	23.68	10/5/2011	11:17:55 AM	
10	3	B11-03362-02	240.00	4.161	17.84	346.40	23.33	10/5/2011	3:29:04 PM	
10	4	B11-03362-03	240.00	1.106	4.74	346.34	23.32	10/5/2011	7:40:12 PM	
10	5	B11-03362-04	240.00	3.449	14.83	345.05	23.25	10/5/2011	11:51:19 PM	
10	6	B11-03362-05	240.00	1.242	5.29	348.84	23.46	10/6/2011	4:02:24 AM	
10	7	B11-03362-06	240.00	1.131	4.86	345.54	23.28	10/6/2011	8:13:31 AM	
10	8	B11-03362-07	240.00	1.239	5.32	346.01	23.31	10/6/2011	12:24:37 PM	
10	9	B11-03362-08	240.00	1.082	4.60	349.91	23.52	10/6/2011	4:35:48 PM	
10	10	B11-03362-09	240.00	1.118	4.77	348.83	23.46	10/6/2011	8:46:53 PM	
10	11	B11-03362-10	240.00	1.171	5.05	343.84	23.18	10/7/2011	12:58:00 AM	
10	12	B11-03362-11	240.00	2.227	9.51	347.89	23.41	10/7/2011	5:09:04 AM	
10	13	B11-03362-12	240.00	1.179	5.00	350.76	23.57	10/7/2011	9:20:14 AM	
10	14	B11-03362-13	240.00	1.095	4.76	340.66	23.01	10/7/2011	1:31:21 PM	
10	15	B11-03362-14	240.00	1.392	5.96	346.77	23.35	10/7/2011	5:42:27 PM	
10	16	B11-03362-17	240.00	1.230	5.33	341.77	23.07	10/7/2011	9:53:37 PM	
10	17	B11-03362-18	240.00	1.204	5.13	348.75	23.46	10/8/2011	2:04:46 AM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
9-29-11	1613	BII-03191-14	BII-03191	2205	
↓	↓	BII-03191-15	↓	↓	
↓	↓	BII-03191-16	↓	↓	
↓	↓	BII-03191-17	↓	↓	
↓	↓	BII-03191-18	↓	↓	
↓	↓	BII-03191-19	↓	↓	
↓	↓	BII-03191-20 SKC	↓	↓	
↓	↓	BII-03191-21	↓	↓	
↓	↓	BII-03191-22	↓	↓	
10-3-11	1116	SNC-51	QA	QA	
10-3-11	1119	BII-03191-18	BII-03191	1256	
↓	↓	BII-03191-19	↓	↓	
↓	↓	BII-03191-20	↓	↓	
↓	↓	BII-03191-21	↓	↓	
↓	↓	BII-03191-22	↓	↓	
* 10-4-11	1231	Background	*	1234	
* ↓	↓	BII-02448-19	*	↓	
* ↓	↓	BII-02473-19	*	↓	
* ↓	↓	BII-02473-20	*	↓	
10-4-11	1630	SNC-51	QA	QA	

* Done as recount per client request *

Reviewed By: SKK Date: 10-11-11
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
10-4-11	1630	Background	B11-03362	0657	RJL
↓	↓	B11-03362-01	↓	↓	RJL
↓	↓	B11-03362-02	↓	↓	RJL
↓	↓	B11-03362-03	↓	↓	RJL
↓	↓	B11-03362-04	↓	↓	RJL
↓	↓	B11-03362-05	↓	↓	RJL
↓	↓	B11-03362-06	↓	↓	RJL
↓	↓	B11-03362-07	↓	↓	RJL
↓	↓	B11-03362-08	↓	↓	RJL
↓	↓	B11-03362-09	↓	↓	RJL
↓	↓	B11-03362-10	↓	↓	RJL
↓	↓	B11-03362-11	↓	↓	RJL
↓	↓	B11-03362-12	↓	↓	RJL
↓	↓	B11-03362-13	↓	↓	RJL
↓	↓	B11-03362-14	↓	↓	RJL
↓	↓	B11-03362-17	↓	↓	RJL
↓	↓	B11-03362-18	↓	↓	RJL
		No data SRL 10-11-11			

NO B11-03362-15 on IC in the batch

Reviewed By: _____ Date: _____
Initials

Standards Activity as of: 10/05/11 11:17

Active	Std ID	Isotope	PSCLT	Verification Date	Exp Date	Status	Ref Date	Ref ACT (dpm)	ACT at Date Above (dpm/g)	Halflife (days)	Parent ID	Expended Date	Comments
A	S-0247	H-3	PSL	10/13/10	10/13/11	OK	10/01/10	5.6100E+00	5.3082	4.500E+03	S-0237		

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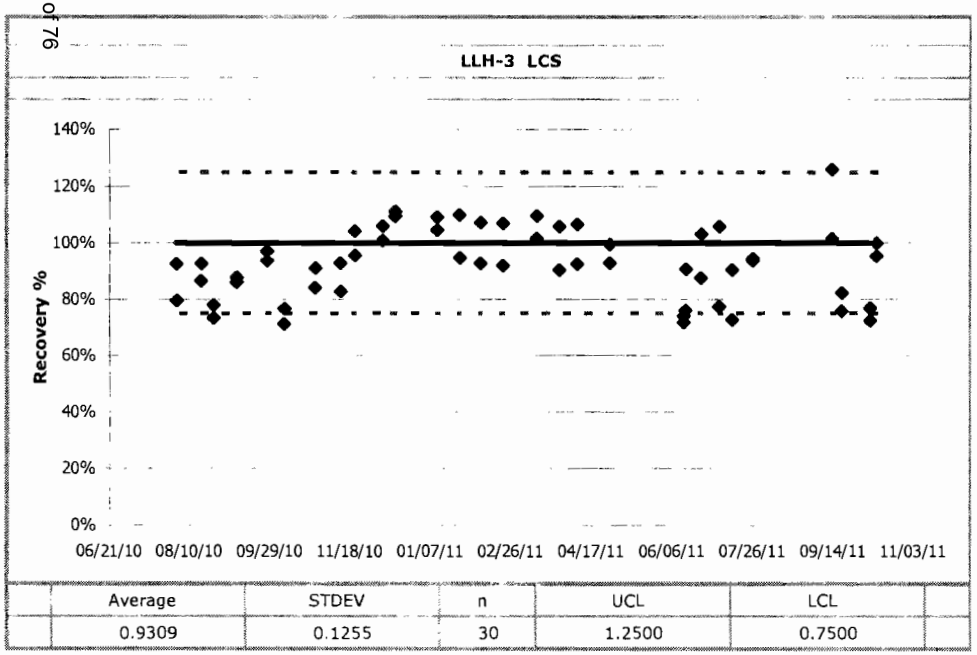
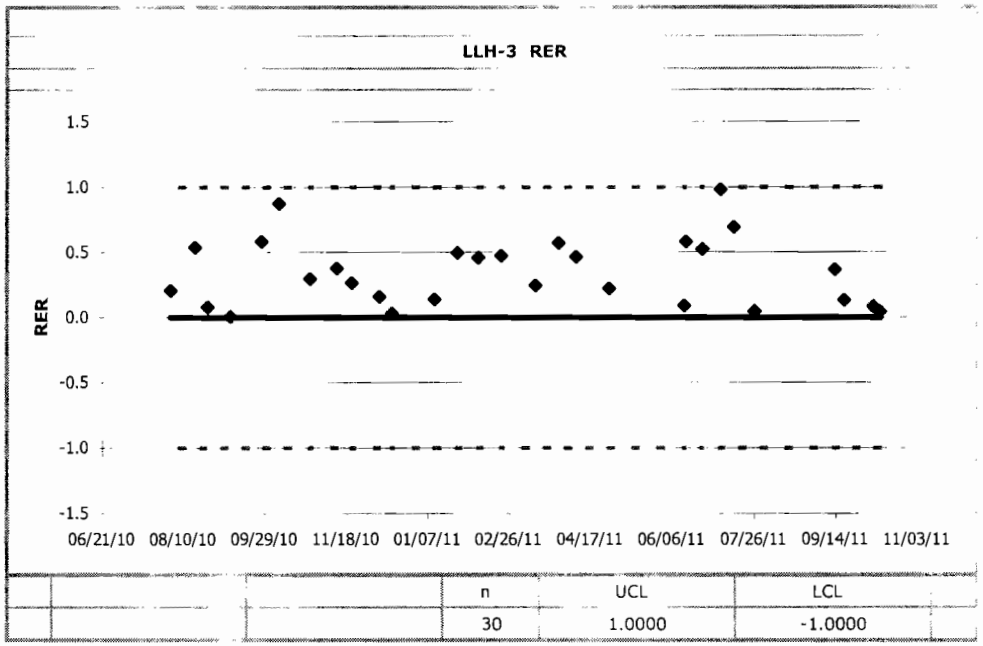
Low Level Tritium by Low Level Liquid Scintillation Counting

Control Charts

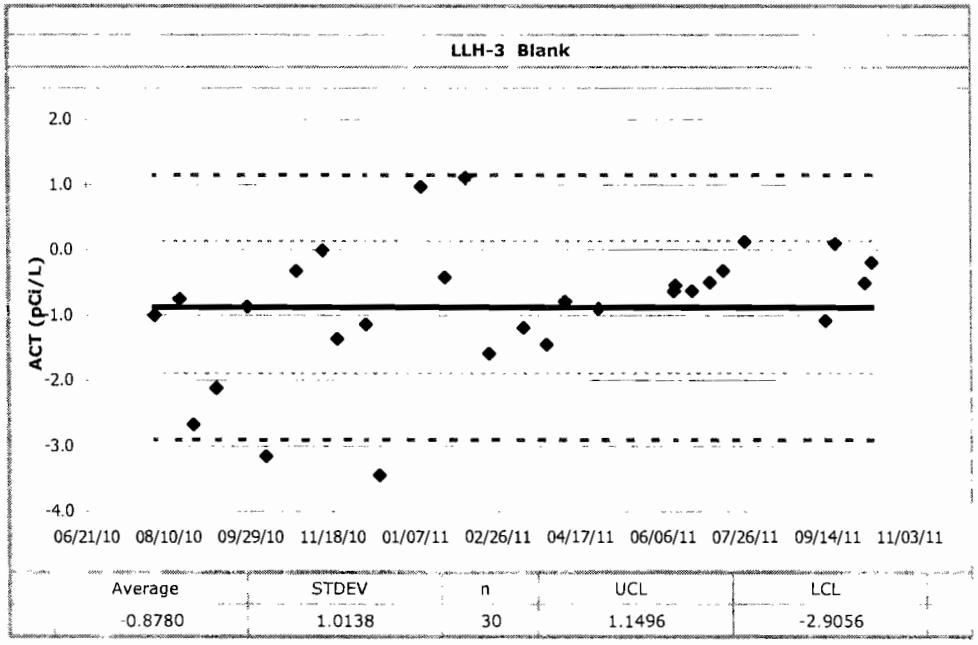
QC Chart



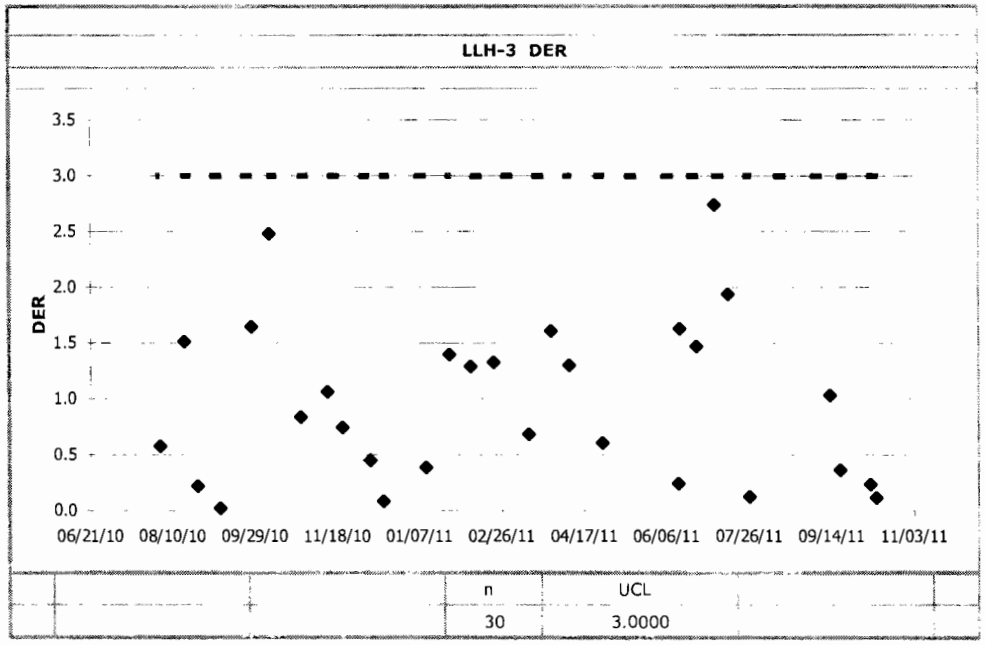
Average	STDEV	n	UCL	LCL
0.9309	0.1255	30	1.2500	0.7500



n	UCL	LCL
30	1.0000	-1.0000



Average	STDEV	n	UCL	LCL
-0.8780	1.0138	30	1.1496	-2.9056

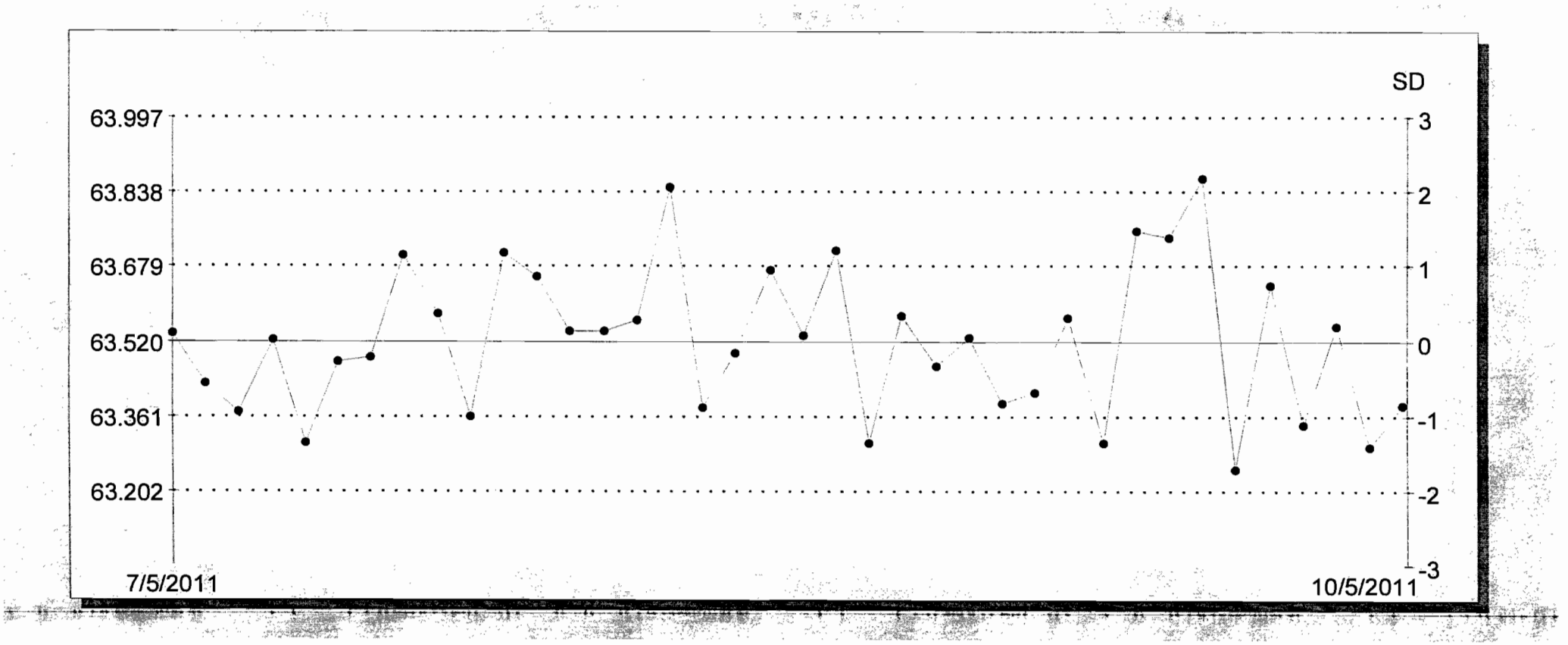


n	UCL
30	3.0000

3H Efficiency
Total # pts : 5377
Valid # pts : 38
Mean : 63.52
SD : 0.16

Date	Value	Valid Pt
Jul 05, 2011	63.53	X
Jul 05, 2011	63.43	X
Jul 05, 2011	63.37	X
Jul 05, 2011	63.52	X
Jul 05, 2011	63.30	X
Jul 08, 2011	63.47	X
Jul 11, 2011	63.48	X
Jul 14, 2011	63.70	X
Jul 18, 2011	63.58	X
Jul 19, 2011	63.36	X
Jul 23, 2011	63.71	X
Jul 28, 2011	63.66	X
Aug 04, 2011	63.54	X
Aug 11, 2011	63.54	X
Aug 15, 2011	63.56	X
Aug 16, 2011	63.85	X
Aug 21, 2011	63.38	X
Aug 25, 2011	63.50	X
Aug 29, 2011	63.67	X
Sep 02, 2011	63.53	X
Sep 04, 2011	63.71	X
Sep 04, 2011	63.30	X
Sep 04, 2011	63.58	X
Sep 04, 2011	63.47	X
Sep 04, 2011	63.53	X
Sep 04, 2011	63.39	X
Sep 04, 2011	63.41	X
Sep 04, 2011	63.57	X
Sep 06, 2011	63.31	X
Sep 06, 2011	63.75	X
Sep 11, 2011	63.74	X
Sep 14, 2011	63.87	X
Sep 17, 2011	63.25	X
Sep 21, 2011	63.64	X
Sep 26, 2011	63.34	X
Sep 29, 2011	63.55	X
Oct 03, 2011	63.29	X
Oct 05, 2011	63.38	X

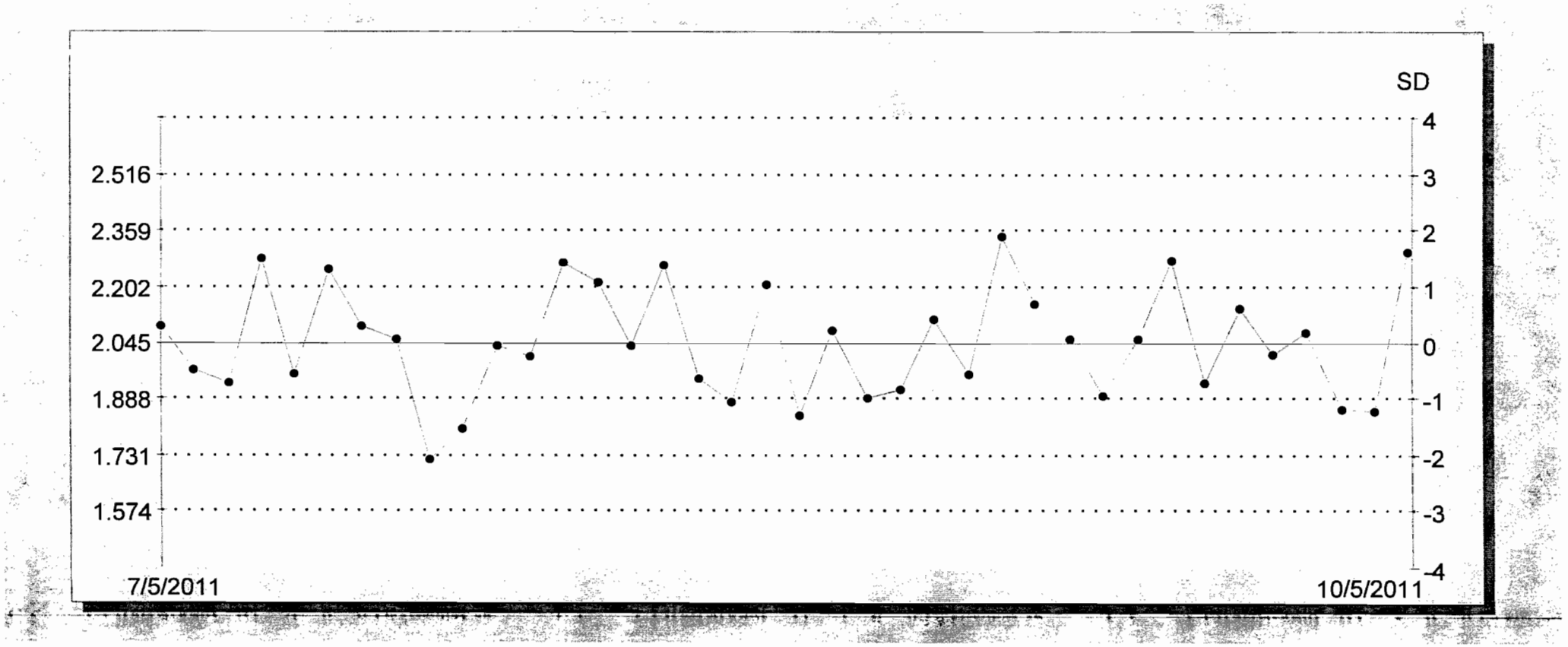
3H Efficiency
Total # pts : 5377
Valid # pts : 38
Mean : 63.52
SD : 0.16



3H Background
Total # pts : 5303
Valid # pts : 38
Mean : 2.04
SD : 0.16

Date	Value	Valid Pt
Jul 05, 2011	2.09	X
Jul 05, 2011	1.97	X
Jul 05, 2011	1.93	X
Jul 05, 2011	2.28	X
Jul 05, 2011	1.96	X
Jul 08, 2011	2.25	X
Jul 11, 2011	2.09	X
Jul 14, 2011	2.05	X
Jul 18, 2011	1.72	X
Jul 19, 2011	1.80	X
Jul 23, 2011	2.04	X
Jul 28, 2011	2.00	X
Aug 04, 2011	2.27	X
Aug 11, 2011	2.21	X
Aug 15, 2011	2.03	X
Aug 16, 2011	2.26	X
Aug 21, 2011	1.94	X
Aug 25, 2011	1.88	X
Aug 29, 2011	2.21	X
Sep 02, 2011	1.84	X
Sep 04, 2011	2.08	X
Sep 04, 2011	1.89	X
Sep 04, 2011	1.91	X
Sep 04, 2011	2.11	X
Sep 04, 2011	1.95	X
Sep 04, 2011	2.34	X
Sep 04, 2011	2.15	X
Sep 04, 2011	2.05	X
Sep 06, 2011	1.89	X
Sep 06, 2011	2.05	X
Sep 11, 2011	2.27	X
Sep 14, 2011	1.93	X
Sep 17, 2011	2.14	X
Sep 21, 2011	2.01	X
Sep 26, 2011	2.07	X
Sep 29, 2011	1.85	X
Oct 03, 2011	1.85	X
Oct 05, 2011	2.30	X

3H Background
Total # pts : 5303
Valid # pts : 38
Mean : 2.04
SD : 0.16



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Tritium- Screening by Low Level Liquid Scintillation Counting

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Tritium-Screening by Low Level Liquid Scintillation Counting

Samples

Procedures: **ARS-060** **ARS-040** *Section 14.1 Tritium Screen in Clean Water without Distillation*

ARS File ID Numbers: ARS1-11-01860; 1917; 1918; 1919
ARS Batch ID: ARS1-B11-03361

	Sample ID:	COUNT TIME	CPMA	Background CPMA	Eff Nucl In A	Aliquot (grams)	ACTIVITY	units	MDA	Sample Must be analyzed as LSC-A-001
1	B11-03361-04	120	1.532	1.524	29.32	5.04	2.439	pCi/L	202.9426	NO
2	B11-03361-05	120	1.431	1.524	28.95	5.05	-28.654	pCi/L	205.1293	NO
3	B11-03361-06	120	1.505	1.524	29.5	5.00	-5.802	pCi/L	203.318	NO
4	B11-03361-07	120	1.407	1.524	28.93	5.04	-36.145	pCi/L	205.6784	NO
5	B11-03361-08	120	1.417	1.524	29.45	5.01	-32.667	pCi/L	203.2566	NO
6	B11-03361-09	120	1.472	1.524	29.37	5.04	-15.824	pCi/L	202.5971	NO
7	B11-03361-10	120	1.598	1.524	29.29	5.03	22.625	pCi/L	203.5543	NO
8	B11-03361-11	120	1.457	1.524	29.39	5.08	-20.214	pCi/L	200.8651	NO
9	B11-03361-12	120	1.347	1.524	29.08	5.00	-54.835	pCi/L	206.2545	NO
10	B11-03361-13	120	1.472	1.524	29.36	5.06	-15.767	pCi/L	201.8651	NO
11	B11-03361-14	120	1.643	1.524	29.41	5.03	36.235	pCi/L	202.7238	NO
12	B11-03361-15	120	2.491	1.524	29.2	5.05	295.392	pCi/L	203.3731	YES, analyze by LSC-A-001
13	B11-03361-16	120	2.916	1.524	29.28	5.07	422.384	pCi/L	202.0174	YES, analyze by LSC-A-001
14	B11-03361-17	120	1.918	1.524	29.48	5.03	119.687	pCi/L	202.2424	NO
15	B11-03361-18	120	1.402	1.524	29.35	5.01	-37.373	pCi/L	203.9492	NO
16							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
17							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
18							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
19							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
20							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
21							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
22							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
23							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!

Please re-screen
B11-03361-15, 16
SDL
9-6-11

Procedures: **ARS-060** **ARS-040** *Section 14.1 Tritium Screen in Clean Water without Distillation*

ARS File ID Numbers: ARS1-11-01919
ARS Batch ID: ARS1-B11-03361

	Sample ID:	COUNT TIME	CPMA	Background CPMA	Eff Nucl In A	Aliquot (grams)	ACTIVITY	units	MDA	Sample Must be analyzed as LSC-A-001
1	B11-03361-15	120	2.397	1.495	29.09	5.05	276.579	pCi/L	202.2567	YES, analyze by LSC-A-001.
2	B11-03361-16	120	2.274	1.495	29.11	5.07	237.758	pCi/L	201.3204	YES, analyze by LSC-A-001.
3							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
4							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
5							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
6							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
7							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
8							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
9							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
10							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
11							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
12							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
13							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
14							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
15							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
16							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
17							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
18							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
19							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
20							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
21							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
22							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
23							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

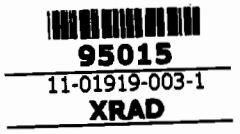
Tritium-Screening by Low Level Liquid Scintillation Counting

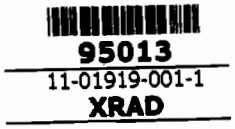
Laboratory Records

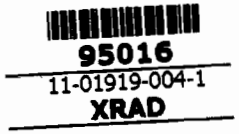
Analysis Batch Report

Analysis Batch ID **ARS1-B11-03361**

				Method	**ARS-054**	**Analysis**	**LSC-A-021**		**Matrix**	**AQ**
				Description	**Low Level Tritium Screening**					
ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B11-03361-01	LCS									
ARS1-B11-03361-02	LCSD									
ARS1-B11-03361-03	MBL									
ARS1-B11-03361-04	TRG				**ARS1-11-01860**	001	1	CAMO-11-24698	STD	09/20/11
ARS1-B11-03361-05	TRG				**ARS1-11-01860**	002	1	CAMO-11-24703	STD	09/20/11
ARS1-B11-03361-06	TRG				**ARS1-11-01860**	003	1	CAMO-11-24650	STD	09/20/11
ARS1-B11-03361-07	TRG				**ARS1-11-01917**	001	1	CALA-11-26771	STD	09/27/11
ARS1-B11-03361-08	TRG				**ARS1-11-01917**	002	1	CALA-11-26774	STD	09/27/11
ARS1-B11-03361-09	TRG				**ARS1-11-01917**	003	1	CALA-11-26783	STD	09/27/11
ARS1-B11-03361-10	TRG				**ARS1-11-01918**	001	1	Buckman1-11-26862	STD	09/27/11
ARS1-B11-03361-11	TRG				**ARS1-11-01918**	002	1	Buckman1-11-26863	STD	09/27/11
ARS1-B11-03361-12	TRG				**ARS1-11-01918**	003	1	Buckman1-11-26864	STD	09/27/11
ARS1-B11-03361-13	TRG				**ARS1-11-01918**	004	1	Buckman06-11-26865	STD	09/27/11
ARS1-B11-03361-14	TRG				**ARS1-11-01918**	005	1	Buckman08-11-26866	STD	09/27/11
ARS1-B11-03361-15	TRG				**ARS1-11-01919**	001	1	CAPU-11-26374	STD	09/27/11
ARS1-B11-03361-16	TRG				**ARS1-11-01919**	002	1	CAPU-11-26377	STD	09/27/11
ARS1-B11-03361-17	TRG				**ARS1-11-01919**	003	1	CAPU-11-26380	STD	09/27/11
ARS1-B11-03361-18	TRG				**ARS1-11-01919**	004	1	CAPU-11-26381	STD	09/27/11







ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
9843	ARS1-B11-03361	ARS1-B11-03361-01		1	g					RUSEY	09/02/2011 14:25:21
9844	ARS1-B11-03361	ARS1-B11-03361-02		1	g					RUSEY	09/02/2011 14:25:21
9845	ARS1-B11-03361	ARS1-B11-03361-03		1	g					RUSEY	09/02/2011 14:25:21
9846	ARS1-B11-03361	ARS1-B11-03361-04	CAMO-11-24698	5.04	g	95002				RUSEY	09/02/2011 14:25:21
9847	ARS1-B11-03361	ARS1-B11-03361-05	CAMO-11-24703	5.05	g	95003				RUSEY	09/02/2011 14:25:21
9848	ARS1-B11-03361	ARS1-B11-03361-06	CAMO-11-24650	5	g	95004				RUSEY	09/02/2011 14:25:21
9849	ARS1-B11-03361	ARS1-B11-03361-07	CALA-11-26771	5.04	g	95005				RUSEY	09/02/2011 14:25:21
9850	ARS1-B11-03361	ARS1-B11-03361-08	CALA-11-26774	5.01	g	95006				RUSEY	09/02/2011 14:25:22
9851	ARS1-B11-03361	ARS1-B11-03361-09	CALA-11-26783	5.04	g	95007				RUSEY	09/02/2011 14:25:22
9852	ARS1-B11-03361	ARS1-B11-03361-10	Buckman1-11-26862	5.03	g	95008				RUSEY	09/02/2011 14:25:22
9853	ARS1-B11-03361	ARS1-B11-03361-11	Buckman1-11-26863	5.08	g	95009				RUSEY	09/02/2011 14:25:22
9854	ARS1-B11-03361	ARS1-B11-03361-12	Buckman1-11-26864	5	g	95010				RUSEY	09/02/2011 14:25:22
9855	ARS1-B11-03361	ARS1-B11-03361-13	Buckman06-11-26865	5.06	g	95011				RUSEY	09/02/2011 14:25:22
9856	ARS1-B11-03361	ARS1-B11-03361-14	Buckman08-11-26866	5.03	g	95012				RUSEY	09/02/2011 14:25:23
9857	ARS1-B11-03361	ARS1-B11-03361-15	CAPU-11-26374	5.05	g	95013				RUSEY	09/02/2011 14:25:23
9858	ARS1-B11-03361	ARS1-B11-03361-16	CAPU-11-26377	5.07	g	95014				RUSEY	09/02/2011 14:25:23
9859	ARS1-B11-03361	ARS1-B11-03361-17	CAPU-11-26380	5.03	g	95015				RUSEY	09/02/2011 14:25:23
9860	ARS1-B11-03361	ARS1-B11-03361-18	CAPU-11-26381	5.01	g	95016				RUSEY	09/02/2011 14:25:23

Assay Definition-

Assay Description:
LLH3 Assay in DPM Mode

Assay Type: DPM (Single)
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110906_1252
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110906_1252\20110906_1252.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110906_1252\LLH3.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110906_1252\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: Low Level H3
   Quench Indicator: tSIE/AEC
   External Std Terminator (sec): 0.5 2s%
   Pre-Count Delay (min): 0.00
Quench Set:
   Low Energy: ARS LL H3
Count Time (min): 120.00
Count Mode: Low Level
Assay Count Cycles: 1 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

Background Subtract: Off
Low CPM Threshold: Off
2 Sigma % Terminator: On - Any Region

Regions	LL	UL	2Sigma % Terminator
A	2.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

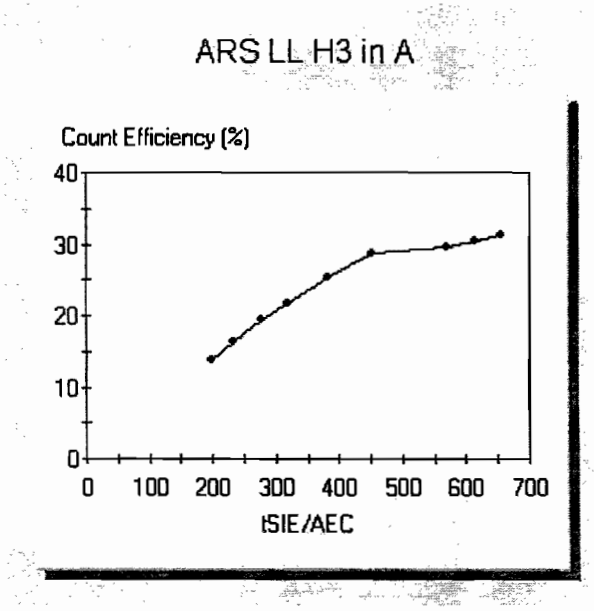
Static Controller: On Luminescence Correction: Off
Colored Samples: Off Heterogeneity Monitor: Off
Coincidence Time (nsec): 18 Delay Before Burst (nsec): 75

Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 11/19/2010
Date Modified:
ARS LL H3 in A

tSIE/AEC	Count Efficiency (%)
655.11	31.16
613.27	30.29
569.42	29.56
454.14	28.64
383.12	25.38
318.52	21.77
280.21	19.43
235.97	16.27
199.12	13.89

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
10	1	BACKGROUND	120.00	1.524	5.22	525.43	29.21	9/2/2011	5:36:40 PM	
10	2	B11-03361-04	120.00	1.532	5.22	540.20	29.32	9/2/2011	7:46:40 PM	
10	3	B11-03361-05	120.00	1.431	4.95	492.53	28.95	9/2/2011	9:56:39 PM	
10	4	B11-03361-06	120.00	1.505	5.10	562.97	29.50	9/3/2011	12:06:40 AM	
10	5	B11-03361-07	120.00	1.407	4.87	489.83	28.93	9/3/2011	2:16:41 AM	
10	6	B11-03361-08	120.00	1.417	4.81	556.33	29.45	9/3/2011	4:26:43 AM	
10	7	B11-03361-09	120.00	1.472	5.01	545.88	29.37	9/3/2011	6:36:44 AM	
10	8	B11-03361-10	120.00	1.598	5.45	535.72	29.29	9/3/2011	8:46:44 AM	
10	9	B11-03361-11	120.00	1.457	4.96	548.24	29.39	9/3/2011	10:56:44 AM	
10	10	B11-03361-12	120.00	1.347	4.63	509.91	29.08	9/3/2011	1:06:44 PM	
10	11	B11-03361-13	120.00	1.472	5.01	544.19	29.36	9/3/2011	3:16:43 PM	
10	12	B11-03361-14	120.00	1.643	5.59	551.16	29.41	9/3/2011	5:26:44 PM	
10	13	B11-03361-15	120.00	2.491	8.53	525.00	29.20	9/3/2011	7:36:51 PM	
10	14	B11-03361-16	120.00	2.916	9.96	534.06	29.28	9/3/2011	9:46:51 PM	
10	15	B11-03361-17	120.00	1.918	6.51	559.47	29.48	9/3/2011	11:56:52 PM	
10	16	B11-03361-18	120.00	1.402	4.78	543.36	29.35	9/4/2011	2:06:54 AM	

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.495	5.12	524.51	29.20	9/6/2011	1:00:54 PM	
2	2	B11-03361-15	120.00	2.397	8.24	510.14	29.09	9/6/2011	3:10:53 PM	
2	3	B11-03361-16	120.00	2.274	7.81	513.21	29.11	9/6/2011	5:20:54 PM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
8-23-11	1302	B11-02500-05	B11-02500	0817	JWR
↓	↓	B11-02500-06	↓	↓	JWR
↓	↓	B11-02500-07	↓	↓	JWR
↓	↓	B11-02500-08	↓	↓	JWR
↓	↓	B11-02500-09	↓	↓	JWR
↓	↓	B11-02500-10	↓	↓	JWR
↓	↓	B11-02500-11	↓	↓	JWR
↓	↓	B11-02500-12	↓	↓	JWR
↓	↓	B11-02500-13	↓	↓	JWR
↓	↓	B11-02500-14	↓	↓	JWR HSW 9-01-11
9-2-11	1545	SNC-51	QA	QA	RJH
9-2-11	1547	Background	B11-03361	1727	RJH
↓	↓	B11-03361-04	↓	↓	RJH
↓	↓	B11-03361-05 ~~B11-CC 9-2-11~~	↓	↓	RJH
↓	↓	B11-03361-06	↓	↓	RJH
↓	↓	B11-03361-07	↓	↓	RJH
↓	↓	B11-03361-08	↓	↓	RJH
↓	↓	B11-03361-09	↓	↓	RJH
↓	↓	B11-03361-10 ~~B11-CC 9-2-11~~	↓	↓	RJH
↓	↓	B11-03361-11	↓	↓	RJH

Reviewed By: SDA Date: 10-11-11
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
9-2-11	1547	B11-03361-12	B11-03361	1727	RJR
↓	↓	B11-03361-13	↓	↓	RJR
↓	↓	B11-03361-14	↓	↓	RJR
↓	↓	B11-03361-15	↓	↓	RJR
↓	↓	B11-03361-16	↓	↓	RJR
↓	↓	B11-03361-17	↓	↓	RJR
↓	↓	B11-03361-18	↓	↓	RJR

2k
6-6-11

Reviewed By: SDR Date: 10-11-11
Initials

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

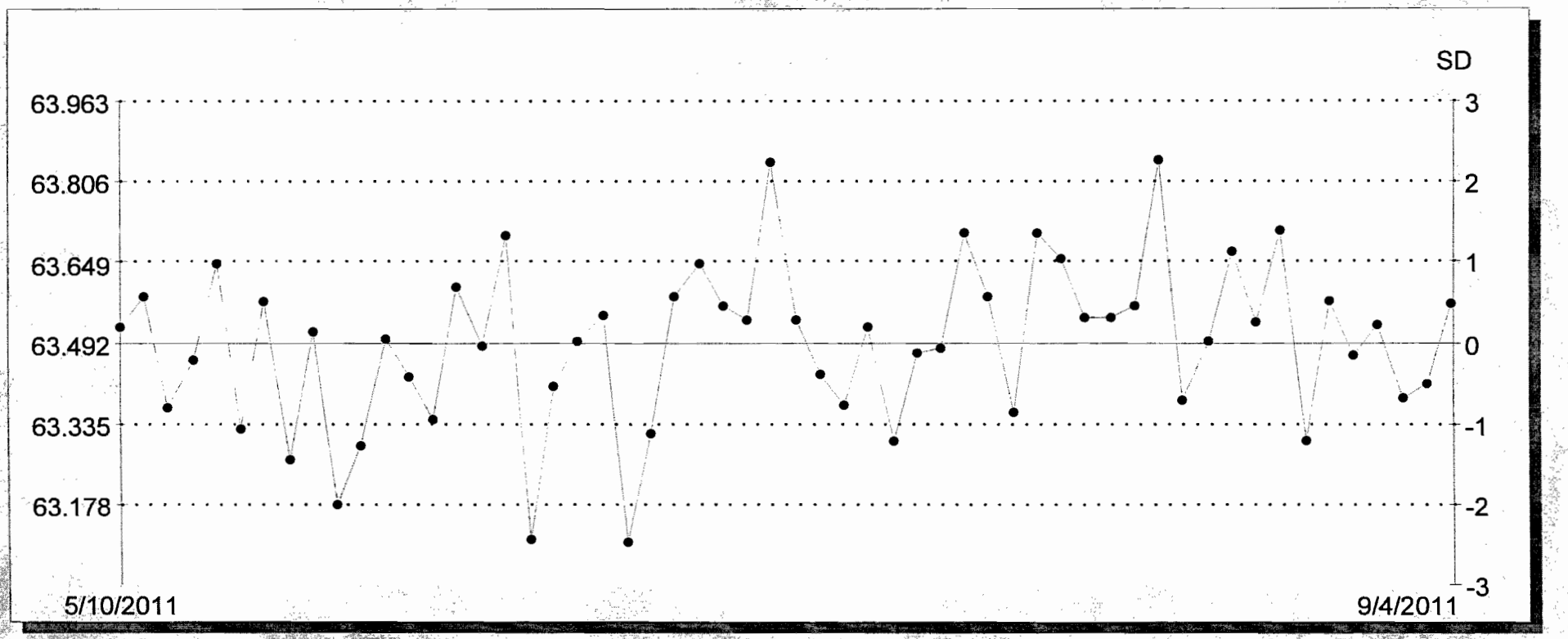
Control Charts

3H Efficiency
Total # pts : 5367
Valid # pts : 56
Mean : 63.49
SD : 0.16

Date	Value	Valid Pt
May 10, 2011	63.52	X
May 16, 2011	63.58	X
May 23, 2011	63.37	X
May 24, 2011	63.46	X
May 31, 2011	63.65	X
Jun 03, 2011	63.33	X
Jun 05, 2011	63.57	X
Jun 05, 2011	63.27	X
Jun 08, 2011	63.51	X
Jun 11, 2011	63.18	X
Jun 14, 2011	63.29	X
Jun 18, 2011	63.50	X
Jun 19, 2011	63.43	X
Jun 20, 2011	63.34	X
Jun 20, 2011	63.60	X
Jun 20, 2011	63.48	X
Jun 20, 2011	63.70	X
Jun 20, 2011	63.11	X
Jun 21, 2011	63.41	X
Jun 24, 2011	63.49	X
Jun 28, 2011	63.55	X
Jul 03, 2011	63.11	X
Jul 04, 2011	63.32	X
Jul 04, 2011	63.58	X
Jul 04, 2011	63.65	X
Jul 04, 2011	63.56	X
Jul 04, 2011	63.54	X
Jul 04, 2011	63.85	X
Jul 05, 2011	63.53	X
Jul 05, 2011	63.43	X
Jul 05, 2011	63.37	X
Jul 05, 2011	63.52	X
Jul 05, 2011	63.30	X
Jul 08, 2011	63.47	X
Jul 11, 2011	63.48	X
Jul 14, 2011	63.70	X
Jul 18, 2011	63.58	X
Jul 19, 2011	63.36	X
Jul 23, 2011	63.71	X
Jul 28, 2011	63.66	X
Aug 04, 2011	63.54	X
Aug 11, 2011	63.54	X

Aug 15, 2011	63.56	X
Aug 16, 2011	63.85	X
Aug 21, 2011	63.38	X
Aug 25, 2011	63.50	X
Aug 29, 2011	63.67	X
Sep 02, 2011	63.53	X
Sep 04, 2011	63.71	X
Sep 04, 2011	63.30	X
Sep 04, 2011	63.58	X
Sep 04, 2011	63.47	X
Sep 04, 2011	63.53	X
Sep 04, 2011	63.39	X
Sep 04, 2011	63.41	X
Sep 04, 2011	63.57	X

3H Efficiency
Total # pts : 5367
Valid # pts : 56
Mean : 63.49
SD : 0.16

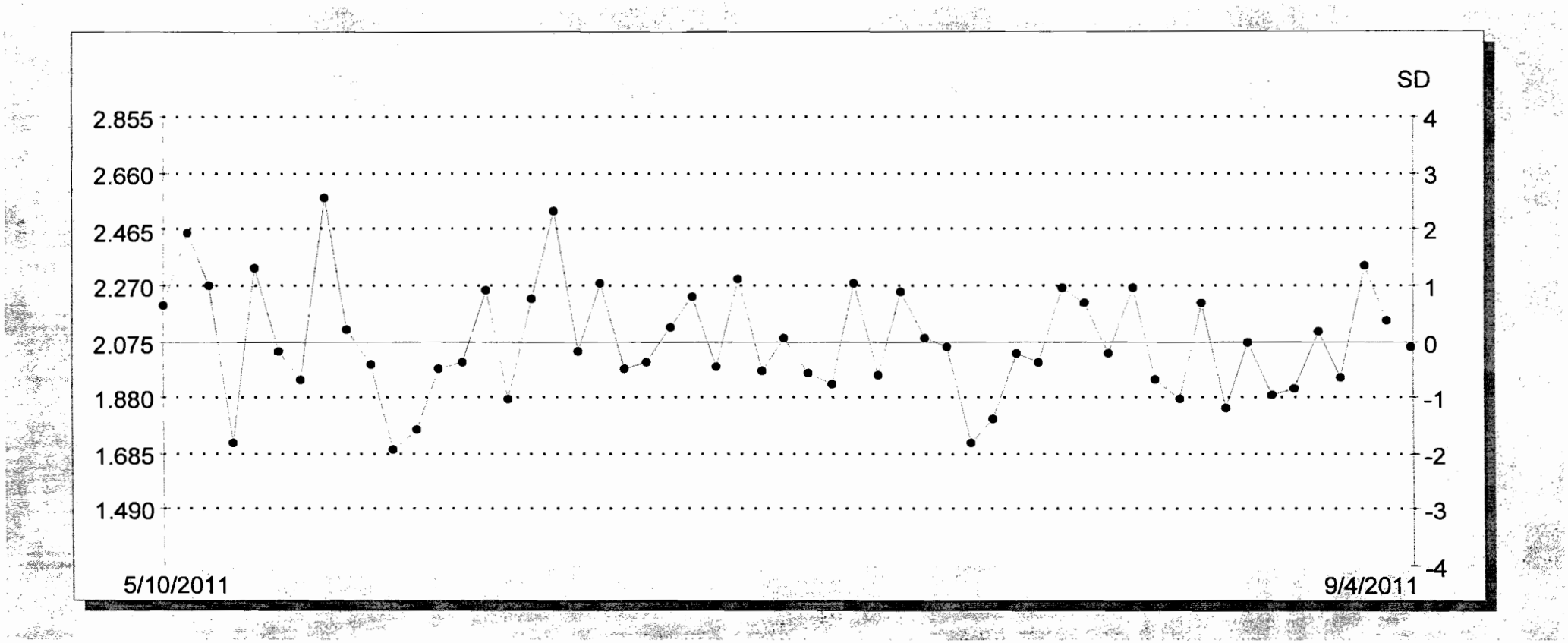


3H Background
Total # pts : 5293
Valid # pts : 55
Mean : 2.08
SD : 0.20

Date	Value	Valid Pt
May 10, 2011	2.20	X
May 16, 2011	2.45	X
May 23, 2011	2.27	X
May 24, 2011	1.72	X
May 31, 2011	2.34	X
Jun 03, 2011	2.05	X
Jun 05, 2011	1.94	X
Jun 05, 2011	2.58	X
Jun 08, 2011	2.12	X
Jun 11, 2011	2.00	X
Jun 14, 2011	1.70	X
Jun 18, 2011	1.77	X
Jun 19, 2011	1.98	X
Jun 20, 2011	2.00	X
Jun 20, 2011	2.25	X
Jun 20, 2011	1.87	X
Jun 20, 2011	2.23	X
Jun 21, 2011	2.53	X
Jun 24, 2011	2.04	X
Jun 28, 2011	2.28	X
Jul 03, 2011	1.98	X
Jul 04, 2011	2.01	X
Jul 04, 2011	2.13	X
Jul 04, 2011	2.23	X
Jul 04, 2011	1.99	X
Jul 04, 2011	2.29	X
Jul 04, 2011	1.97	X
Jul 05, 2011	2.09	X
Jul 05, 2011	1.97	X
Jul 05, 2011	1.93	X
Jul 05, 2011	2.28	X
Jul 05, 2011	1.96	X
Jul 08, 2011	2.25	X
Jul 11, 2011	2.09	X
Jul 14, 2011	2.05	X
Jul 18, 2011	1.72	X
Jul 19, 2011	1.80	X
Jul 23, 2011	2.04	X
Jul 28, 2011	2.00	X
Aug 04, 2011	2.27	X
Aug 11, 2011	2.21	X
Aug 15, 2011	2.03	X

Aug 16, 2011	2.26	X
Aug 21, 2011	1.94	X
Aug 25, 2011	1.88	X
Aug 29, 2011	2.21	X
Sep 02, 2011	1.84	X
Sep 04, 2011	2.08	X
Sep 04, 2011	1.89	X
Sep 04, 2011	1.91	X
Sep 04, 2011	2.11	X
Sep 04, 2011	1.95	X
Sep 04, 2011	2.34	X
Sep 04, 2011	2.15	X
Sep 04, 2011	2.05	X

3H Background
Total # pts : 5293
Valid # pts : 55
Mean : 2.08
SD : 0.20



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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Liquid Scintillation Counting

Calibration Information

STD ID: S-0247

ARS INTERNATIONAL

Add/Edit *Secondary Stds*

Planning

Planning Comments	**Create an H-3 LCS standard**
Target dpm/g (on dil. date)	**5.56**
Target Final volume mL	**2000**
Appx mass g of Parent Sol'n	**3.274623294**
Appx vol ml of Parent Sol'n	**3.280328244**
Expected Addition for Analysis g	**5**

Standards Preparation / Dilution

Secondary Solution #	**S-0247**
Dilution Date (New Ref Date)	**10/11/2010 10:30**
Ampoule, Empty (g)	
Ampoule /Solution Gross (g)	
Net Wt Removed (g)	
Transfer Container, empty (g)	**1.7**
Container Plus Solution (g)	**4.994**
Net Wt Transferred (g)	**3.294**
DPM Xferred on 10/11/2010 10:30	**11185.79962**
Diluent/matrix	**DI H2O**
Diluent Density Cont, empty (g)	
Test Mass of 5 ml of Diluent (g)	
Diluent Density Test - (g/mL)	
Dilution Empty Container Mass (g)	**473.96**
Dilution Full Cont g (If measured)	**2467.85**
Dilution Final Volume ml (If measured)	**2000**
Final Dilution Density (g/mL)	**0.996945**
Final Dilution Measured Mass g	**1993.89**
Comments	**Stock H-3 LCS standard. Dilution performed as stated above by B Steffens. -BJS 10/11/10**
Final Dilution dpm/g	**5.610038479**
Final Dil New Ref Date/Time	**10/11/2010 10:30**

Parent Standard Data

Parent Solution Reference #	**NIST SRM 4927F**			
Parent Solution #	**S-0237**			
Parent Principal Radionuclide	**H-3**	Half Life (Days)	**4499.8000000**	
Parent Reference Date	**03/22/2010 10:10**			
Parent Certified Act	**3503.682716**	Certl Act/Vol Units	**dpm**	**g**
Parent Cert Act Uncert 1 Sigma	**0.0036**			
Parent Sp. Gravity G/Ml	**0.9982**			
Parent Supplier	**NIST SRM 4927F**			
Parent Date Recvd	**01/02/00**			
Parent Received By	**Unknown**			
Parent Cert Exp Date				
Parent Matrix	**H2O**			
Certified dpm/g At Ref Date	**3503.682716**			
Certified dpm/g on 10/11/2010 10:30	**3395.81045**			
Parent Comments	**Intermediate level H-3 standard for creating LCS solutions and matrix spikes. Dilution performed as stated above by B Steffens. -BJS 3/22/10**			
Parent Tech	**Unknown**			
Is_Primary	**FALSE**			
Is_LCS	**TRUE**			
Is_Tracer	**FALSE**			
Is_Calib	**FALSE**			

S-0247	
H-3	Verified *10/13/10*
SL	**Expires** **10/13/11**
Manufactuer	**NIST SRM 4927F**
Sol Matrix	H2O
Ref No	NIST SRM 4927F
Tech	Unknown
Parent ID	S-0237

ARS INTERNATIONAL

RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY

ARS INTERNATIONAL

QUALITY CONTROL PROGRAM

AMERICAN RADIATION SERVICES
RADIOACTIVE REFERENCE SOLUTIONS

ANNUAL ACTIVITY VERIFICATION

VERIFICATION DATE: 10/13/2010 20:18 *date counted*
STANDARD REFERENCE #: S-0247

Principal Radionuclide		Half Life, Years		Half Life, Days
H-3	*ENTER -->*		*OR -->*	4.4998E+03
		1.232E+01		4.4998E+03

Radionuclide: H-3 Dilution Reference Date: 10/11/2010 10:30

Dilution Activity	2.53 pCi per gram ===> dpm/g	5.61
Verif. Date Decay Corrected	2.53 pCi per gram ===> dpm/g	5.61

Minimum of 3 Required

Trial ID	Sample Counts	Count Time (min)	Detector	Efficiency	Bkg. (cpm)	Net Weight	Decay Corrected Activity Result (dpm/g)	Decay Corrected Activity Result (pCi/g)
S-0247-V1	16.99	1	LSC	0.3440	6.86	5.017	5.87	2.64
S-0247-V2	16.76	1	LSC	0.3484	6.86	4.979	5.70	2.57
S-0247-V3	16.97	1	LSC	0.3465	6.86	4.972	5.87	2.64
S-0247-V4	16.76	1	LSC	0.3449	6.86	4.982	5.76	2.60
S-0247-V5	16.88	1	LSC	0.3433	6.86	4.980	5.86	2.64

	Average	5.81	2.62
	Two Sigma Uncertainty	0.15	0.07
10% Max *PASS*	Standard Deviation percent of known concentration	1.35%	1.35%
	Target Activity	5.61	2.53
5% Max *PASS*	% Diff	3.66%	3.66%

Verification Expiration Date: October 13, 2011

Prepared & Counted By: B. Schaff Date: 10/13/2010 20:18

Verified & Approved By: Eugene Mulligan Date: 10-14-10 / 1224

QC Approval: [signature] Date: 10-14-10 / 12:30

STD ID: S-0031

ARS INTERNATIONAL

Add/Edit *Secondary Stds*

Planning

Planning Comments	Dilute intermediate level solution from SRM 4927F
Target dpm/g (on dil. date)	267000
Target Final volume mL	200
Appx mass g of Parent Sol'n	2.093763934
Appx vol ml of Parent Sol'n	2.097539505
Expected Addition for Analysis g	

Standards Preparation / Dilution

Secondary Solution #	S-0031
Dilution Date (New Ref Date)	10/19/2005 00:00
Ampoule, Empty (g)	
Ampoule /Solution Gross (g)	
Net Wt Removed (g)	
Transfer Container, empty (g)	0
Container Plus Solution (g)	4.7574
Net Wt Transferred (g)	4.7574
DPM Xferred on 10/19/2005 00:00	121334194.3
Diluent/matrix	H2O
Diluent Density Cont, empty (g)	
Test Mass of 5 ml of Diluent (g)	
Diluent Density Test - (g/mL)	
Dilution Empty Container Mass (g)	1
Dilution Full Cont g (If measured)	200.64
Dilution Final Volume ml (if measured)	200
Final Dilution Density (g/mL)	0.9982
Final Dilution Measured Mass g	199.64

Comments	S-0031 Intermediate dilution - Information entered from dilution records - 4/19/2006 RTS
Final Dilution dpm/g	607764.9485
Final Dil New Ref Date/Time	10/19/2005 00:00

Parent Standard Data

Parent Solution Reference #	NIST SRM 4927F				
Parent Solution #	S-0107				
Parent Principal Radionuclide	H-3	Half Life (Days)	4499.8000000		
Parent Reference Date	09/03/1998 11:00				
Parent Certified Act	38082000	Cerb Act/Vol Units	dpm	g	
Parent Cert Act Uncert 1 Sigma	0.0036				
Parent Sp. Gravity G/Ml	0.9982				
Parent Supplier	NIST SRM 4927F				
Parent Date Recvd	01/02/00				
Parent Received By	Unknown				
Parent Cert Exp Date					
Parent Matrix	H2O				
Certified dpm/g At Ref Date	38082000				
Certified dpm/g on 10/19/2005 00:00	25504307.89				
Parent Comments	Primary for S-0029 - Information entered from dilution records - 4/18/2006 RTS				
Parent Tech	Unknown				
Is_Primary	FALSE				
Is_LCS	TRUE				
Is_Tracer	FALSE				
Is_Calib	FALSE				

ARS INTERNATIONAL	Add / Edit *Primary* Standards			
Solution Reference #	**NIST SRM 4927F**			
Solution #	**S-0107**			
Principal Radionuclide	**H-3**	Half Life (Days)	**4499.8000**	
Reference Date	**09/03/98 11:00**			
Certified Act	**634700.0000**	Certi Act/Vol Units	**Bq**	**g**
Cert Act Uncert 1 Sigma (fractional .03=3%)	**0.0036**			
Sp. Gravity G/Ml	**0.9982**			
Supplier	**NIST SRM 4927F**			
Date Recvd	**01/02/00**			
Received By	**Unknown**			
Cert Exp Date				
Matrix	**H2O**			
Certified dpm/g At Reference Date	**38082000**			
Certified dpm/g On 10/15/2010 15:48	**19261068.03**			
Comments	Primary for S-0029 - Information entered from dilution records - 4/18/2006 RTS			
Primary Tech	**Unknown**			
Is_Primary	**TRUE**			
Is_LCS	**TRUE**			
Is_Tracer	**FALSE**			
Is_Calib	**FALSE**			

S-0631

National Institute of Standards & Technology

Certificate

Standard Reference Material 4927F
Hydrogen-3 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive hydrogen-3, as water, 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 hydrogen-3 with a total activity of approximately 3.2 MBq. Hydrogen-3 decays by beta-particle emission. None of the beta particles escape from the SRM ampoule. During the decay process no photons are emitted. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. There is no detectable external radiation. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains only distilled water. There is no chemical hazard. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2.

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 September 2008.

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) because of the radioactivity.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, L.R. Karam, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas and M.P. Unterweger of the Radioactivity Group.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by J.W.L. Thomas.

Bert M. Coursey, Chief
Ionizing Radiation Division

Gaithersburg, Maryland 20899
June 1999
Half-life and text revised October 2000

Nancy M. Trahey, Chief
Standard Reference Materials Program

*Notes and references are on pages 5 and 6.

PROPERTIES OF SRM 4927F

Certified values

Solution density	**(0.998 ± 0.002) g·mL^{-1} at 20.0 °C [b]***
Radionuclide	**Hydrogen-3**
Reference time	**1200 EST, 3 September 1998** 1100 CST
Massic activity of the solution [c]	**634.7 kBq·g^{-1}**
Relative expanded uncertainty (k=2)	**0.72% [d] [e]**

Uncertified values

Physical Properties:			
Source description	Liquid in flame-sealed NIST borosilicate-glass ampoule		
Ampoule specifications	Body outside diameter Wall Thickness Barium content Lead-oxide content Other heavy elements	(16.5 ± 0.5) mm (0.60 ± 0.04) mm Less than 2.5% Less than 0.02% Trace quantities	
Solution mass	Approximately 5.0 g		
Chemical Properties:			
Solution composition	Chemical Formula	Concentration (mol·L^{-1})	Mass Fraction (g·g^{-1})
	H_2O ^3HHO	55 6×10^{-7}	1.00 1×10^{-8}
Radiological Properties:			
Radionuclidic impurities	None detected [f]		
Half lives used	Hydrogen-3: (4500 ± 8) d [g]		
Calibration method and measuring instrument(s)	4πβ gas counting of SRM 4927E using the NIST length-compensated internal gas proportional counters and intercomparison of SRMs 4927E/4927F using two 4πβ liquid-scintillation counting systems [h]		

*Notes and references are on pages 5 and 6.

NOTES

[a] The Sievert is the SI unit for dose equivalent. See reference [1]. One μSv is equal to 0.1 mrem.

Distance from Ampoule (cm):	1	30	100
Approximate Dose Rate (μSv/h):	<0.1 (Not detectable)		

[b] The stated uncertainty is two times the standard uncertainty.

[c] **Massic activity** is the preferred name for the quantity activity divided by the total mass of the sample. See reference [1].

[d] The reported value, y, of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as $y = f(x_1, x_2, x_3, \ldots x_n)$, where f is a mathematical function derived from the assumed model of the measurement process.

The value, x_i, used for each input quantity i has a **standard uncertainty**, $u(x_i)$, that generates a corresponding uncertainty in y, $u_i(y) = |\partial y/\partial x_i| \cdot u(x_i)$, called a **component of combined standard uncertainty** of y.

The **combined standard uncertainty** of y, $u_c(y)$, is the positive square root of the sum of the squares of the components of combined standard uncertainty.

The combined standard uncertainty is multiplied by a **coverage factor** of $k = 2$ to obtain U, the **expanded uncertainty** of y.

Since it can be assumed that the possible estimated values of the massic activity are approximately normally distributed with approximate standard deviation $u_c(y)$, the unknown value of the massic activity is believed to lie in the interval $y \pm U$ with a level of confidence of approximately 95 percent.

For further information on the expression of uncertainties, see references [2] and [3].

[e] The value of each standard uncertainty component, and hence the value of the expanded uncertainty itself, is a best estimate based upon all available information, but is only approximately known. That is to say, the "uncertainty of the uncertainty" is large and not well known. This is true for uncertainties evaluated by statistical methods (e.g., the relative standard deviation of the standard deviation of the mean for the massic response is approximately 50%) and for uncertainties evaluated by other methods (which could easily be over estimated or under estimated by substantial amounts). The unknown value of the expanded uncertainty is believed to lie in the interval $U/2$ to $2U$ (i.e., within a factor of 2 of the estimated value).

[f] The estimated limit of detection for radionuclidic impurities is 300 $Bq \cdot g^{-1}$.

[g] The stated uncertainty is the standard uncertainty. See reference [5].

[h] Extensive gas-counting measurements were made on the SRM 4927E solution during 1998 and 1999. The SRM 4927F solution was intercompared with the SRM 4927E solution using liquid-scintillation counting.

[i] Relative standard uncertainty of the input quantity x_i.

ARS INTERNATIONAL

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for

Los Alamos National Laboratory

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ARS INTERNATIONAL

Report Compilation Checklist

ARS SDG:	11-01918	Client Name:	LANL	Sample Matrix:	AQ

LEVEL 1 COMPONENTS	1st Reviewer	
1) Cover Page Complete and Accurate (see ARS-059)?	~~Yes~~ No N/A	
2) Technical Review Checklist(s) Complete and Accurate?	~~Yes~~ No N/A	
3) Case Narrative Complete and Accurate (see ARS-059)?	~~Yes~~ No N/A	
4) Form 1s Present for all Samples and Tests?	~~Yes~~ No N/A	
5) Client Specific Components are Present and Complete?	~~Yes~~ No N/A	

LEVEL 2 COMPONENTS	1st Reviewer	
6) Batch Quality Control Report is Present and Accurate?	~~Yes~~ No N/A	
7) DQO Report is Present and Accurate?	~~Yes~~ No N/A	
8) Client Specific Batch QC Components are Present and Complete?	~~Yes~~ No N/A	

LEVEL 3 COMPONENTS	1st Reviewer	
9) Efficiencies are Present?	~~Yes~~ No N/A	
10) Calibrations are Present?	~~Yes~~ No N/A	
11) Backgrounds are Present?	~~Yes~~ No N/A	
12) Spectrum Analysis is Present?	~~Yes~~ No N/A	
13) Spectral Plots are Present?	~~Yes~~ No N/A	
14) Plateaus are Present?	~~Yes~~ No N/A	
15) Control Charts are Present?	~~Yes~~ No N/A	
16) Other:	Yes No ~~N/A~~	

LEVEL 4 COMPONENTS	1st Reviewer	
17) Preparation Raw Data Present, Signed and Complete?	~~Yes~~ No N/A	
18) Instrument Raw Data Present and Complete?	~~Yes~~ No N/A	
19) Calibration Certificates Present?	~~Yes~~ No N/A	
20) Copies of Log Book Pages Present?	~~Yes~~ No N/A	
21) Sample Receiving Documentation Present?	~~Yes~~ No N/A	
22) LIMS Reports Present?	~~Yes~~ No N/A	
23) Applicable Correspondence Present?	~~Yes~~ No N/A	
24) Other:	Yes No ~~N/A~~	

Susan Reese 10-11-11
Report Generator Signature Date

VJM 10-12-11
Management Review Signature Date

LSC
Technical Review Checklist

ARS SDG ARS1-11-01918

Sample Matrix: AQ **Aliquot** (Circle One) : Dry As Received Filtered Other: _____

Required QC Samples (Mark all that apply): Blank LCS LCSD Sample Dup MS MSD

ARS A. Batch ID(s): **Batch A:** ARS1-B11-03362 **Batch B:** N/A **Batch C:** N/A

Test Method(s): LSC-A-022 N/A N/A

A. RADIOCHEMICAL PREPARATION REVIEW

	Chemist Review	Verifier Review
1) 100% of Manual Transcriptions Verified?	Yes No N/A	Yes No N/A
2) 100% of Manual Calculations Verified?	Yes No N/A	Yes No N/A
3) Blank Composition/Configuration Matches Calibration?	Yes No N/A	Yes No N/A
4) Deviations from procedure are documented and verified?	Yes No N/A	Yes No N/A
5) Appropriate Cocktail Selected?	Yes No N/A	Yes No N/A

6) Sample Prep Anomaly? ☑ No ☐ Yes (See Tech Notes) NCR # (If initiated): _____

Chemist Signature 10-4-11 Date

Verifier Review Signature 10-4-11 Date

B. ANALYSIS REVIEW

	Analyst Review	QA Officer Review
1) Calibrations Valid and Current?	Yes No N/A	Yes No N/A
2) Backgrounds Valid and Current?	Yes No N/A	Yes No N/A
3) Source Checks Completed and Acceptable?	Yes No N/A	Yes No N/A

QA Officer Signature 10-12-11 Date

	Analyst Review	Technicial Review
4) Background Checks Complete and Acceptable?	Yes No N/A	Yes No N/A
5) 100% of Manually Entered Parameters Verified Accurate?	Yes No N/A	Yes No N/A
6) Appropriate QC samples initiated at required frequency?	Yes No N/A	Yes No N/A
6) Test/Sample Specific Parameters (See ARS-059 for details)		
a) Analysis Parameters Checked and Correct and Peak Shapes are Acceptable?	Yes No N/A	Yes No N/A
b) Spectra show no Evidence of Interferences?	Yes No N/A	Yes No N/A
c) Sample Quench for All Samples within Range of Quench Curve?	Yes No N/A	Yes No N/A

7) Analysis Anomaly? ☑ No ☐ Yes (See Comments) NCR # (If initiated): _____

Analyst Signature 10-10-11 Date

Technicial Reviewer Signature 10-10-11 Date

ARS INTERNATIONAL

Batch A: ARS1-B11-03362

LSC
Technical Review Checklist

C. BATCH QC VALIDATION

	Proj. Mgr. Review	QA Officer Review
1) Activity + 3xCSU a Negative Number?	Yes ~~No~~ N/A	Yes ~~No~~ N/A
2) RDL Criteria are Met?	~~Yes~~ No N/A	~~Yes~~ No N/A
3) Method Blank Criterion Met?	~~Yes~~ No N/A	~~Yes~~ No N/A
4) LCS/LCD Criteria Met?	~~Yes~~ No N/A	~~Yes~~ No N/A
5) Duplicate (Sample Duplicate, LCSD, MSD) Criteria Met?	~~Yes~~ No N/A	~~Yes~~ No N/A
6) MS/MSD Criteria Met?	Yes No ~~N/A~~	Yes No ~~N/A~~
7) Batch QC Anomaly? ☒ No ☐ Yes (See Tech Notes) NCR # (If initiated): _____		

Susan Reese 10-11-11
Project Manager Signature Date

VJM 10-12-11
QA Officer Signature Date

GENERAL COMMENTS

ARS INTERNATIONAL

LSC
Technical Review Checklist

ARS SDG ARS1-11-01918

Sample Matrix: AQ **Aliquot** (Circle One) : Dry As Received Filtered Other: _____

Required QC Samples (Mark all that apply): Blank LCS LCSD Sample Dup MS MSD

ARS A. Batch ID(s): **Batch A:** ARS1-B11-03361 **Batch B:** N/A **Batch C:** N/A

Test Method(s): LSC-A-021 N/A N/A

A. RADIOCHEMICAL PREPARATION REVIEW

	Chemist Review	Verifier Review
1) 100% of Manual Transcriptions Verified?	Yes No N/A	Yes No N/A
2) 100% of Manual Calculations Verified?	Yes No N/A	Yes No N/A
3) Blank Composition/Configuration Matches Calibration?	Yes No N/A	Yes No N/A
4) Deviations from procedure are documented and verified?	Yes No N/A	Yes No N/A
5) Appropriate Cocktail Selected?	Yes No N/A	Yes No N/A

6) Sample Prep Anomaly? ☑ No ☐ Yes (See Tech Notes) NCR # (If initiated): _____

Chemist Signature 9-2-11 Date

William Stickle 9-2-11
Verifier Review Signature Date

B. ANALYSIS REVIEW

	Analyst Review	QA Officer Review
1) Calibrations Valid and Current?	Yes No N/A	Yes No N/A
2) Backgrounds Valid and Current?	Yes No N/A	Yes No N/A
3) Source Checks Completed and Acceptable?	Yes No N/A	Yes No N/A

VPM 10-12-11
QA Officer Signature Date

	Analyst Review	Technicial Review
4) Background Checks Complete and Acceptable?	Yes No N/A	Yes No N/A
5) 100% of Manually Entered Parameters Verified Accurate?	Yes No N/A	Yes No N/A
6) Appropriate QC samples initiated at required frequency?	Yes No N/A	Yes No N/A
6) Test/Sample Specific Parameters (See ARS-059 for details)		
a) Analysis Parameters Checked and Correct and Peak Shapes are Acceptable?	Yes No N/A	Yes No N/A
b) Spectra show no Evidence of Interferences?	Yes No N/A	Yes No N/A
c) Sample Quench for All Samples within Range of Quench Curve?	Yes No N/A	Yes No N/A

7) Analysis Anomaly? ☑ No ☐ Yes (See Comments) NCR # (If initiated): _____

9-6-11
Analyst Signature Date

9-6-11
Technicial Reviewer Signature Date

ARS INTERNATIONAL

Batch A: ARS1-B11-03361

LSC
Technical Review Checklist

C. BATCH QC VALIDATION

	Proj. Mgr. Review			QA Officer Review		
1) Activity + 3xCSU a Negative Number?	Yes	No	N/A	Yes	No	N/A
2) RDL Criteria are Met?	Yes	No	N/A	Yes	No	N/A
3) Method Blank Criterion Met?	Yes	No	N/A	Yes	No	N/A
4) LCS/LCD Criteria Met?	Yes	No	N/A	Yes	No	N/A
5) Duplicate (Sample Duplicate, LCSD, MSD) Criteria Met?	Yes	No	N/A	Yes	No	N/A
6) MS/MSD Criteria Met?	Yes	No	N/A	Yes	No	N/A

7) Batch QC Anomaly? ☒ No ☐ Yes (See Tech Notes) NCR # (If initiated): _____

Susan Reese 10-11-11
Project Manager Signature Date

VPM 10-12-11
QA Officer Signature Date

GENERAL COMMENTS

DQO Report for SDG

ARS1-11-01918

Analysis Code	Group	Isotope	Activity Units	Aliquot Units	ProcedureNo	RDL	LCS_LL	LCS_UL	MS_LL	MS_UL	RadY_LL	RadY_UL	GravY_LL	GravY_LL	RER	RPD	DiltionReq	RoughPrepReq	BlankCorrectionMDA	BlankCorrectionAll	CountTimeReq	AliquotRequired
LSC-A-021	STD	H-3		TU	ARS-054	0.00E+00	75	125	60	140	30	110	40	110	1.00	25	FALSE	FALSE	FALSE	FALSE		
LSC-A-022	STD	Enriched H-3		TU	ARS-054	0.00E+00	75	125	60	140	30	110	40	110	1.00	25	FALSE	FALSE	FALSE	FALSE		

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SDG Report - Samples and Containers

SDG Specific Data

SDG	ARS1-11-01918			TAT Days	30	Project Type	Environmental
Sample Count	5	Rpt Level	4	Date Received	9/1/2011	COC Number	11-3383
Client	Los Alamos National Laboratory			Client Deadline	9/30/2011	PO Number	63641-001-10
Client Code	114			Internal Deadline	9/29/2011	Job Number	WEPR1158W100
Profile Number	PN-00094			Lab Deadline	9/27/2011	Job Location	
Comments							

Samples and Containers (→) Checked In Thus Far

FR	ClientID	Matrix	SampleStartDate	SampleEndDate	Disp	Hold	Arch	Storage	X	Units	Y	Units	Z	Units	Comments
001	Buckman1-11-26862	AQ	08/31/11 12:00 PM	08/31/11 12:00 PM	H	90	5	LL3H							
→	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	94980	1	1000.00				40	20		N	N/A				
002	Buckman1-11-26863	AQ	08/31/11 12:00 PM	08/31/11 12:00 PM	H	90	5	LL3H							
→	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	94981	1	1000.00				40	20		N	N/A				
003	Buckman1-11-26864	AQ	08/31/11 12:00 PM	08/31/11 12:00 PM	H	90	5	LL3H							
→	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	94982	1	1000.00				35	20		N	N/A				
004	Buckman06-11-26865	AQ	08/31/11 12:00 PM	08/31/11 12:00 PM	H	90	5	LL3H							
→	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	94983	1	1000.00				30	20		N	N/A				
005	Buckman08-11-26866	AQ	08/31/11 12:00 PM	08/31/11 12:00 PM	H	90	5	LL3H							
→	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	94984	1	1000.00				30	20		N	N/A				

SDG Report - Analysis Assignments

Temp SDG	ARS1-11-01918	Sample Count	5
Client	Los Alamos National Laboratory	Analysis Count	2-10

Samples Count Totals per Analysis

Analysis Code	Analysis Description	Samples Count
LSC-A-021	Low Level Tritium Screen in (Aqueous)	5
LSC-A-022	Low Level Tritium by Enrichment Process in (Aqueous [AQ])	5

Analyses Assigned Per Fraction

Fraction	Analysis Code	X = Assigned
001	LSC-A-021	X
001	LSC-A-022	X
002	LSC-A-021	X
002	LSC-A-022	X
003	LSC-A-021	X
003	LSC-A-022	X
004	LSC-A-021	X
004	LSC-A-022	X
005	LSC-A-021	X
005	LSC-A-022	X

ARS FILE TRACKING SHEET

SDG: ARS1-11-01918

Task	Date / Time	Initials
Date & Time Samples Received	09-01-11/08:55	CWB
ICOC Initiated / Storage Location: LL3H	09-01-11/16:32	CWB
Technical Checks Performed	See Batch	—
Report Written / EDD Generated: 10-11-11 / 1333 (Date/Time) SDA (Initials)	10-11-11/1331	SDA
Quality Assurance Checks Performed on Report	10-12-11	JMM
Management Check Performed on Report	800	
Preliminary Report Sent		
Report E-mailed		
Report Faxed		
Report Reviewed		
Report Mailed		
Invoice Completed Invoice #:_____		
Report Imaged		

SPECIAL REQUIREMENTS

Requirement	Yes	No
3 Hour Rush		✓
24 Hour Rush		✓
48 Hour Rush		✓
Special Invoicing *see notes* Mgmt. Approval:_____		✓

NOTES:

COMPANY NAME: Los Alamos National Lab **SDG:** ARSH1-0918

SHIPPING CONTAINER

Good Condition	☑ Yes	☐ No
Radioactive	☐ Yes	☑ No
UN2910	☐ Yes	☐ No
Sec. Seals	☑ Yes	☐ No
Seals Intact	☑ Yes ☐ No	☐ N/A
Air Bill	☐ Yes	☑ No

COC PRESENT WITH SAMPLES

COC	☑ Yes	☐ No

SAMPLE CONTAINER(S)

Good Condition	☑ Yes	☐ No
Sec. Seals	☑ Yes	☐ No
Seal Intact	☑ Yes ☐ No	☐ N/A
Marked Radioactive	☐ Yes	☑ No

Samples Rcv 5

Matrix [AF , (AQ) , BI , FE , LT , SI , SO , UR , VG]

External and Internal Surveys

Exposure Rate Meter: M3 242801 Serial No.: 44-2 PR2642266 Calibration Due Date: 4-2012

Count Rate Meter: M2 154859 Serial No.: 44-9 PR184559 Calibration Due Date: 4-2012

Background Exposure Rate (µR/hr): 29

Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd): 14 µR/hr

Background Count Rate (cpm): 80

Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd): 20 cpm

Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd): 20 cpm

Sample Label/Comments/Notes	pH Orig (pH ≤ 2 is Acceptable)	pH Final	Mark if Preserve	Acid Lot #	Weight(g) / (Volume(mL))	Acceptance Limits <500 µR/hr: µR/hr	Acceptance Limits <100 cpm/cm²: cpm
Buckman 1-11-268862					100 mL	20	40
↓ 268863					↓	20	40
↓ 268864					↓	20	35
↓ 06-11-268865					↓	20	30
↓ 08-11-268866					↓	20	30

Surveyors' Name: [signature]

Date/Time Surveyed: 9-1-11 / 11:45

DATA VALIDATION COVER SHEET

5119-1

Data Validation Cover Sheet

Records Use only

Los Alamos NATIONAL LABORATORY EST. 1943

Section I.

REQUEST NUMBER: 11-3383 VALIDATION DATE: 10/25/11 LAB CODE: ARS

CONTRACT LABORATORY NAME: American Radiation Services

VALIDATOR: Larry Fukui ORGANIZATION: Analytical Quality Associates, Inc.

ANALYTICAL SUITE (CHECK ALL THAT APPLY):

☐ **TPH-GRO**	☐ **HIGH EXPLOSIVES**	☐ **DIOXIN FURANS**	☐ **LCMSMS PERCHLORATES**
☐ **TPH-DRO**	☐ **METALS**	☐ **PCB CONGENERS**	☐ **ORGANOCHLORINE PESTICIDES/POLYCHLORINATED BIPHENYLS**
☐ **GENERAL CHEMISTRY**	☒ **RADIOCHEMISTRY**	☐ **LCMSMS HIGH EXPLOSIVES**	

☒ **OTHER (DESCRIBE):** Tritium Only

Section II. Completeness Check

YES	NO	N/A	(CHECK ONE)	YES	NO	N/A	(CHECK ONE)
☒	☐	☐	1. CHAIN-OF-CUSTODY FORM(S)	☒	☐	☐	6. RAW/BSS DATA
☒	☐	☐	2. CASE NARRATIVE	☒	☐	☐	7. QUALITY CONTROL FORMS
☒	☐	☐	3. SAMPLE RESULT FORMS	☒	☐	☐	8. QUANTITATION REPORTS
☐	☐	☒	4. SAMPLE CHROMATOGRAMS	☐	☐	☒	9. TICS FORMS
☐	☐	☒	5. STANDARD CHROMATOGRAMS	☐	☐	☒	10. TICS MASS SPECTRA

Comments/problems noted (include information about requests for further information submitted to the contract laboratory and agreed-upon date of resolution and contract laboratory point of contact):

1. In the EQB, sample Buckman1-11-26863 associated with field samples -26862 and -26864, tritium was detected. The associated field sample results were NDs and, thus, were not qualified.
2. It should be noted that no MS or duplicate samples were analyzed. However, an LCS and LCSD were analyzed, met acceptance criteria and, thus, no sample data were qualified.
3. It should also be noted that the LCS/LCSD RER was hand-calculated using the 2-sigma TPU values and was found to be within specifications. No sample data were qualified as a result.

Reviewed by: Susan Ball **Level:** I **Date:** 10/26/11

VALIDATOR'S SIGNATURE: Larry M Fuk DATE: 10/25/11

RAD ANALYTICAL DATA VALIDATION CHECKLIST	
5119-2 **Rad Analytical Data Validation Checklist**	Records Use only Los Alamos NATIONAL LABORATORY EST. 1943

Yes	No	N/A		Assign Qualifier Listed Below If Criterion = Yes	
(Check One)				Non-detected Analyte	Detected Analyte
☐	☒	☐	1. The holding time was >1 and ≤2 times the applicable holding time requirement.	UJ, R9	J-, R9
☐	☒	☐	2. The holding time was >2 times the applicable holding time requirement.	R, R9a	J-, R9a
☐	☐	☒	3. The results for the affected analytes are considered not detected (U) because the associated sample concentration was less than or equal to the MDC.	U, R5	N/A
☐	☐	☒	4. The analyte should be regarded as rejected because spectral interferences prevent positive identification of the analytes.	R, R5a	R, R5a
☐	☒	☐	5. The MDC and/or TPU documentation is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.	R, R5b	J-, R5b
☐	☐	☒	6. The results for the affected analytes should be regarded as not detected (U) because the associated sample concentration was less than 3X the 1 sigma TPU.	U, R11	N/A
☐	☒	☐	7. The sample result is ≤5X the concentration of the related analyte in the method blank.	U, R4	N/A
☐	☒	☐	8. The affected analytes are considered estimated and biased high because this analyte was identified in the method blank but was >5X.	N/A	J, R4a
☒	☐	☐	9. The sample result is ≤5X the concentration of the related analyte in the trip blank, rinsate blank, or equipment blank.	U, R4d	N/A
☐	☒	☐	10. Required method blank information is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.	R, R4e	R, R4e
☐	☐	☒	11. The tracer is <10%R. Follow the external laboratory limits located within the associated data package. Tracer%R is not applicable for Gamma Spectroscopy.	R, R3	R, R3

RAD ANALYTICAL DATA VALIDATION CHECKLIST	
5119-2 **Rad Analytical Data Validation Checklist**	Records Use only Los Alamos NATIONAL LABORATORY EST. 1943

Yes	No	N/A		Assign Qualifier Listed Below If Criterion = Yes	
(Check One)				Non-detected Analyte	Detected Analyte
☐	☐	☒	12. The tracer is < the Lower Acceptance Level (LAL) but ≥10%R. Follow the external laboratory limits located within the associated data package. Tracer%R is not applicable for Gamma Spectroscopy.	UJ, R3a	J-, R3a
☐	☐	☒	13. The Tracer%R value is > the Upper Acceptance Limit (UAL). Follow the external laboratory limits located within the associated data package. Tracer%R is not applicable for Gamma Spectroscopy.	N/A	J+, R3b
☐	☐	☒	14. Required tracer information is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information. Tracer%R is not applicable for Gamma Spectroscopy.	R, R3d	R, R3d
☐	☒	☐	15. The LCS percent recovery was <10%. Follow the external laboratory limits located within the associated data package.	R, R12	R, R12
☐	☒	☐	16. The LCS percent recovery was < the LAL but >10%. Follow the external laboratory limits located within the associated data package.	UJ, R12a	J-, R12a
☐	☒	☐	17. The LCS percent recovery was > the UAL. Follow the external laboratory limits located within the associated data package.	N/A	J+, R12b
☐	☒	☐	18. The LCS documentation is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.	R, R12c	R, R12c
☐	☒	☐	19. Associated duplicate sample has DER or RER > the analytical laboratory's acceptance limits.	R, R10	J, J10
☒	☐	☐	20. The duplicate sample was not prepared and/or analyzed with the samples for unspecified reasons. The duplicate information is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.	R, R6	R, R6

RAD ANALYTICAL DATA VALIDATION CHECKLIST	
5119-2 **Rad Analytical Data Validation Checklist**	Records Use only Los Alamos NATIONAL LABORATORY EST. 1943

Yes	No	N/A		Assign Qualifier Listed Below If Criterion = Yes	
(Check One)				Non-detected Analyte	Detected Analyte
☐	☐	☒	21. The associated matrix spike recovery was <10%. Follow the external laboratory limits. MS/MSD is not applicable to Gamma Spectroscopy.	R, R6	R, R6
☐	☐	☒	22. The associated matrix spike recovery was <10%. Follow the external laboratory limits. MS/MSD is not applicable to Gamma Spectroscopy.	UJ, R6a	J-, R6a
☐	☐	☒	23. The associated matrix spike recovery was above the UAL. Follow the external laboratory limits. MS/MSD is not applicable to Gamma Spectroscopy.	UJ, R6b	J+, R6b
☒	☐	☐	24. Required matrix spike information is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information. If LCS information is present, do not Reject. Qualify data based on LCS information. MS/MSD is not applicable to Gamma Spectroscopy.	R, R6c	R, R6c
☐	☒	☐	25. Duplicate, dilution, or reanalysis.	UJ, R88	J, R88
☐	☒	☐	26. The LANL project chemist identified quality deficiencies in the reported data that require further qualification. This code can ONLY be used and/or under advisement by the LANL project chemist.	UJ, R, R19	J, R, R19
☒	☐	☐	27. Quantification of data via data validation did not occur based on Quality Control requirements in this procedure. Adhere to the external laboratory qualifiers found within the Form I analytical data summary sheets generated by the external laboratory.	U, U_LAB	J, J_LAB NQ, NQ

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

1 (800) 401-4277 FAX (225) 381-2996

ARS Sample Delivery Group:	ARS1-11-01918	**Request or PO Number:**	11-3383
Client Sample ID:	Buckman1-11-26862	**ARS Sample ID:**	ARS1-11-01918-001
Sample Collection Date:	08/31/11	**Date Received:**	09/01/11
Sample Matrix:	Aqueous	**Report Date:**	10/11/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	-0.060	0.220	0.750	0.360	U	TU	ARS-040	10/07/11 00:58	RU	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

Notes: *American Radiation Services, Inc. assumes no liability for the use or interpretation of any analytical results provided other than the cost of the analysis itself. Reproduction of this report in less than full requires the written consent of the American Radiation Services, Inc.*

LELAP Certificate# 01949 NELAP Certificate # E87558

LMF
10/25/11

ARS INTERNATIONAL
2609 North River Road, Port Allen, Louisiana 70767
1 (800) 401-4277 FAX (225) 381-2996

ARS Sample Delivery Group: ARS1-11-01918
Client Sample ID: Buckman1-11-26863
Sample Collection Date: 08/31/11
Sample Matrix: Aqueous

Request or PO Number: 11-3383
ARS Sample ID: ARS1-11-01918-002
Date Received: 09/01/11
Report Date: 10/11/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	2.240	0.430	0.740	0.360		TU	ARS-040	10/07/11 05:09	RU	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

Notes: *American Radiation Services, Inc. assumes no liability for the use or interpretation of any analytical results provided other than the cost of the analysis itself. Reproduction of this report in less than full requires the written consent of the American Radiation Services, Inc.*

LELAP Certificate# 01949 NELAP Certificate # E87558

LMF
10/25/11

ARS INTERNATIONAL
2609 North River Road, Port Allen, Louisiana 70767
1 (800) 401-4277 FAX (225) 381-2996

ARS Sample Delivery Group:	ARS1-11-01918	**Request or PO Number:**	11-3383
Client Sample ID:	Buckman1-11-26864	**ARS Sample ID:**	ARS1-11-01918-003
Sample Collection Date:	08/31/11	**Date Received:**	09/01/11
Sample Matrix:	Aqueous	**Report Date:**	10/11/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	-0.040	0.190	0.640	0.310	U	TU	ARS-040	10/07/11 09:20	RU	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

LELAP Certificate# 01949 NELAP Certificate # E87558

LMF
10/25/11

ARS INTERNATIONAL
2609 North River Road, Port Allen, Louisiana 70767
1 (800) 401-4277 FAX (225) 381-2996

ARS Sample Delivery Group:	ARS1-11-01918	**Request or PO Number:**	11-3383
Client Sample ID:	Buckman06-11-26865	**ARS Sample ID:**	ARS1-11-01918-004
Sample Collection Date:	08/31/11	**Date Received:**	09/01/11
Sample Matrix:	Aqueous	**Report Date:**	10/11/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	-0.220	0.210	0.720	0.350	U	TU	ARS-040	10/07/11 13:31	RU	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

LELAP Certificate# 01949 NELAP Certificate # E87558

LMF
10/25/11

ARS INTERNATIONAL
2609 North River Road, Port Allen, Louisiana 70767
1 (800) 401-4277 FAX (225) 381-2996

ARS Sample Delivery Group:	ARS1-11-01918	**Request or PO Number:**	11-3383
Client Sample ID:	Buckman08-11-26866	**ARS Sample ID:**	ARS1-11-01918-005
Sample Collection Date:	08/31/11	**Date Received:**	09/01/11
Sample Matrix:	Aqueous	**Report Date:**	10/11/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.420	0.230	0.730	0.350	U	TU	ARS-040	10/07/11 17:42	RU	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

LELAP Certificate# 01949 NELAP Certificate # E87558

LMF
10/25/11

Wednesday, August 31, 2011

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 11-3383C

REQUEST NUMBER: 11-3383

LOS ALAMOS

NATIONAL LABORATORY

ATTN: Danny Coleman

American Radiation Services - Primary

1726 Wooddale Court

Baton Rouge, LA 70806

LAB REQUEST COMMENTS:

TURNAROUND/REPORT DUE: 9/30/2011

TURNAROUND REQ'D: 30

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman1-11-26862	1	POLY	WSP-LL-H-3	None	WG
Buckman1-11-26863	1	POLY	WSP-LL-H-3	None	WG
Buckman1-11-26864	1	POLY	WSP-LL-H-3	None	WG
Buckman06-11-26865	1	POLY	WSP-LL-H-3	None	WG
Buckman08-11-26866	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:	**Date**	**Time**	**Received By:**	**Date**	**Time**
Signature			Signature		
Signature	8/31/11	1400	9-1-11	08:55	
Signature			Signature		
Signature			Signature		

Received for DISPOSAL By: **Date** **Time** **Remarks:**

Signature

Wednesday, August 31, 2011

REQUEST NUMBER: 11-3383

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

These Samples are on:
LANL Request Number:11-3383
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples
according to the schedule indicated:

SHIP DATE: 8/31/2011
TURNAROUND/REPORT DUE: 9/30/2011
TURNAROUND REQ'D: 30 Days

RAD SCREENING: Not Required
LAB REQUEST COMMENTS:

LANL ER SMO CONTACT:
Signature:

PRIORITY	METHOD CODE	CNTNR	SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	SPECIAL INSTRUCTIONS
	Generic:Low_Level_Tritium	1	Buckman1-11-26862	WG	8/31/2011	
		1	Buckman1-11-26863	WG	8/31/2011	
		1	Buckman1-11-26864	WG	8/31/2011	
		1	Buckman06-11-26865	WG	8/31/2011	
		1	Buckman08-11-26866	WG	8/31/2011	

Final Page of REQUEST NUMBER 11-3383