

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

Chain of Custody/Analysis Request

COC/Lab Request #:

2013-791

Page 1 of 1

Client Contact:

Lab Agreement # : 63641-001-10

Site Name: Los Alamos National Laboratory

Project Number :

Analysis Turnaround Time:

24 Hour - ☐ Other - ☐

7 Day - ☐

14 Day - ☐

21 Day - ☐

28 Day - ☒

Rad Screening Info:

Yes, Below Background

Special Instructions:

Field Sample ID

Sample Date

Sample
Time

Sample
Matrix

WSP-LL-H-3

CAPA-13-29667

Apr 25 2013

12:41

W

1

CAPA-13-29651

Apr 25 2013

12:41

W

1

CAPA-13-29653

Apr 25 2013

15:40

W

1

Special Instructions:

Relinquished by:

Relinquished by:

Relinquished by:

Date/Time:

Date/Time:

Date/Time:

Received by:

Received by:

Received by:

5/1/13 3:00

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 4164 EVENT NAME: Pajarito (General Surveillance Monitoring Group) MY2013 Q3 Sampling Event_Pajarito Canyon

SAMPLE ID: CAPA-13-29651 WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
DATE COLLECTED (MM/DD/YYYY):		04/25/2013	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):		1241	MEDIA:	UA	↓
PRS ID:		OK	SAMPLE TECH CODE:	UA	GSP
LOCATION ID: R-17 S1		↓	FIELD PREP:	UF	OK
LOCATION TYPE:		↓	FIELD QC TYPE:	FD	↓
PORT: P1A			SAMPLE USAGE:	QC	↓

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2	HCL	Y	NA
↓	WSP-8270C-SVOA	1 LITER AMBER GLASS	2	ICE 2	↓	↓
↓	WSP-8321A-NMED HEXP	1 LITER AMBER GLASS	2	ICE 2	↓	↓
↓	WSP-GrossA/B	1 LITER POLY	1	NONE	↓	↓
↓	WSP-HEXMOD	1 LITER AMBER GLASS	2	ICE	↓	↓
↓	WSP-LL-H-3	1 LITER POLY	1	NONE	↓	↓
↓	WSP-RAD	1 GAL POLY	1	HNO3	↓	↓
↓	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4	↓	↓

SAMPLE COMMENTS: NA

LOCATION COMMENTS: NA

FIELD PARAMETERS:

Dissolved Oxygen NA mg/L Oxidation-Reduction Potential NA mV pH NA 8U

Specific Conductance NA uS/cm Temperature NA deg C Turbidity NA NTU

COLLECTED BY (PRINT) M. Shendo

RELINQUISHED BY (Printed Name) <u>M. Shendo</u> (Signature) <u>[Signature]</u>	Date/Time <u>4/25/2013</u> <u>1615</u>	RECEIVED BY (Printed Name) <u>S. Shendo</u> (Signature) <u>[Signature]</u>	Date/Time <u>4/25/13</u> <u>1615</u>
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date 04/03/2013

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 4164

EVENT NAME:

Pajarito (General Surveillance
Monitoring Group) MY2013 Q3
Sampling Event_Pajarito Canyon

SAMPLE ID: CAPA-13-29653

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
DATE COLLECTED (MM/DD/YYYY):		04/25/2013	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):		1540	MEDIA:	UA	N
PRS ID:		OK	SAMPLE TECH CODE:	UA	DC
LOCATION ID: R-17 S1		↓	FIELD PREP:	UF	OK
LOCATION TYPE: SUP		↓	FIELD QC TYPE:	PEB	↓
PORT: P1A		↓	SAMPLE USAGE:	QC	↓

PRIORITY	ORDER	CONTAINER	# PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2 HCL	Y	NA
↓	WSP-8270C-SVOA	1 LITER AMBER GLASS	2 ICE <i>vs 42x100s</i>	↓	↓
↓	WSP-8321A-NMED HEXP	1 LITER AMBER GLASS	2 ICE	↓	↓
↓	WSP-CL04	250 ML POLY	1 ICE	↓	↓
↓	WSP-GENINORG	1 LITER POLY	1 ICE	↓	↓
↓	WSP-GrossA/B	1 LITER POLY	1 NONE	↓	↓
↓	WSP-H-3	250 ML AMBER GLASS	1 ICE	↓	↓
↓	WSP-HEXMOD	1 LITER AMBER GLASS	2 ICE <i>vs 42x100s</i>	↓	↓
↓	WSP-LL-H-3	1 LITER POLY	1 NONE	↓	↓
↓	WSP-Met+B+SN+SR+U	1 LITER POLY	1 HNO3	↓	↓

Analyses continued on next page

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 4164 EVENT NAME: Pajarito (General Surveillance Monitoring Group) MY2013 Q3 Sampling Event_Pajarito Canyon

SAMPLE ID: CAPA-13-29667 WORK ORDER: NA

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
DATE COLLECTED (MM/DD/YYYY):		04/25/2013	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):		1241	MEDIA:	UA	↓
PRS ID:		OK	SAMPLE TECH CODE:	UA	GSP
LOCATION ID: R-17 S1		↓	FIELD PREP:	UF	OK
LOCATION TYPE: MON		↓	FIELD QC TYPE: REG		↓
PORT: PIA			SAMPLE USAGE: INV		↓

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2	HCL	Y	NA
↓	WSP-8270C-SVOA	1 LITER AMBER GLASS	2	ICE	↓	↓
↓	WSP-8321A-NMED HEXP	1 LITER AMBER GLASS	2	ICE	↓	↓
↓	WSP-GrossA/B	1 LITER POLY	1	NONE	↓	↓
↓	WSP-HEXMOD	1 LITER AMBER GLASS	2	ICE	↓	↓
↓	WSP-LL-H-3	1 LITER POLY	1	NONE	↓	↓
↓	WSP-RAD	1 GAL POLY	1	HNO3	↓	↓
↓	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4	↓	↓

SAMPLE COMMENTS:

Sampled within 50' of diesel generator

LOCATION COMMENTS: NA

FIELD PARAMETERS:

Dissolved Oxygen 7.39 mg/L Oxidation-Reduction Potential 140.2 MV pH 7.88 SU
 Specific Conductance 127 uS/cm Temperature 20.52 deg C Turbidity 127 NTU

COLLECTED BY (PRINT) W. Shaw

RELINQUISHED BY (Printed Name) <u>William Shaw</u> (Signature) <u>[Signature]</u>	Date/Time <u>4/25/2013</u> <u>1615</u>	RECEIVED BY (Printed Name) <u>J. Sherwood</u> (Signature) <u>[Signature]</u>	Date/Time <u>4/25/13</u> <u>1615</u>
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date 04/03/2013

Data Validation Report

Chain Of Custody No. 2013-791

1. Distribution Of Samples In EDD.

	Analytical	Regular	Field	Trip	Field	Equipment
SDG	Method	Samples	Duplicates	Blanks	Blanks	Blanks
ARS1-13-00870	Generic:Low_Level_Tritium	1	1			

	Analytical	Analysis	Prep	Regular	Field	Trip	Field	Equipment	Method	Matrix	Matrix
SDG	Method	Lot ID	Lot ID	Samples	Duplicates	Blanks	Blanks	Blanks	Blanks	Spikes	Spike Dups
ARS1-13-00870	Generic:Low_Level_Tritium	ARS1-B13-00960	ARS1-B13-00960		1	1				1	

2. Distribution Of Analytes In EDD.

Analytical Method	Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spikes	TICS
Generic:Low_Level_Tritium	RAD	CAPA-13-29651	ARS1-B13-00960-09	FD	1	0	0	0
Generic:Low_Level_Tritium	RAD	CAPA-13-29653	ARS1-B13-00960-10	PEB	1	0	0	0
Generic:Low_Level_Tritium	RAD	CAPA-13-29667	ARS1-B13-00960-08	REG	1	0	0	0
Generic:Low_Level_Tritium	RAD	LCS	ARS1-B13-00960-01	LCS	0	0	1	0
Generic:Low_Level_Tritium	RAD	LCSD	ARS1-B13-00960-02	LCSD	0	0	1	0
Generic:Low_Level_Tritium	RAD	MB	ARS1-B13-00960-03	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

No.

Any samples affected by the presence of contaminants in blanks?

No.

6. Any surrogate recoveries outside the control limits?

No.

7. Any MS/MSD recoveries or RPDs outside the control limits?

No.

Analytical	Post-Digestion	Lab Control	Lab Control	Blank	Blank	Lab	Storage	Preparation	Reagent
Spikes	Spikes	Samples	Sample Dups	Spikes	Spike Dups	Duplicates	Blanks	Blanks	Blanks
		1	1						

8. Any LCS/LCSD or BS/BSD recoveries or RPDs outside the control limits?

LCS	LCSD	Analytical	Parameter	Lab	Analysis	Sample	LCS	LCSD	Upper	Lower	Lower Reject
Sample ID	Sample ID	Method	Name	Lot ID	Date	Matrix	Recovery	Recovery	Limit	Limit	Limit
ARS1-B13-00960-01	ARS1-B13-00960-02	Generic:Low_Level_Tritium	Tritium	ARS1-B13-00960	5/21/2013	W	70	95	120	80	10

9. Any Field Duplicate RPDs outside the desired limits?

No.

10. Any Lab Duplicate RPDs outside the desired limits?

No.

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

None.

13. Display Flagged Data.

Location ID	Chain Of Custody No	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	Parameter Name	Lab Qualifier	Validation Qualifier	Validation Reason Codes	Detected
R-17 S1	2013-791	CAPA-13-29651	FD	INIT	RAD	Generic:Low_Level_Tritium	Tritium	U	U	R5	N
R-17 S1	2013-791	CAPA-13-29653	PEB	INIT	RAD	Generic:Low_Level_Tritium	Tritium	U	U	R5	N
R-17 S1	2013-791	CAPA-13-29667	REG	INIT	RAD	Generic:Low_Level_Tritium	Tritium	U	U	R5	N

Reason Code

Description

R5

Analyte is not detected because the amount reported is less than the MDC.

14. Useable Result Count.

Field	Location	Sample	Analytical	No. Unuseable	Total No. Of
Sample ID	ID	Purpose	Method	Records	Records
CAPA-13-29651	R-17 S1	FD	Generic:Low_Level_Tritium	0	1
CAPA-13-29653	R-17 S1	PEB	Generic:Low_Level_Tritium	0	1
CAPA-13-29667	R-17 S1	REG	Generic:Low_Level_Tritium	0	1

Upper Reject		RPD
Limit	RPD	Limit
	31.224	

Lab Result	Lab Units	Report Result	Report Units	Report MDA	Report Uncertainty	Lab Matrix	Sample Date	Percent Moisture	Analysis Lot ID	Validation Status Code	Use Flag
0.56	pCi/L	0.56	pCi/L	2.137	0.644	W	4/25/2013		ARS1-B13-00960	VAL	Y
0.754	pCi/L	0.754	pCi/L	1.974	0.606	W	4/25/2013		ARS1-B13-00960	VAL	Y
0.108	pCi/L	0.108	pCi/L	2.138	0.629	W	4/25/2013		ARS1-B13-00960	VAL	Y



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1 (800) 401-4277 • Fax (225) 381-2996

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Request Number: 2013-791



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**American Radiation Services
Analytical Reports**

for

**Los Alamos National Laboratory
Request: 2013-791**

Original COC



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American Radiation Services Analytical Reports

for

**Los Alamos National Laboratory
Request: 2013-791**

Case Narrative



2609 North River Road • Port Allen, Louisiana 70767

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May 29, 2013

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

Request Number: **2013-791**
LANL Sample ID: **CAPA-13-29667; CAPA-13-29651; CAPA-13-29653.**

Dear Mr. Greene;

On May 2, 2013, 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 black ink, appearing to read "James D. Lee". The signature is fluid and cursive.

Laboratory Management
ARS International

COVER PAGE



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**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)
2013-791	CAPA-13-29667	ARS1-13-00870-001
2013-791	CAPA-13-29651	ARS1-13-00870-002
2013-791	CAPA-13-29653	ARS1-13-00870-003

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. Sample B13-00960-02, the LCSD, had a milky appearance after addition of the cocktail (see technical note). Therefore, the remaining 5.07 ml was mixed with cocktail and counted. This reduced volume resulted in a higher MDC, but LCSD passed all other QC criteria. Percent RPD for Batch B13-00960 exceeded QC requirements but other duplicate criteria were met.

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

5-29-13

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: ARS1-13-00870

Client Sample ID: CAPA-13-29667

Sample Collection Date: 04/25/13

Sample Matrix: Aqueous

Request or PO Number: 2013-791

ARS Sample ID: ARS1-13-00870-001

Date Received: 05/02/13

Report Date: 05/29/13

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	0.108	0.629	2.138	1.031	U	pCi/L	ARS-040	05/23/13 20:32	PDS	NA

NOTES: Lab Agreement 63641-001-10

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

ARS Sample Delivery Group: ARS1-13-00870

Client Sample ID: CAPA-13-29651

Sample Collection Date: 04/25/13

Sample Matrix: Aqueous

Request or PO Number: 2013-791

ARS Sample ID: ARS1-13-00870-002

Date Received: 05/02/13

Report Date: 05/29/13

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	0.560	0.644	2.137	1.031	U	pCi/L	ARS-040	05/24/13 00:43	PDS	NA

NOTES: Lab Agreement 63641-001-10

SDA

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

ARS Sample Delivery Group: ARS1-13-00870
Client Sample ID: CAPA-13-29653
Sample Collection Date: 04/25/13
Sample Matrix: Aqueous

Request or PO Number: 2013-791
ARS Sample ID: ARS1-13-00870-003
Date Received: 05/02/13
Report Date: 05/29/13

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	0.754	0.606	1.974	0.952	U	pCi/L	ARS-040	05/24/13 04:54	PDS	NA

NOTES: Lab Agreement 63641-001-10

SDH

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



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QC Results Report

Sample Delivery Group: ARS1-13-00870

Date Received: 5/2/2013

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-B13-00960	LCS	H3	23.660	3.869	3.745	24.784		pCi/L	ARS-040	5/21/13 19:57	PDS	95	80%-120%

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-B13-00960	MBL	H3	1.458	0.658	2.008	NA	U	pCi/L	ARS-040	5/21/13 19:57	PDS

Sample RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (2s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER Acceptance Range
ARS1-B13-00960	LCSD	H3	23.660	3.869	17.270	2.764		pCi/L	ARS-040	5/21/13 19:57	PDS	0.96	< 1

Sample DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (2s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER Acceptance Range
ARS1-B13-00960	LCSD	H3	23.660	3.869	17.270	2.764		pCi/L	ARS-040	5/21/13 19:57	PDS	2.69	< 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



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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

13 of 96

LCS Report
Analytical Batch: ARS1-B13-00960

BlindID	ABatch	ABatchSampleID	BlindGroup	SlutID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-15414	ARS1-B13-00960	ARS1-B13-00960-01	B-H3	S-0279	H-3	5	2.485052914	13.2473	18.2614	5.0141	BSTEFFENS	5/6/2013	2.479317597	5/21/2013	12.43154636
B-15415	ARS1-B13-00960	ARS1-B13-00960-02	B-H3	S-0279	H-3	5	2.485052914	13.3736	18.3908	5.0172	BSTEFFENS	5/6/2013	2.478935714	5/22/2013	12.43731626

ID_31001_040	ABatch	AnalysisCode	ABatchSampleID	ClientID	IC_ID	S01_1_EnrichCellNo
632	ARS1-B13-00960	LSC-A-022	ARS1-B13-00960-01			20
633	ARS1-B13-00960	LSC-A-022	ARS1-B13-00960-02			8
634	ARS1-B13-00960	LSC-A-022	ARS1-B13-00960-03			87
635	ARS1-B13-00960	LSC-A-022	ARS1-B13-00960-04	CAPA-13-29585		48
636	ARS1-B13-00960	LSC-A-022	ARS1-B13-00960-05	CAPA - 13 - 29574		74
637	ARS1-B13-00960	LSC-A-022	ARS1-B13-00960-06	CAPA - 13 - 29531		1
638	ARS1-B13-00960	LSC-A-022	ARS1-B13-00960-07	CAPA - 13 - 29575		94
639	ARS1-B13-00960	LSC-A-022	ARS1-B13-00960-08	CAPA-13-29667		45
640	ARS1-B13-00960	LSC-A-022	ARS1-B13-00960-09	CAPA-13-29651		38
641	ARS1-B13-00960	LSC-A-022	ARS1-B13-00960-10	CAPA-13-29653		0
642	ARS1-B13-00960	LSC-A-022	ARS1-B13-00960-11	CAMO-13-30558		1
643	ARS1-B13-00960	LSC-A-022	ARS1-B13-00960-12	CAMO-13-30616		40
644	ARS1-B13-00960	LSC-A-022	ARS1-B13-00960-13	CAMO-13-30586		3
645	ARS1-B13-00960	LSC-A-022	ARS1-B13-00960-14	CAMO-13-30562		85

S01_2_TareCell	S01_3_TareResv	S02_GrossWtResv	S03_1_WtNa2O2	C_GrossSampleAdded	S04_1_ElectrolSD
331.94	199.93	700.3	2	500.37	05/06/2013 13:40:00
324.5	206.69	708.6	2.01	501.91	05/06/2013 13:40:00
338.22	214.45	714.45	2.03	500	05/06/2013 13:40:00
339.87	214.67	639.72	1.75	425.05	05/06/2013 13:40:00
323.86	210.34	710.34	2.01	500	05/06/2013 13:40:00
332.83	205.78	705.78	2.05	500	05/06/2013 13:40:00
334.19	206.42	706.44	2.06	500.02	05/06/2013 13:40:00
333.28	216.99	717	2	500.01	05/06/2013 13:40:00
331.28	222.75	722.78	2.05	500.03	05/06/2013 13:40:00
330.48	194.67	694.67	2.02	497	05/06/2013 13:40:00
332.56	211.57	711.57	2.01	500	05/10/2013 13:47:00
330.87	208.6	708.66	2.04	500.06	05/10/2013 13:47:00
335.85	210.2	710.26	2.05	500.06	05/10/2013 13:47:00
339.12	201.4	701.4	2	500	05/10/2013 13:47:00

S04_2_StartAmp	S04_3_StartBathC	S05_1_ElectroIED	S05_2_EndBathC	S05_3_EndCellWt	C_GrossSmplRec
5	2	05/21/2013 07:16:00	2	548.8	16.93
5	2	05/21/2013 07:18:00	2	548.2	17.01
5	2	05/21/2013 09:59:00	2	568.58	15.91
5	2	05/21/2013 07:20:00	2	571.55	17.01
5	2	05/21/2013 07:22:00	2	551.2	17
5	2	05/21/2013 10:01:00	2	555.26	16.65
5	2	05/21/2013 10:03:00	2	557.44	16.83
5	2	05/22/2013 08:59:00	2	567.35	17.08
5	2	05/22/2013 09:01:00	2	571.05	17.02
5	2	05/21/2013 09:56:00	2	540.93	15.78
5	2				
5	2				
5	2				
5	2				

C_EnrichmentF	S06_TareWt	S07_GrossWt	C_RecoveredWa	S08_TearWtLSCVial	S09_VialPlusSmpl	C_NetSample
29.55522741	108.89	121.74	12.85	6.53	16.54	10.01
29.50676073	110.9	126.48	15.58	6.57	11.64	5.07
31.42677561	108.48	121.58	13.1	6.54	16.57	10.03
24.98824221	104.91	119.82	14.91	6.62	16.63	10.01
29.41176471	94.55	109.62	15.07	6.5	16.53	10.03
30.03003003	93.46	106.81	13.35	6.52	16.53	10.01
29.71004159	101.54	114.93	13.39	6.51	16.55	10.04
29.27459016	95.35	110.53	15.18	6.55	16.57	10.02
29.37896592	93.42	106.65	13.23	6.36	16.39	10.03
31.68567807	100.94	113.85	12.91	6.43	16.55	10.12

S10_1_WtVislSmplDrWatFill	C_NetDeadWaterAdded	C_TareWtBFCocktail	S10_2_GrossWtVSC	C_NetWtCocktailAdded
0	0	16.54	26.98	10.44
0	0	11.64	21.88	10.24
0	0	16.57	26.84	10.27
0	0	16.63	26.89	10.26
0	0	16.53	26.76	10.23
0	0	16.53	26.79	10.26
0	0	16.55	26.79	10.24
0	0	16.57	26.93	10.36
0	0	16.39	26.64	10.25
0	0	16.55	26.83	10.28

ARS-040

UserID	ModDate
AMRAD\PSIMS	05/21/2013 13:18:42
AMRAD\PSIMS	05/21/2013 13:36:34
AMRAD\PSIMS	05/21/2013 13:40:19
AMRAD\PSIMS	05/21/2013 13:44:24
AMRAD\PSIMS	05/21/2013 13:46:12
AMRAD\PSIMS	05/21/2013 13:48:13
AMRAD\PSIMS	05/21/2013 13:50:11
AMRAD\PSIMS	05/22/2013 12:27:10
AMRAD\PSIMS	05/22/2013 12:29:15
AMRAD\PSIMS	05/21/2013 13:42:52
AMRAD\PSIMS	05/10/2013 13:47:48
AMRAD\PSIMS	05/10/2013 13:47:55
AMRAD\PSIMS	05/10/2013 13:48:01
AMRAD\PSIMS	05/10/2013 13:48:07

QC Evaluation

EPA Method: ARS-040

Batch ID: ARS1-B13-00960

SDG's: ARS1-13-00743; 869; 870; 930; 931; 932

LCS	17.2700	CSU (2s)	5.4170
LCSD	<u>23.6600</u>	CSU-D (2s)	<u>7.5820</u>

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

$$DER = \frac{6.39}{4.659147} = 1.371496 < 3$$

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

$$\%RPD = \frac{6.39}{20.465} * 100 = 31.22404 < 25\%$$

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

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

$$RER = \frac{6.39}{12.9990} = 0.491576275 < 1$$

Blank Information

	Act	CSU(2s)	MDA	Act>MDA	
AM-241					
U-234					*MDA should be below RDL
U-235					*Blank activity must be below MDA
U-238					*Blank activity must be < 1.65*CSU (DOE only)
Pu-238					
Pu-239/240					ACT = 1.458
Th-228					CSU = 1.289
Th-230					Is ACT<1.65*CSU? YES
Th-232					
H3	1.458	1.289	2.008		
Ra-226					
Ra-228					
Total U					
Pb-210					
Po-209					
Sr-90					
TC-99					
NI-63					

ARS Batch Number:

ARS1-B13 - 00960

Enter these Values for LCS

Current ACT 5.5041
NetWt 5.0141
Aliquot 0.50041

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

Enter these Values for LCSD

Current ACT 5.5041
NetWt 5.0172
Aliquot 0.5019

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

Expected Value Calculations

ARS Batch Number: ARS1-B11 - 00960

LCS	CALCULATED	=	24.845	
	EXPECTED VALUE			
	Range		19.876 - 29.814	
LCSD	CALCULATED	=	24.784	
	EXPECTED VALUE			
	Range		19.827 - 29.741	

<div><div>AMRAD</div><div>AMERICAN RADIATION SERVICES, LLC</div></div>		LSC Instrument Data Transfer Report									
		Batch Sample ID		Non-BKG Samples Transferred				Samples Eligible To Store			
		ARS1-B13-00960		4				4			
LIMS Batch Sample ID	LSC P#	LSC PID	LSC SNPL ID	LSC Count Date	LSC CMA	LSC PSLE	LSC Eff	LSC Count Dur	Analysis Batch	LIMS SDCS	LIMS Run
BKG	11										
ARS1-B13-00960-01	11		BACKGROUND	05/21/13 15:47	1.03	375.34	24.4800	240.00	ARS1-B13-00960		
ARS1-B13-00960-02	11		B13-00960-01	05/21/13 19:57	3.50	395.77	25.3500	240.00	ARS1-B13-00960		
ARS1-B13-00960-03	11		B13-00960-02	05/22/13 00:09	3.04	493.94	29.7300	240.00	ARS1-B13-00960		
ARS1-B13-00960-04	11		B13-00960-03	05/22/13 04:23	1.26	390.45	25.0900	240.00	ARS1-B13-00960		
ARS1-B13-00960-05	11		B13-00960-04	05/22/13 08:34	1.35	386.96	24.9300	240.00	ARS1-B13-00960	ARS1-13-00743	2

\\Peckard3170\Results\H3 Low Level\Low Level H3_2\

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_2\20130521_1538

Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130521_1538\20130521_1538.results

RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130521_1538\LLH3.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130521_1538\LLH3 Results.csv

Assay File Name: C:\Packard\Tricarb\Assays\Low Level H3_2.lsa

Count Conditions-

Nuclide: Low Level H3

Quench Indicator: tsIE/AEC

External Std Terminator (sec): 0.5 2s%

Pre-Count Delay (min): 0.00

Quench Set:

Low Energy: ARS LL H3 10mL

Count Time (min): 240.00

Count Mode: Low Level

Assay Count Cycles: 1

#Vials/Sample: 1

Repeat Sample Count: 1

Calculate % Reference: Off

Background Subtract: Off

Low CPM Threshold: Off

2 Sigma % Terminator: On - Any Region

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

Count Corrections-

Static Controller: On

Colored Samples: Off

24 Coincidence Time (nsec): 18

90 Delay Before Burst (nsec): 75

98 Half Life-

Half Life Correction: Off

Regions Half Life

Units Reference Date

Reference Time

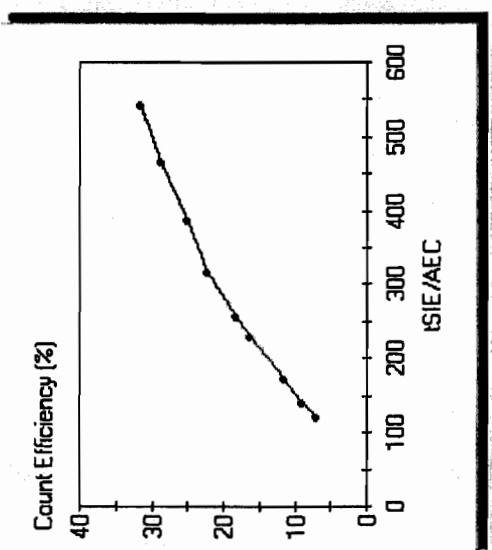
QuantaSmart (TM) - 2.03 - Serial# 423814

5/22/2013 12:37:44 PM
Protocol# 11 - Low Level H3_2.1sa

A
B
C

Cycle 1 Results
Quench Curve Block Data

ARS LL H3 10mL in A



Date Acquired: 11/20/2012
Date Modified:
ARS LL H3 10mL in A

tSIE/AEC	Count Efficiency (%)
543.57	31.51
466.44	28.74
387.42	24.95
316.48	22.21
257.14	18.18
229.94	16.37
172.56	11.68
142.07	9.08
121.26	7.13

P#	S#	SMPL_ID	CPMA	DPM1	tsIE	Eff	Nucl	In A	Count	Time	DATE	TIME	MESSAGES
11	1	BACKGROUND	1.034	4.22	375.34			24.48	240.00		5/21/2013	3:47:07 PM	
11	2	B13-00960-01	3.497	13.80	395.77			25.35	240.00		5/21/2013	7:57:55 PM	
11	3	B13-00960-02	3.035	10.21	493.94			29.73	240.00		5/22/2013	12:09:04 AM	
11	4	B13-00960-03	1.264	5.04	390.45			25.09	240.00		5/22/2013	4:23:45 AM	
11	5	B13-00960-04	1.345	5.40	386.96			24.93	240.00		5/22/2013	8:34:39 AM	

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\20130523_0550
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20130523_0550\20130523_0550.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20130523_0550\LLH3.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20130523_0550\LLH3 Results.csv
Assay File Name: C:\Packard\Tricarb\Assays\Low Level H3.lsa

Count Conditions-
Nuclide: Low Level H3
Quench Indicator: tsIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: ARS LL H3 10mL
Count Time (min): 240.00
Count Mode: Low Level
Assay Count Cycles: 1
#Vials/Sample: 1
Repeat Sample Count: 1
Calculate % Reference: Off

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

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

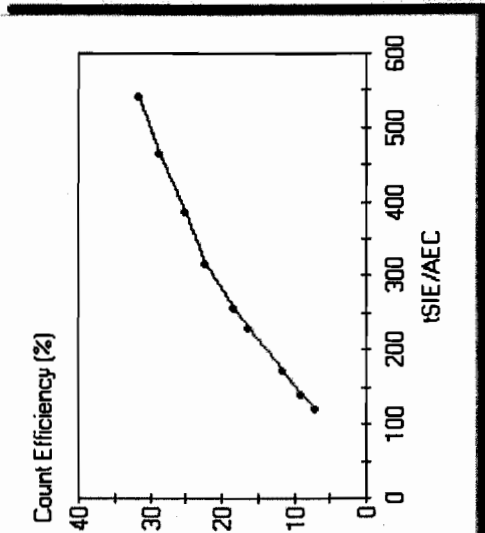
Count Corrections-
Static Controller: On
Colored Samples: Off
Coincidence Time (nsec): 18
Half Life-
Static Controller: Off
Heterogeneity Monitor: Off
Delay Before Burst (nsec): 75

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 10mL in A



Date Acquired: 11/20/2012
Date Modified:
ARS LL H3 10mL in A

tSIE/AEC	Count Efficiency (%)
543.57	31.51
466.44	28.74
387.42	24.95
316.48	22.21
257.14	18.18
229.94	16.37
172.56	11.68
142.07	9.08
121.26	7.13

P#	S#	SMPL_ID	CPMA	DPM1	TSIE	Eff Nucl	In A	Count Time	DATE	TIME	MESSAGES
2	1	B13-00960-05	1.108	4.34	399.35		25.52	240.00	5/23/2013	5:59:04 AM	
2	2	B13-00960-06	1.144	4.43	406.41		25.86	240.00	5/23/2013	10:10:06 AM	
2	3	B13-00960-07	1.060	4.13	402.24		25.66	240.00	5/23/2013	2:21:04 PM	
2	4	B13-00960-08	1.050	4.09	402.34		25.66	240.00	5/23/2013	6:32:03 PM	
2	5	B13-00960-09	1.117	4.39	398.13		25.46	240.00	5/23/2013	10:43:01 PM	
2	6	B13-00960-10	1.155	4.56	395.63		25.34	240.00	5/24/2013	2:54:08 AM	

Calibration Information

Software Version IC: 2.12

Software Version EC: 2.03

Instrument Model: Tri-Carb 3170TR/SL

Instrument Serial Number: 423814

3H Chi Square: 13.63 Date Processed: 5/24/2013 8:32:03 AM

14C Chi Square: 27.74 Date Processed: 5/24/2013 8:32:03 AM

3H E²/B (1-18.6 keV): 2103.96 Date Processed: 5/24/2013 8:32:03 AM

14C E²/B (4-156 keV): 12016.20 Date Processed: 5/24/2013 8:32:03 AM

3H Efficiency (0-18.6 keV): 62.41 Date Processed: 5/24/2013 8:32:03 AM

14C Efficiency (0-156 keV): 95.93 Date Processed: 5/24/2013 8:32:03 AM

IPA Background Date Processed: 5/24/2013 8:32:03 AM

3H Background CPM (0-18.6 keV): 1.92 Date Processed: 5/24/2013 8:32:03 AM

14C Background CPM (0-156 keV): 2.08 Date Processed: 5/24/2013 8:32:03 AM

3H Calibration DPM: 268700

3H Reference Date: 9/2/2011

14C Calibration DPM: 127700

==== IPA Errors and Warnings for Last Acquired Data Per Parameter ====
2/15/2009 2:09:35 AM: IPA Error - Insufficient 14C data to calculate Chi Square.
== End of IPA Errors and Warnings for Last Acquired Data Per Parameter ==

SNC Protocol

Calibration Information

Software Version IC: 2.12

Software Version EC: 2.03

Instrument Model: Tri-Carb 3170TR/SL

Instrument Serial Number: 423814

3H Chi Square: 16.92 Date Processed: 5/24/2013 2:35:30 PM

14C Chi Square: 15.25 Date Processed: 5/24/2013 2:35:30 PM

3H E²/B (1-18.6 keV): 1753.54 Date Processed: 5/24/2013 2:35:30 PM14C E²/B (4-156 keV): 6442.47 Date Processed: 5/24/2013 2:35:30 PM

3H Efficiency (0-18.6 keV): 62.42 Date Processed: 5/24/2013 2:35:30 PM

14C Efficiency (0-156 keV): 96.19 Date Processed: 5/24/2013 2:35:30 PM

IPA Background Date Processed: 5/24/2013 2:35:30 PM

3H Background CPM (0-18.6 keV): 2.31 Date Processed: 5/24/2013 2:35:30 PM

14C Background CPM (0-156 keV): 2.66 Date Processed: 5/24/2013 2:35:30 PM

3H Calibration DPM: 268700

3H Reference Date: 9/2/2011

14C Calibration DPM: 127700

==== IPA Errors and Warnings for Last Acquired Data Per Parameter ====

2/15/2009 2:09:35 AM: IPA Error - Insufficient 14C data to calculate Chi Square.

== End of IPA Errors and Warnings for Last Acquired Data Per Parameter ==

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_2\20130524_1435

Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130524_1435\20130524_1435.results

RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130524_1435\LLH3.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130524_1435\LLH3 Results.csv

Assay File Name: C:\Packard\Tricarb\Assays\Low Level H3_2.lsa

Count Conditions-

Nuclide: Low Level H3

Quench Indicator: tSIE/AEC

External Std Terminator (sec): 0.5 2s%

Pre-Count Delay (min): 0.00

Quench Set:

Low Energy: ARS LL H3 10mL

Count Time (min): 240.00

Count Mode: Low Level

Assay Count Cycles: 1

#Vials/Sample: 1

Repeat Sample Count: 1

Calculate % Reference: Off

Background Subtract: Off

Low CPM Threshold: Off

2 Sigma % Terminator: On - Any Region

Regions

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

Count Corrections-

Static Controller: On

Colored Samples: Off

Luminescence Correction: Off

Heterogeneity Monitor: Off

Coincidence Time (nsec): 18

Delay Before Burst (nsec): 75

Half Life-

Half Life Correction: Off

Regions

Half Life

Units

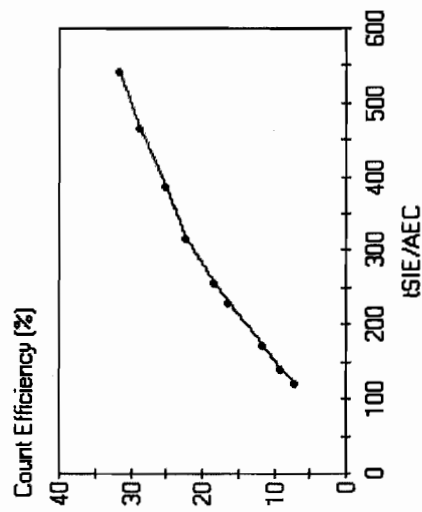
Reference Date

Reference Time

A
 B
 C

Cycle 1 Results
 Quench Curve Block Data

ARS LL H3 10mL in A



Date Acquired: 11/20/2012

Date Modified:

ARS LL H3 10mL in A

tSIE/AEC	Count Efficiency (%)
543.57	31.51
466.44	28.74
387.42	24.95
316.48	22.21
257.14	18.18
229.94	16.37
172.56	11.68
142.07	9.08
121.26	7.13

P#	S#	SMPL ID	CPMA	DPM1	tsIE	Eff	Nucl	In A	Count	Time	DATE	TIME	MESSAGES
11	1	B13-00960-11	1.493	5.81	403.54			25.72	240.00		5/24/2013	2:44:26 PM	
11	2	B13-00960-12	1.183	4.74	387.57			24.96	240.00		5/24/2013	6:55:19 PM	
11	3	B13-00960-13	1.868	7.46	389.19			25.03	240.00		5/24/2013	11:06:19 PM	
11	4	B13-00960-14	1.838	7.27	394.30			25.28	240.00		5/25/2013	3:17:22 AM	

AMRAD AMERICAN RADIATION SERVICES, LLC		LSC Instrument Data Transfer Report										LSC 1	
		ARS1-B13-00960					14					14	
		Batch Sample ID					Non-BKG Samples Transferred					LSC 1	
		Batch Sample ID					Non-BKG Samples Transferred					LSC 1	
LIMS Batch Sample ID	LSC PA ID	LSC BKG ID	LSC COUNT	LSC COUNT DATE	LSC COUNT DUE	LSC COUNT DUE	LSC COUNT DUE	LSC COUNT DUE	LSC COUNT DUE	LSC COUNT DUE	LSC COUNT DUE	LSC COUNT DUE	LSC COUNT DUE
BKG	11	1	1	05/21/13 15:47	05/21/13 15:47	05/21/13 15:47	05/21/13 15:47	05/21/13 15:47	05/21/13 15:47	05/21/13 15:47	05/21/13 15:47	05/21/13 15:47	05/21/13 15:47
ARS1-B13-00960-01	11	2	2	05/21/13 19:57	05/21/13 19:57	05/21/13 19:57	05/21/13 19:57	05/21/13 19:57	05/21/13 19:57	05/21/13 19:57	05/21/13 19:57	05/21/13 19:57	05/21/13 19:57
ARS1-B13-00960-02	11	3	3	05/22/13 00:09	05/22/13 00:09	05/22/13 00:09	05/22/13 00:09	05/22/13 00:09	05/22/13 00:09	05/22/13 00:09	05/22/13 00:09	05/22/13 00:09	05/22/13 00:09
ARS1-B13-00960-03	11	4	4	05/22/13 04:23	05/22/13 04:23	05/22/13 04:23	05/22/13 04:23	05/22/13 04:23	05/22/13 04:23	05/22/13 04:23	05/22/13 04:23	05/22/13 04:23	05/22/13 04:23
ARS1-B13-00960-04	11	5	5	05/22/13 08:34	05/22/13 08:34	05/22/13 08:34	05/22/13 08:34	05/22/13 08:34	05/22/13 08:34	05/22/13 08:34	05/22/13 08:34	05/22/13 08:34	05/22/13 08:34
ARS1-B13-00960-05	2	1	1	05/23/13 05:59	05/23/13 05:59	05/23/13 05:59	05/23/13 05:59	05/23/13 05:59	05/23/13 05:59	05/23/13 05:59	05/23/13 05:59	05/23/13 05:59	05/23/13 05:59
ARS1-B13-00960-06	2	2	2	05/23/13 10:10	05/23/13 10:10	05/23/13 10:10	05/23/13 10:10	05/23/13 10:10	05/23/13 10:10	05/23/13 10:10	05/23/13 10:10	05/23/13 10:10	05/23/13 10:10
ARS1-B13-00960-07	2	3	3	05/23/13 14:21	05/23/13 14:21	05/23/13 14:21	05/23/13 14:21	05/23/13 14:21	05/23/13 14:21	05/23/13 14:21	05/23/13 14:21	05/23/13 14:21	05/23/13 14:21
ARS1-B13-00960-08	2	4	4	05/23/13 18:32	05/23/13 18:32	05/23/13 18:32	05/23/13 18:32	05/23/13 18:32	05/23/13 18:32	05/23/13 18:32	05/23/13 18:32	05/23/13 18:32	05/23/13 18:32
ARS1-B13-00960-09	2	5	5	05/23/13 22:43	05/23/13 22:43	05/23/13 22:43	05/23/13 22:43	05/23/13 22:43	05/23/13 22:43	05/23/13 22:43	05/23/13 22:43	05/23/13 22:43	05/23/13 22:43
ARS1-B13-00960-10	2	6	6	05/24/13 02:54	05/24/13 02:54	05/24/13 02:54	05/24/13 02:54	05/24/13 02:54	05/24/13 02:54	05/24/13 02:54	05/24/13 02:54	05/24/13 02:54	05/24/13 02:54
ARS1-B13-00960-11	11	1	1	05/24/13 14:44	05/24/13 14:44	05/24/13 14:44	05/24/13 14:44	05/24/13 14:44	05/24/13 14:44	05/24/13 14:44	05/24/13 14:44	05/24/13 14:44	05/24/13 14:44
ARS1-B13-00960-12	11	2	2	05/24/13 18:55	05/24/13 18:55	05/24/13 18:55	05/24/13 18:55	05/24/13 18:55	05/24/13 18:55	05/24/13 18:55	05/24/13 18:55	05/24/13 18:55	05/24/13 18:55
ARS1-B13-00960-13	11	3	3	05/24/13 23:06	05/24/13 23:06	05/24/13 23:06	05/24/13 23:06	05/24/13 23:06	05/24/13 23:06	05/24/13 23:06	05/24/13 23:06	05/24/13 23:06	05/24/13 23:06
ARS1-B13-00960-14	11	4	4	05/25/13 03:17	05/25/13 03:17	05/25/13 03:17	05/25/13 03:17	05/25/13 03:17	05/25/13 03:17	05/25/13 03:17	05/25/13 03:17	05/25/13 03:17	05/25/13 03:17

ARS-040 Calculation Results

ARS1-B13-00960

ACF	1
UCF	2.22
Sys Error	0.15

AnalysisCode	ABatchSampleID	Initial_Mass_sample_g	Mass_Na2O2_added_g	Final_mass_electrolyzed_sample_NaOH_g	Mass_equivalent_NaOH_g	Final_Mass_Electrolyzed_sample_g	VolumeFactor_X	Enrichment_Factor_Y
LSC-A-022	ARS1-B13-00960-01	500.370	2.000	16.930	2.052	14.878	0.030	26.335
LSC-A-022	ARS1-B13-00960-02	501.910	2.010	17.010	2.062	14.948	0.030	26.295
LSC-A-022	ARS1-B13-00960-03	500.000	2.030	15.910	2.083	13.827	0.028	28.236
LSC-A-022	ARS1-B13-00960-04	425.050	1.750	17.010	1.796	15.215	0.036	22.035
LSC-A-022	ARS1-B13-00960-05	500.000	2.010	17.000	2.062	14.938	0.030	26.215
LSC-A-022	ARS1-B13-00960-06	500.000	2.050	16.650	2.103	14.547	0.029	26.892
LSC-A-022	ARS1-B13-00960-07	500.020	2.060	16.830	2.114	14.716	0.029	26.595
LSC-A-022	ARS1-B13-00960-08	500.010	2.000	17.080	2.052	15.028	0.030	26.064
LSC-A-022	ARS1-B13-00960-09	500.030	2.050	17.020	2.103	14.917	0.030	26.252
LSC-A-022	ARS1-B13-00960-10	497.000	2.020	15.780	2.073	13.707	0.028	28.309
LSC-A-022	ARS1-B13-00960-11	500.000	2.010	17.050	2.062	14.988	0.030	26.131
LSC-A-022	ARS1-B13-00960-12	500.060	2.040	17.010	2.093	14.917	0.030	26.253
LSC-A-022	ARS1-B13-00960-13	500.060	2.050	17.000	2.103	14.897	0.030	26.288
LSC-A-022	ARS1-B13-00960-14	500.000	2.000	16.980	2.052	14.928	0.030	26.232

ARS-040 Calculation Results

ARS1-B13-00960

ACF	1
UCF	2.22
Sys Error	0.15

AnalysisCode	ABatchSampleID	Average	Sample	CPM	Bkg	CPM	TSIE	Detector	Eff	decimal	Aliquot	AliqUnits	Activity	reference	date	Start	Date	of	Count	Sample	Count	Duration	min
LSC-A-022	ARS1-B13-00960-01	3.497	1.034	395.770	0.254	0.01001	L	9/7/2012	5/21/2013	240.000													
LSC-A-022	ARS1-B13-00960-02	3.035	1.034	493.940	0.297	0.00507	L	9/7/2012	5/22/2013	240.000													
LSC-A-022	ARS1-B13-00960-03	1.264	1.034	390.450	0.251	0.01003	L	5/21/2013	5/22/2013	240.000													
LSC-A-022	ARS1-B13-00960-04	1.345	1.034	386.960	0.249	0.01001	L	4/10/2013	5/22/2013	240.000													
LSC-A-022	ARS1-B13-00960-05	1.108	1.034	399.350	0.255	0.01003	L	4/25/2013	5/23/2013	240.000													
LSC-A-022	ARS1-B13-00960-06	1.144	1.034	406.410	0.259	0.01001	L	4/25/2013	5/23/2013	240.000													
LSC-A-022	ARS1-B13-00960-07	1.060	1.034	402.240	0.257	0.01004	L	4/25/2013	5/23/2013	240.000													
LSC-A-022	ARS1-B13-00960-08	1.050	1.034	402.340	0.257	0.01002	L	4/25/2013	5/23/2013	240.000													
LSC-A-022	ARS1-B13-00960-09	1.117	1.034	398.130	0.255	0.01003	L	4/25/2013	5/23/2013	240.000													
LSC-A-022	ARS1-B13-00960-10	1.155	1.034	395.630	0.253	0.01012	L	4/25/2013	5/24/2013	240.000													
LSC-A-022	ARS1-B13-00960-11	1.493	1.034	403.540	0.257	0.01003	L	5/6/2013	5/24/2013	240.000													
LSC-A-022	ARS1-B13-00960-12	1.183	1.034	387.570	0.250	0.01001	L	5/7/2013	5/24/2013	240.000													
LSC-A-022	ARS1-B13-00960-13	1.868	1.034	389.190	0.250	0.01002	L	5/8/2013	5/24/2013	240.000													
LSC-A-022	ARS1-B13-00960-14	1.838	1.034	394.300	0.253	0.01003	L	5/8/2013	5/25/2013	240.000													

ARS-040 Calculation Results

ARS1-B13-00960

ACF	1
UCF	2.22
Sys Error	0.15

AnalysisCode	ABatchSampleID	Total_Bkg_Count	Duration_min	DF	Sample_Activity_Conc	Standard_Counting_Uncertainty	CU_1	CSU_1	CU_1.96	CSU_1.96	MDC	DLC	ActivityReportUnits
LSC-A-022	ARS1-B13-00960-01		240.000	0.96133	17.270	0.963	0.963	2.764	1.888	5.417	2.221	1.071	pCi
LSC-A-022	ARS1-B13-00960-02		240.000	0.96119	23.660	1.540	1.540	3.869	3.018	7.582	3.745	1.806	pCi
LSC-A-022	ARS1-B13-00960-03		240.000	0.99985	1.458	0.620	0.620	0.658	1.216	1.289	2.008	0.968	pCi
LSC-A-022	ARS1-B13-00960-04		240.000	0.99355	2.564	0.821	0.821	0.907	1.609	1.777	2.611	1.259	pCi
LSC-A-022	ARS1-B13-00960-05		240.000	0.99570	0.499	0.637	0.637	0.641	1.248	1.257	2.135	1.039	pCi
LSC-A-022	ARS1-B13-00960-06		240.000	0.99570	0.715	0.619	0.619	0.628	1.213	1.231	2.058	0.992	pCi
LSC-A-022	ARS1-B13-00960-07		240.000	0.99570	0.172	0.617	0.617	0.617	1.209	1.210	2.091	1.008	pCi
LSC-A-022	ARS1-B13-00960-08		240.000	0.99570	0.108	0.629	0.629	0.629	1.233	1.233	2.138	1.031	pCi
LSC-A-022	ARS1-B13-00960-09		240.000	0.99554	0.560	0.639	0.639	0.644	1.252	1.263	2.137	1.031	pCi
LSC-A-022	ARS1-B13-00960-10		240.000	0.99554	0.754	0.595	0.595	0.606	1.167	1.188	1.974	0.952	pCi
LSC-A-022	ARS1-B13-00960-11		240.000	0.99723	3.076	0.688	0.688	0.828	1.348	1.623	2.122	1.023	pCi
LSC-A-022	ARS1-B13-00960-12		240.000	0.99738	1.026	0.662	0.662	0.679	1.297	1.332	2.180	1.051	pCi
LSC-A-022	ARS1-B13-00960-13		240.000	0.99738	5.713	0.753	0.753	1.141	1.476	2.236	2.169	1.046	pCi
LSC-A-022	ARS1-B13-00960-14		240.000	0.99738	5.459	0.743	0.743	1.106	1.456	2.167	2.150	1.037	pCi


ARS-040 Calculation Results

ARS1-B13-00960

ACF	1
UCF	2.22
Sys Error	0.15

AnalysisCode	ABatchSampleID	AliquotReportUnits	UserID	ModDate
LSC-A-022	ARS1-B13-00960-01	L	AMRAD\PSIMS	5/28/2013
LSC-A-022	ARS1-B13-00960-02	L	AMRAD\PSIMS	5/28/2013
LSC-A-022	ARS1-B13-00960-03	L	AMRAD\PSIMS	5/28/2013
LSC-A-022	ARS1-B13-00960-04	L	AMRAD\PSIMS	5/28/2013
LSC-A-022	ARS1-B13-00960-05	L	AMRAD\PSIMS	5/28/2013
LSC-A-022	ARS1-B13-00960-06	L	AMRAD\PSIMS	5/28/2013
LSC-A-022	ARS1-B13-00960-07	L	AMRAD\PSIMS	5/28/2013
LSC-A-022	ARS1-B13-00960-08	L	AMRAD\PSIMS	5/28/2013
LSC-A-022	ARS1-B13-00960-09	L	AMRAD\PSIMS	5/28/2013
LSC-A-022	ARS1-B13-00960-10	L	AMRAD\PSIMS	5/28/2013
LSC-A-022	ARS1-B13-00960-11	L	AMRAD\PSIMS	5/28/2013
LSC-A-022	ARS1-B13-00960-12	L	AMRAD\PSIMS	5/28/2013
LSC-A-022	ARS1-B13-00960-13	L	AMRAD\PSIMS	5/28/2013
LSC-A-022	ARS1-B13-00960-14	L	AMRAD\PSIMS	5/28/2013

Technical Notes

		Batch	ARS1-B13-00960		
		Analysis Code	LSC-A-022		
		Procedure No	ARS-040		
		Matrix	AQ		
#	Date	Dept	Batch Technical Notes		User ID
1	05/21/13 13:54	CHEMISTRY	Sample B13-00960-02, LCSD, after cryo-distillation presented a problem with the first 10ml when mixed with cocktail. So the remainder which consisted of 5.07ml was mixed with cocktail and used as the LCSD and was counted.		AMRAD\PSIMS



Standards Activity as of: 05/21/13 19:57

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
A	S-0279	H-3	SL	09/10/12	09/10/13	OK	09/07/12	5.7255E+00	5.5041	4.500E+03	S-0237	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
5-16-13	14:36	SNCL6	Q4	Q4	PRJ
+	+	Background	D13-01007		PRJ
+	+	D13-01007-04	+	+	PRJ
+	+	D13-01007-05	+	+	PRJ
+	+	D13-01007-06	+	+	PRJ
5-21-13	12:55	SNCL6	Q4	Q4	PRJ
+	+	Background	D13-00960		PRJ
+	+	D13-00960-01	+	+	PRJ
+	+	D13-00960-02	+	+	PRJ
+	+	D13-00960-03	+	+	PRJ
+	+	D13-00960-04	+	+	PRJ
5-22-13	12:30	SNCL6	Q4	Q4	PRJ
+	+	D13-00960-05	D13-00960	1538	PRJ
+	+	D13-00960-06	+	+	PRJ
+	+	D13-00960-07	+	+	PRJ
+	+	D13-00960-08	+	+	PRJ
+	+	D13-00960-09	+	+	PRJ
+	+	D13-00960-10	+	+	PRJ
+	+	D13-00960-11 SNCL6	Q4	Q4	PRJ
5-24-13	13:02	SNCL6	Q4	Q4	PRJ

Principian Principals

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Reviewed By: SOE
Initials

Date: 5-29-13



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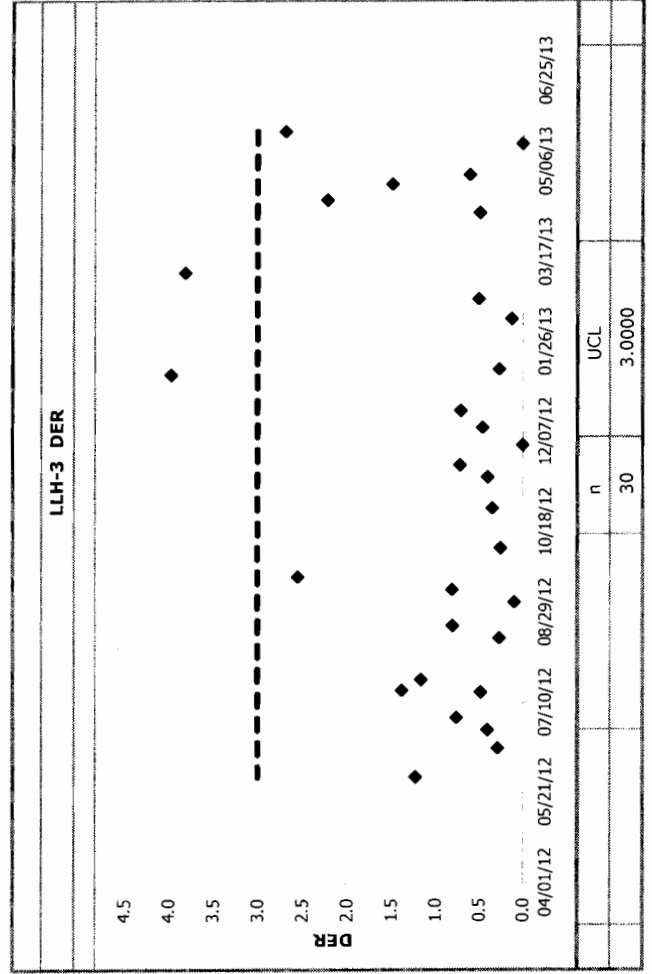
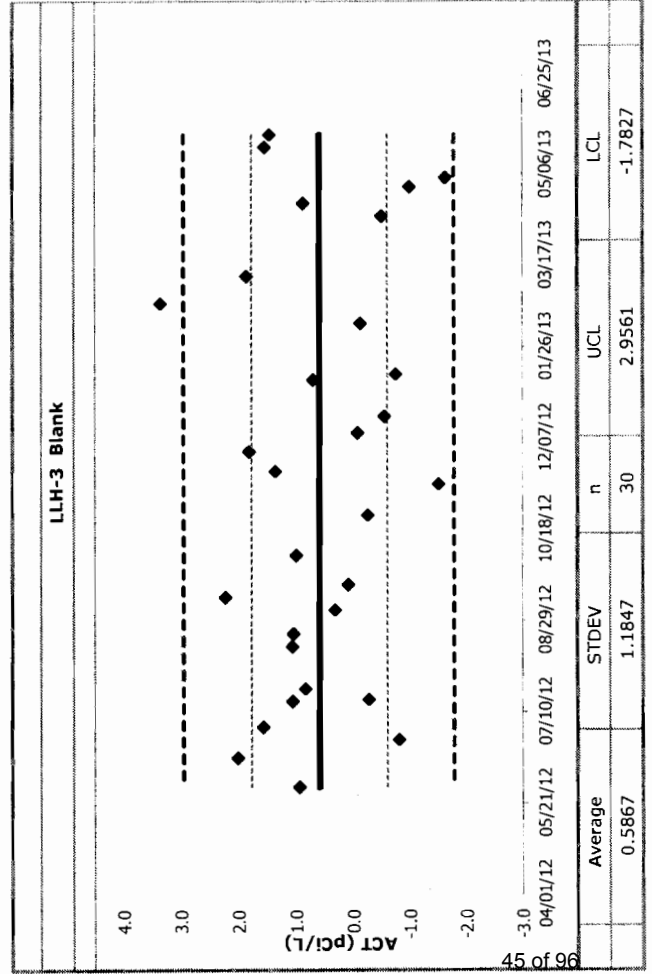
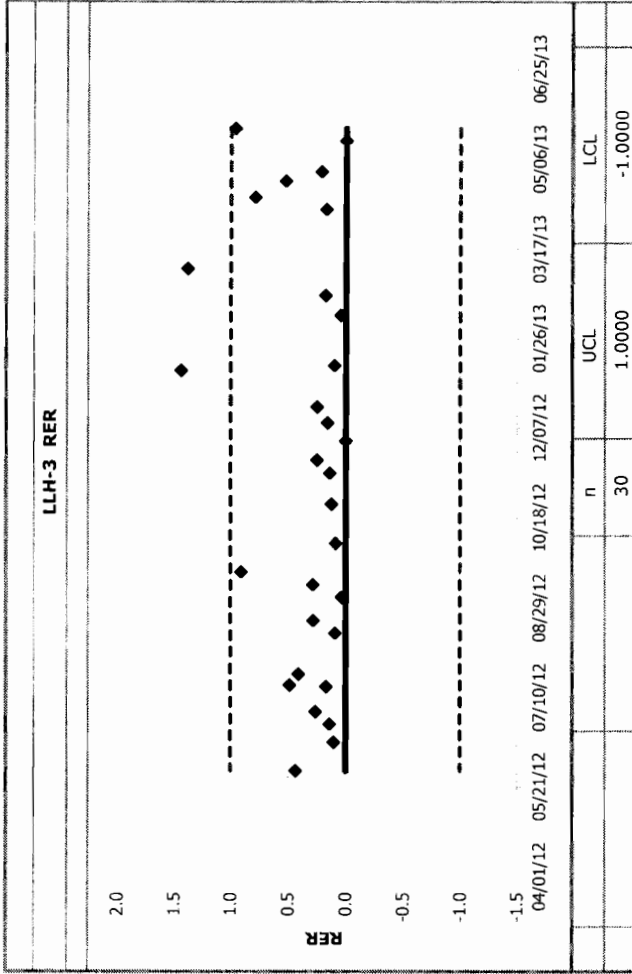
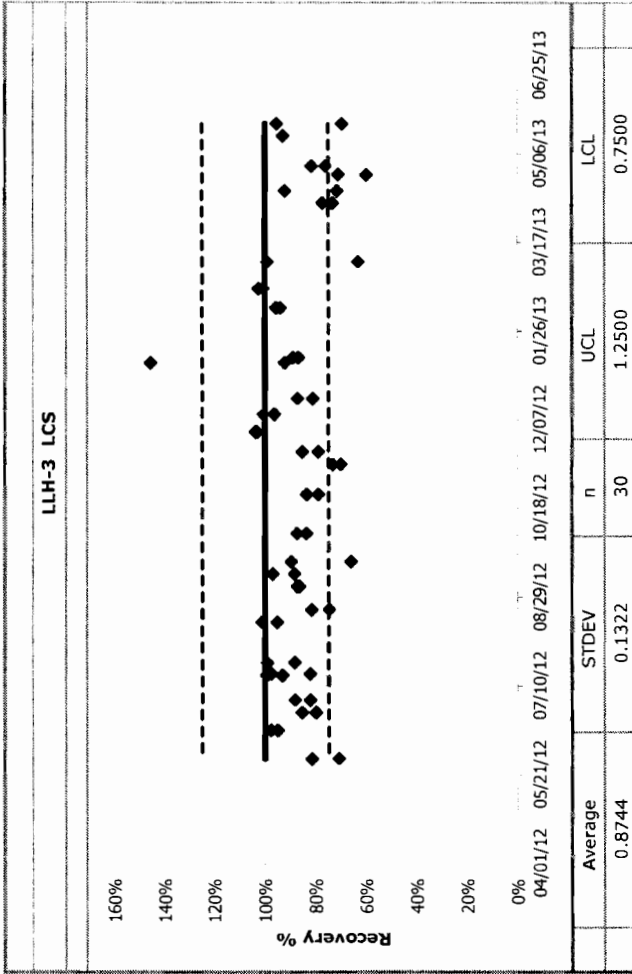
Low Level Tritium

by

Low Level Liquid Scintillation Counting

Control Charts

QC Chart



3H Efficiency
Total # pts : 5629
Valid # pts : 152
Mean : 62.76
SD : 0.27

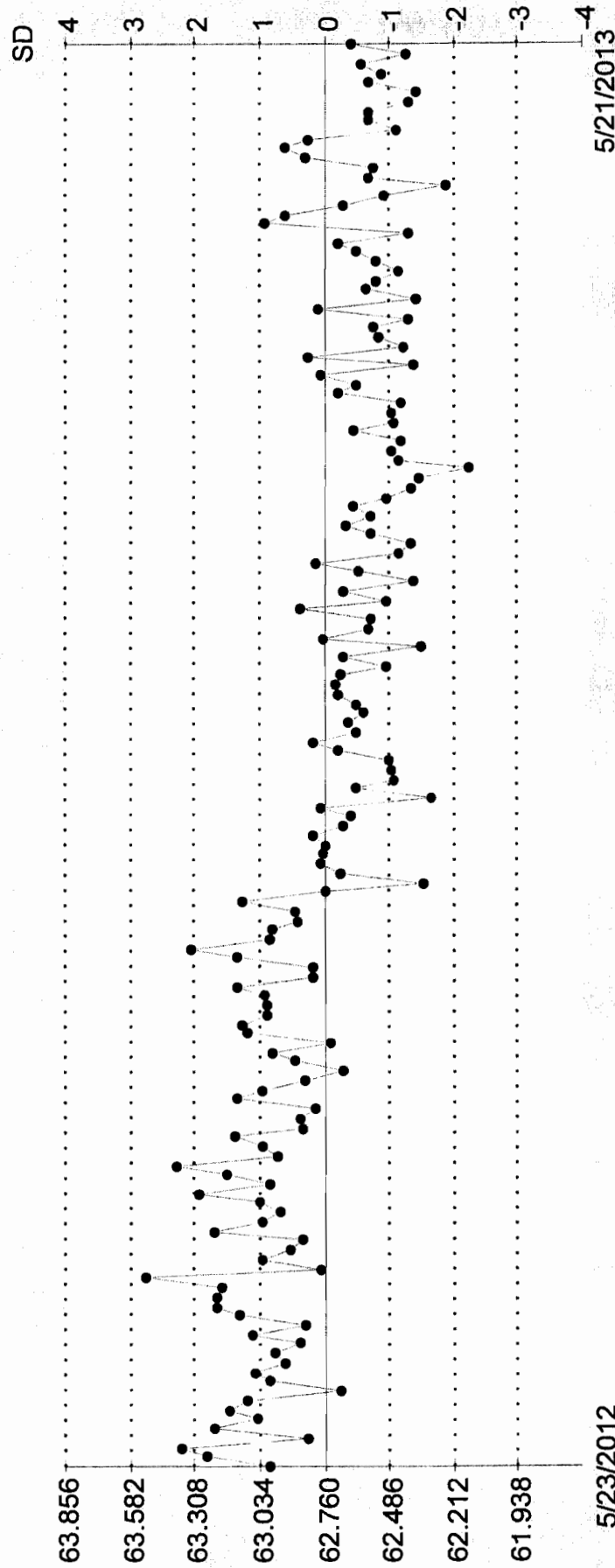
Date	Value	Valid Pt
May 23, 2012	62.99	X
May 30, 2012	63.26	X
May 31, 2012	63.37	X
Jun 06, 2012	62.83	X
Jun 13, 2012	63.22	X
Jun 21, 2012	63.04	X
Jun 22, 2012	63.16	X
Jun 25, 2012	63.09	X
Jun 27, 2012	62.70	X
Jun 27, 2012	62.99	X
Jun 28, 2012	63.05	X
Jun 29, 2012	62.93	X
Jun 30, 2012	62.97	X
Jul 05, 2012	62.86	X
Jul 11, 2012	63.07	X
Jul 12, 2012	62.85	X
Jul 16, 2012	63.12	X
Jul 20, 2012	63.22	X
Jul 22, 2012	63.22	X
Jul 26, 2012	63.19	X
Jul 27, 2012	63.52	X
Aug 09, 2012	62.77	X
Aug 13, 2012	63.03	X
Aug 14, 2012	62.90	X
Aug 16, 2012	62.85	X
Aug 17, 2012	63.22	X
Aug 18, 2012	63.03	X
Aug 21, 2012	62.94	X
Aug 22, 2012	63.04	X
Aug 26, 2012	63.29	X
Aug 27, 2012	62.99	X
Aug 27, 2012	63.17	X
Sep 05, 2012	63.39	X
Sep 09, 2012	62.96	X
Sep 11, 2012	63.03	X
Sep 17, 2012	63.15	X
Sep 18, 2012	62.86	X
Sep 20, 2012	62.86	X
Sep 20, 2012	62.80	X
Sep 24, 2012	63.14	X
Sep 28, 2012	63.03	X
Oct 01, 2012	62.85	X

Oct 04, 2012	62.68	X
Oct 05, 2012	62.88	X
Oct 06, 2012	62.98	X
Oct 11, 2012	62.74	X
Oct 12, 2012	63.08	X
Oct 13, 2012	63.12	X
Oct 17, 2012	63.00	X
Oct 19, 2012	63.00	X
Oct 22, 2012	63.02	X
Oct 23, 2012	63.13	X
Oct 23, 2012	62.80	X
Oct 23, 2012	62.81	X
Oct 23, 2012	63.13	X
Oct 25, 2012	63.32	X
Oct 27, 2012	62.99	X
Oct 31, 2012	62.98	X
Nov 02, 2012	62.87	X
Nov 02, 2012	62.89	X
Nov 04, 2012	63.11	X
Nov 05, 2012	62.76	X
Nov 10, 2012	62.33	X
Nov 12, 2012	62.69	X
Nov 12, 2012	62.77	X
Nov 13, 2012	62.76	X
Nov 14, 2012	62.75	X
Nov 15, 2012	62.81	X
Nov 18, 2012	62.68	X
Nov 19, 2012	62.65	X
Nov 19, 2012	62.78	X
Nov 20, 2012	62.30	X
Nov 21, 2012	62.63	X
Nov 23, 2012	62.47	X
Dec 04, 2012	62.48	X
Dec 08, 2012	62.49	X
Dec 12, 2012	62.70	X
Dec 14, 2012	62.81	X
Dec 15, 2012	62.63	X
Dec 21, 2012	62.66	X
Dec 21, 2012	62.60	X
Dec 31, 2012	62.63	X
Jan 02, 2013	62.70	X
Jan 09, 2013	62.72	X
Jan 10, 2013	62.69	X
Feb 01, 2013	62.50	X
Feb 02, 2013	62.68	X
Feb 06, 2013	62.34	X
Feb 08, 2013	62.77	X
Feb 08, 2013	62.57	X
Feb 15, 2013	62.57	X
Feb 17, 2013	62.87	X
Feb 18, 2013	62.50	X
Feb 20, 2013	62.68	X

Feb 22, 2013	62.61	X
Feb 28, 2013	62.80	X
Mar 01, 2013	62.45	X
Mar 01, 2013	62.39	X
Mar 01, 2013	62.56	X
Mar 04, 2013	62.67	X
Mar 04, 2013	62.57	X
Mar 06, 2013	62.64	X
Mar 08, 2013	62.50	X
Mar 08, 2013	62.39	X
Mar 14, 2013	62.36	X
Mar 15, 2013	62.14	X
Mar 18, 2013	62.45	X
Mar 22, 2013	62.47	X
Mar 22, 2013	62.43	X
Mar 23, 2013	62.64	X
Mar 28, 2013	62.47	X
Mar 29, 2013	62.47	X
Apr 04, 2013	62.44	X
Apr 05, 2013	62.70	X
Apr 07, 2013	62.62	X
Apr 11, 2013	62.77	X
Apr 12, 2013	62.38	X
Apr 15, 2013	62.83	X
Apr 16, 2013	62.42	X
Apr 16, 2013	62.53	X
Apr 16, 2013	62.55	X
Apr 16, 2013	62.41	X
Apr 16, 2013	62.78	X
Apr 16, 2013	62.37	X
Apr 18, 2013	62.59	X
Apr 19, 2013	62.54	X
Apr 22, 2013	62.44	X
Apr 24, 2013	62.54	X
Apr 24, 2013	62.62	X
Apr 25, 2013	62.71	X
Apr 25, 2013	62.40	X
Apr 27, 2013	63.02	X
Apr 29, 2013	62.92	X
May 01, 2013	62.68	X
May 03, 2013	62.51	X
May 06, 2013	62.24	X
May 07, 2013	62.57	X
May 09, 2013	62.56	X
May 09, 2013	62.84	X
May 09, 2013	62.92	X
May 09, 2013	62.83	X
May 09, 2013	62.46	X
May 10, 2013	62.57	X
May 14, 2013	62.57	X
May 15, 2013	62.40	X
May 16, 2013	62.37	X

May 17, 2013	62.52	X
May 17, 2013	62.60	X
May 17, 2013	62.41	X
May 21, 2013	62.65	X

3H Efficiency	
Total # pts	: 5629
Valid # pts	: 152
Mean	: 62.76
SD	: 0.27



3H Background

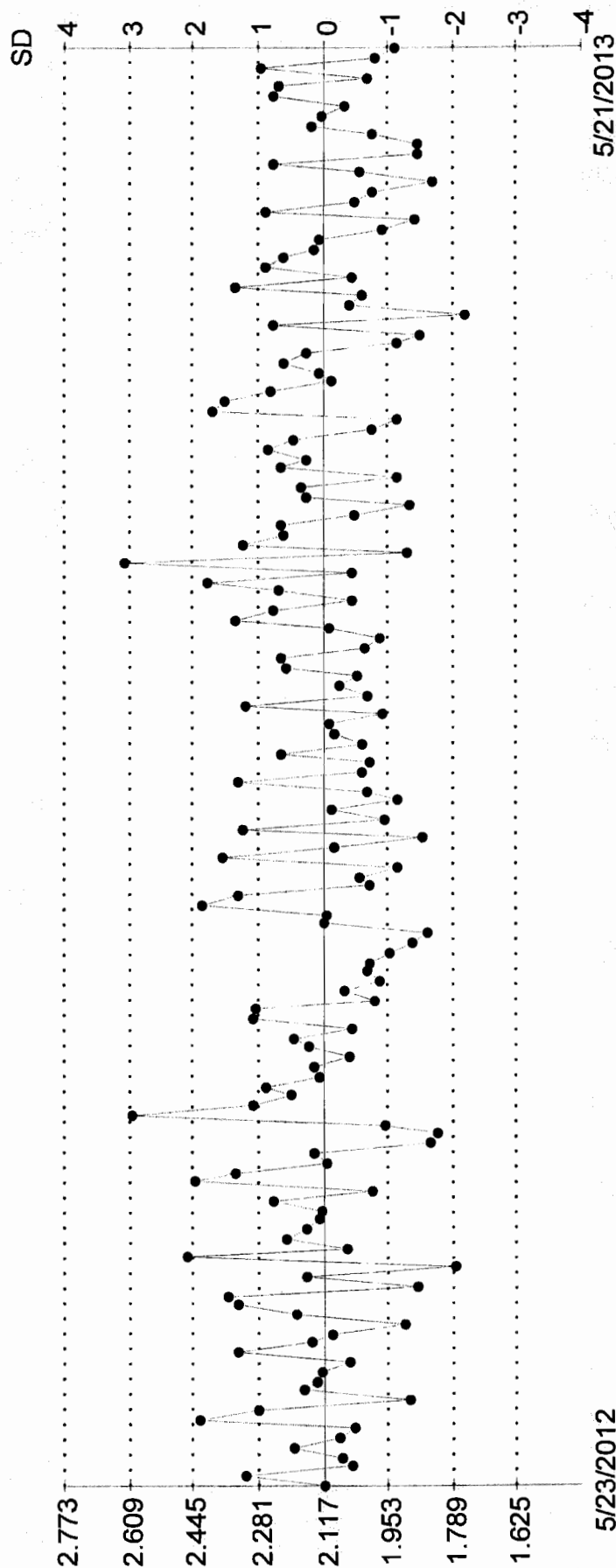
Total # pts : 5555
Valid # pts : 152
Mean : 2.12
SD : 0.16

Date	Value	Valid Pt
May 23, 2012	2.11	X
May 30, 2012	2.31	X
May 31, 2012	2.04	X
Jun 06, 2012	2.07	X
Jun 13, 2012	2.19	X
Jun 21, 2012	2.08	X
Jun 22, 2012	2.04	X
Jun 25, 2012	2.43	X
Jun 27, 2012	2.28	X
Jun 27, 2012	1.90	X
Jun 28, 2012	2.16	X
Jun 29, 2012	2.13	X
Jun 30, 2012	2.12	X
Jul 05, 2012	2.05	X
Jul 11, 2012	2.33	X
Jul 12, 2012	2.15	X
Jul 16, 2012	2.09	X
Jul 20, 2012	1.91	X
Jul 22, 2012	2.19	X
Jul 26, 2012	2.33	X
Jul 27, 2012	2.36	X
Aug 09, 2012	1.88	X
Aug 13, 2012	2.16	X
Aug 14, 2012	1.78	X
Aug 16, 2012	2.46	X
Aug 17, 2012	2.06	X
Aug 18, 2012	2.21	X
Aug 21, 2012	2.16	X
Aug 22, 2012	2.13	X
Aug 26, 2012	2.12	X
Aug 27, 2012	2.25	X
Aug 27, 2012	1.99	X
Sep 05, 2012	2.44	X
Sep 09, 2012	2.34	X
Sep 11, 2012	2.11	X
Sep 17, 2012	2.14	X
Sep 18, 2012	1.85	X
Sep 20, 2012	1.83	X
Sep 20, 2012	1.96	X
Sep 24, 2012	2.60	X
Sep 28, 2012	2.29	X
Oct 01, 2012	2.20	X

Oct 04, 2012	2.26	X
Oct 05, 2012	2.13	X
Oct 06, 2012	2.14	X
Oct 11, 2012	2.05	X
Oct 12, 2012	2.15	X
Oct 13, 2012	2.19	X
Oct 17, 2012	2.04	X
Oct 19, 2012	2.29	X
Oct 22, 2012	2.29	X
Oct 23, 2012	1.99	X
Oct 23, 2012	2.06	X
Oct 23, 2012	1.98	X
Oct 23, 2012	2.01	X
Oct 25, 2012	2.00	X
Oct 27, 2012	1.95	X
Oct 31, 2012	1.89	X
Nov 02, 2012	1.85	X
Nov 02, 2012	2.11	X
Nov 04, 2012	2.11	X
Nov 05, 2012	2.42	X
Nov 10, 2012	2.33	X
Nov 12, 2012	2.00	X
Nov 12, 2012	2.02	X
Nov 13, 2012	1.93	X
Nov 14, 2012	2.37	X
Nov 15, 2012	2.09	X
Nov 18, 2012	1.86	X
Nov 19, 2012	2.32	X
Nov 19, 2012	1.96	X
Nov 20, 2012	2.09	X
Nov 21, 2012	1.93	X
Nov 23, 2012	2.01	X
Dec 04, 2012	2.34	X
Dec 08, 2012	2.02	X
Dec 12, 2012	2.00	X
Dec 14, 2012	2.22	X
Dec 15, 2012	2.02	X
Dec 21, 2012	2.09	X
Dec 21, 2012	2.10	X
Dec 31, 2012	1.97	X
Jan 02, 2013	2.31	X
Jan 09, 2013	2.01	X
Jan 10, 2013	2.08	X
Feb 01, 2013	2.03	X
Feb 02, 2013	2.21	X
Feb 06, 2013	2.22	X
Feb 08, 2013	2.01	X
Feb 08, 2013	1.98	X
Feb 15, 2013	2.10	X
Feb 17, 2013	2.34	X
Feb 18, 2013	2.25	X
Feb 20, 2013	2.04	X

May 17, 2013	2.01	X
May 17, 2013	2.27	X
May 17, 2013	1.99	X
May 21, 2013	1.94	X

3H Background
Total # pts : 5555
Valid # pts : 152
Mean : 2.12
SD : 0.16





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American Radiation Services Analytical Reports

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Tritium- Screening by Low Level Liquid Scintillation Counting



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American Radiation Services Analytical Reports

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Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting Samples

ARS File ID Numbers: ARS1-13-00869; 870
ARS Batch ID: ARS1-B13-00910

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 B13-00940-04	120	2.239	0.988	23.74	10.03	236.659	pCi/L	102.2403	YES, analyze by LSC-A-001.
2 B13-00940-05	120	1.326	0.988	24.32	10.01	62.541	pCi/L	100.0014	NO
3 B13-00940-06	120	1.147	0.988	23.9	10.03	29.878	pCi/L	101.5559	NO
4 B13-00940-07	120	1.284	0.988	24.04	10.03	55.297	pCi/L	100.9645	NO
5 B13-00940-08	120	1.611	0.988	24.23	10.00	115.819	pCi/L	100.4733	YES, analyze by LSC-A-001.
6						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
7						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
8 B13-00940-04	120	1.311	1.293	24.24	10.03	3.335	pCi/L	113.9465	NO
9 B13-00940-08	120	1.120	1.293	24.81	10.00	-31.410	pCi/L	111.6626	NO
10 B13-00940-09	120	1.066	1.293	24.6	10.00	-41.566	pCi/L	112.6158	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!

Run all by
LSC-A-022
SDA
5-7-13



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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting Laboratory Records


135860
13-00869-001-1
WRAD


135861
13-00869-002-1
WRAD


135862
13-00869-003-1
WRAD


135863
13-00870-001-1
WRAD

135864
13-00870-002-1
WRAD

135865
13-00870-003-1
WRAD

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
12540	ARS1-B13-00910	ARS1-B13-00910-01		1 g						AMRAD\PSIMS	05/03/2013 13:29:00
12541	ARS1-B13-00910	ARS1-B13-00910-02		1 g						AMRAD\PSIMS	05/03/2013 13:29:00
12542	ARS1-B13-00910	ARS1-B13-00910-03		1 g						AMRAD\PSIMS	05/03/2013 13:29:00
12543	ARS1-B13-00910	ARS1-B13-00910-04	CAPA - 13 - 29574	10.03 g		135860				AMRAD\PSIMS	05/03/2013 13:29:00
12544	ARS1-B13-00910	ARS1-B13-00910-05	CAPA - 13 - 29531	10.01 g		135861				AMRAD\PSIMS	05/03/2013 13:29:00
12545	ARS1-B13-00910	ARS1-B13-00910-06	CAPA - 13 - 29575	10.03 g		135862				AMRAD\PSIMS	05/03/2013 13:29:00
12546	ARS1-B13-00910	ARS1-B13-00910-07	CAPA-13-29667	10.03 g		135863				AMRAD\PSIMS	05/03/2013 13:29:00
12547	ARS1-B13-00910	ARS1-B13-00910-08	CAPA-13-29651	10 g		135864				AMRAD\PSIMS	05/03/2013 13:29:00
12548	ARS1-B13-00910	ARS1-B13-00910-09	CAPA-13-29653	10 g		135865				AMRAD\PSIMS	05/03/2013 13:29:01

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 2\20130503_1449

Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130503_1449\20130503_1449.results

RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130503_1449\LLH3.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130503_1449\LLH3 Results.csv

Assay File Name: C:\Packard\Tricarb\Assays\Low Level H3 2.lsa

Count Conditions-

Nuclide: Low Level H3

Quench Indicator: tSIE/AEC

External Std Terminator (sec): 0.5 2s%

Pre-Count Delay (min): 0.00

Quench Set:

Low Energy: ARS LL H3 10mL

Count Time (min): 120.00

Count Mode: Low Level

Assay Count Cycles: 1

#Vials/Sample: 1

Repeat Sample Count: 1

Calculate % Reference: Off

Background Subtract: Off

Low CPM Threshold: Off

2 Sigma % Terminator: On - Any Region

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

Count Corrections-

Static Controller: On

Colored Samples: Off

Coincidence Time (nsec): 18

Delay Before Burst (nsec): 75

Half Life-

Half Life Correction: Off

Regions Half Life

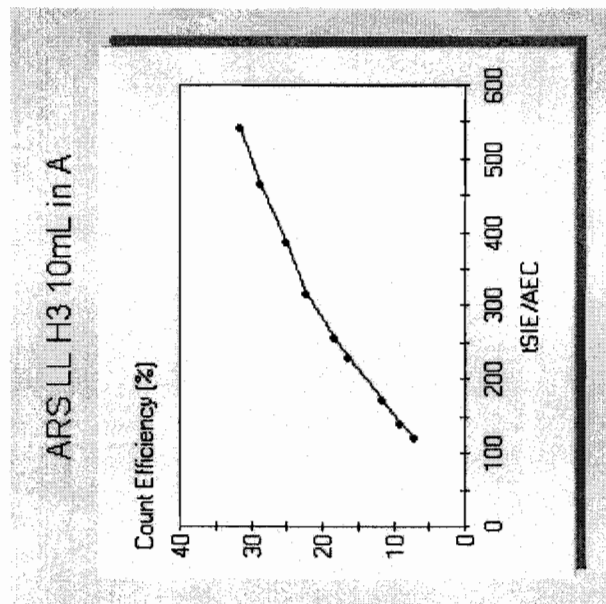
Units

Reference Date

Reference Time

Protocol# 11 - Low Level H3 2.lsa

User: H3 Low Level

A
B
CCycle 1 Results
Quench Curve Block Data

Date Acquired: 11/20/2012

Date Modified:

ARS LL H3 10mL in A

tSIE/AEC	Count Efficiency (%)
543.57	31.51
466.44	28.74
387.42	24.95
316.48	22.21
257.14	18.18
229.94	16.37
172.56	11.68
142.07	9.08
121.26	7.13

Protocol# 11 - Low Level H3 2.1sa

User: H3 Low Level

P#	S#	SMPL_ID	CPMA	DPM1	tsIE	Eff Nucl	In A	Count Time	DATE	TIME	MESSAGES
11	1	BACKGROUND	0.988	4.20	351.26		23.55	120.00	5/3/2013	2:57:59 PM	
11	2	B13-00910-04	2.239	9.43	356.21		23.74	120.00	5/3/2013	5:07:57 PM	*
11	3	B13-00910-05	1.326	5.45	371.24		24.32	120.00	5/3/2013	7:17:48 PM	
11	4	B13-00910-06	1.147	4.80	360.28		23.90	120.00	5/3/2013	9:27:41 PM	
11	5	B13-00910-07	1.284	5.34	363.78		24.04	120.00	5/3/2013	11:37:33 PM	
11	6	B13-00910-08	1.611	6.65	368.88		24.23	120.00	5/4/2013	1:47:27 AM	

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_2\20130506_1057

Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130506_1057.results

RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130506_1057\LLH3.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130506_1057\LLH3 Results.csv

Assay File Name: C:\Packard\Tricarb\Assays\Low Level H3_2.lsa

Count Conditions-

Nuclide: Low Level H3

Quench Indicator: tsIE/AEC

External Std Terminator (sec): 0.5 2s%

Pre-Count Delay (min): 0.00

Quench Set:

Low Energy: ARS LL H3 10mL

Count Time (min): 120.00

Count Mode: Low Level

Assay Count Cycles: 1

#Vials/Sample: 1

Repeat Sample Count: 1

Calculate % Reference: Off

Background Subtract: Off

Low CPM Threshold: Off

2 Sigma % Terminator: On - Any Region

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

Count Corrections-

Static Controller: On

Colored Samples: Off

Coincidence Time (nsec): 18

Delay Before Burst (nsec): 75

Luminescence Correction: Off

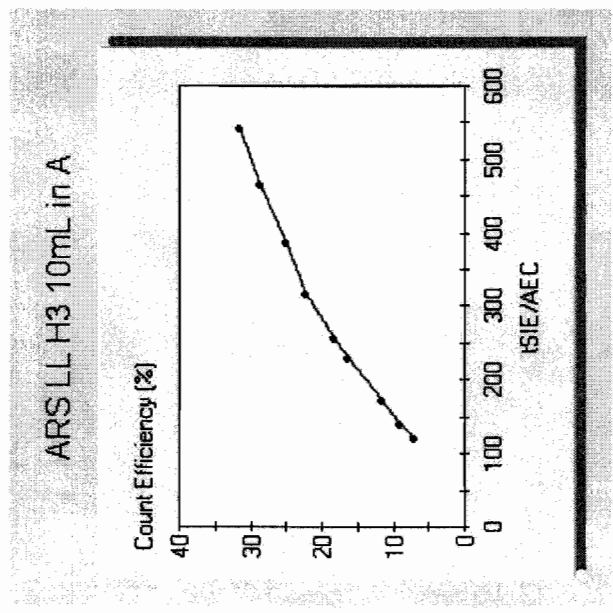
Heterogeneity Monitor: Off

Half Life-

Half Life Correction: Off	Units	Reference Date	Reference Time
Regions Half Life			

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 11/20/2012
Date Modified:
ARS LL H3 10mL in A

tSIE/AEC	Count Efficiency (%)
543.57	31.51
466.44	28.74
387.42	24.95
316.48	22.21
257.14	18.18
229.94	16.37
172.56	11.68
142.07	9.08
121.26	7.13

Protocol# 11 - Low Level H3 2.1sa

User: H3 Low Level

P#	S#	SMPL_ID	CPMA	DPM1	tSIE	Eff	Nucl	In A	Count	Time	DATE	TIME	MESSAGES
11	1	BACKGROUN	1.293	5.37	365.41			24.10	120.00		5/6/2013	11:06:28 AM	
11	2	B13-00910-04	1.311	5.41	369.16			24.24	120.00		5/6/2013	1:16:22 PM	
11	3	B13-00910-08	1.120	4.52	383.75			24.81	120.00		5/6/2013	3:26:13 PM	
11	4	B13-00910-09	1.066	4.33	378.47			24.60	120.00		5/6/2013	5:36:07 PM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
4-25-13	13:30	B13-00827-08	B13-00827		PDJ
↓	↓	B13-00827-09	↓	L	PDJ
↓	↓	B13-00827-10	↓	↓	PDJ
↓	↓	B13-00827-11	↓	↓	PDJ
↓	↓	B13-00827-12	↓	↓	PDJ
↓	↓	B13-00827-13	↓	↓	PDJ
↓	↓	B13-00682-03	B13-00682		PDJ
↓	↓	B13-00682-04	B13-00682	↓	PDJ
↓	↓	SNC 16	QA	QA	PDJ
4-29-13	7:10	SNC 16	QA	QA	PDJ
↓	↓	Background	B13-00839		PDJ
↓	↓	B13-00839-04	↓	↓	PDJ
5-1-13	0853	SNC 16	QA	QA	PDJ
5-3-13	13:30	SNC 16	QA	QA	PDJ
↓	↓	Background	B13-00910	M 49	PDJ
↓	↓	B13-00910-04	↓	↓	PDJ
↓	↓	B13-00910-05	↓	↓	PDJ
↓	↓	B13-00910-06	↓	↓	PDJ
↓	↓	B13-00910-07	↓	↓	PDJ
↓	↓	B13-00910-08	↓	↓	PDJ

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
5-3-13	13:34	D13-00910-04	D13-60910	1449	PPS
5-6-13	9:10	SNUKE	QIA	QIA	PPS
+	+	Background D13-00910-04	D13-60910		PPS
+	+	D13-00910-04	+	+	PPS
+	+	D13-00910-08	+	+	PPS
+	+	D13-00910-09	+	+	PPS
5-7-13	9:56	SNUKE	QIA	QIA	PPS
+	+	Background	D13-00777	1057	PPS
+	+	D13-00777-03	+	+	PPS
+	+	D13-00777-04	+	+	PPS
+	+	D13-00777-05	+	+	PPS
+	+	D13-00777-06	+	+	PPS
+	+	D13-00777-07	+	+	PPS
+	+	D13-00777-08	+	+	PPS
+	+	D13-00777-09	+	+	PPS
+	+	D13-00777-10	+	+	PPS
+	+	D13-00777-11	+	+	PPS
+	+	D13-00777-12	+	+	PPS
+	+	D13-00777-13	+	+	PPS
+	+	D13-00777-14	+	+	PPS



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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

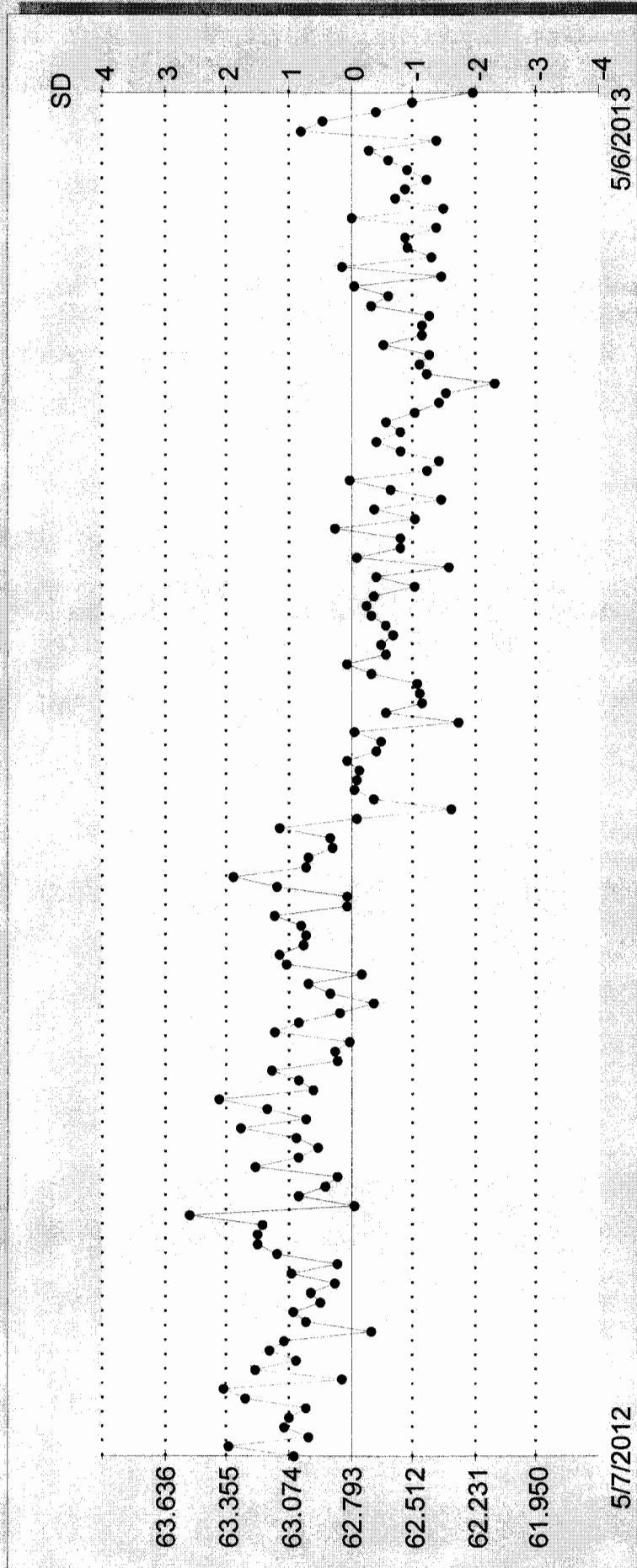
Total # pts : 5614
Valid # pts : 142
Mean : 62.79
SD : 0.28

Date	Value	Valid Pt
May 07, 2012	63.05	X
May 09, 2012	63.34	X
May 14, 2012	62.99	X
May 17, 2012	63.10	X
May 17, 2012	63.07	X
May 23, 2012	62.99	X
May 30, 2012	63.26	X
May 31, 2012	63.37	X
Jun 06, 2012	62.83	X
Jun 13, 2012	63.22	X
Jun 21, 2012	63.04	X
Jun 22, 2012	63.16	X
Jun 25, 2012	63.09	X
Jun 27, 2012	62.70	X
Jun 27, 2012	62.99	X
Jun 28, 2012	63.05	X
Jun 29, 2012	62.93	X
Jun 30, 2012	62.97	X
Jul 05, 2012	62.86	X
Jul 11, 2012	63.07	X
Jul 12, 2012	62.85	X
Jul 16, 2012	63.12	X
Jul 20, 2012	63.22	X
Jul 22, 2012	63.22	X
Jul 26, 2012	63.19	X
Jul 27, 2012	63.52	X
Aug 09, 2012	62.77	X
Aug 13, 2012	63.03	X
Aug 14, 2012	62.90	X
Aug 16, 2012	62.85	X
Aug 17, 2012	63.22	X
Aug 18, 2012	63.03	X
Aug 21, 2012	62.94	X
Aug 22, 2012	63.04	X
Aug 26, 2012	63.29	X
Aug 27, 2012	62.99	X
Aug 27, 2012	63.17	X
Sep 05, 2012	63.39	X
Sep 09, 2012	62.96	X
Sep 11, 2012	63.03	X
Sep 17, 2012	63.15	X
Sep 18, 2012	62.86	X

Sep 20, 2012	62.86	X
Sep 20, 2012	62.80	X
Sep 24, 2012	63.14	X
Sep 28, 2012	63.03	X
Oct 01, 2012	62.85	X
Oct 04, 2012	62.68	X
Oct 05, 2012	62.88	X
Oct 06, 2012	62.98	X
Oct 11, 2012	62.74	X
Oct 12, 2012	63.08	X
Oct 13, 2012	63.12	X
Oct 17, 2012	63.00	X
Oct 19, 2012	63.00	X
Oct 22, 2012	63.02	X
Oct 23, 2012	63.13	X
Oct 23, 2012	62.80	X
Oct 23, 2012	62.81	X
Oct 23, 2012	63.13	X
Oct 25, 2012	63.32	X
Oct 27, 2012	62.99	X
Oct 31, 2012	62.98	X
Nov 02, 2012	62.87	X
Nov 02, 2012	62.89	X
Nov 04, 2012	63.11	X
Nov 05, 2012	62.76	X
Nov 10, 2012	62.33	X
Nov 12, 2012	62.69	X
Nov 12, 2012	62.77	X
Nov 13, 2012	62.76	X
Nov 14, 2012	62.75	X
Nov 15, 2012	62.81	X
Nov 18, 2012	62.68	X
Nov 19, 2012	62.65	X
Nov 19, 2012	62.78	X
Nov 20, 2012	62.30	X
Nov 21, 2012	62.63	X
Nov 23, 2012	62.47	X
Dec 04, 2012	62.48	X
Dec 08, 2012	62.49	X
Dec 12, 2012	62.70	X
Dec 14, 2012	62.81	X
Dec 15, 2012	62.63	X
Dec 21, 2012	62.66	X
Dec 21, 2012	62.60	X
Dec 31, 2012	62.63	X
Jan 02, 2013	62.70	X
Jan 09, 2013	62.72	X
Jan 10, 2013	62.69	X
Feb 01, 2013	62.50	X
Feb 02, 2013	62.68	X
Feb 06, 2013	62.34	X
Feb 08, 2013	62.77	X

Feb 15, 2013	62.57	X
Feb 17, 2013	62.87	X
Feb 18, 2013	62.50	X
Feb 20, 2013	62.68	X
Feb 21, 2013	62.38	X
Feb 22, 2013	62.61	X
Feb 28, 2013	62.80	X
Mar 01, 2013	62.45	X
Mar 01, 2013	62.39	X
Mar 01, 2013	62.56	X
Mar 04, 2013	62.67	X
Mar 04, 2013	62.57	X
Mar 06, 2013	62.64	X
Mar 08, 2013	62.50	X
Mar 08, 2013	62.39	X
Mar 14, 2013	62.36	X
Mar 15, 2013	62.14	X
Mar 18, 2013	62.45	X
Mar 22, 2013	62.47	X
Mar 22, 2013	62.43	X
Mar 23, 2013	62.64	X
Mar 28, 2013	62.47	X
Mar 29, 2013	62.47	X
Apr 04, 2013	62.44	X
Apr 05, 2013	62.70	X
Apr 07, 2013	62.62	X
Apr 11, 2013	62.77	X
Apr 12, 2013	62.38	X
Apr 15, 2013	62.83	X
Apr 16, 2013	62.42	X
Apr 16, 2013	62.53	X
Apr 16, 2013	62.55	X
Apr 16, 2013	62.41	X
Apr 16, 2013	62.78	X
Apr 16, 2013	62.37	X
Apr 18, 2013	62.59	X
Apr 19, 2013	62.54	X
Apr 22, 2013	62.44	X
Apr 24, 2013	62.54	X
Apr 24, 2013	62.62	X
Apr 25, 2013	62.71	X
Apr 25, 2013	62.40	X
Apr 27, 2013	63.02	X
Apr 29, 2013	62.92	X
May 01, 2013	62.68	X
May 03, 2013	62.51	X
May 06, 2013	62.24	X

3H Efficiency
 Total # pts : 5614
 Valid # pts : 142
 Mean : 62.79
 SD : 0.28



3H Background

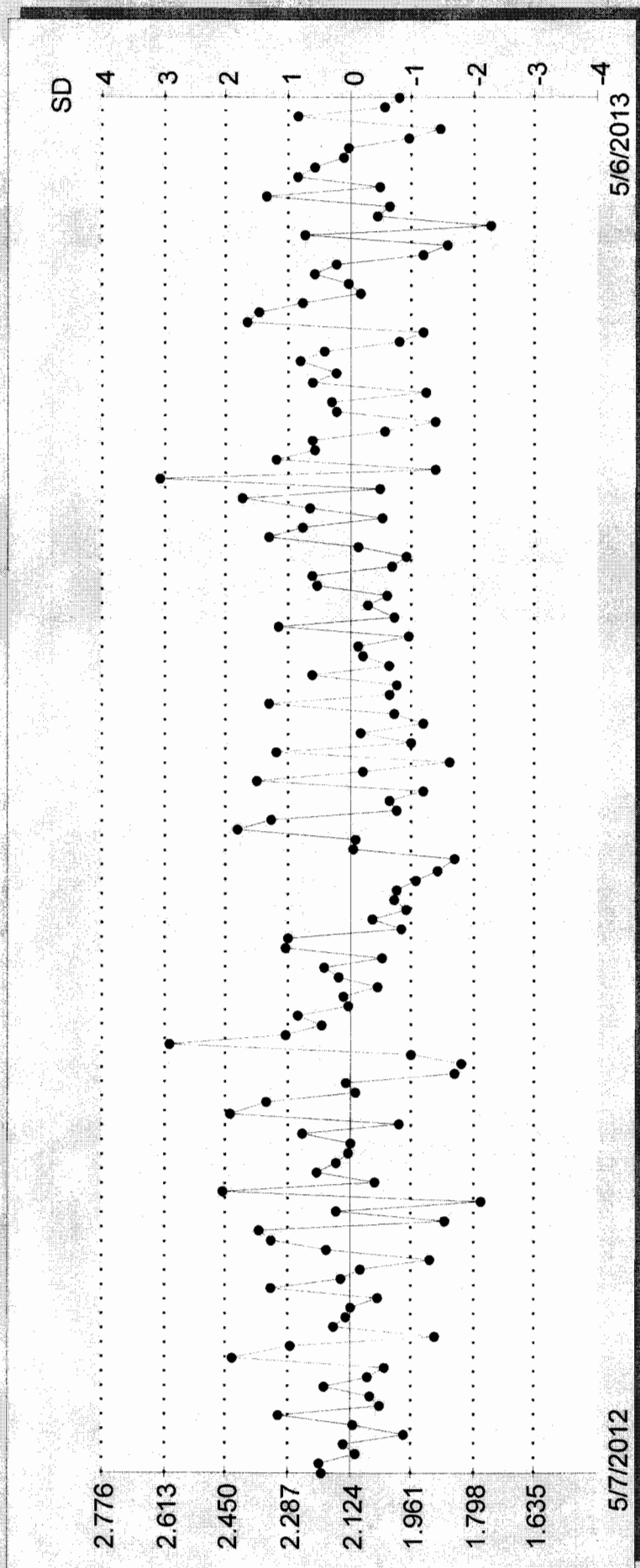
Total # pts : 5540
Valid # pts : 142
Mean : 2.12
SD : 0.16

Date	Value	Valid Pt
May 07, 2012	2.20	X
May 09, 2012	2.20	X
May 14, 2012	2.11	X
May 17, 2012	2.14	X
May 17, 2012	1.98	X
May 23, 2012	2.11	X
May 30, 2012	2.31	X
May 31, 2012	2.04	X
Jun 06, 2012	2.07	X
Jun 13, 2012	2.19	X
Jun 21, 2012	2.08	X
Jun 22, 2012	2.04	X
Jun 25, 2012	2.43	X
Jun 27, 2012	2.28	X
Jun 27, 2012	1.90	X
Jun 28, 2012	2.16	X
Jun 29, 2012	2.13	X
Jun 30, 2012	2.12	X
Jul 05, 2012	2.05	X
Jul 11, 2012	2.33	X
Jul 12, 2012	2.15	X
Jul 16, 2012	2.09	X
Jul 20, 2012	1.91	X
Jul 22, 2012	2.19	X
Jul 26, 2012	2.33	X
Jul 27, 2012	2.36	X
Aug 09, 2012	1.88	X
Aug 13, 2012	2.16	X
Aug 14, 2012	1.78	X
Aug 16, 2012	2.46	X
Aug 17, 2012	2.06	X
Aug 18, 2012	2.21	X
Aug 21, 2012	2.16	X
Aug 22, 2012	2.13	X
Aug 26, 2012	2.12	X
Aug 27, 2012	2.25	X
Aug 27, 2012	1.99	X
Sep 05, 2012	2.44	X
Sep 09, 2012	2.34	X
Sep 11, 2012	2.11	X
Sep 17, 2012	2.14	X
Sep 18, 2012	1.85	X

Sep 20, 2012	1.83	X
Sep 20, 2012	1.96	X
Sep 24, 2012	2.60	X
Sep 28, 2012	2.29	X
Oct 01, 2012	2.20	X
Oct 04, 2012	2.26	X
Oct 05, 2012	2.13	X
Oct 06, 2012	2.14	X
Oct 11, 2012	2.05	X
Oct 12, 2012	2.15	X
Oct 13, 2012	2.19	X
Oct 17, 2012	2.04	X
Oct 19, 2012	2.29	X
Oct 22, 2012	2.29	X
Oct 23, 2012	1.99	X
Oct 23, 2012	2.06	X
Oct 23, 2012	1.98	X
Oct 23, 2012	2.01	X
Oct 25, 2012	2.00	X
Oct 27, 2012	1.95	X
Oct 31, 2012	1.89	X
Nov 02, 2012	1.85	X
Nov 02, 2012	2.11	X
Nov 04, 2012	2.11	X
Nov 05, 2012	2.42	X
Nov 10, 2012	2.33	X
Nov 12, 2012	2.00	X
Nov 12, 2012	2.02	X
Nov 13, 2012	1.93	X
Nov 14, 2012	2.37	X
Nov 15, 2012	2.09	X
Nov 18, 2012	1.86	X
Nov 19, 2012	2.32	X
Nov 19, 2012	1.96	X
Nov 20, 2012	2.09	X
Nov 21, 2012	1.93	X
Nov 23, 2012	2.01	X
Dec 04, 2012	2.34	X
Dec 08, 2012	2.02	X
Dec 12, 2012	2.00	X
Dec 14, 2012	2.22	X
Dec 15, 2012	2.02	X
Dec 21, 2012	2.09	X
Dec 21, 2012	2.10	X
Dec 31, 2012	1.97	X
Jan 02, 2013	2.31	X
Jan 09, 2013	2.01	X
Jan 10, 2013	2.08	X
Feb 01, 2013	2.03	X
Feb 02, 2013	2.21	X
Feb 06, 2013	2.22	X
Feb 08, 2013	2.01	X

Feb 15, 2013	2.10	X
Feb 17, 2013	2.34	X
Feb 18, 2013	2.25	X
Feb 20, 2013	2.04	X
Feb 21, 2013	2.23	X
Feb 22, 2013	2.41	X
Feb 28, 2013	2.04	X
Mar 01, 2013	2.62	X
Mar 01, 2013	1.90	X
Mar 01, 2013	2.32	X
Mar 04, 2013	2.22	X
Mar 04, 2013	2.22	X
Mar 06, 2013	2.04	X
Mar 08, 2013	1.90	X
Mar 08, 2013	2.16	X
Mar 14, 2013	2.17	X
Mar 15, 2013	1.93	X
Mar 18, 2013	2.22	X
Mar 22, 2013	2.16	X
Mar 22, 2013	2.25	X
Mar 23, 2013	2.19	X
Mar 28, 2013	1.99	X
Mar 29, 2013	1.93	X
Apr 04, 2013	2.40	X
Apr 05, 2013	2.36	X
Apr 07, 2013	2.25	X
Apr 11, 2013	2.09	X
Apr 12, 2013	2.13	X
Apr 15, 2013	2.22	X
Apr 16, 2013	2.16	X
Apr 16, 2013	1.93	X
Apr 16, 2013	1.87	X
Apr 16, 2013	2.24	X
Apr 16, 2013	1.75	X
Apr 16, 2013	2.05	X
Apr 18, 2013	2.02	X
Apr 19, 2013	2.34	X
Apr 22, 2013	2.04	X
Apr 24, 2013	2.26	X
Apr 24, 2013	2.22	X
Apr 25, 2013	2.14	X
Apr 25, 2013	2.13	X
Apr 27, 2013	1.97	X
Apr 29, 2013	1.89	X
May 01, 2013	2.26	X
May 03, 2013	2.04	X
May 06, 2013	1.99	X

3H Background
 Total # pts : 5540
 Valid # pts : 142
 Mean : 2.12
 SD : 0.16





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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 9/10/2012 20:16 date counted
 STANDARD REFERENCE # S-0279

Principal Radionuclide

H-3

ENTER -->

Half Life, Years

1.232E+01

OR -->

Half Life, Days

4.4998E+03
4.4998E+03

Radionuclide

H-3

Dilution Reference Date

9/7/2012 10:40

Dilution Activity

2.58

pCi per gram ==> dpm/g

5.73

Verif. Date Decay Corrected

2.58

pCi per gram ==> dpm/g

5.72**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-0279-V1	15.91	1	LSC	0.3302	6.49	5.019	5.68	2.56
S-0279-V2	16.21	1	LSC	0.3291	6.49	5.018	5.89	2.65
S-0279-V3	15.76	1	LSC	0.3290	6.49	5.018	5.62	2.53
S-0279-V4	15.62	1	LSC	0.3293	6.49	5.008	5.54	2.49
S-0279-V5	15.76	1	LSC	0.3280	6.49	5.018	5.63	2.54

10% Max**PASS**

Standard Deviation percent of known concentration

5% Max**PASS**

Average

Two Sigma Uncertainty

Target Activity

% Diff

5.672.550.260.122.30%2.30%5.722.58-0.91%-0.91%Verification Expiration Date: #####

Prepared & Counted By

Date: 9/10/2012 20:16

Verified & Approved By

Date: 9-11-12 0817

QC Approval

Date: 9-11-12 0817**S-0279****H-3**

Verified

9/10/12**SL****Expires****9/10/13****Manufacturer****NIST SRM 4927F****Sol Matrix****H2O****Ref No****NIST SRM 4927F****Tech****Unknown****Parent ID****S-0237****RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY**

H-3 Standard Verification

Verifier's Name: Brian Steffens

Date: 9/7/2012

Pipettor ID: FJ40469

Pipettor ID: Auto-pipettor

Pipettor ID: na

Standard ID: S-0279

Standard ID: N/A

Standards brought up to ~5g with distilled dead water.

Standards made in glass vials.

Weight of Standard		
15mL of Ultima Gold added to standard	S-0279-V1	5.019 g
	S-0279-V2	5.018 g
	S-0279-V3	5.018 g
	S-0279-V4	5.008 g
	S-0279-V5	5.018 g

Balance ID: H1331122173560P

Assay Definition-

Assay Description:
H3 Normal LV1

Assay Type: DPM (Single)

Report Name: Report1

Output Data Path: C:\Packard\Tricarb\Results\ARS\H-3 Normal 3\20120910_0931

Raw Results Path: C:\Packard\Tricarb\Results\ARS\H-3 Normal 3\20120910_0931\20120910_0931.results

RTF File Name: C:\Packard\Tricarb\Results\ARS\H-3 Normal 3\20120910_0931\H3 Results.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\ARS\H-3 Normal 3\20120910_0931\H3 Results.csv

Assay File Name: C:\Packard\Tricarb\Assays\H-3 Normal 3.lsa

Count Conditions-

Nuclide: H-3 Normal

Quench Indicator: tSIE/AEC

External Std Terminator (sec): 0.5 2s

Pre-Count Delay (min): 0.00

Quench Set:

Low Energy: UG STD H-3

Count Time (min): 120.00

Count Mode: Normal

Assay Count Cycles: 1

#Vials/Sample: 1

Repeat Sample Count: 1

Calculate & Reference: Off

Background Subtract: Off

Low CPM Threshold: Off

2 Sigma & Terminator: On - Any Region

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

Count Corrections-

Static Controller: On

Colored Samples: Off

Coincidence Time (nsec): 18

Luminescence Correction: Off

Heterogeneity Monitor: Off

Delay Before Burst (nsec): 75

Half Life-

Half Life Correction: Off

Regions Half life

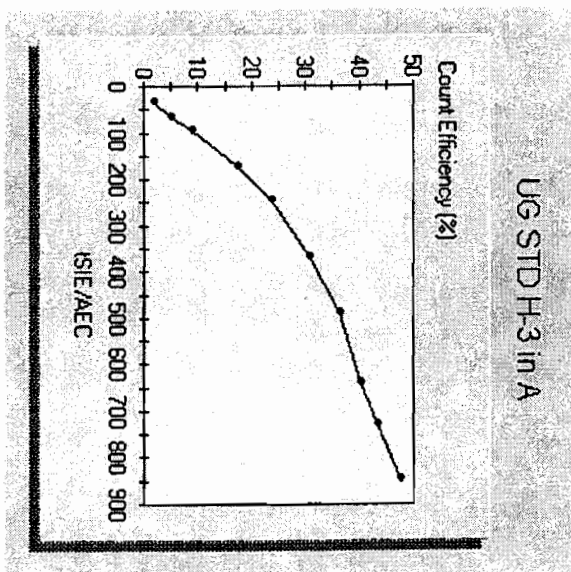
Units

Reference Date

Reference Time

A
 B
 C

Cycle 1 Results
 Quench Curve Block Data



Date Acquired: 06/27/2012
 Date Modified:
 UG STD H-3 in A

tSIE/AEC	Count Efficiency (%)
846.90	47.58
730.85	43.21
639.47	40.08
487.78	36.36
365.41	30.73
244.81	23.69
169.28	17.31
95.01	8.79
64.60	4.97
34.32	1.64

P#	S#	SMPL_ID	CPMA	DPM1	tSIE	Eff Nucl	In A	Count Time	DATE	TIME	MESSAGES
54	1	BACKGROUND	6.49	19.81	409.74		32.77	120.00	9/10/2012	9:36:46 AM	
54	2	S-0279-V1	15.91	48.18	415.20		33.02	120.00	9/10/2012	11:44:40 AM	
54	3	S-0279-V2	16.21	49.25	412.72		32.91	120.00	9/10/2012	1:52:36 PM	
54	4	S-0279-V3	15.76	47.89	412.56		32.90	120.00	9/10/2012	4:00:32 PM	
54	5	S-0279-V4	15.62	47.44	413.22		32.93	120.00	9/10/2012	6:08:27 PM	
54	6	S-0279-V5	15.76	48.04	410.40		32.80	120.00	9/10/2012	8:16:20 PM	

STD ID: S-0279

ARS INTERNATIONAL		Add/Edit Secondary Stds	Parent Standard Data			
Planning		Parent Solution Reference #	NIST SRM 4927F			
Planning Comments	Create a H3 LCS standard.	Parent Solution #	S-0237			
Target dpm/g (on dil. date)	5.5	Parent Principal Radionuclide	H-3	Half Life (Days)	4499.8000000	
Target Final volume mL	2000	Parent Reference Date	03/22/2010 10:10			
Appx mass g of Parent Sol'n	3.606433954	Parent Certified Act	3503.682716	Certi Act/Vol Units	dpm	g
Appx vol ml of Parent Sol'n	3.612937241	Parent Cert Act Uncert 1 Sigma	0.0036			
Expected Addition for Analysis g	5	Parent Sp. Gravity G/ML	0.9982			
Standards Preparation / Dilution		Parent Supplier	NIST SRM 4927F			
Secondary Solution #	S-0279	Parent Date Recvd	01/02/00			
Dilution Date (New Ref Date)	09/07/2012 10:40	Parent Received By	Unknown			
Ampoule, Empty (g)		Parent Cert Exp Date				
Ampoule /Solution Gross (g)		Parent Matrix	H2O			
Net Wt Removed (g)		Certified dpm/g At Ref Date	3503.682716			
Transfer Container, empty (g)	13.144	Certified dpm/g on 06/07/2012 10:40	3050.10438			
Container Plus Solution (g)	16.89	Parent Comments	Intermediate level H-3 standard for creating LCS solutions and matrix spikes. Dilution performed as stated above by B Steffens. -BJS 3/22/10			
Net Wt Transferred (g)	3.746					
DPM Xferred on 09/07/2012 10:40	11425.69101					
Diluent/matrix	DI H2O	Parent Tech	Unknown			
Diluent Density Cont, empty (g)		Is_Primary	FALSE			
Test Mass of 5 ml of Diluent (g)		Is_LCS	TRUE			
Diluent Density Test - (g/mL)		Is_Tracer	FALSE			
Dilution Empty Container Mass (g)	473.93	Is_Calib	FALSE			
Dilution Full Cont g (If measured)	2469.52					
Dilution Final Volume ml (If measured)	2000					
Final Dilution Density (g/mL)	0.997795					
Final Dilution Measured Mass g	1995.59					
Comments	H3 LCS standard. Dilution performed as stated above by B Steffens. -BJS 9/7/12					
Final Dilution dpm/g	5.725470166					
Final Dil New Ref Date/Time	09/07/2012 10:40					



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Report Compilation Checklist

ARS SDG: 13-00870 Client Name: LANL Sample Matrix: AQ

LEVEL 1 COMPONENTS

	1st Reviewer			
1) Cover Page Complete and Accurate (see ARS-059)?	<input checked="" type="checkbox"/> Yes	No	N/A	
2) Technical Review Checklist(s) Complete and Accurate?	<input checked="" type="checkbox"/> Yes	No	N/A	
3) Case Narrative Complete and Accurate (see ARS-059)?	<input checked="" type="checkbox"/> Yes	No	N/A	
4) Form 1s Present for all Samples and Tests?	<input checked="" type="checkbox"/> Yes	No	N/A	
5) Client Specific Components are Present and Complete?	Yes	No	<input checked="" type="checkbox"/> N/A	

LEVEL 2 COMPONENTS

	1st Reviewer			
6) Batch Quality Control Report is Present and Accurate?	<input checked="" type="checkbox"/> Yes	No	N/A	
7) DQO Report is Present and Accurate?	<input checked="" type="checkbox"/> Yes	No	N/A	
8) Client Specific Batch QC Components are Present and Complete?	Yes	No	<input checked="" type="checkbox"/> N/A	

LEVEL 3 COMPONENTS

	1st Reviewer			
9) Efficiencies are Present?	<input checked="" type="checkbox"/> Yes	No	N/A	
10) Calibrations are Present?	<input checked="" type="checkbox"/> Yes	No	N/A	
11) Backgrounds are Present?	<input checked="" type="checkbox"/> Yes	No	N/A	
12) Spectrum Analysis is Present?	<input checked="" type="checkbox"/> Yes	No	N/A	
13) Spectral Plots are Present?	<input checked="" type="checkbox"/> Yes	No	N/A	
14) Plateaus are Present?	<input checked="" type="checkbox"/> Yes	No	N/A	
15) Control Charts are Present?	<input checked="" type="checkbox"/> Yes	No	N/A	
16) Other:	Yes	No	<input checked="" type="checkbox"/> N/A	

LEVEL 4 COMPONENTS

	1st Reviewer			
17) Preparation Raw Data Present, Signed and Complete?	<input checked="" type="checkbox"/> Yes	No	N/A	
18) Instrument Raw Data Present and Complete?	<input checked="" type="checkbox"/> Yes	No	N/A	
19) Calibration Certificates Present?	<input checked="" type="checkbox"/> Yes	No	N/A	
20) Copies of Log Book Pages Present?	<input checked="" type="checkbox"/> Yes	No	N/A	
21) Sample Receiving Documentation Present?	<input checked="" type="checkbox"/> Yes	No	N/A	
22) LIMS Reports Present?	<input checked="" type="checkbox"/> Yes	No	N/A	
23) Applicable Correspondence Present?	<input checked="" type="checkbox"/> Yes	No	N/A	
24) Other:	Yes	No	<input checked="" type="checkbox"/> N/A	

802

Report Generator Signature

5-29-13

Date

James D. Pen

Management Review Signature

5-29-13

Date



LSC Technical Review Checklist

ARS SDG ARS1-13-00870

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

Required QC Samples (Mark all that apply): Blank ☒ LGS ☒ LGS-D Sample Dup MS MSD

ARS A. Batch ID(s): Batch A: B13-00960 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?	<input checked="" type="radio"/> Yes No N/A	<input checked="" type="radio"/> Yes No N/A	
2) 100% of Manual Calculations Verified?	Yes No <input checked="" type="radio"/> N/A	Yes No <input checked="" type="radio"/> N/A	
3) Blank Composition/Configuration Matches Calibration?	<input checked="" type="radio"/> Yes No N/A	<input checked="" type="radio"/> Yes No N/A	
4) Deviations from procedure are documented and verified?	Yes No <input checked="" type="radio"/> N/A	Yes No <input checked="" type="radio"/> N/A	
5) Appropriate Cocktail Selected?	<input checked="" type="radio"/> Yes No N/A	<input checked="" type="radio"/> Yes No N/A	
6) Sample Prep Anomaly? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes (See Tech Notes) NCR # (If initiated): _____			
<u>PV S</u> Chemist Signature	<u>5-28-13</u> Date	<u>[Signature]</u> Verifier Review Signature	<u>5-28-13</u> Date

B. ANALYSIS REVIEW

	Analyst Review	QA Officer Review	
1) Calibrations Valid and Current?	<input checked="" type="radio"/> Yes No N/A	<input checked="" type="radio"/> Yes No N/A	
2) Backgrounds Valid and Current?	<input checked="" type="radio"/> Yes No N/A	<input checked="" type="radio"/> Yes No N/A	
3) Source Checks Completed and Acceptable?	<input checked="" type="radio"/> Yes No N/A	<input checked="" type="radio"/> Yes No N/A	
<u>[Signature]</u> QA Officer Signature		<u>5-29-13</u> Date	
	Analyst Review	Technical Review	
4) Background Checks Complete and Acceptable?	<input checked="" type="radio"/> Yes No N/A	<input checked="" type="radio"/> Yes No N/A	
5) 100% of Manually Entered Parameters Verified Accurate?	<input checked="" type="radio"/> Yes No N/A	<input checked="" type="radio"/> Yes No N/A	
6) Appropriate QC samples initiated at required frequency?	<input checked="" type="radio"/> Yes No N/A	<input checked="" type="radio"/> 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?	<input checked="" type="radio"/> Yes No N/A	<input checked="" type="radio"/> Yes No N/A	
b) Spectra show no Evidence of Interferences?	<input checked="" type="radio"/> Yes No N/A	<input checked="" type="radio"/> Yes No N/A	
c) Sample Quench for All Samples within Range of Quench Curve?	<input checked="" type="radio"/> Yes No N/A	<input checked="" type="radio"/> Yes No N/A	
7) Analysis Anomaly? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes (See Comments) NCR # (If initiated): _____			
<u>PV S</u> Analyst Signature	<u>5-28-13</u> Date	<u>[Signature]</u> Technical Reviewer Signature	<u>5-28-13</u> Date



LSC Technical Review Checklist

ARS SDG ARS1-13-00870Sample 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: B13-00910 Batch B: N/A Batch C: N/ATest Method(s): LSC-A-021 N/A N/A

A. RADIOCHEMICAL PREPARATION REVIEW



	Chemist Review			Verifier Review		
1) 100% of Manual Transcriptions Verified?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
2) 100% of Manual Calculations Verified?	Yes	No	<u>N/A</u>	Yes	No	<u>N/A</u>
3) Blank Composition/Configuration Matches Calibration?	Yes	No	<u>N/A</u>	Yes	No	<u>N/A</u>
4) Deviations from procedure are documented and verified?	Yes	No	<u>N/A</u>	Yes	No	<u>N/A</u>
5) Appropriate Cocktail Selected?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
6) Sample Prep Anomaly? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (See Tech Notes) NCR # (If initiated): _____						
<div>Chemist Signature: <u>Pg</u> Date: <u>5-7-13</u></div> <div>Verifier Review Signature: <u>Christy</u> Date: <u>5-7-13</u></div>						

B. ANALYSIS REVIEW

	Analyst Review			QA Officer Review		
1) Calibrations Valid and Current?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
2) Backgrounds Valid and Current?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
3) Source Checks Completed and Acceptable?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
QA Officer Signature: <u>James D. Lee</u> Date: <u>5-29-13</u>						
	Analyst Review			Technical Review		
4) Background Checks Complete and Acceptable?	<u>Yes</u>	No	N/A	Yes	No	N/A
5) 100% of Manually Entered Parameters Verified Accurate?	<u>Yes</u>	No	N/A	Yes	No	N/A
6) Appropriate QC samples initiated at required frequency?	<u>Yes</u>	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?	<u>Yes</u>	No	N/A	Yes	No	N/A
b) Spectra show no Evidence of Interferences?	<u>Yes</u>	No	N/A	Yes	No	N/A
c) Sample Quench for All Samples within Range of Quench Curve?	<u>Yes</u>	No	N/A	Yes	No	N/A
7) Analysis Anomaly? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (See Comments) NCR # (If initiated): _____						
<div>Analyst Signature: <u>Dr</u> Date: <u>5-7-13</u></div> <div>Technical Reviewer Signature: <u>N/A</u> Date: _____</div>						



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? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (See Tech Notes) NCR # (If initiated): _____				
 Project Manager Signature		 QA Officer Signature		
Date <u>5-29-13</u>		Date <u>5-29-13</u>		

GENERAL COMMENTS

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

DQO Report for SDG
ARS1-13-00870

American Radiation Services
Baton Rouge Laboratory

Analysis Code	Group	Isotope	Activity Units	Aliquot Units	ProcedureNo	RDL	LCS_LL	LCS_UL	MS_LL	MS_UL	Rdy_LL	Rdy_UL	Grav_LL	Grav_UL	RER	RPD	DilutionReq	RoughPrepReq	BlankCorrectionMDA	BlankCorrectionAll	CountTimeReq	AliquotRequired
LSC-A-021	STD	H-3	PCI	L	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	PCI	L	ARS-040	0.00E+00	75	125	60	140	30	110	40	110	1.00	25	FALSE	FALSE	FALSE	FALSE		

SDG Specific Data

Samples and Containers (→) Checked In This Far														
FR	ClientID	Matrix	SampleStartDate	SampleEndDate	Disp	Hold	Arch	Storage	X	Units	Y	Units	Z	Comments
001 →	CAPA-13-29667	AQ	04/25/13 12:41 PM	04/25/13 12:41 PM	H	90	5	K4						
	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Total Vol
	135774	1	1000.00				80	30		N	N/A			
002 →	CAPA-13-29651	AQ	04/25/13 12:41 PM	04/25/13 12:41 PM	H	90	5	K4						
	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Total Vol
	135775	1	1000.00				80	30		N	N/A			
003 →	CAPA-13-29653	AQ	04/25/13 03:40 PM	04/25/13 03:40 PM	H	90	5	K4						
	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Total Vol
	135776	1	1000.00				80	30		N	N/A			

SDG Report - Analysis Assignments

Temp SDG	ARS1-13-00870	Sample Count	
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

ARS FILE TRACKING SHEET

SDG: ARS1-13-00870

Task	Date / Time	Initials
Date & Time Samples Received	05-02-13/13:35	WFW
ICOC Initiated/Storage Location: <u>K4</u>	05-02-13/15:23	WFW
Technical Checks Performed	<i>See Batch</i>	
Report Written / EDD Generated <i>5-29-13 1435 SDL</i>	<i>5-29-13/1431</i>	<i>SDL</i>
Quality Assurance Checks Performed on Report	<i>5-29-13 1548</i>	<i>JDL</i>
Management Checks Performed on Report		
<i>Preliminary Report Scan</i>		
Report E-mailed/Faxed		
Report Reviewed		
Report Mailed		
Invoice Completed Invoice #: _____		
Report Imaged		

SPECIAL REQUIREMENTS

Requirement	Yes	No
3 Hour Rush	<input type="checkbox"/>	<input checked="" type="checkbox"/>
24 Hour Rush	<input type="checkbox"/>	<input checked="" type="checkbox"/>
48 Hour Rush	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3 Day Rush	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5 Day Rush	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10 Day Rush	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Standard Oil/Gas Client (5 Day)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Standard Turnaround	<input checked="" type="checkbox"/>	<input type="checkbox"/>

NOTES

SDG: ARSI-13-00870

SHIPPING CONTAINER

COC PRESENT WITH SAMPLES

COC ☒ Yes ☐ No

SAMPLE CONTAINER(S)

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

Samples Rcv

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

Exposure Rate Meter: <u>M3 242861</u>		Serial No.: <u>PR264244</u>	Calibration Due Date: <u>4-16-14</u>
Count Rate Meter: <u>M2 154859</u>		Serial No.: <u>PR184559</u>	Calibration Due Date: <u>4-16-14</u>
Background Exposure Rate ($\mu\text{R/hr}$) <u>30</u>		Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd) <u>30</u> $\mu\text{R/hr}$	
Background Count Rate (cpm) <u>80</u>		Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd) <u>80</u> cpm	
		Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd) <u>80</u> cpm	

[illegible]

Surveyors' Name: Wanda White

Date/Time Surveyed: 5-2-13 15:14