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

Date: MAR 0 1 2011
Refer To: EP2011-0090

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 June 8, June 22, and August 24, 2010, sampling of the City of Santa Fe's Buckman Wells No. 1, 6, and 8 for low-level tritium analysis. All results were below the U.S. Environmental Protection Agency (EPA) drinking water standards.

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 City of Santa Fe staff. Under this plan, Buckman Wells No. 1, 6, and 8 will be sampled quarterly by the Laboratory: twice per year for full-suite analysis (radionuclides [including tritium], general inorganics [including perchlorate], metals [including chromium], and organics) and twice per year for low-level tritium.

The attached CD contains the following items: (1) American Radiation Services International (ARS) data reports and (2) an Excel file of all analytical results (Tables 1 and 2) with a glossary of laboratory qualification codes, secondary validation codes, and secondary validation reason codes. The analytical results are as follows.

Tritium: Samples from Buckman Wells No. 1, 6, and 8 were submitted to ARS for low-level tritium analysis. Historically, all low-level tritium samples were submitted to the University of Miami Tritium Laboratory (UMTL) for analysis. Beginning in early 2010, however, the Laboratory's contract with UMTL expired and a new contract was awarded to ARS. Accordingly, results from ARS may not be directly comparable to those from UMTL because of differences in

each laboratory's minimum detectable activity (MDA) and counting uncertainty. Analytical results are discussed below and presented in Table 1.

- **June 8, 2010:** Tritium results from the sampling of Buckman Wells No. 1 and 6 were nondetect, as indicated by the secondary validation code "U."

- **June 22, 2010:** The tritium result from the sampling of Buckman Well No. 8 was nondetect, as indicated by the secondary validation code "U."

- **August 24, 2010:** Tritium results from the sampling of Buckman Wells No. 1, 6, and 8 were as follows.

  - Buckman Well No. 1: 3.93 pCi/L
  - Buckman Well No. 1 Field Duplicate: 3.03 pCi/L
  - Buckman Well No. 6: 2.46 pCi/L
  - Buckman Well No. 8: 3.48 pCi/L

  Most of the low-level tritium results reported from these locations since 2001 were nondetect. The method used for the newest results has a higher MDA and perhaps less precision than earlier results. Buckman Wells No. 1, 6, and 8 will be sampled again for low-level tritium during the first quarter of 2011. The EPA maximum contaminant level for tritium in drinking water is 20,000 pCi/L.

Field Parameters: Results from the measurement of field parameters—conductivity, temperature, turbidity, and pH—are presented in Table 2. All results are compliant with the EPA Secondary Drinking Water Regulations.

In summary, all results presented in this report are below EPA drinking water standards. If you would like additional information regarding this report, please contact Bob Beers at (505) 667-7969 (bbeers@lanl.gov).

Sincerely,

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

MG/CD/SP/BB:sm

Attachment: CD with the following items:
(1) ARS data reports
(2) Excel file of Tables 1–2 and glossary of laboratory qualification codes, secondary validation codes, and secondary validation reason codes (LA-UR-10-8346)

Cy: (w/att.)
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
James Bearzi, 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
Neil Weber, San Ildefonso Pueblo
Gene Turner, DOE-LASO, MS A316
Bob Beers, ENV-RCRA, MS K490
RPF, MS M707

Cy: (Letter and CD and/or DVD only))
Laurie King, EPA Region 6, Dallas, TX
Steve Yanicak, NMED-DOE-OB, MS M894
Hai Shen, DOE-LASO, MS A316
Steve Paris, EP-CAP, MS M992
Suzanne Coyne, IRM-DCS, MS M992
William Alexander, EP-BPS, MS M992

Cy: (w/o att.)
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)
James C. Cantwell, 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)
Craig Douglass, EP-CAP, MS M992 (date-stamped letter emailed)
Michael J. Graham, ADEP, MS M991 (date-stamped letter emailed)

Table 1.0
Buckman Wells Nos. 1, 6, and 8
Low-Level Tritium

Location Name	Start Date	Analyte	Anyl Meth Code	Fld Prep Code		Std Result	Units	Std Uncertainty (1s)	Std Mda	Lab Qual Code	Concat Flag Code	Fld Qc Type Code	Lab Code	Sample Id
Buckman 1	6/8/2010	H-3	Generic:Low_Level_Tritium	UF	<	-2.94	pCi/L	0.73	2.11	U	U		ARSL	Buckman1-10-16990
Buckman 6	6/8/2010	H-3	Generic:Low_Level_Tritium	UF	<	-3.35	pCi/L	0.83	2.40	U	U		ARSL	Buckman06-10-16992
Buckman 8	6/22/2010	H-3	Generic:Low_Level_Tritium	UF	<	2.27	pCi/L	0.80	2.40	U	U		ARSL	Buckman08-10-16994
Buckman 1	8/24/2010	H-3	Generic:Low_Level_Tritium	UF		3.93	pCi/L	0.89	2.14				ARSL	Buckman1-10-24996
Buckman 1	8/24/2010	H-3	Generic:Low_Level_Tritium	UF		3.03	pCi/L	0.70	1.66			FD	ARSL	Buckman1-10-24999
Buckman 6	8/24/2010	H-3	Generic:Low_Level_Tritium	UF		2.46	pCi/L	0.58	1.34				ARSL	Buckman06-10-24997
Buckman 8	8/24/2010	H-3	Generic:Low_Level_Tritium	UF		3.48	pCi/L	0.80	1.88				ARSL	Buckman08-10-24998

Table 2.0
Buckman Wells Nos. 1, 6, and 8
Field Parameters

Location Name	Start Date	Analyte	Analyte Desc	Fld Prep Code	Result	Units	Lab Code	Sample Id
Buckman 1	8/24/2010	TURB	GENERIC FIELD TURB	UF	0.29	NTU	FLD	Buckman06-10-24996
Buckman 1	8/24/2010	TEMP	GENERIC FIELD TEMP	UF	22.2	deg C	FLD	Buckman06-10-24996
Buckman 1	8/24/2010	SPEC_CONDC	GENERIC FIELD CONDUCTIVITY	UF	429	uS/cm	FLD	Buckman06-10-24996
Buckman 1	8/24/2010	pH	GENERIC FIELD PH	UF	7.91	SU	FLD	Buckman06-10-24996
Buckman 6	8/24/2010	TURB	GENERIC FIELD TURB	UF	0.20	NTU	FLD	Buckman06-10-24997
Buckman 6	8/24/2010	TEMP	GENERIC FIELD TEMP	UF	24.2	deg C	FLD	Buckman06-10-24997
Buckman 6	8/24/2010	SPEC_CONDC	GENERIC FIELD CONDUCTIVITY	UF	609	uS/cm	FLD	Buckman06-10-24997
Buckman 6	8/24/2010	pH	GENERIC FIELD PH	UF	7.14	SU	FLD	Buckman06-10-24997
Buckman 8	8/24/2010	TURB	GENERIC FIELD TURB	UF	0.11	NTU	FLD	Buckman08-10-24998
Buckman 8	8/24/2010	TEMP	GENERIC FIELD TEMP	UF	26.2	deg C	FLD	Buckman08-10-24998
Buckman 8	8/24/2010	SPEC_CONDC	GENERIC FIELD CONDUCTIVITY	UF	528	uS/cm	FLD	Buckman08-10-24998
Buckman 8	8/24/2010	pH	GENERIC FIELD PH	UF	7.48	SU	FLD	Buckman08-10-24998

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: 10-3478

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 10-3478

Original COC

Wednesday, June 23, 2010 REQUEST NUMBER: 10-3478

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:10-3478
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples
according to the schedule indicated:

SHIP DATE: 6/23/2010
TURNAROUND/REPORT DUE: 7/23/2010
TURNAROUND REQ'D: 30 Days

RAD SCREENING: Yes, Below Background
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	Buckman08-10-16994	WG	6/22/2010	

Final Page of REQUEST NUMBER 10-3478

Wednesday, June 23, 2010

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 10-3478C

REQUEST NUMBER: 10-3478

LOS ALAMOS
NATIONAL LABORATORY

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

TURNAROUND/REPORT DUE: 7/23/2010
TURNAROUND REQ'D: 30

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman08-10-16994	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:		Date	Time	Received By:		Date	Time
		6/23/10	3:00	Heath Pass	Heath Pass	6-24-10	10:10
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		

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

Printed Name Signature

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 10-3478

Case Narrative

ARS INTERNATIONAL

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

September 29, 2010

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

Request Number: **10-3478**
LANL Sample ID: Buckman08-10-16994

Dear Mr. Greene;

On June 24, 2010, ARS International received one (1) water sample to be analyzed for Low Level Tritium.

The samples were processed and 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)
10-3478	Buckman08-10-16994	ARS1-10-01408-001

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."

Signature	Title	Date
	Laboratory Management, ARS International	9-29-10

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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: ARS1-10-01408
Client Sample ID: BUCKMAN08-10-16994
Sample Collection Date: 06/22/10
Sample Matrix: Aqueous

Request or PO Number: 10-3478
ARS Sample ID: ARS1-10-01408-001
Date Received: 06/24/10
Report Date: 09/28/10

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	0.710	0.250	0.750	0.360	U	TU	ARS-040	09/27/10 00:00	JR	N/A

NOTES: Project Cost Code WEPR 1158W100

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

QC Results Report

Sample Delivery Group: ARS1-10-01408
Date Received: 6/24/2010

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-B10-03243	LCS	H3	8.240	1.270	0.630	8.489		TU	ARS-040	9/21/10 0:00	JR	97	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-B10-03243	MBL	H3	-0.270	0.170	0.550	NA	U	TU	ARS-040	9/21/10 0:00	JR

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-B10-03243	LCSD	H3	8.240	1.270	7.920	1.220		TU	ARS-040	9/21/10 0:00	JR	0.13	< 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-B10-03243	LCSD	H3	8.240	1.270	7.920	1.220		TU	ARS-040	9/21/10 0:00	JR	0.36	< 3

Susan Reese
Project Manager Review

LELAP Certificate# 01949 NELAP Certificate # E87558

Expected Value Calculations LANL

ARS Batch Number: ARS1-B09 - 03243

LCS	**CALCULATED EXPECTED VALUE**	=	pCi/L 27.344		TU 8.489	
			Range	21.875	-	32.813
LCSD	**CALCULATED EXPECTED VALUE**	=	27.194		8.443	
			Range	21.756	-	32.633

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Samples

QC Evaluation

EPA Method: ARS-040
Batch ID: ARS1-B10-03243
SDG's: ARS1-10-01366; 1375; 1407; 1408

LCS	26.5500	**CSU (2s)**	8.0100
LCSD	25.5100	**CSU-D (2s)**	7.7000

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

DER $\frac{1.04}{5.555405}$ = 0.187205 **< 3**

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

%RPD $\frac{1.04}{26.03}$ *100 = 3.99539 **< 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 = $\frac{1.04}{15.7100}$ 0.066199873 **<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	-0.87	1.05	1.78	
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 = -0.87
CSU = 1.05
Is ACT<1.65*CSU? YES

ARS Tritium Enrichment Calculations

Enrichment Factor Curve coeff. - Power y = a * X^b		Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	8.978E-01	a	-2.319E-06
b	-9.611E-01	b	2.724E-03
c		c	-1.060E+00
		d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	TU
Coverage Factor	1	UCF	7.151
		Aliquot must be entered in liters!!	

Procedures ARS-040 , ARS-060
ARS File ID Number ARS1-10-01366;1375;1407;1408
ARS Batch ID Number ARS1-B10-03243

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-B10-03243-01	505.85	2.01	11.16	2.07	9.09	0.02	42.73	6	1.72	533.75	0.3700	0.00501	L	2/25/2009	9/21/2010	360	360	0.92362	8.24	0.28	0.28	1.27	0.63	0.31	TU
ARS1-B10-03243-02	507.30	2.02	11.04	2.08	8.96	0.02	43.45	6	1.72	528.99	0.3679	0.00500	L	2/25/2009	9/21/2010	360	360	0.92362	7.92	0.28	0.28	1.22	0.62	0.30	TU
ARS1-B10-03243-03	513.93	2.02	10.80	2.08	8.72	0.02	45.16	2	1.72	524.85	0.3662	0.00502	L	9/27/2010	9/21/2010	360	360	1.00081	-0.27	0.16	0.16	0.17	0.55	0.27	TU
ARS1-B10-03243-04	456.76	2.00	12.28	2.06	10.22	0.02	34.61	2	1.72	522.56	0.3652	0.00438	L	6/15/2010	9/21/2010	360	360	0.98649	-0.31	0.25	0.25	0.25	0.84	0.41	TU
ARS1-B10-03243-05	501.93	2.00	11.46	2.06	9.40	0.02	41.07	18	1.72	539.43	0.3724	0.00504	L	6/15/2010	9/22/2010	360	360	0.98635	29.39	0.43	0.43	4.43	0.61	0.30	TU
ARS1-B10-03243-06	487.31	2.02	8.61	2.08	6.53	0.01	56.66	1	1.69	503.87	0.3592	0.00477	L	6/11/2010	9/22/2010	360	360	0.98581	-0.29	0.14	0.14	0.14	0.48	0.23	TU
ARS1-B10-03243-07	517.96	2.00	13.47	2.06	11.41	0.02	35.13	1	1.69	542.02	0.3736	0.00500	L	6/9/2010	9/23/2010	360	360	0.9854	-0.48	0.20	0.20	0.21	0.71	0.34	TU
ARS1-B10-03243-08	502.50	2.01	12.58	2.07	10.51	0.02	36.93	2	1.69	483.29	0.3547	0.00501	L	6/9/2010	9/23/2010	360	360	0.9854	-0.41	0.20	0.20	0.21	0.71	0.34	TU
ARS1-B10-03243-09	507.44	2.00	12.86	2.06	10.80	0.02	36.32	2	1.69	525.59	0.3665	0.00501	L	6/9/2010	9/23/2010	360	360	0.9854	-0.19	0.20	0.20	0.21	0.69	0.34	TU
ARS1-B10-03243-10	502.62	2.00	11.97	2.06	9.91	0.02	39.09	2	1.69	519.41	0.3638	0.00502	L	6/14/2010	9/24/2010	360	360	0.98594	-0.38	0.19	0.19	0.20	0.65	0.32	TU
ARS1-B10-03243-11	508.30	2.00	11.45	2.06	9.39	0.02	41.61	2	1.69	517.85	0.3631	0.00502	L	6/9/2010	9/24/2010	360	360	0.98526	-0.30	0.18	0.18	0.18	0.61	0.30	TU
ARS1-B10-03243-12	526.71	2.00	12.79	2.06	10.73	0.02	37.88	2	1.72	543.02	0.3740	0.00503	L	6/9/2010	9/22/2010	360	360	0.98553	-0.24	0.19	0.19	0.19	0.66	0.32	TU
ARS1-B10-03243-13	504.27	2.00	12.11	2.06	10.05	0.02	38.68	2	1.69	539.59	0.3725	0.00502	L	6/11/2010	9/24/2010	360	360	0.98553	-0.24	0.19	0.19	0.19	0.64	0.31	TU
ARS1-B10-03243-14	499.24	2.01	11.92	2.07	9.85	0.02	39.06	2	1.69	536.32	0.3711	0.00500	L	6/11/2010	9/24/2010	360	360	0.98553	0.61	0.20	0.20	0.22	0.64	0.31	TU
ARS1-B10-03243-15	499.62	2.00	13.59	2.06	11.53	0.02	33.60	2	1.69	534.24	0.3702	0.00501	L	6/17/2010	9/25/2010	360	360	0.98622	0.71	0.23	0.23	0.25	0.74	0.36	TU
ARS1-B10-03243-16	509.75	2.01	10.24	2.07	8.17	0.02	47.70	6	1.69	544.95	0.3748	0.00502	L	6/16/2010	9/25/2010	360	360	0.98608	6.81	0.23	0.23	1.05	0.52	0.25	TU
ARS1-B10-03243-17	499.44	2.00	12.43	2.06	10.37	0.02	37.19	6	1.69	539.42	0.3724	0.00502	L	6/16/2010	9/25/2010	360	360	0.98608	8.79	0.30	0.30	1.35	0.67	0.33	TU

ARS Tritium Enrichment Calculations

Enrichment Factor Curve coeff. - Power y = a * x^b		Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	8.978E-01	a	-2.319E-06
b	-9.611E-01	b	2.724E-03
c		c	-1.060E+00
		d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	pCi
Coverage Factor	1.96	UCF	2.22

Procedures ARS-040 , ARS-060
ARS File ID Number ARS1-10-01366;1375;1407;1408
ARS Batch ID Number ARS1-B10-03243

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 1.96s CU	Combined Standard Uncertainty 1.96s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
ARS1-B10-03243-01	505.85	2.01	11.16	2.07	9.09	0.02	42.73	6	1.72	533.75	0.3700	0.00501	L	2/25/2009	9/21/2010	360	360	0.92362	26.55	0.90	1.77	8.01	2.03	0.99	pCi/L
ARS1-B10-03243-02	507.30	2.02	11.04	2.08	8.96	0.02	43.45	6	1.72	528.99	0.3679	0.00500	L	2/25/2009	9/21/2010	360	360	0.92362	25.51	0.89	1.74	7.70	2.01	0.98	pCi/L
ARS1-B10-03243-03	513.93	2.02	10.80	2.08	8.72	0.02	45.16	2	1.72	524.85	0.3662	0.00502	L	9/27/2010	9/21/2010	360	360	1.00081	-0.87	0.52	1.01	1.05	1.78	0.87	pCi/L
ARS1-B10-03243-04	456.76	2.00	12.28	2.06	10.22	0.02	34.61	2	1.72	522.56	0.3652	0.00438	L	6/15/2010	9/21/2010	360	360	0.98649	-0.99	0.79	1.55	1.58	2.71	1.33	pCi/L
ARS1-B10-03243-05	501.93	2.00	11.46	2.06	9.40	0.02	41.07	18	1.72	539.43	0.3724	0.00504	L	6/15/2010	9/22/2010	360	360	0.98635	94.68	1.38	2.70	27.97	1.95	0.95	pCi/L
ARS1-B10-03243-06	487.31	2.02	8.61	2.08	6.53	0.01	56.66	1	1.69	503.87	0.3592	0.00477	L	6/11/2010	9/22/2010	360	360	0.98581	-0.94	0.44	0.87	0.91	1.54	0.75	pCi/L
ARS1-B10-03243-07	517.96	2.00	13.47	2.06	11.41	0.02	35.13	1	1.69	542.02	0.3736	0.00500	L	6/9/2010	9/23/2010	360	360	0.9854	-1.53	0.65	1.28	1.36	2.27	1.11	pCi/L
ARS1-B10-03243-08	502.50	2.01	12.58	2.07	10.51	0.02	36.93	2	1.69	483.29	0.3547	0.00501	L	6/9/2010	9/23/2010	360	360	0.9854	-1.32	0.66	1.29	1.34	2.27	1.11	pCi/L
ARS1-B10-03243-09	507.44	2.00	12.86	2.06	10.80	0.02	36.32	2	1.69	525.59	0.3665	0.00501	L	6/9/2010	9/23/2010	360	360	0.9854	-0.62	0.66	1.28	1.30	2.24	1.09	pCi/L
ARS1-B10-03243-10	502.62	2.00	11.97	2.06	9.91	0.02	39.09	2	1.69	519.41	0.3638	0.00502	L	6/14/2010	9/24/2010	360	360	0.98594	-1.22	0.60	1.18	1.23	2.09	1.02	pCi/L
ARS1-B10-03243-11	508.30	2.00	11.45	2.06	9.39	0.02	41.61	2	1.69	517.85	0.3631	0.00502	L	6/9/2010	9/24/2010	360	360	0.98526	-0.96	0.57	1.12	1.15	1.97	0.96	pCi/L
ARS1-B10-03243-12	526.71	2.00	12.79	2.06	10.73	0.02	37.88	2	1.72	543.02	0.3740	0.00503	L	6/9/2010	9/22/2010	360	360	0.98553	-0.77	0.62	1.21	1.23	2.11	1.03	pCi/L
ARS1-B10-03243-13	504.27	2.00	12.11	2.06	10.05	0.02	38.68	2	1.69	539.59	0.3725	0.00502	L	6/11/2010	9/24/2010	360	360	0.98553	-0.76	0.60	1.18	1.20	2.06	1.01	pCi/L
ARS1-B10-03243-14	499.24	2.01	11.92	2.07	9.85	0.02	39.06	2	1.69	536.32	0.3711	0.00500	L	6/11/2010	9/24/2010	360	360	0.98553	1.95	0.64	1.25	1.38	2.06	1.01	pCi/L
ARS1-B10-03243-15	499.62	2.00	13.59	2.06	11.53	0.02	33.60	2	1.69	534.24	0.3702	0.00501	L	6/17/2010	9/25/2010	360	360	0.98622	2.27	0.74	1.45	1.60	2.39	1.17	pCi/L
ARS1-B10-03243-16	509.75	2.01	10.24	2.07	8.17	0.02	47.70	6	1.69	544.95	0.3748	0.00502	L	6/16/2010	9/25/2010	360	360	0.98608	21.94	0.74	1.46	6.61	1.66	0.81	pCi/L
ARS1-B10-03243-17	499.44	2.00	12.43	2.06	10.37	0.02	37.19	6	1.69	539.42	0.3724	0.00502	L	6/16/2010	9/25/2010	360	360	0.98608	28.32	0.96	1.88	8.54	2.14	1.05	pCi/L

ARS Tritium Enrichment Calculations

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

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	pCi
Coverage Factor	1	UCF	2.22

Procedures ARS-040 , ARS-060
ARS File ID Number ARS1-10-01366;1375;1407;1408
ARS Batch ID Number ARS1-B10-03243

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-B10-03243-01	505.85	2.01	11.16	2.07	9.09	0.02	42.73	6	1.72	533.75	0.3700	0.00501	L	2/25/2009	9/21/2010	360	360	0.92362	26.55	0.90	0.90	4.08	2.03	0.99	pCi/L
ARS1-B10-03243-02	507.30	2.02	11.04	2.08	8.96	0.02	43.45	6	1.72	528.99	0.3679	0.00500	L	2/25/2009	9/21/2010	360	360	0.92362	25.51	0.89	0.89	3.93	2.01	0.98	pCi/L
ARS1-B10-03243-03	513.93	2.02	10.80	2.08	8.72	0.02	45.16	2	1.72	524.85	0.3662	0.00502	L	9/27/2010	9/21/2010	360	360	1.00081	-0.87	0.52	0.52	0.53	1.78	0.87	pCi/L
ARS1-B10-03243-04	456.76	2.00	12.28	2.06	10.22	0.02	34.61	2	1.72	522.56	0.3652	0.00438	L	6/15/2010	9/21/2010	360	360	0.98649	-0.99	0.79	0.79	0.81	2.71	1.33	pCi/L
ARS1-B10-03243-05	501.93	2.00	11.46	2.06	9.40	0.02	41.07	18	1.72	539.43	0.3724	0.00504	L	6/15/2010	9/22/2010	360	360	0.98635	94.68	1.38	1.38	14.27	1.95	0.95	pCi/L
ARS1-B10-03243-06	487.31	2.02	8.61	2.08	6.53	0.01	56.66	1	1.69	503.87	0.3592	0.00477	L	6/11/2010	9/22/2010	360	360	0.98581	-0.94	0.44	0.44	0.46	1.54	0.75	pCi/L
ARS1-B10-03243-07	517.96	2.00	13.47	2.06	11.41	0.02	35.13	1	1.69	542.02	0.3736	0.00500	L	6/9/2010	9/23/2010	360	360	0.9854	-1.53	0.65	0.65	0.69	2.27	1.11	pCi/L
ARS1-B10-03243-08	502.50	2.01	12.58	2.07	10.51	0.02	36.93	2	1.69	483.29	0.3547	0.00501	L	6/9/2010	9/23/2010	360	360	0.9854	-1.32	0.66	0.66	0.69	2.27	1.11	pCi/L
ARS1-B10-03243-09	507.44	2.00	12.86	2.06	10.80	0.02	36.32	2	1.69	525.59	0.3665	0.00501	L	6/9/2010	9/23/2010	360	360	0.9854	-0.62	0.66	0.66	0.66	2.24	1.09	pCi/L
ARS1-B10-03243-10	502.62	2.00	11.97	2.06	9.91	0.02	39.09	2	1.69	519.41	0.3638	0.00502	L	6/14/2010	9/24/2010	360	360	0.98594	-1.22	0.60	0.60	0.63	2.09	1.02	pCi/L
ARS1-B10-03243-11	508.30	2.00	11.45	2.06	9.39	0.02	41.61	2	1.69	517.85	0.3631	0.00502	L	6/9/2010	9/24/2010	360	360	0.98526	-0.96	0.57	0.57	0.59	1.97	0.96	pCi/L
ARS1-B10-03243-12	526.71	2.00	12.79	2.06	10.73	0.02	37.88	2	1.72	543.02	0.3740	0.00503	L	6/9/2010	9/22/2010	360	360	0.98553	-0.77	0.62	0.62	0.63	2.11	1.03	pCi/L
ARS1-B10-03243-13	504.27	2.00	12.11	2.06	10.05	0.02	38.68	2	1.69	539.59	0.3725	0.00502	L	6/11/2010	9/24/2010	360	360	0.98553	-0.76	0.60	0.60	0.61	2.06	1.01	pCi/L
ARS1-B10-03243-14	499.24	2.01	11.92	2.07	9.85	0.02	39.06	2	1.69	536.32	0.3711	0.00500	L	6/11/2010	9/24/2010	360	360	0.98553	1.95	0.64	0.64	0.70	2.06	1.01	pCi/L
ARS1-B10-03243-15	499.62	2.00	13.59	2.06	11.53	0.02	33.60	2	1.69	534.24	0.3702	0.00501	L	6/17/2010	9/25/2010	360	360	0.98622	2.27	0.74	0.74	0.82	2.39	1.17	pCi/L
ARS1-B10-03243-16	509.75	2.01	10.24	2.07	8.17	0.02	47.70	6	1.69	544.95	0.3748	0.00502	L	6/16/2010	9/25/2010	360	360	0.98608	21.94	0.74	0.74	3.37	1.66	0.81	pCi/L
ARS1-B10-03243-17	499.44	2.00	12.43	2.06	10.37	0.02	37.19	6	1.69	539.42	0.3724	0.00502	L	6/16/2010	9/25/2010	360	360	0.98608	28.32	0.96	0.96	4.35	2.14	1.05	pCi/L

ARS INTERNATIONAL

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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-B10-03243

Method ARS-054 **Analysis** LSC-A-022 **Matrix** AQ

Description TRITIUM IN WATER

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-03243-01	LCS	B-10230								
ARS1-B10-03243-02	LCSD	B-10231								
ARS1-B10-03243-03	MBL									
ARS1-B10-03243-04	DUP									
ARS1-B10-03243-05	TRG			63283	ARS1-10-01366	001	1	CAPA-10-17584	STD	07/13/10
ARS1-B10-03243-06	DO			63284	ARS1-10-01366	002	1	CAPA-10-17601	STD	07/13/10
ARS1-B10-03243-07	TRG			63285	ARS1-10-01366	003	1	CAPA-10-17672	STD	07/13/10
ARS1-B10-03243-08	TRG			63286	ARS1-10-01366	004	1	CAPA-10-17734	STD	07/13/10
ARS1-B10-03243-09	TRG			63287	ARS1-10-01366	005	1	CAPA-10-17737	STD	07/13/10
ARS1-B10-03243-10	TRG			63288	ARS1-10-01366	006	1	CAPA-10-17856	STD	07/13/10
ARS1-B10-03243-11	TRG			63289	ARS1-10-01366	007	1	CAPA-10-17898	STD	07/13/10
ARS1-B10-03243-12	TRG			63290	ARS1-10-01366	008	1	CAPA-10-17910	STD	07/13/10
ARS1-B10-03243-13	TRG			63291	ARS1-10-01366	009	1	CAPA-10-17914	STD	07/13/10
ARS1-B10-03243-14	TRG			63412	ARS1-10-01375	001	1	GW56-10-15470	STD	07/13/10
ARS1-B10-03243-15	TRG			63413	ARS1-10-01375	002	1	GW56-10-15471	STD	07/13/10
ARS1-B10-03243-16	TRG			63699	ARS1-10-01407	001	1	CAPA-10-17577	STD	07/20/10
ARS1-B10-03243-17	TRG			63700	ARS1-10-01407	002	1	CAPA-10-17580	STD	07/20/10
ARS1-B10-03243-18	TRG			63701	ARS1-10-01407	003	1	CAPA-10-17949	STD	07/20/10
ARS1-B10-03243-19	TRG			63702	ARS1-10-01407	004	1	CAPA-10-18473	STD	07/20/10
ARS1-B10-03243-20	TRG			63703	ARS1-10-01407	005	1	CAPA-10-18479	STD	07/20/10
ARS1-B10-03243-21	TRG			63704	ARS1-10-01407	006	1	CAPA-10-19017	STD	07/20/10
ARS1-B10-03243-22	TRG			63705	ARS1-10-01407	007	1	CAPA-10-19021	STD	07/20/10
ARS1-B10-03243-23	TRG			63706	ARS1-10-01408	001	1	BUCKMAN08-10-16994	STD	07/20/10

71369 10-01366-001-1 XRAD
71370 10-01366-002-1 XRAD
71371 10-01366-003-1 XRAD
71372 10-01366-004-1 XRAD
71373 10-01366-005-1 XRAD
71374 10-01366-006-1 XRAD
71375 10-01366-007-1 XRAD
71376 10-01366-008-1 XRAD
71377 10-01366-009-1 XRAD
71378 10-01375-001-1 XRAD
71379 10-01375-002-1 XRAD
71380 10-01407-001-1 XRAD
71381 10-01407-002-1 XRAD
71382 10-01407-003-1 XRAD
71383 10-01407-004-1 XRAD
71384 10-01407-005-1 XRAD
71385 10-01407-006-1 XRAD
71386 10-01407-007-1 XRAD
71387 10-01408-001-1 XRAD

LCS Report
Analytical Batch: ARS1-B10-03243

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-10230	ARS1-B10-03243	ARS1-B10-03243-01	B-H3	S-0206	H-3	5	2.808406639	13.2224	18.2442	5.0218	WSTICKLE	5/17/2010			
B-10231	ARS1-B10-03243	ARS1-B10-03243-02	B-H3	S-0206	H-3	5	2.808406639	13.3064	18.315	5.0086	WSTICKLE	5/17/2010			

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
6477	ARS1-B10-03243	ARS1-B10-03243-01		5.01	g					JRABER	09/27/2010 08:54:26
6478	ARS1-B10-03243	ARS1-B10-03243-02		5	g					JRABER	09/27/2010 08:54:26
6479	ARS1-B10-03243	ARS1-B10-03243-03		5.02	g					JRABER	09/27/2010 08:54:26
6480	ARS1-B10-03243	ARS1-B10-03243-04		4.38	g					JRABER	09/27/2010 08:54:26
6481	ARS1-B10-03243	ARS1-B10-03243-05	CAPA-10-17584	5.04	g	71369				JRABER	09/27/2010 08:54:26
6482	ARS1-B10-03243	ARS1-B10-03243-06	CAPA-10-17601	4.77	g	71370				JRABER	09/27/2010 08:54:27
6483	ARS1-B10-03243	ARS1-B10-03243-07	CAPA-10-17672	5	g	71371				JRABER	09/27/2010 08:54:27
6484	ARS1-B10-03243	ARS1-B10-03243-08	CAPA-10-17734	5.01	g	71372				JRABER	09/27/2010 08:54:28
6485	ARS1-B10-03243	ARS1-B10-03243-09	CAPA-10-17737	5.01	g	71373				JRABER	09/27/2010 08:54:29
6486	ARS1-B10-03243	ARS1-B10-03243-10	CAPA-10-17856	5.02	g	71374				JRABER	09/27/2010 08:54:29
6487	ARS1-B10-03243	ARS1-B10-03243-11	CAPA-10-17898	5.02	g	71375				JRABER	09/27/2010 08:54:29
6488	ARS1-B10-03243	ARS1-B10-03243-12	CAPA-10-17910	5.03	g	71376				JRABER	09/27/2010 08:54:30
6489	ARS1-B10-03243	ARS1-B10-03243-13	CAPA-10-17914	5.02	g	71377				JRABER	09/27/2010 08:54:30
6490	ARS1-B10-03243	ARS1-B10-03243-14	GW56-10-15470	5	g	71378				JRABER	09/27/2010 08:54:31
6491	ARS1-B10-03243	ARS1-B10-03243-15	GW56-10-15471	5.01	g	71379				JRABER	09/27/2010 08:54:31
6492	ARS1-B10-03243	ARS1-B10-03243-16	CAPA-10-17577	5.02	g	71380				JRABER	09/27/2010 08:54:32
6493	ARS1-B10-03243	ARS1-B10-03243-17	CAPA-10-17580	5.02	g	71381				JRABER	09/27/2010 08:54:32
6494	ARS1-B10-03243	ARS1-B10-03243-18	CAPA-10-17949	3.79	g	71382				JRABER	09/27/2010 08:54:33
6495	ARS1-B10-03243	ARS1-B10-03243-19	CAPA-10-18473	5.01	g	71383				JRABER	09/27/2010 08:54:33
6496	ARS1-B10-03243	ARS1-B10-03243-20	CAPA-10-18479	5.01	g	71384				JRABER	09/27/2010 08:54:34
6497	ARS1-B10-03243	ARS1-B10-03243-21	CAPA-10-19017	5.01	g	71385				JRABER	09/27/2010 08:54:34
6498	ARS1-B10-03243	ARS1-B10-03243-22	CAPA-10-19021	5.02	g	71386				JRABER	09/27/2010 08:54:35
6499	ARS1-B10-03243	ARS1-B10-03243-23	BUCKMAN08-10-16994	5.02	g	71387				JRABER	09/27/2010 08:54:35

ARS, International
Port Allen Lab

Tritium Enrichment Data

Printed: 9/24/2010 4:38 PM

Procedures: **ARS-040**

Date: 8/6/2010

ARS File ID Numbers: ARS1-10-01366, 1375, 1407, 1408

ARS Batch ID: ARS1-B10-03243

	A Batch ID:	Enrichment Cell No.	Tare Wt of Electrolysis Cell & Electrodes	Tare Wt Reservoir	m_i Wt Na_2O_2	Gross Weight of Sample Reservoir	V_i 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	V_r 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	Aliquot Net Sample	*Wt of Vial, Sample& Dead Water Filler If used*	*Net Dead Water Added*	Tare Wt b/t Cocktail	Gross Wt Vial + Sample + Cocktail
1	ARS1-B10-03243-01	3	336.42	198.04	2.01	703.89	505.85	8-6-2010 1009	5.00	2.0	9-2-2010 0913	2.0	545.62	**11.18**	45.33	N/A,N/A	108.05	115.73	7.68	6.33	11.34	**5.01**	**0.00**	**0.00**	11.34	26.39
2	ARS1-B10-03243-02	37	336.74	194.23	2.02	701.53	507.30	8-6-2010 1015	5.00	2.0	9-2-2010 1419	2.0	544.01	**11.04**	45.34	N/A,N/A	101.81	109.49	7.68	6.44	11.44	**5.00**	**0.00**	**0.00**	11.44	26.50
3	ARS1-B10-03243-03	41	332.29	188.80	2.02	702.73	513.93	8-6-2010 1018	5.00	2.0	9-4-2010 1318	2.0	531.89	**10.80**	47.59	N/A,7	111.93	120.12	8.19	6.43	11.45	**5.02**	**0.00**	**0.00**	11.45	26.49
4	ARS1-B10-03243-04	87	336.06	187.52	2.00	644.28	456.76	8-6-2010 1042	5.00	2.0	9-3-2010 1013	2.0	535.86	**12.28**	37.20	N/A,11	120.82	125.22	4.40	6.41	10.79	**4.38**	**11.41**	**0.82**	11.41	26.43
5	ARS1-B10-03243-05	90	336.81	191.09	2.00	693.02	501.93	8-6-2010 1045	5.00	2.0	9-2-2010 1115	2.0	539.36	**11.46**	43.84	5,N/A	97.91	105.71	7.80	6.41	11.45	**5.04**	**0.00**	**0.00**	11.45	26.46
6	ARS1-B10-03243-06	89	337.06	191.93	2.02	659.24	467.31	8-6-2010 1058	5.00	2.0	9-4-2010 0825	2.0	537.60	**8.61**	54.26	G,N/A	99.80	104.63	4.83	6.44	11.21	**4.77**	**11.48**	**0.27**	11.48	26.51
7	ARS1-B10-03243-07	48	336.06	191.70	2.00	709.66	517.96	8-6-2010 1135	5.00	2.0	9-5-2010 1425	2.0	541.23	**13.47**	38.46	N/A,N/A	107.40	117.27	9.87	6.58	11.58	**5.00**	**0.00**	**0.00**	11.58	26.61
8	ARS1-B10-03243-08	47	336.52	200.60	2.01	703.10	502.50	8-6-2010 1142	5.00	2.0	9-5-2010 1547	2.0	549.70	**12.58**	39.91	N/A,N/A	99.15	107.66	8.51	6.35	11.36	**5.01**	**0.00**	**0.00**	11.36	26.42
9	ARS1-B10-03243-09	91	335.10	187.11	2.00	694.55	507.44	8-6-2010 1151	5.00	2.0	9-6-2010 1302	2.0	535.07	**12.86**	38.46	N/A,N/A	117.09	126.56	9.47	6.47	11.48	**5.01**	**0.00**	**0.00**	11.48	26.52
10	ARS1-B10-03243-10	69	335.03	194.95	2.00	697.47	502.52	8-6-2010 1345	5.00	2.0	9-4-2010 1546	2.0	541.95	**11.97**	41.96	N/A,N/A	101.72	110.07	8.35	6.44	11.46	**5.02**	**0.00**	**0.00**	11.46	26.50
11	ARS1-B10-03243-11	71	340.75	195.29	2.00	703.59	508.30	8-6-2010 1352	5.00	2.0	9-6-2010 1549	2.0	547.49	**11.45**	44.39	N/A,7	116.60	124.28	7.68	6.58	11.60	**5.02**	**0.00**	**0.00**	11.60	26.63
12	ARS1-B10-03243-12	97	335.46	194.51	2.00	721.22	526.71	8-6-2010 1356	5.00	2.0	9-4-2010 0857	2.0	542.76	**12.79**	41.18	5,N/A	97.92	106.78	8.86	6.43	11.46	**5.03**	**0.00**	**0.00**	11.46	26.48
13	ARS1-B10-03243-13	50	335.19	203.13	2.00	707.40	504.27	8-6-2010 1650	5.00	2.0	9-5-2010 1346	2.0	550.43	**12.11**	41.61	G,N/A	99.08	107.30	8.22	6.61	11.63	**5.02**	**0.00**	**0.00**	11.63	26.66
14	ARS1-B10-03243-14	60	338.07	157.72	2.01	656.96	499.24	8-16-2010 1423	5.00	2.0	9-6-2010 1642	2.0	507.71	**11.92**	41.65	N/A,N/A	101.63	110.01	8.38	6.41	11.41	**5.00**	**0.00**	**0.00**	11.41	26.44
15	ARS1-B10-03243-15	6	332.41	205.42	2.00	705.04	499.62	8-16-2010 v 143	5.00	2.0	9-4-2010 0912	2.0	551.42	**13.59**	36.76	N/A,C	105.66	113.71	8.05	6.44	11.45	**5.01**	**0.00**	**0.00**	11.45	26.48
16	ARS1-B10-03243-16	78	334.02	200.63	2.01	710.38	509.75	8-6-2010 1653	5.00	2.0	9-5-2010 1323	2.0	544.89	**10.24**	49.78	N/A,N/A	117.22	124.23	7.01	6.75	11.77	**5.02**	**0.00**	**0.00**	11.77	26.81
17	ARS1-B10-03243-17	29	336.87	188.47	2.00	687.91	499.44	8-6-2010 1658	5.00	2.0	9-5-2010 1246	2.0	537.77	**12.43**	40.13	N/A,N/A	101.60	110.68	9.08	6.54	11.56	**5.02**	**0.00**	**0.00**	11.56	26.59
18	ARS1-B10-03243-18	22	336.88	191.63	2.01	688.76	497.13	8-16-2010 1435	5.00	2.0	9-4-2010 1346	2.0	539.68	**11.17**	44.51	N/A,11	115.09	119.00	3.91	6.54	10.33	**3.79**	**11.72**	**1.39**	11.72	26.74
19	ARS1-B10-03243-19	54	334.98	191.30	2.00	685.48	494.18	8-16-2010 1443	5.00	2.0	9-6-2010 1014	2.0	537.53	**11.25**	43.53	N/A,7	116.59	124.13	7.54	6.40	11.41	**5.01**	**0.00**	**0.00**	11.41	26.49
20	ARS1-B10-03243-20	61	335.40	195.37	2.00	697.25	501.88	8-16-2010 1458	5.00	2.0	9-6-2010 0945	2.0	542.55	**11.78**	42.60	N/A,N/A	108.11	116.49	8.38	6.39	11.40	**5.01**	**0.00**	**0.00**	11.40	26.43
21	ARS1-B10-03243-21	86	335.35	196.51	2.00	696.42	499.91	8-16-2010 1506	5.00	2.0	9-7-2010 1643	2.0	543.79	**11.93**	41.90	N/A,C	99.15	107.41	8.26	6.52	11.53	**5.01**	**0.00**	**0.00**	11.53	26.55
22	ARS1-B10-03243-22	39	335.25	187.59	2.01	695.88	508.29	8-16-2010 1514	5.00	2.0	9-7-2010 1649	2.0	536.81	**13.97**	36.96	5,N/A	97.82	107.94	10.12	6.44	11.46	**5.02**	**0.00**	**0.00**	11.46	26.48
23	ARS1-B10-03243-23	92	336.66	195.48	2.00	700.38	504.90	8-16-2010 1521	5.00	2.0	9-8-2010 0849	2.0	545.98	**13.84**	36.46	G,N/A	99.80	109.33	9.53	6.43	11.45	**5.02**	**0.00**	**0.00**	11.45	26.48

S:\Laboratory Department\LabDocuments\LowLevelTritium\2010 LowLevelTritiumData\ARS1-B10-03243

Chemist Signature Jimmy D. Rabun

Net Wt of Cocktail Added
15.05
15.06
15.04
15.01
15.01
15.03
15.03
15.03
15.04
15.04
15.05
15.02
15.03
15.03
15.03
15.03
15.03
15.02
15.08
15.03
15.02
15.02
15.03

S:\Laboratory Department\LabDocuments\LowLevelTritium\2010 LowLevelTritiumData\ARS1-B10-03243

Chemist Signature: Jammy D. Rabun

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\20100920_1928
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100920_1928\20100920_1928.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100920_1928\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100920_1928\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL H3
   Quench Indicator: tSIE/AEC
   External Std Terminator (sec): 0.5 2s%
   Pre-Count Delay (min): 0.00
Quench Set:
   Low Energy: LL H3 PLASTIC
Count Time (min): 360.00
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	0.0	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

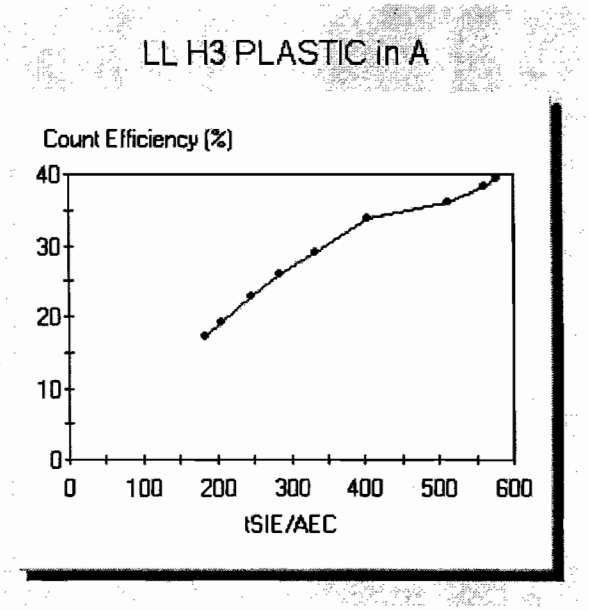
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 09/08/2009
Date Modified:
LL H3 PLASTIC in A

tSIE/AEC	Count Efficiency (%)
577.71	39.37
561.32	38.19
514.09	36.15
404.21	33.71
334.90	29.12
284.93	26.04
246.14	22.78
207.51	19.18
185.88	17.18

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	360.00	1.716	4.62	537.43	37.16	9/20/2010	7:37:37 PM	
2	2	B10-03243-01	360.00	6.033	16.30	533.75	37.00	9/21/2010	1:55:30 AM	
2	3	B10-03243-02	360.00	5.953	16.18	528.99	36.79	9/21/2010	8:11:53 AM	
2	4	B10-03243-03	360.00	1.564	4.27	524.85	36.62	9/21/2010	2:26:13 PM	
2	5	B10-03243-04	360.00	1.611	4.41	522.56	36.52	9/21/2010	8:39:13 PM	
2	6	B10-03243-05	360.00	17.744	47.64	539.43	37.24	9/22/2010	2:51:44 AM	
Missing vial 7.										
Missing vial 8.										
Missing vial 9.										
Missing vial 10.										
Missing vial 11.										
Missing vial 12.										
2	13	B10-03243-12	360.00	1.574	4.21	543.02	37.40	9/22/2010	9:04:49 AM	

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	360.00	1.685	4.68	508.34	36.02	9/22/2010	5:17:05 PM	
2	2	B10-03243-06	360.00	1.498	4.17	503.87	35.92	9/22/2010	11:29:18 PM	
2	3	B10-03243-07	360.00	1.477	3.95	542.02	37.36	9/23/2010	5:41:33 AM	
2	4	B10-03243-08	360.00	1.510	4.26	483.29	35.47	9/23/2010	11:53:50 AM	
2	5	B10-03243-09	360.00	1.621	4.42	525.59	36.65	9/23/2010	6:06:09 PM	
2	6	B10-03243-10	360.00	1.511	4.15	519.41	36.38	9/24/2010	12:18:26 AM	
2	7	B10-03243-11	360.00	1.538	4.24	517.85	36.31	9/24/2010	6:30:41 AM	
2	8	B10-03243-13	360.00	1.635	4.39	539.59	37.25	9/24/2010	12:42:55 PM	
2	9	B10-03243-14	360.00	1.661	4.48	536.32	37.11	9/24/2010	6:55:09 PM	
2	10	B10-03243-15	360.00	1.601	4.33	534.24	37.02	9/25/2010	1:07:26 AM	
2	11	B10-03243-16	360.00	5.946	15.86	544.95	37.48	9/25/2010	7:19:39 AM	
2	12	B10-03243-17	360.00	5.636	15.13	539.42	37.24	9/25/2010	1:31:53 PM	
2	13	B10-03243-18	360.00	6.681	18.60	503.66	35.92	9/25/2010	7:44:21 PM	
2	14	B10-03243-19	360.00	1.637	4.42	533.83	37.00	9/26/2010	1:56:34 AM	
2	15	B10-03243-20	360.00	1.595	4.33	529.51	36.82	9/26/2010	8:08:50 AM	
2	16	B10-03243-21	360.00	1.691	4.54	539.34	37.24	9/26/2010	2:21:07 PM	
2	17	B10-03243-22	360.00	1.608	4.33	537.05	37.14	9/26/2010	8:33:20 PM	
2	18	B10-03243-23	360.00	1.664	4.48	537.16	37.15	9/27/2010	2:45:36 AM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
9-20-10	0944	S-0112-R2	Veris	1139	
↓	↓	S-0112-R3	↓	↓	
↓	↓	S-0112-R4	↓	↓	
↓	↓	S-0112-R5	↓	↓	
9-20-2010	0955	SINC 51	QA	QA	JDR
↓	↓	Background	Bio-03243	1928	JDR
↓	↓	Bio-03243-01	↓	↓	JDR
↓	↓	Bio-03243-02	↓	↓	JDR
↓	↓	Bio-03243-03	↓	↓	JDR
↓	↓	Bio-03243-04	↓	↓	JDR
↓	↓	Bio-03243-05	↓	↓	JDR
↓	↓	Bio-03243-06	↓	↓	JDR
↓	↓	Bio-03243-07	↓	↓	JDR
↓	↓	Bio-03243-08	↓	↓	JDR
↓	↓	Bio-03243-09	REPEAT	↓	JDR
↓	↓	Bio-03243-10	↓	9-22-2010 ↓	JDR
↓	↓	Bio-03243-11	↓	↓	JDR
↓	↓	Bio-03243-12	↓	↓	JDR
↓	↓	Bio-03243-13	↓	↓	JDR
↓	↓	Bio-03243-14	↓	↓	JDR

Reviewed By: JB Date: 9-27-10
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
9-20-10	0955	B10-03243-15	B10-03243	1928	JDR
↓	↓	B10-03243-16	↓	↓	JDR
↓	↓	B10-03243-17	↓	↓	JDR
↓	↓	B10-03243-18	↓	↓	JDR
↓	↓	B10-03243-19	↓	↓	JDR
↓	↓	B10-03243-20	↓	↓	JDR
↓	↓	B10-03243-21	↓	↓	JDR
↓	↓	B10-03243-22	↓	↓	JDR
↓	↓	B10-03243-23	↓	↓	JDR
~~JDR 9-22-2010~~ ~~9-22-2010~~					
	N/A				
		JDR			
		9-27-2010			

Reviewed By: JD Date: 9-27-10
Initials

Technical Notes

Batch	ARS1-B10-03243
Analysis Code	LSC-A-022
Procedure No	ARS-054
Matrix	AQ

#	Date	Dept	Batch Technical Notes	User ID
1	08/11/10 09:35	CHEMISTRY	Samples B10-03243-14 and B10-03243-15 both had large amounts of solids in sample. Possibility that this may cause quenching if not all solids are removed by primary distillation.	JRABER
2	08/16/10 11:06	CHEMISTRY	Chiller operating bath was turned off while enrichment continued for all samples in batch. This lasted approximately 8-10 hours. I am unsure what affect if any this will have on analysis.	JRABER
3	08/20/10 08:57	CHEMISTRY	Voltage was NOT decreased to 2.8V for sample B10-03243-06 during enrichment. Only approx 4mL of sample is left in enrichment cell. I am unsure what affect this may have on analysis. If this causes duplicate criteria to fail, then I suggest using LCS and LCSD.	JRABER
4	09/22/10 16:23	CHEMISTRY	During counting, samples B10-03243-06 though B10-03243-11 were skipped by liquid scintillation counter.	JRABER

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

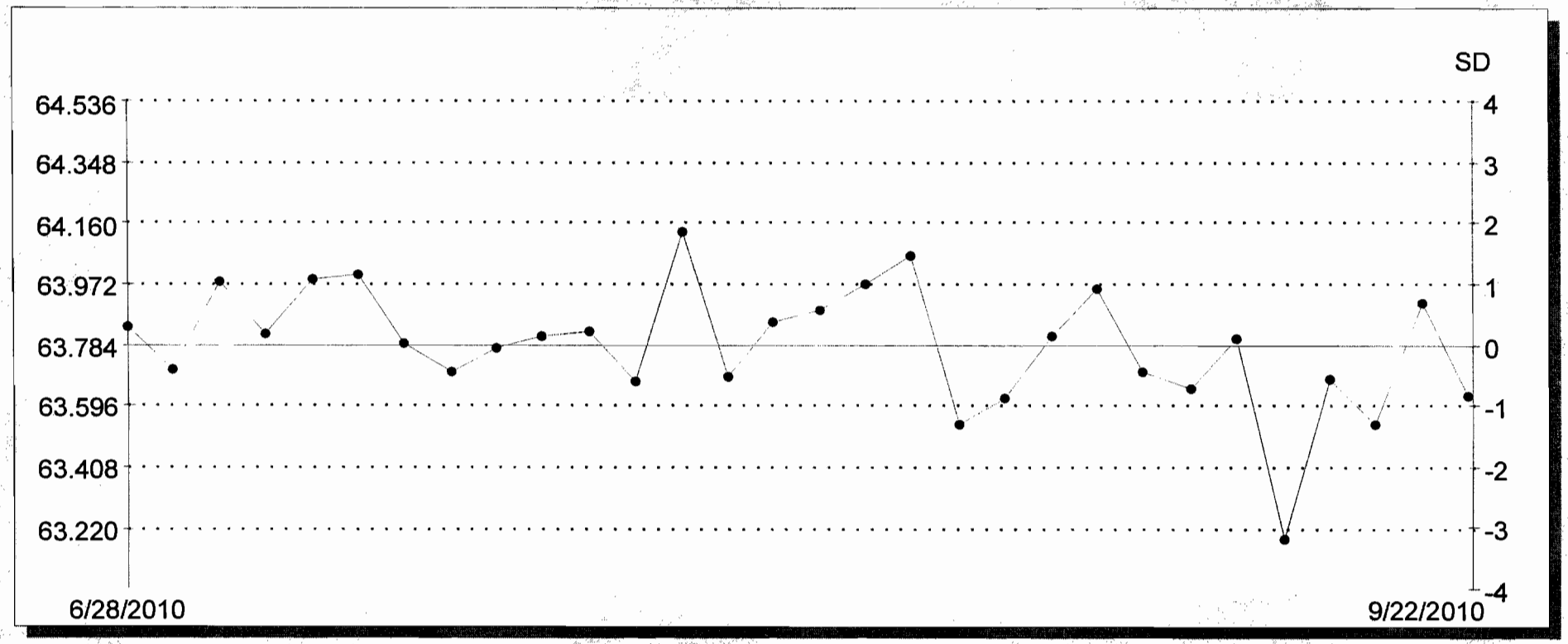
Low Level Tritium by Low Level Liquid Scintillation Counting

Control Charts

3H Efficiency
Total # pts : 5218
Valid # pts : 30
Mean : 63.79
SD : 0.19

Date	Value	Valid Pt
Jun 28, 2010	63.84	X
Jul 06, 2010	63.71	X
Jul 07, 2010	63.98	X
Jul 12, 2010	63.82	X
Jul 19, 2010	63.99	X
Jul 20, 2010	64.00	X
Jul 21, 2010	63.79	X
Jul 23, 2010	63.71	X
Jul 26, 2010	63.78	X
Jul 28, 2010	63.81	X
Aug 03, 2010	63.83	X
Aug 09, 2010	63.67	X
Aug 17, 2010	64.14	X
Aug 23, 2010	63.69	X
Aug 24, 2010	63.86	X
Aug 26, 2010	63.89	X
Aug 27, 2010	63.97	X
Aug 30, 2010	64.06	X
Aug 31, 2010	63.54	X
Aug 31, 2010	63.62	X
Sep 07, 2010	63.81	X
Sep 08, 2010	63.96	X
Sep 09, 2010	63.70	X
Sep 09, 2010	63.65	X
Sep 13, 2010	63.80	X
Sep 14, 2010	63.19	X
Sep 15, 2010	63.68	X
Sep 20, 2010	63.54	X
Sep 20, 2010	63.92	X
Sep 22, 2010	63.63	X

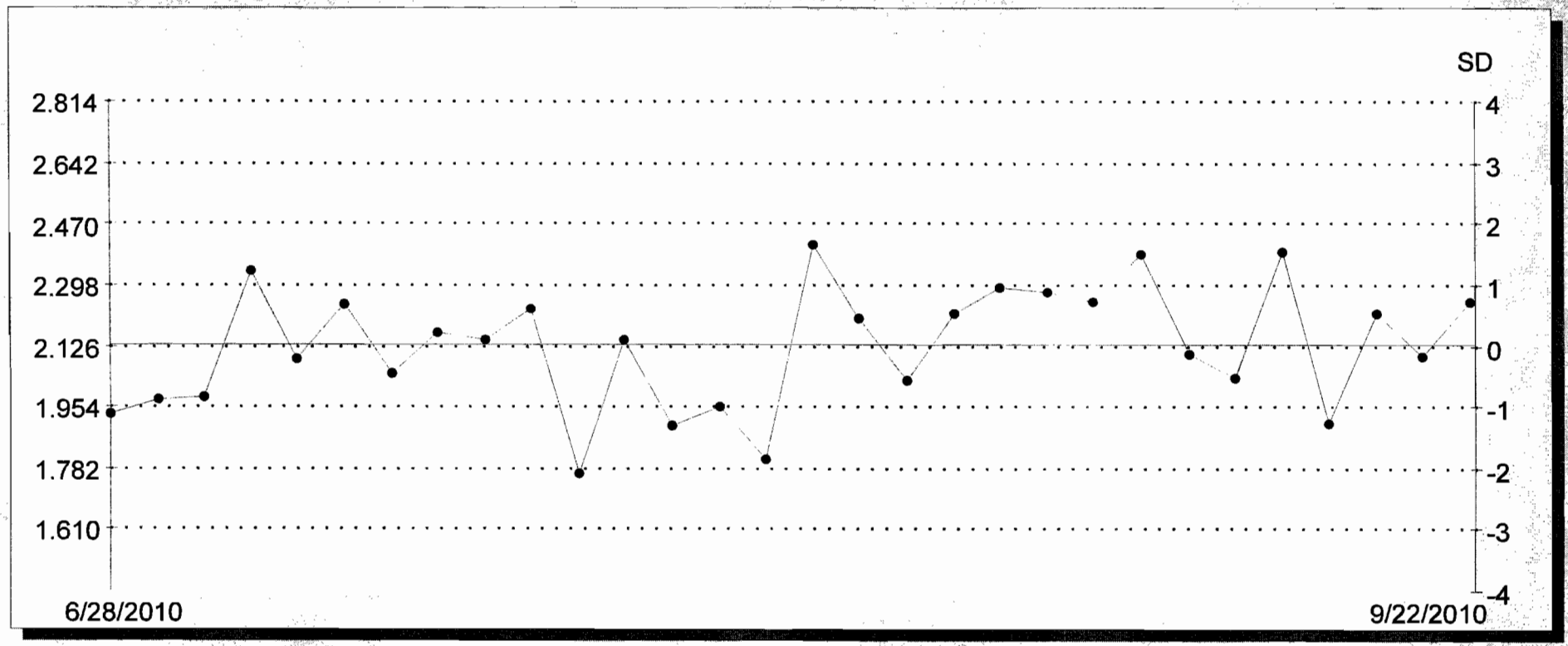
3H Efficiency
Total # pts : 5218
Valid # pts : 30
Mean : 63.79
SD : 0.19



3H Background
Total # pts : 5148
Valid # pts : 30
Mean : 2.13
SD : 0.17

Date	Value	Valid Pt
Jun 28, 2010	1.94	X
Jul 06, 2010	1.97	X
Jul 07, 2010	1.98	X
Jul 12, 2010	2.34	X
Jul 19, 2010	2.09	X
Jul 20, 2010	2.25	X
Jul 21, 2010	2.05	X
Jul 23, 2010	2.17	X
Jul 26, 2010	2.14	X
Jul 28, 2010	2.23	X
Aug 03, 2010	1.77	X
Aug 09, 2010	2.14	X
Aug 17, 2010	1.90	X
Aug 23, 2010	1.96	X
Aug 24, 2010	1.81	X
Aug 26, 2010	2.41	X
Aug 27, 2010	2.21	X
Aug 30, 2010	2.03	X
Aug 31, 2010	2.22	X
Aug 31, 2010	2.29	X
Sep 07, 2010	2.28	X
Sep 08, 2010	2.25	X
Sep 09, 2010	2.39	X
Sep 09, 2010	2.10	X
Sep 13, 2010	2.03	X
Sep 14, 2010	2.39	X
Sep 15, 2010	1.91	X
Sep 20, 2010	2.22	X
Sep 20, 2010	2.10	X
Sep 22, 2010	2.25	X

3H Background
Total # pts : 5148
Valid # pts : 30
Mean : 2.13
SD : 0.17



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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: ARS1-10-01366, 1375, 1407, 1408.
ARS Batch ID: ARS1-B10-03242

	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	B10-03242-04	120	1.979	1.915	37.88	5.04	15.100	pCi/L	175.4392	NO
2	B10-03242-05	120	1.553	1.915	37.92	5.03	-85.491	pCi/L	175.6025	NO
3	B10-03242-06	120	1.487	1.915	38.17	5.04	-100.216	pCi/L	174.1062	NO
4	B10-03242-07	120	1.642	1.915	38.94	5.00	-63.160	pCi/L	172.0288	NO
5	B10-03242-08	120	1.428	1.915	38.29	4.99	-114.813	pCi/L	175.2997	NO
6	B10-03242-09	120	1.639	1.915	39.16	4.98	-63.751	pCi/L	171.7493	NO
7	B10-03242-10	120	1.585	1.915	37.76	5.03	-78.264	pCi/L	176.3466	NO
8	B10-03242-11	120	1.380	1.915	38.69	4.97	-125.327	pCi/L	174.1855	NO
9	B10-03242-12	120	1.722	1.915	37.94	5.04	-45.465	pCi/L	175.1617	NO
10	B10-03242-13	120	1.304	1.915	34.76	5.06	-156.480	pCi/L	190.4306	NO
11	B10-03242-14	120	0.941	1.915	22.65	5.02	-385.864	pCi/L	294.5745	NO
12	B10-03242-15	120	1.540	1.915	37.93	4.97	-89.606	pCi/L	177.6756	NO
13	B10-03242-16	120	1.526	1.915	38.48	5.06	-89.993	pCi/L	172.021	NO
14	B10-03242-17	120	1.782	1.915	38.25	5.05	-31.015	pCi/L	173.398	NO
15	B10-03242-18	120	1.583	1.915	37.64	5.05	-78.676	pCi/L	176.2082	NO
16	B10-03242-19	120	1.432	1.915	38.26	5.01	-113.504	pCi/L	174.7368	NO
17	B10-03242-20	120	1.723	1.915	37.58	4.98	-46.213	pCi/L	178.9703	NO
18	B10-03242-21	120	1.656	1.915	38.16	5.00	-61.146	pCi/L	175.5451	NO
19	B10-03242-22	120	1.735	1.915	38.18	4.96	-42.816	pCi/L	176.8681	NO
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

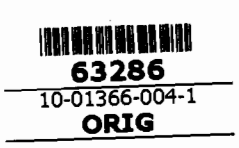
Analysis Batch Report

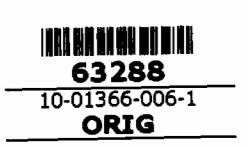
Analysis Batch ID ARS1-B10-03242

Method ARS-054 **Analysis** LSC-A-021 **Matrix** AQ

Description TRITIUM IN WATER

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-03242-01	LCS									
ARS1-B10-03242-02	LCSD									
ARS1-B10-03242-03	MBL									
ARS1-B10-03242-04	TRG				**ARS1-10-01366**	001	1	CAPA-10-17584		07/13/10
ARS1-B10-03242-05	TRG				**ARS1-10-01366**	002	1	CAPA-10-17601		07/13/10
ARS1-B10-03242-06	TRG				**ARS1-10-01366**	003	1	CAPA-10-17672		07/13/10
ARS1-B10-03242-07	TRG				**ARS1-10-01366**	004	1	CAPA-10-17734		07/13/10
ARS1-B10-03242-08	TRG				**ARS1-10-01366**	005	1	CAPA-10-17737		07/13/10
ARS1-B10-03242-09	TRG				**ARS1-10-01366**	006	1	CAPA-10-17856		07/13/10
ARS1-B10-03242-10	TRG				**ARS1-10-01366**	007	1	CAPA-10-17898		07/13/10
ARS1-B10-03242-11	TRG				**ARS1-10-01366**	008	1	CAPA-10-17910		07/13/10
ARS1-B10-03242-12	TRG				**ARS1-10-01366**	009	1	CAPA-10-17914		07/13/10
ARS1-B10-03242-13	TRG				**ARS1-10-01375**	001	1	GW56-10-15470		07/13/10
ARS1-B10-03242-14	TRG				**ARS1-10-01375**	002	1	GW56-10-15471		07/13/10
ARS1-B10-03242-15	TRG				**ARS1-10-01407**	001	1	CAPA-10-17577		07/20/10
ARS1-B10-03242-16	TRG				**ARS1-10-01407**	002	1	CAPA-10-17580		07/20/10
ARS1-B10-03242-17	TRG				**ARS1-10-01407**	003	1	CAPA-10-17949		07/20/10
ARS1-B10-03242-18	TRG				**ARS1-10-01407**	004	1	CAPA-10-18473		07/20/10
ARS1-B10-03242-19	TRG				**ARS1-10-01407**	005	1	CAPA-10-18479		07/20/10
ARS1-B10-03242-20	TRG				**ARS1-10-01407**	006	1	CAPA-10-19017		07/20/10
ARS1-B10-03242-21	TRG				**ARS1-10-01407**	007	1	CAPA-10-19021		07/20/10
ARS1-B10-03242-22	TRG				**ARS1-10-01408**	001	1	BUCKMAN08-10-16994		07/20/10





ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
5796	ARS1-B10-03242	ARS1-B10-03242-01		1	g					JRABER	06/28/2010 17:01:54
5797	ARS1-B10-03242	ARS1-B10-03242-02		1	g					JRABER	06/28/2010 17:01:54
5798	ARS1-B10-03242	ARS1-B10-03242-03		1	g					JRABER	06/28/2010 17:01:54
5799	ARS1-B10-03242	ARS1-B10-03242-04	CAPA-10-17584	5.04	g	63968				JRABER	06/28/2010 17:01:54
5800	ARS1-B10-03242	ARS1-B10-03242-05	CAPA-10-17601	5.03	g	63969				JRABER	06/28/2010 17:01:54
5801	ARS1-B10-03242	ARS1-B10-03242-06	CAPA-10-17672	5.04	g	63970				JRABER	06/28/2010 17:01:54
5802	ARS1-B10-03242	ARS1-B10-03242-07	CAPA-10-17734	5	g	63971				JRABER	06/28/2010 17:01:54
5803	ARS1-B10-03242	ARS1-B10-03242-08	CAPA-10-17737	4.99	g	63972				JRABER	06/28/2010 17:01:54
5804	ARS1-B10-03242	ARS1-B10-03242-09	CAPA-10-17856	4.98	g	63973				JRABER	06/28/2010 17:01:55
5805	ARS1-B10-03242	ARS1-B10-03242-10	CAPA-10-17898	5.03	g	63974				JRABER	06/28/2010 17:01:55
5806	ARS1-B10-03242	ARS1-B10-03242-11	CAPA-10-17910	4.97	g	63975				JRABER	06/28/2010 17:01:55
5807	ARS1-B10-03242	ARS1-B10-03242-12	CAPA-10-17914	5.04	g	63976				JRABER	06/28/2010 17:01:55
5808	ARS1-B10-03242	ARS1-B10-03242-13	GW56-10-15470	5.06	g	63977				JRABER	06/28/2010 17:01:55
5809	ARS1-B10-03242	ARS1-B10-03242-14	GW56-10-15471	5.02	g	63978				JRABER	06/28/2010 17:01:55
5810	ARS1-B10-03242	ARS1-B10-03242-15	CAPA-10-17577	4.97	g	63979				JRABER	06/28/2010 17:01:55
5811	ARS1-B10-03242	ARS1-B10-03242-16	CAPA-10-17580	5.06	g	63980				JRABER	06/28/2010 17:01:55
5812	ARS1-B10-03242	ARS1-B10-03242-17	CAPA-10-17949	5.05	g	63981				JRABER	06/28/2010 17:01:55
5813	ARS1-B10-03242	ARS1-B10-03242-18	CAPA-10-18473	5.05	g	63982				JRABER	06/28/2010 17:01:55
5814	ARS1-B10-03242	ARS1-B10-03242-19	CAPA-10-18479	5.01	g	63983				JRABER	06/28/2010 17:01:56
5815	ARS1-B10-03242	ARS1-B10-03242-20	CAPA-10-19017	4.98	g	63984				JRABER	06/28/2010 17:01:56
5816	ARS1-B10-03242	ARS1-B10-03242-21	CAPA-10-19021	5	g	63985				JRABER	06/28/2010 17:01:56
5817	ARS1-B10-03242	ARS1-B10-03242-22	BUCKMAN08-10-16994	4.96	g	63986				JRABER	06/28/2010 17:01:56

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\20100707_1326
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100707_1326\20100707_1326.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100707_1326\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100707_1326\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL H3
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: LL H3 PLASTIC
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	0.0	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

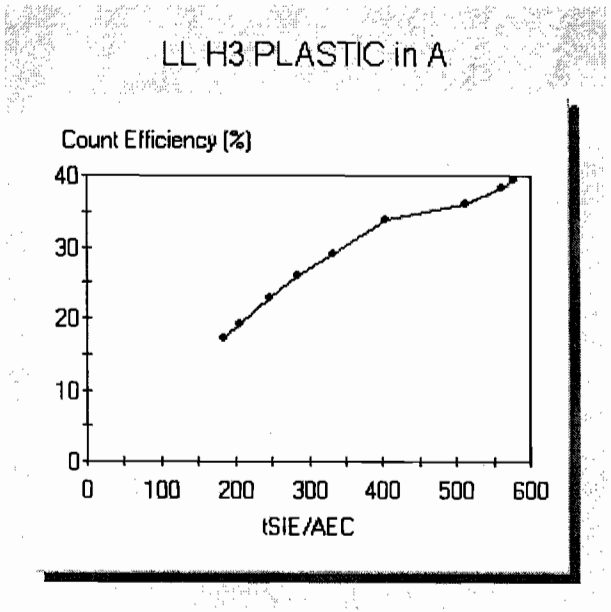
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 09/08/2009
Date Modified:
LL H3 PLASTIC in A

tSIE/AEC	Count Efficiency (%)
577.71	39.37
561.32	38.19
514.09	36.15
404.21	33.71
334.90	29.12
284.93	26.04
246.14	22.78
207.51	19.18
185.88	17.18

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.915	4.92	571.89	38.95	7/7/2010	1:35:32 PM	
2	2	B10-03242-04	120.00	1.979	5.22	554.11	37.88	7/7/2010	3:47:30 PM	
2	3	B10-03242-05	120.00	1.553	4.10	555.15	37.92	7/7/2010	5:58:41 PM	
2	4	B10-03242-06	120.00	1.487	3.89	560.88	38.17	7/7/2010	8:10:35 PM	
2	5	B10-03242-07	120.00	1.642	4.22	571.65	38.94	7/7/2010	10:20:47 PM	
2	6	B10-03242-08	120.00	1.428	3.73	562.78	38.29	7/8/2010	12:30:55 AM	
2	7	B10-03242-09	120.00	1.639	4.19	574.69	39.16	7/8/2010	2:41:02 AM	
2	8	B10-03242-10	120.00	1.585	4.20	551.52	37.76	7/8/2010	4:51:06 AM	
2	9	B10-03242-11	120.00	1.380	3.57	568.32	38.69	7/8/2010	7:01:08 AM	
2	10	B10-03242-12	120.00	1.722	4.54	555.51	37.94	7/8/2010	9:11:12 AM	
2	11	B10-03242-13	120.00	1.304	3.75	451.64	34.76	7/8/2010	11:21:14 AM	
2	12	B10-03242-14	120.00	0.941	4.16	244.73	22.65	7/8/2010	1:31:12 PM	
2	13	B10-03242-15	120.00	1.540	4.06	555.31	37.93	7/8/2010	3:41:16 PM	
2	14	B10-03242-16	120.00	1.526	3.97	565.33	38.48	7/8/2010	5:51:18 PM	
2	15	B10-03242-17	120.00	1.782	4.66	562.20	38.25	7/8/2010	8:01:21 PM	
2	16	B10-03242-18	120.00	1.583	4.21	548.61	37.64	7/8/2010	10:11:23 PM	
2	17	B10-03242-19	120.00	1.432	3.74	562.39	38.26	7/9/2010	12:21:25 AM	
2	18	B10-03242-20	120.00	1.723	4.59	547.21	37.58	7/9/2010	2:31:27 AM	
2	19	B10-03242-21	120.00	1.656	4.34	560.62	38.16	7/9/2010	4:41:27 AM	
2	20	B10-03242-22	120.00	1.735	4.54	561.14	38.18	7/9/2010	6:51:28 AM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
7-1-10	1620	Bio-02839-11	Bio-02859	1622	JDR
↓	↓	Bio-02839-13	↓	↓	JDR
↓	↓	Bio-02839-14	↓	↓	JDR
↓	↓	Bio-02859-15	↓	↓	JDR
↓	↓	Bio-02859-15	↓	↓	JDR
↓	↓	Bio-02859-19	↓	↓	JDR
↓	↓	Bio-02859-20	↓	↓	JDR
↓	↓	Bio-02859-22	↓	↓	JDR
7-6-10	0945	SNC 51	QA	QA	JDR
↓	↓	Background	Bio-02859	1022	JDR
↓	↓	Bio-02839-19	Bio-02859	↓	JDR
↓	↓	Bio-02839-20	↓	↓	JDR
↓	↓	Bio-02859-22	↓	↓	JDR
7-7-2010	1140	SNC 51	QA	QA	JDR
↓	↓	Background	Bio-03242	1326	JDR
↓	↓	Bio-03242-04	↓	↓	JDR
↓	↓	Bio-03242-05	↓	↓	JDR
↓	↓	Bio-03242-06	↓	↓	JDR
↓	↓	Bio-03242-07	↓	↓	JDR
↓	↓	Bio-03242-08	↓	↓	JDR

Reviewed By: JD Initials Date: 9-29-10

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
7-7-10	1140	B10-03242-09	B10-03242	1326	JDR
↓	↓	B10-03242-10	↓	↓	JDR
↓	↓	B10-03242-11	↓	↓	JDR
↓	↓	B10-03242-12	↓	↓	JDR
↓	↓	B10-03242-13	↓	↓	JDR
↓	↓	B10-03242-14	↓	↓	JDR
↓	↓	B10-03242-15	↓	↓	JDR
↓	↓	B10-03242-16	↓	↓	JDR
↓	↓	B10-03242-17	↓	↓	JDR
↓	↓	B10-03242-18	↓	↓	JDR
↓	↓	B10-03242-19	↓	↓	JDR
↓	↓	B10-03242-20	↓	↓	JDR
↓	↓	B10-03242-21	↓	↓	JDR
↓	↓	B10-03242-22	↓	↓	JDR

Reviewed By: JB Date: 9-29-10
Initials

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for

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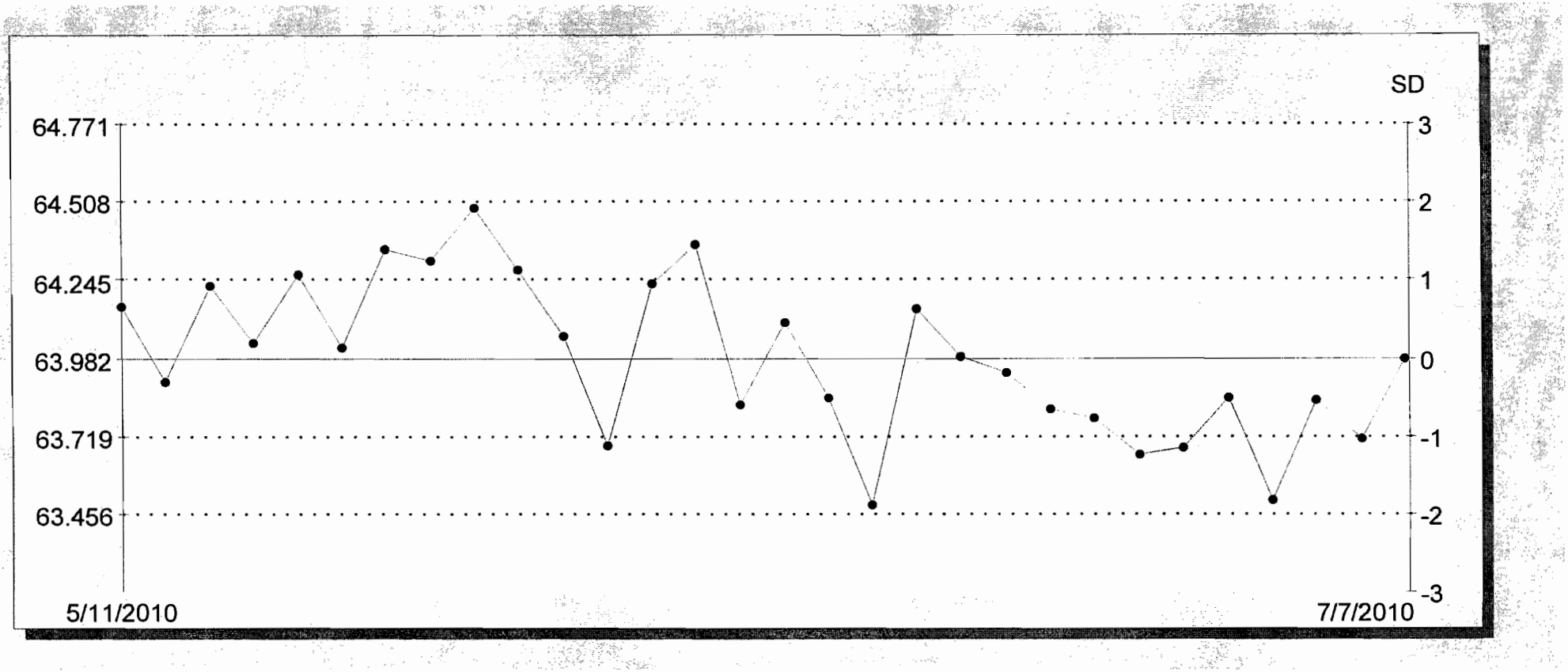
Tritium-Screening by Low Level Liquid Scintillation Counting

Control Charts

3H Efficiency
Total # pts : 5191
Valid # pts : 30
Mean : 63.98
SD : 0.26

Date	Value	Valid Pt
May 11, 2010	64.16	X
May 12, 2010	63.90	X
May 12, 2010	64.23	X
May 13, 2010	64.04	X
May 14, 2010	64.26	X
May 18, 2010	64.01	X
May 24, 2010	64.35	X
May 29, 2010	64.31	X
May 30, 2010	64.49	X
May 30, 2010	64.28	X
Jun 01, 2010	64.05	X
Jun 04, 2010	63.68	X
Jun 07, 2010	64.23	X
Jun 08, 2010	64.37	X
Jun 11, 2010	63.82	X
Jun 14, 2010	64.10	X
Jun 15, 2010	63.84	X
Jun 16, 2010	63.49	X
Jun 17, 2010	64.15	X
Jun 20, 2010	63.98	X
Jun 21, 2010	63.94	X
Jun 21, 2010	63.81	X
Jun 21, 2010	63.78	X
Jun 21, 2010	63.66	X
Jun 21, 2010	63.68	X
Jun 21, 2010	63.85	X
Jun 21, 2010	63.50	X
Jun 28, 2010	63.84	X
Jul 06, 2010	63.71	X
Jul 07, 2010	63.98	X

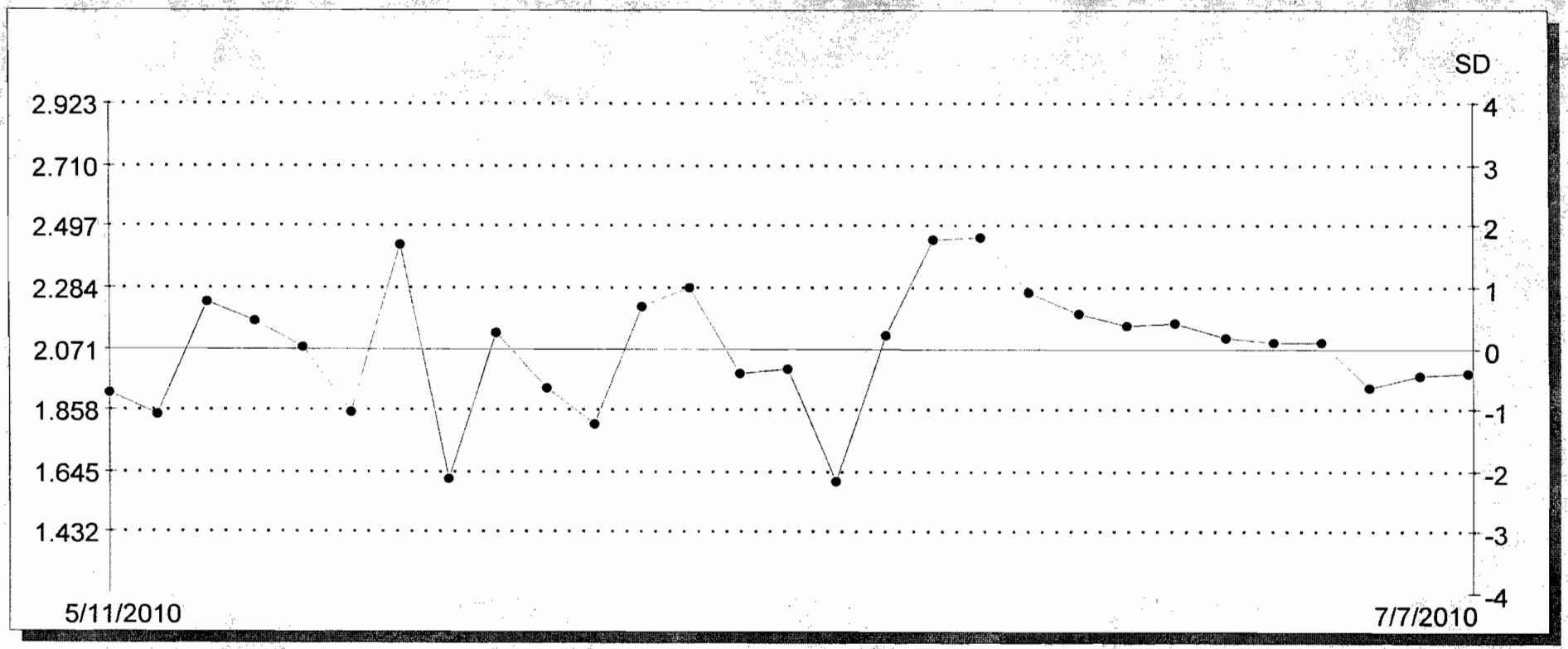
3H Efficiency
Total # pts : 5191
Valid # pts : 30
Mean : 63.98
SD : 0.26



3H Background
Total # pts : 5121
Valid # pts : 29
Mean : 2.07
SD : 0.21

Date	Value	Valid Pt
May 11, 2010	1.92	X
May 12, 2010	1.85	X
May 12, 2010	2.23	X
May 13, 2010	2.17	X
May 14, 2010	2.08	X
May 18, 2010	1.85	X
May 24, 2010	2.43	X
May 29, 2010	1.62	X
May 30, 2010	2.13	X
May 30, 2010	1.93	X
Jun 01, 2010	1.81	X
Jun 04, 2010	2.21	X
Jun 07, 2010	2.28	X
Jun 08, 2010	1.99	X
Jun 11, 2010	2.00	X
Jun 14, 2010	1.61	X
Jun 15, 2010	2.11	X
Jun 16, 2010	2.45	X
Jun 17, 2010	2.46	X
Jun 20, 2010	2.27	X
Jun 21, 2010	2.19	X
Jun 21, 2010	2.15	X
Jun 21, 2010	2.16	X
Jun 21, 2010	2.11	X
Jun 21, 2010	2.09	X
Jun 21, 2010	2.09	X
Jun 28, 2010	1.94	X
Jul 06, 2010	1.97	X
Jul 07, 2010	1.98	X

3H Background
Total # pts : 5121
Valid # pts : 29
Mean : 2.07
SD : 0.21



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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Liquid Scintillation Counting

Calibration Information

QUALITY CONTROL PROGRAM

AMERICAN RADIATION SERVICES
RADIOACTIVE REFERENCE SOLUTIONS

ANNUAL ACTIVITY VERIFICATION

VERIFICATION DATE: 5/13/2010 0:00 *date counted*
STANDARD REFERENCE #: S-0206

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: 2/25/2009 8:30

Dilution Activity	3.01 pCi per gram ===> dpm/g	6.68
Verif. Date Decay Corrected	2.81 pCi per gram ===> dpm/g	6.24

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-0206-V1B	11.98	1	LSC	0.3328	1.62	5.040	6.18	2.78
S-0206-V2B	11.42	1	LSC	0.3186	1.62	5.010	6.13	2.76
S-0206-V3B	12.01	1	LSC	0.3360	1.62	4.990	6.19	2.79
S-0206-V4B	11.75	1	LSC	0.3275	1.62	5.010	6.17	2.78
S-0206-V5B	11.45	1	LSC	0.3196	1.62	5.020	6.13	2.76

	Average	6.16	2.77
	Two Sigma Uncertainty	0.06	0.02
10% Max *PASS*	Standard Deviation percent of known concentration	0.45%	0.45%
	Target Activity	6.24	2.81
5% Max *PASS*	% Diff	-1.27%	-1.27%

Verification Expiration Date: May 13, 2011

Prepared & Counted By: Jeremy Raber Date: 5/13/2010 0:00

Verified & Approved By: Date: 5/14/2010

QC Approval: Date: 5/14/2010

S-0206		
H-3	Verified	*5/14/10*
SL	**Expires**	**5/14/11**
Manufactuer	**NIST**	
Sol Matrix	H2O	
Ref No	NIST 4361C	
Tech	M Thibodeaux	
Parent ID	S-0152	

RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY

STD ID: S-0206

ARS INTERNATIONAL

Add/Edit *Secondary Stds*

Planning

Planning Comments	**Create a Low Level H3 LCS solution.**
Target dpm/g (on dil. date)	**6.66**
Target Final volume mL	**500**
Appx mass g of Parent Sol'n	**49.8188436**
Appx vol ml of Parent Sol'n	**49.91868096**
Expected Addition for Analysis g	**5**

Standards Preparation / Dilution

Secondary Solution #	**S-0206**
Dilution Date (New Ref Date)	**02/25/2009 08:30**
Ampoule, Empty (g)	
Ampoule /Solution Gross (g)	
Net Wt Removed (g)	
Transfer Container, empty (g)	**103.64**
Container Plus Solution (g)	**153.45**
Net Wt Transferred (g)	**49.81**
DPM Xferred on 02/25/2009 08:30	**3329.408875**
Diluent/matrix	**Dead H2O**
Diluent Density Cont, empty (g)	
Test Mass of 5 ml of Diluent (g)	
Diluent Density Test - (g/mL)	
Dilution Empty Container Mass (g)	**198.75**
Dilution Full Cont g (if measured)	**697.31**
Dilution Final Volume ml (if measured)	**500**
Final Dilution Density (g/mL)	**0.99712**
Final Dilution Measured Mass g	**498.56**
Comments	**Use as H3LL LCS creation. Dilution performed as stated above by M Thibodeaux on 2/25/09. -BJS 2/25/09**
Final Dilution dpm/g	**6.678050535**
Final Dil New Ref Date/Time	**02/25/2009 08:30**

Parent Standard Data

Parent Solution Reference #	**NIST 4361C**			
Parent Solution #	**S-0152**			
Parent Principal Radionuclide	**H-3**	Half Life (Days)	**4499.8000000**	
Parent Reference Date	**09/03/1998 11:00**			
Parent Certified Act	**120.54**	Certi Act/Vol Units	**dpm**	**g**
Parent Cert Act Uncert 1 Sigma	**0.0076**			
Parent Sp. Gravity G/Ml	**0.998**			
Parent Supplier	**NIST**			
Parent Date Recvd	**12/04/06**			
Parent Received By	**LU**			
Parent Cert Exp Date				
Parent Matrix	**H2O**			
Certified dpm/g At Ref Date	**120.54**			
Certified dpm/g on 02/25/2009 08:30	**66.84217777**			
Parent Comments	Liquid in a 500-ml borosilicate-glass medis bottle with teflon-lined screw cap. Approximately 500 grams			
Parent Tech	**M. Thibodeaux**			
Is_Primary	**FALSE**			
Is_LCS	**TRUE**			
Is_Tracer	**FALSE**			
Is_Calib	**FALSE**			

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

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Report Compilation Checklist

ARS SDG: 10-01408 **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	

Report Generator Signature — 9-28-10 Date

Management Review Signature — 9-29-10 Date

ARS INTERNATIONAL

LSC
Technical Review Checklist

ARS SDG ARS1-10-01408

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-B10-03242	**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): _____

Jimmy D. Rabun 7-5-2010
Chemist Signature **Date**

Jamaal Brown 7-7-10
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

JBrad 9-29-10
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

TDR 7-9-2010

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

Jimmy D. Rabun 7-9-2010
Analyst Signature **Date**

N/A
Technicial Reviewer Signature **Date**

ARS INTERNATIONAL

Batch A: ARS1-B10-03242

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 — Project Manager Signature — 9-28-10 — Date

JByd — QA Officer Signature — 9-29-10 — Date

GENERAL COMMENTS

LSC
Technical Review Checklist

ARS SDG ARS1-10-01408

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-B10-03243 **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): _____

Jimmy D. Ralm 9-20-2010
Chemist Signature Date

Jamaal Brown 9-20-10
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

JBrad 9-29-10
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

JDR 9-27-2010

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

Jimmy D. Ralm 9-27-2010
Analyst Signature Date

N/A
Technicial Reviewer Signature Date

ARS INTERNATIONAL

Batch A: ARS1-B10-03243

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 Riese — Project Manager Signature — 9-28-10 — Date

[signature] — QA Officer Signature — 9-29-10 — Date

GENERAL COMMENTS

DQO Report for SDG

ARS1-10-01408

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		

SDG Report - Analysis Assignments

Temp SDG	**ARS1-10-01408**	**Sample Count**	**1**
Client	**Los Alamos National Laboratory**	**Analysis Count**	**2-2**

Samples Count Totals per Analysis

Analysis Code	Analysis Description	Samples Count
LSC-A-021	Low Level Tritium Screen in (Aqueous)	1
LSC-A-022	Low Level Tritium by Enrichment Process in (Aqueous [AQ])	1

Analyses Assigned Per Fraction

Fraction	Analysis Code	X = Assigned
001	LSC-A-021	X
001	LSC-A-022	X

SDG Report - Samples and Containers

SDG Specific Data

SDG	ARS1-10-01408	TAT Days	30	Project Type	Environmental
Sample Count	Rpt Level 4	Date Received	6/24/2010	COC Number	10-3478
Client	Los Alamos National Laboratory	Client Deadline	7/23/2010	PO Number	WEPR1158W100
Client Code	114	Internal Deadline	7/22/2010	Job Number	63641-001-10
Profile Number	PN-00094	Lab Deadline	7/20/2010	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	BUCKMAN08-10-16997	AQ	06/22/10 12:00 PM	06/22/10 12:00 PM	H	90	5	E3							
→	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
	63706	1	1108.00				50	28		N	N/A				

ARS FILE TRACKING SHEET

SDG: 10-01408

Task	Date / Time	Initials
Date & Time Samples Received	06-24-10/10:10	N.P
ICOC Initiated / Storage Location: E3	06-24-10/16:20	N.P
Technical Checks Performed	— See batch —	
Report Written / EDD Generated: 9-28-10/1423 (Date/Time) | SDL (Initials)	9-28-10|1421	SDL
Quality Assurance Checks Performed on Report		
Management Check Performed on Report		
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:

ARS-062
04/23/2010

COMPANY NAME: LANL SDG: 10-0190

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: 1

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

External and Internal Surveys

Exposure Rate Meter: M324284 Serial No.: 442PR264926 Calibration Due Date: 4-8-11

Count Rate Meter: M2154859 Serial No.: 442PR184559 Calibration Due Date: 4-6-11

Background Exposure Rate (µR/hr): 26 Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd): 26 µR/hr

Background Count Rate (cpm): 50 Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd): 50 cpm

Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd): 50 cpm

Sample Label/Comments/Notes	pH Orig (pH ≤ 2 is Acceptable)	pH Final (pH ≤ 2 is Acceptable)	Mark if Preserve	Acid Lot #	Weight(g) / Volume(mL)	µR/hr (Acceptance Limits <500 µR/hr)	cpm (Acceptance Limits <100 cpm/cm²)
Rockman08-12-16994	—	N/A	—	—	1108	28	50

Surveyors' Name: Heath Pierson Date/Time Surveyed: 6-24-10 15:49

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Request Number: 10-3350

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 10-3350

Original COC

Wednesday, June 09, 2010

REQUEST NUMBER: 10-3350

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:10-3350
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples
according to the schedule indicated:

SHIP DATE: 6/9/2010
TURNAROUND/REPORT DUE: 7/9/2010
TURNAROUND REQ'D: 30 Days

RAD SCREENING: Yes, Below Background
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	Buckman1-10-16990	WG	6/8/2010	
		1	Buckman06-10-16992	WG	6/8/2010	

Final Page of REQUEST NUMBER 10-3350

Wednesday, June 09, 2010

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 10-3350C

REQUEST NUMBER: 10-3350

LOS ALAMOS
NATIONAL LABORATORY

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

TURNAROUND/REPORT DUE: 7/9/2010
TURNAROUND REQ'D: 30

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman1-10-16990	1	POLY	WSP-LL-H-3	None	WG
Buckman06-10-16992	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:		**Date**	**Time**	**Received By:**		**Date**	**Time**
		6/9/10	3:00	Heath Pass		6-10-10	10:06
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		

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

Printed Name Signature

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 10-3350

Case Narrative

ARS INTERNATIONAL

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September 8, 2010

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

Request Number: **10-3350**
LANL Sample ID: Buckman 1-10-16990; Buckman 06-10-16992.

Dear Mr. Greene;

On June 10, 2010, ARS International received two (2) water samples to be analyzed for Low Level Tritium.

The samples were processed and 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,

for Tony Byrd

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)
10-3350	Buckman 1-10-16990	ARS1-10-01288-001
10-3350	Buckman 06-10-16992	ARS1-10-01288-002

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."

Signature	Title	Date
for Tony Byrd	Laboratory Management, ARS International	9-8-10

ARS INTERNATIONAL

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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
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ARS Sample Delivery Group:	ARS1-10-01288	**Request or PO Number:**	10-3350
Client Sample ID:	BUCK1-10-16990	**ARS Sample ID:**	ARS1-10-01288-001
Sample Collection Date:	06/08/10	**Date Received:**	06/10/10
Sample Matrix:	Aqueous	**Report Date:**	09/08/10

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	-0.920	0.230	0.660	0.320	U	TU	ARS-040	09/01/10 00:00	JR	N/A

NOTES: Project Cost Code WEPR1158W100

Susan Reese
Project Manager Review

LELAP Certificate# 01949 NELAP Certificate # E87558

ARS INTERNATIONAL

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ARS Sample Delivery Group:	ARS1-10-01288	**Request or PO Number:**	10-3350
Client Sample ID:	BUCK06-10-16992	**ARS Sample ID:**	ARS1-10-01288-002
Sample Collection Date:	06/08/10	**Date Received:**	06/10/10
Sample Matrix:	Aqueous	**Report Date:**	09/08/10

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	-1.050	0.260	0.750	0.370	U	TU	ARS-040	09/02/10 00:00	JR	N/A

NOTES: Project Cost Code WEPR1158W100

Susan Deese

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

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QC Results Report

Sample Delivery Group: ARS1-10-01288; 01290
Date Received: 6/10/2010

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-B10-02987	LCS	H3	7.310	1.130	0.670	8.341		TU	ARS-040	8/31/10 0:00	JR	88	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-B10-02987	MBL	H3	-0.660	0.190	0.580	NA	U	TU	ARS-040	9/1/10 0:00	JR

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-B10-02987	LCSD	H3	7.310	1.130	7.340	1.130		TU	ARS-040	9/1/10 0:00	JR	0.01	< 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-B10-02987	LCSD	H3	7.310	1.130	7.340	1.130		TU	ARS-040	9/1/10 0:00	JR	0.04	< 3

Project Manager Review

LELAP Certificate# 01949 NELAP Certificate # E87558

Expected Value Calculations LANL

ARS Batch Number: ARS1-~~B09~~ B10 - 02987

LCS	**CALCULATED EXPECTED VALUE**	=	26.866				8.341 TU
			Range	21.493	-	32.239	
LCSD	**CALCULATED EXPECTED VALUE**	=	27.564				8.558 TU
			Range	22.051	-	33.077	

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

Low Level Tritium by Low Level Liquid Scintillation Counting

Samples

QC Evaluation

EPA Method: ARS-040
Batch ID: ARS1-B10-02987
SDG's: ARS1-10-01288; 01290

LCS	23.5600	**CSU (2s)**	7.1500
LCSD	23.6600	**CSU-D (2s)**	7.1300

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

DER $\frac{0.1}{5.0487474}$ = 0.019807 **< 3**

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

%RPD $\frac{0.1}{23.61}$ *100 = 0.423549 **< 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 = $\frac{0.1}{14.2800}$ 0.007002801 **<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	-2.12	1.21	1.88	
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 = -2.12
CSU = 1.21
Is ACT<1.65*CSU? YES

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	ARS1-10-01288; 01290
ARS Batch ID Number	ARS1-B10-02987

Enrichment Factor Curve coeff. - Power y = a * x^b		Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	8.978E-01	a	-2.319E-06
b	-9.611E-01	b	2.724E-03
c		c	-1.060E+00
		d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	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	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-B10-02987-01	515.27	2.00	11.34	2.06	9.28	0.02	42.64	6	2.11	560.37	0.3815	0.00500	L	2/25/2009	8/31/2010	360	360	0.92632	7.31	0.28	0.28	1.13	0.67	0.33	TU
ARS1-B10-02987-02	502.55	2.00	9.64	2.06	7.58	0.02	50.56	7	2.11	542.12	0.3736	0.00500	L	2/25/2009	9/1/2010	360	360	0.92619	7.34	0.25	0.25	1.13	0.58	0.28	TU
ARS1-B10-02987-03	510.19	2.01	10.51	2.07	8.44	0.02	46.27	2	2.11	547.80	0.3760	0.00500	L	9/7/2010	9/1/2010	360	360	1.00081	-0.66	0.17	0.17	0.19	0.58	0.29	TU
ARS1-B10-02987-04	458.40	2.00	11.75	2.06	9.69	0.02	36.55	2	2.11	548.75	0.3765	0.00500	L	6/8/2010	9/1/2010	360	360	0.98827	-1.25	0.21	0.21	0.28	0.75	0.37	TU
ARS1-B10-02987-05	438.10	2.01	10.26	2.07	8.19	0.02	41.14	2	2.11	558.22	0.3805	0.00500	L	6/8/2010	9/1/2010	360	360	0.98827	-0.92	0.18	0.18	0.23	0.66	0.32	TU
ARS1-B10-02987-06	506.45	2.01	12.83	2.07	10.76	0.02	36.38	2	2.11	549.94	0.3770	0.00499	L	6/8/2010	9/2/2010	360	360	0.98813	-1.05	0.21	0.21	0.26	0.75	0.37	TU
ARS1-B10-02987-07	513.40	2.01	11.73	2.07	9.66	0.02	40.88	2	2.11	541.71	0.3734	0.00503	L	6/7/2010	9/2/2010	360	360	0.98799	-0.94	0.19	0.19	0.23	0.67	0.33	TU
ARS1-B10-02987-08	517.97	2.01	13.07	2.07	11.00	0.02	36.39	13	2.11	556.43	0.3798	0.00501	L	6/7/2010	9/2/2010	360	360	0.98799	22.67	0.42	0.42	3.43	0.74	0.36	TU
ARS1-B10-02987-09	512.55	2.01	11.55	2.07	9.48	0.02	41.56	2	2.11	540.10	0.3727	0.00499	L	6/7/2010	9/3/2010	360	360	0.98786	-0.57	0.19	0.19	0.21	0.67	0.33	TU
ARS1-B10-02987-10	508.97	2.02	11.05	2.08	8.97	0.02	43.54	9	2.11	543.37	0.3741	0.00402	L	6/8/2010	9/3/2010	360	360	0.98799	13.82	0.37	0.37	2.11	0.79	0.38	TU
ARS1-B10-02987-11	501.49	2.01	12.03	2.07	9.96	0.02	38.81	2	2.11	555.02	0.3792	0.00500	L	6/7/2010	9/3/2010	360	360	0.98786	-0.98	0.20	0.20	0.24	0.70	0.34	TU
ARS1-B10-02987-12	508.65	2.00	12.08	2.06	10.02	0.02	39.12	2	2.11	542.15	0.3736	0.00501	L	6/7/2010	9/3/2010	360	360	0.98786	-0.79	0.20	0.20	0.23	0.70	0.34	TU
ARS1-B10-02987-13	511.77	2.00	10.24	2.06	8.18	0.02	47.82	2	2.11	550.72	0.3773	0.00500	L	6/7/2010	9/4/2010	360	360	0.98772	-0.64	0.16	0.16	0.19	0.57	0.28	TU
ARS1-B10-02987-14	499.37	2.00	11.94	2.06	9.88	0.02	38.96	2	2.11	543.09	0.3740	0.00500	L	6/7/2010	9/4/2010	360	360	0.98772	-0.99	0.20	0.20	0.25	0.71	0.35	TU

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	ARS1-10-01288; 01290
ARS Batch ID Number	ARS1-B10-02987

Enrichment Factor Curve coeff. - Power y = a * x^b		Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	8.978E-01	a	-2.319E-06
b	-9.611E-01	b	2.724E-03
c		c	-1.060E+00
		d	1.383E+02

lambda	1.3863E-04	**ACF (def. = 1)**	1
Syserror	0.15	**Reporting Units**	**pCi**
Coverage Factor	1.96	**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 1.96s CU	Combined Standard Uncertainty 1.96s CSU	Minimum Detectable Conc MDC	Decision Level Conc. DLC	Reporting Units Units
ARS1-B10-02987-01	515.27	2.00	11.34	2.06	9.28	0.02	42.64	6	2.11	560.37	0.3815	0.00500	L	2/25/2009	8/31/2010	360	360	0.92632	23.56	0.90	1.76	7.15	2.17	1.06	pCi/L
ARS1-B10-02987-02	502.55	2.00	9.64	2.06	7.58	0.02	50.56	7	2.11	542.12	0.3736	0.00500	L	2/25/2009	9/1/2010	360	360	0.92619	23.66	0.81	1.58	7.13	1.87	0.92	pCi/L
ARS1-B10-02987-03	510.19	2.01	10.51	2.07	8.44	0.02	46.27	2	2.11	547.80	0.3760	0.00500	L	9/7/2010	9/1/2010	360	360	1.00081	-2.12	0.53	1.04	1.21	1.88	0.92	pCi/L
ARS1-B10-02987-04	458.40	2.00	11.75	2.06	9.69	0.02	36.55	2	2.11	548.75	0.3765	0.00500	L	6/8/2010	9/1/2010	360	360	0.98827	-4.03	0.66	1.30	1.76	2.41	1.18	pCi/L
ARS1-B10-02987-05	438.10	2.01	10.26	2.07	8.19	0.02	41.14	2	2.11	558.22	0.3805	0.00500	L	6/8/2010	9/1/2010	360	360	0.98827	-2.96	0.59	1.16	1.45	2.12	1.04	pCi/L
ARS1-B10-02987-06	506.45	2.01	12.83	2.07	10.76	0.02	36.38	2	2.11	549.94	0.3770	0.00499	L	6/8/2010	9/2/2010	360	360	0.98813	-3.39	0.68	1.33	1.66	2.42	1.19	pCi/L
ARS1-B10-02987-07	513.40	2.01	11.73	2.07	9.66	0.02	40.88	2	2.11	541.71	0.3734	0.00503	L	6/7/2010	9/2/2010	360	360	0.98799	-3.02	0.60	1.18	1.48	2.16	1.06	pCi/L
ARS1-B10-02987-08	517.97	2.01	13.07	2.07	11.00	0.02	36.39	13	2.11	556.43	0.3798	0.00501	L	6/7/2010	9/2/2010	360	360	0.98799	73.02	1.36	2.66	21.63	2.39	1.17	pCi/L
ARS1-B10-02987-09	512.55	2.01	11.55	2.07	9.48	0.02	41.56	2	2.11	540.10	0.3727	0.00499	L	6/7/2010	9/3/2010	360	360	0.98786	-1.82	0.61	1.20	1.32	2.15	1.05	pCi/L
ARS1-B10-02987-10	508.97	2.02	11.05	2.08	8.97	0.02	43.54	9	2.11	543.37	0.3741	0.00402	L	6/8/2010	9/3/2010	360	360	0.98799	44.50	1.20	2.34	13.29	2.53	1.24	pCi/L
ARS1-B10-02987-11	501.49	2.01	12.03	2.07	9.96	0.02	38.81	2	2.11	555.02	0.3792	0.00500	L	6/7/2010	9/3/2010	360	360	0.98786	-3.15	0.63	1.23	1.54	2.25	1.10	pCi/L
ARS1-B10-02987-12	508.65	2.00	12.08	2.06	10.02	0.02	39.12	2	2.11	542.15	0.3736	0.00501	L	6/7/2010	9/3/2010	360	360	0.98786	-2.55	0.64	1.26	1.46	2.26	1.11	pCi/L
ARS1-B10-02987-13	511.77	2.00	10.24	2.06	8.18	0.02	47.82	2	2.11	550.72	0.3773	0.00500	L	6/7/2010	9/4/2010	360	360	0.98772	-2.07	0.52	1.02	1.19	1.84	0.90	pCi/L
ARS1-B10-02987-14	499.37	2.00	11.94	2.06	9.88	0.02	38.96	2	2.11	543.09	0.3740	0.00500	L	6/7/2010	9/4/2010	360	360	0.98772	-3.19	0.64	1.25	1.56	2.28	1.11	pCi/L

ARS Tritium Enrichment Calculations

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ARS File ID Number	ARS1-10-01288; 01290
ARS Batch ID Number	ARS1-B10-02987

Enrichment Factor Curve coeff. - Power y = a * x^b		Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	8.978E-01	a	-2.319E-06
b	-9.611E-01	b	2.724E-03
c		c	-1.060E+00
		d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	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-B10-02987-01	515.27	2.00	11.34	2.06	9.28	0.02	42.64	6	2.11	560.37	0.3815	0.00500	L	2/25/2009	8/31/2010	360	360	0.92632	23.56	0.90	0.90	3.65	2.17	1.06	pCi/L
ARS1-B10-02987-02	502.55	2.00	9.64	2.06	7.58	0.02	50.56	7	2.11	542.12	0.3736	0.00500	L	2/25/2009	9/1/2010	360	360	0.92619	23.66	0.81	0.81	3.64	1.87	0.92	pCi/L
ARS1-B10-02987-03	510.19	2.01	10.51	2.07	8.44	0.02	46.27	2	2.11	547.80	0.3760	0.00500	L	9/7/2010	9/1/2010	360	360	1.00081	-2.12	0.53	0.53	0.62	1.88	0.92	pCi/L
ARS1-B10-02987-04	458.40	2.00	11.75	2.06	9.69	0.02	36.55	2	2.11	548.75	0.3765	0.00500	L	6/8/2010	9/1/2010	360	360	0.98827	-4.03	0.66	0.66	0.90	2.41	1.18	pCi/L
ARS1-B10-02987-05	438.10	2.01	10.26	2.07	8.19	0.02	41.14	2	2.11	558.22	0.3805	0.00500	L	6/8/2010	9/1/2010	360	360	0.98827	-2.96	0.59	0.59	0.74	2.12	1.04	pCi/L
ARS1-B10-02987-06	506.45	2.01	12.83	2.07	10.76	0.02	36.38	2	2.11	549.94	0.3770	0.00499	L	6/8/2010	9/2/2010	360	360	0.98813	-3.39	0.68	0.68	0.85	2.42	1.19	pCi/L
ARS1-B10-02987-07	513.40	2.01	11.73	2.07	9.66	0.02	40.88	2	2.11	541.71	0.3734	0.00503	L	6/7/2010	9/2/2010	360	360	0.98799	-3.02	0.60	0.60	0.75	2.16	1.06	pCi/L
ARS1-B10-02987-08	517.97	2.01	13.07	2.07	11.00	0.02	36.39	13	2.11	556.43	0.3798	0.00501	L	6/7/2010	9/2/2010	360	360	0.98799	73.02	1.36	1.36	11.04	2.39	1.17	pCi/L
ARS1-B10-02987-09	512.55	2.01	11.55	2.07	9.48	0.02	41.56	2	2.11	540.10	0.3727	0.00499	L	6/7/2010	9/3/2010	360	360	0.98786	-1.82	0.61	0.61	0.67	2.15	1.05	pCi/L
ARS1-B10-02987-10	508.97	2.02	11.05	2.08	8.97	0.02	43.54	9	2.11	543.37	0.3741	0.00402	L	6/8/2010	9/3/2010	360	360	0.98799	44.50	1.20	1.20	6.78	2.53	1.24	pCi/L
ARS1-B10-02987-11	501.49	2.01	12.03	2.07	9.96	0.02	38.81	2	2.11	555.02	0.3792	0.00500	L	6/7/2010	9/3/2010	360	360	0.98786	-3.15	0.63	0.63	0.79	2.25	1.10	pCi/L
ARS1-B10-02987-12	508.65	2.00	12.08	2.06	10.02	0.02	39.12	2	2.11	542.15	0.3736	0.00501	L	6/7/2010	9/3/2010	360	360	0.98786	-2.55	0.64	0.64	0.75	2.26	1.11	pCi/L
ARS1-B10-02987-13	511.77	2.00	10.24	2.06	8.18	0.02	47.82	2	2.11	550.72	0.3773	0.00500	L	6/7/2010	9/4/2010	360	360	0.98772	-2.07	0.52	0.52	0.61	1.84	0.90	pCi/L
ARS1-B10-02987-14	499.37	2.00	11.94	2.06	9.88	0.02	38.96	2	2.11	543.09	0.3740	0.00500	L	6/7/2010	9/4/2010	360	360	0.98772	-3.19	0.64	0.64	0.80	2.28	1.11	pCi/L

ARS INTERNATIONAL

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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

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-02987**

Method ARS-054 **Analysis** LSC-A-022 **Matrix** AQ

Description TRITIUM IN WATER

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3		SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-02987-01	LCS	B-10228									
ARS1-B10-02987-02	LCSD	B-10229									
ARS1-B10-02987-03	MBL										
ARS1-B10-02987-04	DUP										
ARS1-B10-02987-05	DO				62694	ARS1-10-01288	001	1	BUCKMAN1-10-16990	STD	07/06/10
ARS1-B10-02987-06	TRG				62695	ARS1-10-01288	002	1	BUCKMAN06-10-16992	STD	07/06/10
ARS1-B10-02987-07	TRG				62704	ARS1-10-01290	001	1	CAPA-10-17740	STD	07/06/10
ARS1-B10-02987-08	TRG				62705	ARS1-10-01290	002	1	CAPA-10-17743	STD	07/06/10
ARS1-B10-02987-09	TRG				62706	ARS1-10-01290	003	1	CAPA-10-17746	STD	07/06/10
ARS1-B10-02987-10	TRG				62707	ARS1-10-01290	004	1	CAPA-10-17777	STD	07/06/10
ARS1-B10-02987-11	TRG				62708	ARS1-10-01290	005	1	CAPA-10-17852	STD	07/06/10
ARS1-B10-02987-12	TRG				62709	ARS1-10-01290	006	1	CAPA-10-17854	STD	07/06/10
ARS1-B10-02987-13	TRG				62710	ARS1-10-01290	007	1	CAPA-10-17952	STD	07/06/10
ARS1-B10-02987-14	TRG				62711	ARS1-10-01290	008	1	CAPA-10-17850	STD	07/06/10

69417
10-01288-001-1
XRAD

69418
10-01288-002-1
XRAD

69419
10-01290-001-1
XRAD

69420
10-01290-002-1
XRAD

69421
10-01290-003-1
XRAD

69422
10-01290-004-1
XRAD

69423
10-01290-005-1
XRAD

69424
10-01290-006-1
XRAD

69425
10-01290-007-1
XRAD

69426
10-01290-008-1
XRAD

LCS Report
Analytical Batch: ARS1-B10-02987

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-10228	ARS1-B10-02987	ARS1-B10-02987-01	B-H3	S-0206	H-3	5	2.808406639	13.3905	18.4008	5.0103	WSTICKLE	5/17/2010			
B-10229	ARS1-B10-02987	ARS1-B10-02987-02	B-H3	S-0206	H-3	5	2.808406639	13.1463	18.1599	5.0136	WSTICKLE	5/17/2010			

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
6273	ARS1-B10-02987	ARS1-B10-02987-01		5	g					JRABER	09/07/2010 09:27:13
6274	ARS1-B10-02987	ARS1-B10-02987-02		5	g					JRABER	09/07/2010 09:27:14
6275	ARS1-B10-02987	ARS1-B10-02987-03		5	g					JRABER	09/07/2010 09:27:14
6276	ARS1-B10-02987	ARS1-B10-02987-04		5	g					JRABER	09/07/2010 09:27:14
6277	ARS1-B10-02987	ARS1-B10-02987-05	BUCKMAN1-10-16990	5	g	69417				JRABER	09/07/2010 09:27:14
6278	ARS1-B10-02987	ARS1-B10-02987-06	BUCKMAN06-10-16992	4.99	g	69418				JRABER	09/07/2010 09:27:14
6279	ARS1-B10-02987	ARS1-B10-02987-07	CAPA-10-17740	5.03	g	69419				JRABER	09/07/2010 09:27:14
6280	ARS1-B10-02987	ARS1-B10-02987-08	CAPA-10-17743	5.01	g	69420				JRABER	09/07/2010 09:27:14
6281	ARS1-B10-02987	ARS1-B10-02987-09	CAPA-10-17746	4.99	g	69421				JRABER	09/07/2010 09:27:14
6282	ARS1-B10-02987	ARS1-B10-02987-10	CAPA-10-17777	4.02	g	69422				JRABER	09/07/2010 09:27:15
6283	ARS1-B10-02987	ARS1-B10-02987-11	CAPA-10-17852	5	g	69423				JRABER	09/07/2010 09:27:15
6284	ARS1-B10-02987	ARS1-B10-02987-12	CAPA-10-17854	5.01	g	69424				JRABER	09/07/2010 09:27:15
6285	ARS1-B10-02987	ARS1-B10-02987-13	CAPA-10-17952	5	g	69425				JRABER	09/07/2010 09:27:15
6286	ARS1-B10-02987	ARS1-B10-02987-14	CAPA-10-17850	5	g	69426				JRABER	09/07/2010 09:27:15

ARS, International
Port Allen Lab

Tritium Enrichment Data

Printed: 9/7/2010 8:50 AM

Procedures: ARS-040

Date: 7/29/2010

ARS File ID Numbers: ARS1-10-01288, 01290

ARS Batch ID: ARS1-B10-02987

	A Batch ID:	Enrichment Cell No.	Tare Wt of Electrolysis Cell & Electrodes	Tare Wt Reservoir	m_i Wt Na_2O_2	Gross Weight of Sample Reservoir	V_i 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	V_f Gross Sample Recovered	Enrichment Factor	Cryo-Distil Flask #	Tare Wt Cryo-distil flask	Gross Wt flask + Sample	Recovered Water	Tare Weight of LSC Vial	Aliquot Vial + Sample	Aliquot 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
1	ARS1-B10-02987-01	72	337.34	194.65	2.00	709.92	515.27	8-2-2010 1449	5.00	2.0	8-24-2010 0812	2.0	543.33	**11.34**	45.4	N/A,N/A	112.23	120.29	8.06	6.78	11.78	**5.00**	0.00	**0.00**	11.78	26.78
2	ARS1-B10-02987-02	84	339.29	201.00	2.00	703.55	502.55	8-2-2010 1455	5.00	2.0	8-24-2010 0935	2.0	549.93	**9.64**	92.5	N/A,N/A	117.19	123.28	6.09	6.40	11.40	**5.00**	0.00	**0.00**	11.40	26.42
3	ARS1-B10-02987-03	85	337.80	194.73	2.01	704.92	510.19	8-2-2010 1440	5.00	2.0	8-24-2010 1345	2.0	543.04	**10.51**	58.5	G,N/A	99.90	106.95	7.05	6.47	11.47	**5.00**	0.00	**0.00**	11.47	26.48
4	ARS1-B10-02987-04	99	341.11	188.01	2.00	646.41	458.40	7-29-2010 0921	5.00	2.0	8-22-2010 1401	2.0	540.87	**11.75**	89.01	N/A,7	102.82	110.83	8.01	6.41	11.41	**5.00**	0.00	**0.00**	11.41	26.44
5	ARS1-B10-02987-05	18	337.12	200.07	2.01	638.17	438.10	7-29-2010 0935	5.00	2.0	8-21-2010 0835	2.0	547.45	**10.26**	42.7	N/A,N/A	121.15	128.14	6.99	6.78	11.78	**5.00**	0.00	**0.00**	11.78	26.81
6	ARS1-B10-02987-06	94	336.82	193.83	2.01	700.28	506.45	7-29-2010 0940	5.00	2.0	8-22-2010 0942	2.0	543.48	**12.83**	38.7	N/A,C	99.24	108.52	9.28	6.44	11.43	**4.99**	0.00	**0.00**	11.43	26.47
7	ARS1-B10-02987-07	93	339.04	194.64	2.01	708.04	513.40	7-29-2010 0943	5.00	2.0	8-21-2010 1429	2.0	545.41	**11.73**	93.2	5,N/A	101.89	110.25	8.36	6.46	11.49	**5.03**	0.00	**0.00**	11.49	26.52
8	ARS1-B10-02987-08	21	335.16	201.45	2.01	719.42	517.97	7-29-2010 0949	5.00	2.0	8-21-2010 0935	2.0	549.68	**13.07**	88.3	G,N/A	99.80	109.72	9.92	6.78	11.79	**5.01**	0.00	**0.00**	11.79	26.84
9	ARS1-B10-02987-09	82	337.92	192.92	2.01	705.47	512.55	7-29-2010 1013	5.00	2.0	8-22-2010 1047	2.0	542.39	**11.55**	4.3	N/A,N/A	117.19	123.98	6.79	6.51	11.50	**4.99**	0.00	**0.00**	11.50	26.56
10	ARS1-B10-02987-10	19	333.61	198.09	2.02	707.06	508.97	7-29-2010 1019	5.00	2.0	8-22-2010 1311	2.0	542.75	**11.05**	0.0	N/A,11	100.56	104.61	4.05	6.39	10.41	**4.02**	**11.41**	**1.00**	11.41	26.45
11	ARS1-B10-02987-11	65	339.16	197.30	2.01	698.79	501.49	7-29-2010 1113	5.00	2.0	8-22-2010 1602	2.0	548.49	**12.03**	41.0	N/A,N/A	113.22	121.68	8.46	6.46	11.46	**5.00**	0.00	**0.00**	11.46	26.49
12	ARS1-B10-02987-12	49	335.29	200.72	2.00	709.37	508.65	7-29-2010 1145	5.00	2.0	8-21-2010 1649	2.0	548.09	**12.08**	42.1	N/A,N/A	107.99	116.36	8.37	6.49	11.50	**5.01**	0.00	**0.00**	11.50	26.53
13	ARS1-B10-02987-13	4	336.70	189.57	2.00	701.34	511.77	7-29-2010 1425	5.00	2.0	8-23-2010 0945	2.0	536.51	**10.24**	92.5	N/A,7	110.86	118.73	7.87	6.54	11.54	**5.00**	0.00	**0.00**	11.54	26.58
14	ARS1-B10-02987-14	76	335.34	207.78	2.00	707.15	499.37	7-29-2010 1436	5.00	2.0	8-23-2010 1456	2.0	555.06	**11.94**	91.1	N/A,N/A	101.71	109.84	8.13	6.43	11.43	**5.00**	0.00	**0.00**	11.43	26.48

Chemist Signature: Jimmy D. Rabun

Net Wt of Cocktail Added
15.00
15.02
15.01
15.03
15.03
15.04
15.03
15.02
15.00
15.04
15.03
15.03
15.04
15.05

Chemist Signature: Jimmy D. Rahe

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\20100831_1550
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100831_1550\20100831_1550.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100831_1550\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100831_1550\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL H3
  Quench Indicator: tSIE/AEC
  External Std Terminator (sec): 0.5 2s%
  Pre-Count Delay (min): 0.00
Quench Set:
  Low Energy: LL H3 PLASTIC
Count Time (min): 360.00
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	0.0	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

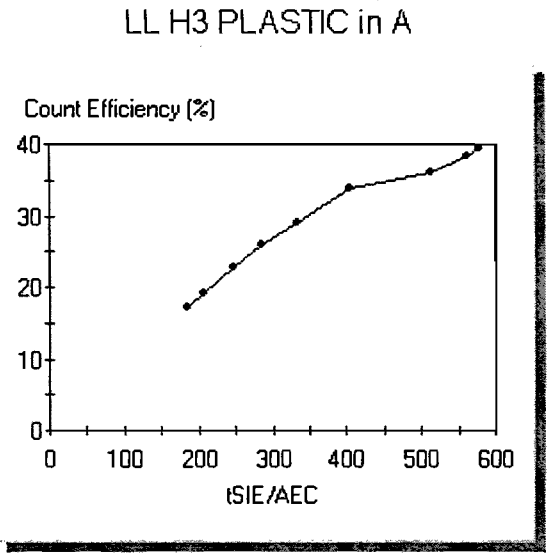
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 09/08/2009
Date Modified:
LL H3 PLASTIC in A

tSIE/AEC	Count Efficiency (%)
577.71	39.37
561.32	38.19
514.09	36.15
404.21	33.71
334.90	29.12
284.93	26.04
246.14	22.78
207.51	19.18
185.88	17.18

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	360.00	2.109	5.62	546.21	37.54	8/31/2010	3:59:25 PM	
2	2	B10-02987-01	360.00	6.049	15.86	560.37	38.15	8/31/2010	10:17:20 PM	
2	3	B10-02987-02	360.00	6.703	17.94	542.12	37.36	9/1/2010	4:35:17 AM	
2	4	B10-02987-03	360.00	1.718	4.57	547.80	37.60	9/1/2010	10:53:14 AM	
2	5	B10-02987-04	360.00	1.575	4.18	548.75	37.65	9/1/2010	5:11:00 PM	
2	6	B10-02987-05	360.00	1.641	4.31	558.22	38.05	9/1/2010	11:23:17 PM	
2	7	B10-02987-06	360.00	1.678	4.45	549.94	37.70	9/2/2010	5:35:33 AM	
2	8	B10-02987-07	360.00	1.648	4.41	541.71	37.34	9/2/2010	11:48:24 AM	
2	9	B10-02987-08	360.00	13.215	34.80	556.43	37.98	9/2/2010	6:00:39 PM	
2	10	B10-02987-09	360.00	1.835	4.92	540.10	37.27	9/3/2010	12:12:55 AM	
2	11	B10-02987-10	360.00	8.506	22.74	543.37	37.41	9/3/2010	6:25:14 AM	
2	12	B10-02987-11	360.00	1.614	4.26	555.02	37.92	9/3/2010	12:37:28 PM	
2	13	B10-02987-12	360.00	1.727	4.62	542.15	37.36	9/3/2010	6:49:53 PM	
2	14	B10-02987-13	360.00	1.698	4.50	550.72	37.73	9/4/2010	1:02:03 AM	
2	15	B10-02987-14	360.00	1.563	4.18	543.09	37.40	9/4/2010	7:14:14 AM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
8-27-10	0814	Bio-03942-19	Bio-03942	↓	JDR
↓	↓	Bio-03942-20	↓	↓	JDR
↓	↓	Bio-03942-21	↓	↓	JDR
↓	↓	Bio-03942-22	↓	↓	JDR
↓	↓	Bio-03942-23	↓	↓	JDR
8-30-2010	0818	SNC 51	QA	QA	JDR
↓	↓	Background	Bio-03942	1005	JDR
↓	↓	Bio-03942-09	↓	↓	JDR
↓	↓	Bio-03942-10	↓	↓	JDR
↓	↓	Bio-03942-11	↓	↓	JDR
↓	↓	Bio-03942-12	↓	↓	JDR
↓	↓	Bio-03942-13	↓	↓	JDR
↓	↓	~~Bio-03942-14~~	↓ JDR	8-31-2010	JDR
8-31-2010	0811	SNC 51	QA	QA	JDR
↓	↓	Background	Bio-03942	0953	JDR
↓	↓	Bio-03942-14	↓	↓	JDR
8-31-2010	1428	SNC51	QA	QA	JDR
↓	↓	Background	Bio-02987	1550	JDR
↓	↓	Bio-02987-01	↓	↓	JDR
↓	↓	Bio-02987-02	↓	↓	JDR

Reviewed By: LSW Date: 9-01-10
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
8-31-2010	1428	B10-02987-03	B10-02987	1550	JDR
↓	↓	B10-02987-04	↓	↓	JDR
↓	↓	B10-02987-05	↓	↓	JDR
↓	↓	B10-02987-06	↓	↓	JDR
↓	↓	B10-02987-07	↓	↓	JDR
↓	↓	B10-02987-08	↓	↓	JDR
↓	↓	B10-02987-09	↓	↓	JDR
↓	↓	B10-02987-10	↓	↓	JDR
↓	↓	B10-02987-11	↓	↓	JDR
↓	↓	B10-02987-12	↓	↓	JDR
↓	↓	B10-02987-13	↓	↓	JDR
↓	↓	B10-02987-14	↓	↓	JDR

N/A JDR 9-5-2010

Reviewed By: LSW Initials Date: 9-08-10

Technical Notes

Batch	ARS1-B10-02987
Analysis Code	LSC-A-022
Procedure No	ARS-054
Matrix	AQ

#	Date	Dept	Batch Technical Notes	User ID
1	08/16/10 11:05	CHEMISTRY	Chiller operating bath was turned off while enrichment continued for samples B10-02987-01---->03. This continued for approx 8-10 hours. I am unsure what affect if any this will have on analysis.	JRABER

ARS INTERNATIONAL

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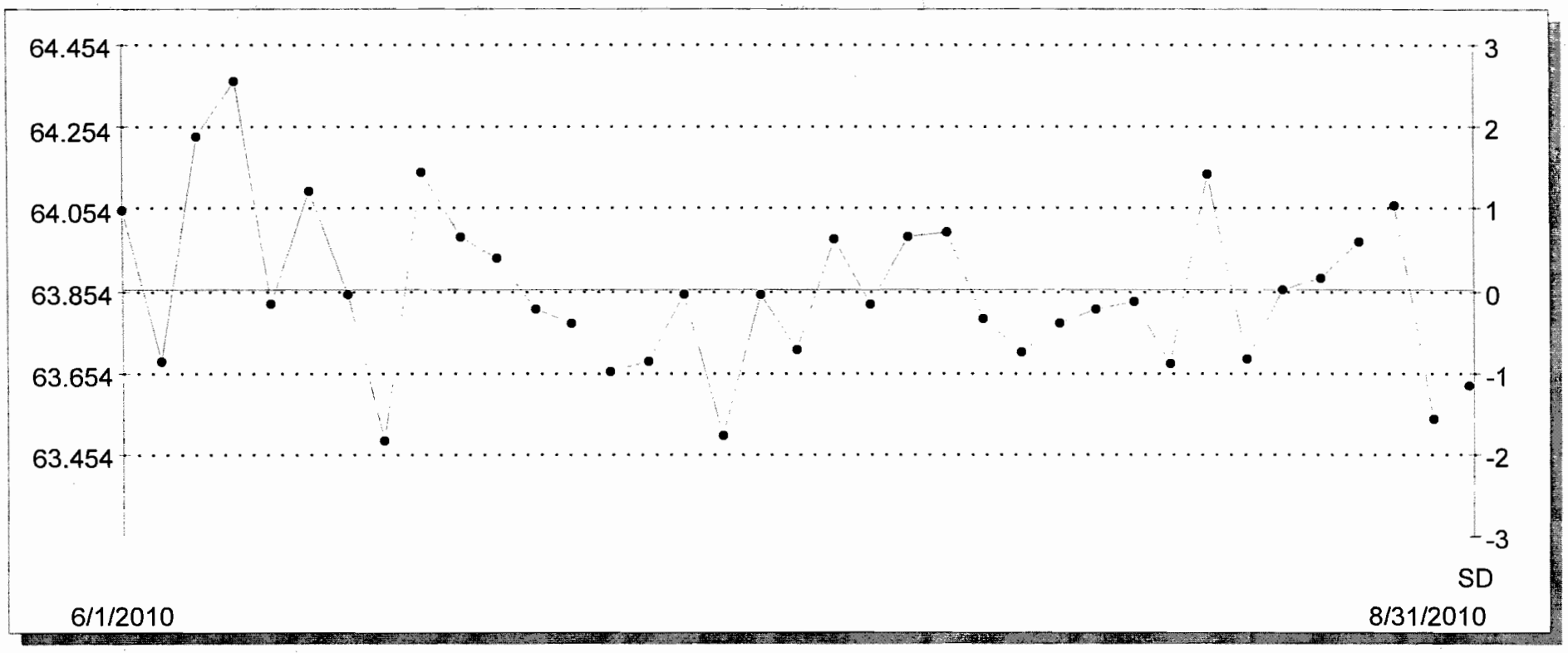
Low Level Tritium by Low Level Liquid Scintillation Counting

Control Charts

3H Efficiency
Total # pts : 5208
Valid # pts : 37
Mean : 63.86
SD : 0.20

Date	Value	Valid Pt
Jun 01, 2010	64.05	X
Jun 04, 2010	63.68	X
Jun 07, 2010	64.23	X
Jun 08, 2010	64.37	X
Jun 11, 2010	63.82	X
Jun 14, 2010	64.10	X
Jun 15, 2010	63.84	X
Jun 16, 2010	63.49	X
Jun 17, 2010	64.15	X
Jun 20, 2010	63.98	X
Jun 21, 2010	63.94	X
Jun 21, 2010	63.81	X
Jun 21, 2010	63.78	X
Jun 21, 2010	63.66	X
Jun 21, 2010	63.68	X
Jun 21, 2010	63.85	X
Jun 21, 2010	63.50	X
Jun 28, 2010	63.84	X
Jul 06, 2010	63.71	X
Jul 07, 2010	63.98	X
Jul 12, 2010	63.82	X
Jul 19, 2010	63.99	X
Jul 20, 2010	64.00	X
Jul 21, 2010	63.79	X
Jul 23, 2010	63.71	X
Jul 26, 2010	63.78	X
Jul 28, 2010	63.81	X
Aug 03, 2010	63.83	X
Aug 09, 2010	63.67	X
Aug 17, 2010	64.14	X
Aug 23, 2010	63.69	X
Aug 24, 2010	63.86	X
Aug 26, 2010	63.89	X
Aug 27, 2010	63.97	X
Aug 30, 2010	64.06	X
Aug 31, 2010	63.54	X
Aug 31, 2010	63.62	X

3H Efficiency
Total # pts : 5208
Valid # pts : 37
Mean : 63.86
SD : 0.20

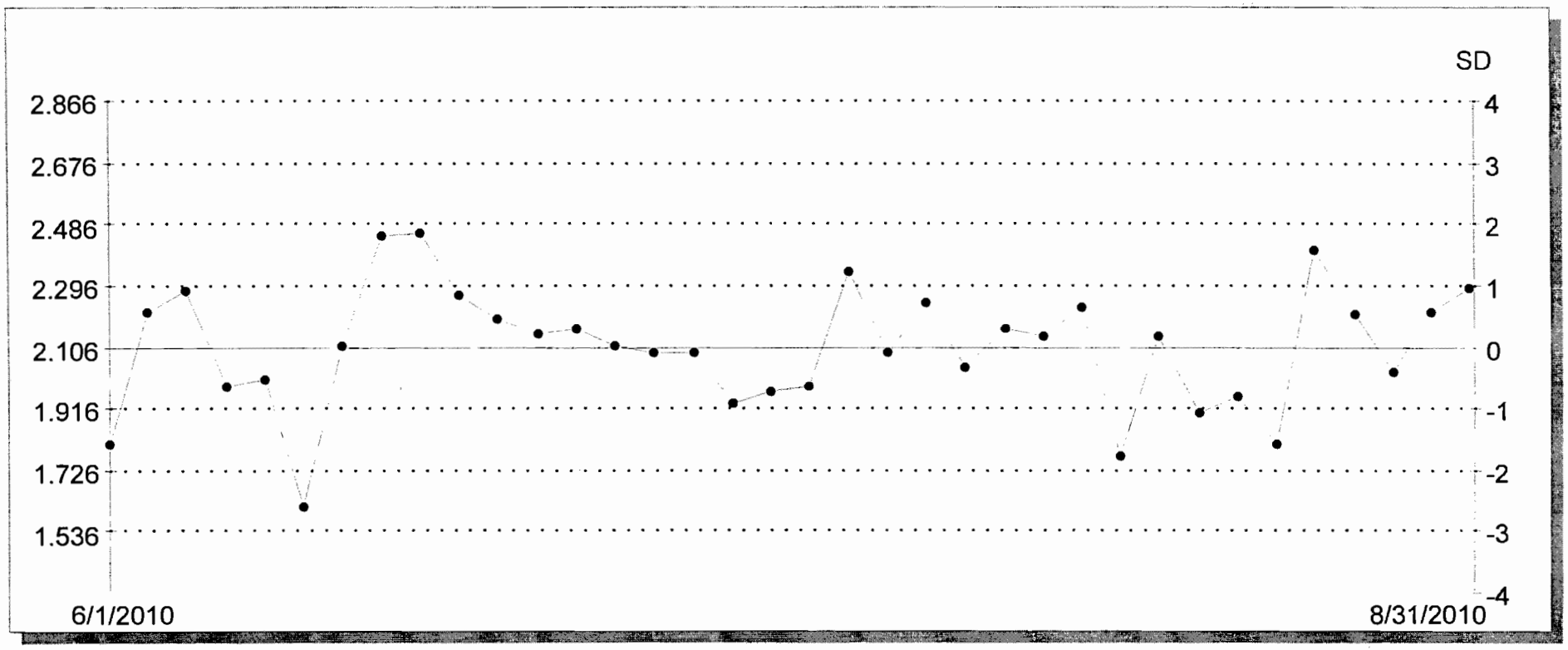


3H Background
Total # pts : 5138
Valid # pts : 36
Mean : 2.11
SD : 0.19

Date	Value	Valid Pt
Jun 01, 2010	1.81	X
Jun 04, 2010	2.21	X
Jun 07, 2010	2.28	X
Jun 08, 2010	1.99	X
Jun 11, 2010	2.00	X
Jun 14, 2010	1.61	X
Jun 15, 2010	2.11	X
Jun 16, 2010	2.45	X
Jun 17, 2010	2.46	X
Jun 20, 2010	2.27	X
Jun 21, 2010	2.19	X
Jun 21, 2010	2.15	X
Jun 21, 2010	2.16	X
Jun 21, 2010	2.11	X
Jun 21, 2010	2.09	X
Jun 21, 2010	2.09	X
Jun 28, 2010	1.94	X
Jul 06, 2010	1.97	X
Jul 07, 2010	1.98	X
Jul 12, 2010	2.34	X
Jul 19, 2010	2.09	X
Jul 20, 2010	2.25	X
Jul 21, 2010	2.05	X
Jul 23, 2010	2.17	X
Jul 26, 2010	2.14	X
Jul 28, 2010	2.23	X
Aug 03, 2010	1.77	X
Aug 09, 2010	2.14	X
Aug 17, 2010	1.90	X
Aug 23, 2010	1.96	X
Aug 24, 2010	1.81	X
Aug 26, 2010	2.41	X
Aug 27, 2010	2.21	X
Aug 30, 2010	2.03	X
Aug 31, 2010	2.22	X
Aug 31, 2010	2.29	X

3H Background

Total # pts	: 5138
Valid # pts	: 36
Mean	: 2.11
SD	: 0.19



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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: ARS1-10-01288; 01290.
ARS Batch ID: ARS1-B10-02986

	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	ARS1-B10-02986-04	120	2.053	1.645	38.84	5.00	94.636	pCi/L	160.2347	NO
2	ARS1-B10-02986-05	120	1.502	1.645	38.6	5.00	-33.375	pCi/L	161.2309	NO
3	ARS1-B10-02986-06	120	1.594	1.645	38.05	5.00	-12.075	pCi/L	163.5615	NO
4	ARS1-B10-02986-07	120	1.777	1.645	37.32	5.00	31.865	pCi/L	166.7608	NO
5	ARS1-B10-02986-08	120	2.072	1.645	37.42	5.00	102.802	pCi/L	166.3152	NO
6	ARS1-B10-02986-09	120	1.637	1.645	37.32	5.00	-1.931	pCi/L	166.7608	NO
7	ARS1-B10-02986-10	120	1.751	1.645	36.47	5.00	26.185	pCi/L	170.6475	NO
8	ARS1-B10-02986-11	120	1.567	1.645	36.83	5.00	-19.080	pCi/L	168.9795	NO
9	ARS1-B10-02986-12	120	1.543	1.645	36.47	5.00	-25.197	pCi/L	170.6475	NO
10	ARS1-B10-02986-13	120	1.536	1.645	36.53	5.00	-26.882	pCi/L	170.3672	NO
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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Tritium-Screening by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

Analysis Batch ID **ARS1-B10-02986**

Method **ARS-054** **Analysis** **LSC-A-021** **Matrix** **AQ**

Description **TRITIUM IN WATER**

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-02986-01	LCS									
ARS1-B10-02986-02	LCSD									
ARS1-B10-02986-03	MBL									
ARS1-B10-02986-04	TRG				**ARS1-10-01288**	001	1	BUCKMAN1-10-16990		07/06/10
ARS1-B10-02986-05	TRG				**ARS1-10-01288**	002	1	BUCKMAN06-10-16992		07/06/10
ARS1-B10-02986-06	TRG				**ARS1-10-01290**	001	1	CAPA-10-17740		07/06/10
ARS1-B10-02986-07	TRG				**ARS1-10-01290**	002	1	CAPA-10-17743		07/06/10
ARS1-B10-02986-08	TRG				**ARS1-10-01290**	003	1	CAPA-10-17746		07/06/10
ARS1-B10-02986-09	TRG				**ARS1-10-01290**	004	1	CAPA-10-17777		07/06/10
ARS1-B10-02986-10	TRG				**ARS1-10-01290**	005	1	CAPA-10-17852		07/06/10
ARS1-B10-02986-11	TRG				**ARS1-10-01290**	006	1	CAPA-10-17854		07/06/10
ARS1-B10-02986-12	TRG				**ARS1-10-01290**	007	1	CAPA-10-17952		07/06/10
ARS1-B10-02986-13	TRG				**ARS1-10-01290**	008	1	CAPA-10-17850		07/06/10

62766
10-01288-001-1
WRAD

62767
10-01288-002-1
WRAD

62768
10-01290-001-1
WRAD

62769
10-01290-002-1
WRAD

62774
10-01290-003-1
WRAD

62778
10-01290-004-1
WRAD

62779
10-01290-005-1
WRAD

62781
10-01290-006-1
WRAD

62782
10-01290-007-1
WRAD

62783
10-01290-008-1
WRAD

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
5694	ARS1-B10-02986	ARS1-B10-02986-01		1	g					JRABER	06/11/2010 12:11:38
5695	ARS1-B10-02986	ARS1-B10-02986-02		1	g					JRABER	06/11/2010 12:11:38
5696	ARS1-B10-02986	ARS1-B10-02986-03		1	g					JRABER	06/11/2010 12:11:39
5697	ARS1-B10-02986	ARS1-B10-02986-04	BUCKMAN1-10-16990	5	g	62766				JRABER	06/11/2010 12:11:39
5698	ARS1-B10-02986	ARS1-B10-02986-05	BUCKMAN06-10-16992	5	g	62767				JRABER	06/11/2010 12:11:39
5699	ARS1-B10-02986	ARS1-B10-02986-06	CAPA-10-17740	5	g	62768				JRABER	06/11/2010 12:11:39
5700	ARS1-B10-02986	ARS1-B10-02986-07	CAPA-10-17743	5	g	62769				JRABER	06/11/2010 12:11:39
5701	ARS1-B10-02986	ARS1-B10-02986-08	CAPA-10-17746	5	g	62774				JRABER	06/11/2010 12:11:39
5702	ARS1-B10-02986	ARS1-B10-02986-09	CAPA-10-17777	5	g	62778				JRABER	06/11/2010 12:11:39
5703	ARS1-B10-02986	ARS1-B10-02986-10	CAPA-10-17852	5	g	62779				JRABER	06/11/2010 12:11:39
5704	ARS1-B10-02986	ARS1-B10-02986-11	CAPA-10-17854	5	g	62781				JRABER	06/11/2010 12:11:40
5705	ARS1-B10-02986	ARS1-B10-02986-12	CAPA-10-17952	5	g	62782				JRABER	06/11/2010 12:11:40
5706	ARS1-B10-02986	ARS1-B10-02986-13	CAPA-10-17850	5	g	62783				JRABER	06/11/2010 12:11:40

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\20100616_1152
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100616_1152\20100616_1152.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100616_1152\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100616_1152\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL H3
  Quench Indicator: tSIE/AEC
  External Std Terminator (sec): 0.5 2s%
  Pre-Count Delay (min): 0.00
Quench Set:
  Low Energy: LL H3 PLASTIC
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	0.0	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

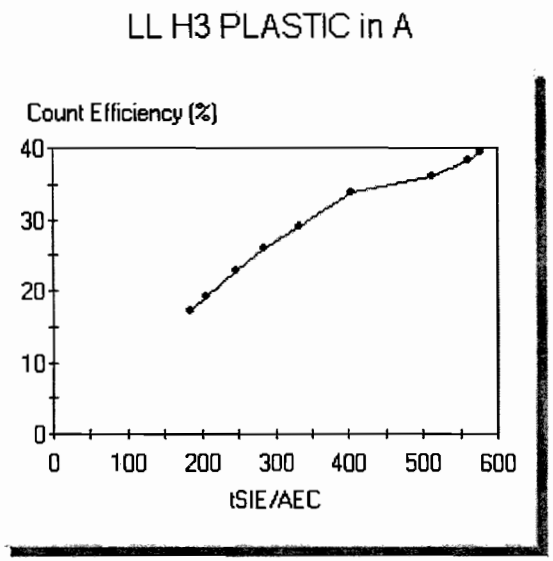
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 09/08/2009
Date Modified:
LL H3 PLASTIC in A

tSIE/AEC	Count Efficiency (%)
577.71	39.37
561.32	38.19
514.09	36.15
404.21	33.71
334.90	29.12
284.93	26.04
246.14	22.78
207.51	19.18
185.88	17.18

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nuc1 In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.645	4.34	555.42	37.93	6/16/2010	12:01:31 PM	
2	2	B10-02986-04	120.00	2.053	5.29	570.29	38.84	6/16/2010	2:11:51 PM	
2	3	B10-02986-05	120.00	1.502	3.89	566.97	38.60	6/16/2010	4:21:58 PM	
2	4	B10-02986-06	120.00	1.594	4.19	558.06	38.05	6/16/2010	6:32:04 PM	
2	5	B10-02986-07	120.00	1.777	4.76	541.25	37.32	6/16/2010	8:42:10 PM	
2	6	B10-02986-08	120.00	2.072	5.54	543.55	37.42	6/16/2010	10:52:16 PM	

B10-02986-09

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	~~BACKGROUND~~	120.00	1.637	4.39	541.24	37.32	6/17/2010	10:26:21 AM	
2	2	B10-02986-~~04~~ 10	120.00	1.751	4.80	521.44	36.47	6/17/2010	12:36:24 PM	
2	3	B10-02986-~~05~~ 11	120.00	1.567	4.26	529.72	36.83	6/17/2010	2:46:27 PM	
2	4	B10-02986-~~06~~ 12	120.00	1.543	4.23	521.50	36.47	6/17/2010	4:56:30 PM	
2	5	B10-02986-~~07~~ 13	120.00	1.536	4.21	522.94	36.53	6/17/2010	7:06:34 PM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
6-11-2010	1418	B10-02984-10	B10-02984	Did not count	JDR
↓	↓	B10-02984-11	↓	↓	JDR
↓	↓	B10-02984-12	↓	↓	JDR
↓	↓	B10-02984-13	↓	↓	JDR
↓	↓	B10-02984-14	↓	↓	JDR
↓	↓	B10-02984-15	↓	0916	JDR
↓	↓	B10-02984-16	↓	↓	JDR
↓	↓	B10-02984-17	↓	↓	JDR
↓	↓	B10-02984-18	↓	↓	JDR
6-15-10	0812	SNC 51	QA	QA	
↓	↓	B10-02984-09	B10-02984	0950	
↓	↓	B10-02984-10	↓	↓	
↓	↓	B10-02984-11	↓	↓	
↓	↓	B10-02984-12	↓	↓	
↓	↓	B10-02984-13	↓	↓	
↓	↓	B10-02984-14	↓	↓	
6-16-2010	0841	SNC51	QA	QA	JDR
↓	↓	Background	B10-02986	1152	JDR
↓	↓	B10-02986-04	↓	↓	JDR
↓	↓	B10-02986-05	↓	↓	JDR

Reviewed By: DSW Date: 9-08-10
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
6-16-2010	0841	Bio-02986-06	Bio-02986	1152	JDR
↓	↓	Bio-02986-07	↓	↓	JDR
↓	↓	Bio-02986-08	↓	↓	JDR
↓	↓	Bio-02986-09	↓	↓	JDR
↓	↓	Bio-02986-10	↓	↓	JDR
↓	↓	Bio-02986-11	↓	↓	JDR
↓	↓	Bio-02986-12	↓	↓	JDR
↓	↓	Bio-02986-13	↓	↓	JDR
6-17-10	0835	Bio-02986-09	Bio-02954	1919	
↓	↓	Bio-02986-10	↓	↓	
↓	↓	Bio-02986-11	↓	↓	
↓	↓	Bio-02986-12	↓	↓	
.	↓	Bio-02986-13	↓	↓	
* ↓	↓	SNC 51	2A	2A	
6-17-10	0950	Background	Bio-02931		
↓	↓	Bio-02931-01	↓		
↓	↓	Bio-02931-02	↓		
↓	↓	Bio-02931-03	↓		
↓	↓	Bio-02931-04	↓		
↓	↓	Bio-02931-05	↓		

* SNC counted before Batch 10-02954 on 6-17-10

Reviewed By: JSW Date: 9-08-10
Initials

Technical Notes

Batch	ARS1-B10-02986
Analysis Code	LSC-A-021
Procedure No	ARS-054
Matrix	AQ

#	Date	Dept	Batch Technical Notes	User ID
1	06/18/10 08:42	CHEMISTRY	Tri-Carb liquid scintillation counter did not count samples B10-02986-09 through B10-02986-13. Once this was discovered, another chemist counted these 5 samples without counting a background.	JRABER

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

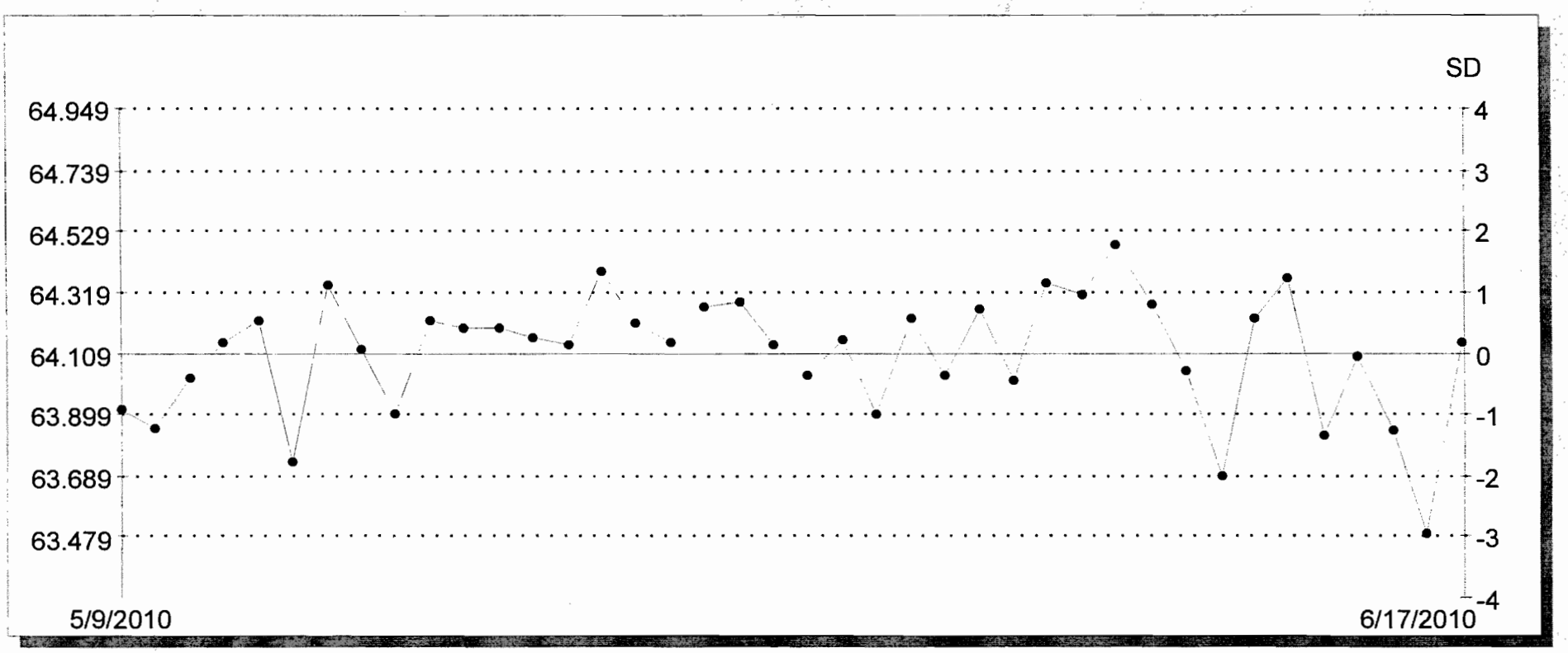
Tritium-Screening by Low Level Liquid Scintillation Counting

Control Charts

3H Efficiency
Total # pts : 5180
Valid # pts : 40
Mean : 64.11
SD : 0.21

Date	Value	Valid Pt
May 09, 2010	63.92	X
May 09, 2010	63.85	X
May 09, 2010	64.03	X
May 09, 2010	64.15	X
May 09, 2010	64.22	X
May 09, 2010	63.74	X
May 09, 2010	64.35	X
May 09, 2010	64.12	X
May 09, 2010	63.90	X
May 09, 2010	64.22	X
May 09, 2010	64.19	X
May 09, 2010	64.20	X
May 09, 2010	64.16	X
May 09, 2010	64.14	X
May 09, 2010	64.39	X
May 10, 2010	64.22	X
May 10, 2010	64.15	X
May 10, 2010	64.27	X
May 10, 2010	64.29	X
May 10, 2010	64.14	X
May 10, 2010	64.03	X
May 11, 2010	64.16	X
May 12, 2010	63.90	X
May 12, 2010	64.23	X
May 13, 2010	64.04	X
May 14, 2010	64.26	X
May 18, 2010	64.01	X
May 24, 2010	64.35	X
May 29, 2010	64.31	X
May 30, 2010	64.49	X
May 30, 2010	64.28	X
Jun 01, 2010	64.05	X
Jun 04, 2010	63.68	X
Jun 07, 2010	64.23	X
Jun 08, 2010	64.37	X
Jun 11, 2010	63.82	X
Jun 14, 2010	64.10	X
Jun 15, 2010	63.84	X
Jun 16, 2010	63.49	X
Jun 17, 2010	64.15	X

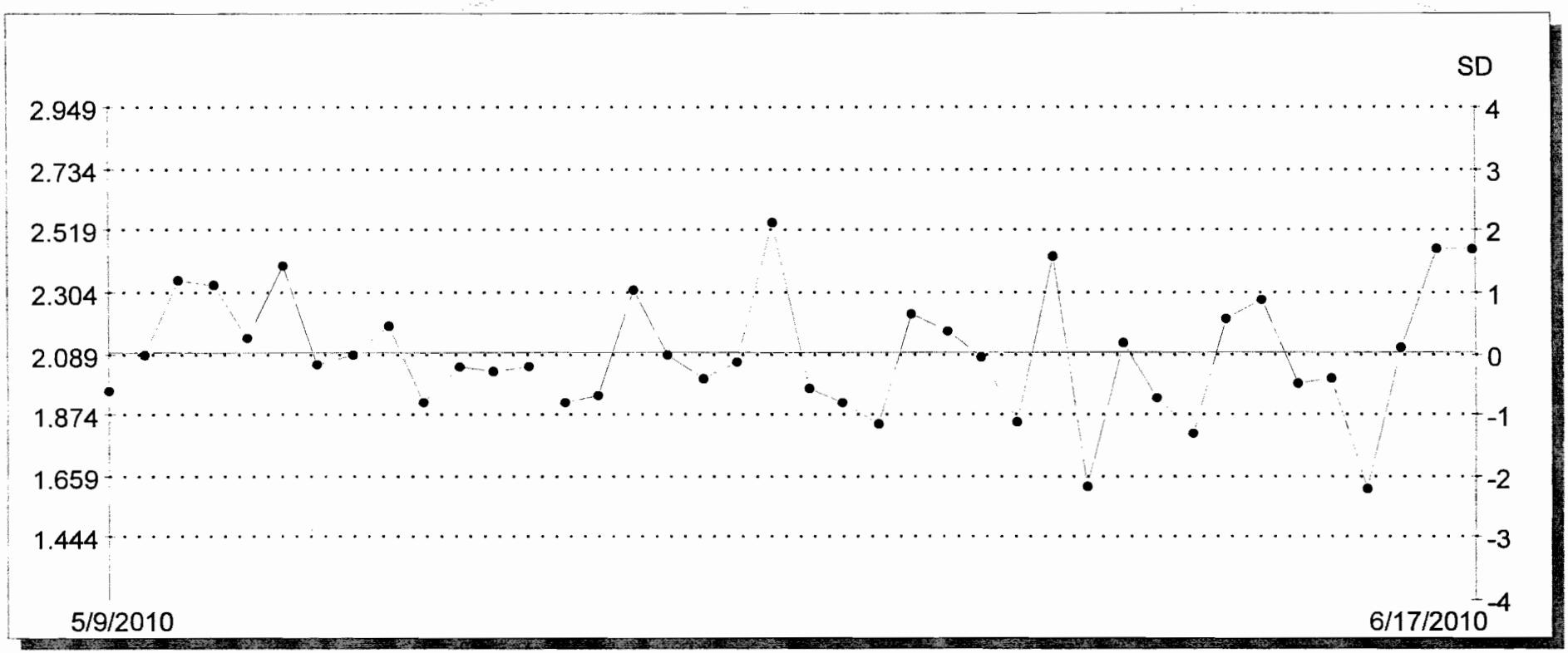
3H Efficiency
Total # pts : 5180
Valid # pts : 40
Mean : 64.11
SD : 0.21



3H Background
Total # pts : 5111
Valid # pts : 40
Mean : 2.09
SD : 0.21

Date	Value	Valid Pt
May 09, 2010	1.96	X
May 09, 2010	2.09	X
May 09, 2010	2.34	X
May 09, 2010	2.33	X
May 09, 2010	2.15	X
May 09, 2010	2.40	X
May 09, 2010	2.05	X
May 09, 2010	2.09	X
May 09, 2010	2.18	X
May 09, 2010	1.92	X
May 09, 2010	2.05	X
May 09, 2010	2.02	X
May 09, 2010	2.04	X
May 09, 2010	1.91	X
May 09, 2010	1.94	X
May 10, 2010	2.31	X
May 10, 2010	2.08	X
May 10, 2010	2.00	X
May 10, 2010	2.06	X
May 10, 2010	2.55	X
May 10, 2010	1.97	X
May 11, 2010	1.92	X
May 12, 2010	1.85	X
May 12, 2010	2.23	X
May 13, 2010	2.17	X
May 14, 2010	2.08	X
May 18, 2010	1.85	X
May 24, 2010	2.43	X
May 29, 2010	1.62	X
May 30, 2010	2.13	X
May 30, 2010	1.93	X
Jun 01, 2010	1.81	X
Jun 04, 2010	2.21	X
Jun 07, 2010	2.28	X
Jun 08, 2010	1.99	X
Jun 11, 2010	2.00	X
Jun 14, 2010	1.61	X
Jun 15, 2010	2.11	X
Jun 16, 2010	2.45	X
Jun 17, 2010	2.46	X

3H Background
Total # pts : 5111
Valid # pts : 40
Mean : 2.09
SD : 0.21



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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Liquid Scintillation Counting

Calibration Information

QUALITY CONTROL PROGRAM

AMERICAN RADIATION SERVICES
RADIOACTIVE REFERENCE SOLUTIONS

ANNUAL ACTIVITY VERIFICATION

VERIFICATION DATE: 5/13/2010 0:00 *date counted*
STANDARD REFERENCE #: S-0206

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: 2/25/2009 8:30

Dilution Activity	3.01	pCi per gram ===> dpm/g	6.68
Verif. Date Decay Corrected	2.81	pCi per gram ===> dpm/g	6.24

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-0206-V1B	11.98	1	LSC	0.3328	1.62	5.040	6.18	2.78
S-0206-V2B	11.42	1	LSC	0.3186	1.62	5.010	6.13	2.76
S-0206-V3B	12.01	1	LSC	0.3360	1.62	4.990	6.19	2.79
S-0206-V4B	11.75	1	LSC	0.3275	1.62	5.010	6.17	2.78
S-0206-V5B	11.45	1	LSC	0.3196	1.62	5.020	6.13	2.76

		Average	6.16 / 2.77
		Two Sigma Uncertainty	0.06 / 0.02
10% Max	*PASS*	Standard Deviation percent of known concentration	0.45% / 0.45%
		Target Activity	6.24 / 2.81
5% Max	*PASS*	% Diff	-1.27% / -1.27%

Verification Expiration Date: May 13, 2011

Prepared & Counted By: Jeremy Raber Date: 5/13/2010 0:00
Verified & Approved By: Virginia Mulligan Date: 5/14/2010
QC Approval: Tony Segal Date: 5/14/2010

S-0206	
H-3	Verified 5/14/10
SL	**Expires 5/14/11**
Manufactuer	**NIST**
Sol Matrix	H2O
Ref No	NIST 4361C
Tech	M Thibodeaux
Parent ID	S-0152

RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY

STD ID: S-0206

ARS INTERNATIONAL

Add/Edit *Secondary Stds*

Planning

Planning Comments	**Create a Low Level H3 LCS solution.**
Target dpm/g (on dil. date)	**6.66**
Target Final volume mL	**500**
Appx mass g of Parent Sol'n	**49.8188436**
Appx vol ml of Parent Sol'n	**49.91868096**
Expected Addition for Analysis g	**5**

Standards Preparation / Dilution

Secondary Solution #	**S-0206**
Dilution Date (New Ref Date)	**02/25/2009 08:30**
Ampoule, Empty (g)	
Ampoule /Solution Gross (g)	
Net Wt Removed (g)	
Transfer Container, empty (g)	**103.64**
Container Plus Solution (g)	**153.45**
Net Wt Transferred (g)	**49.81**
DPM Xferred on 02/25/2009 08:30	**3329.408875**
Diluent/matrix	**Dead H2O**
Diluent Density Cont, empty (g)	
Test Mass of 5 ml of Diluent (g)	
Diluent Density Test - (g/mL)	
Dilution Empty Container Mass (g)	**198.75**
Dilution Full Cont g (if measured)	**697.31**
Dilution Final Volume ml (if measured)	**500**
Final Dilution Density (g/mL)	**0.99712**
Final Dilution Measured Mass g	**498.56**
Comments	**Use as H3LL LCS creation. Dilution performed as stated above by M Thibodeaux on 2/25/09. -BJS 2/25/09**
Final Dilution dpm/g	**6.678050535**
Final Dil New Ref Date/Time	**02/25/2009 08:30**

Parent Standard Data

Parent Solution Reference #	**NIST 4361C**			
Parent Solution #	**S-0152**			
Parent Principal Radionuclide	**H-3**	Half Life (Days)	**4499.8000000**	
Parent Reference Date	**09/03/1998 11:00**			
Parent Certified Act	**120.54**	Certl Act/Vol Units	**dpm**	**g**
Parent Cert Act Uncert 1 Sigma	**0.0076**			
Parent Sp. Gravity G/Ml	**0.998**			
Parent Supplier	**NIST**			
Parent Date Recvd	**12/04/06**			
Parent Received By	**LU**			
Parent Cert Exp Date				
Parent Matrix	**H2O**			
Certified dpm/g At Ref Date	**120.54**			
Certified dpm/g on 02/25/2009 08:30	**66.84217777**			
Parent Comments	Liquid in a 500-ml borosilicate-glass medis bottle with teflon-lined screw cap. Approximately 500 grams			
Parent Tech	**M. Thibodeaux**			
Is_Primary	**FALSE**			
Is_LCS	**TRUE**			
Is_Tracer	**FALSE**			
Is_Calib	**FALSE**			

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for

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ARS INTERNATIONAL

Report Compilation Checklist

ARS SDG: 10-01288 **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 9-8-10
Report Generator Signature **Date**

B [illegible] 9-8-10
Management Review Signature **Date**
for Tony Byrd

ARS INTERNATIONAL

LSC
Technical Review Checklist

ARS SDG ARS1-10-01288

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-B10-02987 **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): _____

Jimmy D. Rabun 8-31-10
Chemist Signature **Date**

Tamara Brown 8-31-10
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

BJ Byrd for Tony Byrd 9-8-10
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

N/A JDR 9-7-10

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

Jimmy D. Rabun 9-7-10
Analyst Signature **Date**

N/A
Technicial Reviewer Signature **Date**

ARS INTERNATIONAL

Batch A: ARS1-B10-02987

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 9-8-10
Project Manager Signature Date

B Byrd for Tony Byrd 9-8-10
QA Officer Signature Date

GENERAL COMMENTS

ARS INTERNATIONAL

LSC
Technical Review Checklist

ARS SDG ARS1-10-01288

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-B10-02986	**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): _____

Jimmy D. Rahn 6-16-2010
Chemist Signature Date

Jamaal Brown 6-16-10
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

RJ Shaw For Tony Byrd 9-8-10
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

JDR 6-18-2010

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

Jimmy D. Rahn 6-18-2010
Analyst Signature Date

N/A
Technicial Reviewer Signature Date

ARS INTERNATIONAL

Batch A: ARS1-B10-02986

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 Sleex 9-8-10
Project Manager Signature Date

B [signature] for Tony Byrd 9-8-10
QA Officer Signature Date

GENERAL COMMENTS

DQO Report for SDG
ARS1-10-01288

62467

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	BlankCorrectionAli	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		

SDG Report - Samples and Containers

SDG Specific Data

SDG	ARS1-10-01288			TAT Days	30	Project Type	Environmental
Sample Count	2	Rpt Level	4	Date Received	6/10/2010	COC Number	10-3350
Client	Los Alamos National Laboratory			Client Deadline	7/9/2010	PO Number	WEPR1158W100
Client Code	114			Internal Deadline	7/8/2010	Job Number	63641-001-10
Profile Number	PN-00094			Lab Deadline	7/6/2010	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	BUCKMAN1-10-16990	AQ	06/08/10 12:00 PM	06/08/10 12:00 PM	H	90	5	Q4							
→	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
	62694	1	1123.00				60	29		N	N/A				
002	BUCKMAN06-10-16992	AQ	06/08/10 12:00 PM	06/08/10 12:00 PM	H	90	5	Q4							
→	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
	62695	1	1124.00				70	29		N	N/A				

SDG Report - Analysis Assignments

Temp SDG	ARS1-10-01288	Sample Count	2
Client	Los Alamos National Laboratory	Analysis Count	2-4

Samples Count Totals per Analysis

Analysis Code	Analysis Description	Samples Count
LSC-A-021	Low Level Tritium Screen in (Aqueous)	2
LSC-A-022	Low Level Tritium by Enrichment Process in (Aqueous [AQ])	2

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

ARS FILE TRACKING SHEET

SDG: 10-01288

Task	Date / Time	Initials
Date & Time Samples Received	06-10-10/10:06	H.P.
ICOC Initiated / Storage Location: Q4	06-10-10/13:27	H.P.
Technical Checks Performed	See batch	
Report Written / EDD Generated: 9-8-10 / 1010 / SDL (Date/Time / Initials)	9-8-10/1006	SDL
Quality Assurance Checks Performed on Report	9-8-10/1421	
Management Check Performed on Report	9-8-10/1421	
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:

ARS-062
04/23/2010

COMPANY NAME: LANL SDG: 10-01288

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: 2

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

External and Internal Surveys

Exposure Rate Meter: M3242861 Serial No.: 442PR264266 Calibration Due Date: 4-19-11

Count Rate Meter: M2154859 Serial No.: 442PR184559 Calibration Due Date: 4-6-11

Background Exposure Rate (µR/hr): 24

Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd): 26 µR/hr

Background Count Rate (cpm): 50

Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd): 50 cpm

Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd): 50 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 1-10-16990	—	—	N/A	—	1123	29	60
Lot-10-16992	—	—		—	1124	29	70

Surveyors' Name: Heath Pan

Date/Time Surveyed: 6-10-10 11:00

Susan Leese

From: Tony Byrd
Sent: Wednesday, September 08, 2010 12:56 PM
To: Susan Leese
Cc: Tony Byrd; Brian Steffens; Virgene Ideker-Mulligan
Subject: RE: [redacted]

[redacted]

Please place a copy of this communication with the file as [redacted]

Sincerely,

Tony L. Byrd
Quality Assurance Officer
tbyrd@amrad.com
QAQC@amrad.com

ARS INTERNATIONAL

☎ 225.346.6032 Direct Line
225.505.0596 Mobile
225.381.2996 FAX

-----Original Message-----
From: Susan Leese
Sent: Wednesday, September 08, 2010 12:39 PM
To: Tony Byrd
Subject: LANL 10-01288

Here's the first one-
Just sent the price quote to Audrey

Susan Leese
ARS Project Manager
SLeese@amrad.com

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: 10-4334

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: 10-4334

Original COC

Wednesday, August 25, 2010

REQUEST NUMBER: 10-4334

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:10-4334
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples
according to the schedule indicated:

SHIP DATE: 8/25/2010
TURNAROUND/REPORT DUE: 9/24/2010
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	Buckman1-10-24996	WG	8/24/2010	
		1	Buckman06-10-24997	WG	8/24/2010	
		1	Buckman08-10-24998	WG	8/24/2010	
		1	Buckman1-10-24999	WG	8/24/2010	

Final Page of REQUEST NUMBER 10-4334

Wednesday, August 25, 2010

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 10-4334C

REQUEST NUMBER: 10-4334

LOS ALAMOS
NATIONAL LABORATORY

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

TURNAROUND/REPORT DUE: 9/24/2010
TURNAROUND REQ'D: 30

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman06-10-24997	1	POLY	WSP-LL-H-3	None	WG
Buckman1-10-24996	1	POLY	WSP-LL-H-3	None	WG
Buckman08-10-24998	1	POLY	WSP-LL-H-3	None	WG
Buckman1-10-24999	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:		**Date**	**Time**	**Received By:**		**Date**	**Time**
Printed Name	Signature			Printed Name	Signature		
		8/25/10	1400			8/26/10	10:48
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		

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

Printed Name Signature

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: 10-4334

Case Narrative

ARS INTERNATIONAL

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

November 19, 2010

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

Request Number: **10-4334**
LANL Sample ID: Buckman1-10-24996; Buckman06-10-24997; Buckman08-10-24998; Buckman1-10-24999.

Dear Mr. Greene;

On August 26, 2010, ARS International received four (4) water samples to be analyzed for Low Level Tritium.

The samples were processed and 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)
10-4334	Buckman1-10-24996	ARS1-10-01880-001
10-4334	Buckman06-10-24997	ARS1-10-01880-002
10-4334	Buckman08-10-24998	ARS1-10-01880-003
10-4334	Buckman1-10-24999	ARS1-10-01880-004

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."

Signature | Laboratory Management, ARS International (Title) | 1-19-10 (Date)

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

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-10-01880	**Request or PO Number:**	10-4334
Client Sample ID:	Buckman1-10-24996	**ARS Sample ID:**	ARS1-10-01880-001
Sample Collection Date:	08/24/10	**Date Received:**	08/26/10
Sample Matrix:	Aqueous	**Report Date:**	11/19/10

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	1.230	0.280	0.670	0.320		TU	ARS-040	11/15/10 00:00	JR	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

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

ARS Sample Delivery Group:	ARS1-10-01880	**Request or PO Number:**	10-4334
Client Sample ID:	Buckman06-10-24997	**ARS Sample ID:**	ARS1-10-01880-002
Sample Collection Date:	08/24/10	**Date Received:**	08/26/10
Sample Matrix:	Aqueous	**Report Date:**	11/19/10

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	0.770	0.180	0.420	0.200		TU	ARS-040	11/15/10 00:00	JR	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:	ARS1-10-01880	**Request or PO Number:**	10-4334
Client Sample ID:	Buckman08-10-24998	**ARS Sample ID:**	ARS1-10-01880-003
Sample Collection Date:	08/24/10	**Date Received:**	08/26/10
Sample Matrix:	Aqueous	**Report Date:**	11/19/10

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	1.090	0.250	0.590	0.290		TU	ARS-040	11/15/10 00:00	JR	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: ARS1-10-01880
Client Sample ID: Buckman1-10-24999
Sample Collection Date: 08/24/10
Sample Matrix: Aqueous

Request or PO Number: 10-4334
ARS Sample ID: ARS1-10-01880-004
Date Received: 08/26/10
Report Date: 11/19/10

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	0.950	0.220	0.520	0.250		TU	ARS-040	11/15/10 00:00	JR	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

LELAP Certificate# 01949 NELAP Certificate # E87558

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

QC Results Report

Sample Delivery Group: ARS1-10-01880
Date Received: 8/26/2010

Laboratory Control Sample Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1s)	MDC	Expected Value	Qual	Raport Units	Analysis Test Method	Analysis Date/Tima	Analysis Technician	Percent Recovery (%)	LCS Acceptance Range
ARS1-B10-04304	LCS	H3	6.980	1.080	0.610	8.428		TU	ARS-040	11/12/10 0:00	JR	83	75%-125%

Blank Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1s)	MDC	Expected Value	Qual	Raport Units	Analysis Test Method	Analysis Date/Time	Analysis Technician
ARS1-B10-04304	MBL	H3	-0.010	0.140	0.480	NA	U	TU	ARS-040	11/13/10 0:00	JR

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-B10-04304	LCSD	H3	6.980	1.080	7.840	1.210		TU	ARS-040	1/13/10 0:00	JR	0.38	< 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-B10-04304	LCSD	H3	6.980	1.080	7.840	1.210		TU	ARS-040	11/13/10 0:00	JR	1.06	< 3

Susan Reese
Project Manager Review

LELAP Certificate# 01949 NELAP Certificate # E87558

ARS1-B10-04304

Expected Value Calculations LANL

ARS Batch Number: ARS1-B09 - 00000

LCS	**CALCULATED EXPECTED VALUE**	=	27.148	8.428		
			Range	21.719	-	32.578
LCSD	**CALCULATED EXPECTED VALUE**	=	27.203	8.446		
			Range	21.763	-	32.644

ARS INTERNATIONAL

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

Samples

QC Evaluation

EPA Method: ARS-040
Batch ID: ARS1-B10-04304
SDG's: ARS1-10-01833,34,78,80,81,1940,42

LCS	22.4900	**CSU (2s)**	6.8200
LCSD	25.2700	**CSU-D (2s)**	7.6500

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

DER $\frac{2.78}{5.1243268}$ = 0.54251 **< 3**

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

%RPD $\frac{2.78}{23.88}$ *100 = 11.64154 **< 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 = $\frac{2.78}{14.4700}$ 0.192121631 **<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	-0.02	0.91	1.56	
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 = -0.02
CSU = 0.91
Is ACT<1.65*CSU? YES

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	10-01833,34,78,80,81,1940,42
ARS Batch ID Number	ARS1-B10-04304

Enrichment Factor Curve coeff. - Power y = a * x^b		Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	8.978E-01	a	-2.318E-06
b	-9.611E-01	b	2.724E-03
c		c	-1.060E+00
		d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	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	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
B10-04304-01	503.98	2.00	11.68	2.06	9.62	0.02	40.32	5	1.44	548.29	0.3763	0.00502	L	2/25/2009	11/12/2010	360	360	0.91699	6.98	0.27	0.27	1.08	0.61	0.29	TU
B10-04304-02	504.73	2.00	12.52	2.06	10.46	0.02	37.26	5	1.44	561.98	0.3623	0.00503	L	2/25/2009	11/13/2010	360	360	0.91666	7.84	0.29	0.29	1.21	0.64	0.31	TU
B10-04304-03	504.43	2.00	10.72	2.06	8.66	0.02	44.65	1	1.44	573.80	0.3909	0.00500	L	11/12/2010	11/13/2010	360	360	0.99984	-0.01	0.14	0.14	0.14	0.48	0.24	TU
B10-04304-04	439.06	2.00	13.00	2.06	10.94	0.02	31.21	2	1.44	469.52	0.3516	0.00504	L	8/12/2010	11/13/2010	360	360	0.98717	1.42	0.25	0.25	0.33	0.77	0.38	TU
B10-04304-05	434.68	2.00	11.29	2.06	9.23	0.02	36.40	2	1.44	542.71	0.3738	0.00502	L	8/12/2010	11/13/2010	360	360	0.98717	1.15	0.20	0.20	0.27	0.63	0.31	TU
B10-04304-06	505.23	2.00	12.76	2.06	10.70	0.02	36.49	2	1.44	553.33	0.3784	0.00503	L	8/12/2010	11/14/2010	360	360	0.99704	1.13	0.20	0.20	0.26	0.62	0.30	TU
B10-04304-07	514.04	2.02	12.22	2.08	10.14	0.02	39.07	2	1.44	542.14	0.3736	0.00390	L	8/13/2010	11/14/2010	360	360	0.98717	1.38	0.24	0.24	0.32	0.75	0.37	TU
B10-04304-08	498.85	2.01	12.00	2.07	9.93	0.02	38.73	2	1.44	545.04	0.3749	0.00502	L	8/19/2010	11/14/2010	360	360	0.98799	1.08	0.19	0.19	0.25	0.59	0.29	TU
B10-04304-09	511.47	2.00	12.02	2.06	9.96	0.02	39.55	2	1.44	550.45	0.3772	0.00504	L	8/24/2010	11/14/2010	360	360	0.98668	1.05	0.18	0.18	0.24	0.57	0.28	TU
B10-04304-10	513.78	2.00	13.76	2.08	11.70	0.02	34.03	2	1.44	550.37	0.3771	0.00500	L	8/24/2010	11/15/2010	360	360	0.98654	1.23	0.22	0.22	0.28	0.67	0.32	TU
B10-04304-11	497.63	2.00	9.17	2.06	7.11	0.01	53.27	2	1.44	558.64	0.3808	0.00502	L	8/24/2010	11/15/2010	360	360	0.98654	0.77	0.14	0.14	0.18	0.42	0.20	TU
B10-04304-12	496.49	2.00	12.16	2.06	10.10	0.02	37.93	2	1.44	553.46	0.3785	0.00501	L	8/24/2010	11/15/2010	360	360	0.98654	1.09	0.19	0.19	0.25	0.59	0.29	TU
B10-04304-13	504.53	2.00	10.60	2.06	8.54	0.02	45.26	2	1.44	520.46	0.3643	0.00501	L	8/24/2010	11/15/2010	360	360	0.98654	0.95	0.17	0.17	0.22	0.52	0.25	TU
B10-04304-14	498.72	2.00	10.79	2.06	8.73	0.02	43.82	33	1.44	528.97	0.3679	0.00321	L	8/23/2010	11/16/2010	360	360	0.98827	86.28	0.85	0.85	12.97	0.83	0.40	TU
B10-04304-15	503.50	2.00	11.38	2.06	9.32	0.02	41.53	14	1.44	563.13	0.3832	0.00500	L	8/20/2010	11/16/2010	360	360	0.98786	22.34	0.37	0.37	3.37	0.54	0.26	TU
B10-04304-16	496.97	2.00	12.30	2.06	10.32	0.02	37.19	16	1.44	522.23	0.3650	0.00501	L	8/23/2010	11/16/2010	360	360	0.98827	30.29	0.46	0.46	4.57	0.63	0.31	TU
B10-04304-17	493.93	2.00	13.81	2.06	11.75	0.02	32.63	2	1.44	550.07	0.3770	0.00503	L	8/25/2010	11/16/2010	360	360	0.98854	1.27	0.22	0.22	0.29	0.69	0.34	TU
B10-04304-20	491.77	2.00	9.83	2.06	7.77	0.02	48.36	5	1.44	557.68	0.3803	0.00503	L	8/31/2010	11/17/2010	360	360	0.98923	5.43	0.20	0.20	0.84	0.46	0.23	TU

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	10-01833,34,78,80,81,1940,42
ARS Batch ID Number	ARS1-B10-04304

Enrichment Factor Curve coeff. - Power y = a * x^b		Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	8.978E-01	a	-2.318E-06
b	-9.611E-01	b	2.724E-03
c		c	-1.060E+00
		d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	pCi
Coverage Factor	1.96	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 1.96s CU	Combined Standard Uncertainty 1.96s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
B10-04304-01	503.98	2.00	11.68	2.06	9.62	0.02	40.32	5	1.44	548.29	0.3763	0.00502	L	2/25/2009	11/12/2010	360	360	0.91669	22.49	0.86	1.68	6.82	1.95	0.95	pCi/L
B10-04304-02	504.73	2.00	12.52	2.06	10.46	0.02	37.26	5	1.44	561.98	0.3823	0.00503	L	2/25/2009	11/13/2010	360	360	0.91686	25.27	0.93	1.82	7.65	2.07	1.01	pCi/L
B10-04304-03	504.43	2.00	10.72	2.06	8.66	0.02	44.65	1	1.44	573.80	0.3909	0.00500	L	11/12/2010	11/13/2010	360	360	0.99984	-0.02	0.48	0.91	0.61	1.56	0.76	pCi/L
B10-04304-04	439.06	2.00	13.00	2.06	10.94	0.02	31.21	2	1.44	469.52	0.3516	0.00504	L	8/12/2010	11/13/2010	360	360	0.98717	4.59	0.61	1.58	2.08	2.49	1.22	pCi/L
B10-04304-05	434.68	2.00	11.29	2.06	9.23	0.02	36.40	2	1.44	542.71	0.3738	0.00502	L	8/12/2010	11/13/2010	360	360	0.96717	3.71	0.65	1.28	1.68	2.02	0.98	pCi/L
B10-04304-06	505.23	2.00	12.76	2.06	10.70	0.02	36.49	2	1.44	553.33	0.3784	0.00503	L	8/12/2010	11/14/2010	360	360	0.98704	3.65	0.84	1.26	1.66	1.99	0.97	pCi/L
B10-04304-07	514.04	2.02	12.22	2.06	10.14	0.02	39.07	2	1.44	542.14	0.3736	0.00390	L	8/13/2010	11/14/2010	360	360	0.96717	4.46	0.78	1.54	2.02	2.42	1.18	pCi/L
B10-04304-08	498.85	2.01	12.00	2.07	9.93	0.02	38.73	2	1.44	545.04	0.3749	0.00502	L	8/19/2010	11/14/2010	360	360	0.98799	3.48	0.61	1.20	1.58	1.89	0.92	pCi/L
B10-04304-09	511.47	2.00	12.02	2.06	9.96	0.02	39.55	2	1.44	550.45	0.3772	0.00504	L	8/24/2010	11/14/2010	360	360	0.98868	3.37	0.59	1.18	1.53	1.83	0.89	pCi/L
B10-04304-10	513.78	2.00	13.76	2.06	11.70	0.02	34.03	2	1.44	550.37	0.3771	0.00500	L	8/24/2010	11/15/2010	360	360	0.98854	3.95	0.69	1.38	1.79	2.15	1.05	pCi/L
B10-04304-11	497.63	2.00	9.17	2.06	7.11	0.01	53.27	2	1.44	558.84	0.3808	0.00502	L	8/24/2010	11/15/2010	360	360	0.98854	2.49	0.44	0.86	1.13	1.35	0.66	pCi/L
B10-04304-12	496.49	2.00	12.16	2.06	10.10	0.02	37.93	2	1.44	553.46	0.3785	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	3.52	0.62	1.21	1.60	1.91	0.93	pCi/L
B10-04304-13	504.53	2.00	10.60	2.06	8.54	0.02	45.26	2	1.44	520.46	0.3643	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	3.07	0.54	1.06	1.39	1.67	0.81	pCi/L
B10-04304-14	498.72	2.00	10.79	2.06	8.73	0.02	43.82	33	1.44	528.97	0.3679	0.00321	L	8/23/2010	11/16/2010	360	360	0.98827	277.93	2.72	5.34	81.69	2.66	1.30	pCi/L
B10-04304-15	503.50	2.00	11.38	2.06	9.32	0.02	41.53	14	1.44	563.13	0.3832	0.00500	L	8/20/2010	11/16/2016	360	360	0.98786	71.95	1.19	2.33	21.28	1.73	0.84	pCi/L
B10-04304-16	496.97	2.00	12.38	2.06	10.32	0.02	37.19	16	1.44	522.23	0.3650	0.00501	L	6/23/2010	11/16/2010	360	360	0.98827	97.57	1.46	2.89	28.83	2.03	0.99	pCi/L
B10-04304-17	493.93	2.00	13.81	2.06	11.75	0.02	32.63	2	1.44	550.07	0.3770	0.00503	L	8/25/2010	11/16/2010	360	360	0.98854	4.09	0.72	1.41	1.86	2.23	1.08	pCi/L
B10-04304-20	491.77	2.00	9.83	2.06	7.77	0.02	48.36	5	1.44	557.66	0.3803	0.00503	L	8/31/2010	11/17/2010	360	360	0.98923	17.51	0.66	1.29	5.31	1.49	0.73	pCi/L

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	10-01833,34,78,80,81,1940,42
ARS Batch ID Number	ARS1-B10-04304

Enrichment Factor Curve coeff. - Power y = a * x^b		Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	8.978E-01	a	-2.319E-06
b	-9.611E-01	b	2.724E-03
c		c	-1.000E+00
		d	1.363E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	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
B10-04304-01	503.98	2.00	11.66	2.06	9.62	0.02	40.32	5	1.44	546.29	0.3763	0.00502	L	2/25/2009	11/12/2010	360	360	0.91699	22.49	0.86	0.86	3.48	1.95	0.95	pCi/L
B10-04304-02	504.73	2.00	12.52	2.06	10.46	0.02	37.26	5	1.44	561.98	0.3823	0.00503	L	2/25/2009	11/13/2010	360	360	0.91686	25.27	0.93	0.93	3.90	2.07	1.01	pCi/L
B10-04304-03	504.43	2.00	10.72	2.06	8.66	0.02	44.65	1	1.44	573.80	0.3909	0.00500	L	11/12/2010	11/13/2010	360	360	0.99984	-0.02	0.46	0.46	0.46	1.56	0.78	pCi/L
B10-04304-04	439.06	2.00	13.00	2.06	10.94	0.02	31.21	2	1.44	469.52	0.3516	0.00504	L	8/12/2010	11/13/2010	360	360	0.98717	4.59	0.81	0.81	1.06	2.49	1.22	pCi/L
B10-04304-05	434.68	2.00	11.29	2.06	9.23	0.02	36.40	2	1.44	542.71	0.3738	0.00502	L	8/12/2010	11/13/2010	360	360	0.98717	3.71	0.68	0.65	0.56	2.02	0.98	pCi/L
B10-04304-06	505.23	2.00	12.76	2.06	10.70	0.02	36.49	2	1.44	553.33	0.3784	0.00503	L	8/12/2010	11/14/2010	360	360	0.98704	3.65	0.64	0.64	0.84	1.99	0.97	pCi/L
B10-04304-07	514.04	2.02	12.22	2.08	10.14	0.02	39.07	2	1.44	542.14	0.3736	0.00390	L	8/13/2010	11/14/2010	360	360	0.98717	4.46	0.78	0.76	1.03	2.42	1.18	pCi/L
B10-04304-08	496.85	2.01	12.00	2.07	9.93	0.02	38.73	2	1.44	545.04	0.3749	0.00502	L	8/19/2010	11/14/2010	360	360	0.98799	3.48	0.61	0.61	0.80	1.89	0.92	pCi/L
B10-04304-09	511.47	2.00	12.02	2.06	9.96	0.02	39.55	2	1.44	550.45	0.3772	0.00504	L	8/24/2010	11/14/2010	360	360	0.98866	3.37	0.59	0.59	0.78	1.83	0.89	pCi/L
B10-04304-10	513.78	2.00	13.76	2.06	11.70	0.02	34.03	2	1.44	550.37	0.3771	0.00500	L	8/24/2010	11/15/2010	360	360	0.98854	3.95	0.69	0.69	0.91	2.15	1.05	pCi/L
B10-04304-11	497.63	2.00	9.17	2.06	7.11	0.01	53.27	2	1.44	558.84	0.3608	0.00502	L	8/24/2010	11/15/2010	360	360	0.98854	2.49	0.44	0.44	0.58	1.35	0.66	pCi/L
B10-04304-12	496.49	2.00	12.16	2.06	10.10	0.02	37.93	2	1.44	553.46	0.3785	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	3.52	0.62	0.62	0.81	1.91	0.93	pCi/L
B10-04304-13	504.53	2.00	10.60	2.06	8.54	0.02	45.26	2	1.44	520.46	0.3643	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	3.07	0.54	0.54	0.71	1.67	0.81	pCi/L
B10-04304-14	498.72	2.00	10.79	2.06	8.73	0.02	43.82	33	1.44	528.97	0.3679	0.00321	L	8/23/2010	11/16/2010	360	360	0.98627	277.93	2.72	2.72	41.78	2.66	1.30	pCi/L
B10-04304-15	503.50	2.00	11.38	2.06	9.32	0.02	41.53	14	1.44	563.13	0.3832	0.00500	L	8/20/2010	11/16/2010	360	360	0.98786	71.95	1.19	1.19	10.66	1.73	0.84	pCi/L
B10-04304-16	496.97	2.00	12.38	2.06	10.32	0.02	37.18	16	1.44	522.23	0.3650	0.00501	L	8/23/2010	11/16/2010	360	360	0.98627	97.57	1.48	1.48	14.71	2.03	0.99	pCi/L
B10-04304-17	493.93	2.00	13.81	2.06	11.75	0.02	32.63	2	1.44	550.07	0.3770	0.00503	L	8/25/2010	11/16/2010	360	360	0.98854	4.09	0.72	0.72	0.95	2.23	1.08	pCi/L
B10-04304-20	491.77	2.00	9.83	2.06	7.77	0.02	46.36	5	1.44	557.68	0.3803	0.00503	L	8/31/2010	11/17/2010	360	360	0.98923	17.51	0.66	0.66	2.71	1.49	0.73	pCi/L

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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

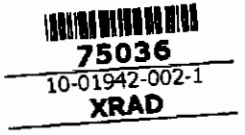
Analysis Batch Report

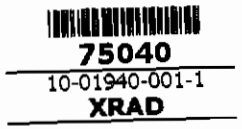
Analysis Batch ID **ARS1-B10-04304**

Method ARS-054 **Analysis** LSC-A-022 **Matrix** AQ

Description Low Level Tritium by Enrichment

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-04304-01	LCS	B-10212								
ARS1-B10-04304-02	LCSD	B-10213								
ARS1-B10-04304-03	MBL									
ARS1-B10-04304-04	DUP									
ARS1-B10-04304-05	DO				**ARS1-10-01833**	001	1	CAPA-10-24119	STD	09/14/10
ARS1-B10-04304-06	TRG				**ARS1-10-01833**	002	1	CAPA-10-24120	STD	09/14/10
ARS1-B10-04304-07	TRG				**ARS1-10-01833**	003	1	CAPA-10-24143	STD	09/14/10
ARS1-B10-04304-08	TRG				**ARS1-10-01834**	001	1	CAPA-10-24872	STD	09/14/10
ARS1-B10-04304-09	TRG				**ARS1-10-01878**	001	1	CAPA-10-24868	STD	09/21/10
ARS1-B10-04304-10	TRG				**ARS1-10-01880**	001	1	Buckman1-10-24996	STD	09/21/10
ARS1-B10-04304-11	TRG				**ARS1-10-01880**	002	1	Buckman06-10-24997	STD	09/21/10
ARS1-B10-04304-12	TRG				**ARS1-10-01880**	003	1	Buckman08-10-24998	STD	09/21/10
ARS1-B10-04304-13	TRG				**ARS1-10-01880**	004	1	Buckman1-10-24999	STD	09/21/10
ARS1-B10-04304-14	TRG				**ARS1-10-01881**	001	1	CAPU-10-25281	STD	09/21/10
ARS1-B10-04304-15	TRG				**ARS1-10-01942**	001	1	CALA-10-24991	STD	09/21/10
ARS1-B10-04304-16	TRG				**ARS1-10-01942**	002	1	CALA-10-25201	STD	09/21/10
ARS1-B10-04304-17	TRG				**ARS1-10-01942**	003	1	CALA-10-25215	STD	09/21/10
ARS1-B10-04304-20	TRG				**ARS1-10-01940**	001	1	CAWA-10-26041	STD	09/28/10





LCS Report
Analytical Batch: ARS1-B10-04304

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-10212	ARS1-B10-04304	ARS1-B10-04304-01	B-H3	S-0206	H-3	5	2.808406639	13.2909	18.299	5.0081	WSTICKLE	5/17/2010			
B-10213	ARS1-B10-04304	ARS1-B10-04304-02	B-H3	S-0206	H-3	5	2.808406639	13.2585	18.2842	5.0257	WSTICKLE	5/17/2010			

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
6897	ARS1-B10-04304	ARS1-B10-04304-01		5.02	g					JRABER	11/12/2010 14:09:03
6898	ARS1-B10-04304	ARS1-B10-04304-02		5.03	g					JRABER	11/12/2010 14:09:04
6899	ARS1-B10-04304	ARS1-B10-04304-03		5	g					JRABER	11/12/2010 14:09:04
6900	ARS1-B10-04304	ARS1-B10-04304-04		5.04	g					JRABER	11/12/2010 14:09:04
6901	ARS1-B10-04304	ARS1-B10-04304-05	CAPA-10-24119	5.02	g	75023				JRABER	11/12/2010 14:09:04
6902	ARS1-B10-04304	ARS1-B10-04304-06	CAPA-10-24120	5.03	g	75024				JRABER	11/12/2010 14:09:04
6903	ARS1-B10-04304	ARS1-B10-04304-07	CAPA-10-24143	3.9	g	75025				JRABER	11/12/2010 14:09:04
6904	ARS1-B10-04304	ARS1-B10-04304-08	CAPA-10-24872	5.02	g	75026				JRABER	11/12/2010 14:09:04
6905	ARS1-B10-04304	ARS1-B10-04304-09	CAPA-10-24868	5.04	g	75027				JRABER	11/12/2010 14:09:04
6906	ARS1-B10-04304	ARS1-B10-04304-10	Buckman1-10-24996	5	g	75028				JRABER	11/12/2010 14:09:05
6907	ARS1-B10-04304	ARS1-B10-04304-11	Buckman06-10-24997	5.02	g	75029				JRABER	11/12/2010 14:09:05
6908	ARS1-B10-04304	ARS1-B10-04304-12	Buckman08-10-24998	5.01	g	75030				JRABER	11/12/2010 14:09:05
6909	ARS1-B10-04304	ARS1-B10-04304-13	Buckman1-10-24999	5.01	g	75031				JRABER	11/12/2010 14:09:05
6910	ARS1-B10-04304	ARS1-B10-04304-14	CAPU-10-25281	3.21	g	75032				JRABER	11/12/2010 14:09:05
6911	ARS1-B10-04304	ARS1-B10-04304-15	CALA-10-24991	5	g	75033				JRABER	11/12/2010 14:09:05
6912	ARS1-B10-04304	ARS1-B10-04304-16	CALA-10-25201	5.01	g	75036				JRABER	11/12/2010 14:09:05
6913	ARS1-B10-04304	ARS1-B10-04304-17	CALA-10-25215	5.03	g	75038				JRABER	11/12/2010 14:09:06
6914	ARS1-B10-04304	ARS1-B10-04304-20	CAWA-10-26041	5.03	g	75040				JRABER	11/12/2010 14:09:06

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\20101112_1141
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20101112_1141\20101112_1141.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20101112_1141\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20101112_1141\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL H3
  Quench Indicator: tSIE/AEC
  External Std Terminator (sec): 0.5 2s%
  Pre-Count Delay (min): 0.00
Quench Set:
  Low Energy: LL H3 PLASTIC
Count Time (min): 360.00
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	0.0	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

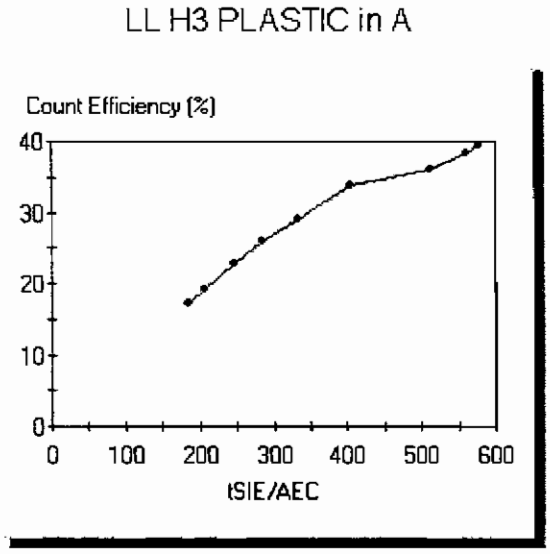
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 09/08/2009
Date Modified:
LL H3 PLASTIC in A

tSIE/AEC	Count Efficiency (%)
577.71	39.37
561.32	38.19
514.09	36.15
404.21	33.71
334.90	29.12
284.93	26.04
246.14	22.78
207.51	19.18
185.88	17.18

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	360.00	1.444	3.84	549.14	37.66	11/12/2010	11:50:04 AM	
2	2	B10-04304-01	360.00	4.932	13.11	548.29	37.63	11/12/2010	6:02:12 PM	
2	3	B10-04304-02	360.00	5.129	13.42	561.98	38.23	11/13/2010	12:14:37 AM	
2	4	B10-04304-03	360.00	1.444	3.69	573.80	39.09	11/13/2010	6:26:55 AM	
2	5	B10-04304-04	360.00	1.732	4.93	469.52	35.16	11/13/2010	12:39:19 PM	
2	6	B10-04304-05	360.00	1.717	4.59	542.71	37.38	11/13/2010	6:57:17 PM	
2	7	B10-04304-06	360.00	1.596	4.22	553.33	37.84	11/14/2010	1:13:38 AM	
2	8	B10-04304-07	360.00	1.783	4.77	542.14	37.36	11/14/2010	7:28:39 AM	
2	9	B10-04304-08	360.00	1.603	4.28	545.04	37.49	11/14/2010	1:44:04 PM	
2	10	B10-04304-09	360.00	1.679	4.45	550.45	37.72	11/14/2010	7:57:08 PM	
2	11	B10-04304-10	360.00	1.614	4.28	550.37	37.71	11/15/2010	2:09:21 AM	
2	12	B10-04304-11	360.00	1.680	4.41	558.84	38.08	11/15/2010	8:21:27 AM	
2	13	B10-04304-12	360.00	1.625	4.29	553.46	37.85	11/15/2010	2:33:52 PM	
2	14	B10-04304-13	360.00	1.612	4.42	520.46	36.43	11/15/2010	8:46:08 PM	
2	15	B10-04304-14	360.00	33.032	89.78	528.97	36.79	11/16/2010	2:58:26 AM	
2	16	B10-04304-15	360.00	13.506	35.25	563.13	38.32	11/16/2010	9:10:53 AM	
2	17	B10-04304-16	360.00	16.023	43.90	522.23	36.50	11/16/2010	3:23:12 PM	
2	18	B10-04304-17	360.00	1.664	4.41	550.07	37.70	11/16/2010	9:35:34 PM	
2	19	B10-04304-20	360.00	4.701	12.36	557.68	38.03	11/17/2010	3:47:46 AM	

Procedures: ARS-040

Date: 10/4/2010

ARS File ID Numbers: ARS1-10-01833, 1834, 1878, 1880, 1881, 1942, 1940

ARS Batch ID: ARS1-B10-04304

	A Batch ID:	Enrichment Cell No.	Tare Wt of Electrolysis Cell & Electrodes	Tare Wt Reservoir	m_i Wt Na_2O_2	V_f Gross Weight of Sample Reservoir	V_f 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	V_r Gross Sample Recovered	V_r	Cryo-Distil Flask #	Tare Wt Cryo-distil flask	Gross Wt flask + Sample	V_r	Tare Weight of LSC Vial	Aliquot Vial + Sample	Aliquot Net Sample	Wt of Vial, Sample& Deard Water Filler # used	Net Deard Water Added	Tare Wt b/f Cocktail	Gross Wt Vial + Sample + Cocktail
1	ARS1-B10-04304-01	50	331.09	198.96	2.00	703.94	[redacted]	10-5-2010 0945	5.00	2.0	10-30-10 1436	2.0	542.73	11.88	[redacted]	N/A,N/A	96.59	103.73	[redacted]	6.40	11.42	5.02	0.00	0.00	11.42	26.43
2	ARS1-B10-04304-02	60	336.77	189.32	2.00	694.05	[redacted]	10-5-2010 0948	5.00	2.0	10-29-10 0815	2.0	538.61	12.52	[redacted]	N/A,N/A	96.42	104.75	[redacted]	6.52	11.55	5.03	0.00	0.00	11.55	26.55
3	ARS1-B10-04304-03	78	334.77	193.74	2.00	698.17	[redacted]	10-5-2010 1018	5.00	2.0	10-30-10 1015	2.0	539.23	10.72	[redacted]	N/A,N/A	102.36	109.39	[redacted]	6.46	11.46	5.00	0.00	0.00	11.46	26.48
4	ARS1-B10-04304-04	68	337.19	195.41	2.00	834.47	[redacted]	10-6-2010 0952	5.00	2.0	11-2-10 1218	2.0	545.60	13.00	[redacted]	N/A,C	96.58	105.37	[redacted]	6.43	11.47	5.04	0.00	0.00	11.47	26.50
5	ARS1-B10-04304-05	59	338.40	191.74	2.00	826.42	[redacted]	10-6-2010 1002	5.00	2.0	11-2-10 1502	2.0	541.43	11.29	[redacted]	N/A,N/A	99.74	108.16	[redacted]	6.41	11.43	5.02	0.00	0.00	11.43	26.45
6	ARS1-B10-04304-06	82	336.32	194.86	2.00	700.09	[redacted]	10-4-2010 1546	5.00	2.0	11-1-10 1609	2.0	543.94	12.76	[redacted]	N/A,7	116.59	125.91	[redacted]	6.46	11.49	5.03	0.00	0.00	11.49	26.52
7	ARS1-B10-04304-07	67	332.60	194.21	2.02	706.25	[redacted]	10-4-2010 1552	5.00	2.0	11-1-10 0813	2.0	539.03	12.22	[redacted]	N/A,11	98.00	101.97	[redacted]	6.47	10.37	3.90	11.54	1.17	11.54	26.58
8	ARS1-B10-04304-08	77	337.82	191.29	2.01	690.14	[redacted]	10-4-2010 1603	5.00	2.0	11-2-10 1405	2.0	541.21	12.00	[redacted]	G N/A	99.62	108.20	[redacted]	6.42	11.44	5.02	0.00	0.00	11.44	26.45
9	ARS1-B10-04304-09	35	343.07	206.76	2.00	718.23	[redacted]	10-4-2010 1612	5.00	2.0	11-2-10 1438	2.0	561.85	12.02	[redacted]	A,C	98.16	107.02	[redacted]	6.53	11.57	5.04	0.00	0.00	11.57	26.59
10	ARS1-B10-04304-10	12	332.20	190.91	2.00	704.68	[redacted]	10-6-2010 1011	5.00	2.0	11-3-10 0845	2.0	536.87	13.76	[redacted]	N/A,N/A	108.10	118.28	[redacted]	6.43	11.43	5.00	0.00	0.00	11.43	26.44
11	ARS1-B10-04304-11	83	340.46	190.57	2.00	688.20	[redacted]	10-7-2010 1016	5.00	2.0	11-4-10 1458	2.0	540.20	9.17	[redacted]	N/A,N/A	101.72	107.56	[redacted]	6.60	11.52	5.02	0.00	0.00	11.52	26.53
12	ARS1-B10-04304-12	70	338.04	157.91	2.00	654.40	[redacted]	10-7-2010 1018	5.00	2.0	11-4-10 0816	2.0	508.11	12.16	[redacted]	N/A,C	105.63	114.27	[redacted]	6.48	11.49	5.01	0.00	0.00	11.49	26.53
13	ARS1-B10-04304-13	100	337.52	199.43	2.00	684.96	[redacted]	10-7-2010 1023	5.00	2.0	11-4-10 0846	2.0	538.55	10.80	[redacted]	G,7	94.44	101.77	[redacted]	6.77	11.78	5.01	0.00	0.00	11.78	26.83
14	ARS1-B10-04304-14	26	334.44	186.08	2.00	684.80	[redacted]	10-7-2010 1031	5.00	2.0	11-4-10 0915	2.0	531.31	10.79	[redacted]	N/A,11	98.00	101.25	[redacted]	6.38	9.59	3.21	11.40	1.81	11.40	26.44
15	ARS1-B10-04304-15	74	341.30	185.51	2.00	699.01	[redacted]	10-8-2010 0946	5.00	2.0	11-5-10 1623	2.0	548.19	11.38	[redacted]	A,N/A	100.52	107.75	[redacted]	6.53	11.53	5.00	0.00	0.00	11.53	26.56
16	ARS1-B10-04304-16	95	331.83	192.48	2.00	689.43	[redacted]	10-8-2010 0951	5.00	2.0	11-6-10 0825	2.0	536.67	12.38	[redacted]	N/A,N/A	101.73	110.14	[redacted]	6.39	11.40	5.01	0.00	0.00	11.40	26.43
17	ARS1-B10-04304-17	42	333.22	201.82	2.00	695.75	[redacted]	10-8-2010 0953	5.00	2.0	11-6-10 0815	2.0	548.85	13.81	[redacted]	N/A,N/A	117.22	127.44	[redacted]	6.45	11.48	5.03	0.00	0.00	11.48	26.49
18	ARS1-B10-04304-20	25	334.78	200.82	2.00	692.59	[redacted]	10-8-2010 1002	5.00	2.0	11-6-10 1546	2.0	545.43	9.83	[redacted]	A,N/A	100.54	106.92	[redacted]	6.77	11.80	5.03	0.00	0.00	11.80	26.80
19							[redacted]							0.00	[redacted]				[redacted]			0.00		0.00		

Chemist Signature

Chemist Signature

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
11-9-2010	0810	Bio-04096-09	Bio-04096	0[illegible]	JDR
↓	↓	Bio-04096-10	↓	↓	JDR
↓	↓	Bio-04096-11	↓	↓	JDR
11-11-2010	0759	SNC 51	QA	QA	JDR
↓	↓	Background	Bio-04096	0[illegible]8	JDR
↓	↓	Bio-04096-11	↓	↓	JDR
11-12-10	0[illegible]5	SNC 51	[illegible]	[illegible]	[illegible]
↓	↓	Background	[illegible]	[illegible]	[illegible]
↓	↓	Bio-[illegible]-01	↓	↓	[illegible]
↓	↓	Bio-[illegible]-02	↓	↓	[illegible]
↓	↓	Bio-[illegible]-03	↓	↓	[illegible]
↓	↓	Bio-[illegible]-04	↓	↓	[illegible]
↓	↓	Bio-[illegible]-05	↓	↓	[illegible]
↓	↓	Bio-[illegible]-06	↓	↓	[illegible]
↓	↓	Bio-[illegible]-07	↓	↓	[illegible]
↓	↓	Bio-[illegible]-08	↓	↓	[illegible]
↓	↓	Bio-[illegible]-09	↓	↓	[illegible]
↓	↓	Bio-[illegible]-10	↓	↓	[illegible]
↓	↓	Bio-[illegible]-11	↓	↓	[illegible]
↓	↓	Bio-[illegible]-12	↓	↓	[illegible]

LSW 11-12-10

Reviewed By: LSW Date: 11-16-10
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
11-17-10	0945	Bio-04304-13	Bio-04304	-1111	JDR
↓	↓	Bio-04304-14	↓	↓	JDR
↓	↓	Bio-04304-15	↓	↓	JDR
↓	↓	Bio-04304-16	↓	↓	JDR
↓	↓	Bio-04304-17	↓	↓	JDR
LSW 11-16-10 ↓	↓	Bio-04304-18	↓	↓	JDR
11-17-2010	1604	SNC 51	QA	QA	JDR
↓	↓	Background	Bio-05208		JDR
↓	↓	Bio-05208-04	↓		JDR
↓	↓	Bio-05208-05	↓		JDR
↓	↓	Bio-05208-06	↓		JDR
↓	↓	Bio-05208-07	↓		JDR
↓	↓	Bio-05208-08	↓		JDR
↓	↓	Bio-05208-09	↓		JDR
↓	↓	Bio-05208-10	↓		JDR
↓	↓	Bio-05208-11	↓		JDR
↓	↓	Bio-05208-12	↓		JDR
↓	↓	Bio-05208-13	↓		JDR
↓	↓	Bio-05208-14	↓		JDR
↓	↓	Bio-05208-15	↓		JDR

LSW 11-17-10 data not available

Reviewed By: NB Date: 11-19-10
Initials

Analysis Batch Report

Analysis Batch ID **ARS1-B10-04304**

Method	ARS-054	Analysis	LSC-A-022	Matrix	AQ
Description	Low Level Tritium by Enrichment				

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-04304-01	LCS	B-10212								
ARS1-B10-04304-02	LCSD	B-10213								
ARS1-B10-04304-03	MBL									
ARS1-B10-04304-04	DUP									
ARS1-B10-04304-05	DO				**ARS1-10-01833**	001	1	CAPA-10-24119	STD	09/14/10
ARS1-B10-04304-06	TRG				**ARS1-10-01833**	002	1	CAPA-10-24120	STD	09/14/10
ARS1-B10-04304-07	TRG				**ARS1-10-01833**	003	1	CAPA-10-24143	STD	09/14/10
ARS1-B10-04304-08	TRG				**ARS1-10-01834**	001	1	CAPA-10-24872	STD	09/14/10
ARS1-B10-04304-09	TRG				**ARS1-10-01878**	001	1	CAPA-10-24868	STD	09/21/10
ARS1-B10-04304-10	TRG				**ARS1-10-01880**	001	1	Buckman1-10-24996	STD	09/21/10
ARS1-B10-04304-11	TRG				**ARS1-10-01880**	002	1	Buckman06-10-24997	STD	09/21/10
ARS1-B10-04304-12	TRG				**ARS1-10-01880**	003	1	Buckman08-10-24998	STD	09/21/10
ARS1-B10-04304-13	TRG				**ARS1-10-01880**	004	1	Buckman1-10-24999	STD	09/21/10
ARS1-B10-04304-14	TRG				**ARS1-10-01881**	001	1	CAPU-10-25281	STD	09/21/10
ARS1-B10-04304-15	TRG				**ARS1-10-01942**	001	1	CALA-10-24991	STD	09/21/10
ARS1-B10-04304-16	TRG				**ARS1-10-01942**	002	1	CALA-10-25201	STD	09/21/10
ARS1-B10-04304-17	TRG				**ARS1-10-01942**	003	1	CALA-10-25215	STD	09/21/10
ARS1-B10-04304-18	TRG				**ARS1-10-01942**	004	1	CALA-10-25510	STD	09/21/10
ARS1-B10-04304-19	TRG				**ARS1-10-01942**	005	1	CALA-10-25204	STD	09/21/10
ARS1-B10-04304-20	TRG				**ARS1-10-01940**	001	1	CAWA-10-26041	STD	09/28/10

→ 9-22-2010
↳ 1514: these 2 samples were deleted as instructed by Susan Leese.

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

American Radiation Services Analytical Reports

for

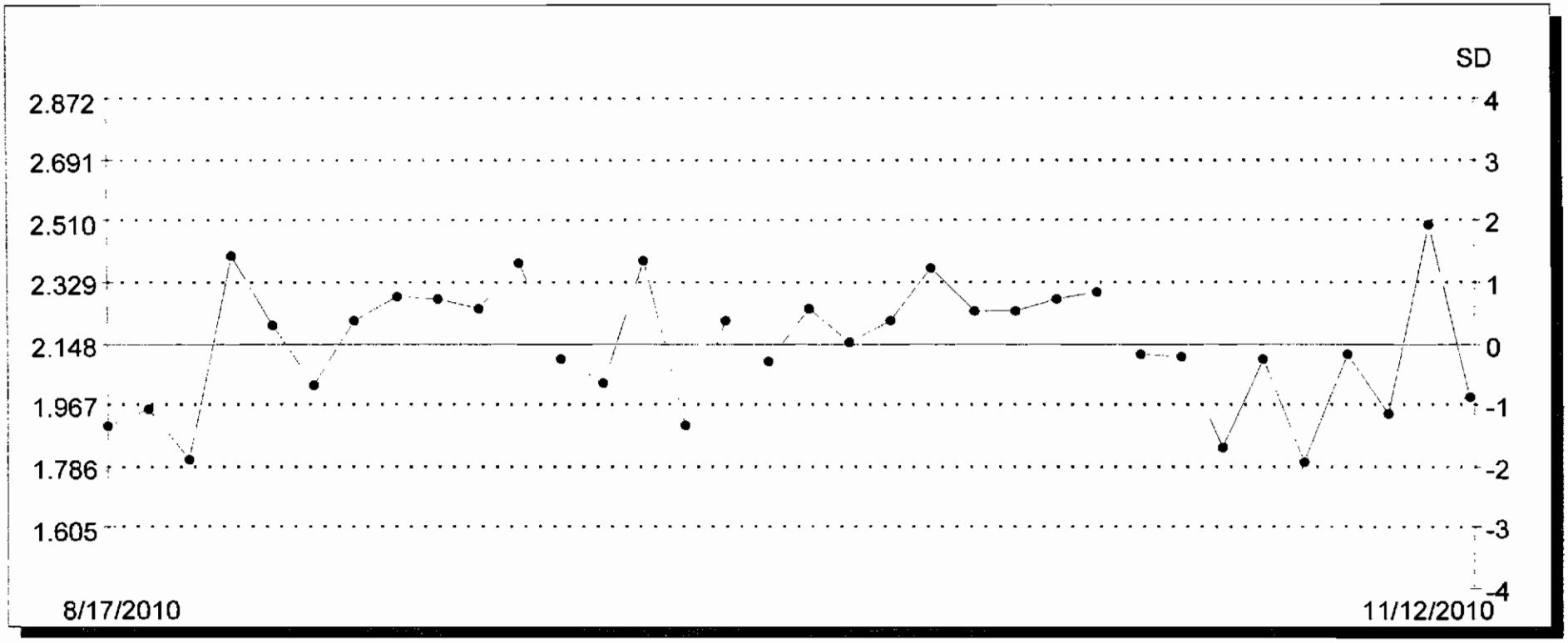
Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting Control Charts

3H Background
Total # pts : 5164
Valid # pts : 34
Mean : 2.15
SD : 0.18

Date	Value	Valid Pt
Aug 17, 2010	1.90	X
Aug 23, 2010	1.96	X
Aug 24, 2010	1.81	X
Aug 26, 2010	2.41	X
Aug 27, 2010	2.21	X
Aug 30, 2010	2.03	X
Aug 31, 2010	2.22	X
Aug 31, 2010	2.29	X
Sep 07, 2010	2.28	X
Sep 08, 2010	2.25	X
Sep 09, 2010	2.39	X
Sep 09, 2010	2.10	X
Sep 13, 2010	2.03	X
Sep 14, 2010	2.39	X
Sep 15, 2010	1.91	X
Sep 20, 2010	2.22	X
Sep 20, 2010	2.10	X
Sep 22, 2010	2.25	X
Sep 27, 2010	2.15	X
Sep 29, 2010	2.22	X
Oct 01, 2010	2.37	X
Oct 08, 2010	2.25	X
Oct 12, 2010	2.24	X
Oct 15, 2010	2.28	X
Oct 18, 2010	2.30	X
Oct 19, 2010	2.12	X
Oct 22, 2010	2.11	X
Oct 23, 2010	1.84	X
Oct 25, 2010	2.10	X
Oct 27, 2010	1.80	X
Nov 04, 2010	2.12	X
Nov 09, 2010	1.94	X
Nov 11, 2010	2.50	X
Nov 12, 2010	1.99	X

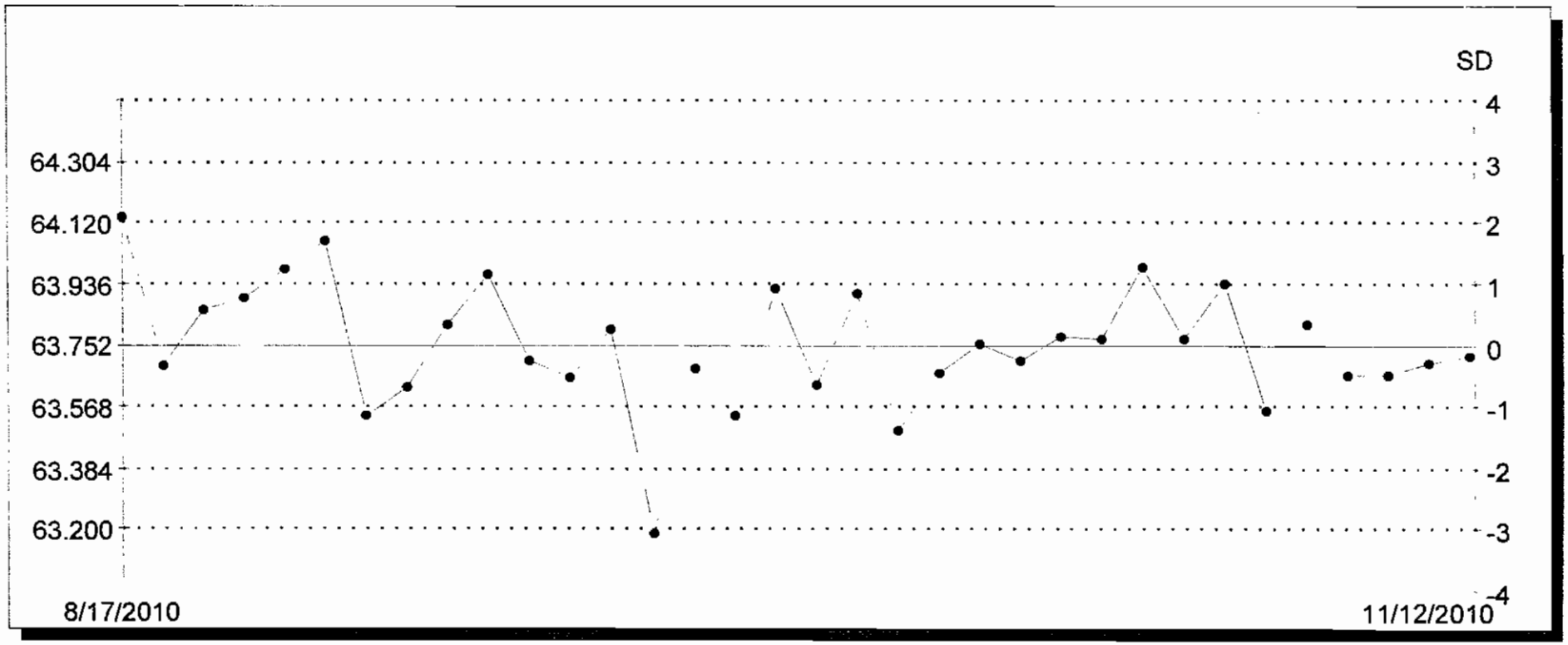
3H Background
Total # pts : 5164
Valid # pts : 34
Mean : 2.15
SD : 0.18



3H Efficiency
Total # pts : 5234
Valid # pts : 34
Mean : 63.75
SD : 0.18

Date	Value	Valid Pt
Aug 17, 2010	64.14	X
Aug 23, 2010	63.69	X
Aug 24, 2010	63.86	X
Aug 26, 2010	63.89	X
Aug 27, 2010	63.97	X
Aug 30, 2010	64.06	X
Aug 31, 2010	63.54	X
Aug 31, 2010	63.62	X
Sep 07, 2010	63.81	X
Sep 08, 2010	63.96	X
Sep 09, 2010	63.70	X
Sep 09, 2010	63.65	X
Sep 13, 2010	63.80	X
Sep 14, 2010	63.19	X
Sep 15, 2010	63.68	X
Sep 20, 2010	63.54	X
Sep 20, 2010	63.92	X
Sep 22, 2010	63.63	X
Sep 27, 2010	63.91	X
Sep 29, 2010	63.50	X
Oct 01, 2010	63.67	X
Oct 08, 2010	63.75	X
Oct 12, 2010	63.71	X
Oct 15, 2010	63.78	X
Oct 18, 2010	63.77	X
Oct 19, 2010	63.99	X
Oct 22, 2010	63.77	X
Oct 23, 2010	63.94	X
Oct 25, 2010	63.56	X
Oct 27, 2010	63.81	X
Nov 04, 2010	63.66	X
Nov 09, 2010	63.66	X
Nov 11, 2010	63.70	X
Nov 12, 2010	63.72	X

3H Efficiency
Total # pts : 5234
Valid # pts : 34
Mean : 63.75
SD : 0.18



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Tritium- Screening
by
Low Level Liquid
Scintillation Counting

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Tritium-Screening
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Scintillation Counting
Samples

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

ARS File ID Numbers: ARS1-10-01833; 01834; 01878; 01880; 01881; 01942; 01940.
ARS Batch ID: ARS1-B10-04303

	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	B10-04303-04	120	1 799	1.898	38.71	5.03	-22.903	pCi/L	171.2768	NO
2	B10-04303-05	120	1.842	1.898	38.44	5.04	-13.020	pCi/L	172.1376	NO
3	B10-04303-06	120	1 750	1.898	37.77	5.00	-35.301	pCi/L	176.5927	NO
4	B10-04303-07	120	1 713	1.898	38.62	5.03	-42.898	pCi/L	171.6759	NO
5	B10-04303-08	120	1.651	1.898	38.22	4.99	-58.338	pCi/L	174.8632	NO
6	B10-04303-09	120	1 576	1.898	38.54	5.01	-75.120	pCi/L	172.719	NO
7	B10-04303-10	120	1.556	1.898	38.77	5.01	-79.312	pCi/L	171.6944	NO
8	B10-04303-11	120	1 708	1.898	38.25	5.01	-44.661	pCi/L	174.0286	NO
9	B10-04303-12	120	1.797	1.898	39.04	5.02	-23.214	pCi/L	170.1673	NO
10	B10-04303-13	120	2.705	1.898	38.73	5.03	186.597	pCi/L	171.1883	~~YES, analyze by LSC-A-001.~~ Process via LSC-A-022 9-13-10
11	B10-04303-14	120	1.830	1.898	38.49	5.01	-15.884	pCi/L	172.9434	NO
12	B10-04303-15	120	2.048	1 898	39.17	5.00	34.500	pCi/L	170.281	NO
13	B10-04303-16	120	1.430	1.898	38.73	5.00	-108.862	pCi/L	172.2155	NO
14	B10-04303-17	120	1.801	1.898	37.11	5.00	-23.548	pCi/L	179.7334	NO
15	B10-04303-18	120	2.049	1.898	38 64	5.01	35.136	pCi/L	172.2721	NO
16	B10-04303-19	120	1.879	1.898	38 44	5.00	-4.453	pCi/L	173.5147	NO
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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Laboratory Records

Analysis Batch Report

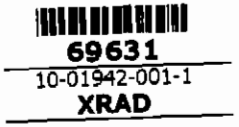
Analysis Batch ID **ARS1-B10-04303**

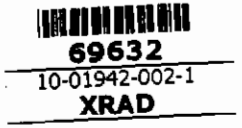
Method	ARS-054	Analysis	LSC-A-021	Matrix	AQ

Description Low Level Tritium Screen

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3
ARS1-B10-04303-01	LCS			
ARS1-B10-04303-02	LCSD			
ARS1-B10-04303-03	MBL			
ARS1-B10-04303-04	TRG			
ARS1-B10-04303-05	TRG			
ARS1-B10-04303-06	TRG			
ARS1-B10-04303-07	TRG			
ARS1-B10-04303-08	TRG			
ARS1-B10-04303-09	TRG			
ARS1-B10-04303-10	TRG			
ARS1-B10-04303-11	TRG			
ARS1-B10-04303-12	TRG			
ARS1-B10-04303-13	TRG			
ARS1-B10-04303-14	TRG			
ARS1-B10-04303-15	TRG			
ARS1-B10-04303-16	TRG			
ARS1-B10-04303-17	TRG			
ARS1-B10-04303-18	TRG			
ARS1-B10-04303-19	TRG			

SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-10-01833	001	1	CAPA-10-24119	STD	09/14/10
ARS1-10-01833	002	1	CAPA-10-24120	STD	09/14/10
ARS1-10-01833	003	1	CAPA-10-24143	STD	09/14/10
ARS1-10-01834	001	1	CAPA-10-24872	STD	09/14/10
ARS1-10-01878	001	1	CAPA-10-24868	STD	09/21/10
ARS1-10-01880	001	1	Buckman1-10-24996	STD	09/21/10
ARS1-10-01880	002	1	Buckman06-10-24997	STD	09/21/10
ARS1-10-01880	003	1	Buckman08-10-24998	STD	09/21/10
ARS1-10-01880	004	1	Buckman1-10-24999	STD	09/21/10
ARS1-10-01881	001	1	CAPU-10-25281	STD	09/21/10
ARS1-10-01942	001	1	CALA-10-24991	STD	09/21/10
ARS1-10-01942	002	1	CALA-10-25201	STD	09/21/10
ARS1-10-01942	003	1	CALA-10-25215	STD	09/21/10
ARS1-10-01942	004	1	CALA-10-25510	STD	09/21/10
ARS1-10-01942	005	1	CALA-10-25204	STD	09/21/10
ARS1-10-01940	001	1	CAWA-10-26041	STD	09/28/10





ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
6308	ARS1-B10-04303	ARS1-B10-04303-01		1	g					JRABER	09/08/2010 11:42:48
6309	ARS1-B10-04303	ARS1-B10-04303-02		1	g					JRABER	09/08/2010 11:42:48
6310	ARS1-B10-04303	ARS1-B10-04303-03		1	g					JRABER	09/08/2010 11:42:48
6311	ARS1-B10-04303	ARS1-B10-04303-04	CAPA-10-24119	5.03	g	69621				JRABER	09/08/2010 11:42:48
6312	ARS1-B10-04303	ARS1-B10-04303-05	CAPA-10-24120	5.04	g	69622				JRABER	09/08/2010 11:42:48
6313	ARS1-B10-04303	ARS1-B10-04303-06	CAPA-10-24143	5	g	69623				JRABER	09/08/2010 11:42:48
6314	ARS1-B10-04303	ARS1-B10-04303-07	CAPA-10-24872	5.03	g	69624				JRABER	09/08/2010 11:42:48
6315	ARS1-B10-04303	ARS1-B10-04303-08	CAPA-10-24868	4.99	g	69625				JRABER	09/08/2010 11:42:48
6316	ARS1-B10-04303	ARS1-B10-04303-09	Buckman1-10-24996	5.01	g	69626				JRABER	09/08/2010 11:42:49
6317	ARS1-B10-04303	ARS1-B10-04303-10	Buckman06-10-24997	5.01	g	69627				JRABER	09/08/2010 11:42:49
6318	ARS1-B10-04303	ARS1-B10-04303-11	Buckman08-10-24998	5.01	g	69628				JRABER	09/08/2010 11:42:49
6319	ARS1-B10-04303	ARS1-B10-04303-12	Buckman1-10-24999	5.02	g	69629				JRABER	09/08/2010 11:42:49
6320	ARS1-B10-04303	ARS1-B10-04303-13	CAPU-10-25281	5.03	g	69630				JRABER	09/08/2010 11:42:49
6321	ARS1-B10-04303	ARS1-B10-04303-14	CALA-10-24991	5.01	g	69631				JRABER	09/08/2010 11:42:49
6322	ARS1-B10-04303	ARS1-B10-04303-15	CALA-10-25201	5	g	69632				JRABER	09/08/2010 11:42:49
6323	ARS1-B10-04303	ARS1-B10-04303-16	CALA-10-25215	5	g	69633				JRABER	09/08/2010 11:42:50
6324	ARS1-B10-04303	ARS1-B10-04303-17	CALA-10-25510	5	g	69634				JRABER	09/08/2010 11:42:50
6325	ARS1-B10-04303	ARS1-B10-04303-18	CALA-10-25204	5.01	g	69635				JRABER	09/08/2010 11:42:50
6326	ARS1-B10-04303	ARS1-B10-04303-19	CAWA-10-26041	5	g	69636				JRABER	09/08/2010 11:42:50

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\20100909_1235
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100909_1235\20100909_1235.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100909_1235\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100909_1235\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL H3
  Quench Indicator: tSIE/AEC
  External Std Terminator (sec): 0.5 2s%
  Pre-Count Delay (min): 0.00
Quench Set:
  Low Energy: LL H3 PLASTIC
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	0.0	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

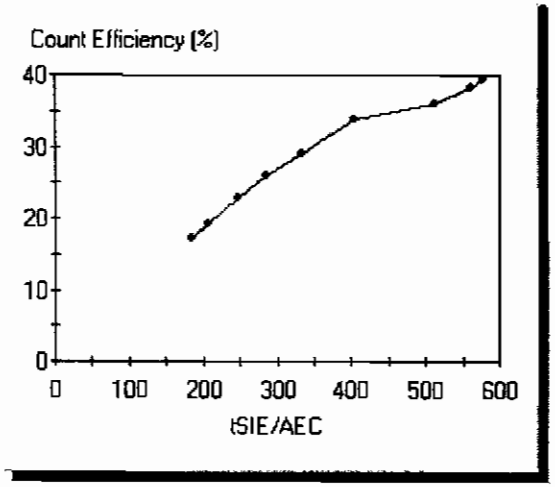
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 09/08/2009
Date Modified:
LL H3 PLASTIC in A

tSIE/AEC	Count Efficiency (%)
577.71	39.37
561.32	38.19
514.09	36.15
404.21	33.71
334.90	29.12
284.93	26.04
246.14	22.78
207.51	19.18
185.88	17.18

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nuc1 In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.898	4.97	561.12	38.18	9/9/2010	12:44:42 PM	
2	2	B10-04303-04	120.00	1.799	4.65	568.57	38.71	9/9/2010	2:56:43 PM	
2	3	B10-04303-05	120.00	1.842	4.79	564.86	38.44	9/9/2010	5:08:42 PM	
2	4	B10-04303-06	120.00	1.750	4.63	551.57	37.77	9/9/2010	7:20:42 PM	
2	5	B10-04303-07	120.00	1.713	4.44	567.35	38.62	9/9/2010	9:32:39 PM	
2	6	B10-04303-08	120.00	1.651	4.32	561.78	38.22	9/9/2010	11:44:35 PM	
2	7	B10-04303-09	120.00	1.576	4.09	566.26	38.54	9/10/2010	1:56:27 AM	
2	8	B10-04303-10	120.00	1.556	4.01	569.33	38.77	9/10/2010	4:07:21 AM	
2	9	B10-04303-11	120.00	1.708	4.47	562.23	38.25	9/10/2010	6:17:31 AM	
2	10	B10-04303-12	120.00	1.797	4.60	573.13	39.04	9/10/2010	8:27:34 AM	
2	11	B10-04303-13	120.00	2.705	6.99	568.75	38.73	9/10/2010	10:37:37 AM	
2	12	B10-04303-14	120.00	1.830	4.75	565.52	38.49	9/10/2010	12:47:42 PM	
2	13	B10-04303-15	120.00	2.048	5.23	574.95	39.17	9/10/2010	2:57:50 PM	
2	14	B10-04303-16	120.00	1.430	3.69	568.88	38.73	9/10/2010	5:07:52 PM	
2	15	B10-04303-17	120.00	1.801	4.85	536.44	37.11	9/10/2010	7:17:56 PM	
2	16	B10-04303-18	120.00	2.049	5.30	567.62	38.64	9/10/2010	9:28:00 PM	
2	17	B10-04303-19	120.00	1.879	4.89	564.82	38.44	9/10/2010	11:38:03 PM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
9-9-2010	1100	SWC 51	QA	Q17	JDR
↓	↓	Background	Bio-04303	1235	JDR
↓	↓	Bio-04303-04	↓	↓	JDR
↓	↓	Bio-04303-05	↓	↓	JDR
↓	↓	Bio-04303-06	↓	↓	JDR
↓	↓	Bio-04303-07	↓	↓	JDR
↓	↓	Bio-04303-08	↓	↓	JDR
↓	↓	Bio-04303-09	↓	↓	JDR
↓	↓	Bio-04303-10	↓	↓	JDR
↓	↓	Bio-04303-11	↓	↓	JDR
↓	↓	Bio-04303-12	↓	↓	JDR
↓	↓	Bio-04303-13	↓	↓	JDR
↓	↓	Bio-04303-14	↓	↓	JDR
↓	↓	Bio-04303-15	↓	↓	JDR
↓	↓	Bio-04303-16	↓	↓	JDR
↓	↓	Bio-04303-17	↓	↓	JDR
↓	↓	Bio-04303-18	↓	↓	JDR
↓	↓	Bio-04303-19	↓	↓	JDR
9-10-10	1316	Background	10-01823 NI-63	0139	JDR
↓	↓	LCS	↓	↓	JDR

Reviewed By: LSW Date: 10-14-10
Initials

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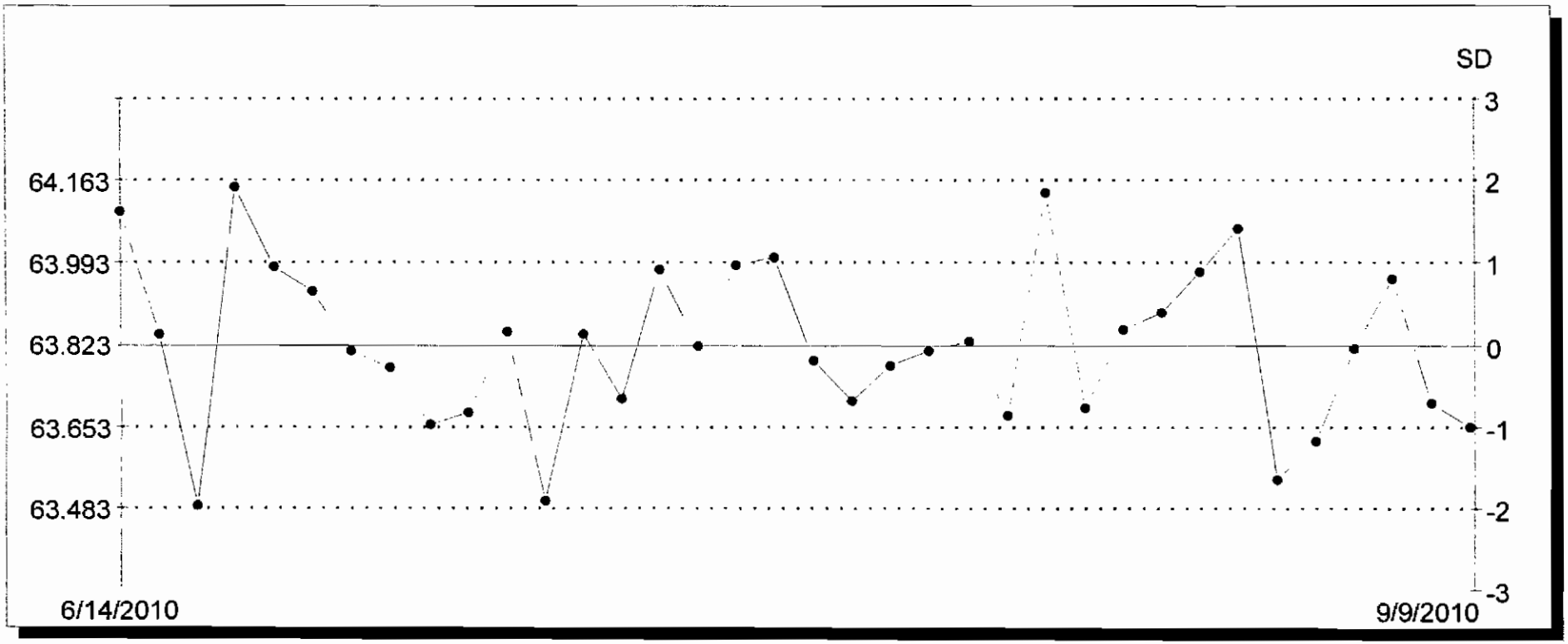
Control Charts

3H Efficiency
Total # pts : 5212
Valid # pts : 36
Mean : 63.82
SD : 0.17

Date	Value	Valid Pt
Jun 14, 2010	64.10	X
Jun 15, 2010	63.84	X
Jun 16, 2010	63.49	X
Jun 17, 2010	64.15	X
Jun 20, 2010	63.98	X
Jun 21, 2010	63.94	X
Jun 21, 2010	63.81	X
Jun 21, 2010	63.78	X
Jun 21, 2010	63.66	X
Jun 21, 2010	63.68	X
Jun 21, 2010	63.85	X
Jun 21, 2010	63.50	X
Jun 28, 2010	63.84	X
Jul 06, 2010	63.71	X
Jul 07, 2010	63.98	X
Jul 12, 2010	63.82	X
Jul 19, 2010	63.99	X
Jul 20, 2010	64.00	X
Jul 21, 2010	63.79	X
Jul 23, 2010	63.71	X
Jul 26, 2010	63.78	X
Jul 28, 2010	63.81	X
Aug 03, 2010	63.83	X
Aug 09, 2010	63.67	X
Aug 17, 2010	64.14	X
Aug 23, 2010	63.69	X
Aug 24, 2010	63.86	X
Aug 26, 2010	63.89	X
Aug 27, 2010	63.97	X
Aug 30, 2010	64.06	X
Aug 31, 2010	63.54	X
Aug 31, 2010	63.62	X
Sep 07, 2010	63.81	X
Sep 08, 2010	63.96	X
Sep 09, 2010	63.70	X
Sep 09, 2010	63.65	X

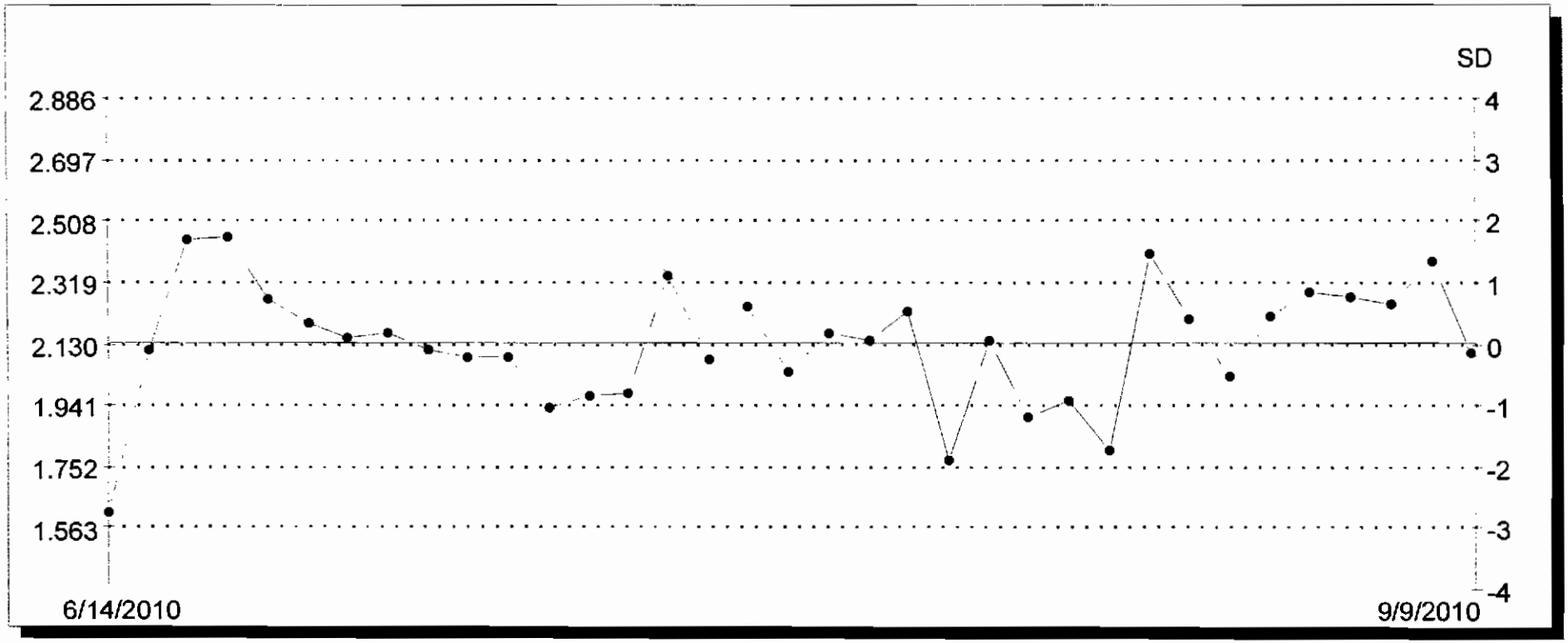
3H Efficiency
Total # pts : 5212
Valid # pts : 36
Mean : 63.82
SD : 0.17



3H Background
Total # pts : 5142
Valid # pts : 35
Mean : 2.13
SD : 0.19

Date	Value	Valid Pt
Jun 14, 2010	1.61	X
Jun 15, 2010	2.11	X
Jun 16, 2010	2.45	X
Jun 17, 2010	2.46	X
Jun 20, 2010	2.27	X
Jun 21, 2010	2.19	X
Jun 21, 2010	2.15	X
Jun 21, 2010	2.16	X
Jun 21, 2010	2.11	X
Jun 21, 2010	2.09	X
Jun 21, 2010	2.09	X
Jun 28, 2010	1.94	X
Jul 06, 2010	1.97	X
Jul 07, 2010	1.98	X
Jul 12, 2010	2.34	X
Jul 19, 2010	2.09	X
Jul 20, 2010	2.25	X
Jul 21, 2010	2.05	X
Jul 23, 2010	2.17	X
Jul 26, 2010	2.14	X
Jul 28, 2010	2.23	X
Aug 03, 2010	1.77	X
Aug 09, 2010	2.14	X
Aug 17, 2010	1.90	X
Aug 23, 2010	1.96	X
Aug 24, 2010	1.81	X
Aug 26, 2010	2.41	X
Aug 27, 2010	2.21	X
Aug 30, 2010	2.03	X
Aug 31, 2010	2.22	X
Aug 31, 2010	2.29	X
Sep 07, 2010	2.28	X
Sep 08, 2010	2.25	X
Sep 09, 2010	2.39	X
Sep 09, 2010	2.10	X

3H Background
Total # pts : 5142
Valid # pts : 35
Mean : 2.13
SD : 0.19



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Low Level Liquid Scintillation Counting

Calibration Information

QUALITY CONTROL PROGRAM

AMERICAN RADIATION SERVICES
RADIOACTIVE REFERENCE SOLUTIONS

ANNUAL ACTIVITY VERIFICATION

VERIFICATION DATE: 5/13/2010 0:00 *date counted*
STANDARD REFERENCE #: S-0206

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: 2/25/2009 8:30

Dilution Activity	3.01 pCi per gram ===> dpm/g	6.68
Verif. Date Decay Corrected	2.81 pCi per gram ===> dpm/g	6.24

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-0206-V1B	11.98	1	LSC	0.3328	1.62	5.040	6.18	2.78
S-0206-V2B	11.42	1	LSC	0.3186	1.62	5.010	6.13	2.76
S-0206-V3B	12.01	1	LSC	0.3360	1.62	4.990	6.19	2.79
S-0206-V4B	11.75	1	LSC	0.3275	1.62	5.010	6.17	2.78
S-0206-V5B	11.45	1	LSC	0.3196	1.62	5.020	6.13	2.76

	Average	6.16	2.77
	Two Sigma Uncertainty	0.06	0.02
10% Max *PASS*	Standard Deviation percent of known concentration	0.45%	0.45%
	Target Activity	6.24	2.81
5% Max *PASS*	% Diff	-1.27%	-1.27%

Verification Expiration Date: May 13, 2011

Prepared & Counted By: Jeremy Raber Date: 5/13/2010 0:00
Verified & Approved By: Eugene Mulligan Date: 5/14/2010
QC Approval: [signature] Date: 5/14/2010

S-0206	
H-3	Verified 5/14/10
SL	Expires 5/14/11
Manufactuer	NIST
Sol Matrix	H2O
Ref No	NIST 4361C
Tech	M. Thibodeaux
Parent ID	S-0152

RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY

STD ID: S-0206

ARS INTERNATIONAL

Add/Edit *Secondary Stds*

Planning

Planning Comments	**Create a Low Level H3 LCS solution.**
Target dpm/g (on dil. date)	**6.66**
Target Final volume mL	**500**
Appx mass g of Parent Sol'n	**49.8188436**
Appx vol ml of Parent Sol'n	**49.91868096**
Expected Addition for Analysis g	**5**

Standards Preparation / Dilution

Secondary Solution #	**S-0206**
Dilution Date (New Ref Date)	**02/25/2009 08:30**
Ampoule, Empty (g)	
Ampoule /Solution Gross (g)	
Net Wt Removed (g)	
Transfer Container, empty (g)	**103.64**
Container Plus Solution (g)	**153.45**
Net Wt Transferred (g)	**49.81**
DPM Xferred on 02/25/2009 08:30	**3329.408875**
Diluent/matrix	**Dead H2O**
Diluent Density Cont, empty (g)	
Test Mass of 5 ml of Diluent (g)	
Diluent Density Test - (g/mL)	
Dilution Empty Container Mass (g)	**198.75**
Dilution Full Cont g (if measured)	**697.31**
Dilution Final Volume ml (if measured)	**500**
Final Dilution Density (g/mL)	**0.99712**
Final Dilution Measured Mass g	**498.56**
Comments	**Use as H3LL LCS creation. Dilution performed as stated above by M Thibodeaux on 2/25/09. -BJS 2/25/09**
Final Dilution dpm/g	**6.678050535**
Final Dil New Ref Date/Time	**02/25/2009 08:30**

Parent Standard Data

Parent Solution Reference #	**NIST 4361C**				
Parent Solution #	**S-0152**				
Parent Principal Radionuclide	**H-3**	Half Life (Days)	**4499.8000000**		
Parent Reference Date	**09/03/1998 11:00**				
Parent Certified Act	**120.54**	Certi Act/Vol Units	**dpm**	**g**	
Parent Cert Act Uncert 1 Sigma	**0.0076**				
Parent Sp. Gravity G/Ml	**0.998**				
Parent Supplier	**NIST**				
Parent Date Recvd	**12/04/06**				
Parent Received By	**LU**				
Parent Cert Exp Date					
Parent Matrix	**H2O**				
Certified dpm/g At Ref Date	**120.54**				
Certified dpm/g on 02/25/2009 08:30	**66.84217727**				
Parent Comments	Liquid in a 500-ml borosilicate-glass media bottle with teflon-lined screw cap. Approximately 500 grams				
Parent Tech	**M. Thibodeaux**				
Is_Primary	**FALSE**				
Is_LCS	**TRUE**				
Is_Tracer	**FALSE**				
Is_Calib	**FALSE**				

ARS INTERNATIONAL

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

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ARS INTERNATIONAL

Report Compilation Checklist

ARS SDG: 10-01880 **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 11.19.10
Report Generator Signature Date

Management Review Signature 11-19-10
Date

LSC
Technical Review Checklist

ARS SDG ARS1-10-01880

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-B10-04304 **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): _____

Jimmy D. Rahn 11-12-2010
Chemist Signature Date

Jamaal Brown 11-12-10
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

QA Officer Signature 11-19-10 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

N/A JDR 11-17-2010

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

Jimmy D. Rahn 11-17-2010
Analyst Signature Date

N/A
Technicial Reviewer Signature Date

ARS INTERNATIONAL

Batch A: ARS1-B10-04304

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 11-19-10 (Project Manager Signature / Date)		Boyd 11-19-10 (QA Officer Signature / Date)

GENERAL COMMENTS

ARS INTERNATIONAL

LSC
Technical Review Checklist

ARS SDG ARS1-10-01880

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-B10-04303 **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): _____

Jimmy D. Rahn 9-9-2010
Chemist Signature **Date**

Jamaal Brown 9-9-10
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

QA Officer Signature 11-19-10 **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

N/A JPR 9-13-10

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

Jimmy D. Rahn 9-13-2010
Analyst Signature **Date**

N/A
Technicial Reviewer Signature **Date**

ARS INTERNATIONAL

Batch A: ARS1-B10-04303

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 — Project Manager Signature — 11·19·10 — Date

QA Officer Signature — 11-19-10 — Date

GENERAL COMMENTS

DQO Report for SDG
ARS1-10-01880

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	DilutionReq	RoughPrepReq	BlankCorrectionMDA	BlankCorrectionAll	CountTimeReq	AliquotRequired
LSC-A-021	STC	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	STC	Enriched H-3		TU	ARS-054	0 00E+00	75	125	60	140	30	110	40	110	1 00	25	FALSE	FALSE	FALSE	FALSE		

SDG Report - Samples and Containers

SDG Specific Data

SDG	ARS1-10-01880	TAT Days	30	Project Type	Environmental
Sample Count	Rpt Level 4	Date Received	8/26/2010	COC Number	10-4334C
Client	Los Alamos National Laboratory	Client Deadline	9/24/2010	PO Number	63641-001-10
Client Code	114	Internal Deadline	9/23/2010	Job Number	WEPR115BW100
Profile Number	PN-00094	Lab Deadline	9/21/2010	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	Buckman1-10-24996	AQ	08/24/10 12:00 PM	08/24/10 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
	68677	1	1000.00				60	18		Y	N/A				
002	Buckman06-10-24997	AQ	08/24/10 12:00 PM	08/24/10 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
	68678	1	1000.00				65	18		Y	N/A				
003	Buckman08-10-24998	AQ	08/24/10 12:00 PM	08/24/10 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
	68679	1	1000.00				70	17		N	N/A				
004	Buckman1-10-24999	AQ	08/24/10 12:00 PM	08/24/10 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
	68680	1	1000.00				70	17		N	N/A				

SDG Report - Analysis Assignments

Temp SDG	ARS1-10-01880	Sample Count	
Client	Los Alamos National Laboratory	Analysis Count	2-8

Samples Count Totals per Analysis

Analysis Code	Analysis Description	Samples Count
LSC-A-021	Low Level Tritium Screen In (Aqueous)	4
LSC-A-022	Low Level Tritium by Enrichment Process In (Aqueous [AQ])	4

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

ARS FILE TRACKING SHEET

SDG: ARS1-10-01880

Task	Date / Time	Initials
Date & Time Samples Received	8-26-10 10:48	CWB
ICOC Initiated / Storage Location: LL3H	8-26-10 15:43	CWB
Technical Checks Performed	See Batch	———
Report Written / EDD Generated: ____/____ | ____ (Date/Time Initials)	11-19-10 1407	SDR
Quality Assurance Checks Performed on Report	11-19-10 1642	JB
Management Check Performed on Report		
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: LANL

SDG: ARS1-10-01880

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~~ 8-26-10	~~☑ 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: 4

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

External and Internal Surveys

Exposure Rate Meter: M3 242861 Serial No.: M44-2PR2641266 Calibration Due Date: 4-19-11

Count Rate Meter: M2 64859 Serial No.: ~~M44-9PR2642866~~ 184559 CO 8-26-10 Calibration Due Date: 4-6-11

Background Exposure Rate (µR/hr): 18

Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd): 22 µR/hr

Background Count Rate (cpm): 65

Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd): 70 cpm

Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd): 50 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 1-10-24996					1000	18	60
Buckman 06-10-24997					1000	18	65
Buckman 04-10-24998					1000	17	70
Buckman 1-~~10~~ 15-24999 SKG 8-26-10					1000	17	70

Surveyors' Name: [signature]

Date/Time Surveyed: 11:56 8-26-10