American Radiation Services - Primary

1726 Wooddale Court
Baton Rouge LA 70806

Chain of Custody/Analysis Request

ADEP

COC/Lab Request #: 2014-2942

Page 1 of 1

Client Contact:

Lab Agreement # : 63641-001-10

Project Number :

Site Name: Los Alamos National Laboratory

Analysis Turnaround Time:

24 Hour - ☐ Other - ☐

7 Day - ☐

14 Day - ☐

21 Day - ☐

28 Day - ☒

Rad Screening Info: Yes, Below Background

Lab Reporting Limit Type: Sample Quantitation Limit

Special Instructions:

Field Sample ID	Sample Date	Sample Time	Sample Matrix	WSP-LL-H-3
CAAN-14-54789	Mar 5 2014	11:32	W	1

Special Instructions:

Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:
	Melissa Montoya	3/5/14 3:00			
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 4563 **EVENT NAME:** Ancho (MDA AB Monitoring) Q2 MY2014 Sampling Event

SAMPLE ID: CAAN-14-54789 **WORK ORDER:** NA

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
DATE COLLECTED (MM/DD/YYYY):		03/05/2014	**FIELD MATRIX:**	WG	OK
TIME COLLECTED (HH:MM):		11:32	**MEDIA:**	UA	↓
PRS ID:		OK	**SAMPLE TECH CODE:**	UA	GSP
LOCATION ID:	R-30		**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
N/A	MSGP-Hg	1 LITER POLY	1	HNO3	Y	NONE
↓	WSP-8011-EDB_DBCP	40 ML SEPTUM AMBER GLASS	2	HCL 3/4 2/24/14 $Na_2S_2O_3$	↓	↓
	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2	HCL		
	WSP-8270C-SVOA	1 LITER AMBER GLASS	2	ICE		
	WSP-8310-PAH	1 LITER AMBER GLASS	2	ICE		
	WSP-8321A-NMED HEXP	1 LITER AMBER GLASS	2	ICE		
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-GrossA/B	1 LITER POLY	1	HNO3		
	WSP-LL-8081A-HCB	1 LITER AMBER GLASS	2	ICE		
↓	WSP-LL-8151A-PCP	1 LITER AMBER GLASS	2	ICE	↓	↓

Analyses continued on next page

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 4563 **EVENT NAME:** Ancho (MDA AB Monitoring) Q2 MY2014 Sampling Event

SAMPLE ID: CAAN-14-54789 **WORK ORDER:** NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
N/A	WSP-LL-8260B	40 ML SEPTUM AMBER GLASS	2	HCL	y	NONE
↓	WSP-LL-8270C	1 LITER AMBER GLASS	1	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: NONE

LOCATION COMMENTS: Generator ~40' away

FIELD PARAMETERS:

Dissolved Oxygen 7.14 mg/L Flow (in gpm) 5.17 GPM Oxidation-Reduction Potential 157.7 mV

pH 8.11 SU Specific Conductance 121 uS/cm Temperature 19.00 deg C

Turbidity 0.6 NTU

COLLECTED BY (PRINT) D. Fellenz, M. Green

RELINQUISHED BY (Printed Name) Julie Maze (Signature) Julie Maze	Date/Time 03/05/2014 13:00	RECEIVED BY (Printed Name) [illegible] (Signature) [illegible]	Date/Time 03/05/2014 13:00
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date 02/27/2014

DATA VALIDATION REPORT

Chain Of Custody No. 2014-2942

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
ARS1-14-00544	Generic:Low_Level_Tritium	1				

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
ARS1-14-00544	Generic:Low_Level_Tritium	ARS1-B14-	ARS1-B14-	1					1					1	1						

2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
Generic:Low_Level_Tritium	RAD	CAAN-14-54789	ARS1-B14-00498-04	REG	1	0	0	0
Generic:Low_Level_Tritium	RAD	LCS	ARS1-B14-00498-01	LCS	0	0	1	0
Generic:Low_Level_Tritium	RAD	LCSD	ARS1-B14-00498-02	LCSD	0	0	1	0
Generic:Low_Level_Tritium	RAD	MB	ARS1-B14-00498-03	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

No.

DATA VALIDATION REPORT

6. Any surrogate recoveries outside the control limits?

No.

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

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 Comments.

13. Display Flagged Data.

Location ID	COC Number	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	Paramter Name	Lab Qualifier	Validation Qualifier	Validation Reason Codes	Detect Flag	Lab Result	Lab Units	Report Result	Report Units	Report MDA	Report Uncertainty	Lab Matrix	Sample Date	Percent	Analysis Lot ID	Validation Status Code	Use Flag
R-30	2014-2942	CAAN-14-54789	REG	INIT	RAD	Generic:Low_Level_Tritiu	Tritium	U	U	R5	N	0.3900	pCi/L	0.3900	pCi/L	2.1420	0.6400	W	03/05/2014		ARS1-B14-00498	VAL	Y

Reason Code **Description**

Reason Code	Description
R5	Analyte is not detected because the amount reported is less than the MDC.

14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAAN-14-54789	R-30	REG	Generic:Low_Level_Tritium	0	1

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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Request Number: 2014-2942

ARS INTERNATIONAL

2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 2014-2942

Original COC

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

Chain of Custody/Analysis Request

COC/Lab Request #: 2014-2942

Page 1 of 1

Client Contact:

Lab Agreement # : 63641-001-10

Project Number :

Analysis Turnaround Time:

24 Hour - ☐ Other - ☐
7 Day - ☐
14 Day - ☐
21 Day - ☐
28 Day - ☒

Site Name: Los Alamos National Laboratory

Rad Screening Info: Yes, Below Background

Lab Reporting Limit Type: Sample Quantitation Limit

Special Instructions:

Field Sample ID	Sample Date	Sample Time	Sample Matrix	WSP-LL-H-3
CAAN-14-54789	Mar 5 2014	11:32	W	1

Special Instructions:

Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:

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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 2014-2942

Case Narrative

ARS INTERNATIONAL

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

March 28, 2014

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

Request Number: **2014-2942**
LANL Sample ID: **CAAN-14-54789**

Dear Mr. Greene;

On March 6, 2014, ARS International received one (1) water sample to be analyzed for Low Level Tritium.

Sample 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,

Laboratory Management
ARS International

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

COVER PAGE

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

Request Number	LANL PROJECT SAMPLE ID NUMBER	American Radiation Services SAMPLE ID NUMBER(S)
2014-2942	CAAN-14-54789	ARS1-14-00544-001

SAMPLE RECEIPT
The samples were received in good condition. The samples were screened for radioactive contamination as per procedure **ARS-062 "Sample Receiving"**. A 28-day turnaround was requested on the chain of custody.

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

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

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

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

Signature	Title	Date
	Laboratory Management, ARS International	03-22-14

2609 North River Road, Port Allen, Louisiana 70767

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

ARS International, LLC

Laboratory Analysis Report

ARS1-14-00544

Prepared for:

Los Alamos National Laboratory

Keith Greene
P.O. Box 1663
MS M992
Los Alamos, NM 87545
kgreene@lanl.gov

Phone: 505-665-9966
Fax: 505-665-9972

Susan Reese

Project Manager Review

Management Review

Notes: ARS International, LLC 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 client.

Contact Person: Questions regarding this analytical report should be addressed to:

Project Manager

ProjectManagers@amrad.com

Phone: 225.381.2991
Fax: 225.381.2996

ACLASS ACCREDITED DoD ELAP

LELAP Cert# 01949

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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

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

ARS Sample Delivery Group:	ARS1-14-00544	**Request or PO Number:**	2014-2942
Client Sample ID:	CAAN-14-54789	**ARS Sample ID:**	ARS1-14-00544-001
Sample Collection Date:	03/05/14	**Date Received:**	03/06/14
Sample Matrix:	Aqueous	**Report Date:**	03/28/14

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	0.390	0.640	2.142	1.035	U	pCi/L	ARS-040	03/22/14 11:09	PDS	NA

NOTES: Contract #250953

Project Manager Review

LELAP Certificate# 01949

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

QC Results Report

Sample Delivery Group: ARS1-14-00544; 545
Date Received: 3/6/2014

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-B14-00498	LCS	H3	21.163	3.347	2.398	25.046		pCi/L	ARS-040	3/21/14 20:35	PDS	84	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-B14-00498	MBL	H3	1.195	0.658	2.071	NA	U	pCi/L	ARS-040	3/21/14 20:35	PDS

Sample RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER AcceptanceRange
ARS1-B14-00498	LCSD	H3	21.163	3.347	20.701	1.893		pCi/L	ARS-040	3/21/14 20:35	PDS	0.09	< 1

Sample DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER AcceptanceRange
ARS1-B14-00498	LCSD	H3	21.163	3.347	20.701	1.893		pCi/L	ARS-040	3/21/14 20:35	PDS	0.24	< 3

Project Manager Review

LELAP Certificate# 01949 NELAP Certificate # E87558

QC Evaluation

EPA Method: ARS-040
Batch ID: ARS1-B14-00498
SDG's: ARS1-14-00544; 545

LCS	21.1630	CSU (2s)	6.5610
LCSD	20.7010	CSU-D (2s)	6.3740

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

DER $\frac{0.462}{4.573691}$ = 0.101013 **< 3**

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

%RPD $\frac{0.462}{20.932}$ *100 = 2.207147 **< 25%**

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

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

RER = $\frac{0.462}{12.9350}$ 0.035717047 **<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	1.195	1.29	2.071	
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 = 1.195
CSU = 1.29
Is ACT<1.65*CSU? YES

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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

AMRAD AMERICAN RADIATION SERVICES, LLC

Analysis Batch ID **ARS1-B14-00498**

Method	**ARS-040**	**Analysis**	**LSC-A-022**	**Matrix**	**AQ**
Description	**Low Level Tritium by Electrolytic Enrichment**				

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B14-00498-01	LCS	B-16495								
ARS1-B14-00498-02	LCSD	B-16496								
ARS1-B14-00498-03	MBL									
ARS1-B14-00498-04	TRG				**ARS1-14-00544**	001	1	CAAN-14-54789	STD	03/31/14
ARS1-B14-00498-05	TRG				**ARS1-14-00545**	001	1	CAWA-14-54709	STD	03/31/14

LCS Report
Analytical Batch: ARS1-B14-00498

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-16495	ARS1-B14-00498	ARS1-B14-00498-01	B-H3	S-0289	H-3	5	2.491861735	13.291	18.331	5.04	AMRAD\BSTEFFENS	3/6/2014	2.486110705	3/21/2014	12.52999795
B-16496	ARS1-B14-00498	ARS1-B14-00498-02	B-H3	S-0289	H-3	5	2.491861735	13.438	18.487	5.049	AMRAD\BSTEFFENS	3/6/2014	2.485727775	3/22/2014	12.55043954

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\20140321_1616
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20140321_1616\20140321_1616.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20140321_1616\LLH3.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20140321_1616\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 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

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

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

Count Corrections-

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

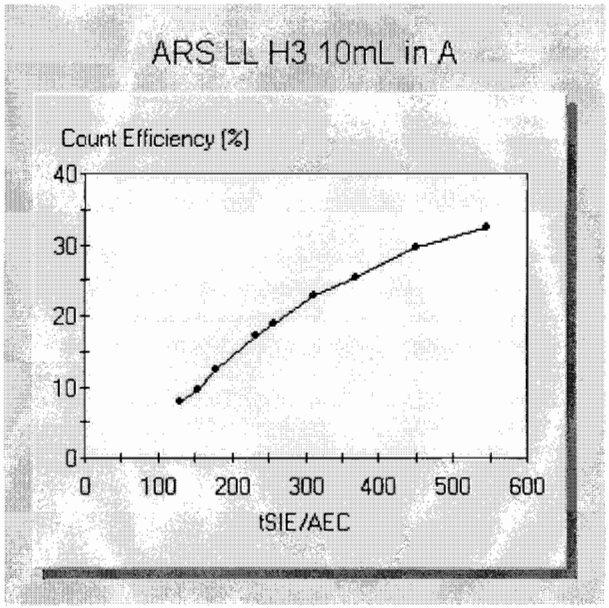
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 08/22/2013
Date Modified:
ARS LL H3 10mL in A

tSIE/AEC	Count Efficiency (%)
544.56	32.36
451.00	29.46
369.98	25.40
311.75	22.73
257.34	18.93
232.82	17.19
180.53	12.39
154.79	9.65
131.07	7.78

P#	S#	SMPL_ID	CPMA	DPM1	tSIE	Eff Nuc1 In A	Count Time	DATE	TIME	MESSAGES
2	1	BACKGROUND	1.159	4.65	359.36	24.91	240.00	3/21/2014	4:25:11 PM	
2	2	B14-00498-01	4.112	16.08	373.38	25.57	240.00	3/21/2014	8:35:56 PM	
2	3	B14-00498-02	4.430	16.60	395.69	26.69	240.00	3/22/2014	12:46:47 AM	
2	4	B14-00498-03	1.352	5.16	386.28	26.21	240.00	3/22/2014	4:57:53 AM	
2	5	B14-00498-04	1.220	4.54	399.32	26.87	240.00	3/22/2014	9:08:43 AM	
2	6	B14-00498-05	1.260	4.83	383.99	26.10	240.00	3/22/2014	1:19:33 PM	

ARS Batch Number: ARS1-B14 - 00498

Enter these Values for LCS			
	Current ACT	5.5192	Standards Report
	NetWt	5.0400	LCS Report
	Aliquot	0.5003	Procedural Data Report

Enter these Values for LCSD			
	Current ACT	5.5192	Standards Report
	NetWt	5.0490	LCS Report
	Aliquot	0.5005	Procedural Data Report

Expected Value Calculations

ARS Batch Number:

LCS	**CALCULATED EXPECTED VALUE**	=	25.0461			
			Range	18.7846	-	31.3077
LCSD	**CALCULATED EXPECTED VALUE**	=	25.0783			
			Range	18.8087	-	31.3479

ID_31001_040	ABatch	AnalysisCode	ABatchSampleID	ClientID	IC_ID	S01_1_EnrichCellNo
964	ARS1-B14-00498	LSC-A-022	ARS1-B14-00498-01			0
965	ARS1-B14-00498	LSC-A-022	ARS1-B14-00498-02			45
966	ARS1-B14-00498	LSC-A-022	ARS1-B14-00498-03			86
967	ARS1-B14-00498	LSC-A-022	ARS1-B14-00498-04	CAAN-14-54789		63
968	ARS1-B14-00498	LSC-A-022	ARS1-B14-00498-05	CAWA-14-54709		77

S01_2_TareCell	S01_3_TareResv	S02_GrossWtResv	S03_1_WtNa2O2	C_GrossSampleAdded	S04_1_ElectrolSD
321.78	223.16	723.44	2	500.28	03/07/2014 13:55:00
328.6	198.55	699.08	2	500.53	03/07/2014 13:55:00
337.89	195.32	695.47	2	500.15	03/07/2014 13:55:00
330.51	200.29	700.35	2	500.06	03/07/2014 13:55:00
326.13	203.45	703.45	2	500	03/07/2014 13:55:00

S04_2_StartAmp	S04_3_StartBathC	S05_1_ElectrolED	S05_2_EndBathC	S05_3_EndCellWt	C_GrossSmplRec
5	2	03/20/2014 07:00:00	2	561.94	17
5	2	03/21/2014 07:00:00	2	542.6	15.45
5	2	03/20/2014 07:00:00	2	549.35	16.14
5	2	03/20/2014 07:00:00	2	547.78	16.98
5	2	03/20/2014 07:00:00	2	545.84	16.26

C_EnrichmentF	S06_TareWt	S07_GrossWt	C_RecoveredWa	S08_TearWtLSCVial	S09_VialPlusSmpl	C_NetSample
29.42823529	101.5	114.38	12.88	6.55	16.59	10.04
32.39676375	94.71	104.51	9.8	6.6	16.4	9.8
30.988228	108.44	119.48	11.04	6.56	16.57	10.01
29.44994111	108.29	118.39	10.1	6.44	16.45	10.01
30.7503075	111.29	122.26	10.97	6.56	16.56	10

S10_1_WtVislSmplDrWatFill	C_NetDeadWaterAdded	C_TareWtBFCocktail	S10_2_GrossWtVSC	C_NetWtCocktailAdded
0	0	16.59	26.85	10.26
16.65	0.25	16.65	26.75	10.1
0	0	16.57	26.89	10.32
0	0	16.45	26.52	10.07
0	0	16.56	26.89	10.33

UserID	ModDate
AMRAD\PSavage	03/21/2014 14:20:22
AMRAD\PSavage	03/21/2014 14:23:29
AMRAD\PSavage	03/21/2014 14:25:30
AMRAD\PSavage	03/21/2014 14:29:38
AMRAD\PSavage	03/21/2014 14:31:38

LSC Instrument Data Transfer Report

\\Packard3170\Results\H3 Low Level\Low Level H3\2

Batch Sample ID	Non-BKG Samples Transferred	Samples Eligible To Save	
ARS1-B14-00498	5	5	LSC 1

LIMS Batch Sample ID	LSC P#	LSC PID	LSC S#	LSC SMPL_ID	LSC Count Date	LSC CPMA	LSC tSIE	LSC EFF	LSC Count Dur	Analysis Batch	LIMS SDG	LIMS Run
BKG	2		1	BACKGROUND	03/21/14 16:25	1.16	359.36	24.9100	240.00	ARS1-B14-00498		
ARS1-B14-00498-01	2		2	B14-00498-01	03/21/14 20:35	4.11	373.38	25.5700	240.00	ARS1-B14-00498		
ARS1-B14-00498-02	2		3	B14-00498-02	03/22/14 00:46	4.43	395.69	26.6900	240.00	ARS1-B14-00498		
ARS1-B14-00498-03	2		4	B14-00498-03	03/22/14 04:57	1.35	386.28	26.2100	240.00	ARS1-B14-00498		
ARS1-B14-00498-04	2		5	B14-00498-04	03/22/14 09:08	1.22	399.32	26.8700	240.00	ARS1-B14-00498	ARS1-14-00544	1
ARS1-B14-00498-05	2		6	B14-00498-05	03/22/14 13:19	1.26	383.99	26.1000	240.00	ARS1-B14-00498	ARS1-14-00545	1

ARS-040 Calculation Results

ARS1-B14-00498

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-B14-00498-01	500.280	2.000	17.000	2.052	14.948	0.030	26.212
LSC-A-022	ARS1-B14-00498-02	500.530	2.000	15.450	2.052	13.398	0.027	29.134
LSC-A-022	ARS1-B14-00498-03	500.150	2.000	16.140	2.052	14.088	0.028	27.741
LSC-A-022	ARS1-B14-00498-04	500.060	2.000	16.980	2.052	14.928	0.030	26.235
LSC-A-022	ARS1-B14-00498-05	500.000	2.000	16.260	2.052	14.208	0.028	27.508

ARS-040 Calculation Results

ARS1-B14-00498

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-B14-00498-01	4.112	1.159	373.380	0.256	0.01004	L	1/3/2013	3/21/2014	240.000
LSC-A-022	ARS1-B14-00498-02	4.430	1.159	395.690	0.267	0.00980	L	1/3/2013	3/22/2014	240.000
LSC-A-022	ARS1-B14-00498-03	1.352	1.159	386.280	0.262	0.01001	L	3/21/2014	3/22/2014	240.000
LSC-A-022	ARS1-B14-00498-04	1.220	1.159	399.320	0.269	0.01001	L	3/5/2014	3/22/2014	240.000
LSC-A-022	ARS1-B14-00498-05	1.260	1.159	383.990	0.261	0.01000	L	3/3/2014	3/22/2014	240.000

ARS-040 Calculation Results

ARS1-B14-00498

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-B14-00498-01	240.000	0.93404	21.163	1.062	1.062	3.347	2.082	6.561	2.398	1.159	pCi
LSC-A-022	ARS1-B14-00498-02	240.000	0.93404	20.701	0.966	0.966	3.252	1.893	6.374	2.118	1.023	pCi
LSC-A-022	ARS1-B14-00498-03	240.000	0.99985	1.195	0.633	0.633	0.658	1.241	1.290	2.071	1.001	pCi
LSC-A-022	ARS1-B14-00498-04	240.000	0.99738	0.390	0.637	0.637	0.640	1.249	1.254	2.142	1.035	pCi
LSC-A-022	ARS1-B14-00498-05	240.000	0.99708	0.636	0.632	0.632	0.639	1.238	1.252	2.106	1.017	pCi

ARS-040 Calculation Results

ARS1-B14-00498	
ACF	1
UCF	2.22
Sys Error	0.15

AnalysisCode	ABatchSampleID	AliquotReportUnits	UserID	ModDate
LSC-A-022	ARS1-B14-00498-01	L	AMRAD\PSavage	3/24/2014
LSC-A-022	ARS1-B14-00498-02	L	AMRAD\PSavage	3/24/2014
LSC-A-022	ARS1-B14-00498-03	L	AMRAD\PSavage	3/24/2014
LSC-A-022	ARS1-B14-00498-04	L	AMRAD\PSavage	3/24/2014
LSC-A-022	ARS1-B14-00498-05	L	AMRAD\PSavage	3/24/2014

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
~~3-17-14~~	~~WSD~~				
3-17-14	10:52	D14W424-01	D14-W424	1642	VR
↓	14:50	Background	D14W424	0122	PM
↓	↓	D14W424-01	↓	↓	PM
↓	↓	↓ -02	↓	↓	PM
↓	↓	↓ -03	↓	↓	PM
↓	↓	↓ -04	↓	↓	PM
↓	↓	↓ -05	↓	↓	PM
↓	↓	↓ -06	↓	↓	PM
↓	↓	↓ -07	↓	↓	PM
↓	↓	↓ -08	↓	↓	PM
↓	↓	↓ -09	↓	↓	PM
↓	↓	↓ -10	↓	↓	PM
3-20-14	12:00	SWC 14	QA	QA	PM
↓	↓	Background	D14W602	1375	PM
↓	↓	D14-W602-01	↓	↓	PM
↓	↓	↓ -05	↓	↓	PM
↓	↓	↓ -06	↓	↓	PM
↓	↓	↓ 07	↓	↓	PM
3-21-14	14:45	SWC 16	QA	QA	PM
↓	↓	Background	D14-W492	1616	PM

Reviewed By: SDL Initials Date: 3-28-14

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
3-21-14	14:45	B14-00498-01	B14-00498	1 of 6	[illegible]
↓	↓	↓ -02	↓	↓	[illegible]
↓	↓	↓ -03	↓	↓	[illegible]
↓	↓	↓ -04	↓	↓	[illegible]
↓	↓	↓ -05	↓	↓	[illegible]
		SDL			
		3-28-14			

Reviewed By: SDL Date: 3-28-14
Initials

ARS INTERNATIONAL

2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

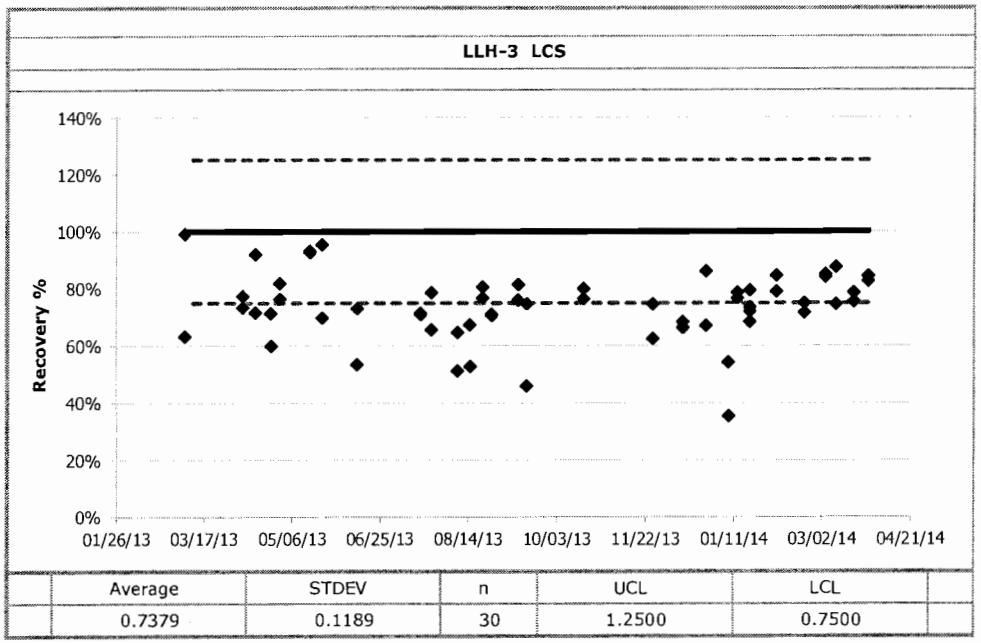
Low Level Tritium by Low Level Liquid Scintillation Counting

Control Charts

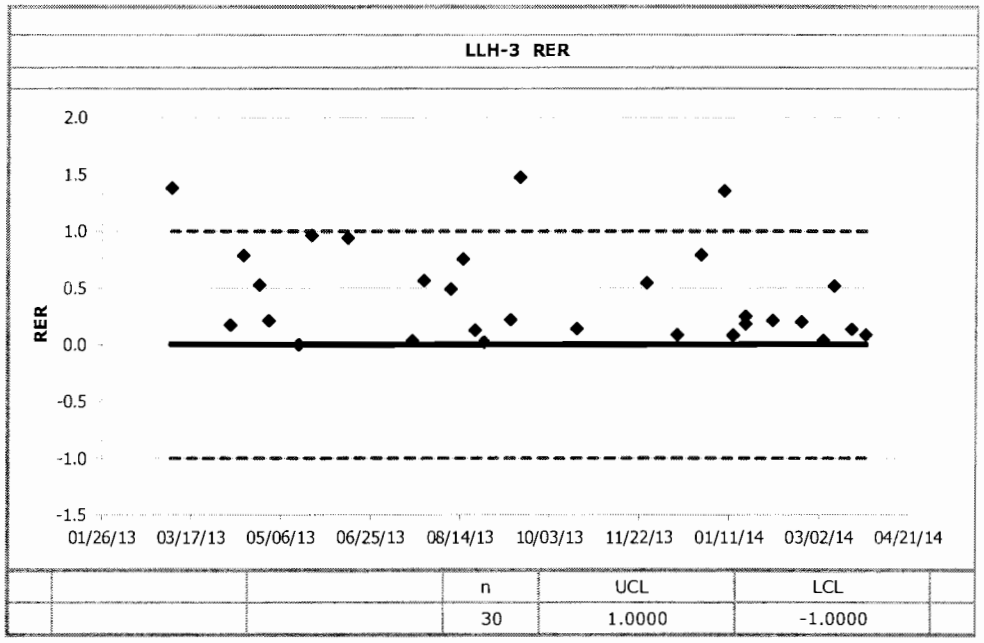
American Radiation Services
Baton Rouge Laboratory

QC Chart

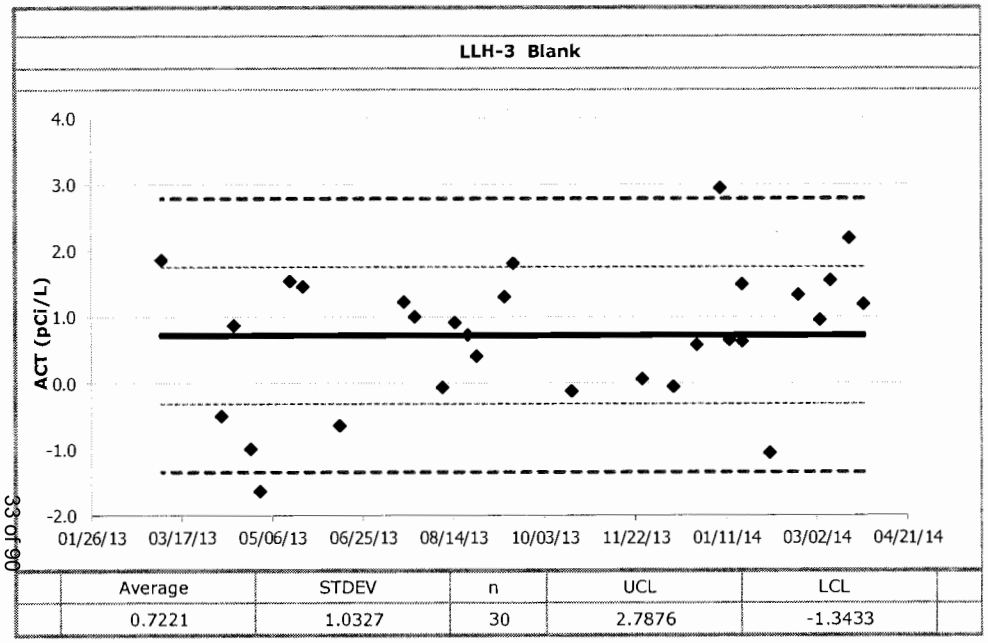
Printed: 3/28/2014 1:48 PM
Page 1 of 1



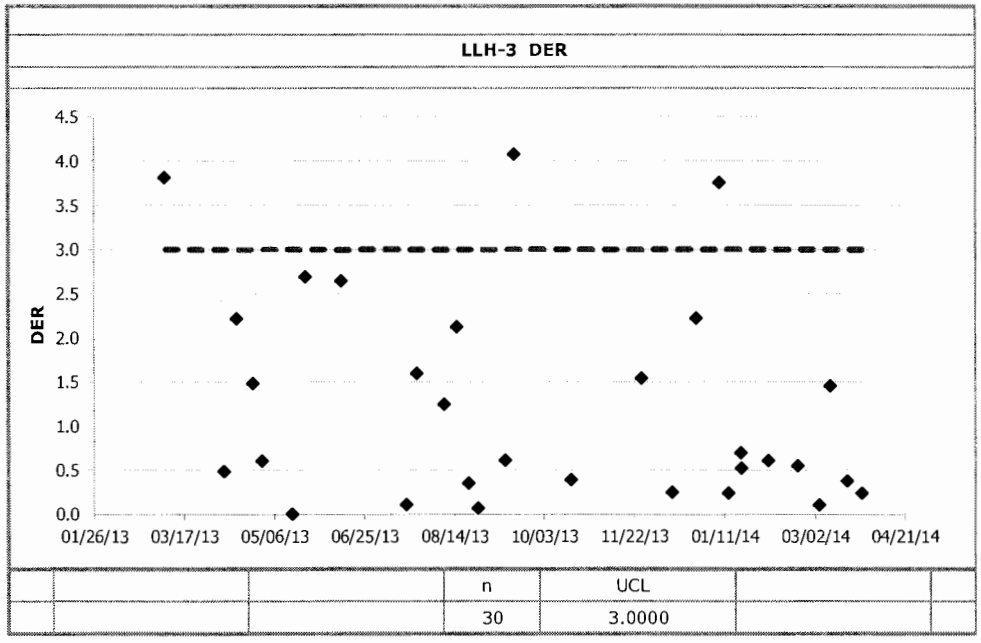
Average	STDEV	n	UCL	LCL
0.7379	0.1189	30	1.2500	0.7500



n	UCL	LCL
30	1.0000	-1.0000



Average	STDEV	n	UCL	LCL
0.7221	1.0327	30	2.7876	-1.3433



n	UCL
30	3.0000

3H Efficiency
Total # pts : 5815
Valid # pts : 227
Mean : 62.56
SD : 0.18

Date	Value	Valid Pt
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	62.57	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
May 22, 2013	62.75	X

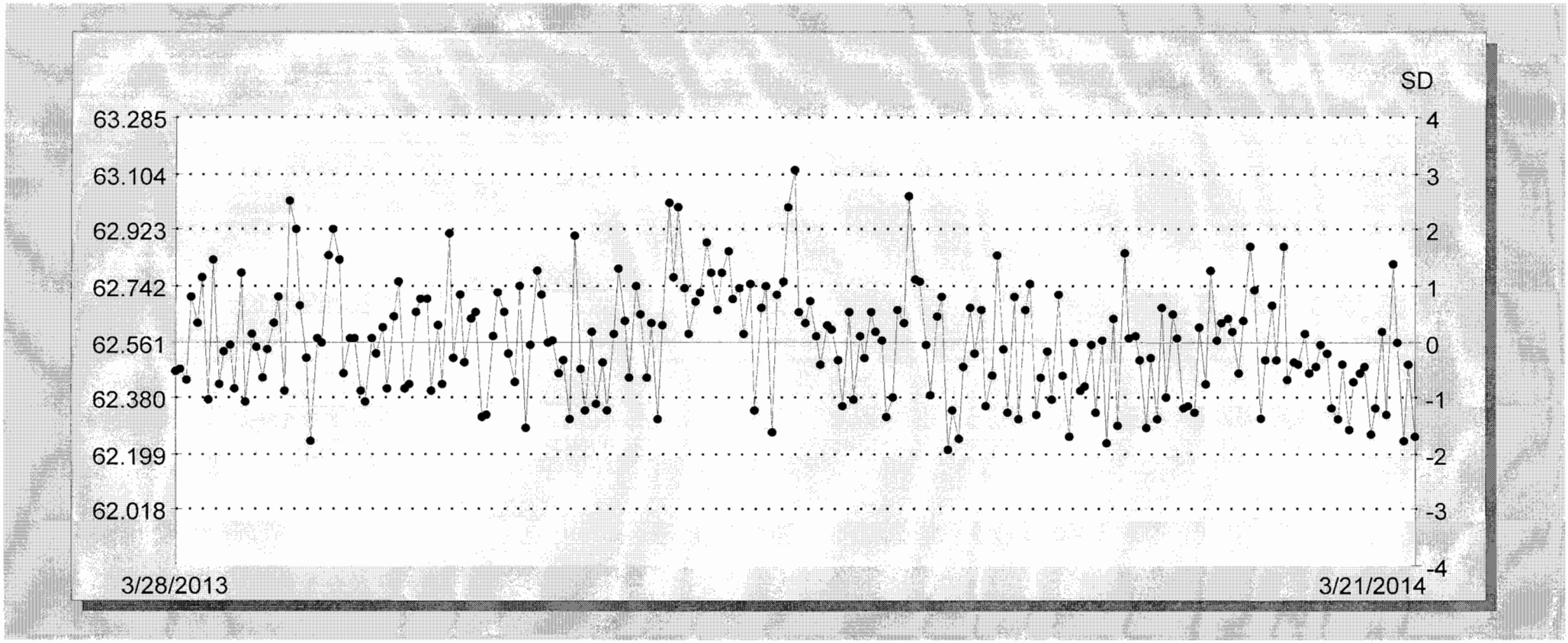
May 24, 2013	62.41	X
May 24, 2013	62.42	X
May 29, 2013	62.66	X
Jun 07, 2013	62.70	X
Jun 07, 2013	62.70	X
Jun 09, 2013	62.40	X
Jun 10, 2013	62.61	X
Jun 13, 2013	62.43	X
Jun 15, 2013	62.91	X
Jun 17, 2013	62.51	X
Jun 18, 2013	62.71	X
Jun 19, 2013	62.50	X
Jun 21, 2013	62.64	X
Jun 24, 2013	62.66	X
Jun 27, 2013	62.32	X
Jun 28, 2013	62.33	X
Jul 01, 2013	62.58	X
Jul 03, 2013	62.72	X
Jul 11, 2013	62.66	X
Jul 15, 2013	62.53	X
Jul 17, 2013	62.43	X
Jul 17, 2013	62.74	X
Jul 18, 2013	62.28	X
Jul 20, 2013	62.55	X
Jul 22, 2013	62.79	X
Jul 23, 2013	62.71	X
Jul 29, 2013	62.56	X
Aug 01, 2013	62.57	X
Aug 02, 2013	62.46	X
Aug 05, 2013	62.50	X
Aug 06, 2013	62.31	X
Aug 08, 2013	62.90	X
Aug 08, 2013	62.47	X
Aug 09, 2013	62.34	X
Aug 13, 2013	62.59	X
Aug 13, 2013	62.36	X
Aug 13, 2013	62.50	X
Aug 13, 2013	62.34	X
Aug 13, 2013	62.59	X
Aug 13, 2013	62.80	X
Aug 13, 2013	62.63	X
Aug 13, 2013	62.44	X
Aug 14, 2013	62.74	X
Aug 14, 2013	62.65	X
Aug 14, 2013	62.45	X
Aug 14, 2013	62.62	X
Aug 14, 2013	62.31	X
Aug 14, 2013	62.62	X
Aug 22, 2013	63.01	X
Aug 23, 2013	62.77	X
Aug 28, 2013	63.00	X
Sep 04, 2013	62.73	X

Sep 09, 2013	62.69	X
Sep 09, 2013	62.72	X
Sep 13, 2013	62.88	X
Sep 15, 2013	62.78	X
Sep 20, 2013	62.66	X
Sep 24, 2013	62.78	X
Sep 26, 2013	62.85	X
Oct 10, 2013	62.70	X
Oct 11, 2013	62.74	X
Oct 11, 2013	62.59	X
Oct 12, 2013	62.75	X
Oct 12, 2013	62.34	X
Oct 12, 2013	62.67	X
Oct 12, 2013	62.74	X
Oct 12, 2013	62.27	X
Oct 12, 2013	62.72	X
Oct 12, 2013	62.75	X
Oct 12, 2013	62.99	X
Oct 12, 2013	63.12	X
Oct 12, 2013	62.66	X
Oct 12, 2013	62.62	X
Oct 12, 2013	62.69	X
Oct 12, 2013	62.58	X
Oct 12, 2013	62.48	X
Oct 13, 2013	62.62	X
Oct 13, 2013	62.60	X
Oct 13, 2013	62.50	X
Oct 13, 2013	62.36	X
Oct 13, 2013	62.65	X
Oct 13, 2013	62.37	X
Oct 13, 2013	62.58	X
Oct 13, 2013	62.51	X
Oct 13, 2013	62.66	X
Oct 13, 2013	62.59	X
Oct 13, 2013	62.57	X
Oct 13, 2013	62.32	X
Oct 13, 2013	62.38	X
Oct 13, 2013	62.66	X
Oct 13, 2013	62.62	X
Oct 14, 2013	63.03	X
Oct 14, 2013	62.77	X
Oct 14, 2013	62.75	X
Oct 14, 2013	62.55	X
Oct 14, 2013	62.39	X
Oct 16, 2013	62.64	X
Oct 17, 2013	62.71	X
Oct 24, 2013	62.21	X
Oct 25, 2013	62.34	X
Nov 05, 2013	62.25	X
Nov 06, 2013	62.48	X
Nov 07, 2013	62.67	X
Nov 08, 2013	62.52	X

Nov 16, 2013	62.35	X
Nov 22, 2013	62.45	X
Nov 26, 2013	62.84	X
Dec 03, 2013	62.54	X
Dec 06, 2013	62.33	X
Dec 09, 2013	62.70	X
Dec 09, 2013	62.31	X
Dec 12, 2013	62.67	X
Dec 13, 2013	62.75	X
Dec 15, 2013	62.33	X
Dec 20, 2013	62.44	X
Dec 27, 2013	62.53	X
Dec 31, 2013	62.37	X
Dec 31, 2013	62.71	X
Dec 31, 2013	62.45	X
Dec 31, 2013	62.25	X
Dec 31, 2013	62.56	X
Dec 31, 2013	62.40	X
Dec 31, 2013	62.42	X
Dec 31, 2013	62.55	X
Dec 31, 2013	62.33	X
Dec 31, 2013	62.56	X
Jan 01, 2014	62.23	X
Jan 01, 2014	62.64	X
Jan 01, 2014	62.29	X
Jan 01, 2014	62.85	X
Jan 01, 2014	62.57	X
Jan 01, 2014	62.58	X
Jan 01, 2014	62.50	X
Jan 01, 2014	62.29	X
Jan 01, 2014	62.51	X
Jan 01, 2014	62.31	X
Jan 01, 2014	62.67	X
Jan 01, 2014	62.38	X
Jan 01, 2014	62.65	X
Jan 01, 2014	62.57	X
Jan 02, 2014	62.34	X
Jan 02, 2014	62.36	X
Jan 02, 2014	62.33	X
Jan 02, 2014	62.61	X
Jan 02, 2014	62.42	X
Jan 02, 2014	62.79	X
Jan 02, 2014	62.57	X
Jan 02, 2014	62.62	X
Jan 02, 2014	62.64	X
Jan 02, 2014	62.60	X
Jan 02, 2014	62.46	X
Jan 02, 2014	62.63	X
Jan 02, 2014	62.87	X
Jan 02, 2014	62.73	X
Jan 03, 2014	62.31	X
Jan 03, 2014	62.50	X

Jan 03, 2014	62.50	X
Jan 03, 2014	62.87	X
Jan 03, 2014	62.44	X
Jan 03, 2014	62.49	X
Jan 08, 2014	62.49	X
Jan 15, 2014	62.58	X
Jan 17, 2014	62.46	X
Jan 20, 2014	62.48	X
Jan 20, 2014	62.55	X
Jan 27, 2014	62.52	X
Jan 31, 2014	62.34	X
Feb 03, 2014	62.31	X
Feb 05, 2014	62.48	X
Feb 11, 2014	62.27	X
Feb 14, 2014	62.43	X
Feb 25, 2014	62.46	X
Feb 26, 2014	62.48	X
Feb 27, 2014	62.26	X
Mar 06, 2014	62.35	X
Mar 07, 2014	62.59	X
Mar 11, 2014	62.32	X
Mar 17, 2014	62.81	X
Mar 17, 2014	62.56	X
Mar 20, 2014	62.24	X
Mar 20, 2014	62.49	X
Mar 21, 2014	62.25	X

3H Efficiency
Total # pts : 5815
Valid # pts : 227
Mean : 62.56
SD : 0.18



3H Background
Total # pts : 5741
Valid # pts : 227
Mean : 2.10
SD : 0.18

Date	Value	Valid Pt
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
May 07, 2013	1.84	X
May 09, 2013	2.03	X
May 09, 2013	2.24	X
May 09, 2013	1.88	X
May 09, 2013	1.88	X
May 09, 2013	1.99	X
May 10, 2013	2.15	X
May 14, 2013	2.12	X
May 15, 2013	2.06	X
May 16, 2013	2.25	X
May 17, 2013	2.23	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
May 22, 2013	2.21	X

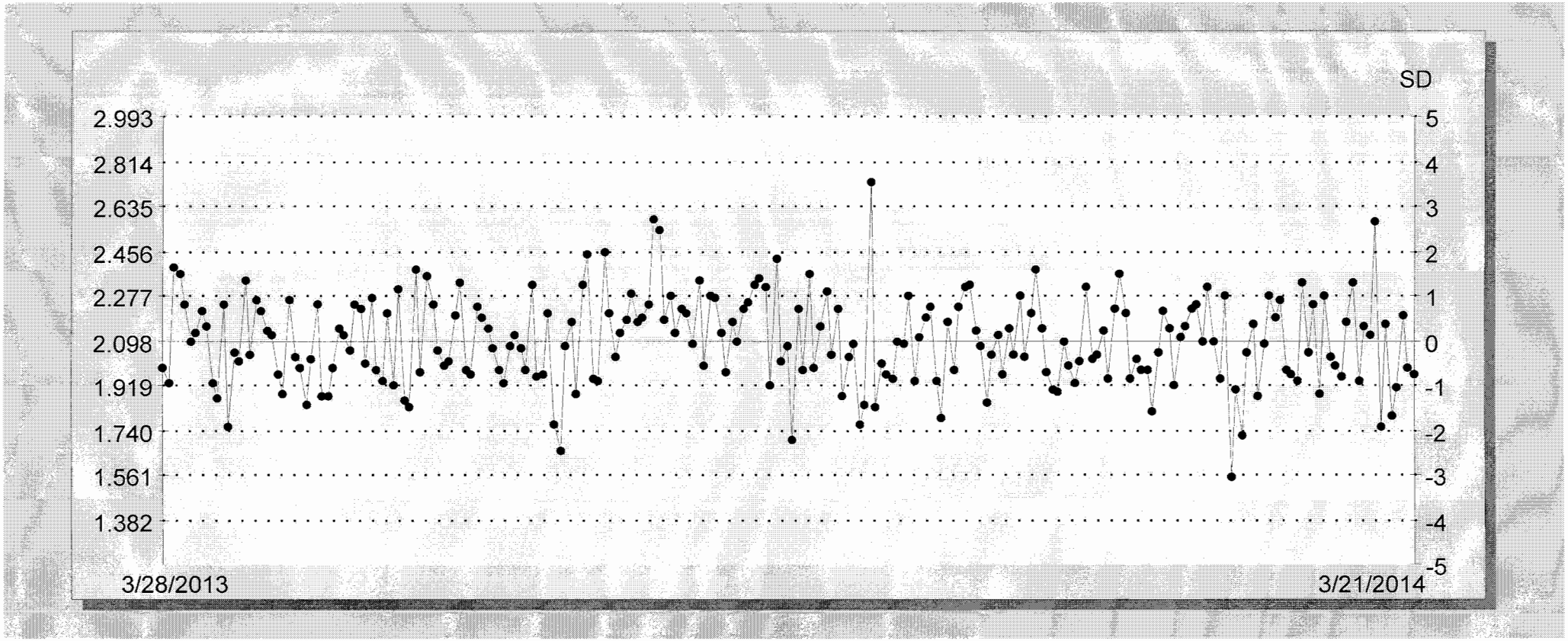
May 24, 2013	1.92	X
May 24, 2013	2.31	X
May 29, 2013	1.86	X
Jun 07, 2013	1.83	X
Jun 07, 2013	2.38	X
Jun 09, 2013	1.97	X
Jun 10, 2013	2.35	X
Jun 13, 2013	2.24	X
Jun 15, 2013	2.06	X
Jun 17, 2013	2.00	X
Jun 18, 2013	2.02	X
Jun 19, 2013	2.20	X
Jun 21, 2013	2.34	X
Jun 24, 2013	1.98	X
Jun 27, 2013	1.96	X
Jun 28, 2013	2.23	X
Jul 01, 2013	2.19	X
Jul 03, 2013	2.15	X
Jul 11, 2013	2.07	X
Jul 15, 2013	1.98	X
Jul 17, 2013	1.93	X
Jul 17, 2013	2.08	X
Jul 18, 2013	2.13	X
Jul 20, 2013	2.07	X
Jul 22, 2013	1.99	X
Jul 23, 2013	2.32	X
Jul 29, 2013	1.96	X
Aug 01, 2013	1.97	X
Aug 02, 2013	2.21	X
Aug 05, 2013	1.77	X
Aug 06, 2013	1.66	X
Aug 08, 2013	2.08	X
Aug 08, 2013	2.18	X
Aug 09, 2013	1.88	X
Aug 13, 2013	2.32	X
Aug 13, 2013	2.45	X
Aug 13, 2013	1.95	X
Aug 13, 2013	1.94	X
Aug 13, 2013	2.45	X
Aug 13, 2013	2.21	X
Aug 13, 2013	2.03	X
Aug 13, 2013	2.13	X
Aug 14, 2013	2.18	X
Aug 14, 2013	2.29	X
Aug 14, 2013	2.17	X
Aug 14, 2013	2.19	X
Aug 14, 2013	2.25	X
Aug 14, 2013	2.59	X
Aug 22, 2013	2.54	X
Aug 23, 2013	2.18	X
Aug 28, 2013	2.28	X
Sep 04, 2013	2.13	X

Sep 09, 2013	2.21	X
Sep 09, 2013	2.09	X
Sep 13, 2013	2.34	X
Sep 15, 2013	2.00	X
Sep 20, 2013	2.28	X
Sep 24, 2013	2.27	X
Sep 26, 2013	2.13	X
Oct 10, 2013	1.97	X
Oct 11, 2013	2.17	X
Oct 11, 2013	2.10	X
Oct 12, 2013	2.23	X
Oct 12, 2013	2.25	X
Oct 12, 2013	2.32	X
Oct 12, 2013	2.35	X
Oct 12, 2013	2.31	X
Oct 12, 2013	1.92	X
Oct 12, 2013	2.43	X
Oct 12, 2013	2.01	X
Oct 12, 2013	2.08	X
Oct 12, 2013	1.70	X
Oct 12, 2013	2.23	X
Oct 12, 2013	1.98	X
Oct 12, 2013	2.37	X
Oct 12, 2013	1.99	X
Oct 13, 2013	2.16	X
Oct 13, 2013	2.30	X
Oct 13, 2013	2.04	X
Oct 13, 2013	2.23	X
Oct 13, 2013	1.88	X
Oct 13, 2013	2.03	X
Oct 13, 2013	2.09	X
Oct 13, 2013	1.76	X
Oct 13, 2013	1.84	X
Oct 13, 2013	2.74	X
Oct 13, 2013	1.83	X
Oct 13, 2013	2.01	X
Oct 13, 2013	1.97	X
Oct 13, 2013	1.95	X
Oct 13, 2013	2.09	X
Oct 14, 2013	2.08	X
Oct 14, 2013	2.28	X
Oct 14, 2013	1.94	X
Oct 14, 2013	2.11	X
Oct 14, 2013	2.19	X
Oct 16, 2013	2.23	X
Oct 17, 2013	1.94	X
Oct 24, 2013	1.79	X
Oct 25, 2013	2.17	X
Nov 05, 2013	1.98	X
Nov 06, 2013	2.23	X
Nov 07, 2013	2.31	X
Nov 08, 2013	2.33	X

Nov 16, 2013	2.08	X
Nov 22, 2013	1.85	X
Nov 26, 2013	2.04	X
Dec 03, 2013	2.12	X
Dec 06, 2013	1.97	X
Dec 09, 2013	2.14	X
Dec 09, 2013	2.04	X
Dec 12, 2013	2.28	X
Dec 13, 2013	2.03	X
Dec 15, 2013	2.21	X
Dec 20, 2013	2.39	X
Dec 27, 2013	2.15	X
Dec 31, 2013	1.97	X
Dec 31, 2013	1.90	X
Dec 31, 2013	1.90	X
Dec 31, 2013	2.09	X
Dec 31, 2013	2.00	X
Dec 31, 2013	1.93	X
Dec 31, 2013	2.02	X
Dec 31, 2013	2.31	X
Dec 31, 2013	2.03	X
Dec 31, 2013	2.04	X
Jan 01, 2014	2.14	X
Jan 01, 2014	1.95	X
Jan 01, 2014	2.22	X
Jan 01, 2014	2.37	X
Jan 01, 2014	2.21	X
Jan 01, 2014	1.95	X
Jan 01, 2014	2.03	X
Jan 01, 2014	1.99	X
Jan 01, 2014	1.99	X
Jan 01, 2014	1.82	X
Jan 01, 2014	2.05	X
Jan 01, 2014	2.22	X
Jan 01, 2014	2.14	X
Jan 01, 2014	1.92	X
Jan 02, 2014	2.11	X
Jan 02, 2014	2.16	X
Jan 02, 2014	2.23	X
Jan 02, 2014	2.24	X
Jan 02, 2014	2.10	X
Jan 02, 2014	2.31	X
Jan 02, 2014	2.10	X
Jan 02, 2014	1.95	X
Jan 02, 2014	2.28	X
Jan 02, 2014	1.55	X
Jan 02, 2014	1.90	X
Jan 02, 2014	1.72	X
Jan 02, 2014	2.05	X
Jan 02, 2014	2.17	X
Jan 03, 2014	1.88	X
Jan 03, 2014	2.09	X

Jan 03, 2014	2.19	X
Jan 03, 2014	2.26	X
Jan 03, 2014	1.98	X
Jan 03, 2014	1.96	X
Jan 08, 2014	1.94	X
Jan 15, 2014	2.33	X
Jan 17, 2014	2.05	X
Jan 20, 2014	2.24	X
Jan 20, 2014	1.89	X
Jan 27, 2014	2.28	X
Jan 31, 2014	2.04	X
Feb 03, 2014	2.00	X
Feb 05, 2014	1.96	X
Feb 11, 2014	2.18	X
Feb 14, 2014	2.33	X
Feb 25, 2014	1.94	X
Feb 26, 2014	2.16	X
Feb 27, 2014	2.12	X
Mar 06, 2014	2.58	X
Mar 07, 2014	1.75	X
Mar 11, 2014	2.16	X
Mar 17, 2014	1.80	X
Mar 17, 2014	1.91	X
Mar 20, 2014	2.20	X
Mar 20, 2014	1.99	X
Mar 21, 2014	1.96	X

3H Background
Total # pts : 5741
Valid # pts : 227
Mean : 2.10
SD : 0.18



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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium- Screening by Low Level Liquid Scintillation Counting

ARS INTERNATIONAL

2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

Samples

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

ARS File ID Numbers: ARS1-14-00544; 545
ARS Batch ID: ARS1-B14-00489

	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	B14-00489-04	120	1.307	1.03	25.92	10 03	47.994	pCi/L	95.52876	NO
2	B14-00489-05	120	1.245	1.03	25.75	10 00	37.610	pCi/L	96.44791	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!

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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

AMRAD AMERICAN RADIATION SERVICES, LLC

Analysis Batch ID **ARS1-B14-00489**

Method	**ARS-054**	**Analysis**	**LSC-A-021**	**Matrix**	**AQ**
Description	**Low Level Tritium Screening**				

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B14-00489-01	LCS									
ARS1-B14-00489-02	LCSD									
ARS1-B14-00489-03	MBL									
ARS1-B14-00489-04	TRG				**ARS1-14-00544**	001	1	CAAN-14-54789	STD	03/31/14
ARS1-B14-00489-05	TRG				**ARS1-14-00545**	001	1	CAWA-14-54709	STD	03/31/14

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
13390	ARS1-B14-00489	ARS1-B14-00489-01		1	g					AMRAD\PSAVAGE	03/06/2014 13:12:59
13391	ARS1-B14-00489	ARS1-B14-00489-02		1	g					AMRAD\PSAVAGE	03/06/2014 13:12:59
13392	ARS1-B14-00489	ARS1-B14-00489-03		1	g					AMRAD\PSAVAGE	03/06/2014 13:12:59
13393	ARS1-B14-00489	ARS1-B14-00489-04	CAAN-14-54789	10.03	g	158009				AMRAD\PSAVAGE	03/06/2014 13:12:59
13394	ARS1-B14-00489	ARS1-B14-00489-05	CAWA-14-54709	10	g	158010				AMRAD\PSAVAGE	03/06/2014 13:12:59

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\20140306_1451
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20140306_1451\20140306_1451.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20140306_1451\LLH3.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20140306_1451\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 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

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

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

Count Corrections-

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

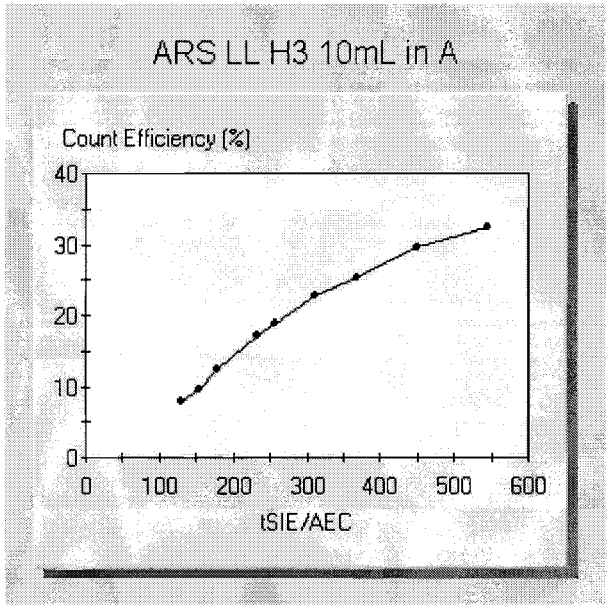
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 08/22/2013
Date Modified:
ARS LL H3 10mL in A

tSIE/AEC	Count Efficiency (%)
544.56	32.36
451.00	29.46
369.98	25.40
311.75	22.73
257.34	18.93
232.82	17.19
180.53	12.39
154.79	9.65
131.07	7.78

P#	S#	SMPL_ID	CPMA	DPM1	tSIE	Eff Nucl In A	Count Time	DATE	TIME	MESSAGES
2	1	BACKGROUND	1.030	4.13	360.13	24.95	120.00	3/6/2014	2:59:49 PM	
2	2	B14-00489-04	1.307	5.04	380.50	25.92	120.00	3/6/2014	5:09:41 PM	
2	3	B14-00489-05	1.245	4.83	377.03	25.75	120.00	3/6/2014	7:19:34 PM	

Low Level Tritium pH Checks

SDG#	Fraction	pH	Date	Analyst
ARS1-14-05514	01	7	3-6-14	PD
ARS1-14-05515	01	7	3-6-14	PD
	DL			
	3-28-14			

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
2-25-14	07:51	BM-00410-04	B14-00410	0930	[illegible]
↓	↓	↓ -05	↓	↓	[illegible]
↓	↓	↓ -06	↓	↓	[illegible]
↓	↓	↓ 07	↓	↓	[illegible]
↓	↓	↓ -08	↓	↓	[illegible]
2-26-14	14:35	SWC 16	BLK	BLK	[illegible]
↓	↓	Background	B14-00274	1620	[illegible]
↓	↓	B14-00274 01	↓	↓	[illegible]
↓	↓	↓ 02	↓	↓	[illegible]
↓	↓	↓ 03	↓	↓	[illegible]
↓	↓	↓ 04	↓	↓	[illegible]
↓	↓	↓ 05	↓	↓	[illegible]
↓	↓	SWC 16	BLK	BLK	[illegible]
3-6-14	13:13	SWC 16	BLK	BLK	[illegible]
↓	↓	Background	B14-00484	1451	[illegible]
↓	↓	B1400484-04	↓	↓	[illegible]
↓	↓	↓ -05	↓	↓	[illegible]
			3-28-14		

Reviewed By: [signature] Date: 3-28-14

Initials

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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

Control Charts

3H Efficiency
Total # pts : 5808
Valid # pts : 228
Mean : 62.56
SD : 0.18

Date	Value	Valid Pt
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

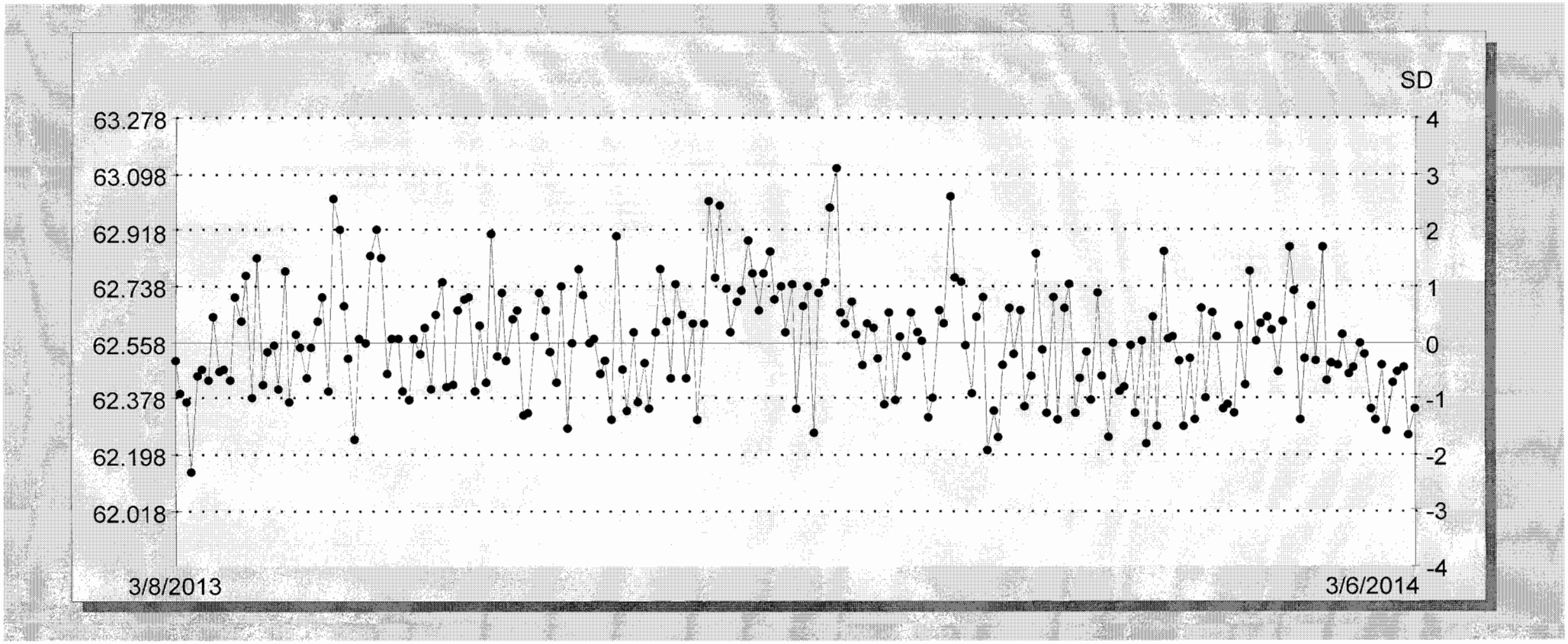
May 15, 2013	62.40	X
May 16, 2013	62.37	X
May 17, 2013	62.57	X
May 17, 2013	62.52	X
May 17, 2013	62.60	X
May 17, 2013	62.41	X
May 21, 2013	62.65	X
May 22, 2013	62.75	X
May 24, 2013	62.41	X
May 24, 2013	62.42	X
May 29, 2013	62.66	X
Jun 07, 2013	62.70	X
Jun 07, 2013	62.70	X
Jun 09, 2013	62.40	X
Jun 10, 2013	62.61	X
Jun 13, 2013	62.43	X
Jun 15, 2013	62.91	X
Jun 17, 2013	62.51	X
Jun 18, 2013	62.71	X
Jun 19, 2013	62.50	X
Jun 21, 2013	62.64	X
Jun 24, 2013	62.66	X
Jun 27, 2013	62.32	X
Jun 28, 2013	62.33	X
Jul 01, 2013	62.58	X
Jul 03, 2013	62.72	X
Jul 11, 2013	62.66	X
Jul 15, 2013	62.53	X
Jul 17, 2013	62.43	X
Jul 17, 2013	62.74	X
Jul 18, 2013	62.28	X
Jul 20, 2013	62.55	X
Jul 22, 2013	62.79	X
Jul 23, 2013	62.71	X
Jul 29, 2013	62.56	X
Aug 01, 2013	62.57	X
Aug 02, 2013	62.46	X
Aug 05, 2013	62.50	X
Aug 06, 2013	62.31	X
Aug 08, 2013	62.90	X
Aug 08, 2013	62.47	X
Aug 09, 2013	62.34	X
Aug 13, 2013	62.59	X
Aug 13, 2013	62.36	X
Aug 13, 2013	62.50	X
Aug 13, 2013	62.34	X
Aug 13, 2013	62.59	X
Aug 13, 2013	62.80	X
Aug 13, 2013	62.63	X
Aug 13, 2013	62.44	X
Aug 14, 2013	62.74	X
Aug 14, 2013	62.65	X

Aug 14, 2013	62.62	X
Aug 14, 2013	62.31	X
Aug 14, 2013	62.62	X
Aug 22, 2013	63.01	X
Aug 23, 2013	62.77	X
Aug 28, 2013	63.00	X
Sep 04, 2013	62.73	X
Sep 09, 2013	62.59	X
Sep 09, 2013	62.69	X
Sep 09, 2013	62.72	X
Sep 13, 2013	62.88	X
Sep 15, 2013	62.78	X
Sep 20, 2013	62.66	X
Sep 24, 2013	62.78	X
Sep 26, 2013	62.85	X
Oct 10, 2013	62.70	X
Oct 11, 2013	62.74	X
Oct 11, 2013	62.59	X
Oct 12, 2013	62.75	X
Oct 12, 2013	62.34	X
Oct 12, 2013	62.67	X
Oct 12, 2013	62.74	X
Oct 12, 2013	62.27	X
Oct 12, 2013	62.72	X
Oct 12, 2013	62.75	X
Oct 12, 2013	62.99	X
Oct 12, 2013	63.12	X
Oct 12, 2013	62.66	X
Oct 12, 2013	62.62	X
Oct 12, 2013	62.69	X
Oct 12, 2013	62.58	X
Oct 12, 2013	62.48	X
Oct 13, 2013	62.62	X
Oct 13, 2013	62.60	X
Oct 13, 2013	62.50	X
Oct 13, 2013	62.36	X
Oct 13, 2013	62.65	X
Oct 13, 2013	62.37	X
Oct 13, 2013	62.58	X
Oct 13, 2013	62.51	X
Oct 13, 2013	62.66	X
Oct 13, 2013	62.59	X
Oct 13, 2013	62.57	X
Oct 13, 2013	62.32	X
Oct 13, 2013	62.38	X
Oct 13, 2013	62.66	X
Oct 13, 2013	62.62	X
Oct 14, 2013	63.03	X
Oct 14, 2013	62.77	X
Oct 14, 2013	62.75	X
Oct 14, 2013	62.55	X
Oct 14, 2013	62.39	X

Oct 17, 2013	62.71	X
Oct 24, 2013	62.21	X
Oct 25, 2013	62.34	X
Nov 05, 2013	62.25	X
Nov 06, 2013	62.48	X
Nov 07, 2013	62.67	X
Nov 08, 2013	62.52	X
Nov 15, 2013	62.66	X
Nov 16, 2013	62.35	X
Nov 22, 2013	62.45	X
Nov 26, 2013	62.84	X
Dec 03, 2013	62.54	X
Dec 06, 2013	62.33	X
Dec 09, 2013	62.70	X
Dec 09, 2013	62.31	X
Dec 12, 2013	62.67	X
Dec 13, 2013	62.75	X
Dec 15, 2013	62.33	X
Dec 20, 2013	62.44	X
Dec 27, 2013	62.53	X
Dec 31, 2013	62.37	X
Dec 31, 2013	62.71	X
Dec 31, 2013	62.45	X
Dec 31, 2013	62.25	X
Dec 31, 2013	62.56	X
Dec 31, 2013	62.40	X
Dec 31, 2013	62.42	X
Dec 31, 2013	62.55	X
Dec 31, 2013	62.33	X
Dec 31, 2013	62.56	X
Jan 01, 2014	62.23	X
Jan 01, 2014	62.64	X
Jan 01, 2014	62.29	X
Jan 01, 2014	62.85	X
Jan 01, 2014	62.57	X
Jan 01, 2014	62.58	X
Jan 01, 2014	62.50	X
Jan 01, 2014	62.29	X
Jan 01, 2014	62.51	X
Jan 01, 2014	62.31	X
Jan 01, 2014	62.67	X
Jan 01, 2014	62.38	X
Jan 01, 2014	62.65	X
Jan 01, 2014	62.57	X
Jan 02, 2014	62.34	X
Jan 02, 2014	62.36	X
Jan 02, 2014	62.33	X
Jan 02, 2014	62.61	X
Jan 02, 2014	62.42	X
Jan 02, 2014	62.79	X
Jan 02, 2014	62.57	X
Jan 02, 2014	62.62	X

Jan 02, 2014	62.60	X
Jan 02, 2014	62.46	X
Jan 02, 2014	62.63	X
Jan 02, 2014	62.87	X
Jan 02, 2014	62.73	X
Jan 03, 2014	62.31	X
Jan 03, 2014	62.50	X
Jan 03, 2014	62.68	X
Jan 03, 2014	62.50	X
Jan 03, 2014	62.87	X
Jan 03, 2014	62.44	X
Jan 03, 2014	62.49	X
Jan 08, 2014	62.49	X
Jan 15, 2014	62.58	X
Jan 17, 2014	62.46	X
Jan 20, 2014	62.48	X
Jan 20, 2014	62.55	X
Jan 27, 2014	62.52	X
Jan 31, 2014	62.34	X
Feb 03, 2014	62.31	X
Feb 05, 2014	62.48	X
Feb 11, 2014	62.27	X
Feb 14, 2014	62.43	X
Feb 25, 2014	62.46	X
Feb 26, 2014	62.48	X
Feb 27, 2014	62.26	X
Mar 06, 2014	62.35	X

3H Efficiency
Total # pts : 5808
Valid # pts : 228
Mean : 62.56
SD : 0.18



3H Background
Total # pts : 5734
Valid # pts : 228
Mean : 2.10
SD : 0.18

Date	Value	Valid Pt
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
May 07, 2013	1.84	X
May 09, 2013	2.03	X
May 09, 2013	2.24	X
May 09, 2013	1.88	X
May 09, 2013	1.88	X
May 09, 2013	1.99	X
May 10, 2013	2.15	X
May 14, 2013	2.12	X

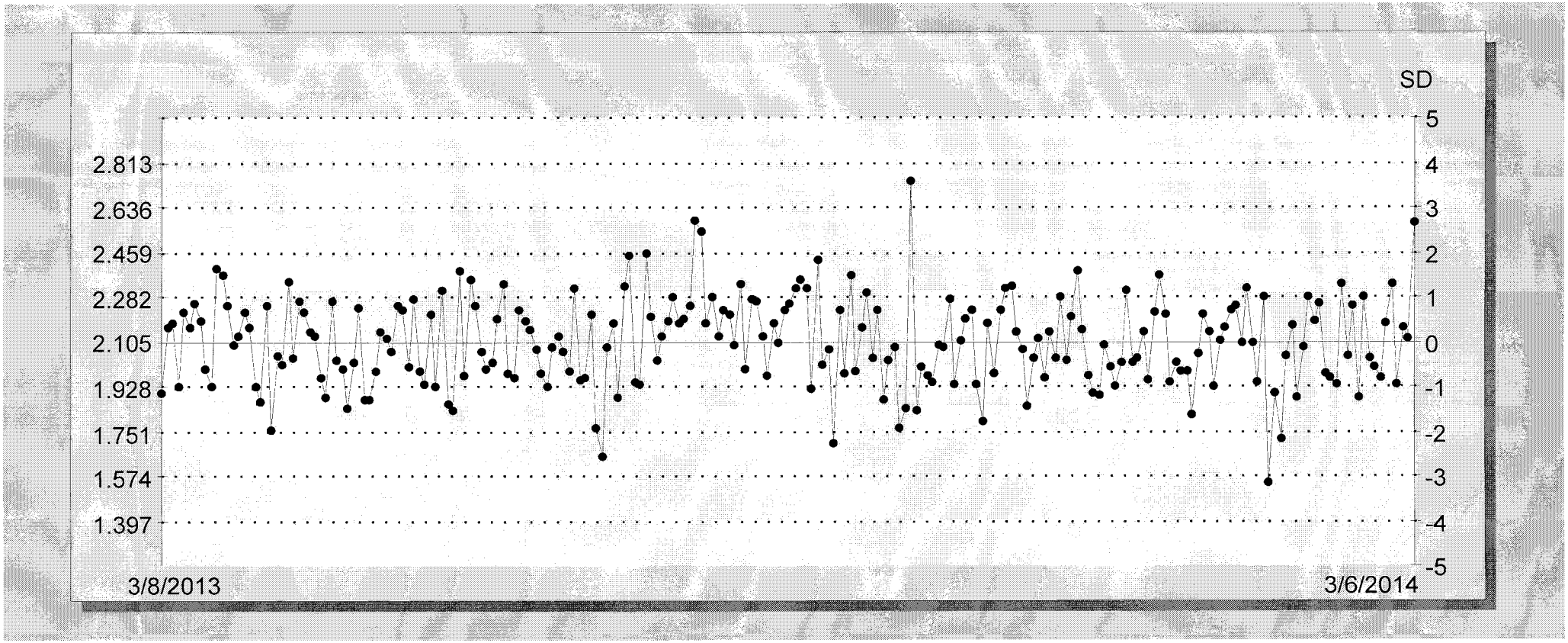
May 15, 2013	2.06	X
May 16, 2013	2.25	X
May 17, 2013	2.23	X
May 17, 2013	2.01	X
May 17, 2013	2.27	X
May 17, 2013	1.99	X
May 21, 2013	1.94	X
May 22, 2013	2.21	X
May 24, 2013	1.92	X
May 24, 2013	2.31	X
May 29, 2013	1.86	X
Jun 07, 2013	1.83	X
Jun 07, 2013	2.38	X
Jun 09, 2013	1.97	X
Jun 10, 2013	2.35	X
Jun 13, 2013	2.24	X
Jun 15, 2013	2.06	X
Jun 17, 2013	2.00	X
Jun 18, 2013	2.02	X
Jun 19, 2013	2.20	X
Jun 21, 2013	2.34	X
Jun 24, 2013	1.98	X
Jun 27, 2013	1.96	X
Jun 28, 2013	2.23	X
Jul 01, 2013	2.19	X
Jul 03, 2013	2.15	X
Jul 11, 2013	2.07	X
Jul 15, 2013	1.98	X
Jul 17, 2013	1.93	X
Jul 17, 2013	2.08	X
Jul 18, 2013	2.13	X
Jul 20, 2013	2.07	X
Jul 22, 2013	1.99	X
Jul 23, 2013	2.32	X
Jul 29, 2013	1.96	X
Aug 01, 2013	1.97	X
Aug 02, 2013	2.21	X
Aug 05, 2013	1.77	X
Aug 06, 2013	1.66	X
Aug 08, 2013	2.08	X
Aug 08, 2013	2.18	X
Aug 09, 2013	1.88	X
Aug 13, 2013	2.32	X
Aug 13, 2013	2.45	X
Aug 13, 2013	1.95	X
Aug 13, 2013	1.94	X
Aug 13, 2013	2.45	X
Aug 13, 2013	2.21	X
Aug 13, 2013	2.03	X
Aug 13, 2013	2.13	X
Aug 14, 2013	2.18	X
Aug 14, 2013	2.29	X

Aug 14, 2013	2.19	X
Aug 14, 2013	2.25	X
Aug 14, 2013	2.59	X
Aug 22, 2013	2.54	X
Aug 23, 2013	2.18	X
Aug 28, 2013	2.28	X
Sep 04, 2013	2.13	X
Sep 09, 2013	2.23	X
Sep 09, 2013	2.21	X
Sep 09, 2013	2.09	X
Sep 13, 2013	2.34	X
Sep 15, 2013	2.00	X
Sep 20, 2013	2.28	X
Sep 24, 2013	2.27	X
Sep 26, 2013	2.13	X
Oct 10, 2013	1.97	X
Oct 11, 2013	2.17	X
Oct 11, 2013	2.10	X
Oct 12, 2013	2.23	X
Oct 12, 2013	2.25	X
Oct 12, 2013	2.32	X
Oct 12, 2013	2.35	X
Oct 12, 2013	2.31	X
Oct 12, 2013	1.92	X
Oct 12, 2013	2.43	X
Oct 12, 2013	2.01	X
Oct 12, 2013	2.08	X
Oct 12, 2013	1.70	X
Oct 12, 2013	2.23	X
Oct 12, 2013	1.98	X
Oct 12, 2013	2.37	X
Oct 12, 2013	1.99	X
Oct 13, 2013	2.16	X
Oct 13, 2013	2.30	X
Oct 13, 2013	2.04	X
Oct 13, 2013	2.23	X
Oct 13, 2013	1.88	X
Oct 13, 2013	2.03	X
Oct 13, 2013	2.09	X
Oct 13, 2013	1.76	X
Oct 13, 2013	1.84	X
Oct 13, 2013	2.74	X
Oct 13, 2013	1.83	X
Oct 13, 2013	2.01	X
Oct 13, 2013	1.97	X
Oct 13, 2013	1.95	X
Oct 13, 2013	2.09	X
Oct 14, 2013	2.08	X
Oct 14, 2013	2.28	X
Oct 14, 2013	1.94	X
Oct 14, 2013	2.11	X
Oct 14, 2013	2.19	X

Oct 17, 2013	1.94	X
Oct 24, 2013	1.79	X
Oct 25, 2013	2.17	X
Nov 05, 2013	1.98	X
Nov 06, 2013	2.23	X
Nov 07, 2013	2.31	X
Nov 08, 2013	2.33	X
Nov 15, 2013	2.14	X
Nov 16, 2013	2.08	X
Nov 22, 2013	1.85	X
Nov 26, 2013	2.04	X
Dec 03, 2013	2.12	X
Dec 06, 2013	1.97	X
Dec 09, 2013	2.14	X
Dec 09, 2013	2.04	X
Dec 12, 2013	2.28	X
Dec 13, 2013	2.03	X
Dec 15, 2013	2.21	X
Dec 20, 2013	2.39	X
Dec 27, 2013	2.15	X
Dec 31, 2013	1.97	X
Dec 31, 2013	1.90	X
Dec 31, 2013	1.90	X
Dec 31, 2013	2.09	X
Dec 31, 2013	2.00	X
Dec 31, 2013	1.93	X
Dec 31, 2013	2.02	X
Dec 31, 2013	2.31	X
Dec 31, 2013	2.03	X
Dec 31, 2013	2.04	X
Jan 01, 2014	2.14	X
Jan 01, 2014	1.95	X
Jan 01, 2014	2.22	X
Jan 01, 2014	2.37	X
Jan 01, 2014	2.21	X
Jan 01, 2014	1.95	X
Jan 01, 2014	2.03	X
Jan 01, 2014	1.99	X
Jan 01, 2014	1.99	X
Jan 01, 2014	1.82	X
Jan 01, 2014	2.05	X
Jan 01, 2014	2.22	X
Jan 01, 2014	2.14	X
Jan 01, 2014	1.92	X
Jan 02, 2014	2.11	X
Jan 02, 2014	2.16	X
Jan 02, 2014	2.23	X
Jan 02, 2014	2.24	X
Jan 02, 2014	2.10	X
Jan 02, 2014	2.31	X
Jan 02, 2014	2.10	X
Jan 02, 2014	1.95	X

Jan 02, 2014	1.55	X
Jan 02, 2014	1.90	X
Jan 02, 2014	1.72	X
Jan 02, 2014	2.05	X
Jan 02, 2014	2.17	X
Jan 03, 2014	1.88	X
Jan 03, 2014	2.09	X
Jan 03, 2014	2.28	X
Jan 03, 2014	2.19	X
Jan 03, 2014	2.26	X
Jan 03, 2014	1.98	X
Jan 03, 2014	1.96	X
Jan 08, 2014	1.94	X
Jan 15, 2014	2.33	X
Jan 17, 2014	2.05	X
Jan 20, 2014	2.24	X
Jan 20, 2014	1.89	X
Jan 27, 2014	2.28	X
Jan 31, 2014	2.04	X
Feb 03, 2014	2.00	X
Feb 05, 2014	1.96	X
Feb 11, 2014	2.18	X
Feb 14, 2014	2.33	X
Feb 25, 2014	1.94	X
Feb 26, 2014	2.16	X
Feb 27, 2014	2.12	X
Mar 06, 2014	2.58	X

3H Background
Total # pts : 5734
Valid # pts : 228
Mean : 2.10
SD : 0.18



ARS INTERNATIONAL

2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Liquid Scintillation Counting

Calibration Information

ARS INTERNATIONAL

QUALITY CONTROL PROGRAM

AMERICAN RADIATION SERVICES
RADIOACTIVE REFERENCE SOLUTIONS

ANNUAL ACTIVITY VERIFICATION

VERIFICATION DATE: 1/7/2014 3:43 *date counted*
STANDARD REFERENCE #: S-0289

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

Radionuclide: H-3 — Dilution Reference Date: 1/3/2014 13:25

Dilution Activity	2.66 pCi per gram ===> dpm/g	5.91
Verif. Date Decay Corrected	2.66 pCi per gram ===> dpm/g	5.90

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-0289-V1	21.75	1	LSC	0.3549	10.54	5.019	6.29	2.83
S-0289-V2	20.53	1	LSC	0.3546	10.54	4.993	5.64	2.54
S-0289-V3	20.60	1	LSC	0.3546	10.54	4.996	5.68	2.56
S-0289-V4	21.00	1	LSC	0.3547	10.54	5.005	5.89	2.65
S-0289-V5	21.18	1	LSC	0.3542	10.54	4.993	6.02	2.71

	Average	5.90	2.66
	Two Sigma Uncertainty	0.52	0.24
10% Max *PASS*	Standard Deviation percent of known concentration	4.51%	4.51%
	Target Activity	5.90	2.66
5% Max *PASS*	% Diff	0.00%	0.00%

Verification Expiration Date: January 7, 2015

Prepared & Counted By: _____ Date: 1/7/2014 3:43

Verified & Approved By: D H Mullyan Date: 1-8-14

QC Approval: D H Mullyan Date: 1-8-14

S-0289
H-3
SL
Manufacturer: NIST SRM 4927F
Sol Matrix: H2O
Ref No: NIST SRM 4927F
Tech: Unknown
Parent ID: S-0237

Verified 1/7/14
Expires 1/7/15

ARS
RADIOACTIVE STANDARDS – BATON ROUGE LABORATORY

Assay Definition-

Assay Description:
H3 Normal Lvl

Assay Type: DPM (Single)
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\ARS\H3 Normal Lvl2\20140106_1733
Raw Results Path: C:\Packard\Tricarb\Results\ARS\H3 Normal Lvl2\20140106_1733\20140106_1733.results
RTF File Name: C:\Packard\Tricarb\Results\ARS\H3 Normal Lvl2\20140106_1733\H3 Results.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\ARS\H3 Normal Lvl2\20140106_1733\H3 Results.csv
Assay File Name: C:\Packard\TriCarb\Assays\H3 Normal Lvl2.lsa

Count Conditions-

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

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

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

Count Corrections-

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

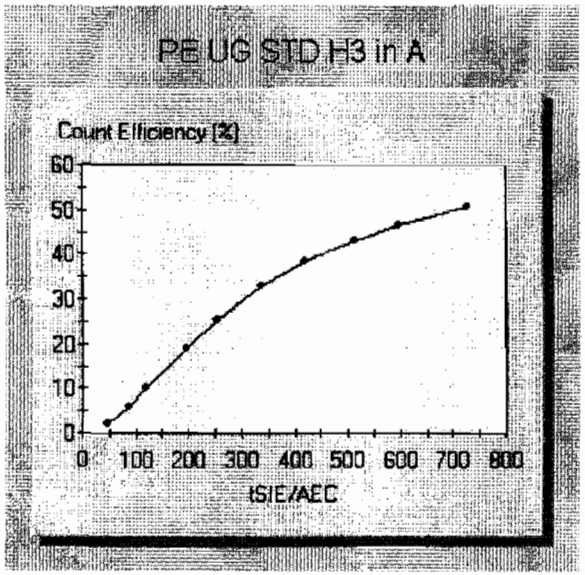
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 05/30/2013
Date Modified:
PE UG STD H3 in A

tSIE/AEC	Count Efficiency (%)
726.67	50.69
595.82	46.27
512.39	42.97
421.70	38.56
337.18	32.90
253.25	25.44
195.24	19.09
120.68	10.06
85.94	5.83
47.95	1.96

P#	S#	SMPL_ID	CPMA	DPM1	tSIE	Eff Nucl In A	Count Time	DATE	TIME	MESSAGES
20	1	BACKGROUND	10.54	29.70	375.63	35.48	120.00	1/6/2014	5:34:01 PM	
20	2	S-0289-V1	21.75	61.30	375.79	35.49	120.00	1/6/2014	7:35:52 PM	
20	3	S-0289-V2	20.53	57.89	375.34	35.46	120.00	1/6/2014	9:37:44 PM	
20	4	S-0289-V3	20.60	58.09	375.37	35.46	120.00	1/6/2014	11:39:36 PM	
20	5	S-0289-V4	21.00	59.21	375.58	35.47	120.00	1/7/2014	1:41:31 AM	
20	6	S-0289-V5	21.18	59.80	374.77	35.42	120.00	1/7/2014	3:43:23 AM	

STD ID: S-0289

ARS INTERNATIONAL

Add/Edit *Secondary Stds*

Planning	
Planning Comments	Create an H-3 LCS standard
Target dpm/g (on dil. date)	5.5
Target Final volume mL	2000
Appx mass g of Parent Soln	3.67265112
Appx vol ml of Parent Soln	3.679273813
Expected Addition for Analysis g	5

Standards Preparation / Dilution	
Secondary Solution #	S-0289
Dilution Date (New Ref Date)	01/03/2013 13:25
Ampoule, Empty (g)	
Ampoule /Solution Gross (g)	
Net Wt Removed (g)	
Transfer Container, empty (g)	1.8639
Container Plus Solution (g)	5.8014
Net Wt Transferred (g)	3.9375
DPM Xferred on 01/03/2013 13:25	11793.25195
Diluent/matrix	DI H2O
Diluent Density Cont, empty (g)	
Test Mass of 5 ml of Diluent (g)	
Diluent Density Test - (g/mL)	
Dilution Empty Container Mass (g)	416.9
Dilution Full Cont g (if measured)	2413.04
Dilution Final Volume ml (if measured)	2000
Final Dilution Density (g/mL)	0.99807
Final Dilution Measured Mass g	1996.14
Comments	H3 LCS standard. Dilution performed as stated above by BSteffens on 1/3/13. BJS 1/3/13
Final Dilution dpm/g	5.908028472
Final Dil New Ref Date/Time	01/03/2013 13:25

Parent Standard Data

Parent Solution Reference #	NIST SRM 4927F				
Parent Solution #	S-0237				
Parent Principal Radionuclide	H-3	Half Life (Days)	4499.3000000		
Parent Reference Date	03/22/2010 10:10				
Parent Certified Act	3503.682716	Certi Act/Vol Units	dpm	g	
Parent Cert Act Uncert 1 Sigma	0.0036				
Parent Sp. Gravity G/Ml	0.9982				
Parent Supplier	NIST SRM 4927F				
Parent Date Recvd	01/07/00				
Parent Received By	Unknown				
Parent Cert Exp Date					
Parent Matrix	H2O				
Certified dpm/g At Ref Date	3503.682716				
Certified dpm/g on 01/03/2013 13:25	2995.111607				
Parent Comments	Intermediate level H-3 standard for creating LCS solutions and matrix spikes. Dilution performed as stated above by B Steffens. -BJS 3/22/10				
Parent Tech	Unknown				
Is_Primary	FALSE				
Is_LCS	TRUE				
Is_Tracer	FALSE				
Is_Calib	FALSE				

H-3 Standard Verification

Verifier's Name: Brian Steffens **Date:** 1/6/2014

Pipettor ID: FJ40469
Pipettor ID: Auto-pipettor
Pipettor ID: na
Standard ID: S-0289
Standard ID: N/A

Standards brought up to ~5g with distilled dead water.
Standards made in glass vials.

15mL of Ultima Gold added to standard

	Weight of Standard
S-0289-V1	5.019 g
S-0289-V2	4.993 g
S-0289-V3	4.996 g
S-0289-V4	5.005 g
S-0289-V5	4.993 g

Balance ID: H1331122173560P

H-3 Standard Verification

Verifier's Name: Brian Steffens **Date:** 1-6-14

Pipettor ID: FJ40469

Pipettor ID: Auto-pipettor

Pipettor ID: na

Standard ID: S-0289

Standard ID: N/A

Standards brought up to ~5g with distilled dead water.
Standards made in glass vials.

15mL of Ultima Gold added to standard

	Weight of Standard	
S-0289-V1	5.019	g
S-0289-V2	4.993	g
S-0289-V3	4.996	g
S-0289-V4	5.005	g
S-0289-V5	4.993	g

Balance ID: H1331122173560P

STD ID: S-0289

ARS INTERNATIONAL

Add/Edit *Secondary Stds*

Planning

Planning Comments	
Target dpm/g (on dil. date)	5.5
Target Final volume mL	2000
Appx mass g of Parent Sol'n	3.884999595
Appx vol ml of Parent Sol'n	3.892005204
Expected Addition for Analysis g	

Standards Preparation / Dilution

Secondary Solution #	S-0289
Dilution Date (New Ref Date)	1-3-13 1325
Ampoule, Empty (g)	
Ampoule /Solution Gross (g)	
Net Wt Removed (g)	
Transfer Container, empty (g)	1.8639
Container Plus Solution (g)	5.8014
Net Wt Transferred (g)	
DPM Xferred on 01/03/2014 11:01	
Diluent/matrix	
Diluent Density Cont, empty (g)	
Test Mass of 5 ml of Diluent (g)	
Diluent Density Test - (g/mL)	
Dilution Empty Container Mass (g)	416.90
Dilution Full Cont g (if measured)	2413.04
Dilution Final Volume ml (if measured)	
Final Dilution Density (g/mL)	
Final Dilution Measured Mass g	
Comments	
Final Dilution dpm/g	
Final Dil New Ref Date/Time	01/03/2014 11:01

Parent Standard Data

Parent Solution Reference #	NIST SRM 4927F				
Parent Solution #	S-0237				
Parent Principal Radionuclide	H-3	Half Life (Days)	4499.8000000		
Parent Reference Date	03/22/2010 10:10				
Parent Certified Act	3503.682716	Certi Act/Vol Units	dpm	g	
Parent Cert Act Uncert 1 Sigma	0.0036				
Parent Sp. Gravity G/Ml	0.9982				
Parent Supplier	NIST SRM 4927F				
Parent Date Recvd	01/02/00				
Parent Received By	Unknown				
Parent Cert Exp Date					
Parent Matrix	H2O				
Certified dpm/g At Ref Date	3503.682716				
Certified dpm/g on 01/03/2014 11:01	2831.403127				
Parent Comments	Intermediate level H-3 standard for creating LCS solutions and matrix spikes. Dilution performed as stated above by B Steffens. BJS 3/22/10				
Parent Tech	Unknown				
Is_Primary	FALSE				
Is_LCS	TRUE				
Is_Tracer	FALSE				
Is_Calib	FALSE				

ARS INTERNATIONAL

2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Folder Duplicate

ARS INTERNATIONAL

Report Compilation Checklist

ARS SDG: 14-00544 **Client Name:** LANL **Sample Matrix:** AQ

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

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

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

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

3-28-14
Report Generator Signature Date

3-28-14
Management Review Signature Date

ARS-059
07/03/2009

ARS INTERNATIONAL

LSC
Technical Review Checklist

ARS SDG ARS1-14-00545

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

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

ARS A. Batch ID(s): **Batch A:** B14-00489 **Batch B:** N/A **Batch C:** N/A

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

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

[signature] 3-7-14
Chemist Signature **Date**

Christie Zyla 3-7-14
Verifier Review Signature **Date**

B. ANALYSIS REVIEW

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

[signature] 3-28-14
QA Officer Signature **Date**

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

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

[signature] 3-7-14
Analyst Signature **Date**

NA
Technicial Reviewer Signature **Date**

ARS INTERNATIONAL

Batch A: B14-00489

LSC
Technical Review Checklist

C. BATCH QC VALIDATION

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

SDL 3-28-14
Project Manager Signature Date

James D. 3-28-14
QA Officer Signature Date

GENERAL COMMENTS

LSC
Technical Review Checklist

ARS SDG ARS1-14-00545

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

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

ARS A. Batch ID(s): **Batch A:** B14-00498 **Batch B:** N/A **Batch C:** N/A

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

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

[signature] 3-24-14 — **Chemist Signature** / **Date**

[signature] 3-24-14 — **Verifier Review Signature** / **Date**

B. ANALYSIS REVIEW

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

[signature] 3-28-14 — **QA Officer Signature** / **Date**

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

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

[signature] 3-24-14 — **Analyst Signature** / **Date**

[signature] 3-24-14 — **Technicial Reviewer Signature** / **Date**

ARS INTERNATIONAL

Batch A: B14-00498

LSC
Technical Review Checklist

C. BATCH QC VALIDATION

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

SQL 3-28-14
Project Manager Signature Date

[signature] 3-28-14
QA Officer Signature Date

GENERAL COMMENTS

DQO Report for SDG

ARS1-14-00544

Analysis Code	Group	Isotope	Activity Units	Aliquot Units	ProcedureNo	RDL	LCS_LL	LCS_UL	MS_LL	MS_UL	RadY_LL	RadY_UL	GravY_LL	GravY_LL	RER	RPD	DiltionReq	RoughPrepReq	BlankCorrectionMDA	BlankCorrectionAll	CountTimeReq	AliquotRequired
LSC-A-021	STD	H-3	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 Report - Samples and Containers

SDG Specific Data

SDG	ARS1-14-00544	TAT Days	28	Project Type	Environmental
Sample Count	1 Rpt Level 4	Date Received	3/6/2014	COC Number	2014-2942
Client	Los Alamos National Laboratory	Client Deadline	4/3/2014	PO Number	
Client Code	114	Internal Deadline	4/2/2014	Job Number	
Profile Number	PN-00094	Lab Deadline	3/31/2014	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	CAAN-14-54789	AQ	03/05/14 11:32 AM	03/05/14 11:32 AM	H	90	5	O3							
→	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	157979	1	1000.00				70	29		N	N/A				

SDG Report - Analysis Assignments

Temp SDG	ARS1-14-00544	Sample Count	1
Client	Los Alamos National Laboratory	Analysis Count	2-2

Samples Count Totals per Analysis

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

Analyses Assigned Per Fraction

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

ARS FILE TRACKING SHEET

SDG: ARS1-14-00544

Task	Date / Time	Initials
Date & Time Samples Received	03-06-14/10:32	MD
ICOC Initiated/Storage Location: O3	03-06-14/10:52	PDS
Technical Checks Performed	Sent batch	
Report Written / EDD Generated 3-28-14 1423 | SDL	3-28-14/1413	SDL
Quality Assurance Checks Performed on Report	3-28-14 1513	JM
Management Checks Performed on Report		
Preliminary Report Scan	NA	
Report E-mailed/Faxed	3-31-14/1104	SDL
Invoice Completed Invoice #:		
Requires Report Mailed Yes / ~~No~~		
Requires Original COC mailed Yes / ~~No~~		
Report Reviewed and Imaged		

SPECIAL REQUIREMENTS

Requirement	Yes	No
3 Hour Rush	☐	☑
24 Hour Rush	☐	☑
48 Hour Rush	☐	☑
3 Day Rush	☐	☑
5 Day Rush	☐	☑
10 Day Rush	☐	☑
Standard Oil/Gas Client (5 Day)	☐	☑
Standard Turnaround	☑	☐

NOTES:
Federal

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

Chain of Custody/Analysis Request ADEP

COC/Lab Request #: 2014-2942

Page 1 of 1

Client Contact:

Lab Agreement # : 63641-001-10

Project Number :

Analysis Turnaround Time:

24 Hour - ☐ Other - ☐
7 Day - ☐
14 Day - ☐
21 Day - ☐
28 Day - ☒

Site Name: Los Alamos National Laboratory

Rad Screening Info: Yes, Below Background

Lab Reporting Limit Type: Sample Quantitation Limit

Special Instructions:

Field Sample ID	Sample Date	Sample Time	Sample Matrix	WSP-LL-H-3
CAAN-14-54789	Mar 5 2014	11:32	W	1

Special Instructions:

Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:
	Melissa Montoya	3/5/14 3:00		3-6-14	10:32
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:

COMPANY NAME: LADL SDG: 480-14464

SHIPPING CONTAINER

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

COC PRESENT WITH SAMPLES

COC	☑ Yes	☐ No

SAMPLE CONTAINER(S)

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

Samples Rcv: 1

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

External and Internal Surveys

Exposure Rate Meter:	M3 242861	Serial No.:	PR 264266	Calibration Due Date:	4/16/14
Count Rate Meter:	M2 154859	Serial No.:	PR 184559	Calibration Due Date:	4/16/14

Background Exposure Rate (µR/hr)	7	Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd)	7 µR/hr
Background Count Rate (cpm)	50	Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd)	60 cpm
		Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd)	52 cpm

Sample Label/Comments/Notes	pH Orig (pH ≤ 2 is Acceptable)	pH Final	Mark if Preserve	Acid Lot #	Weight(g) / Volume(mL)	µR/hr (Acceptance Limits <500 µR/hr)	cpm (Acceptance Limits <100 cpm/cm²)
CNHD-14-54[illegible]1	2	2	☐	35-17	1000	29	70
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				
			☐				

Surveyors' Name: Michael Davis Date/Time Surveyed: 2-6-14 10:32