

1726 Wooddale Court
Baton Rouge LA 70806

COC/Lab Request #:
12-1497

Page 1 of 1

[illegible]

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 3955

EVENT NAME:

Mortandad (Chromium
Monitoring) Q4 Watershed
Sampling

SAMPLE ID: CAMO-12-21741

WORK ORDER: NA

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
DATE COLLECTED (MM/DD/YYYY):		08/08/2012	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):		1740	MEDIA:	UA	↓
PRS ID:		OK	SAMPLE TECH CODE:	UA	65P
LOCATION ID: R-62		↓	FIELD PREP:	UF	OK
LOCATION TYPE: MON		↓	FIELD QC TYPE:	REG	↓
PORT: SINGLE COMPLETION		↓	SAMPLE USAGE:	INV	↓

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2	HCL	Y	7 day turn
	WSP-8270C-SVOA	1 LITER AMBER GLASS	3	ICE	↓	7 day turn
	WSP-8321A-NMED HEXP	1 LITER AMBER GLASS	3	ICE	↓	7 day turn
	WSP-GrossA/B	1 LITER POLY	1	NONE	↓	7 day turn
	WSP-HEXMOD	1 LITER AMBER GLASS	2	ICE	↓	7 day turn
	WSP-LL-H-3	1 LITER POLY	1	NONE	↓	7 day turn
↓	WSP-RAD	1 GAL POLY	1	HNO3	↓	7 day turn
↓	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4	↓	7 day turn

SAMPLE COMMENTS: Sampled at 9 CVs. Samples collected within
50 ft of running diesel generator.

LOCATION COMMENTS: NA

FIELD PARAMETERS:

Dissolved Oxygen 6.01 mg/L

Oxidation-Reduction Potential 72.7 MV

pH 8.31 SU

Specific Conductance 165 uS/cm

Temperature 21.83 deg C

Turbidity 0.65 NTU

COLLECTED BY (PRINT) D. Fellenz

RELINQUISHED BY (Printed Name) David Fellenz (Signature) <i>[Signature]</i>	Date/Time 8/9/12 0940	RECEIVED BY (Printed Name) <i>[Signature]</i> (Signature) <i>[Signature]</i>	Date/Time 8/9/12 940
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date 07/30/2012

Data Validation Report

Chain Of Custody No. 12-1497

1. Distribution Of Samples In EDD.

	Analytical	Regular	Field	Trip	Field	Equipment
SDG	Method	Samples	Duplicates	Blanks	Blanks	Blanks
ARS1-12-01671	Generic:Low_Level_Tritium	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
ARS1-12-01671	Generic:Low_Level_Tritium	ARS1-B12-01999	ARS1-B12-01999	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	CAMO-12-21741	ARS1-B12-01999-04	REG	1	0	0	0
Generic:Low_Level_Tritium	RAD	LCS	ARS1-B12-01999-01	LCS	0	0	1	0
Generic:Low_Level_Tritium	RAD	LCSD	ARS1-B12-01999-02	LCSD	0	0	1	0
Generic:Low_Level_Tritium	RAD	MB	ARS1-B12-01999-03	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

Field	Lab	Type Of	Analytical	Sample	Parameter	Lab	Lab		Lab
Sample ID	Sample ID	Blank	Method	Matrix	Name	Result	Qualifier	Units	Detection Limit
MB	ARS1-B12-01999-03	METHOD BLANK	Generic:Low_Level_Tritium	W	Tritium	2.235		pCi/L	1.96

Any samples affected by the presence of contaminants in blanks?

Field	Blank Field	Blank Lab	Blank	Analytical	Parameter		Blank	Sample	Lab	Detect	
Sample ID	Sample ID	Sample ID	Type	Method	Name	Units	Result	Result	Qualifier	Limit	Detected
CAMO-12-21741	MB	ARS1-B12-01999-03	METHOD BLANK	Generic:Low_Level_Tritium	Tritium	pCi/L	2.235	7.009		2.032	Y

6. Any surrogate recoveries outside the control limits?

No.

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

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						

Correction	Correction	Use
Factor (ND)	Factor (I)	Factors
5		Y

No.

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

No.

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 Coments.

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-62	12-1497	CAMO-12-21741	REG	INIT	RAD	Generic:Low_Level_Tritium	Tritium		U	R4	N

Reason Code	Description
R4	The sample result is <=5X the concentration of the related analyte in the method blank.

14. Useable Result Count.

Field	Location	Sample	Analytical	No. Unuseable	Total No. Of
Sample ID	ID	Purpose	Method	Records	Records
CAMO-12-21741	R-62	REG	Generic:Low_Level_Tritium	0	1

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
7.009	pCi/L	7.009	pCi/L	2.032	1.284	W	8/8/2012		ARS1-B12- 01999	VAL	Y



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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Request Number: 12-1497



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Request: 12-1497**

Original COC

American Radiation Services - Primary 1726 Wooddale Court Baton Rouge LA 70806		Chain of Custody/Analysis Request		COC/Lab Request #: 12-1497 Page 1 of 1	
Client Contact:		Lab Agreement # : 63641-001-10 Project Number :		Site Name: Los Alamos National Laboratory	
Analysis Turnaround Time: 24 Hour - <input type="checkbox"/> 7 Day - <input type="checkbox"/> 14 Day - <input type="checkbox"/> 21 Day - <input type="checkbox"/> 28 Day - <input checked="" type="checkbox"/> Other - <input type="checkbox"/>		Sample Date Aug 8 2012		Sample Time 17:40	
Field Sample ID CAMO-12-21741		Sample Matrix W		Rad Screening Info: Yes, Below Background	
Special Instructions:		Special Instructions:		Special Instructions:	
Relinquished by: S. Sherwood		Date/Time: 8/15/12 3pm		Received by: [Signature]	
Relinquished by:		Date/Time:		Received by:	
Relinquished by:		Date/Time:		Received by:	



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for

**Los Alamos National Laboratory
Request: 12-1497**

Case Narrative



2609 North River Road • Port Allen, Louisiana 70767

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September 11, 2012

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

Request Number: **12-1497**
LANL Sample ID: **CAMO-12-21741**

Dear Mr. Greene;

On August 16, 2012, ARS International received one (1) water sample to be analyzed for Low Level Tritium.

The sample underwent enrichment and was 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)
12-1497	CAMO-12-21741	ARS1-12-01671-001

ANALYTICAL METHODS

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

ANALYTICAL RESULTS

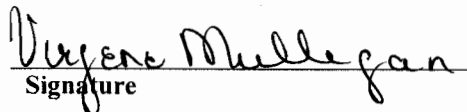
The result data that are flagged with "U" indicate that the activity is below the MDC.

Activity of the Method Blank exceeded that of the Blank MDA, but at 2 sigma, was still less than 1.65 times Blank CSU, and therefore met acceptance criteria.

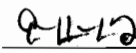
American Radiation Services Project Manager/Laboratory Director's Comments:

"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


Date



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for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting



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

ARS Sample Delivery Group: ARS1-12-01671
Client Sample ID: CAMO-12-21741
Sample Collection Date: 08/08/12
Sample Matrix: Aqueous

Request or PO Number: 12-1497
ARS Sample ID: ARS1-12-01671-001
Date Received: 08/16/12
Report Date: 09/11/12

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	7.009	1.284	2.032	0.980		pCi/L	ARS-040	09/08/12 19:56	RJU	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.

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QC Results Report

Sample Delivery Group: ARS1-12-01671

Date Received: 8/16/2012

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-B12-01999	LCS	H3	22.031	3.458	2.168	24.931		pCi/L	ARS-040	9/8/12 5:23	RJU	88	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-B12-01999	MBL	H3	2.235	0.707	1.960	NA		pCi/L	ARS-040	9/8/12 5:23	RJU

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-B12-01999	LCSD	H3	22.031	3.458	24.093	3.752		pCi/L	ARS-040	9/8/12 5:23	RJU	0.29	< 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-B12-01999	LCSD	H3	22.031	3.458	24.093	3.752		pCi/L	ARS-040	9/8/12 5:23	RJU	0.81	< 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.

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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-B12-01999												
												
	Method				ARS-040	Analysis			LSC-A-022	Matrix	AQ	
	Description				Low Level Tritium by Electrolytic Enrichment							
	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline		
ABatch Sample ID												
ARS1-B12-01999-01	LCS	B-14311										
ARS1-B12-01999-02	LCSD	B-14312										
ARS1-B12-01999-03	MBL											
ARS1-B12-01999-04	TRG											
					ARS1-12-01671	001	1	CAMO-12-21741	STD		09/10/12	

122384
12-01671-001-1
WRAD

LCS Report
Analytical Batch: ARS1-B12-01999

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-14311	ARS1-B12-01999	ARS1-B12-01999-01	B-H3	S-0262	H-3	5	2.444624247	13.392	18.5214	5.1294	BSTEFFENS	8/20/2012	2.437479902	9/8/2012	12.50280941
B-14312	ARS1-B12-01999	ARS1-B12-01999-02	B-H3	S-0262	H-3	5	2.444624247	13.3949	18.4957	5.1008	BSTEFFENS	8/20/2012	2.437479902	9/8/2012	12.43309748

Assay Definition-

Assay Description:

LLH3 Assay in DPM Mode

Assay Type: DPM (Single)

Report Name: Report1

Output Data Path: C:\Packard\Tricarb\Results\ARS\Low Level H3_4\20120908_0103

Raw Results Path: C:\Packard\Tricarb\Results\ARS\Low Level H3_4\20120908_0103\20120908_0103.results

RTF File Name: C:\Packard\Tricarb\Results\ARS\Low Level H3_4\20120908_0103\LLH3.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\ARS\Low Level H3_4\20120908_0103\LLH3 Results.csv

Assay File Name: C:\Packard\Tricarb\Assays\Low Level H3_4.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

Delay Before Burst (nsec): 75

Half Life-

Half Life Correction: Off

Regions Half Life

Units Reference Date

Reference Time

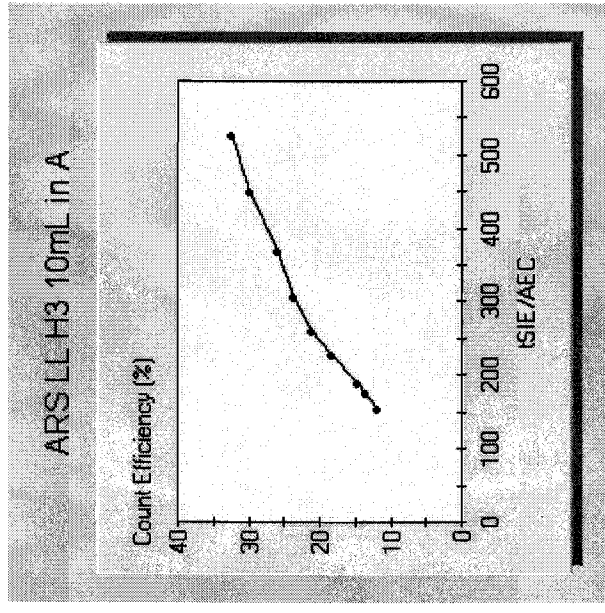
A

B

C

Cycle 1 Results

Quench Curve Block Data



Date Acquired: 11/18/2011

Date Modified:

ARS LL H3 10mL in A

tSIE/AEC	Count Efficiency (%)
526.29	32.47
450.16	29.90
370.15	25.92
306.68	23.60
260.68	20.99
228.69	18.21
189.46	14.53
177.14	13.64
155.73	11.73

Protocol# 28 - Low Level H3_4.lsa

User: ARS

P#	S#	SMPL_ID	CPMA	DPM1	TSIE	Eff Nucl In A	Count Time	DATE	TIME	MESSAGES
28	1	BACKGROUND	1.016	3.94	365.34	25.75	240.00	9/8/2012	1:12:23 AM	
28	2	B12-01999-01	4.207	15.36	399.62	27.39	240.00	9/8/2012	5:23:20 AM	
28	3	B12-01999-02	4.699	17.06	402.65	27.54	240.00	9/8/2012	9:34:18 AM	
28	4	B12-01999-03	1.374	4.90	413.16	28.06	240.00	9/8/2012	1:45:15 PM	
28	5	B12-01999-04	2.099	7.70	396.88	27.25	240.00	9/8/2012	5:56:15 PM	

LSC Instrument Data Transfer Report															\\Pcard3170\Results\ARS\Low Level H3_4\20120908_0103\LLH3 Results.csv
				Batch Sample ID			Non-BKG Samples Transferred			Samples Eligible To Save					
				ARS1-B12-01999			4			4					LSC 1
LIMS Batch Sample ID	LSC Pa	LSC PID	LSC S#	LSC SNPL_ID	LSC Count Date	LSC CPMA	LSC LSIE	LSC EFF	LSC Count Dur	Analysis Batch	LIMS SDG	LIMS Run	LIMS Fraction	LIMS Analysis	
1 BKG	28		1	BACKGROUND	09/08/12 01:12	1.02	365.34	25.7500	240.00	ARS1-B12-01999					
2 ARS1-B12-01999-01	28		2	B12-01999-01	09/08/12 05:23	4.21	399.62	27.3900	240.00	ARS1-B12-01999					
3 ARS1-B12-01999-02	28		3	B12-01999-02	09/08/12 09:34	4.70	402.65	27.5400	240.00	ARS1-B12-01999					
4 ARS1-B12-01999-03	28		4	B12-01999-03	09/08/12 13:45	1.37	413.16	28.0600	240.00	ARS1-B12-01999					
5 ARS1-B12-01999-04	28		5	B12-01999-04	09/08/12 17:56	2.10	396.88	27.2500	240.00	ARS1-B12-01999	ARS1-12-01671	1 001		LSC-A-022	



LSC Instrument Data Transfer Report

\\Pedarad3170\Results\ARS\Low Level H3_4\20120908_0103\LLH3 Results.csv



LSC Instrument Data Transfer Report

\\Peckard3170\Results\ARS\Low Level H3_4\20:

Batch Sample ID				Non-BKG Samples Transferred				Samples Eligible To Save				LSC 1			
ARS1-B12-01999				4				4				LSC 1			
LIMS Batch Sample ID	LSC P#	LSC PID	LSC S#	LSC SMPL ID	LSC Count Date	LSC CPMA	LSC SIE	LSC EFF	LSC Count Dur	Analysis Batch	LIMS SDG	LIMS Run			
BKG	28		1	BACKGROUND	09/08/12 01:12	1.02	365.34	25.7500	240.00	ARS1-B12-01999					
ARS1-B12-01999-01	28		2	B12-01999-01	09/08/12 05:23	4.21	399.62	27.3900	240.00	ARS1-B12-01999					
ARS1-B12-01999-02	28		3	B12-01999-02	09/08/12 09:34	4.70	402.65	27.5400	240.00	ARS1-B12-01999					
ARS1-B12-01999-03	28		4	B12-01999-03	09/08/12 13:45	1.37	413.16	28.0600	240.00	ARS1-B12-01999					
ARS1-B12-01999-04	28		5	B12-01999-04	09/08/12 17:56	2.10	396.88	27.2500	240.00	ARS1-B12-01999	ARS1-12-01671	1			

ARS-040 Calculation Results			
ARS1-B12-01999			
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-B12-01999-01	501.490	2.020	17.680	2.073	15.607	0.031	25.205
LSC-A-022	ARS1-B12-01999-02	500.700	2.060	16.930	2.114	14.816	0.030	26.457
LSC-A-022	ARS1-B12-01999-03	501.140	2.050	17.390	2.103	15.287	0.031	25.696
LSC-A-022	ARS1-B12-01999-04	500.860	2.000	17.350	2.052	15.298	0.031	25.664

ARS-040 Calculation Results			
ARS1-B12-01999			
ACF	1		
UCF	2.22		
Sys Error	0.15		

AnalysisCode	ABatchSampleID	Average_Sample_CPM	Bkg_CPM	LSIE	Detector_Eff_decimal	Aliquot	AliqUnits	Activity_reference_date	Start_Date_of_Count	Sample_Count	Duration_min
LSC-A-022	ARS1-B12-01999-01	4.207	1.016	399.620	0.274	0.01000	L	9/7/2011	9/8/2012		240.000
LSC-A-022	ARS1-B12-01999-02	4.699	1.016	402.650	0.275	0.01000	L	9/7/2011	9/8/2012		240.000
LSC-A-022	ARS1-B12-01999-03	1.374	1.016	413.160	0.281	0.01001	L	9/7/2012	9/8/2012		240.000
LSC-A-022	ARS1-B12-01999-04	2.099	1.016	396.880	0.273	0.01000	L	8/8/2012	9/8/2012		240.000

ARS-040 Calculation Results

ARS1-B12-01999

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-B12-01999-01		240.000	0.94504	22.031	1.019	1.019	3.458	1.996	6.778	2.168	1.045	pCi
LSC-A-022	ARS1-B12-01999-02		240.000	0.94504	24.093	1.009	1.009	3.752	1.979	7.355	2.054	0.990	pCi
LSC-A-022	ARS1-B12-01999-03		240.000	0.99985	2.235	0.623	0.623	0.707	1.221	1.386	1.960	0.945	pCi
LSC-A-022	ARS1-B12-01999-04		240.000	0.99524	7.009	0.737	0.737	1.284	1.445	2.517	2.032	0.980	pCi

ARS-040 Calculation Results

ARS1-B12-01999

ACF	1
UCF	2.22
Sys Error	0.15

AnalysisCode	ABatchSampleID	AliquotReportUnits	UserID	ModDate
LSC-A-022	ARS1-B12-01999-01	L	AMRAD\RUSEY	9/11/2012
LSC-A-022	ARS1-B12-01999-02	L	AMRAD\RUSEY	9/11/2012
LSC-A-022	ARS1-B12-01999-03	L	AMRAD\RUSEY	9/11/2012
LSC-A-022	ARS1-B12-01999-04	L	AMRAD\RUSEY	9/11/2012

ID_31001_040	ABatch	AnalysisCode	ABatchSampleID	ClientID	IC_ID	S01_1_EnrichCellNo	S01_2_TareCell	S01_3_TareResv	S02_GrossWtResv	S03_1_WtNa2O2	C_GrossSampleAdded
300	ARS1-B12-01999	LSC-A-022	ARS1-B12-01999-01		8		334.23	210.62	712.11	2.02	501.49
301	ARS1-B12-01999	LSC-A-022	ARS1-B12-01999-02		12		336.43	208.41	709.11	2.06	500.7
302	ARS1-B12-01999	LSC-A-022	ARS1-B12-01999-03		18		334.43	214.13	715.27	2.05	501.14
303	ARS1-B12-01999	LSC-A-022	ARS1-B12-01999-04	CAMO-12-21741	24		326	206.68	707.54	2	500.86

Ben [Signature] 9-7-12

S04_1_ElectroID	S04_2_StartAmp	S04_3_StartBathC	S05_1_ElectroIED	S05_2_EndBathC	S05_3_EndCellWt	C_GrossSmplRec	C_EnrichmentF	S06_TareWt	S07_GrossWt	C_RecoveredWa
08/20/2012 15:00:00	5	1.8	09/05/2012 07:07:00	1.9	562.53	17.68	28.364819	115.6	128.85	13.25
08/20/2012 15:00:00	5	1.8	09/05/2012 07:08:00	1.9	561.77	16.93	29.57471943	110.59	122.2	11.61
08/20/2012 15:00:00	5	1.8	09/05/2012 07:10:00	1.9	565.95	17.39	28.81771133	112.33	126.15	13.82
08/20/2012 15:00:00	5	1.8	09/05/2012 07:12:00	1.9	550.03	17.35	28.86801153	101.83	116.36	14.53

Ben R. Ayers 9-7-12

S08_TearWtLSCVial	S09_VialPlusSmpl	C_NetSample	S10_1_WtVisIsmplDrWatFill	C_NetDeadWaterAdded	C_TareWtBFcocktail	S10_2_GrossWtVSC	C_NetWtCocktailAdded	UserID	ModDate
6.48	16.48	10	0	0	16.48	27.24	10.76	AMRAD\RUSEY	09/07/2012 11:45:10
6.49	16.49	10	0	0	16.49	27.75	11.26	AMRAD\RUSEY	09/07/2012 11:50:07
6.44	16.45	10.01	0	0	16.45	27.16	10.71	AMRAD\RUSEY	09/07/2012 11:52:03
6.44	16.44	10	0	0	16.44	27.09	10.65	AMRAD\RUSEY	09/07/2012 11:54:34

[Handwritten signature] 9-7-12

QC Evaluation
EPA Method: ARS-040
Batch ID: ARS1-B12-01999
SDG's: ARS1-12-01671

LCS	22.0310	CSU (2s)	6.7780
LCSD	24.0930	CSU-D (2s)	7.3550

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

$$DER = \frac{2.062}{5.000933} = 0.412323 < 3$$

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

$$\%RPD = \frac{2.062}{23.062} * 100 = 8.941115 < 25\%$$

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

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

$$RER = \frac{2.062}{14.1330} = 0.145899667 < 1$$

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	2.235	1.386	1.96	
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 = 2.235
CSU = 1.386
Is ACT < 1.65*CSU? **YES**

LANL

ARS Batch Number:

ARS1-B12 - 01999

Enter
these
Values
for
LCSCurrent ACT
NetWt
Aliquot5.4112
5.1294
0.5015

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

Report Name Field Name on the Report

Standards Report ACT at Date Above (dpm/g)
LCS Report NetWt
Tritium Enrichment Data Gross Sample Added/1000Enter
these
Values
for
LCSDCurrent ACT
NetWt
Aliquot5.4112
5.1008
0.5007

Expected Value Calculations

ARS Batch Number:

ARS1-B11 - 01999

LCS

CALCULATED
= EXPECTED VALUE

24.931

Range

19.945 - 29.918

LCSD

CALCULATED
= EXPECTED VALUE

24.831

Range

19.865 - 29.798



Standards Activity as of: 09/08/12 05:23

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
	5-1175		51	09/01/12	09/01/12	OK	09/01/12	5.0E+05	5.0E+05	5.0E+05	5-1175		

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
9-6-12	1001	B12-02129-09	B12-02129	1004	DJH
↓	↓	B12-02129-10	↓	↓	DJH
↓	↓	B12-02129-11	↓	↓	DJH
↓	↓	B12-02129-12	↓	↓	DJH
↓	↓	B12-02129-13	↓	↓	DJH
↓	↓	B12-02129-14	↓	↓	DJH
↓	↓	B12-02129-15	↓	↓	DJH
↓	↓	B12-02129-16	↓	↓	DJH
↓	↓	B12-02129-17	↓	↓	DJH
↓	↓	B12-02129-18	↓	↓	DJH
↓	↓	B12-02129-19	↓	↓	DJH
↓	↓	B12-02129-20	↓	↓	DJH
9-6-12	1500	SAC-16	QA	QA	DJH
9-7-12	1205	Background	B12-01999	0103	DJH
↓	↓	B12-01999-01	↓	↓	DJH
↓	↓	B12-01999-02	↓	↓	DJH
↓	↓	B12-01999-03	↓	↓	DJH
↓	↓	B12-01999-04	↓	↓	DJH
9-7-12	1405	Background	B12-02154	2158	DJH
↓	↓	B12-02154-04	↓	↓	DJH

203 Net
Count Rate
4-7-12



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Low Level Tritium

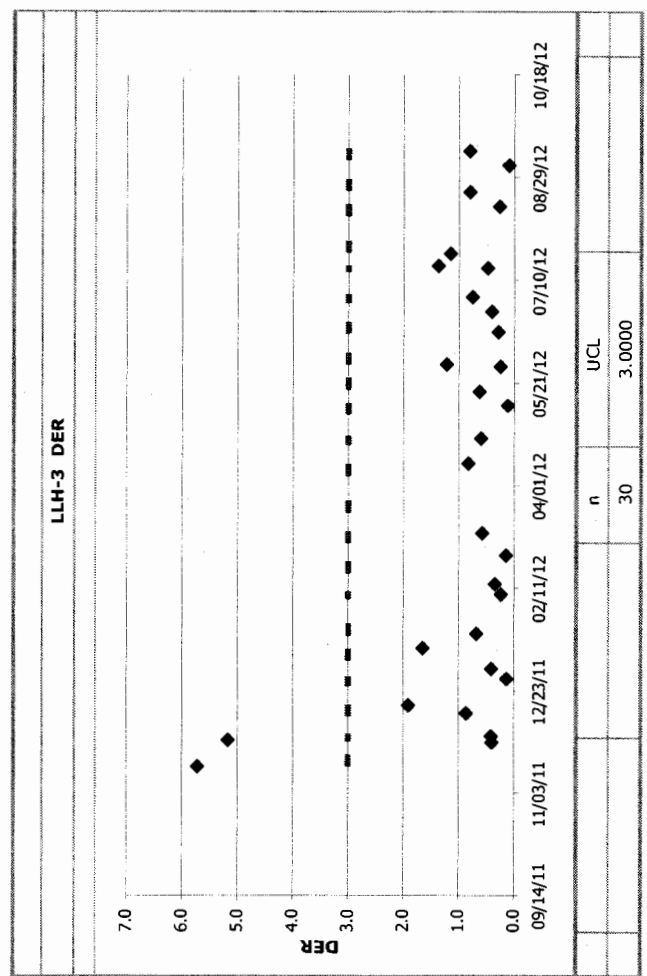
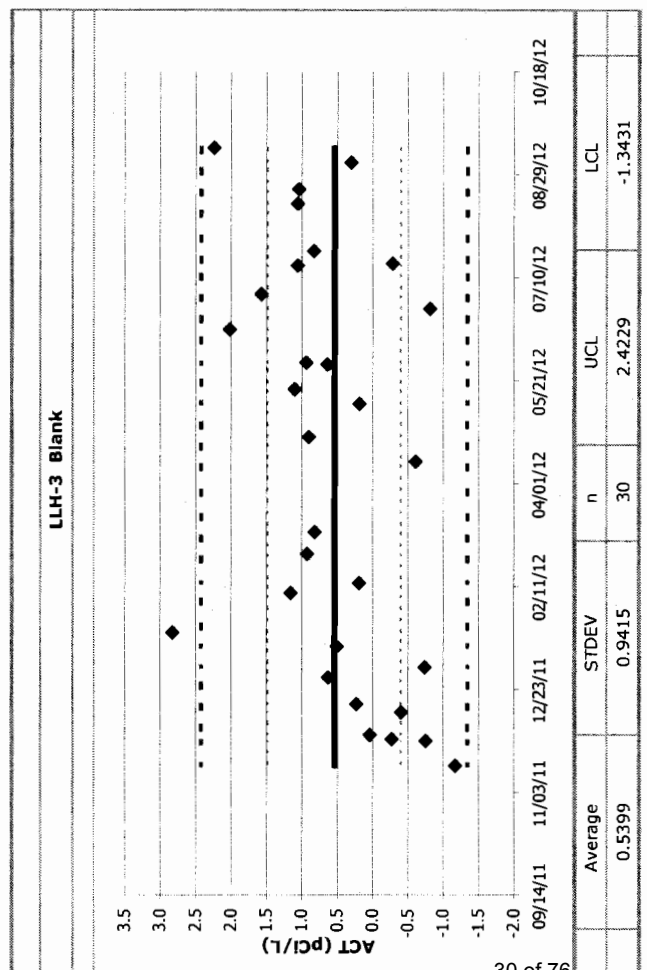
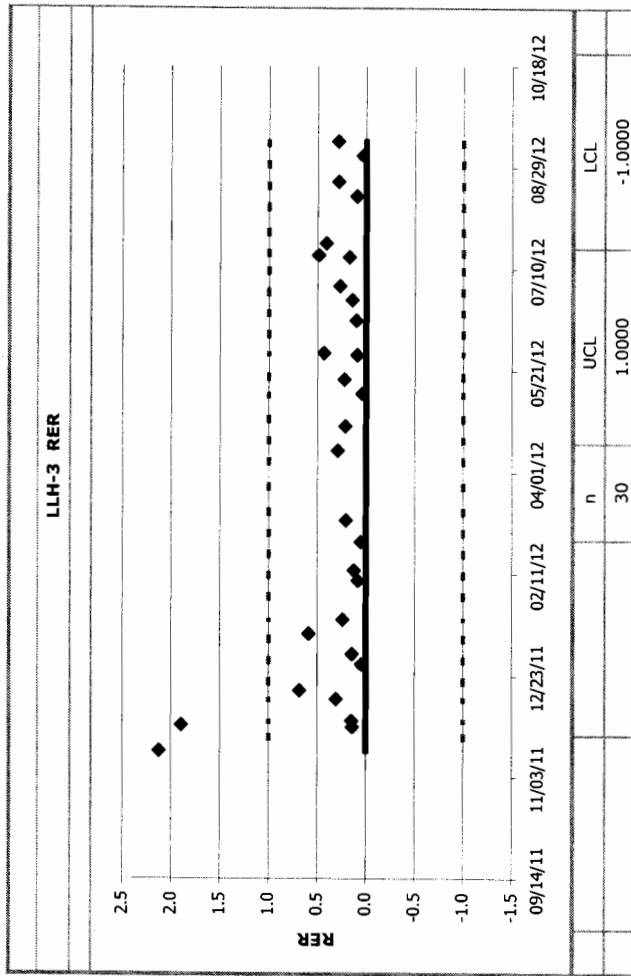
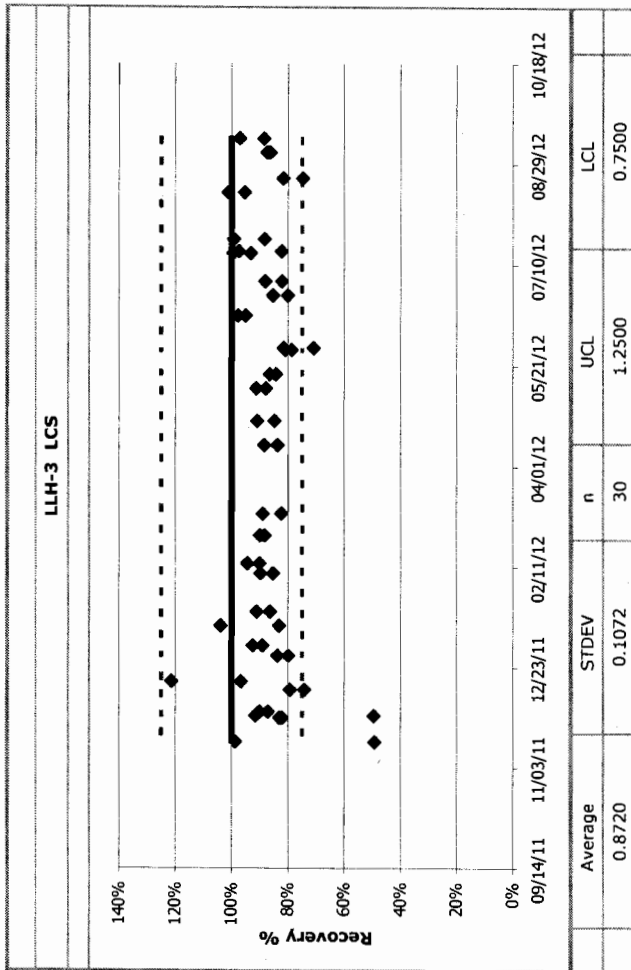
by

Low Level Liquid

Scintillation Counting

Control Charts

QC Chart



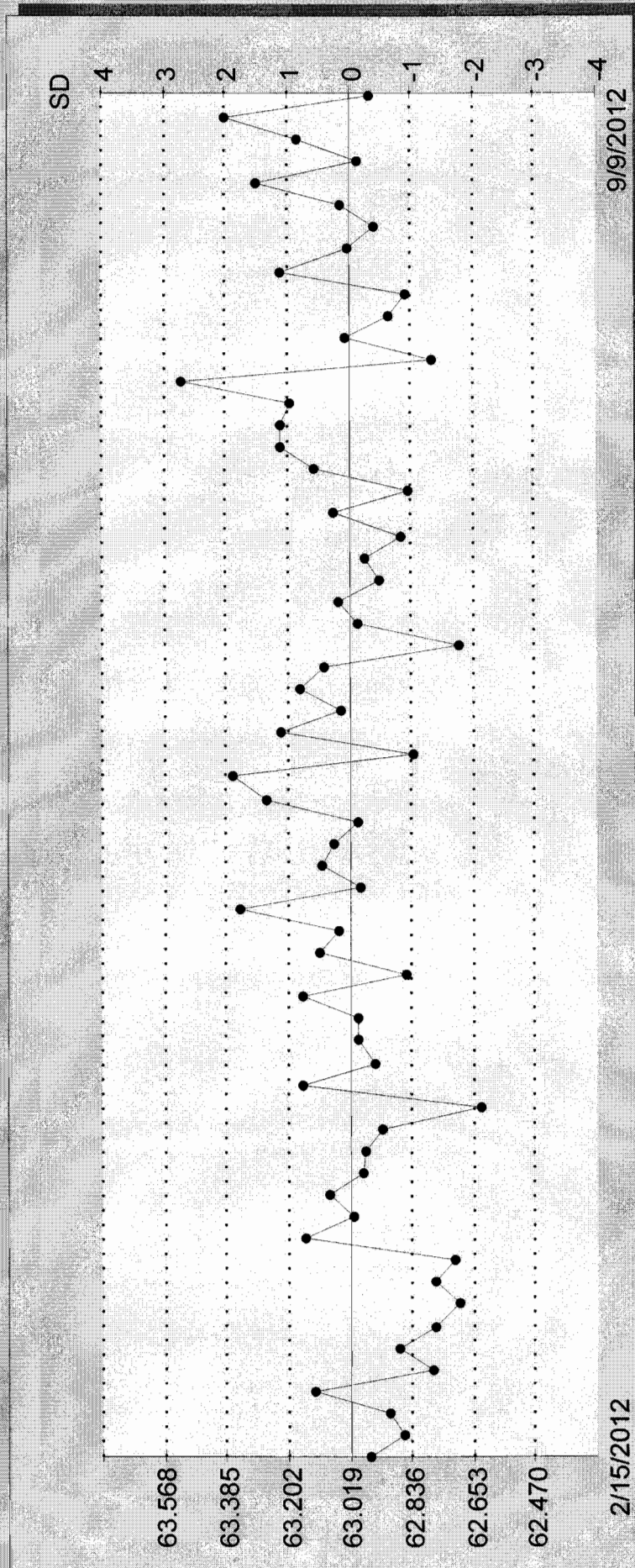
3H Efficiency

Total # pts : 5511
Valid # pts : 63
Mean : 63.02
SD : 0.18

Date	Value	Valid Pt
Feb 15, 2012	62.96	X
Feb 16, 2012	62.86	X
Feb 17, 2012	62.90	X
Feb 20, 2012	63.13	X
Feb 23, 2012	62.77	X
Feb 24, 2012	62.87	X
Mar 05, 2012	62.76	X
Mar 07, 2012	62.70	X
Mar 12, 2012	62.76	X
Mar 15, 2012	62.71	X
Mar 22, 2012	63.15	X
Mar 23, 2012	63.01	X
Mar 28, 2012	63.08	X
Apr 05, 2012	62.98	X
Apr 10, 2012	62.97	X
Apr 12, 2012	62.92	X
Apr 13, 2012	62.63	X
Apr 20, 2012	63.16	X
Apr 23, 2012	62.95	X
Apr 26, 2012	62.99	X
Apr 27, 2012	62.99	X
Apr 30, 2012	63.16	X
May 01, 2012	62.85	X
May 03, 2012	63.11	X
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

3H Efficiency : 5511
Total # pts : 63
Valid # pts : 63.02
Mean : 63.02
SD : 0.18



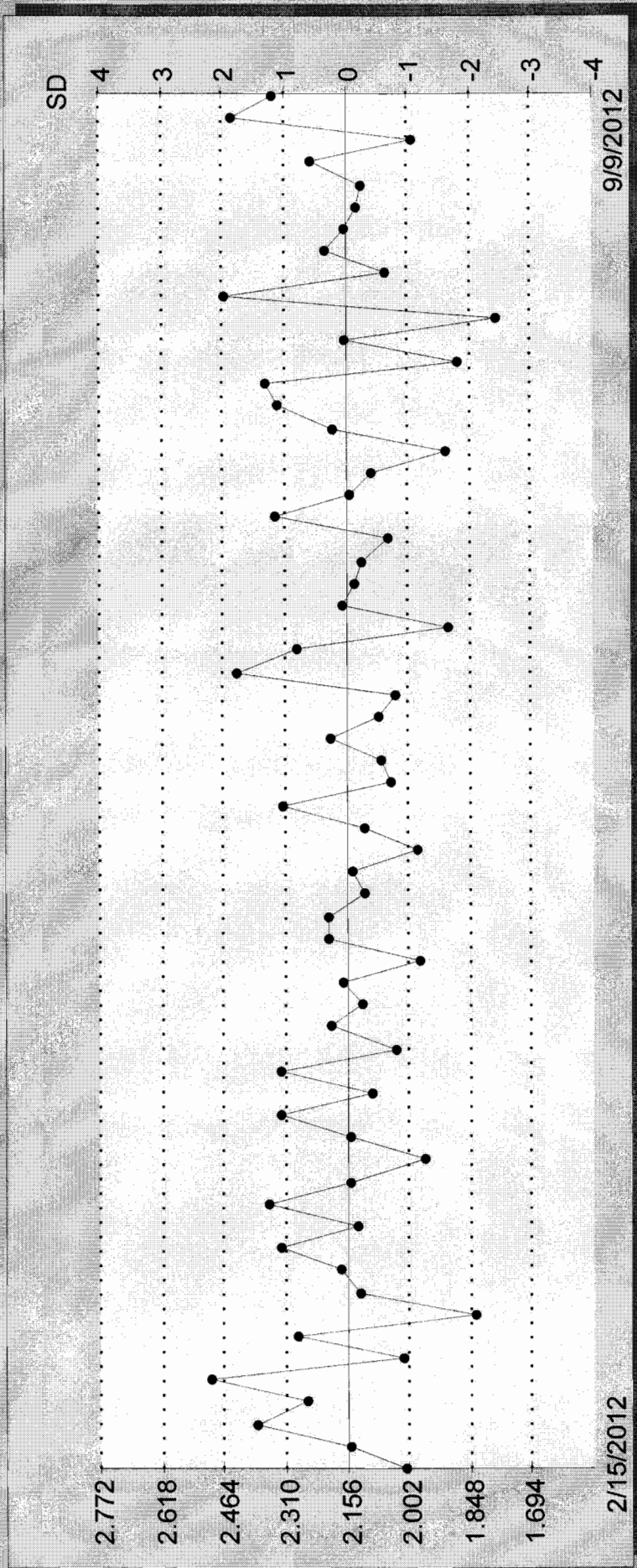
3H Background

Total # pts : 5437
Valid # pts : 63
Mean : 2.16
SD : 0.15

Date	Value	Valid Pt
Feb 15, 2012	2.01	X
Feb 16, 2012	2.15	X
Feb 17, 2012	2.39	X
Feb 20, 2012	2.25	X
Feb 23, 2012	2.50	X
Feb 24, 2012	2.01	X
Mar 05, 2012	2.28	X
Mar 07, 2012	1.84	X
Mar 12, 2012	2.13	X
Mar 15, 2012	2.17	X
Mar 22, 2012	2.32	X
Mar 23, 2012	2.13	X
Mar 28, 2012	2.35	X
Apr 05, 2012	2.15	X
Apr 10, 2012	1.96	X
Apr 12, 2012	2.15	X
Apr 13, 2012	2.32	X
Apr 20, 2012	2.09	X
Apr 23, 2012	2.32	X
Apr 26, 2012	2.03	X
Apr 27, 2012	2.20	X
Apr 30, 2012	2.12	X
May 01, 2012	2.17	X
May 03, 2012	1.97	X
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

3H Background
Total # pts : 5437
Valid # pts : 63
Mean : 2.16
SD : 0.15





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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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Tritium-Screening by Low Level Liquid Scintillation Counting Samples

ARS File ID Numbers: ARS1-12-01671
ARS Batch ID: ARS1-B12-01980

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 B12-01980-04	120	1.553	1.4	26.79	10.07	25.547	pCi/L	106.7026	NO
2 B12-01980-04 rescreen	120	1.469	1.4	26.99	10.07	11.436	pCi/L	105.912	NO
3						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
4						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
5						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
6						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
7						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
8						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
9						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
10						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
11						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
12						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
13						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
14						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
15						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
16						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
17						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
18						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
19						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
20						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
21						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
22						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
23						#DIV/0!	pCi/L	#DIV/0!	#DIV/0!



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Tritium-Screening by Low Level Liquid Scintillation Counting Laboratory Records

Analysis Batch Report

Analysis Batch ID ARS1-B12-01980						
Method		ARS-054	Analysis	LSC-A-021	Matrix	AQ
Description Low Level Tritium Screening						
ARS1-B12-01980-01	LCS					
ARS1-B12-01980-02	LCSD					
ARS1-B12-01980-03	MBL					
ARS1-B12-01980-04	TRG	ARS1-12-01671	001	1	CAMO-12-21741	STD
						09/10/12


120876
12-01671-001-1
WRAD

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
11555	ARS1-B12-01980	ARS1-B12-01980-01		1 g						RUSEY	08/16/2012 12:13:22
11556	ARS1-B12-01980	ARS1-B12-01980-02		1 g						RUSEY	08/16/2012 12:13:22
11557	ARS1-B12-01980	ARS1-B12-01980-03		1 g						RUSEY	08/16/2012 12:13:22
11558	ARS1-B12-01980	ARS1-B12-01980-04	CAMO-12-21741	10.07 g		120876				RUSEY	08/16/2012 12:13:22

Barry 8-16-12

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\20120816_1402

Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20120816_1402\20120816_1402.results

RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20120816_1402\LLH3.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20120816_1402\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): 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

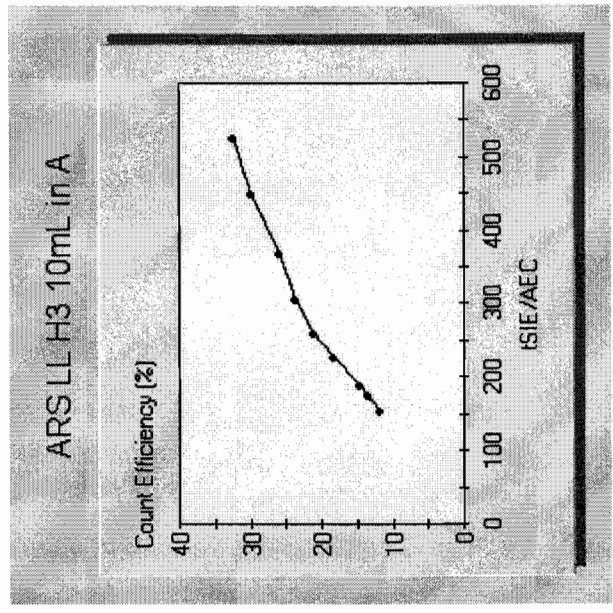
Units

Reference Date

Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 11/18/2011		
Date Modified:		
ARS LL H3 10mL in A		
tSIE/AEC	Count	Efficiency (%)
526.29	32.47	
450.16	29.90	
370.15	25.92	
306.68	23.60	
260.68	20.99	
228.69	18.21	
189.46	14.53	
177.14	13.64	
155.73	11.73	

P#	S#	SMPL_ID	CPMA	DPM1	tsIE	Eff Nucl	In A	Count Time	DATE	TIME	MESSAGES
2	1	BACKGROUND	1.400	5.18	391.87		27.00	120.00	8/16/2012	2:11:43 PM	
2	2	B12-01980-04	1.553	5.80	387.56		26.79	120.00	8/16/2012	4:21:37 PM	
2	3	B12-01980-04-RS	1.469	5.44	391.61		26.99	120.00	8/16/2012	6:31:34 PM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
8-9-12	1006	B12-01615-01	B12-01615	Tet	DJH
↓	↓	B12-01615-02	↓	↓	DJH
↓	↓	B12-01615-03	↓	↓	DJH
↓	↓	B12-01615-04	↓	↓	DJH
↓	↓	B12-01615-05	↓	↓	RJH
↓	↓	B12-01615-06	↓	↓	DJH
↓	↓	B12-01615-07	↓	↓	DJH
↓	↓	B12-01615-08	↓	↓	DJH
8-13-12	1403	SNC-16	QA	QA	RJH
8-13-12	1405	Background	B12-01777	1545	DJH
↓	↓	B12-01777-01	↓	↓	DJH
↓	↓	B12-01777-02	↓	↓	DJH
↓	↓	B12-01777-03	↓	↓	DJH
↓	↓	B12-01777-04	↓	↓	DJH
↓	↓	B12-01777-05	↓	↓	RJH
↓	↓	B12-01777-06	↓	↓	DJH
8-14-12	0554	SNC-16	QA	QA	DJH
8-15-12	0654	B12-01777-04	B12-01777	0655	DJH
8-16-12	1224	SNC-16	QA	QA	DJH
8-16-12	1226	Background	B12-01980	1402	RJH

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
8-16-12	1226	B12-01980-04	B12-01980	1402	Dyu
↓	↓	B12-01980-04-KS	↓	1402	Dyu
8-16-12	1		Dyu 8-16-12		
8-17-12	0553 0701 8-17-12	SNC-16	QA	QA	Dyu
<div style="transform: rotate(-45deg); font-size: 2em; font-family: cursive;"> 8-17-12 </div>					



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**Tritium-Screening
by**

**Low Level Liquid
Scintillation Counting**

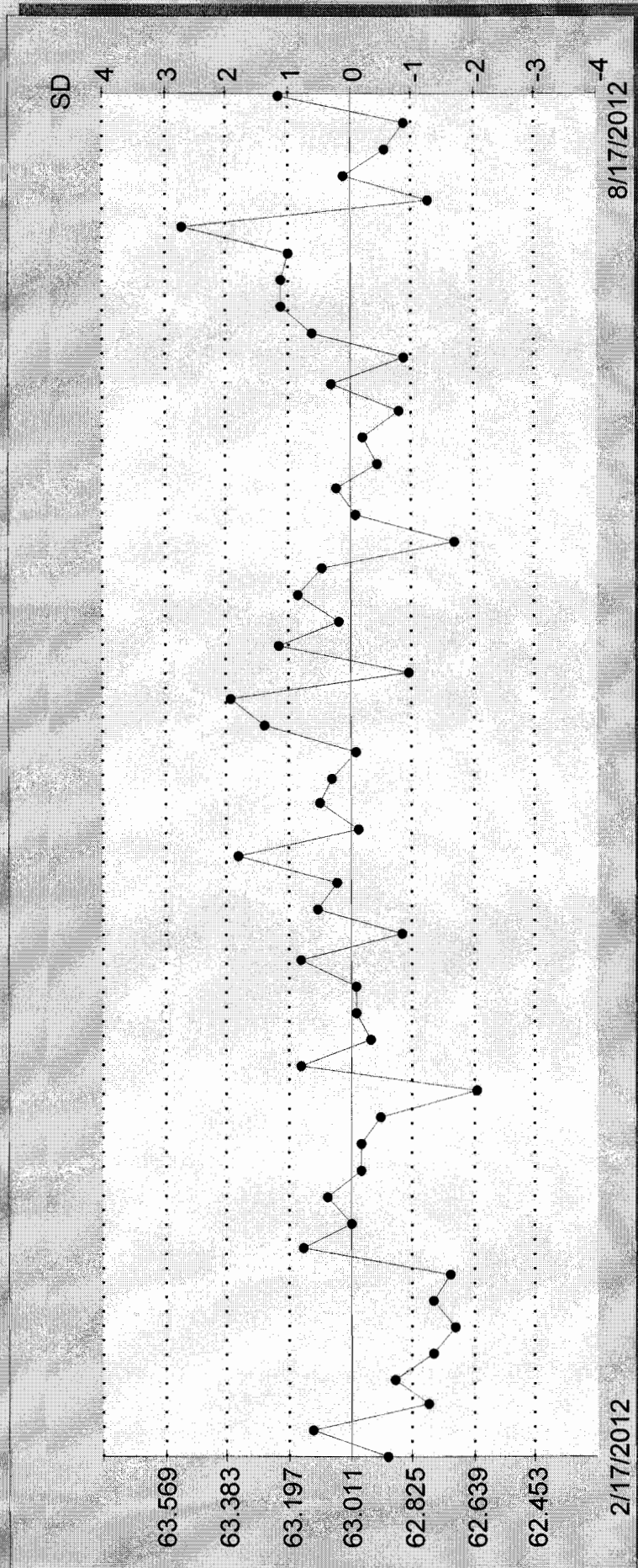
Control Charts

3H Efficiency
Total # pts : 5503
Valid # pts : 53
Mean : 63.01
SD : 0.19

Date	Value	Valid Pt
Feb 17, 2012	62.90	X
Feb 20, 2012	63.13	X
Feb 23, 2012	62.77	X
Feb 24, 2012	62.87	X
Mar 05, 2012	62.76	X
Mar 07, 2012	62.70	X
Mar 12, 2012	62.76	X
Mar 15, 2012	62.71	X
Mar 22, 2012	63.15	X
Mar 23, 2012	63.01	X
Mar 28, 2012	63.08	X
Apr 05, 2012	62.98	X
Apr 10, 2012	62.97	X
Apr 12, 2012	62.92	X
Apr 13, 2012	62.63	X
Apr 20, 2012	63.16	X
Apr 23, 2012	62.95	X
Apr 26, 2012	62.99	X
Apr 27, 2012	62.99	X
Apr 30, 2012	63.16	X
May 01, 2012	62.85	X
May 03, 2012	63.11	X
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

3H Efficiency : 5503
Total # pts : 53
Valid # pts : 63.01
Mean : 63.01
SD : 0.19



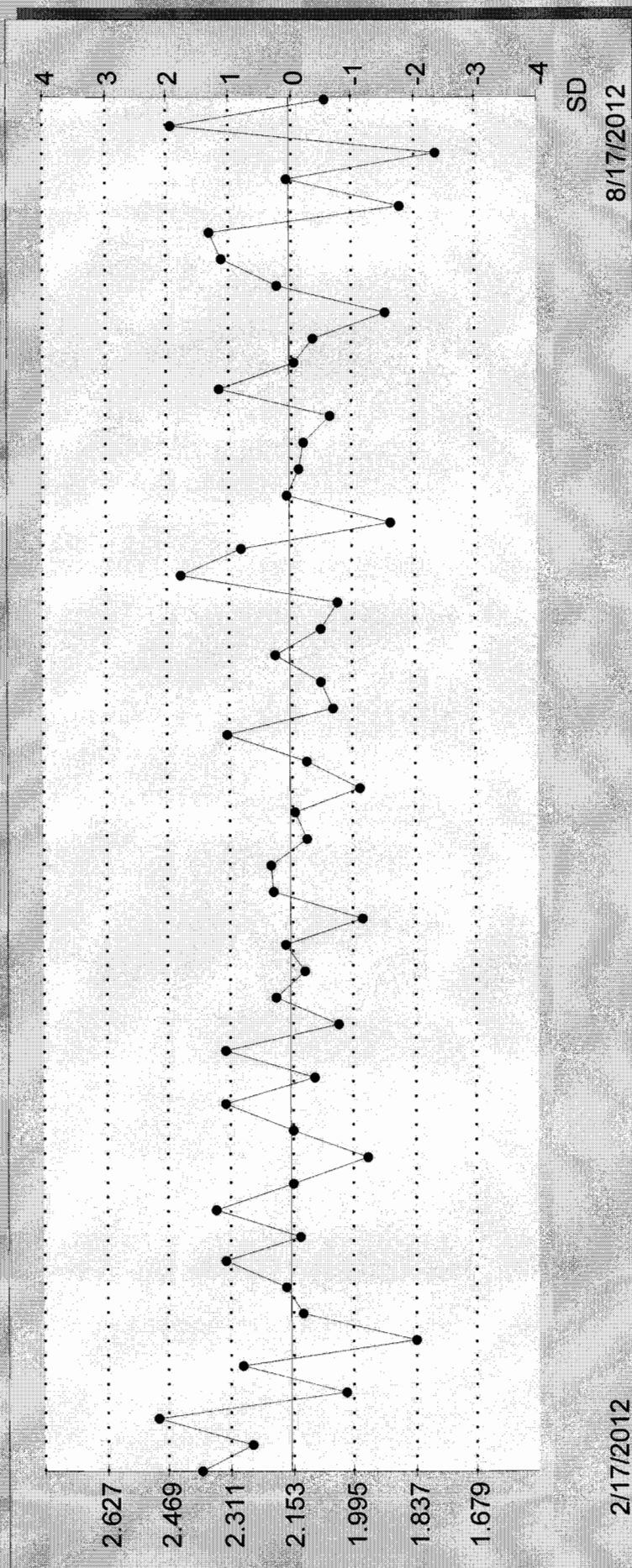
3H Background

Total # pts : 5429
Valid # pts : 53
Mean : 2.15
SD : 0.16

Date	Value	Valid Pt
Feb 17, 2012	2.39	X
Feb 20, 2012	2.25	X
Feb 23, 2012	2.50	X
Feb 24, 2012	2.01	X
Mar 05, 2012	2.28	X
Mar 07, 2012	1.84	X
Mar 12, 2012	2.13	X
Mar 15, 2012	2.17	X
Mar 22, 2012	2.32	X
Mar 23, 2012	2.13	X
Mar 28, 2012	2.35	X
Apr 05, 2012	2.15	X
Apr 10, 2012	1.96	X
Apr 12, 2012	2.15	X
Apr 13, 2012	2.32	X
Apr 20, 2012	2.09	X
Apr 23, 2012	2.32	X
Apr 26, 2012	2.03	X
Apr 27, 2012	2.20	X
Apr 30, 2012	2.12	X
May 01, 2012	2.17	X
May 03, 2012	1.97	X
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

3H Background
Total # pts : 5429
Valid # pts : 53
Mean : 2.15
SD : 0.16





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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Liquid Scintillation Counting

Calibration Information

STD ID: S-0262

ARS INTERNATIONAL		Add/Edit Secondary Stds	Parent Standard Data			
Planning		Parent Solution Reference #	NIST SRM 4927F			
Planning Comments	Create an H3 LCS stock solution.	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	3.408758506	Parent Certified Act	3503.682716	Cert Act/Vol Units	dpm	g
Appx vol mL of Parent Sol'n	3.414905335	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-0262	Parent Date Recvd	01/02/00			
Dilution Date (New Ref Date)	09/07/2011 11:47	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)	13.352	Certified dpm/g on 09/07/2011 11:47	3226.981313			
Container Plus Solution (g)	16.889	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)	3.537					
DPM Xferred on 09/07/2011 11:47	11413.83291					
Diluent/matrix	Dead 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)	473.97	Is_Calib	FALSE			
Dilution Full Cont g (if measured)	2467.33					
Dilution Final Volume mL (if measured)	2000					
Final Dilution Density (g/mL)	0.99668					
Final Dilution Measured Mass g	1993.36					
Comments	H3 LCS stock solution dilution performed as stated above by B Steffens. -BJS 9/7/11					
Final Dilution dpm/g	5.725926529					
Final Dil New Ref Date/Time	09/07/2011 11:47					

S-0262



H-3

Verified 9/7/11

SL

Expires 9/7/12

Manufacturer NIST SRM 4927F

Sol Matrix H2O

Ref No NIST SRM 4927F

Tech Unknown

Parent ID S-0237



RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY



QUALITY CONTROL PROGRAM
AMERICAN RADIATION SERVICES
RADIOACTIVE REFERENCE SOLUTIONS
ANNUAL ACTIVITY VERIFICATION

VERIFICATION DATE **9/13/2011 7:43** date counted
 STANDARD REFERENCE # **S-0262**

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 **9/7/2011 11:47**

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-0262-V1	16.07	1	LSC	0.3754	5.40	5.050	5.63	2.54
S-0262-V2	16.39	1	LSC	0.3770	5.40	5.037	5.79	2.61
S-0262-V3	15.70	1	LSC	0.3763	5.40	5.035	5.44	2.45
S-0262-V4	15.00	1	LSC	0.3768	5.40	5.022	5.07	2.29
S-0262-V5	15.85	1	LSC	0.3774	5.40	5.019	5.52	2.49

10% Max

PASS

Standard Deviation percent of known concentration

5% Max

PASS

Average	5.49	2.47
Two Sigma Uncertainty	0.52	0.24
Target Activity	5.72	2.58
% Diff	-4.13%	-4.13%

Verification Expiration Date: **#####**

Prepared & Counted By

Date: **9/13/2011 7:43**

Verified & Approved By

Date: **9-13-11**

QC Approval

Date: **9-13-11**

S-0262

H-3

Verified **9/7/11**

SL

Expires **9/7/12**

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: 9/7/2011

Pipettor ID: FJ40469

Pipettor ID: Auto-pipettor

Pipettor ID: na

Standard ID: S-0262

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-0262-V1	5.050 g
S-0262-V2	5.037 g
S-0262-V3	5.035 g
S-0262-V4	5.022 g
S-0262-V5	5.019 g

Balance ID: H1331122173560P

Assay Definition-

Assay Description:

H-3 Normal Level Assay

Assay Type: DPM (Single)

Report Name: Report1

Output Data Path: C:\Packard\Tricarb\Results\ARS\H-3 Normal Lvl 3\20110912_2059

Raw Results Path: C:\Packard\Tricarb\Results\ARS\H-3 Normal Lvl 3\20110912_2059\20110912_2059.results

RTF File Name: C:\Packard\Tricarb\Results\ARS\H-3 Normal Lvl 3\20110912_2059\H-3 Results.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\ARS\H-3 Normal Lvl 3\20110912_2059\H-3 Results.csv

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

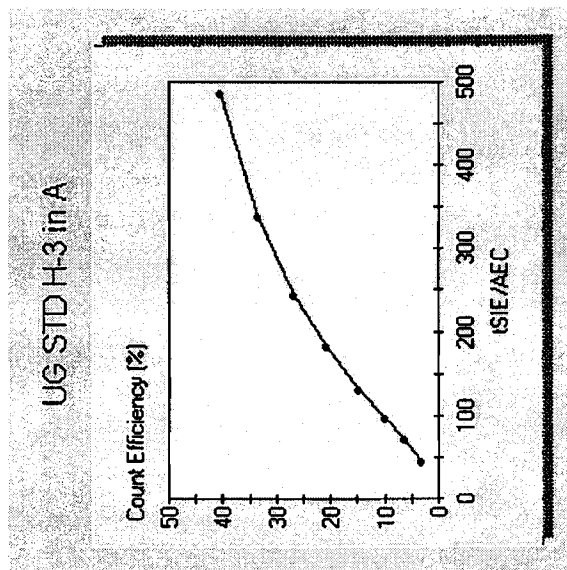
Units

Reference Date

Reference Time

A
 B
 C

Cycle 1 Results
 Quench Curve Block Data



Date Acquired: 06/15/2011
 Date Modified:
 UG STD H-3 in A

tSIE/AEC	Count Efficiency (%)
487.53	40.41
339.12	33.51
243.83	26.83
182.60	20.93
130.85	14.63
96.86	9.97
71.30	6.34
46.31	3.09

P#	S#	SMPL_ID	CPMA	DPM1	tsIE	Eff	Nucl	In A	Count	Time	DATE	TIME	MESSAGES
50	1	BACKGROUND	5.40	14.31	429.68			37.72	120.00		9/12/2011	9:04:58 PM	
50	2	S-0262-V1	16.07	42.82	425.91			37.54	120.00		9/12/2011	11:12:00 PM	
50	3	S-0262-V2	16.39	43.48	429.27			37.70	120.00		9/13/2011	1:19:59 AM	
50	4	S-0262-V3	15.70	41.73	427.79			37.63	120.00		9/13/2011	3:27:57 AM	
50	5	S-0262-V4	15.00	39.81	428.81			37.68	120.00		9/13/2011	5:35:55 AM	
50	6	S-0262-V5	15.85	42.00	430.24			37.74	120.00		9/13/2011	7:43:52 AM	



National Institute of Standards & Technology

Certificate

Standard Reference Material 4927F

Hydrogen-3 Radioactivity Standard

This Standard Reference Material (SRM) consists of tritiated water, having a standardized and certified quantity of radioactive hydrogen-3. It is intended primarily for the calibration of instruments that are used to measure radioactivity and for the monitoring of radiochemical procedures. The solution, whose composition is specified in Table 1, is contained in a flame-sealed, 5 mL, NIST, borosilicate-glass ampoule (see Note 1)*.

The certified **hydrogen-3** massic activity value, at a **Reference Time of 1200 EST, 3 September 1998**, is:

$$(634.7 \pm 4.6) \text{ kBq} \cdot \text{g}^{-1}$$

Additional physical, chemical, and radiological properties for the SRM, as well as details on the standardization method, are given in Table 1. Uncertainty intervals for certified quantities are expanded ($k = 2$) uncertainties calculated according to the ISO and NIST Guidelines (see Note 2). Table 2 contains a specification of the components that comprise the uncertainty analyses.

The certification of this SRM, within the measurement uncertainties specified, is valid for at least five (5) years after receipt. The solution matrix, in an unopened ampoule, is believed to be indefinitely homogeneous and stable, within its half-life-dependent, useful lifetime. NIST will monitor this material and will report any substantive changes in certification to the purchaser. Should any of the certified values change, purchasers of this SRM will be notified of the change by NIST.

This SRM may represent a radiological hazard. Hydrogen-3 decays by beta particle emission. None of the beta particles escape from the SRM vial. During the decay process no photons are emitted. The SRM should be stored and used at a temperature between 5 and 35 °C. See Note 1

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, Dr. M.P Unterweger, Acting Group Leader. The overall technical direction and physical measurements leading to certification were provided by Drs. L.L. Lucas and M.P Unterweger of the Radioactivity Group. The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program.

Lisa R. Karam, Deputy Chief
Ionizing Radiation Division

Gaithersburg, Maryland 20899
May 2008
See Certificate Revision History on Last Page

Robert L. Watters, Jr., Chief
Measurement Services Division

Table 1. Properties of SRM 4927F

Certified values

Radionuclide	Hydrogen-3
Reference time	1200 EST, 3 September 1998
Massic activity of the solution	634.7 kBq•g⁻¹
Relative expanded uncertainty (<i>k</i> = 2)	0.72 % (see Note 2)*

Uncertified information

Source description	Liquid in flame-sealed, 5 mL NIST borosilicate ampoule (see Note 1)
Solution composition	Distilled water
Solution density	(0.998 ± 0.002) g•mL ⁻¹ at 20 °C (see Note 3)
Solution mass	Approximately 5.0 g
Radionuclidic impurities	None detected (see Note 4)
Half-lives used	³ H: (4500 ± 8) d (see Note 5)
Calibration method (and instruments)	The certified massic activity for ³ H was obtained by 4πβ gas counting of SRM 4927E using the NIST length-compensated internal gas proportional counters and intercomparison of SRMs 4927E/4927F using two 4πβ liquid-scintillation (LS) counting systems (see Note 6)

Table 2. Uncertainty evaluation for the massic activity for SRM 4927F

Uncertainty component		Assessment Type [†]	Relative standard uncertainty contribution on massic activity of ³ H (%)
1	Massic count rate of SRM 4927E, corrected for background and decay; standard deviation of the mean for 23 sets of gas counting measurements (see Note 6)	A	0.18
2	LS intercomparison of SRM 4927F and SRM 4927E; standard deviation of the mean for 7 sets of LS measurements	A	0.06
3	Decay corrections for ³ H; (for half-life uncertainty of 0.18%)	A	0.002
4	Gram-mole determinations based on pressure, volume and temperature measurements	B	0.20
5	Livetime determinations	B	0.10
6	Extrapolation of count-rate-versus-energy to zero energy	B	0.20
7	Limit for radionuclidic impurities	B	0.05
Relative combined standard uncertainty			0.36
Relative expanded uncertainty (<i>k</i> = 2)			0.72

[†] = (A) denotes evaluation by statistical methods; (B) denotes evaluation by other methods.

NOTES

Note 1. Refer to <http://physics.nist.gov/Divisions/Div846/srm.html> for the standardized ampoule dimensions and for assistance and instructions on how to properly open an ampoule. Information on additional storage and handling requirements is also included in the website.

Note 2. The uncertainties on certified values are expanded uncertainties, $U = k u_c$. The quantity u_c is the combined standard uncertainty calculated according to the ISO and NIST Guides (see references [1] and [2]). The combined standard uncertainty is multiplied by a coverage factor of $k = 2$ and was chosen to obtain an approximate 95 % level of confidence.

Note 3. The stated uncertainty is two times the standard uncertainty. See reference [2]

Note 4. The estimated lower limit of detection for radionuclidic impurities is $300 \text{ Bq} \cdot \text{g}^{-1}$

Note 5. The stated uncertainty is the standard uncertainty. See reference [2] and [3].

Note 6. Extensive gas-counting measurements were made on the SRM 4927E solution during 1998 and 1999. The SRM 4927F solution was intercompared with the SRM 4927E using LS counting.

REFERENCES

- [1] International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993 (corrected and reprinted, 1995). Available from Global Engineering Documents, 12 Inverness Way East, Englewood, CO 80112, U.S.A. Telephone 1-800-854-7179.
- [2] B. N. Taylor and C. E. Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.
- [3] L.L. Lucas and M.P. Unterwieser, *Comprehensive Review and Critical Evaluation of the Half-Life of Tritium*, J. Res. Natl. Inst. Stand. Technol. **105**, 541-549 (2000)

Certificate Revision History: May 2008 (Text revised); February 2007 (Text revised and expiration date extended); October 2000 (Half-life and text revised); June 1999 (Original certificate date).



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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

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Report Compilation Checklist

ARS SDG: 12-01671 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?	<input checked="" type="checkbox"/> Yes	No	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

Susan Weese
Report Generator Signature

9-11-12
Date

VFM
Management Review Signature

9-11-12
Date



LSC Technical Review Checklist

ARS SDG ARS1-12-01671

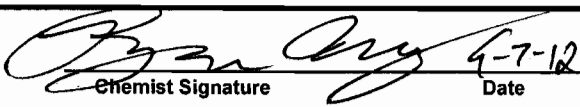
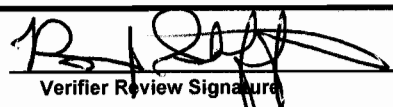
Sample Matrix: AQ Aliquot (Circle One) : Dry As Received ☒ Filtered Other: _____

Required QC Samples (Mark all that apply): Blank ☒ LOS ☒ LOSD ☒ Sample Dup MS MSD




ARS A. Batch ID(s): Batch A: ARS1-B12-01999 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
2) 100% of Manual Calculations Verified?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>
3) Blank Composition/Configuration Matches Calibration?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
4) Deviations from procedure are documented and verified?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>
5) Appropriate Cocktail Selected?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
6) Sample Prep Anomaly? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (See Tech Notes) NCR # (If initiated): _____		
 Chemist Signature	 Verifier Review Signature	<u>9-7-12</u> Date

B. ANALYSIS REVIEW

	Analyst Review	QA Officer Review
1) Calibrations Valid and Current?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
2) Backgrounds Valid and Current?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
3) Source Checks Completed and Acceptable?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
 QA Officer Signature		<u>9-11-12</u> Date
	Analyst Review	Technical Review
4) Background Checks Complete and Acceptable?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
5) 100% of Manually Entered Parameters Verified Accurate?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
6) Appropriate QC samples initiated at required frequency?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
6) Test/Sample Specific Parameters (See ARS-059 for details)		
a) Analysis Parameters Checked and Correct and Peak Shapes are Acceptable?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
b) Spectra show no Evidence of Interferences?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
c) Sample Quench for All Samples within Range of Quench Curve?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
7) Analysis Anomaly? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (See Comments) NCR # (If initiated): _____		
 Analyst Signature	 Technical Reviewer Signature	<u>9-11-12</u> Date



LSC
Technical Review Checklist

ARS SDG ARS1-12-01671

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

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

ARS A. Batch ID(s): Batch A: ARS1-B12-01980 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?	<input checked="" type="checkbox"/> Yes	No	N/A	<input checked="" type="checkbox"/> Yes	No	N/A
2) 100% of Manual Calculations Verified?	Yes	No	<input checked="" type="checkbox"/> N/A	Yes	No	<input checked="" type="checkbox"/> N/A
3) Blank Composition/Configuration Matches Calibration?	Yes	No	<input checked="" type="checkbox"/> N/A	Yes	No	<input checked="" type="checkbox"/> N/A
4) Deviations from procedure are documented and verified?	Yes	No	<input checked="" type="checkbox"/> N/A	Yes	No	<input checked="" type="checkbox"/> N/A
5) Appropriate Cocktail Selected?	<input checked="" type="checkbox"/> Yes	No	N/A	<input checked="" type="checkbox"/> Yes	No	N/A
6) Sample Prep Anomaly? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (See Tech Notes) NCR # (If initiated): _____						
Chemist Signature <u>[Signature]</u>			Date <u>8-16-12</u>	Verifier Review Signature <u>[Signature]</u> Date <u>8-16-12</u>		

B. ANALYSIS REVIEW

	Analyst Review			QA Officer Review		
1) Calibrations Valid and Current?	<input checked="" type="checkbox"/> Yes	No	N/A	<input checked="" type="checkbox"/> Yes	No	N/A
2) Backgrounds Valid and Current?	<input checked="" type="checkbox"/> Yes	No	N/A	<input checked="" type="checkbox"/> Yes	No	N/A
3) Source Checks Completed and Acceptable?	<input checked="" type="checkbox"/> Yes	No	N/A	<input checked="" type="checkbox"/> Yes	No	N/A
			QA Officer Signature <u>[Signature]</u>		Date <u>8-11-12</u>	
	Analyst Review			Technical Review		
4) Background Checks Complete and Acceptable?	<input checked="" type="checkbox"/> Yes	No	N/A	<input checked="" type="checkbox"/> Yes	No	N/A
5) 100% of Manually Entered Parameters Verified Accurate?	<input checked="" type="checkbox"/> Yes	No	N/A	<input checked="" type="checkbox"/> Yes	No	N/A
6) Appropriate QC samples initiated at required frequency?	<input checked="" type="checkbox"/> Yes	No	N/A	<input checked="" type="checkbox"/> 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="checkbox"/> Yes	No	N/A	<input checked="" type="checkbox"/> Yes	No	N/A
b) Spectra show no Evidence of Interferences?	<input checked="" type="checkbox"/> Yes	No	N/A	<input checked="" type="checkbox"/> Yes	No	N/A
c) Sample Quench for All Samples within Range of Quench Curve?	<input checked="" type="checkbox"/> Yes	No	N/A	<input checked="" type="checkbox"/> Yes	No	N/A
7) Analysis Anomaly? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (See Comments) NCR # (If initiated): _____						
Analyst Signature <u>[Signature]</u>			Date <u>8-17-12</u>	Technical Reviewer Signature <u>WIA</u> Date _____		

SDG Report - Samples and Containers

SDG Specific Data

SDG	ARS1-12-01671	TAT Days	28	Project Type	Environmental
Sample Count	Rpt Level	Date Received	8/16/2012	COC Number	12-1497
Client	Los Alamos National Laboratory	Client Deadline	9/13/2012	PO Number	63641-001-10
Client Code	114	Internal Deadline	9/12/2012	Job Number	
Profile Number	PN-00094	Lab Deadline	9/10/2012	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	CAMO-12-21741	AQ	08/08/12 05:40 PM	08/08/12 05:40 PM	H	90	5	K6							
→	IC_ID	Con	Volume_mL	Wt_g	pH_Orig	pH_Final	CPH	ur_Mr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Minp	AF Total Vol
	120853	1	1000.00				70	20		N	N/A				

SDG Report - Analysis Assignments

Temp SDG	ARS1-12-01671	Sample Count
Client	Los Alamos National Laboratory	Analysis Count 2-2

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

Analyses Assigned Per Fraction		
Fraction	Analysis Code	X -- Assigned
001	LSC-A-021	X
001	LSC-A-022	X

DQO Report for SDG
ARS1-12-01671

Analysis Code	Group	Isotope	Activity Units	Aliquot Units	ProcedureNo	RDL	LCS_LL	LCS_UL	MS_LL	MS_UL	RadY_LL	RadY_UL	GravY_LL	GravY_UL	RER	RPD	DilutionReq	RoughPrepReq	BlankCorrecionMDA	BlankCorrecionAll	CountTimeReq	AliquotRequired
LSC-A-021	STC	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	STC	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		

ARS FILE TRACKING SHEET

SDG: ARS1-12-01671

Task	Date / Time	Initials
Date & Time Samples Received	08/16/12 10:15	cad
ICOC Initiated / Storage Location: <u>K6</u>	08/16/12 10:35	cad
Technical Checks Performed	See Batch	—
Report Written / EDD Generated: <u>9-11-12/1351</u> <u>SDR</u>	<u>9-11-12/1345</u>	<u>SDR</u>
	<small>Date/Time</small>	<small>Initials</small>
Quality Assurance Checks Performed on Report	9-11-12	1407
Management Check Performed on Report	1407	UHM
Preliminary Report Sent	—	NA
Report E-mailed		
Report Faxed	—	NA
Report Reviewed		
Report Mailed		
Invoice Completed Invoice #: _____		
Report Imaged		

SPECIAL REQUIREMENTS

Requirement	Yes	No
3 Hour Rush		✓
24 Hour Rush		✓
48 Hour Rush		✓
3 Day TAT		✓
5 Day TAT		✓

NOTES:

LANC

SDG: ARS-12-01671

External and Internal Surveys

SHIPPING CONTAINER

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

COC PRESENT WITH SAMPLES

COC ☒ Yes ☐ No

SAMPLE CONTAINER(S)

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

Marked Radioactive ☐ Yes ☒ No

Samples Rcv

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

pH \leq 2 is Acceptable

Acceptance Limits

$$<500^{\mu\text{R}}/\text{hr} \quad <100^{\text{cpm}}/\text{cm}^2$$
[illegible]

Surveyors' Name: 

Date/Time Surveyed: 1/8/16/12 1000