



American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Request Number: 11-1637



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: 11-1637**

Original COC

Wednesday, March 16, 2011

REQUEST NUMBER: 11-1637

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman

American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

These Samples are on:

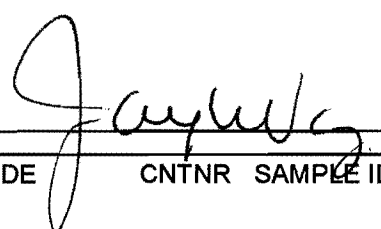
LANL Request Number:11-1637

Per Agreement Number:63641-001-10

Project Cost Code: WEPR1158W100

Please analyse the enclosed samples
according to the schedule indicated:**SHIP DATE: 3/16/2011****TURNAROUND/REPORT DUE: 4/15/2011****TURNAROUND REQ'D: 30 Days****RAD SCREENING: Not Required****LAB REQUEST COMMENTS:**

LANL ER SMO CONTACT:

Signature: 

PRIORITY	METHOD CODE	CNTNR	SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	SPECIAL INSTRUCTIONS
	Generic:Low_Level_Tritium	1	Buckman1-11-5682	WG	3/14/2011	
		1	Buckman06-11-5683	WG	3/14/2011	
		1	Buckman08-11-5684	WG	3/14/2011	

Final Page of REQUEST NUMBER 11-1637

Wednesday, March 16, 2011

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 11-1637C

LOS ALAMOS

REQUEST NUMBER: 11-1637

NATIONAL LABORATORY

ATTN: Danny Coleman

TURNAROUND/REPORT DUE: 4/15/2011

American Radiation Services - Primary

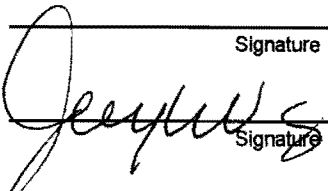
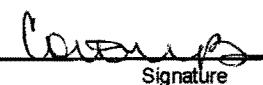
TURNAROUND REQ'D: 30

1726 Wooddale Court

Baton Rouge, LA 70806

LAB REQUEST COMMENTS:

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman1-11-5682	1	POLY	WSP-LL-H-3	None	WG
Buckman06-11-5683	1	POLY	WSP-LL-H-3	None	WG
Buckman08-11-5684	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:	Date	Time	Received By:	Date	Time
	3/16/11	1400		3-17-11	10:09
Signature			Signature		
Signature			Signature		
Signature			Signature		

Received for DISPOSAL By:	Date	Time	Remarks:
Signature			



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American Radiation Services Analytical Reports

for

**Los Alamos National Laboratory
Request: 11-1637**

Case Narrative



2609 North River Road • Port Allen, Louisiana 70767

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June 24, 2011

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

Request Number: **11-1637**
LANL Sample ID: **Buckman1-11-5682; Buckman06-11-5683; Buckman08-11-5684.**

Dear Mr. Greene;

On March 17, 2011, ARS International received three (3) water samples to be analyzed for Low Level Tritium.

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

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

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

Sincerely,

A handwritten signature in cursive script that reads 'Eugene Mulligan'.

Laboratory Management
ARS International



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COVER PAGE

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

Request Number	LANL PROJECT SAMPLE ID NUMBER	American Radiation Services SAMPLE ID NUMBER(S)
11-1637	Buckman1-11-5682	ARS1-11-00547-001
11-1637	Buckman06-11-5683	ARS1-11-00547-002
11-1637	Buckman08-11-5684	ARS1-11-00547-003

ANALYTICAL METHODS

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

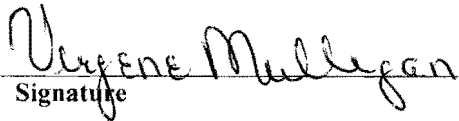
ANALYTICAL RESULTS

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

6-24-11
Date



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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting



2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group: ARS1-11-00547
Client Sample ID: Buckman1-11-5682
Sample Collection Date: 03/14/11
Sample Matrix: Aqueous

Request or PO Number: 11-1637
ARS Sample ID: ARS1-11-00547-001
Date Received: 03/17/11
Report Date: 06/24/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.930	0.260	0.680	0.330		TU	ARS-040	06/21/11 23:51	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 # EB7558



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

ARS Sample Delivery Group: ARS1-11-00547
Client Sample ID: Buckman06-11-5683
Sample Collection Date: 03/14/11
Sample Matrix: Aqueous

Request or PO Number: 11-1637
ARS Sample ID: ARS1-11-00547-002
Date Received: 03/17/11
Report Date: 06/24/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	1.120	0.310	0.820	0.390		TU	ARS-040	06/22/11 03:04	JR	NA

NOTES: Project Cost Code WEPR1158W100


Project Manager Review

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LELAP Certificate# 01949

NELAP Certificate # E87558



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

ARS Sample Delivery Group: ARS1-11-00547
Client Sample ID: Buckman08-11-5684
Sample Collection Date: 03/14/11
Sample Matrix: Aqueous

Request or PO Number: 11-1637
ARS Sample ID: ARS1-11-00547-003
Date Received: 03/17/11
Report Date: 06/24/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	-0.780	0.250	0.810	0.390	U	TU	ARS-040	06/22/11 06:16	JR	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

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LELAP Certificate# 01949

NELAP Certificate # E87558



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QC Results Report

Sample Delivery Group: ARS1-11-00547

Date Received: 3/17/2011

Laboratory Control Sample Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1s)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Percent Recovery (%)	LCS Acceptance Range
ARS1-B11-01170	LCS	H3	7.110	1.120	0.710	8.128		TU	ARS-040	6/21/11 14:19	JR	87	75%-125%

Blank Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1s)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date/Time	Analysis Technician
ARS1-B11-01170	MBL	H3	-0.620	0.200	0.640	NA	U	TU	ARS-040	6/21/11 20:40	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 Acceptance Range
ARS1-B11-01170	LCSD	H3	7.110	1.120	8.380	1.310		TU	ARS-040	6/21/11 17:29	JR	0.52	< 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 Acceptance Range
ARS1-B11-01170	LCSD	H3	7.110	1.120	8.380	1.310		TU	ARS-040	6/21/11 17:29	JR	1.47	< 3

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 ARS International.

LELAP Certificate# 01949

NELAP Certificate # E87558

Expected Value Calculations

LANL

ARS Batch Number: ARS1-B10 - 01170

LCS

CALCULATED
EXPECTED VALUE

=

pci/L

26.179

Range

20.943 - 31.414

TU
8.128

LCSD

CALCULATED
EXPECTED VALUE

=

26.162

Range

20.930 - 31.395

8.122



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American Radiation Services Analytical Reports

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Los Alamos National Laboratory

**Low Level Tritium
by**

**Low Level Liquid
Scintillation Counting**

Samples

QC Evaluation

EPA Method: ARS-040

Batch ID: ARS1-B11-01170

SDG's: ARS1-11-00547; 548; 549; 601; 602

LCS	<u>22.8900</u>	CSU (2s)	<u>7.0400</u>
LCSD	<u>27.0100</u>	CSU-D (2s)	<u>8.2800</u>

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

$$DER = \frac{4.12}{5.4341513} = 0.758168 < 3$$

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

$$\% \text{ RPD} = \frac{4.12}{24.95} * 100 = 16.51303 < 25\%$$

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

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

$$RER = \frac{4.12}{15.3200} = 0.268929504 < 1$$

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	1.25	2.07	
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

CSU = 1.25

Is ACT<1.65*CSU? YES

ARS Tritium Enrichment Calculations

Procedures
ARS File ID Number
ARS Batch ID Number

ARS-040, ARS-060
ARS1-11-00547,548,549,601,602
ARS1-B11-01170

Enrichment Factor Curve coeff. - Power $y = a \cdot x^b$			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			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)	Mass Na2O2 added (g)	Final mass electrolyzed sample w/ NaOH (g)	Mass equivalent NaOH (g)	Final Mass Electrolyzed sample (g pure H2O)	Volume factor	Enrichment Factor	Average Sample CPM	Bkg CPM	QIP	Detector Eff (decimal)	Aliquot	Enter aliquot in final Rep. Units	Activity reference date	Start Date of Count	Total Sample Count Duration (min)	Total Bkg Count Duration (min)	Decay Correction to To	Sample Activity Conc.	Standard Counting Uncertainty	Counting Uncertainty	Combined Standard Uncertainty	Minimum Detectable Conc.	Decision Level Conc.	Reporting Units
	V _i	m _i	V _f	m _f	V _f	X	Y	R _s	R _b	tSIE	Eff	Aliquot	Units	T ₀	T _c	t cnt (min)	t cnt (min)	DF	AC _i	CU	1s CU	1s CSU	MDC	DLC	Units
B11-01170-01	504.33	2.00	11.92	2.06	9.86	0.02	39.40	6	1.41	485.51	0.3009	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	7.11	0.33	0.33	1.12	0.71	0.34	TU
B11-01170-02	504.65	2.00	13.03	2.06	10.97	0.02	35.59	6	1.41	492.59	0.3022	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	8.38	0.37	0.37	1.31	0.78	0.38	TU
B11-01170-03	506.24	2.00	12.35	2.06	10.29	0.02	37.96	1	1.41	513.56	0.3058	0.00800	L	6/21/2011	6/21/2011	180	180	0.99999	-0.62	0.17	0.17	0.20	0.64	0.31	TU
B11-01170-04	506.02	2.02	11.63	2.08	9.55	0.02	40.77	2	1.41	406.43	0.2720	0.00804	L	3/14/2011	6/21/2011	180	180	0.98636	0.93	0.22	0.22	0.26	0.68	0.33	TU
B11-01170-05	503.20	2.01	13.71	2.07	11.64	0.02	33.52	2	1.41	410.46	0.2740	0.00807	L	3/14/2011	6/22/2011	180	180	0.98622	1.12	0.26	0.26	0.31	0.82	0.39	TU
B11-01170-06	505.38	2.00	13.63	2.06	11.57	0.02	33.86	1	1.41	411.21	0.2744	0.00803	L	3/14/2011	6/22/2011	180	180	0.98622	-0.78	0.22	0.22	0.25	0.81	0.39	TU
B11-01170-07	504.43	2.03	11.13	2.09	9.04	0.02	42.85	1	1.41	402.05	0.2699	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	-0.63	0.18	0.18	0.20	0.66	0.32	TU
B11-01170-08	516.63	1.99	12.43	2.05	10.38	0.02	38.38	3	1.41	403.70	0.2707	0.00757	L	3/11/2011	6/22/2011	180	180	0.98581	2.86	0.28	0.28	0.51	0.77	0.37	TU
B11-01170-09	511.23	2.00	12.16	2.06	10.10	0.02	39.01	4	1.41	410.77	0.2742	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	4.29	0.29	0.29	0.70	0.71	0.34	TU
B11-01170-10	509.67	2.01	11.75	2.07	9.68	0.02	40.52	1	1.41	412.42	0.2750	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	-0.66	0.18	0.18	0.21	0.68	0.33	TU
B11-01170-11	511.88	1.99	11.49	2.05	9.44	0.02	41.68	1	1.41	410.95	0.2743	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	-0.64	0.18	0.18	0.20	0.66	0.32	TU
B11-01170-12	504.59	1.99	10.63	2.05	8.58	0.02	45.06	1	1.41	307.62	0.2155	0.00820	L	3/11/2011	6/23/2011	180	180	0.98568	-0.74	0.21	0.21	0.23	0.76	0.37	TU
B11-01170-13	508.51	2.00	11.07	2.06	9.01	0.02	43.31	2	1.41	422.58	0.2800	0.00800	L	3/10/2011	6/23/2011	180	180	0.98554	0.86	0.20	0.20	0.24	0.62	0.30	TU
B11-01170-14	507.87	2.02	11.43	2.08	9.35	0.02	41.75	1	1.41	415.81	0.2766	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-0.63	0.18	0.18	0.20	0.66	0.32	TU
B11-01170-17	498.51	2.00	10.47	2.06	8.41	0.02	45.40	1	1.41	414.25	0.2759	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-0.58	0.16	0.16	0.19	0.61	0.29	TU
B11-01170-18	501.98	2.00	11.43	2.06	9.37	0.02	41.20	1	1.41	422.34	0.2799	0.00800	L	3/18/2011	6/23/2011	180	180	0.98663	-0.63	0.18	0.18	0.20	0.66	0.32	TU
B11-01170-19	503.31	2.01	11.35	2.07	9.28	0.02	41.69	1	1.41	418.98	0.2782	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	-0.63	0.18	0.18	0.20	0.65	0.31	TU
B11-01170-20	504.40	1.99	11.82	2.05	9.77	0.02	39.76	1	1.41	414.60	0.2761	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	-0.67	0.19	0.19	0.21	0.69	0.33	TU
B11-01170-21	508.41	2.01	10.35	2.07	8.28	0.02	46.97	1	1.41	411.26	0.2744	0.00800	L	3/17/2011	6/23/2011	180	180	0.9865	-0.57	0.16	0.16	0.18	0.59	0.28	TU
B11-01170-22	502.58	2.00	10.51	2.06	8.45	0.02	45.55	1	1.41	412.08	0.2748	0.00800	L	3/18/2011	6/24/2011	180	180	0.9865	-0.58	0.16	0.16	0.19	0.60	0.29	TU
B11-01170-23	487.79	1.99	10.56	2.05	8.51	0.02	43.96	1	1.41	411.69	0.2746	0.00800	L	3/17/2011	6/24/2011	180	180	0.98636	-0.61	0.17	0.17	0.19	0.63	0.30	TU

ARS Tritium Enrichment Calculations

Procedures
 ARS File ID Number
 ARS Batch ID Number

ARS-040 , ARS-060
 ARS1-11-00547;548;549;601;602
 ARS1-B11-01170

Enrichment Factor Curve coeff. - Power $y = a \cdot x^b$		Bkg Quench Curve coeff. - Polynomial $y = ax^3+bx^2+cx+d$	
a	8.978E-01	a	-2.319E-08
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)	Mass Na2O2 added (g)	Final mass electrolyzed sample w/ NaOH (g)	Mass equivalent NaOH (g)	Final Mass Electrolyzed sample (g pure H2O)	Volume factor	Enrichment Factor	Average Sample CPM	Bkg CPM	QIP	Detector Eff (decimal)	Aliquot	Enter aliq. in final Rep. Units	Activity reference date	Start Date of Count	Total Sample Count Duration (min)	Total Bkg Count Duration (min)	Decay Correction to Tc	Sample Activity Conc.	Standard Counting Uncertainty	Counting Uncertainty	Combined Standard Uncertainty	Minimum Detectable Conc.	Decision Level Conc.	Reporting Units
	V _i	m _i	V _f	m _f	V _f	X	Y	R _s	R _b	tSIE	Eff	Aliquot	Units	T _o	T _c	t cnt (min)	t cnt (min)	DF	AC _i	CU	1s CU	1s CSU	MDC	DLC	Units
B11-01170-01	504.33	2.00	11.92	2.06	9.86	0.02	39.40	6	1.41	485.51	0.3009	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	22.89	1.06	1.06	3.59	2.28	1.10	pCi/L
B11-01170-02	504.65	2.00	13.03	2.06	10.97	0.02	35.59	6	1.41	492.59	0.3022	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	27.01	1.19	1.19	4.22	2.52	1.21	pCi/L
B11-01170-03	506.24	2.00	12.35	2.06	10.29	0.02	37.96	1	1.41	513.56	0.3058	0.00800	L	6/21/2011	6/21/2011	180	180	0.99999	-2.00	0.56	0.56	0.64	2.07	1.00	pCi/L
B11-01170-04	506.02	2.02	11.63	2.08	9.55	0.02	40.77	2	1.41	406.43	0.2720	0.00804	L	3/14/2011	6/21/2011	180	180	0.98636	3.01	0.71	0.71	0.84	2.19	1.06	pCi/L
B11-01170-05	503.20	2.01	13.71	2.07	11.64	0.02	33.52	2	1.41	410.46	0.2740	0.00807	L	3/14/2011	6/22/2011	180	180	0.98622	3.62	0.85	0.85	1.01	2.63	1.27	pCi/L
B11-01170-06	505.38	2.00	13.63	2.06	11.57	0.02	33.86	1	1.41	411.21	0.2744	0.00803	L	3/14/2011	6/22/2011	180	180	0.98622	-2.53	0.71	0.71	0.80	2.62	1.26	pCi/L
B11-01170-07	504.43	2.03	11.13	2.09	9.04	0.02	42.85	1	1.41	402.05	0.2699	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	-2.04	0.57	0.57	0.65	2.11	1.02	pCi/L
B11-01170-08	516.63	1.99	12.43	2.05	10.38	0.02	38.38	3	1.41	403.70	0.2707	0.00757	L	3/11/2011	6/22/2011	180	180	0.98581	9.22	0.91	0.91	1.66	2.48	1.20	pCi/L
B11-01170-09	511.23	2.00	12.16	2.06	10.10	0.02	39.01	4	1.41	410.77	0.2742	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	13.81	0.93	0.93	2.27	2.28	1.10	pCi/L
B11-01170-10	509.67	2.01	11.75	2.07	9.68	0.02	40.52	1	1.41	412.42	0.2750	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	-2.12	0.59	0.59	0.67	2.19	1.06	pCi/L
B11-01170-11	511.88	1.99	11.49	2.05	9.44	0.02	41.68	1	1.41	410.95	0.2743	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	-2.06	0.58	0.58	0.66	2.14	1.03	pCi/L
B11-01170-12	504.59	1.99	10.63	2.05	8.58	0.02	45.06	1	1.41	307.62	0.2155	0.00820	L	3/11/2011	6/23/2011	180	180	0.98568	-2.37	0.66	0.66	0.75	2.45	1.18	pCi/L
B11-01170-13	508.51	2.00	11.07	2.06	9.01	0.02	43.31	2	1.41	422.58	0.2800	0.00800	L	3/10/2011	6/23/2011	180	180	0.98554	2.77	0.65	0.65	0.77	2.01	0.97	pCi/L
B11-01170-14	507.87	2.02	11.43	2.08	9.35	0.02	41.75	1	1.41	415.81	0.2766	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-2.04	0.57	0.57	0.65	2.11	1.02	pCi/L
B11-01170-17	498.51	2.00	10.47	2.06	8.41	0.02	45.40	1	1.41	414.25	0.2759	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-1.88	0.53	0.53	0.60	1.95	0.94	pCi/L
B11-01170-18	501.98	2.00	11.43	2.06	9.37	0.02	41.20	1	1.41	422.34	0.2799	0.00800	L	3/18/2011	6/23/2011	180	180	0.98663	-2.04	0.57	0.57	0.65	2.11	1.02	pCi/L
B11-01170-19	503.31	2.01	11.35	2.07	9.28	0.02	41.69	1	1.41	418.98	0.2782	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	-2.03	0.57	0.57	0.65	2.10	1.01	pCi/L
B11-01170-20	504.40	1.99	11.82	2.05	9.77	0.02	39.76	1	1.41	414.60	0.2761	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	-2.15	0.60	0.60	0.68	2.22	1.07	pCi/L
B11-01170-21	508.41	2.01	10.35	2.07	8.28	0.02	46.97	1	1.41	411.26	0.2744	0.00800	L	3/17/2011	6/23/2011	180	180	0.9865	-1.83	0.51	0.51	0.58	1.89	0.91	pCi/L
B11-01170-22	502.58	2.00	10.51	2.06	8.45	0.02	45.55	1	1.41	412.08	0.2748	0.00800	L	3/18/2011	6/24/2011	180	180	0.9865	-1.88	0.53	0.53	0.60	1.95	0.94	pCi/L
B11-01170-23	487.79	1.99	10.56	2.05	8.51	0.02	43.96	1	1.41	411.69	0.2746	0.00800	L	3/17/2011	6/24/2011	180	180	0.98636	-1.95	0.55	0.55	0.62	2.02	0.97	pCi/L

ARS Tritium Enrichment Calculations

Procedures ARS-040 , ARS-060
ARS File ID Number ARS1-11-00547;548;549;601;602
ARS Batch ID Number ARS1-B11-01170

Enrichment Factor Curve coeff. - Power $y = a \cdot x^b$		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
Sysemor	0.15	Reporting Units	pCi
Coverage Factor	1.96	UCF	2.22

Sample ID	Initial Mass sample (g)	Mass Na2O2 added (g)	Final mass electrolyzed sample w/ NaOH (g)	Mass equivalent NaOH (g)	Final Mass Electrolyzed sample (g pure H2O)	Volume factor	Enrichment Factor	Average Sample CPM	Bkg CPM	QIP	Detector Eff (decimal)	Aliquot	Enter aliq. in final Rep. Units	Activity reference date	Start Date of Count	Total Sample Count Duration (min)	Total Bkg Count Duration (min)	Decay Correction to To	Sample Activity Conc.	Standard Counting Uncertainty	Counting Uncertainty	Combined Standard Uncertainty	Minimum Detectable Conc.	Decision Level Conc.	Reporting Units
	V_i	m_i	V_r	m_r	V_f	X	Y	R_s	R_b	tSIE	Eff	Aliquot	Units	T_o	T_c	t cnt (min)	t cnt (min)	DF	AC_i	CU	1.96s CU	1.96s CSU	MDC	DLC	Units
B11-01170-01	504.33	2.00	11.92	2.06	9.86	0.02	39.40	6	1.41	485.51	0.3009	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	22.89	1.06	2.08	7.04	2.28	1.10	pCi/L
B11-01170-02	504.65	2.00	13.03	2.06	10.97	0.02	35.59	6	1.41	492.59	0.3022	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	27.01	1.19	2.34	8.28	2.52	1.21	pCi/L
B11-01170-03	506.24	2.00	12.35	2.06	10.29	0.02	37.96	1	1.41	513.56	0.3058	0.00800	L	6/21/2011	6/21/2011	180	180	0.99999	-2.00	0.56	1.10	1.25	2.07	1.00	pCi/L
B11-01170-04	506.02	2.02	11.63	2.08	9.55	0.02	40.77	2	1.41	406.43	0.2720	0.00804	L	3/14/2011	6/21/2011	180	180	0.98636	3.01	0.71	1.38	1.64	2.19	1.06	pCi/L
B11-01170-05	503.20	2.01	13.71	2.07	11.64	0.02	33.52	2	1.41	410.46	0.2740	0.00807	L	3/14/2011	6/22/2011	180	180	0.98622	3.62	0.85	1.66	1.97	2.63	1.27	pCi/L
B11-01170-06	505.38	2.00	13.63	2.06	11.57	0.02	33.86	1	1.41	411.21	0.2744	0.00803	L	3/14/2011	6/22/2011	180	180	0.98622	-2.53	0.71	1.39	1.58	2.62	1.26	pCi/L
B11-01170-07	504.43	2.03	11.13	2.09	9.04	0.02	42.85	1	1.41	402.05	0.2699	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	-2.04	0.57	1.12	1.27	2.11	1.02	pCi/L
B11-01170-08	516.63	1.99	12.43	2.05	10.38	0.02	38.38	3	1.41	403.70	0.2707	0.00757	L	3/11/2011	6/22/2011	180	180	0.98581	9.22	0.91	1.78	3.24	2.48	1.20	pCi/L
B11-01170-09	511.23	2.00	12.16	2.06	10.10	0.02	39.01	4	1.41	410.77	0.2742	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	13.81	0.93	1.81	4.45	2.28	1.10	pCi/L
B11-01170-10	509.67	2.01	11.75	2.07	9.68	0.02	40.52	1	1.41	412.42	0.2750	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	-2.12	0.59	1.16	1.32	2.19	1.06	pCi/L
B11-01170-11	511.88	1.99	11.49	2.05	9.44	0.02	41.68	1	1.41	410.95	0.2743	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	-2.06	0.58	1.13	1.29	2.14	1.03	pCi/L
B11-01170-12	504.59	1.99	10.63	2.05	8.58	0.02	45.06	1	1.41	307.62	0.2155	0.00820	L	3/11/2011	6/23/2011	180	180	0.98568	-2.37	0.66	1.30	1.48	2.45	1.18	pCi/L
B11-01170-13	508.51	2.00	11.07	2.06	9.01	0.02	43.31	2	1.41	422.58	0.2800	0.00800	L	3/10/2011	6/23/2011	180	180	0.98554	2.77	0.65	1.27	1.51	2.01	0.97	pCi/L
B11-01170-14	507.87	2.02	11.43	2.08	9.35	0.02	41.75	1	1.41	415.81	0.2766	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-2.04	0.57	1.12	1.27	2.11	1.02	pCi/L
B11-01170-17	498.51	2.00	10.47	2.06	8.41	0.02	45.40	1	1.41	414.25	0.2759	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-1.88	0.53	1.04	1.17	1.95	0.94	pCi/L
B11-01170-18	501.98	2.00	11.43	2.06	9.37	0.02	41.20	1	1.41	422.34	0.2799	0.00800	L	3/18/2011	6/23/2011	180	180	0.98663	-2.04	0.57	1.12	1.27	2.11	1.02	pCi/L
B11-01170-19	503.31	2.01	11.35	2.07	9.28	0.02	41.69	1	1.41	418.98	0.2782	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	-2.03	0.57	1.12	1.27	2.10	1.01	pCi/L
B11-01170-20	504.40	1.99	11.82	2.05	9.77	0.02	39.76	1	1.41	414.60	0.2761	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	-2.15	0.60	1.18	1.34	2.22	1.07	pCi/L
B11-01170-21	508.41	2.01	10.35	2.07	8.28	0.02	46.97	1	1.41	411.26	0.2744	0.00600	L	3/17/2011	6/23/2011	180	180	0.9865	-1.83	0.51	1.00	1.14	1.89	0.91	pCi/L
B11-01170-22	502.58	2.00	10.51	2.06	8.45	0.02	45.55	1	1.41	412.08	0.2748	0.00800	L	3/18/2011	6/24/2011	180	180	0.9865	-1.88	0.53	1.03	1.17	1.95	0.94	pCi/L
B11-01170-23	487.79	1.99	10.56	2.05	8.51	0.02	43.96	1	1.41	411.69	0.2746	0.00800	L	3/17/2011	6/24/2011	180	180	0.98636	-1.95	0.55	1.07	1.22	2.02	0.97	pCi/L



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**American Radiation Services
Analytical Reports**

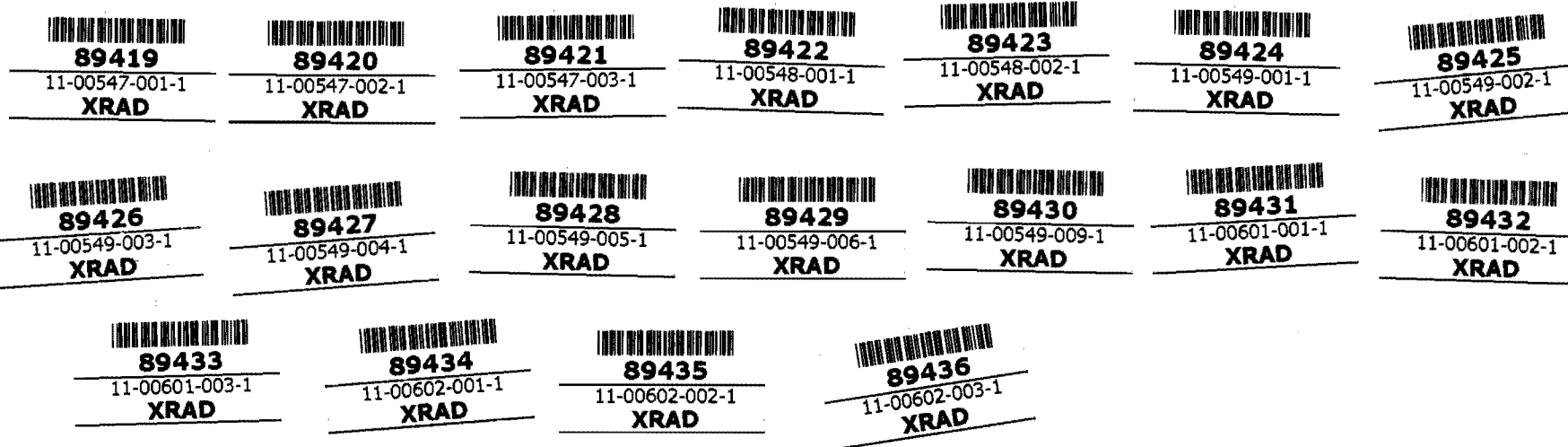
for

Los Alamos National Laboratory

**Low Level Tritium
by
Low Level Liquid
Scintillation Counting
Laboratory
Records**

Analysis Batch Report

	Analysis Batch ID ARS1-B11-01170											
	Method				ARS-054		Analysis		LSC-A-022		Matrix	AQ
	Description				Low Level Tritium by Electrolytic Enrichment							
	ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline	
ARS1-B11-01170-01	LCS	B-11324										
ARS1-B11-01170-02	LCSD	B-11325										
ARS1-B11-01170-03	MBL											
ARS1-B11-01170-04	TRG				ARS1-11-00547	001	1	Buckman1-11-5682	STD	04/12/11		
ARS1-B11-01170-05	TRG				ARS1-11-00547	002	1	Buckman06-11-5683	STD	04/12/11		
ARS1-B11-01170-06	TRG				ARS1-11-00547	003	1	Buckman08-11-5684	STD	04/12/11		
ARS1-B11-01170-07	TRG				ARS1-11-00548	001	1	CALA-11-5224	STD	04/12/11		
ARS1-B11-01170-08	TRG				ARS1-11-00548	002	1	CALA-11-5227	STD	04/12/11		
ARS1-B11-01170-09	TRG				ARS1-11-00549	001	1	CAPU-11-5282	STD	04/12/11		
ARS1-B11-01170-10	TRG				ARS1-11-00549	002	1	CAPU-11-5283	STD	04/12/11		
ARS1-B11-01170-11	TRG				ARS1-11-00549	003	1	CAPU-11-5290	STD	04/12/11		
ARS1-B11-01170-12	TRG				ARS1-11-00549	004	1	CAPU-11-5296	STD	04/12/11		
ARS1-B11-01170-13	TRG				ARS1-11-00549	005	1	CAPU-11-5301	STD	04/12/11		
ARS1-B11-01170-14	TRG				ARS1-11-00549	006	1	CAPU-11-5304	STD	04/12/11		
ARS1-B11-01170-17	TRG				ARS1-11-00549	009	1	CAPU-11-5292	STD	04/12/11		
ARS1-B11-01170-18	TRG				ARS1-11-00601	001	1	CAPU-11-5264	STD	04/18/11		
ARS1-B11-01170-19	TRG				ARS1-11-00601	002	1	CAPU-11-5269	STD	04/18/11		
ARS1-B11-01170-20	TRG				ARS1-11-00601	003	1	CAPU-11-5298	STD	04/18/11		
ARS1-B11-01170-21	TRG				ARS1-11-00602	001	1	CALA-11-5106	STD	04/18/11		
ARS1-B11-01170-22	TRG				ARS1-11-00602	002	1	CALA-11-5110	STD	04/18/11		
ARS1-B11-01170-23	TRG				ARS1-11-00602	003	1	CALA-11-5173	STD	04/18/11		



Analysis Batch Report

	Analysis Batch ID ARS1-B11-01170											
	Method				ARS-054		Analysis		LSC-A-022		Matrix	AQ
	Description				Low Level Tritium by Electrolytic Enrichment							
	ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline	
ARS1-B11-01170-01	LCS	B-11324										
ARS1-B11-01170-02	LCSD	B-11325										
ARS1-B11-01170-03	MBL											
ARS1-B11-01170-04	TRG				ARS1-11-00547	001	1	Buckman1-11-5682	STD	04/12/11		
ARS1-B11-01170-05	TRG				ARS1-11-00547	002	1	Buckman06-11-5683	STD	04/12/11		
ARS1-B11-01170-06	TRG				ARS1-11-00547	003	1	Buckman08-11-5684	STD	04/12/11		
ARS1-B11-01170-07	TRG				ARS1-11-00548	001	1	CALA-11-5224	STD	04/12/11		
ARS1-B11-01170-08	TRG				ARS1-11-00548	002	1	CALA-11-5227	STD	04/12/11		
ARS1-B11-01170-09	TRG				ARS1-11-00549	001	1	CAPU-11-5282	STD	04/12/11		
ARS1-B11-01170-10	TRG				ARS1-11-00549	002	1	CAPU-11-5283	STD	04/12/11		
ARS1-B11-01170-11	TRG				ARS1-11-00549	003	1	CAPU-11-5290	STD	04/12/11		
ARS1-B11-01170-12	TRG				ARS1-11-00549	004	1	CAPU-11-5296	STD	04/12/11		
ARS1-B11-01170-13	TRG				ARS1-11-00549	005	1	CAPU-11-5301	STD	04/12/11		
ARS1-B11-01170-14	TRG				ARS1-11-00549	006	1	CAPU-11-5304	STD	04/12/11		
ARS1-B11-01170-15	TRG				ARS1-11-00549	007	1	CAPU-11-5308	STD	04/12/11		
ARS1-B11-01170-16	TRG				ARS1-11-00549	008	1	CAPU-11-5311	STD	04/12/11		
ARS1-B11-01170-17	TRG				ARS1-11-00549	009	1	CAPU-11-5292	STD	04/12/11		
ARS1-B11-01170-18	TRG				ARS1-11-00601	001	1	CAPU-11-5264	STD	04/18/11		
ARS1-B11-01170-19	TRG				ARS1-11-00601	002	1	CAPU-11-5269	STD	04/18/11		
ARS1-B11-01170-20	TRG				ARS1-11-00601	003	1	CAPU-11-5298	STD	04/18/11		
ARS1-B11-01170-21	TRG				ARS1-11-00602	001	1	CALA-11-5106	STD	04/18/11		
ARS1-B11-01170-22	TRG				ARS1-11-00602	002	1	CALA-11-5110	STD	04/18/11		
ARS1-B11-01170-23	TRG				ARS1-11-00602	003	1	CALA-11-5173	STD	04/18/11		

4-1-11 1134

JER ARS1-B11-01170-15 and ARS1-B11-01170-16 deleted from current batch
b/c samples failed screening criteria twice.

LCS Report
Analytical Batch: ARS1-B11-01170

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountData	KnownValue
B-11324	ARS1-B11-01170	ARS1-B11-01170-01	B-H3	S-0206	H-3	5	2.698567445	17.31	22.31	5	VMULLIGAN	1/31/2011			
B-11325	ARS1-B11-01170	ARS1-B11-01170-02	B-H3	S-0206	H-3	5	2.698567445	17.35	22.35	5	VMULLIGAN	1/31/2011			

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
9028	ARS1-B11-01170	ARS1-B11-01170-01		8 g						JRABER	06/21/2011 10:46:42
9029	ARS1-B11-01170	ARS1-B11-01170-02		8 g						JRABER	06/21/2011 10:46:42
9030	ARS1-B11-01170	ARS1-B11-01170-03		8 g						JRABER	06/21/2011 10:46:42
9031	ARS1-B11-01170	ARS1-B11-01170-04	Buckman1-11-5682	8.04 g		89419				JRABER	06/21/2011 10:46:42
9032	ARS1-B11-01170	ARS1-B11-01170-05	Buckman06-11-5683	8.07 g		89420				JRABER	06/21/2011 10:46:42
9033	ARS1-B11-01170	ARS1-B11-01170-06	Buckman08-11-5684	8.03 g		89421				JRABER	06/21/2011 10:46:42
9034	ARS1-B11-01170	ARS1-B11-01170-07	CALA-11-5224	8 g		89422				JRABER	06/21/2011 10:46:43
9035	ARS1-B11-01170	ARS1-B11-01170-08	CALA-11-5227	7.57 g		89423				JRABER	06/21/2011 10:46:43
9036	ARS1-B11-01170	ARS1-B11-01170-09	CAPU-11-5282	8 g		89424				JRABER	06/21/2011 10:46:43
9037	ARS1-B11-01170	ARS1-B11-01170-10	CAPU-11-5283	8 g		89425				JRABER	06/21/2011 10:46:43
9038	ARS1-B11-01170	ARS1-B11-01170-11	CAPU-11-5290	8 g		89426				JRABER	06/21/2011 10:46:43
9039	ARS1-B11-01170	ARS1-B11-01170-12	CAPU-11-5296	8.2 g		89427				JRABER	06/21/2011 10:46:43
9040	ARS1-B11-01170	ARS1-B11-01170-13	CAPU-11-5301	8 g		89428				JRABER	06/21/2011 10:46:43
9041	ARS1-B11-01170	ARS1-B11-01170-14	CAPU-11-5304	8 g		89429				JRABER	06/21/2011 10:46:43
9042	ARS1-B11-01170	ARS1-B11-01170-17	CAPU-11-5292	8 g		89430				JRABER	06/21/2011 10:46:43
9043	ARS1-B11-01170	ARS1-B11-01170-18	CAPU-11-5264	8 g		89431				JRABER	06/21/2011 10:46:43
9044	ARS1-B11-01170	ARS1-B11-01170-19	CAPU-11-5269	8 g		89432				JRABER	06/21/2011 10:46:43
9045	ARS1-B11-01170	ARS1-B11-01170-20	CAPU-11-5298	8 g		89433				JRABER	06/21/2011 10:46:43
9046	ARS1-B11-01170	ARS1-B11-01170-21	CALA-11-5106	8 g		89434				JRABER	06/21/2011 10:46:43
9047	ARS1-B11-01170	ARS1-B11-01170-22	CALA-11-5110	8 g		89435				JRABER	06/21/2011 10:46:44
9048	ARS1-B11-01170	ARS1-B11-01170-23	CALA-11-5173	8 g		89436				JRABER	06/21/2011 10:46:44

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\20110621_1056

Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\20110621_1056.results

RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\LLH3.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\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: ARS LL H3

Count Time (min): 180.00

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				

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\20110621_1056
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\20110621_1056.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\LLH3.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\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: ARS LL H3
Count Time (min): 180.00
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

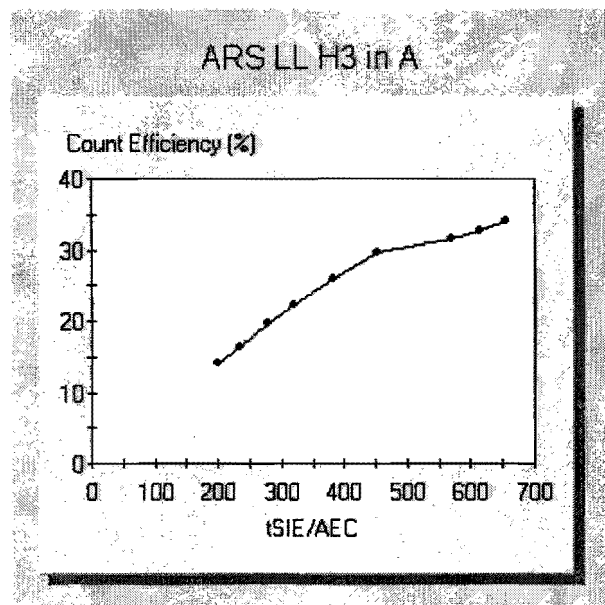
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
---------	-----------	-------	----------------	----------------

Protocol# 2 - Low Level H3.lsa

User: H3 Low Level

A
B
CCycle 1 Results
Quench Curve Block Data

Date Acquired: 11/19/2010

Date Modified:

ARS LL H3 in A

tSIE/AEC	Count Efficiency (%)
655.11	34.08
613.27	32.77
569.42	31.54
454.14	29.55
383.12	26.06
318.52	22.25
280.21	19.79
235.97	16.48
199.12	13.98

P#	S#	SMPL_ID	Count	Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	180.00		6.915	25.08	413.84	27.57	6/21/2011	11:05:54 AM	*
2	2	B11-01170-01	180.00		5.712	18.98	485.51	30.09	6/21/2011	2:19:16 PM	
2	3	B11-01170-02	180.00		5.849	19.36	492.59	30.22	6/21/2011	5:29:53 PM	
2	4	B11-01170-03	180.00		1.403	4.59	513.56	30.58	6/21/2011	8:40:34 PM	
2	5	B11-01170-04	180.00		1.599	5.88	406.43	27.20	6/21/2011	11:51:14 PM	
2	6	B11-01170-05	180.00		1.555	5.67	410.46	27.40	6/22/2011	3:04:06 AM	
2	7	B11-01170-06	180.00		1.284	4.68	411.21	27.44	6/22/2011	6:16:52 AM	
2	8	B11-01170-07	180.00		1.452	5.38	402.05	26.99	6/22/2011	9:27:40 AM	
2	9	B11-01170-08	180.00		3.214	11.87	403.70	27.07	6/22/2011	12:38:13 PM	
2	10	B11-01170-09	180.00		4.492	16.39	410.77	27.42	6/22/2011	3:48:52 PM	
2	11	B11-01170-10	180.00		1.473	5.36	412.42	27.50	6/22/2011	6:59:28 PM	
2	12	B11-01170-11	180.00		1.491	5.44	410.95	27.43	6/22/2011	10:10:01 PM	
2	13	B11-01170-12	180.00		1.333	6.19	307.62	21.55	6/23/2011	1:20:41 AM	
2	14	B11-01170-13	180.00		1.503	5.37	422.58	28.00	6/23/2011	4:31:15 AM	
2	15	B11-01170-14	180.00		1.358	4.91	415.81	27.66	6/23/2011	7:41:49 AM	
2	16	B11-01170-17	180.00		1.372	4.97	414.25	27.59	6/23/2011	10:52:20 AM	
2	17	B11-01170-18	180.00		1.316	4.70	422.34	27.99	6/23/2011	2:02:50 PM	
2	18	B11-01170-19	180.00		1.491	5.36	418.98	27.82	6/23/2011	5:13:10 PM	
2	19	B11-01170-20	180.00		1.440	5.22	414.60	27.61	6/23/2011	8:23:44 PM	
2	20	B11-01170-21	180.00		1.458	5.31	411.26	27.44	6/23/2011	11:34:13 PM	
2	21	B11-01170-22	180.00		1.436	5.23	412.08	27.48	6/24/2011	2:44:47 AM	
2	22	B11-01170-23	180.00		1.314	4.78	411.69	27.46	6/24/2011	5:55:18 AM	
2	23	Sample #23	180.00		1.413	5.15	411.01	27.43	6/24/2011	9:05:49 AM	

2nd Background

8ml's of dead H₂O

w/ 12ml's cocktail

JDR 6-24-2011

Tritium Enrichment Data

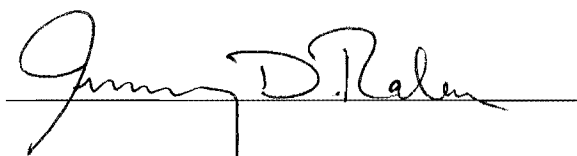
Procedures: ARS-040

Date: 4/7/2011

ARS File ID Numbers: ARS1-11-00547; -11-00548; -11-00549; -11-00550

ARS Batch ID: ARS1-B11-01170

		VF					Aliquot								
A Batch ID:		Gross Sample Recovered	Enrichment factor	Cryo-Distil Flask #	Tare Wt Cryo-distil flask	Gross Wt flask + Sample	Recovered Water	Tare Weight of LSC Vial	Vial + Sample	Net Sample	Wt of Vial, Sample & Dead Water Filler If used	Net Dead Water Added	Tare Wt b/f Cocktail	Gross Wt Vial + Sample + Cocktail	Net Wt of Cocktail Added
1	ARS1-B11-01170-01	11.92	42.31	N/A,N/A	101.67	110.71	9.04	6.42	14.42	8.00	0.00	0.00	14.42	26.41	11.99
2	ARS1-B11-01170-02	13.03	38.73	N/A,N/A	116.55	125.71	9.16	6.42	14.42	8.00	0.00	0.00	14.42	26.42	12.00
3	ARS1-B11-01170-03	12.35	40.99	N/A,N/A	93.78	102.81	9.03	6.43	14.43	8.00	0.00	0.00	14.43	26.42	11.99
4	ARS1-B11-01170-04	11.63	43.51	N/A,N/A	99.80	108.08	8.28	6.51	14.55	8.04	0.00	0.00	14.55	26.55	12.00
5	ARS1-B11-01170-05	13.71	36.70	N/A,N/A	116.55	126.88	10.33	6.54	14.61	8.07	0.00	0.00	14.61	26.60	11.99
6	ARS1-B11-01170-06	13.63	37.08	N/A,N/A	93.06	101.87	8.81	6.60	14.63	8.03	0.00	0.00	14.63	26.63	12.00
7	ARS1-B11-01170-07	11.13	45.32	N/A,N/A	101.91	109.97	8.06	6.42	14.42	8.00	0.00	0.00	14.42	26.41	11.99
8	ARS1-B11-01170-08	12.43	41.56	N/A,N/A	93.79	101.46	7.67	6.41	13.98	7.57	14.46	0.48	14.46	26.45	11.99
9	ARS1-B11-01170-09	12.16	42.04	N/A,N/A	101.67	110.55	8.88	6.53	14.53	8.00	0.00	0.00	14.53	26.53	12.00
10	ARS1-B11-01170-10	11.75	43.38	N/A,N/A	97.03	105.03	8.00	6.42	14.42	8.00	0.00	0.00	14.42	26.41	11.99
11	ARS1-B11-01170-11	11.49	44.55	N/A,N/A	101.66	109.66	8.00	6.41	14.41	8.00	0.00	0.00	14.41	26.41	12.00
12	ARS1-B11-01170-12	10.63	47.47	N/A,N/A	93.05	101.07	8.02	6.43	14.63	8.20	0.00	0.00	14.63	26.62	11.99
13	ARS1-B11-01170-13	11.07	45.94	N/A,N/A	97.35	105.36	8.01	6.51	14.51	8.00	0.00	0.00	14.51	26.50	11.99
14	ARS1-B11-01170-14	11.43	44.43	N/A,N/A	99.51	107.51	8.00	6.53	14.53	8.00	0.00	0.00	14.53	26.54	12.01
15	ARS1-B11-01170-17	10.47	47.61	N/A,N/A	103.57	111.59	8.02	6.42	14.42	8.00	0.00	0.00	14.42	26.42	12.00
16	ARS1-B11-01170-18	11.43	43.92	N/A,N/A	107.38	115.39	8.01	6.42	14.42	8.00	0.00	0.00	14.42	26.41	11.99
17	ARS1-B11-01170-19	11.35	44.34	N/A,N/A	96.03	104.04	8.01	6.39	14.39	8.00	0.00	0.00	14.39	26.41	12.02
18	ARS1-B11-01170-20	11.82	42.67	N/A,N/A	94.03	102.05	8.02	6.43	14.43	8.00	0.00	0.00	14.43	26.42	11.99
19	ARS1-B11-01170-21	10.35	49.12	N/A,N/A	104.27	112.27	8.00	6.51	14.51	8.00	0.00	0.00	14.51	26.51	12.00
20	ARS1-B11-01170-22	10.51	47.82	N/A,N/A	109.54	117.55	8.01	6.53	14.53	8.00	0.00	0.00	14.53	26.53	12.00
21	ARS1-B11-01170-23	10.56	46.19	N/A,N/A	93.07	101.09	8.02	6.61	14.61	8.00	0.00	0.00	14.61	26.59	11.98
22		0.00	-	-	-	-	0.00	-	-	0.00	-	0.00	-	-	0.00
23		0.00	-	-	-	-	0.00	-	-	0.00	-	0.00	-	-	0.00
24		0.00	-	-	-	-	0.00	-	-	0.00	-	0.00	-	-	0.00
25		0.00	-	-	-	-	0.00	-	-	0.00	-	0.00	-	-	0.00
26		0.00	-	-	-	-	0.00	-	-	0.00	-	0.00	-	-	0.00
27		0.00	-	-	-	-	0.00	-	-	0.00	-	0.00	-	-	0.00
28		0.00	-	-	-	-	0.00	-	-	0.00	-	0.00	-	-	0.00
29		0.00	-	-	-	-	0.00	-	-	0.00	-	0.00	-	-	0.00



Procedures: ARS-040

Date: 4/7/2011

ARS File ID Numbers: ARS1-11-00547; -11-00548; -11-00549; -11-00601; -11-00602

ARS Batch ID: ARS1-B11-01170

		mi				Vi								
A Batch ID:	Enrichment Cell No.	Tare Wt of Electrolysis Cell & Electrodes	Tare Wt Reservoir	Wt Na ₂ O ₂	Gross Weight of Sample Reservoir	Gross Sample Added	Electrolysis Start Date & Time	Start AMP	Start Bath C°	Electolysis End Date & Time	End Bath C°	End Wt of Cell + Resv. + Sample		
1	ARS1-B11-01170-01	1	331.17	199.48	2.00	703.81	504.33	4-6-11 1017	5.00	2.0	6-1-11 0947	2.0	542.57	
2	ARS1-B11-01170-02	2	336.19	189.18	2.00	693.83	504.65	4-6-11 1108	5.00	2.0	6-1-11 0947	2.0	538.40	
3	ARS1-B11-01170-03	7	334.91	191.91	2.00	698.15	506.24	4-6-11 1114	5.00	2.0	6-1-11 0947	2.0	539.17	
4	ARS1-B11-01170-04	27	338.25	207.25	2.02	713.27	506.02	4-8-11 0957	5.00	2.0	6-1-11 0947	2.0	557.13	
5	ARS1-B11-01170-05	41	331.36	192.60	2.01	695.80	503.20	4-8-11 0958	5.00	2.0	6-1-11 0947	2.0	537.67	
6	ARS1-B11-01170-06	100	336.49	203.92	2.00	709.30	505.38	4-8-11 1000	5.00	2.0	6-1-11 0947	2.0	554.04	
7	ARS1-B11-01170-07	34	337.04	198.83	2.03	703.26	504.43	4-8-11 1002	5.00	2.0	6-1-11 0947	2.0	547.00	
8	ARS1-B11-01170-08	N/A	340.53	212.43	1.99	729.06	516.63	4-8-11 1003	5.00	2.0	6-1-11 0947	2.0	565.39	
9	ARS1-B11-01170-09	N/A	334.61	186.13	2.00	697.36	511.23	4-8-11 1006	5.00	2.0	6-1-11 0947	2.0	532.90	
10	ARS1-B11-01170-10	N/A	334.34	195.20	2.01	704.87	509.67	4-8-11 1049	5.00	2.0	6-1-11 0947	2.0	541.29	
11	ARS1-B11-01170-11	N/A	335.39	195.03	1.99	706.91	511.88	4-8-11 1057	5.00	2.0	6-1-11 0947	2.0	541.91	
12	ARS1-B11-01170-12	N/A	340.52	196.14	1.99	700.73	504.59	4-10-11 1149	5.00	2.0	6-1-11 0947	2.0	547.29	
13	ARS1-B11-01170-13	N/A	332.00	207.84	2.00	716.35	508.51	4-10-11 1152	5.00	2.0	6-1-11 0947	2.0	550.91	
14	ARS1-B11-01170-14	78	332.74	190.79	2.02	698.66	507.87	4-10-11 1154	5.00	2.0	6-1-11 0947	2.0	534.96	
15	ARS1-B11-01170-17	N/A	327.23	189.21	2.00	687.72	498.51	4-10-11 1158	5.00	2.0	6-1-11 0947	2.0	526.91	
16	ARS1-B11-01170-18	N/A	339.40	200.88	2.00	702.86	501.98	4-10-11 1204	5.00	2.0	6-1-11 0947	2.0	551.71	
17	ARS1-B11-01170-19	47	334.25	199.16	2.01	702.47	503.31	4-11-11 1504	5.00	2.0	6-1-11 0947	2.0	544.76	
18	ARS1-B11-01170-20	10	331.35	208.70	1.99	713.10	504.40	4-11-11 1509	5.00	2.0	6-1-11 0947	2.0	551.87	
19	ARS1-B11-01170-21	62	334.10	211.86	2.01	720.27	508.44	4-11-11 1514	5.00	2.0	6-1-11 0947	2.0	556.31	
20	ARS1-B11-01170-22	N/A	334.52	211.44	2.00	714.02	502.58	4-11-11 1519	5.00	2.0	6-1-11 0947	2.0	556.47	
21	ARS1-B11-01170-23	N/A	330.41	191.21	1.99	679.00	487.79	4-11-11 1527	5.00	2.0	6-1-11 0947	2.0	532.18	
22							0.00							
23							0.00							
24							0.00							
25							0.00							
26							0.00							
27							0.00							
28							0.00							
29							0.00							

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
6-21-2011	0951	B11-01170-01 Background JDR 6-21-11	B11-01170	1056	JDR
↓	↓	B11-01170-01	↓	↓	JDR
↓	↓	B11-01170-02	↓	↓	JDR
↓	↓	B11-01170-03	↓	↓	JDR
↓	↓	B11-01170-04	↓	↓	JDR
↓	↓	B11-01170-05	↓	↓	JDR
↓	↓	B11-01170-06	↓	↓	JDR
↓	↓	B11-01170-07	↓	↓	JDR
↓	↓	B11-01170-08	↓	↓	JDR
↓	↓	B11-01170-09	↓	↓	JDR
↓	↓	B11-01170-10	↓	↓	JDR
↓	↓	B11-01170-11	↓	↓	JDR
↓	↓	B11-01170-12	↓	↓	JDR
↓	↓	B11-01170-13	↓	↓	JDR
↓	↓	B11-01170-14	↓	↓	JDR
↓	↓	B11-01170-17	↓	↓	JDR
↓	↓	B11-01170-18	↓	↓	JDR
↓	↓	B11-01170-19	↓	↓	JDR
↓	↓	B11-01170-20	↓	↓	JDR
↓	↓	B11-01170-21	↓	↓	JDR

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
6-21-2011	0951	B11-01170-22	B11-01170	1056	JDR
↓	↓	B11-01170-23	↓	↓	JDR
↓	↓	2nd Background	↓	↓	JDR
6-23-11	1608	SNC S1	QA	QA	JDR
↓	↓	B11-02218-01	B11-02218		JDR
↓	↓	B11-02218-02	↓		JDR
↓	↓	B11-02218-03	↓		JDR
↓	↓	B11-02218-04	↓		JDR
↓	↓	B11-02218-05	↓		JDR
↓	↓	B11-02218-06	↓		JDR
↓	↓	B11-02218-07	↓		JDR
↓	↓	B11-02218-08	↓		JDR
↓	↓	B11-02218-09	↓		JDR
↓	↓	B11-02218-10	↓		JDR
↓	↓	B11-02218-11	↓		JDR
↓	↓	B11-02218-12	↓		JDR
↓	↓	B11-02218-13	↓		JDR
↓	↓	B11-02218-14	↓		JDR
↓	↓	B11-02218-15	↓		JDR
↓	↓	B11-02218-16	↓		JDR

JSW
6-22-11

6-24-2011
JDR
NO DATA



Standards Activity as of: 06/21/11 10:38

Active	Std ID	Isotope	PSCLT	Verification Date	Exp Date	Status	Ref Date	Ref ACT (dpm)	ACT at Date Above (dpm/g)	Half-life (days)	Parent ID	Expend Date	Comments
A	S-0195	Ra-226	PC			Not Ver	06/24/08	7.7832E+02	777.3081	5.840E+05			Primary Ra-226 standard for calibration.
A	S-0196	Ra-226	SLC			Not Ver	07/03/08	2.3567E+02	235.3681	5.840E+05	S-0195		Calibration standard for Ra-226.
A	S-0197	Ra-228	SL	11/11/10	11/11/11	OK	07/10/08	4.4972E+01	31.5281	2.100E+03	S-0127		LCS for Ra-228
A	S-0198	Ra-226	SL	09/24/09	09/24/10	EXP	07/07/08	1.4886E+03	1486.7317	5.840E+05	S-0193		Intermediate level LCS standard for use in creating LCS stock solutions.
A	S-0199	Ni-63	SL	04/14/10	04/14/11	EXP	08/25/08	4.5399E+01	44.5225	3.660E+04	S-0178		Ni-63 LCS solution with 7.5 ml of 2 mg/ml Ni carrier added to the vial.
A	S-0200	Sr-89	PC			Not Ver	09/17/08	1.0942E+04	0.0200	5.053E+01			Primary Sr-89 calibration standard
A	S-0206	H-3	SL	05/14/10	05/14/11	EXP	02/25/09	6.6781E+00	5.8621	4.500E+03	S-0152		Use as H3LL LCS creation. Dilution performed as stated above by H. Tibb.
A	S-0210	Ba-133	PT			Not Ver	05/15/09	7.6431E+02	665.4942	3.840E+03			Primary Ba-133 tracer
A	S-0211	Ba-133	ST			Not Ver	05/18/09	4.5236E+02	394.0898	3.840E+03	S-0210		Intermediate level tracer solution. Dilution performed as stated above.
A	S-0212	Ba-133	SLT	05/21/09	05/21/10	EXP	05/18/09	9.9546E+00	8.6722	3.840E+03	S-0211		Ba-133 tracer solution. Dilution performed as stated above by H. Tibb.
A	S-0213	Ba-133	SLT	05/25/09	05/25/10	EXP	05/23/09	6.6543E+01	58.0236	3.840E+03	S-0211		Ba-133 tracer solution. Dilution performed as stated above by H. Tibb.
A	S-0215	C-14	P			Not Ver	09/03/90	5.4020E+04	53883.5736	2.082E+06			C-14 for calibration use only (5 ml ampoule).
A	S-0216	Am-241	PL			Not Ver	05/16/07	1.0640E+02	105.7030	1.579E+05			Parent Am-241 Working Soln (40 ml 5 ml NIST borosilicate glass ampoule).
A	S-0218	C-14	SC	08/05/09	08/05/10	EXP	07/22/09	2.0419E+05	294121.4213	2.082E+06	S-0215		C-14 calibration standard used for adding the C-14 standard to Am-241.
A	S-0220	Am-241	P			Not Ver	08/19/09	2.6725E+01	26.6464	1.579E+05			No certificate for this standard on file in the QA office. NTIB is no.
A	S-0221	Am-241	SL	08/05/10	08/05/11	OK	08/19/09	2.6725E+01	26.6464	1.579E+05	S-0220		Am-241 LCS standard. Active denominated for secondary calibration.
A	S-0222	Pu-242	PT	09/28/09	09/28/10	EXP	09/23/09	2.6314E+01	26.3142	1.365E+08			
A	S-0223	Pu-242	SLT	10/06/10	10/06/11	OK	09/25/09	7.6699E+00	7.6699	1.365E+08	S-0222		Pu-242 tracer solution. Dilution performed as stated above by B. Staff.
A	S-0224	Ra-226	SL	11/11/10	11/11/11	OK	11/04/09	6.4243E+01	64.1979	5.840E+05	S-0198		Ra-226 LCS stock solution. Dilution performed as stated above by B. Staff.
A	S-0225	Sr-89	PC			Not Ver	10/01/09	1.0276E+05	18.6437	5.053E+01			Primary Sr-89 standard. 5 ml liquid in flame sealed vial.
A	S-0226	Pu-239	SC	11/19/09	11/19/10	EXP	11/16/09	1.9777E+03	1977.6410	8.807E+06	S-0186		Pu-239 calibration standard. Dilution performed as stated above by B. Staff.
A	S-0227	U-238	PC			Not Ver	05/17/07	1.7557E+02	175.5667	1.632E+12			Primary U-238 calibration standard. 5 ml liquid in flame sealed vial.
A	S-0228	U-238	SC	11/19/09	11/19/10	EXP	11/17/09	2.6904E+02	269.0445	1.632E+12	S-0227		Uranium standard for use in creating Alpha Spec check sources. Dilution performed as stated above by B. Staff.
A	S-0229	Sr-89	SC	11/18/09	07/28/10	EXP	11/18/09	1.7112E+04	5.9977	5.053E+01	S-0225		Sr-89 calibration standard. Dilution performed as stated above by B. Staff.
A	S-0230	U-238	PL			Not Ver	11/23/09	1.8617E+02	186.1684	1.632E+12			Primary U-238, 235, 234 standard. 5 ml liquid in flame sealed vial.
A	S-0231	Th-230	SL	10/18/10	10/18/11	OK	02/19/10	1.2559E+01	12.5584	2.753E+07	S-0172		Primary Th-230 LCS standard. Dilution performed as stated above by B. Staff.
A	S-0232	Th-229	PT			Not Ver	01/28/05	1.1940E+02	119.3279	2.681E+06			
A	S-0233	Th-229	SLT	02/22/10	02/22/11	EXP	01/28/05	1.1940E+02	119.3279	2.681E+06	S-0232		Primary Th-229 tracer standard. Dilution performed by a new user.
A	S-0234	Sr-90	PL			Not Ver	03/04/10	4.5500E+02	440.8634	1.041E+04			Previously logged as TLLC. Sr-90 standard to be used for creating LCS.
A	S-0235	Sr-90	SL			Not Ver	03/12/10	4.4497E+01	43.1370	1.041E+04	S-0234		Primary Sr-90 LCS standard. Dilution performed as stated above by B. Staff.
A	S-0236	Sr-90	SL	03/08/11	03/08/12	OK	03/17/10	4.8169E+01	46.7126	1.041E+04	S-0160		Sr-90 LCS standard. Dilution performed as stated above by B. Staff.
A	S-0237	H-3	SL	03/25/11	03/25/12	OK	03/22/10	3.5037E+03	3266.0216	4.500E+03	S-0031		Intermediate level H-3 standard for creating LCS solutions in a vial.
A	S-0240	Sr-90	SL	04/13/10	04/13/11	EXP	04/13/10	4.8132E+01	46.7612	1.041E+04	S-0160		Palenide Sr-90 LCS standard. Dilution performed as stated above by B. Staff.
A	S-0241	U-232	ST	06/11/10	06/11/11	EXP	06/09/10	9.1520E+00	9.0574	2.516E+04	S-0161		Primary U-232 tracer solution. Dilution performed as stated above by B. Staff.
A	S-0242	Pu-239	PL			Not Ver	11/23/09	6.5202E+03	6519.8617	8.807E+06			Primary Pu-239 standard. 5 ml liquid in flame sealed vial.
A	S-0243	Sr-90	PL	07/01/10	07/01/11	OK	07/01/09	1.3200E+00	1.2382	1.041E+04			Happel air filter used as QC for LDC up to filter particulate samples.
A	S-0244	Th-230	PL	07/01/10	07/01/11	OK	07/01/09	6.5900E-01	0.6590	2.753E+07			Happel air filter used as QC for LDC up to filter particulate samples.
A	S-0245	Fe-55	SC	08/18/10	08/18/11	OK	08/13/10	2.6617E+00	2.1375	9.860E+02	S-0183		Fe-55 LCS standard. Dilution performed as stated above by B. Staff.
A	S-0246	Th-229	ST	10/18/10	10/18/11	OK	09/20/10	1.1204E+01	11.2036	2.681E+06	S-0233		Th-229 tracer standard. Dilution performed as stated above by B. Staff.
A	S-0247	H-3	SL	10/13/10	10/13/11	OK	10/11/10	5.6100E+00	5.3956	4.500E+03	S-0237		Batch H-3 LCS standard. Dilution performed as stated above by B. Staff.
A	S-0248	Pu-242	PT			Not Ver	01/01/10	2.6770E+01	26.7699	1.365E+08			Primary Pu-242 standard in flame sealed 5 ml nonreactive glass ampoule.
A	S-0249	C-14	PC			Not Ver	02/03/11	7.5143E+03	7513.9554	2.082E+06			Primary C-14 calibration standard.
A	S-0250	C-14	S	03/07/11	03/07/12	OK	02/17/11	4.7591E+00	4.7589	2.090E+06	S-0153		C-14 LCS standard. Dilution performed as stated above by B. Staff.
A	S-0251	C-14	SC	03/07/11	03/07/12	OK	02/21/11	1.1123E+04	11122.4385	2.082E+06	S-0249		C-14 calibration standard. Dilution performed as stated above by B. Staff.
A	S-0252	Pu-242	ST	03/28/11	03/28/12	OK	03/28/11	7.9422E+00	7.9422	1.365E+08	S-0248		Pu-242 tracer solution. Dilution performed as stated above by B. Staff.



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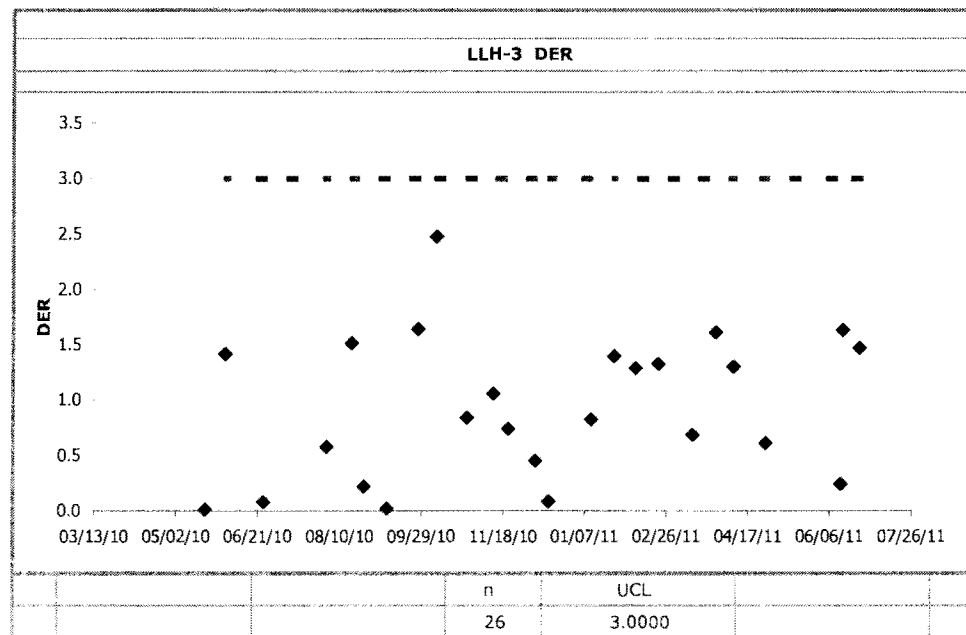
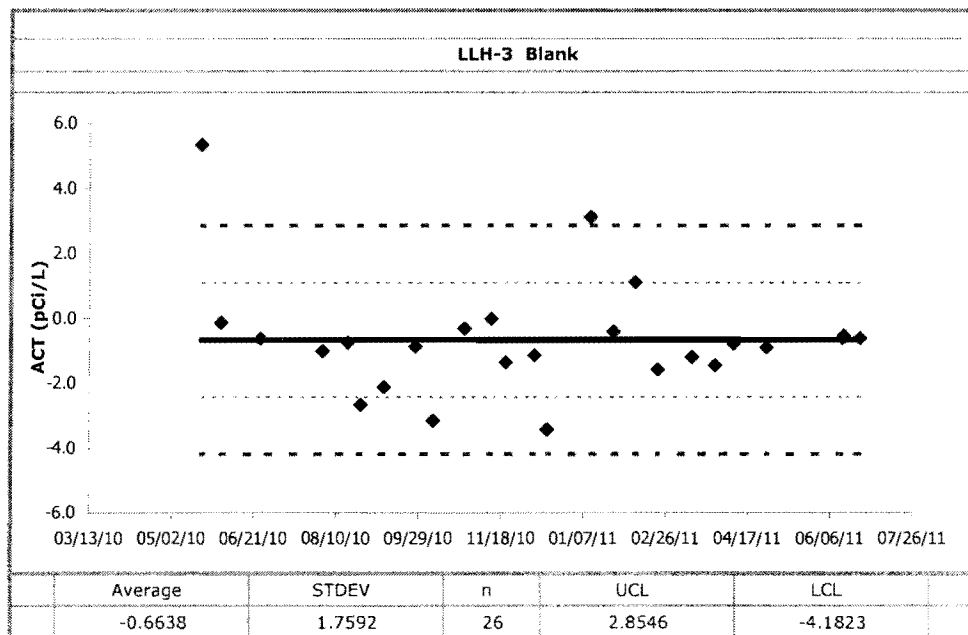
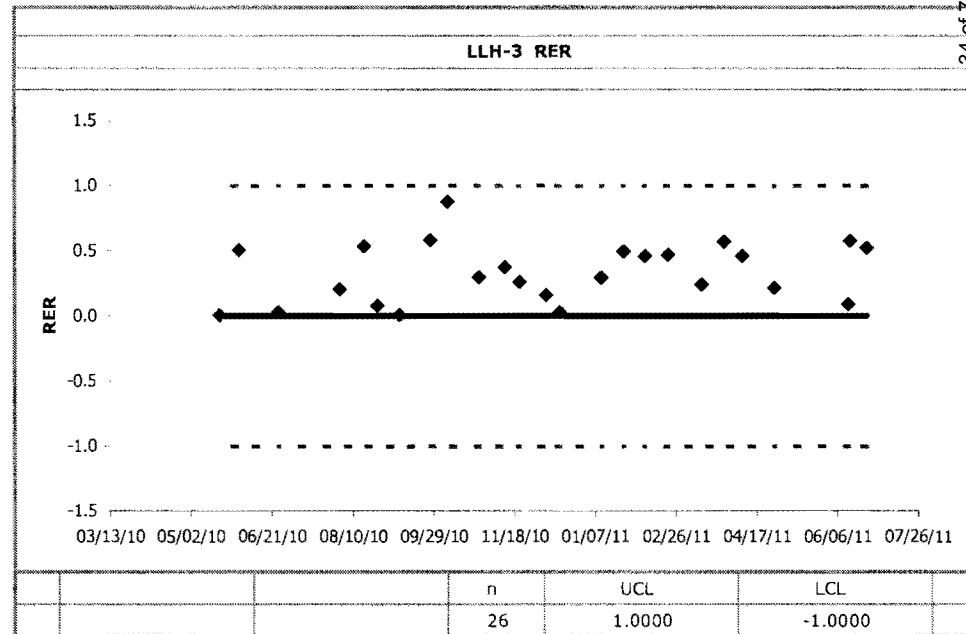
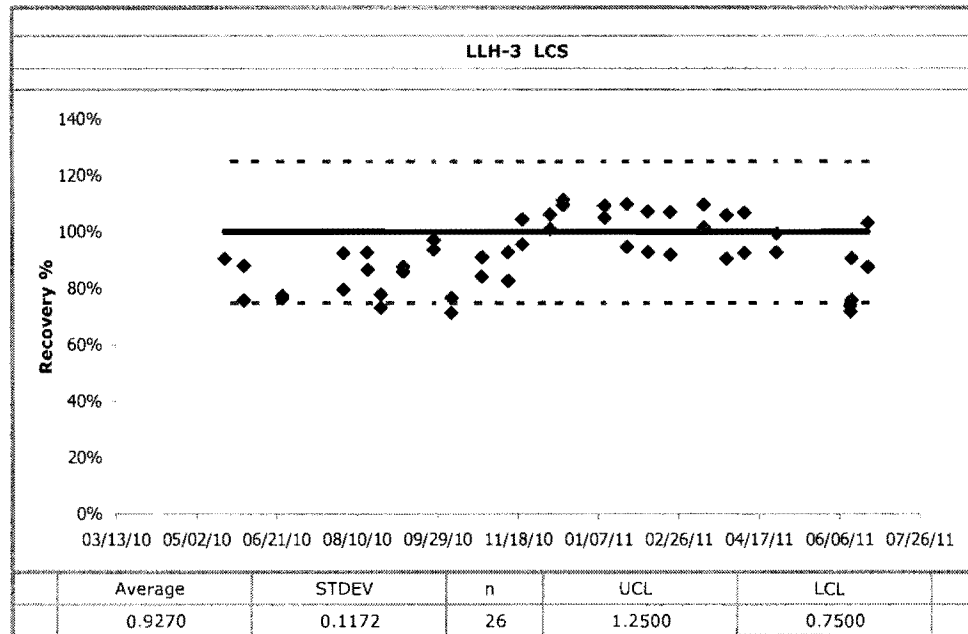
Low Level Tritium

by

**Low Level Liquid
Scintillation Counting**

Control Charts

QC Chart



3H Background

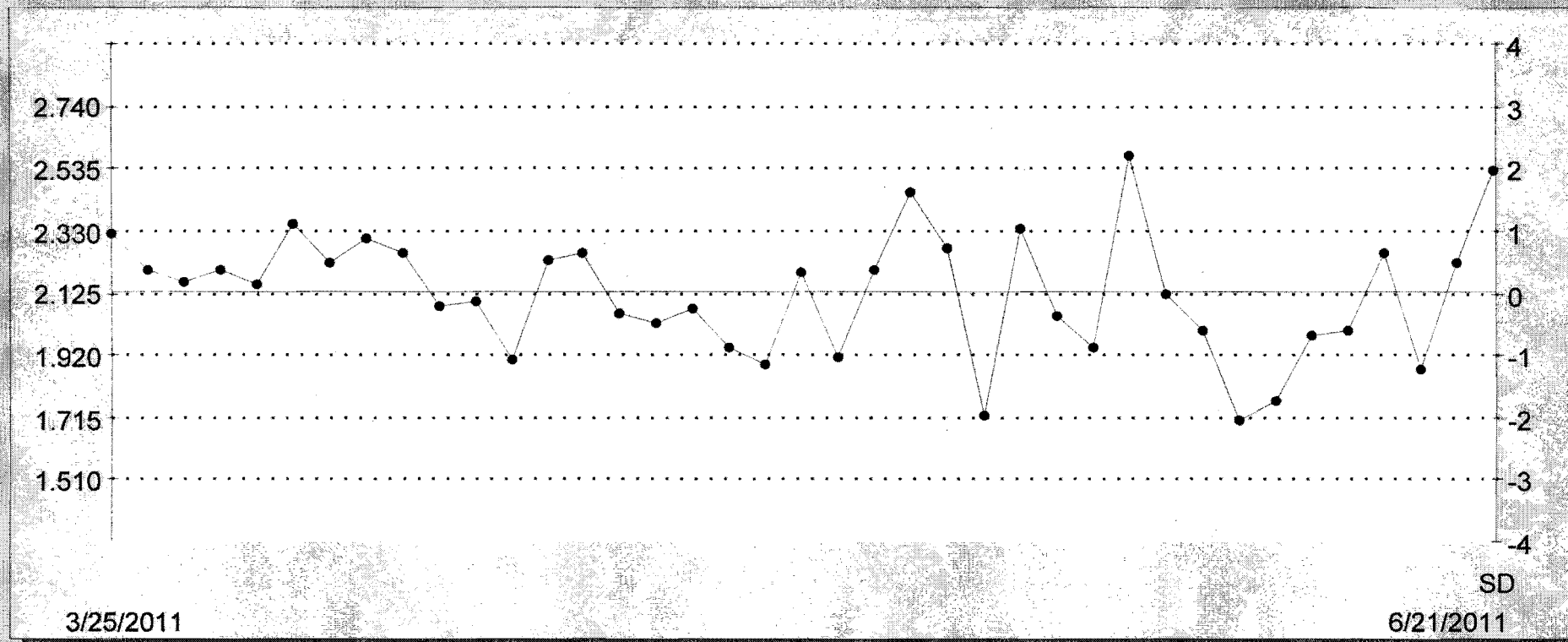
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Valid # pts : 39
Mean : 2.12
SD : 0.20

Date	Value	Valid Pt
Mar 25, 2011	2.32	X
Mar 28, 2011	2.20	X
Apr 01, 2011	2.16	X
Apr 08, 2011	2.20	X
Apr 12, 2011	2.15	X
Apr 15, 2011	2.35	X
Apr 22, 2011	2.22	X
Apr 28, 2011	2.31	X
Apr 29, 2011	2.26	X
Apr 29, 2011	2.08	X
Apr 29, 2011	2.10	X
Apr 29, 2011	1.90	X
Apr 30, 2011	2.23	X
Apr 30, 2011	2.25	X
Apr 30, 2011	2.05	X
Apr 30, 2011	2.02	X
Apr 30, 2011	2.08	X
Apr 30, 2011	1.95	X
Apr 30, 2011	1.89	X
May 02, 2011	2.19	X
May 03, 2011	1.91	X
May 10, 2011	2.20	X
May 16, 2011	2.45	X
May 23, 2011	2.27	X
May 24, 2011	1.72	X
May 31, 2011	2.34	X
Jun 03, 2011	2.05	X
Jun 05, 2011	1.94	X
Jun 05, 2011	2.58	X
Jun 08, 2011	2.12	X
Jun 11, 2011	2.00	X
Jun 14, 2011	1.70	X
Jun 18, 2011	1.77	X
Jun 19, 2011	1.98	X
Jun 20, 2011	2.00	X
Jun 20, 2011	2.25	X
Jun 20, 2011	1.87	X
Jun 20, 2011	2.23	X
Jun 21, 2011	2.53	X

3H Background

Total # pts : 5256
Valid # pts : 39
Mean : 2.12
SD : 0.20

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3H Efficiency

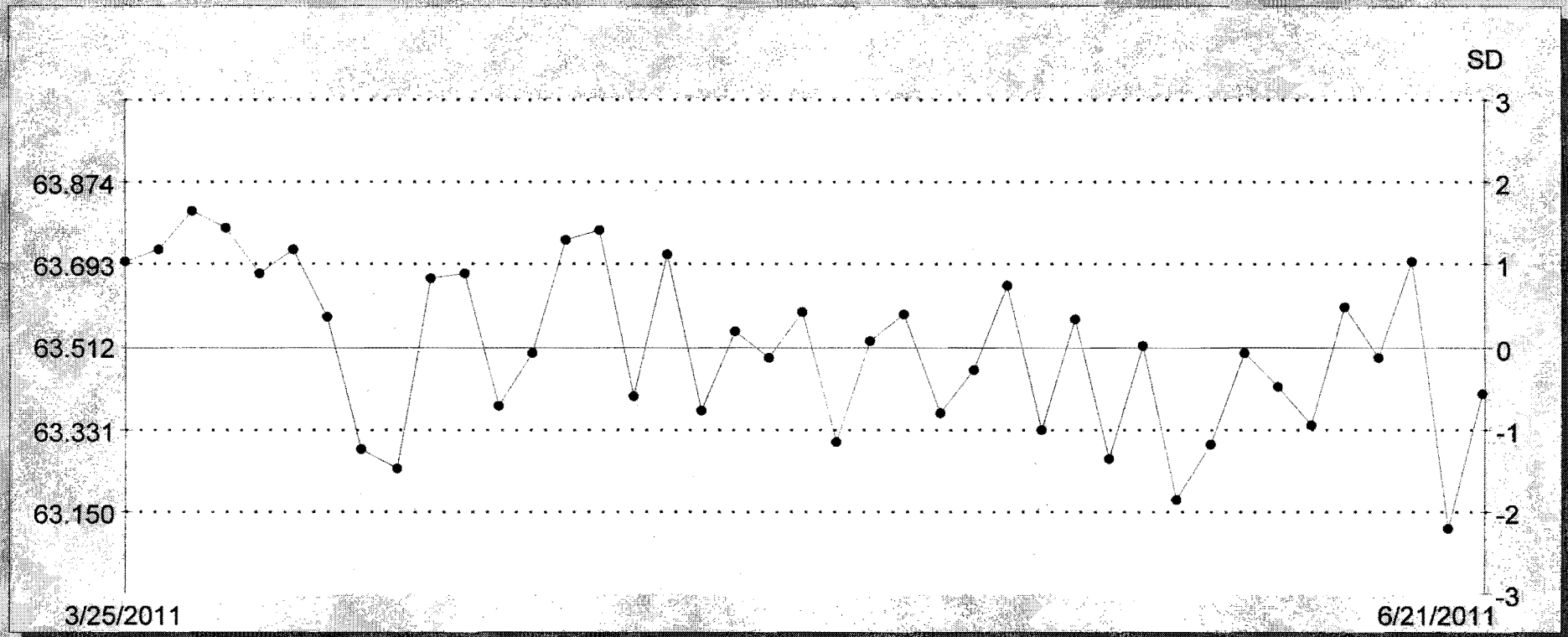
Total # pts : 5330
Valid # pts : 41
Mean : 63.51
SD : 0.18

Date	Value	Valid Pt
Mar 25, 2011	63.70	X
Mar 28, 2011	63.73	X
Apr 01, 2011	63.81	X
Apr 08, 2011	63.78	X
Apr 12, 2011	63.67	X
Apr 15, 2011	63.73	X
Apr 22, 2011	63.57	X
Apr 28, 2011	63.29	X
Apr 29, 2011	63.24	X
Apr 29, 2011	63.66	X
Apr 29, 2011	63.67	X
Apr 29, 2011	63.38	X
Apr 30, 2011	63.50	X
Apr 30, 2011	63.75	X
Apr 30, 2011	63.77	X
Apr 30, 2011	63.40	X
Apr 30, 2011	63.71	X
Apr 30, 2011	63.37	X
Apr 30, 2011	63.55	X
Apr 30, 2011	63.49	X
May 02, 2011	63.59	X
May 03, 2011	63.30	X
May 10, 2011	63.52	X
May 16, 2011	63.58	X
May 23, 2011	63.37	X
May 24, 2011	63.46	X
May 31, 2011	63.65	X
Jun 03, 2011	63.33	X
Jun 05, 2011	63.57	X
Jun 05, 2011	63.27	X
Jun 08, 2011	63.51	X
Jun 11, 2011	63.18	X
Jun 14, 2011	63.29	X
Jun 18, 2011	63.50	X
Jun 19, 2011	63.43	X
Jun 20, 2011	63.34	X
Jun 20, 2011	63.60	X
Jun 20, 2011	63.48	X
Jun 20, 2011	63.70	X
Jun 20, 2011	63.11	X
Jun 21, 2011	63.41	X

3H Efficiency

Total # pts : 5330
Valid # pts : 41
Mean : 63.51
SD : 0.18

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Tritium- Screening by Low Level Liquid Scintillation Counting



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Tritium-Screening by Low Level Liquid Scintillation Counting Samples

Procedures:

ARS-060

ARS-040

Section 14.1 Tritium Screen in Clean Water without Distillation

ARS File ID Numbers: ARS1-11-00547; 548; 549; 601; 602

ARS Batch ID: ARS1-B11-01169

	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-B11-01169-04	120	1.653	1.621	31.95	5.02	8.987	pCi/L	192.6391	NO
2	ARS1-B11-01169-05	120	1.610	1.621	32	4.99	-3.103	pCi/L	193.4944	NO
3	ARS1-B11-01169-06	120	1.734	1.621	31.85	5.02	31.836	pCi/L	193.2439	NO
4	ARS1-B11-01169-07	120	1.751	1.621	31.86	5.00	36.760	pCi/L	193.956	NO
5	ARS1-B11-01169-08	120	1.646	1.621	31.93	5.01	7.040	pCi/L	193.1445	NO
6	ARS1-B11-01169-09	120	1.409	1.551	31.48	5.03	-40.395	pCi/L	191.0072	NO
7	ARS1-B11-01169-10	120	1.717	1.551	31.9	5.02	46.694	pCi/L	188.8678	NO
8	ARS1-B11-01169-11	120	1.623	1.551	31.59	5.00	20.533	pCi/L	191.4841	NO
9	ARS1-B11-01169-12	120	1.623	1.551	31.95	4.99	20.343	pCi/L	189.7059	NO
10	ARS1-B11-01169-13	120	1.690	1.551	31.75	5.02	39.284	pCi/L	189.7601	NO
11	ARS1-B11-01169-14	120	2.272	1.551	31.56	5.03	204.587	pCi/L	190.523	YES, analyze by LSC-A-001.
12	ARS1-B11-01169-15	120	2.751	1.621	31.96	5.02	317.260	pCi/L	192.5788	YES, analyze by LSC-A-001.
13	ARS1-B11-01169-16	120	3.108	1.621	31.6	5.00	423.937	pCi/L	195.5518	YES, analyze by LSC-A-001.
14	ARS1-B11-01169-17	120	1.520	1.621	31.97	5.01	-28.405	pCi/L	192.9028	NO
15	ARS1-B11-01169-18	120	1.866	1.621	31.78	5.00	69.453	pCi/L	194.4442	NO
16	ARS1-B11-01169-19	120	1.676	1.621	31.63	4.99	15.697	pCi/L	195.7579	NO
17	ARS1-B11-01169-20	120	1.959	1.621	32.12	5.03	94.237	pCi/L	191.2386	NO
18	ARS1-B11-01169-21	120	2.143	1.621	31.64	5.05	147.160	pCi/L	193.3709	NO
19	ARS1-B11-01169-22	120	1.921	1.621	31.59	5.03	85.045	pCi/L	194.4471	NO
20	ARS1-B11-01169-23	120	1.808	1.621	31.45	5.02	53.354	pCi/L	195.7017	NO
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!

per VM,
please
rescreen

Procedures:

ARS-060

ARS-040

Section 14.1 Tritium Screen in Clean Water without Distillation

ARS File ID Numbers: ARS1-11-00547; 548; 549; 601; 602.

ARS Batch ID: ARS1-B11-01169

	Sample ID:	COUNT TIME	CPMA	Background CPMA	Eff Nucl In A	Aliquot (grams)	ACTIVITY	units	MDA	Sample Must be analyzed as LSC-A-001
1	B11-01169-14	120	1.591	1.559	31.72	5.03	9.034	pCi/L	190.0338	NO
2	B11-01169-15	120	2.660	1.559	31.95	5.02	309.214	pCi/L	189.0416	YES, analyze by LSC-A-001.
3	B11-01169-16	120	2.919	1.559	32.06	5.00	382.166	pCi/L	189.1466	YES, analyze by LSC-A-001.
4							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
5							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
6							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
7							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
8							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
9							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
10							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
11							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
12							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
13							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
14							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
15							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
16							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
17							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
18							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
19							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
20							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
21							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
22							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
23							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!

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Tritium-Screening by Low Level Liquid Scintillation Counting Laboratory Records

Analysis Batch Report

	Analysis Batch ID ARS1-B11-01169										
	Method				ARS-054	Analysis			LSC-A-021	Matrix	AQ
	Description				Low Level Tritium Screening						
	ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B11-01169-01	LCS										
ARS1-B11-01169-02	LCSD										
ARS1-B11-01169-03	MBL										
ARS1-B11-01169-04	TRG				ARS1-11-00547	001	1	Buckman1-11-5682	STD	04/12/11	
ARS1-B11-01169-05	TRG				ARS1-11-00547	002	1	Buckman06-11-5683	STD	04/12/11	
ARS1-B11-01169-06	TRG				ARS1-11-00547	003	1	Buckman08-11-5684	STD	04/12/11	
ARS1-B11-01169-07	TRG				ARS1-11-00548	001	1	CALA-11-5224	STD	04/12/11	
ARS1-B11-01169-08	TRG				ARS1-11-00548	002	1	CALA-11-5227	STD	04/12/11	
ARS1-B11-01169-09	TRG				ARS1-11-00549	001	1	CAPU-11-5282	STD	04/12/11	
ARS1-B11-01169-10	TRG				ARS1-11-00549	002	1	CAPU-11-5283	STD	04/12/11	
ARS1-B11-01169-11	TRG				ARS1-11-00549	003	1	CAPU-11-5290	STD	04/12/11	
ARS1-B11-01169-12	TRG				ARS1-11-00549	004	1	CAPU-11-5296	STD	04/12/11	
ARS1-B11-01169-13	TRG				ARS1-11-00549	005	1	CAPU-11-5301	STD	04/12/11	
ARS1-B11-01169-14	TRG				ARS1-11-00549	006	1	CAPU-11-5304	STD	04/12/11	
ARS1-B11-01169-15	TRG				ARS1-11-00549	007	1	CAPU-11-5308	STD	04/12/11	
ARS1-B11-01169-16	TRG				ARS1-11-00549	008	1	CAPU-11-5311	STD	04/12/11	
ARS1-B11-01169-17	TRG				ARS1-11-00549	009	1	CAPU-11-5292	STD	04/12/11	
ARS1-B11-01169-18	TRG				ARS1-11-00601	001	1	CAPU-11-5264	STD	04/18/11	
ARS1-B11-01169-19	TRG				ARS1-11-00601	002	1	CAPU-11-5269	STD	04/18/11	
ARS1-B11-01169-20	TRG				ARS1-11-00601	003	1	CAPU-11-5298	STD	04/18/11	
ARS1-B11-01169-21	TRG				ARS1-11-00602	001	1	CALA-11-5106	STD	04/18/11	
ARS1-B11-01169-22	TRG				ARS1-11-00602	002	1	CALA-11-5110	STD	04/18/11	
ARS1-B11-01169-23	TRG				ARS1-11-00602	003	1	CALA-11-5173	STD	04/18/11	



82987

11-00547-001-1

XRAD



82988

11-00547-002-1

XRAD



82989

11-00547-003-1

XRAD



82990

11-00548-001-1

XRAD



82991

11-00548-002-1

XRAD



82992

11-00549-001-1

XRAD



82993

11-00549-002-1

XRAD



82994

11-00549-003-1

XRAD



82995

11-00549-004-1

XRAD



82996

11-00549-005-1

XRAD



82997

11-00549-006-1

XRAD



82998

11-00549-007-1

XRAD



82999

11-00549-008-1

XRAD



83000

11-00549-009-1

XRAD



83001

11-00601-001-1

XRAD



83002

11-00601-002-1

XRAD



83003

11-00601-003-1

XRAD



83004

11-00602-001-1

XRAD



83005

11-00602-002-1

XRAD



83006

11-00602-003-1

XRAD

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
8125	ARS1-B11-01169	ARS1-B11-01169-01		1 g						JRABER	03/25/2011 10:12:57
8126	ARS1-B11-01169	ARS1-B11-01169-02		1 g						JRABER	03/25/2011 10:12:57
8127	ARS1-B11-01169	ARS1-B11-01169-03		1 g						JRABER	03/25/2011 10:12:58
8128	ARS1-B11-01169	ARS1-B11-01169-04	Buckman1-11-5682	5.02 g		82987				JRABER	03/25/2011 10:12:58
8129	ARS1-B11-01169	ARS1-B11-01169-05	Buckman06-11-5683	4.99 g		82988				JRABER	03/25/2011 10:12:58
8130	ARS1-B11-01169	ARS1-B11-01169-06	Buckman08-11-5684	5.02 g		82989				JRABER	03/25/2011 10:12:58
8131	ARS1-B11-01169	ARS1-B11-01169-07	CALA-11-5224	5 g		82990				JRABER	03/25/2011 10:12:58
8132	ARS1-B11-01169	ARS1-B11-01169-08	CALA-11-5227	5.01 g		82991				JRABER	03/25/2011 10:12:58
8133	ARS1-B11-01169	ARS1-B11-01169-09	CAPU-11-5282	5.03 g		82992				JRABER	03/25/2011 10:12:58
8134	ARS1-B11-01169	ARS1-B11-01169-10	CAPU-11-5283	5.02 g		82993				JRABER	03/25/2011 10:12:58
8135	ARS1-B11-01169	ARS1-B11-01169-11	CAPU-11-5290	5 g		82994				JRABER	03/25/2011 10:12:59
8136	ARS1-B11-01169	ARS1-B11-01169-12	CAPU-11-5296	4.99 g		82995				JRABER	03/25/2011 10:12:59
8137	ARS1-B11-01169	ARS1-B11-01169-13	CAPU-11-5301	5.02 g		82996				JRABER	03/25/2011 10:12:59
8138	ARS1-B11-01169	ARS1-B11-01169-14	CAPU-11-5304	5.03 g		82997				JRABER	03/25/2011 10:12:59
8139	ARS1-B11-01169	ARS1-B11-01169-15	CAPU-11-5308	5.02 g		82998				JRABER	03/25/2011 10:12:59
8140	ARS1-B11-01169	ARS1-B11-01169-16	CAPU-11-5311	5 g		82999				JRABER	03/25/2011 10:12:59
8141	ARS1-B11-01169	ARS1-B11-01169-17	CAPU-11-5292	5.01 g		83000				JRABER	03/25/2011 10:13:00
8142	ARS1-B11-01169	ARS1-B11-01169-18	CAPU-11-5264	5 g		83001				JRABER	03/25/2011 10:13:00
8143	ARS1-B11-01169	ARS1-B11-01169-19	CAPU-11-5269	4.99 g		83002				JRABER	03/25/2011 10:13:00
8144	ARS1-B11-01169	ARS1-B11-01169-20	CAPU-11-5298	5.03 g		83003				JRABER	03/25/2011 10:13:00
8145	ARS1-B11-01169	ARS1-B11-01169-21	CALA-11-5106	5.05 g		83004				JRABER	03/25/2011 10:13:00
8146	ARS1-B11-01169	ARS1-B11-01169-22	CALA-11-5110	5.03 g		83005				JRABER	03/25/2011 10:13:00
8147	ARS1-B11-01169	ARS1-B11-01169-23	CALA-11-5173	5.02 g		83006				JRABER	03/25/2011 10:13:00

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\20110331_1144
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110331_1144\20110331_1144.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110331_1144\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110331_1144\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: ARS LL H3
Count Time (min): 120.00
Count Mode: Low Level
Assay Count Cycles: 1 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

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

Regions	LL	UL	2Sigma % Terminator
A	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-

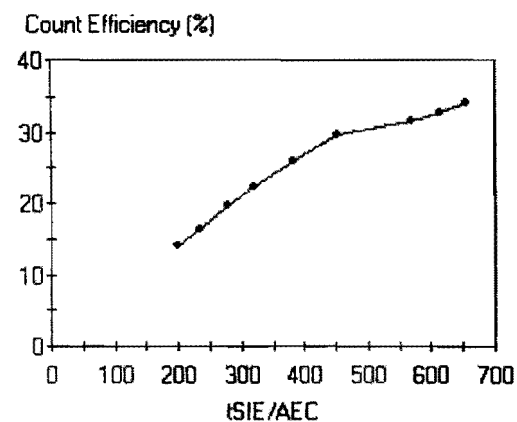
Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
---------	-----------	-------	----------------	----------------

A
B
C

Cycle 1 Results
Quench Curve Block Data

ARS LL H3 in A



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

tSIE/AEC	Count Efficiency (%)
655.11	34.08
613.27	32.77
569.42	31.54
454.14	29.55
383.12	26.06
318.52	22.25
280.21	19.79
235.97	16.48
199.12	13.98

3/31/2011 8:25:13 PM
Protocol# 2 - Low Level H3.lsa

QuantaSmart (TM) - 2.03 - Serial# 423814

Page # 3
User: H3 Low Level

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.559	5.00	550.14	31.21	3/31/2011	11:53:12 AM	
2	2	B11-01169-14	120.00	1.591	5.01	575.81	31.72	3/31/2011	2:03:15 PM	
2	3	B11-01169-15	120.00	2.660	8.33	583.86	31.95	3/31/2011	4:13:14 PM	
2	4	B11-01169-16	120.00	2.919	9.11	587.91	32.06	3/31/2011	6:23:11 PM	

P#	S#	SMPL_ID	Count	Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00		1.621	5.08	582.21	31.90	3/28/2011	12:42:03 PM	
2	2	B11-01169-04	120.00		1.653	5.17	584.11	31.95	3/28/2011	2:52:00 PM	
2	3	B11-01169-05	120.00		1.610	5.03	585.73	32.00	3/28/2011	5:02:00 PM	
2	4	B11-01169-06	120.00		1.734	5.44	580.49	31.85	3/28/2011	7:12:01 PM	
2	5	B11-01169-07	120.00		1.751	5.50	580.93	31.86	3/28/2011	9:22:00 PM	
2	6	B11-01169-08	120.00		1.646	5.16	583.32	31.93	3/28/2011	11:32:01 PM	
Missing vial 7.											
Missing vial 8.											
Missing vial 9.											
Missing vial 10.											
Missing vial 11.											
Missing vial 12.											
2	13	B11-01169-15	120.00		2.751	8.61	584.35	31.96	3/29/2011	1:42:19 AM	
2	14	B11-01169-16	120.00		3.108	9.84	571.39	31.60	3/29/2011	3:52:19 AM	
2	15	B11-01169-17	120.00		1.520	4.75	584.76	31.97	3/29/2011	6:02:21 AM	
2	16	B11-01169-18	120.00		1.866	5.87	578.00	31.78	3/29/2011	8:12:22 AM	
2	17	B11-01169-19	120.00		1.676	5.30	572.50	31.63	3/29/2011	10:22:23 AM	
2	18	B11-01169-20	120.00		1.959	6.10	590.16	32.12	3/29/2011	12:32:24 PM	
2	19	B11-01169-21	120.00		2.143	6.77	572.98	31.64	3/29/2011	2:42:25 PM	
2	20	B11-01169-22	120.00		1.921	6.08	571.16	31.59	3/29/2011	4:52:25 PM	
2	21	B11-01169-23	120.00		1.808	5.75	564.03	31.45	3/29/2011	7:02:25 PM	

3/30/2011 11:30:10 PM
Protocol# 2 - Low Level H3.lsa

QuantaSmart (TM) - 2.03 - Serial# 423814

Page # 3
User: H3 Low Level

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.551	4.97	551.24	31.23	3/30/2011	8:28:07 AM	
2	2	B11-01169-09	120.00	1.409	4.48	565.67	31.48	3/30/2011	10:38:10 AM	
2	3	B11-01169-10	120.00	1.717	5.38	582.20	31.90	3/30/2011	12:48:11 PM	
2	4	B11-01169-11	120.00	1.623	5.14	571.10	31.59	3/30/2011	2:58:10 PM	
2	5	B11-01169-12	120.00	1.623	5.08	584.03	31.95	3/30/2011	5:08:09 PM	
2	6	B11-01169-13	120.00	1.690	5.32	577.03	31.75	3/30/2011	7:18:09 PM	
2	7	B11-01169-14	120.00	2.272	7.20	570.12	31.56	3/30/2011	9:28:10 PM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
3-23-11	1505	B11-01049-07	B11-01049	1920	JDR
↓	↓	B11-01049-08	↓	↓	JDR
↓	↓	B11-01049-09	↓	↓	JDR
↓	↓	B11-01049-10	↓	↓	JDR
↓	↓	B11-01049-11	↓	↓	JDR
↓	↓	B11-01049-12	↓	↓	JDR
↓	↓	B11-01049-13	↓	↓	JDR
↓	↓	B11-01049-14	↓	↓	JDR
↓	↓	B11-01049-15	↓	↓	JDR
↓	↓	B11-01049-16	↓	↓	JDR
↓	↓	B11-01049-17	↓	↓	JDR
3-28-11	0855	SNC 51	QA	QA	JDR
↓	↓	Background	B11-01169	1233	JDR
↓	↓	B11-01169-04	↓	↓	JDR
↓	↓	B11-01169-05	↓	↓	JDR
↓	↓	B11-01169-06	↓	↓	JDR
↓	↓	B11-01169-07	↓	↓	JDR
↓	↓	B11-01169-08	↓	↓	JDR
↓	↓	SKIPPED 09	B11-01169-09	↓	JDR
↓	↓	B11-01169-10	↓	↓	JDR

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
3-28-11	0855	B11-01169-11	1311-01169	1233	JDR
↓	↓	B11-01169-12	↓	JDR	JDR
↓	↓	B11-01169-13	↓	↓	3-JDR-2011
↓	↓	B11-01169-14	↓	↓	JDR
↓	↓	B11-01169-15	↓	↓	JDR
↓	↓	B11-01169-16	↓	↓	JDR
↓	↓	B11-01169-17	↓	↓	JDR
↓	↓	B11-01169-18	↓	↓	JDR
↓	↓	B11-01169-19	↓	↓	JDR
↓	↓	B11-01169-20	↓	↓	JDR
↓	↓	B11-01169-21	↓	↓	JDR
↓	↓	B11-01169-22	↓	↓	JDR
↓	↓	B11-01169-23	↓	↓	JDR
3-30-2011	0816	Background B11-01169-24	B11-01169	0819	JDR
↓	↓	B11-01169-09	↓	↓	JDR
↓	↓	B11-01169-10	↓	↓	JDR
↓	↓	B11-01169-11	↓	↓	JDR
↓	↓	B11-01169-12	↓	↓	JDR
↓	↓	B11-01169-13	↓	↓	JDR
↓	↓	B11-01169-14	↓	↓	JDR

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
3-31-11	1141	Background	B11-01169	1144	JDR
↓	↓	B11-01169-14	↓	↓	JDR
↓	↓	B11-01169-15	↓	↓	JDR
↓	↓	B11-01169-16	↓	↓	JDR
4-1-11	0827	SNC 51	QA	QA	JDR
↓	↓	Background	B11-00550	1013	JDR
↓	↓	B11-00550-01	↓	↓	JDR
↓	↓	B11-00550-02	↓	↓	JDR
↓	↓	B11-00550-03	↓	↓	JDR
↓	↓	B11-00550-04	↓	↓	JDR
↓	↓	B11-00550-05	↓	↓	JDR
↓	↓	B11-00550-06	↓	↓	JDR
↓	↓	B11-00550-07	↓	↓	JDR
↓	↓	B11-00550-08	↓	↓	JDR
↓	↓	B11-00550-09	↓	↓	JDR
↓	↓	B11-00550-10	↓	↓	JDR
↓	↓	B11-00550-11	↓	↓	JDR
↓	↓	B11-00550-12	↓	↓	JDR
↓	↓	B11-00550-13	↓	↓	JDR
↓	↓	B11-00550-14	↓	↓	JDR



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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 Background

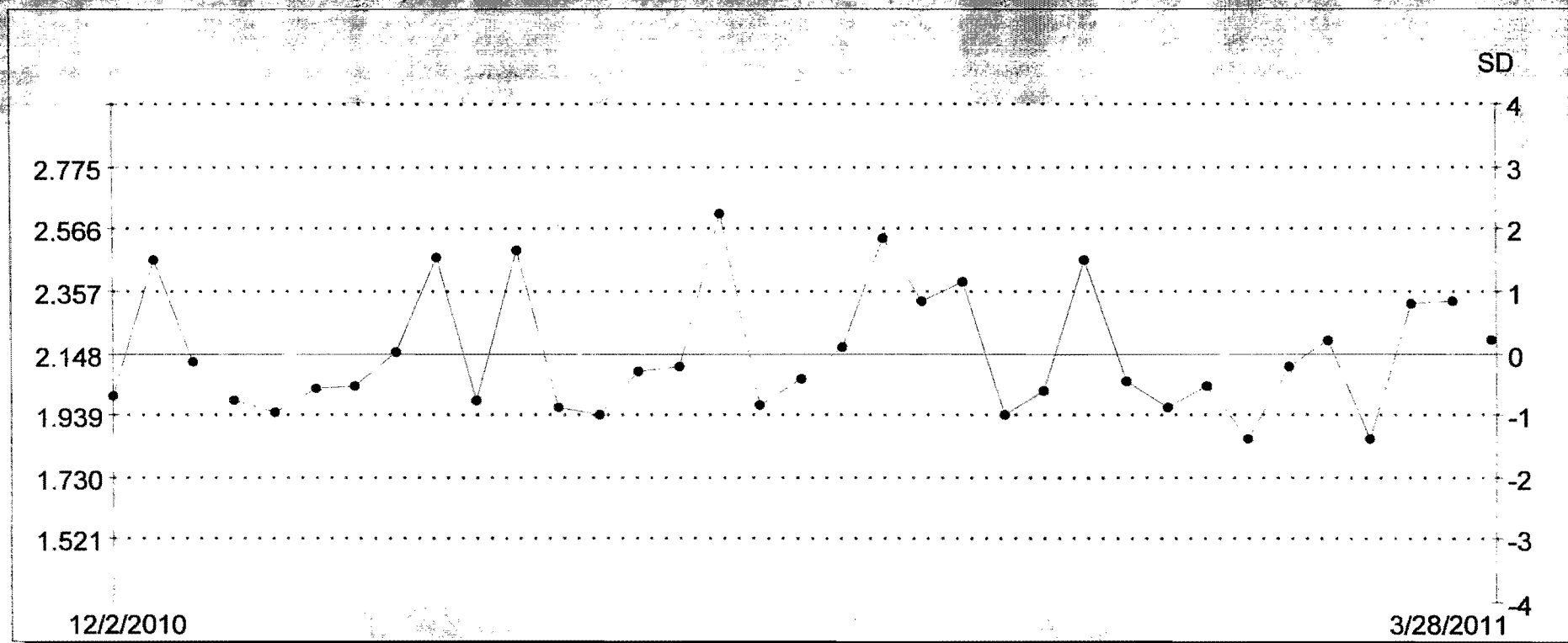
Total # pts : 5219
Valid # pts : 35
Mean : 2.15
SD : 0.21

Date	Value	Valid Pt
Dec 02, 2010	2.00	X
Dec 08, 2010	2.46	X
Dec 13, 2010	2.12	X
Dec 15, 2010	1.99	X
Dec 22, 2010	1.95	X
Dec 29, 2010	2.03	X
Dec 30, 2010	2.04	X
Jan 03, 2011	2.15	X
Jan 05, 2011	2.47	X
Jan 10, 2011	1.99	X
Jan 11, 2011	2.49	X
Jan 14, 2011	1.96	X
Jan 19, 2011	1.94	X
Jan 21, 2011	2.09	X
Jan 27, 2011	2.10	X
Jan 29, 2011	2.62	X
Feb 01, 2011	1.97	X
Feb 07, 2011	2.06	X
Feb 09, 2011	2.17	X
Feb 10, 2011	2.54	X
Feb 13, 2011	2.33	X
Feb 18, 2011	2.39	X
Feb 22, 2011	1.94	X
Feb 24, 2011	2.02	X
Feb 25, 2011	2.46	X
Feb 28, 2011	2.05	X
Mar 02, 2011	1.96	X
Mar 06, 2011	2.04	X
Mar 13, 2011	1.86	X
Mar 16, 2011	2.11	X
Mar 17, 2011	2.19	X
Mar 17, 2011	1.86	X
Mar 18, 2011	2.32	X
Mar 25, 2011	2.32	X
Mar 28, 2011	2.20	X

3H Background

Total # pts : 5219
Valid # pts : 35
Mean : 2.15
SD : 0.21

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3H Efficiency

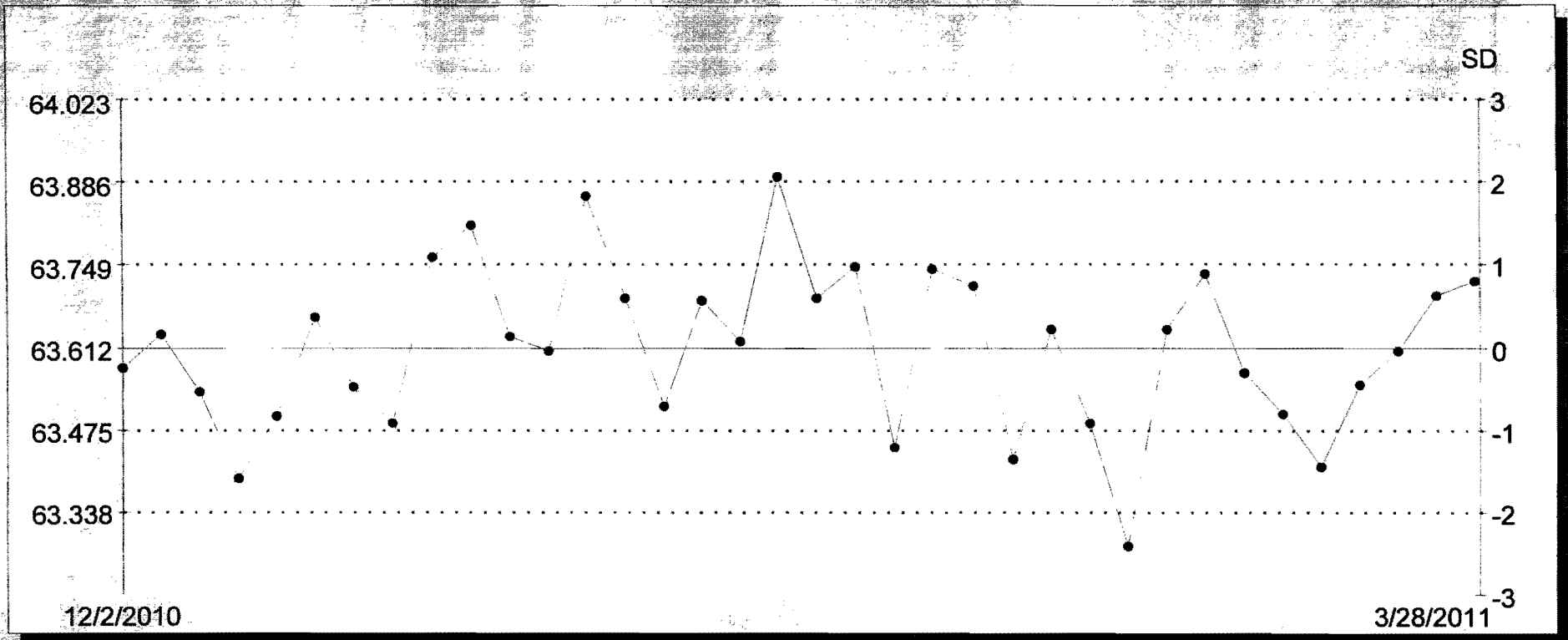
Total # pts : 5291
Valid # pts : 36
Mean : 63.61
SD : 0.14

Date	Value	Valid Pt
Dec 02, 2010	63.58	X
Dec 08, 2010	63.64	X
Dec 13, 2010	63.54	X
Dec 15, 2010	63.39	X
Dec 22, 2010	63.50	X
Dec 29, 2010	63.66	X
Dec 30, 2010	63.55	X
Jan 03, 2011	63.49	X
Jan 05, 2011	63.76	X
Jan 10, 2011	63.82	X
Jan 11, 2011	63.63	X
Jan 14, 2011	63.61	X
Jan 19, 2011	63.87	X
Jan 21, 2011	63.69	X
Jan 27, 2011	63.52	X
Jan 29, 2011	63.69	X
Feb 01, 2011	63.62	X
Feb 07, 2011	63.90	X
Feb 09, 2011	63.69	X
Feb 10, 2011	63.75	X
Feb 13, 2011	63.45	X
Feb 18, 2011	63.75	X
Feb 22, 2011	63.72	X
Feb 24, 2011	63.43	X
Feb 25, 2011	63.65	X
Feb 28, 2011	63.49	X
Mar 02, 2011	63.28	X
Mar 06, 2011	63.64	X
Mar 13, 2011	63.74	X
Mar 16, 2011	63.57	X
Mar 17, 2011	63.50	X
Mar 17, 2011	63.41	X
Mar 17, 2011	63.55	X
Mar 18, 2011	63.61	X
Mar 25, 2011	63.70	X
Mar 28, 2011	63.73	X

3H Efficiency

Total # pts : 5291
Valid # pts : 36
Mean : 63.61
SD : 0.14

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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
H-3

ENTER -->

 Half Life, Years
1.232E+01

OR -->

 Half Life, Days
4.4998E+03
4.4998E+03
Radionuclide H-3Dilution 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

10% Max

PASS

Standard Deviation percent of known concentration

5% Max

PASS

Target Activity

% Diff

Average

Two Sigma Uncertainty

6.16	2.77
0.06	0.02
0.45%	0.45%
6.24	2.81
-1.27%	-1.27%

Verification Expiration Date: May 13, 2011Prepared & Counted By Jeremy RaberDate: 5/13/2010 0:00

Verified & Approved By

Dyane MulliganDate: 5/14/2010

QC Approval

SamuelDate: 5/14/2010**S-0206****H-3**Verified 5/14/10**SL**Expires **5/14/11**Manufacturer **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 <i>Secondary Stds</i>	Parent Standard Data	
Planning		Parent Solution Reference #	NIST 4361C	
Planning Comments	Create a Low Level H3 LCS solution.	Parent Solution #	S-0152	
Target dpm/g (on dil. date)	6.66	Parent Principal Radionuclide	H-3	Half Life (Days) 4499.8000000
Target Final volume mL	500	Parent Reference Date	09/03/1998 11:00	
Appx mass g of Parent Sol'n	49.8188436	Parent Certified Act	120.54	Certi Act/Vol Units dpm g
Appx vol ml of Parent Sol'n	49.91868096	Parent Cert Act Uncert 1 Sigma	0.0076	
Expected Addition for Analysis g	5	Parent Sp. Gravity G/ML	0.998	
Standards Preparation / Dilution		Parent Supplier	NIST	
Secondary Solution #	S-0206	Parent Date Recvd	12/04/06	
Dilution Date (New Ref Date)	02/25/2009 08:30	Parent Received By	LU	
Ampoule, Empty (g)		Parent Cert Exp Date		
Ampoule /Solution Gross (g)		Parent Matrix	H2O	
Net Wt Removed (g)		Certified dpm/g At Ref Date	120.54	
Transfer Container, empty (g)	103.64	Certified dpm/g on 02/25/2009 08:30	66.84217777	
Container Plus Solution (g)	153.45	Parent Comments	Liquid in a 500-ml borosilicate-glass medis bottle with teflon-lined screw cap. Approximately 500 grams	
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)		Parent Tech	M. Thibodeaux	
Test Mass of 5 ml of Diluent (g)		Is_Primary	FALSE	
Diluent Density Test - (g/mL)		Is_LCS	TRUE	
Dilution Empty Container Mass (g)	198.75	Is_Tracer	FALSE	
Dilution Full Cont g (if measured)	697.31	Is_Calib	FALSE	
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			



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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

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Report Compilation Checklist

ARS SDG: 11-00547 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 Heese
Report Generator Signature

6-24-11
Date

Ujm
Management Review Signature

6-24-11
Date



LSC Technical Review Checklist

ARS SDG	ARS1-11-00547		
Sample Matrix:	AQ	Aliquot (Circle One):	Dry As Received Filtered Other:
Required QC Samples (Mark all that apply):	Blank	LOS	LOSD Sample Dup MS MSD
ARS A. Batch ID(s):	Batch A: ARS1-B11-01170	Batch B: N/A	Batch C: N/A
Test Method(s):	LSC-A-022	N/A	N/A

A. RADIOCHEMICAL PREPARATION REVIEW

	Chemist Review			Verifier Review		
1) 100% of Manual Transcriptions Verified?	Yes	No	N/A	Yes	No	N/A
2) 100% of Manual Calculations Verified?	Yes	No	N/A	Yes	No	N/A
3) Blank Composition/Configuration Matches Calibration?	Yes	No	N/A	Yes	No	N/A
4) Deviations from procedure are documented and verified?	Yes	No	N/A	Yes	No	N/A
5) Appropriate Cocktail Selected?	Yes	No	N/A	Yes	No	N/A
6) Sample Prep Anomaly?	☒ No ☐ Yes (See Tech Notes)		NCR # (If initiated):			
Chemist Signature: Jimmy D. Rahn Date: 6-21-2011 Verifier Review Signature: James Brown Date: 6-21-11						

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: VHM Date: 6-24-11						
	Analyst Review			Technical Review		
4) Background Checks Complete and Acceptable?	Yes	No	N/A	Yes	No	N/A
5) 100% of Manually Entered Parameters Verified Accurate?	Yes	No	N/A	Yes	No	N/A
6) Appropriate QC samples initiated at required frequency?	Yes	No	N/A	Yes	No	N/A
6) Test/Sample Specific Parameters (See ARS-059 for details)						
a) Analysis Parameters Checked and Correct and Peak Shapes are Acceptable?	Yes	No	N/A	Yes	No	N/A
b) Spectra show no Evidence of Interferences?	Yes	No	N/A	Yes	No	N/A
c) Sample Quench for All Samples within Range of Quench Curve?	Yes	No	N/A	Yes	No	N/A
7) Analysis Anomaly?	☒ No ☐ Yes (See Comments)		NCR # (If initiated):			
Analyst Signature: Jimmy D. Rahn Date: 6-24-2011 Technical Reviewer Signature: N/A Date:						



Batch A: ARS1-B11-01170

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): _____		
Project Manager Signature Date	QA Officer Signature Date	

GENERAL COMMENTS



LSC Technical Review Checklist

ARS SDG	ARS1-11-00547		
Sample Matrix:	AQ	Aliquot (Circle One):	Dry As Received Filtered Other:
Required QC Samples (Mark all that apply):	Blank	LCS	LCSD Sample Dup MS MSD
ARS A. Batch ID(s):	Batch A: ARS1-B11-01169	Batch B: N/A	Batch C: N/A
Test Method(s):	LSC-A-021	N/A	N/A

A. RADIOCHEMICAL PREPARATION REVIEW

	Chemist Review			Verifier Review		
1) 100% of Manual Transcriptions Verified?	Yes	No	N/A	Yes	No	N/A
2) 100% of Manual Calculations Verified?	Yes	No	N/A	Yes	No	N/A
3) Blank Composition/Configuration Matches Calibration?	Yes	No	N/A	Yes	No	N/A
4) Deviations from procedure are documented and verified?	Yes	No	N/A	Yes	No	N/A
5) Appropriate Cocktail Selected?	Yes	No	N/A	Yes	No	N/A
6) Sample Prep Anomaly?	☒ No ☐ Yes (See Tech Notes)		NCR # (If initiated):			
Chemist Signature: <u>Jimmy D. Rala</u> Date: <u>3-28-11</u> Verifier Review Signature: <u>Samad Brown</u> Date: <u>3-28-11</u>						

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: <u>Vjm</u> Date: <u>6-24-11</u>						
	Analyst Review			Technical Review		
4) Background Checks Complete and Acceptable?	Yes	No	N/A	Yes	No	N/A
5) 100% of Manually Entered Parameters Verified Accurate?	Yes	No	N/A	Yes	No	N/A
6) Appropriate QC samples initiated at required frequency?	Yes	No	N/A	Yes	No	N/A
6) Test/Sample Specific Parameters (See ARS-059 for details)						
a) Analysis Parameters Checked and Correct and Peak Shapes are Acceptable?	Yes	No	N/A	Yes	No	N/A
b) Spectra show no Evidence of Interferences?	Yes	No	N/A	Yes	No	N/A
c) Sample Quench for All Samples within Range of Quench Curve?	Yes	No	N/A	Yes	No	N/A
7) Analysis Anomaly?	☒ No ☐ Yes (See Comments)		NCR # (If initiated):			
Analyst Signature: <u>Jimmy D. Rala</u> Date: <u>3-31-11</u> Technical Reviewer Signature: <u>N/A</u> Date: <u></u>						

Batch A: ARS1-B11-01169

LSC Technical Review Checklist

C. BATCH QC VALIDATION

	Proj. Mgr. Review	QA Officer Review
1) Activity + 3xCSU a Negative Number?	Yes No <u>N/A</u>	Yes No <u>N/A</u>
2) RDL Criteria are Met?	Yes No <u>N/A</u>	Yes No <u>N/A</u>
3) Method Blank Criterion Met?	Yes No <u>N/A</u>	Yes No <u>N/A</u>
4) LCS/LCD Criteria Met?	Yes No <u>N/A</u>	Yes No <u>N/A</u>
5) Duplicate (Sample Duplicate, LCSD, MSD) Criteria Met?	Yes No <u>N/A</u>	Yes No <u>N/A</u>
6) MS/MSD Criteria Met?	Yes No <u>N/A</u>	Yes No <u>N/A</u>
7) Batch QC Anomaly? ☒ No ☐ Yes (See Tech Notes) NCR # (If initiated): _____		
<u>Susan Heen</u> Project Manager Signature	<u>6-24-11</u> Date	<u>WJM</u> QA Officer Signature
<u>6-24-11</u> Date		

GENERAL COMMENTS

SDG Report - Samples and Containers

SDG Specific Data						
SDG	ARS1-11-00547		TAT Days	30	Project Type	Environmental
Sample Count	Rpt Level	4	Date Received	3/17/2011	COC Number	11-1637
Client	Los Alamos National Laboratory		Client Deadline	4/15/2011	PO Number	63641-001-10
Client Code	114		Internal Deadline	4/14/2011	Job Number	WEPR1158W100
Profile Number	PN-00094		Lab Deadline	4/12/2011	Job Location	
Comments						

Samples and Containers (→) Checked In Thus Far															
FR	ClientID	Matrix	SampleStartDate	SampleEndDate	Disp	Hold	Arch	Storage	X	Units	Y	Units	Z	Units	Comments
001	Buckman1-11-5682	AQ	03/14/11 12:00 PM	03/14/11 12:00 PM	H	90	5	LL3H							
→	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	82442	1	1000.00				20	11		N	N/A				
002	Buckman06-11-5683	AQ	03/14/11 12:00 PM	03/14/11 12:00 PM	H	90	5	LL3H							
→	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	82443	1	1000.00				20	12		N	N/A				
003	Buckman08-11-5684	AQ	03/14/11 12:00 PM	03/14/11 12:00 PM	H	90	5	LL3H							
→	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	82444	1	1000.00				20	12		N	N/A				

SDG Report - Analysis Assignments

Temp SDG	ARS1-11-00547	Sample Count	3
Client	Los Alamos National Laboratory	Analysis Count	2-6

Samples Count Totals per Analysis		
Analysis Code	Analysis Description	Samples Count
LSC-A-021	Low Level Tritium Screen in (Aqueous)	3
LSC-A-022	Low Level Tritium by Enrichment Process in (Aqueous [AQ])	3

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

Analysis Code	Group	Isotope	Activity Units	Allquot Units	ProcedureNo	RDL	LCS_LL	LCS_UL	MS_LL	MS_UL	RadY_LL	RadY_UL	GravY_LL	GravY_UL	RER	RPD	DilutionReq	RoughPrepReq	BlankCorrectionMDA	BlankCorrectionAll	CountTimeReq	AllquotRequired
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		

ARS FILE TRACKING SHEET

SDG: ARS1-11-00547

Task	Date / Time	Initials
Date & Time Samples Received	03-17-11/10:09	CWB
ICOC Initiated / Storage Location: <u>LL3H</u>	03-17-11/11:39	CWB
Technical Checks Performed	See Batch	—
Report Written / EDD Generated: <u>6-24-11/1357</u> <u>SDH</u>	<u>6-24-11/1355</u>	<u>SDH</u>
	Date/Time	Initials
Quality Assurance Checks Performed on Report	6-24-11/1420	SDH
Management Check Performed on Report	6-24-11/1420	SDH
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:

SDG: 4251-1100547

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