

[illegible]

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

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

SAMPLE ID: CAPA-13-29666 WORK ORDER: NA

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
DATE COLLECTED (MM/DD/YYYY):		04/15/2013	FIELD MATRIX:	WG	ok
TIME COLLECTED (HH:MM):		1234	MEDIA:	UA	
PRS ID:		ok	SAMPLE TECH CODE:	UA	RSP
LOCATION ID: PCI-2			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	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2	HCL	Y	N/A
	WSP-8270C-SVOA	1 LITER AMBER GLASS	3	ICE		
	WSP-GrossA/B	1 LITER POLY	1	NONE		
	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:

LOCATION COMMENTS:

FIELD PARAMETERS:

Dissolved Oxygen 8.16 mg/L Oxidation-Reduction Potential 235.5 MV pH 7.08 SU

Specific Conductance 105 uS/cm Temperature 13.42 deg C Turbidity 0.4 NTU

COLLECTED BY (PRINT)

RELINQUISHED BY (Printed Name) <u>John S. H.</u> (Signature) <u>[Signature]</u>	Date/Time <u>4/15/13</u> <u>1350</u>	RECEIVED BY (Printed Name) <u>A. M. Mark</u> (Signature) <u>[Signature]</u>	Date/Time <u>4/15/13</u> <u>1350</u>
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date 04/03/2013

Data Validation Report

Chain Of Custody No. 2013-736

1. Distribution Of Samples In EDD.

	Analytical	Regular	Field	Trip	Field	Equipment
SDG	Method	Samples	Duplicates	Blanks	Blanks	Blanks
ARS1-13-00746	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
ARS1-13-00746	Generic:Low_Level_Tritium	ARS1-B13-00845	ARS1-B13-00845	1						1	

2. Distribution Of Analytes In EDD.

Analytical Method	Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spikes	TICS
Generic:Low_Level_Tritium	RAD	CAPA-13-29666	ARS1-B13-00845-09	REG	1	0	0	0
Generic:Low_Level_Tritium	RAD	LCS	ARS1-B13-00845-01	LCS	0	0	1	0
Generic:Low_Level_Tritium	RAD	LCSD	ARS1-B13-00845-02	LCSD	0	0	1	0
Generic:Low_Level_Tritium	RAD	MB	ARS1-B13-00845-03	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

No.

Any samples affected by the presence of contaminants in blanks?

No.

6. Any surrogate recoveries outside the control limits?

No.

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

No.

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

No.

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

9. Any Field Duplicate RPDs outside the desired limits?

No.

10. Any Lab Duplicate RPDs outside the desired limits?

No.

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

None.

13. Display Flagged Data.

Location ID	Chain Of Custody No	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	Parameter Name	Lab Qualifier	Validation Qualifier	Validation Reason Codes	Detected
PCI-2	2013-736	CAPA-13-29666	REG	INIT	RAD	Generic:Low_Level_Tritium	Tritium	U	U	R5	N

Reason Code

R5

Description

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

14. Useable Result Count.

Field	Location	Sample	Analytical	No. Unuseable	Total No. Of
Sample ID	ID	Purpose	Method	Records	Records
CAPA-13-29666	PCI-2	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
1.82	pCi/L	1.82	pCi/L	2.26	0.753	W	4/15/2013		ARS1-B13- 00845	VAL	Y



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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Request Number: 2013-736



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for

**Los Alamos National Laboratory
Request: 2013-736**

Original COC

3 of 86



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**Los Alamos National Laboratory
Request: 2013-736**

Case Narrative



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May 16, 2013

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

Request Number: **2013-736**
LANL Sample ID: **CAPA-13-29666**.

Dear Mr. Greene;

On April 18, 2013, 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 black ink, appearing to read "James D. Lu".

Laboratory Management
ARS International



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

Request Number	LANL PROJECT SAMPLE ID NUMBER	American Radiation Services SAMPLE ID NUMBER(S)
2013-736	CAPA-13-29666	ARS1-13-00746-001

ANALYTICAL METHODS

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

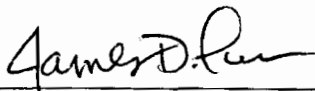
ANALYTICAL RESULTS

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

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

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

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


Signature

Laboratory Management, ARS International
Title

5-16-13
Date



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Low Level Tritium by Low Level Liquid Scintillation Counting



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ARS Sample Delivery Group: ARS1-13-00746
Client Sample ID: CAPA-13-29666
Sample Collection Date: 04/15/13
Sample Matrix: Aqueous

Request or PO Number: 2013-736
ARS Sample ID: ARS1-13-00746-001
Date Received: 04/18/13
Report Date: 05/16/13

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	1.820	0.753	2.260	1.091	U	pCi/L	ARS-040	05/12/13 11:13	PS	NA

NOTES: Lab Agreement 63641-001-10

Project Manager Review

Notes: American Radiation Services, Inc. assumes no liability for the use or interpretation of any analytical results provided other than the cost of the analysis itself. Reproduction of this report in less than full requires the written consent of the American Radiation Services, Inc.

LELAP Certificate# 01949



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QC Results Report

Sample Delivery Group: ARS1-13-00746

Date Received: 4/18/2013

Laboratory Control Sample Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1s)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Percent Recovery (%)	LCS Acceptance Range
ARS1-B13-00845	LCS	H3	22.879	3.594	2.306	24.539		pCi/L	ARS-040	5/14/13 13:02	PS	93	80%-120%

Blank Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1s)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date/Time	Analysis Technician
ARS1-B13-00845	MBL	H3	1.541	0.749	2.315	NA	U	pCi/L	ARS-040	5/11/13 15:56	PS

Sample RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (2s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER Acceptance Range
ARS1-B13-00845	LCSD	H3	22.879	3.594	22.893	3.588		pCi/L	ARS-040	5/11/13 15:56	PS	0.00	< 1

Sample DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (2s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER Acceptance Range
ARS1-B13-00845	LCSD	H3	22.879	3.594	22.893	3.588		pCi/L	ARS-040	5/11/13 15:56	PS	0.01	< 3

SDL

Project Manager Review

Notes: American Radiation Services, Inc. assumes no liability for the use or interpretation of any analytical results provided other than the cost of the analysis itself. Reproduction of this report in less than full requires the written consent of ARS International.

LELAP Certificate# 01949

NELAP Certificate # E87558

QC Evaluation

EPA Method: ARS-040

Batch ID: ARS1-B13-00845

SDG's: ARS1-13-00744;745;746;747;788;789;790;799

LCS	<u>22.8790</u>	CSU (2s)	<u>7.0440</u>
LCSD	<u>22.8930</u>	CSU-D (2s)	<u>7.0330</u>

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

$$DER = \frac{0.014}{4.976973} = 0.002813 < 3$$

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

$$\% RPD = \frac{0.014}{22.886} * 100 = 0.061173 < 25\%$$

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

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

$$RER = \frac{0.014}{14.0770} = 0.00099453 < 1$$

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	1.541	1.468	2.315	
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 = 1.541
 CSU = 1.468
 Is ACT<1.65*CSU? YES



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for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting Laboratory Records

Analysis Batch Report

<div> AMERICAN RADATION SERVICES, LLC</div>	Analysis Batch ID ARS1-B13-00845									
	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
ARS1-B13-00845-01	LCS	B-15342								
ARS1-B13-00845-02	LCSD	B-15343								
ARS1-B13-00845-03	MBL									
ARS1-B13-00845-04	TRG				ARS1-13-00744	001	1	CAMO-13-29627	STD	05/13/13
ARS1-B13-00845-05	TRG				ARS1-13-00744	002	1	CAMO-13-29628	STD	05/13/13
ARS1-B13-00845-06	TRG				ARS1-13-00744	003	1	CAMO-13-29615	STD	05/13/13
ARS1-B13-00845-07	TRG				ARS1-13-00745	001	1	CAMO-13-29626	STD	05/13/13
ARS1-B13-00845-08	TRG				ARS1-13-00745	002	1	CAMO-13-29614	STD	05/13/13
ARS1-B13-00845-09	TRG				ARS1-13-00746	001	1	CAPA-13-29666	STD	05/13/13
ARS1-B13-00845-10	TRG				ARS1-13-00747	001	1	CAPA-13-29568	STD	05/13/13
ARS1-B13-00845-11	TRG				ARS1-13-00788	001	1	CAMO-13-29629	STD	05/20/13
ARS1-B13-00845-12	TRG				ARS1-13-00788	002	1	CAMO-13-29630	STD	05/20/13
ARS1-B13-00845-13	TRG				ARS1-13-00788	003	1	CAMO-13-29631	STD	05/20/13
ARS1-B13-00845-14	TRG				ARS1-13-00789	001	1	CAPA-13-29562	STD	05/20/13
ARS1-B13-00845-15	TRG				ARS1-13-00789	002	1	CAPA-13-29564	STD	05/20/13
ARS1-B13-00845-16	TRG				ARS1-13-00789	003	1	CAPA-13-29565	STD	05/20/13
ARS1-B13-00845-17	TRG				ARS1-13-00789	004	1	CAPA-13-29573	STD	05/20/13
ARS1-B13-00845-18	TRG				ARS1-13-00790	001	1	CAPA-13-29570	STD	05/20/13
ARS1-B13-00845-19	TRG				ARS1-13-00790	002	1	CAPA-13-29582	STD	05/20/13
ARS1-B13-00845-20	TRG				ARS1-13-00790	003	1	CAPA-13-29583	STD	05/20/13
ARS1-B13-00845-21	TRG				ARS1-13-00799	001	1	CAMO-13-29625	STD	05/20/13

LCS Report
Analytical Batch: ARS1-B13-00845

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-15400	ARS1-B13-00845	ARS1-B13-00845-01	B-H3	S-0279	H-3	5	2.489267243	13.2263	18.2405	5.0142	BSTEFFENS	4/25/2013	2.481992429	5/14/2013	12.44520644
B-15401	ARS1-B13-00845	ARS1-B13-00845-02	B-H3	S-0279	H-3	5	2.489267243	13.437	18.4265	4.9895	BSTEFFENS	4/25/2013	2.483139669	5/11/2013	12.38962538

Assay Definition-

Assay Description:

LLH3 Assay in DPM Mode

Assay Type: DPM (Single)

Report Name: Report1

Output Data Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130510_2336

Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130510_2336\20130510_2336.results

RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130510_2336\LLH3.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130510_2336\LLH3 Results.csv

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

Count Conditions-

Nuclide: Low Level H3

Quench Indicator: tSIE/AEC

External Std Terminator (sec): 0.5 2s%

Pre-Count Delay (min): 0.00

Quench Set:

Low Energy: ARS LL H3 10mL

Count Time (min): 240.00

Count Mode: Low Level

Assay Count Cycles: 1

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-

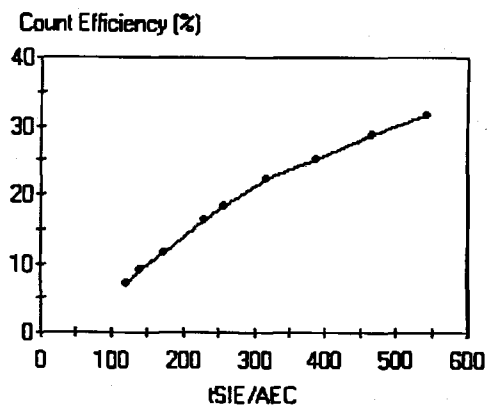
Half Life Correction: Off

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

A
B
C

Cycle 1 Results
Quench Curve Block Data

ARS LL H3 10mL in A



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

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

5/14/2013 11:17:50 AM

QuantaSmart (TM) - 2.03 - Serial# 423814

Protocol# 11 - Low Level H3_2.1sa

Page # 3

User: H3 Low Level

P#	S#	SMPL_ID	CPMA	DPM1	tSIE	Eff Nucl In A	Count Time	DATE	TIME	MESSAGES
11	1	BACKGROUND	1.077	4.50	361.53	23.95	240.00	5/10/2013	11:45:13 PM	
11	2	B13-00845-02	4.403	18.26	365.84	24.11	240.00	5/11/2013	3:56:06 AM	
11	3	B13-00845-03	1.292	5.37	363.96	24.04	240.00	5/11/2013	8:07:12 AM	
11	4	B13-00845-04	1.129	4.75	356.74	23.76	240.00	5/11/2013	12:18:12 PM	
11	5	B13-00845-05	1.231	5.17	357.73	23.80	240.00	5/11/2013	4:29:11 PM	
11	6	B13-00845-06	1.136	4.78	357.27	23.78	240.00	5/11/2013	8:40:10 PM	
11	7	B13-00845-07	5.802	24.34	358.67	23.84	240.00	5/12/2013	12:51:10 AM	
11	8	B13-00845-08	5.523	22.98	363.76	24.03	240.00	5/12/2013	5:02:12 AM	
11	9	B13-00845-09	1.337	5.59	360.38	23.90	240.00	5/12/2013	9:13:16 AM	
11	10	B13-00845-10	1.139	4.78	359.04	23.85	240.00	5/12/2013	1:24:17 PM	
11	11	B13-00845-11	1.183	5.02	352.02	23.58	240.00	5/12/2013	5:35:15 PM	
11	12	B13-00845-12	1.230	5.13	361.82	23.96	240.00	5/12/2013	9:46:12 PM	
11	13	B13-00845-13	1.223	5.11	360.92	23.93	240.00	5/13/2013	1:57:17 AM	
11	14	B13-00845-14	1.171	4.88	363.30	24.02	240.00	5/13/2013	6:08:17 AM	
11	15	B13-00845-15	3.593	15.03	360.43	23.91	240.00	5/13/2013	10:19:20 AM	
11	16	B13-00845-16	4.132	17.24	361.84	23.96	240.00	5/13/2013	2:30:19 PM	
11	17	B13-00845-17	1.138	4.76	360.44	23.91	240.00	5/13/2013	6:41:24 PM	
11	18	B13-00845-18	1.280	5.31	365.48	24.10	240.00	5/13/2013	10:52:28 PM	
11	19	B13-00845-19	1.144	4.81	357.97	23.81	240.00	5/14/2013	3:03:30 AM	
11	20	B13-00845-20	1.265	5.30	359.71	23.88	240.00	5/14/2013	7:14:29 AM	

Assay Definition-

Assay Description:

LLH3 Assay in DPM Mode

Assay Type: DPM (Single)

Report Name: Report1

Output Data Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20130514_1253

Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20130514_1253\20130514_1253.results

RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20130514_1253\LLH3.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20130514_1253\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-

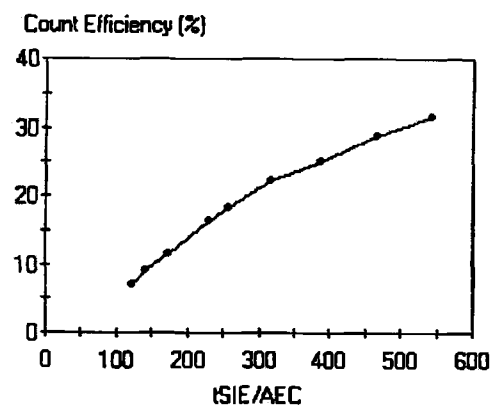
Half Life Correction: Off

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

A
B
C

Cycle 1 Results
Quench Curve Block Data

ARS LL H3 10mL in A



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

18 of 86

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

5/15/2013 2:03:31 PM
Protocol# 2 - Low Level H3.lsa

QuantaSmart (TM) - 2.03 - Serial# 423814

Page # 3
User: H3 Low Level

P#	S#	SMPL_ID	CPMA	DPM1	tSIE	Eff Nucl In A	Count Time	DATE	TIME	MESSAGES
2	1	B13-00845-01	4.282	17.39	379.11	24.63	240.00	5/14/2013	1:02:04 PM	
2	2	B13-00845-21	1.191	4.82	380.77	24.69	240.00	5/14/2013	5:16:44 PM	
2	3	B13-00845-07	5.621	22.44	389.58	25.05	240.00	5/14/2013	9:27:42 PM	
2	4	B13-00845-08	5.566	21.95	396.06	25.36	240.00	5/15/2013	1:38:44 AM	
2	5	B13-00845-15	3.475	14.02	383.05	24.78	240.00	5/15/2013	5:49:48 AM	
2	6	B13-00845-16	4.241	16.98	387.92	24.97	240.00	5/15/2013	10:00:46 AM	

ARS-040 Calculation Results
ARS1-B13-00845

ACF	1
UCF	2.22
Sys Error	0.15

AnalysisCode	ABatchSampleID	Total Bkg Count	Duration_min	DF	Sample Activity Conc	Standard Counting Uncertainty	CU_1	CSU_1	CU_1_96	CSU_1_96	MDC	DLC	ActivityReportUnits
LSC-A-022	ARS1-B13-00845-01		240.000	0.96237	22.879	1.067	1.067	3.594	2.091	7.044	2.306	1.112	pCi
LSC-A-022	ARS1-B13-00845-02		240.000	0.96282	22.893	1.040	1.040	3.588	2.039	7.033	2.223	1.073	pCi
LSC-A-022	ARS1-B13-00845-03		240.000	0.99969	1.541	0.712	0.712	0.749	1.396	1.468	2.315	1.117	pCi
LSC-A-022	ARS1-B13-00845-04		240.000	0.99539	0.361	0.665	0.665	0.667	1.303	1.307	2.239	1.081	pCi
LSC-A-022	ARS1-B13-00845-05		240.000	0.99539	1.018	0.648	0.648	0.666	1.270	1.305	2.135	1.030	pCi
LSC-A-022	ARS1-B13-00845-06		240.000	0.99524	0.426	0.693	0.693	0.696	1.358	1.364	2.331	1.125	pCi
LSC-A-022	ARS1-B13-00845-07		240.000	0.99570	29.449	1.083	1.083	4.548	2.122	8.914	2.093	1.010	pCi
LSC-A-022	ARS1-B13-00845-08		240.000	0.99570	30.500	1.130	1.130	4.713	2.216	9.237	2.194	1.059	pCi
LSC-A-022	ARS1-B13-00845-09		240.000	0.99585	1.820	0.702	0.702	0.753	1.376	1.476	2.260	1.091	pCi
LSC-A-022	ARS1-B13-00845-10		240.000	0.99616	0.426	0.660	0.660	0.663	1.294	1.300	2.218	1.070	pCi
LSC-A-022	ARS1-B13-00845-11		240.000	0.99631	0.697	0.638	0.638	0.647	1.251	1.268	2.125	1.025	pCi
LSC-A-022	ARS1-B13-00845-12		240.000	0.99616	1.018	0.652	0.652	0.670	1.278	1.313	2.148	1.037	pCi
LSC-A-022	ARS1-B13-00845-13		240.000	0.99616	0.976	0.654	0.654	0.670	1.282	1.314	2.158	1.041	pCi
LSC-A-022	ARS1-B13-00845-14		240.000	0.99631	0.644	0.663	0.663	0.670	1.300	1.314	2.213	1.068	pCi
LSC-A-022	ARS1-B13-00845-15		240.000	0.99646	16.617	0.954	0.954	2.669	1.870	5.231	2.238	1.080	pCi
LSC-A-022	ARS1-B13-00845-16		240.000	0.99600	19.009	0.894	0.894	2.988	1.753	5.857	1.940	0.936	pCi
LSC-A-022	ARS1-B13-00845-17		240.000	0.99631	0.401	0.631	0.631	0.634	1.237	1.242	2.121	1.024	pCi
LSC-A-022	ARS1-B13-00845-18		240.000	0.99692	1.344	0.656	0.656	0.686	1.286	1.345	2.138	1.031	pCi
LSC-A-022	ARS1-B13-00845-19		240.000	0.99692	0.484	0.694	0.694	0.698	1.361	1.368	2.331	1.125	pCi
LSC-A-022	ARS1-B13-00845-20		240.000	0.99692	1.345	0.706	0.706	0.735	1.385	1.440	2.310	1.115	pCi
LSC-A-022	ARS1-B13-00845-21		240.000	0.99662	0.795	0.678	0.678	0.688	1.329	1.349	2.252	1.087	pCi

ARS-040 Calculation Results

ARS1-B13-00845

ACF	1
UCF	2.22
Sys Error	0.15

AnalysisCode	ABatchSampleID	Initial Mass sample g	Mass Na2O2 added g	Final mass electrolyzed sample NaOH g	Mass equivalent NaOH g	Final Mass Electrolyzed sample g	VolumeFactor X	Enrichment Factor Y
LSC-A-022	ARS1-B13-00845-01	507.160	2.000	17.010	2.052	14.958	0.029	26.541
LSC-A-022	ARS1-B13-00845-02	502.470	2.030	16.030	2.083	13.947	0.028	28.135
LSC-A-022	ARS1-B13-00845-03	500.630	2.050	17.100	2.103	14.997	0.030	26.148
LSC-A-022	ARS1-B13-00845-04	500.310	2.000	16.320	2.052	14.268	0.029	27.413
LSC-A-022	ARS1-B13-00845-05	500.000	2.050	15.750	2.103	13.647	0.027	28.595
LSC-A-022	ARS1-B13-00845-06	500.000	2.050	17.010	2.103	14.907	0.030	26.268
LSC-A-022	ARS1-B13-00845-07	500.020	2.050	16.180	2.103	14.077	0.028	27.756
LSC-A-022	ARS1-B13-00845-08	500.080	2.060	17.030	2.114	14.916	0.030	26.255
LSC-A-022	ARS1-B13-00845-09	500.000	2.050	16.580	2.103	14.477	0.029	27.017
LSC-A-022	ARS1-B13-00845-10	500.010	2.050	16.260	2.103	14.157	0.028	27.604
LSC-A-022	ARS1-B13-00845-11	500.000	2.000	15.430	2.052	13.378	0.027	29.146
LSC-A-022	ARS1-B13-00845-12	500.000	2.000	15.823	2.052	13.771	0.028	28.347
LSC-A-022	ARS1-B13-00845-13	500.040	2.040	15.970	2.093	13.877	0.028	28.141
LSC-A-022	ARS1-B13-00845-14	500.050	2.030	16.330	2.083	14.247	0.028	27.438
LSC-A-022	ARS1-B13-00845-15	500.000	2.000	16.940	2.052	14.888	0.030	26.299
LSC-A-022	ARS1-B13-00845-16	500.030	2.030	15.000	2.083	12.917	0.026	30.147
LSC-A-022	ARS1-B13-00845-17	500.010	2.030	15.690	2.083	13.607	0.027	28.675
LSC-A-022	ARS1-B13-00845-18	500.030	2.040	15.960	2.093	13.867	0.028	28.160
LSC-A-022	ARS1-B13-00845-19	500.060	2.040	17.000	2.093	14.907	0.030	26.270
LSC-A-022	ARS1-B13-00845-20	500.010	2.060	16.910	2.114	14.796	0.030	26.456
LSC-A-022	ARS1-B13-00845-21	500.010	2.000	17.000	2.052	14.948	0.030	26.198

ARS-040 Calculation Results

ARS1-B13-00845

ACF	1
UCF	2.22
Sys Error	0.15

AnalysisCode	ABatchSampleID	Average Sample CPM	Bkg_CPM	tSIE	Detector Eff decimal	Aliquot	AliqUnits	Activity reference date	Start Date of Count	Sample Count	Duration min
LSC-A-022	ARS1-B13-00845-01	4.282	1.077	379.110	0.246	0.01003	L	9/7/2012	5/14/2013	240.000	
LSC-A-022	ARS1-B13-00845-02	4.403	1.077	365.840	0.241	0.01002	L	9/7/2012	5/11/2013	240.000	
LSC-A-022	ARS1-B13-00845-03	1.292	1.077	363.960	0.240	0.01000	L	5/9/2013	5/11/2013	240.000	
LSC-A-022	ARS1-B13-00845-04	1.129	1.077	356.740	0.238	0.01002	L	4/11/2013	5/11/2013	240.000	
LSC-A-022	ARS1-B13-00845-05	1.231	1.077	357.730	0.238	0.01006	L	4/11/2013	5/11/2013	240.000	
LSC-A-022	ARS1-B13-00845-06	1.136	1.077	357.270	0.238	0.01004	L	4/11/2013	5/11/2013	240.000	
LSC-A-022	ARS1-B13-00845-07	5.621	1.077	389.580	0.251	0.01004	L	4/17/2013	5/14/2013	240.000	
LSC-A-022	ARS1-B13-00845-08	5.566	1.077	396.060	0.254	0.01000	L	4/17/2013	5/15/2013	240.000	
LSC-A-022	ARS1-B13-00845-09	1.337	1.077	360.380	0.239	0.01001	L	4/15/2013	5/12/2013	240.000	
LSC-A-022	ARS1-B13-00845-10	1.139	1.077	359.040	0.239	0.01000	L	4/17/2013	5/12/2013	240.000	
LSC-A-022	ARS1-B13-00845-11	1.183	1.077	352.020	0.236	0.01000	L	4/18/2013	5/12/2013	240.000	
LSC-A-022	ARS1-B13-00845-12	1.230	1.077	361.820	0.240	0.01001	L	4/18/2013	5/12/2013	240.000	
LSC-A-022	ARS1-B13-00845-13	1.223	1.077	360.920	0.239	0.01005	L	4/18/2013	5/13/2013	240.000	
LSC-A-022	ARS1-B13-00845-14	1.171	1.077	363.300	0.240	0.01001	L	4/19/2013	5/13/2013	240.000	
LSC-A-022	ARS1-B13-00845-15	3.475	1.077	383.050	0.248	0.01001	L	4/22/2013	5/15/2013	240.000	
LSC-A-022	ARS1-B13-00845-16	4.241	1.077	387.920	0.250	0.01000	L	4/19/2013	5/15/2013	240.000	
LSC-A-022	ARS1-B13-00845-17	1.138	1.077	360.440	0.239	0.01004	L	4/19/2013	5/13/2013	240.000	
LSC-A-022	ARS1-B13-00845-18	1.280	1.077	365.480	0.241	0.01006	L	4/24/2013	5/13/2013	240.000	
LSC-A-022	ARS1-B13-00845-19	1.144	1.077	357.970	0.238	0.01001	L	4/24/2013	5/14/2013	240.000	
LSC-A-022	ARS1-B13-00845-20	1.265	1.077	359.710	0.239	0.01000	L	4/24/2013	5/14/2013	240.000	
LSC-A-022	ARS1-B13-00845-21	1.191	1.077	380.770	0.247	0.01002	L	4/22/2013	5/14/2013	240.000	

ARS-040 Calculation Results	
ARS1-B13-00845	
ACF	1
UCF	2.22
Sys Error	0.15

AnalysisCode	ABatchSampleID	AliquotReportUnits	UserID	ModDate
LSC-A-022	ARS1-B13-00845-01	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-02	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-03	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-04	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-05	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-06	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-07	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-08	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-09	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-10	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-11	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-12	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-13	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-14	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-15	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-16	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-17	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-18	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-19	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-20	L	AMRAD\PSIMS	5/16/2013
LSC-A-022	ARS1-B13-00845-21	L	AMRAD\PSIMS	5/16/2013

<div>AMRAD AMERICAN RADIATION SERVICES, LLC</div>				LSC Instrument Data Transfer Report					\\Packard3170\Results\H3 Low Level\Low Level H3\						
Batch Sample ID				Net BKG Sample Transferred			Sample Count Rate (C/sec)			LSC 1					
ARS1-B13-00845				25			25								
DATE	TIME	LF	HF	DATE	TIME	LF	HF	DATE	TIME	LF	HF	DATE	TIME	LF	HF
BKG	11		1	BACKGROUND	05/10/13 23:45	1.08	361.53	23.9500	240.00	ARS1-B13-00845					
ARS1-B13-00845-02	11		2	B13-00845-02	05/11/13 03:56	4.40	365.84	24.1100	240.00	ARS1-B13-00845					
ARS1-B13-00845-03	11		3	B13-00845-03	05/11/13 08:07	1.29	363.96	24.0400	240.00	ARS1-B13-00845					
ARS1-B13-00845-04	11		4	B13-00845-04	05/11/13 12:18	1.13	356.74	23.7600	240.00	ARS1-B13-00845	ARS1-13-00744			1	
ARS1-B13-00845-05	11		5	B13-00845-05	05/11/13 16:29	1.23	357.73	23.8000	240.00	ARS1-B13-00845	ARS1-13-00744			1	
ARS1-B13-00845-06	11		6	B13-00845-06	05/11/13 20:40	1.14	357.27	23.7800	240.00	ARS1-B13-00845	ARS1-13-00744			1	
ARS1-B13-00845-07	11		7	B13-00845-07	05/12/13 00:51	5.80	358.67	23.8400	240.00	ARS1-B13-00845	ARS1-13-00745			1	
ARS1-B13-00845-08	11		8	B13-00845-08	05/12/13 05:02	5.52	363.76	24.0300	240.00	ARS1-B13-00845	ARS1-13-00745			1	
ARS1-B13-00845-09	11		9	B13-00845-09	05/12/13 09:13	1.34	360.38	23.9000	240.00	ARS1-B13-00845	ARS1-13-00746			1	
ARS1-B13-00845-10	11		10	B13-00845-10	05/12/13 13:24	1.14	359.04	23.8500	240.00	ARS1-B13-00845	ARS1-13-00747			1	
ARS1-B13-00845-11	11		11	B13-00845-11	05/12/13 17:35	1.18	352.02	23.5800	240.00	ARS1-B13-00845	ARS1-13-00788			1	
ARS1-B13-00845-12	11		12	B13-00845-12	05/12/13 21:46	1.23	361.82	23.9600	240.00	ARS1-B13-00845	ARS1-13-00788			1	
ARS1-B13-00845-13	11		13	B13-00845-13	05/13/13 01:57	1.22	360.92	23.9300	240.00	ARS1-B13-00845	ARS1-13-00788			1	
ARS1-B13-00845-14	11		14	B13-00845-14	05/13/13 06:08	1.17	363.30	24.0200	240.00	ARS1-B13-00845	ARS1-13-00789			1	
ARS1-B13-00845-15	11		15	B13-00845-15	05/13/13 10:19	3.59	360.43	23.9100	240.00	ARS1-B13-00845	ARS1-13-00789			1	
ARS1-B13-00845-16	11		16	B13-00845-16	05/13/13 14:30	4.13	361.84	23.9600	240.00	ARS1-B13-00845	ARS1-13-00789			1	
ARS1-B13-00845-17	11		17	B13-00845-17	05/13/13 18:41	1.14	360.44	23.9100	240.00	ARS1-B13-00845	ARS1-13-00789			1	
ARS1-B13-00845-18	11		18	B13-00845-18	05/13/13 22:52	1.28	365.48	24.1000	240.00	ARS1-B13-00845	ARS1-13-00790			1	
ARS1-B13-00845-19	11		19	B13-00845-19	05/14/13 03:03	1.14	357.97	23.8100	240.00	ARS1-B13-00845	ARS1-13-00790			1	
ARS1-B13-00845-20	11		20	B13-00845-20	05/14/13 07:14	1.27	359.71	23.8800	240.00	ARS1-B13-00845	ARS1-13-00790			1	
ARS1-B13-00845-01	2		1	B13-00845-01	05/14/13 13:02	4.28	379.11	24.6300	240.00	ARS1-B13-00845					
ARS1-B13-00845-07	2		3	B13-00845-07	05/14/13 21:27	5.62	389.58	25.0500	240.00	ARS1-B13-00845	ARS1-13-00745			1	
ARS1-B13-00845-08	2		4	B13-00845-08	05/15/13 01:38	5.57	396.06	25.3600	240.00	ARS1-B13-00845	ARS1-13-00745			1	
ARS1-B13-00845-15	2		5	B13-00845-15	05/15/13 05:49	3.48	383.05	24.7800	240.00	ARS1-B13-00845	ARS1-13-00789			1	
ARS1-B13-00845-16	2		6	B13-00845-16	05/15/13 10:00	4.24	387.92	24.9700	240.00	ARS1-B13-00845	ARS1-13-00789			1	
ARS1-B13-00845-21	2		2	B13-00845-21	05/14/13 17:16	1.19	380.77	24.6900	240.00	ARS1-B13-00845	ARS1-13-00799				

ID_31001_040	ABatch	AnalysisCode	ABatchSampleID	ClientID	IC_ID	S01_1_EnrichCellNo
601	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-01			29
602	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-02			25
603	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-03			23
604	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-04	CAMO-13-29627		4
605	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-05	CAMO-13-29628		0
606	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-06	CAMO-13-29615		13
607	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-07	CAMO-13-29626		24
608	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-08	CAMO-13-29614		66
609	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-09	CAPA-13-29666		80
610	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-10	CAPA-13-29568		31
611	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-11	CAMO-13-29629		3
612	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-12	CAMO-13-29630		63
613	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-13	CAMO-13-29631		41
614	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-14	CAPA-13-29562		2
615	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-15	CAPA-13-29564		85
616	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-16	CAPA-13-29565		1
617	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-17	CAPA-13-29573		50
618	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-18	CAPA-13-29570		16
619	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-19	CAPA-13-29582		54
620	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-20	CAPA-13-29583		94
621	ARS1-B13-00845	LSC-A-022	ARS1-B13-00845-21	CAMO-13-29625		84

S01_2_TareCell	S01_3_TareResv	S02_GrossWtResv	S03_1_WtNa2O2	C_GrossSampleAdded	S04_1_ElectroSD
334.85	206.24	713.4	2	507.16	04/26/2013 10:53:00
334.17	208.13	710.6	2.03	502.47	04/26/2013 10:53:00
336.19	214.24	714.87	2.05	500.63	04/26/2013 10:53:00
324.16	200.77	701.08	2	500.31	04/26/2013 10:53:00
341.66	198.17	698.17	2.05	500	04/26/2013 10:53:00
327.81	201.23	701.23	2.05	500	04/26/2013 10:53:00
338.11	226.15	726.17	2.05	500.02	04/26/2013 10:53:00
335.2	216.27	716.35	2.06	500.08	04/26/2013 10:53:00
332.78	214.02	714.02	2.05	500	04/26/2013 10:53:00
327.11	189.01	689.02	2.05	500.01	04/26/2013 10:53:00
332.36	211.25	711.25	2	500	04/26/2013 10:53:00
330.19	195.74	695.74	2	500	04/26/2013 10:53:00
330.01	200.62	700.66	2.04	500.04	04/26/2013 10:53:00
326.89	200.38	700.43	2.03	500.05	04/26/2013 10:53:00
335.27	204.29	704.29	2	500	04/26/2013 10:53:00
334.96	212.44	712.47	2.03	500.03	04/26/2013 10:53:00
332.16	216	716.01	2.03	500.01	04/26/2013 10:53:00
332.84	193.2	693.23	2.04	500.03	04/26/2013 10:53:00
332.41	197.14	697.2	2.04	500.06	04/26/2013 10:53:00
324.84	195.37	695.38	2.06	500.01	04/26/2013 10:53:00
324.97	210.43	710.44	2	500.01	04/29/2013 11:17:00


S04_2_StartAmp	S04_3_StartBathC	S05_1_ElectroIED	S05_2_EndBathC	S05_3_EndCellWt	C_GrossSmplRec
5	2	05/14/2013 07:43:00	2	558.1	17.01
5	2	05/09/2013 07:17:00	2	558.33	16.03
5	2	05/09/2013 09:58:00	2	567.53	17.1
5	2	05/09/2013 07:20:00	2	541.25	16.32
5	2	05/10/2013 08:54:00	2	555.58	15.75
5	2	05/09/2013 10:01:00	2	546.05	17.01
5	2	05/10/2013 08:55:00	2	580.44	16.18
5	2	05/09/2013 09:56:00	2	568.5	17.03
5	2	05/08/2013 11:02:00	2	563.38	16.58
5	2	05/08/2013 11:09:00	2	532.38	16.26
5	2	05/07/2013 14:23:00	2	559.04	15.43
5	2	05/09/2013 09:59:00	2	541.753	15.823
5	2	05/09/2013 07:28:00	2	546.6	15.97
5	2	05/08/2013 11:04:00	2	543.6	16.33
5	2	05/08/2013 07:22:00	2	556.5	16.94
5	2	05/09/2013 07:25:00	2	562.4	15
5	2	05/09/2013 12:53:00	2	563.85	15.69
5	2	05/10/2013 08:56:00	2	542	15.96
5	2	05/08/2013 07:22:00	2	546.55	17
5	2	05/07/2013 14:25:00	2	537.12	16.91
5	2	05/14/2013 07:41:00	2	552.4	17

C_EnrichmentF	S06_TareWt	S07_GrossWt	C_RecoveredWa	S08_TearWtLSCVial	S09_VialPlusSmpl	C_NetSample
29.8154027	94.84	108.66	13.82	6.73	16.76	10.03
31.345602	108.78	121.79	13.01	6.58	16.6	10.02
29.27660819	107.98	121.92	13.94	6.55	16.55	10
30.65625	115.36	128.43	13.07	6.52	16.54	10.02
31.74603175	110.8	123.4	12.6	6.5	16.56	10.06
29.39447384	111.1	127.69	16.59	6.5	16.54	10.04
30.90358467	114.74	128.33	13.59	6.51	16.55	10.04
29.36465062	93.45	108.66	15.21	6.5	16.5	10
30.15681544	108.93	122.72	13.79	6.44	16.45	10.01
30.75092251	106.55	120.67	14.12	6.49	16.49	10
32.404407	95.5	106.79	11.29	6.45	16.45	10
31.59957025	93.22	104.5	11.28	6.55	16.56	10.01
31.31120852	103.03	117.71	14.68	6.58	16.63	10.05
30.62155542	109.51	122.06	12.55	6.54	16.55	10.01
29.51593861	108.73	123.23	14.5	6.51	16.52	10.01
33.33533333	109.54	120.04	10.5	6.6	16.6	10
31.86806883	102.55	116.13	13.58	6.67	16.71	10.04
31.3302005	108.79	119.72	10.93	6.57	16.63	10.06
29.41529412	97.6	113.16	15.56	6.55	16.56	10.01
29.56889415	108.22	122.43	14.21	6.49	16.49	10
29.41235294	102.43	115.84	13.41	6.47	16.49	10.02

S10_1_WtVislSmplDrWatFill	C_NetDeadWaterAdded	C_TareWtBFCocktail	S10_2_GrossWtVSC	C_NetWtCocktailAdded
0	0	16.76	27.07	10.31
0	0	16.6	26.85	10.25
0	0	16.55	26.83	10.28
0	0	16.54	26.8	10.26
0	0	16.56	26.73	10.17
0	0	16.54	26.81	10.27
0	0	16.55	26.87	10.32
0	0	16.5	26.77	10.27
0	0	16.45	26.73	10.28
0	0	16.49	26.77	10.28
0	0	16.45	26.69	10.24
0	0	16.56	26.82	10.26
0	0	16.63	26.89	10.26
0	0	16.55	26.83	10.28
0	0	16.52	26.83	10.31
0	0	16.6	26.87	10.27
0	0	16.71	26.98	10.27
0	0	16.63	26.92	10.29
0	0	16.56	26.84	10.28
0	0	16.49	26.79	10.3
0	0	16.49	26.76	10.27

UserID	ModDate
AMRAD\PSIMS	05/14/2013 11:37:50
AMRAD\PSIMS	05/09/2013 11:13:27
AMRAD\PSIMS	05/09/2013 13:38:03
AMRAD\PSIMS	05/09/2013 11:21:38
AMRAD\PSIMS	05/10/2013 11:02:03
AMRAD\PSIMS	05/09/2013 13:42:25
AMRAD\PSIMS	05/10/2013 11:04:19
AMRAD\PSIMS	05/09/2013 14:31:04
AMRAD\PSIMS	05/08/2013 14:16:45
AMRAD\PSIMS	05/08/2013 14:13:55
AMRAD\PSIMS	05/08/2013 11:55:27
AMRAD\PSIMS	05/09/2013 14:32:42
AMRAD\PSIMS	05/09/2013 11:36:02
AMRAD\PSIMS	05/08/2013 14:11:16
AMRAD\PSIMS	05/08/2013 12:01:05
AMRAD\PSIMS	05/09/2013 11:49:40
AMRAD\PSIMS	05/09/2013 15:38:19
AMRAD\PSIMS	05/10/2013 11:07:05
AMRAD\PSIMS	05/08/2013 12:06:36
AMRAD\PSIMS	05/08/2013 11:58:27
AMRAD\PSIMS	05/14/2013 11:39:59

Technical Notes

		Batch	ARS1-B13-00845		
		Analysis Code	LSC-A-022		
		Procedure No	ARS-040		
		Matrix	AQ		
#	Date	Dept	Batch Technical Notes	User ID	
1	05/03/13 14:28	CHEMISTRY	Sample B13-00845-18, SDG ARS1-13-790-001 produced a foam during enrichment.	AMRAD\PSIMS	

ARS Batch Number: ARS1-B13 - 00845

Enter
these
Values
for LCS

Current ACT	5.5100
NetWt	5.0142
Aliquot	0.5072

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

Enter
these
Values
for LCSD

Current ACT	5.5126
NetWt	4.9895
Aliquot	0.5025

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

Expected Value Calculations

ARS Batch Number: ARS1-B11 - 00845

LCS	CALCULATED	=	24.539	-----	Range	19.631	-	29.447	-----
	EXPECTED VALUE								
LCSD	CALCULATED	=	24.658	-----	Range	19.726	-	29.589	-----
	EXPECTED VALUE								

LCS



Standards Activity as of: 05/14/13 13:02

Active	Std ID	Isotope	PSLT	Verification Date	Exp Date	Status	Ref Date	Ref ACT (dpm)	ACT at Date Above (dpm/g)	Half-life (days)	Parent ID	Expend Date	Comments
A	S-0279	H-3	SL	09/10/12	09/10/13	OK	09/07/12	5.7255E+00	5.5100	4.500E+03	S-0237		H3 LCS standard. Dilution performed as stated above by B Stafford. -6

LCSD



Standards Activity as of: 05/11/13 03:56

Active	Std ID	Isotope	PSLT	Verification Date	Exp Date	Status	Ref Date	Ref ACT (cpm)	ACT at Date Above (dpm/g)	Half-life (days)	Parent ID	Expanded Date	Comments
A	S-0279	H-3	SL	09/10/12	09/10/13	OK	09/07/12	5.7255E+00	5.5126	4.500E+03	S-0237		NO LCS standard. Dilution performed as stated above by B Steffens. -B

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
5-7-13	8:58	D13-00777-15	D13-00777		PDJ
✓	+	D13-00777-16	+	+	PDJ
✓	+	D13-00777-17	+	+	PDJ
✓	+	D13-00777-18	+	+	PDJ
5-9-13	15:22	SNC	Q13	Q12	PDJ
✓	+	D13-00777-04	D13-00777	1642	PDJ
✓	+	D13-00777-08	✓	+	PDJ
✓	+	D13-00777-09	+	+	PDJ
✓	+	D13-00777-10	✓	+	PDJ
✓	+	D13-00777-11	✓	5917 (PDJ)	PDJ
✓	+	D13-00777-12	+	+	PDJ
✓	✓	D13-00777-17	+	+	PDJ
5-10-13	11:14	5933 SNC SNC 16	Q14	Q12	PDJ
✓	✓	Background	D13-00845		PDJ
+	✓	D13-00845-02	+	+	PDJ
+	+	D13-00845-03	+	+	PDJ
+	+	D13-00845-04	+	+	PDJ
✓	+	D13-00845-05	+	+	PDJ
✓	+	D13-00845-06	+	+	PDJ
✓	+	D13-00845-07	✓	✓	PDJ

802

5-16-13

Beta Liquid Scintillation Counter Log Book

Technician Initials	Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
PD	5-16-13	11:46	B17-00845-05	B17-00845		PD
B	+	+	B17-00845-07	+	+	PD
a	+	+	B17-00845-10	+	+	PD
PD	+	+	B17-00845-11	+	+	PD
PD	+	+	B17-00845-12	+	+	PD
PD	+	+	B17-00845-13	+	+	PD
PD	+	+	B17-00845-14	+	+	PD
PD	+	+	B17-00845-15	+	+	PD
PD	+	+	B17-00845-16	+	+	PD
PD	+	+	B17-00845-17	+	+	PD
PD	+	+	B17-00845-18	+	+	PD
PD	+	+	B17-00845-19	+	+	PD
PD	+	+	B17-00845-20	+	+	PD
PD	5-14-13	11:41	SN16	04	04	PD
PD	+	+	B17-00845-21	B17-00845		PD
PD	+	+	B17-00845-22	+	+	PD
PD	+	+	B17-00845-23	+	+	PD
PD	+	+	B17-00845-24	+	+	PD
PD	+	+	B17-00845-25	+	+	PD
PD	+	+	B17-00845-26	+	+	PD



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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium

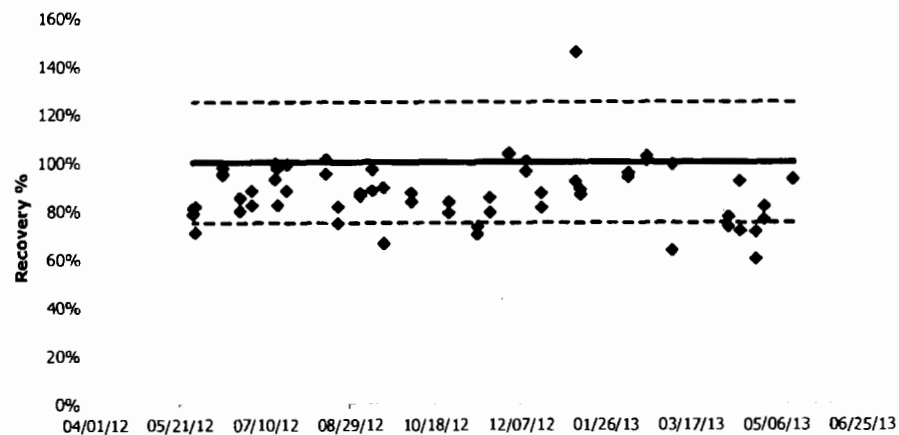
by

Low Level Liquid Scintillation Counting

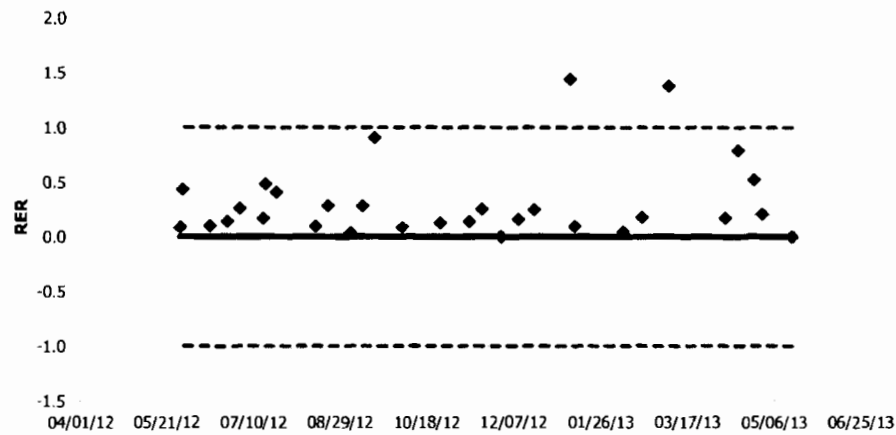
Control Charts

QC Chart

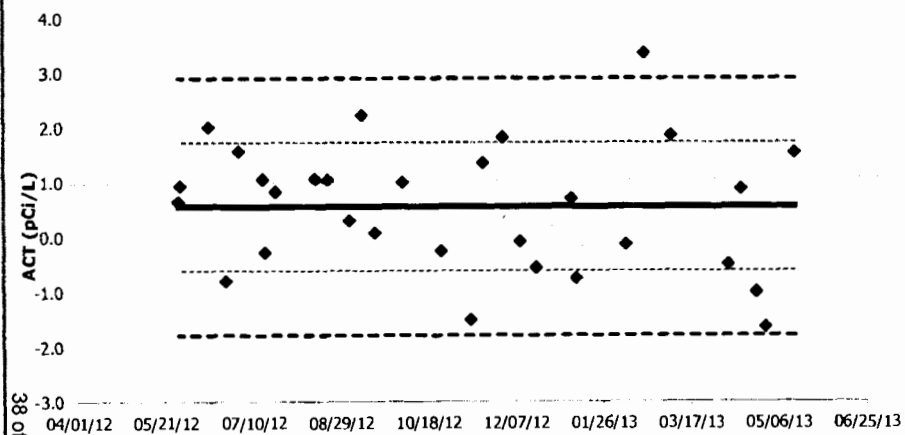
LLH-3 LCS



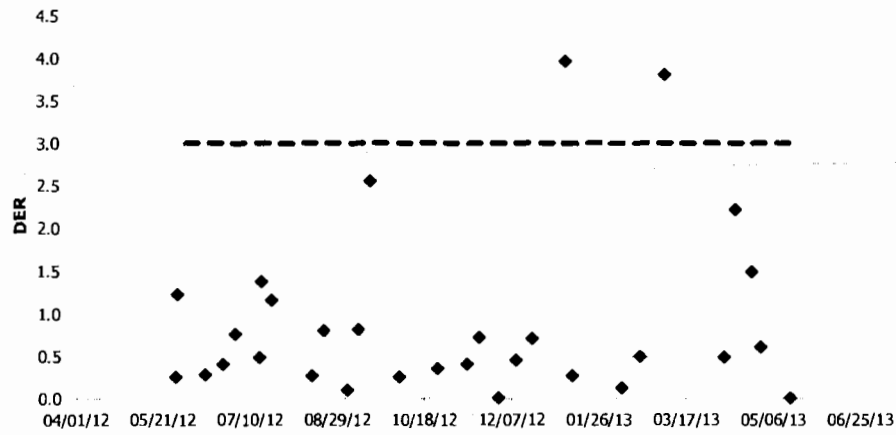
LLH-3 RER



LLH-3 Blank



LLH-3 DER



3H Efficiency

Total # pts : 5623
Valid # pts : 148
Mean : 62.78
SD : 0.28

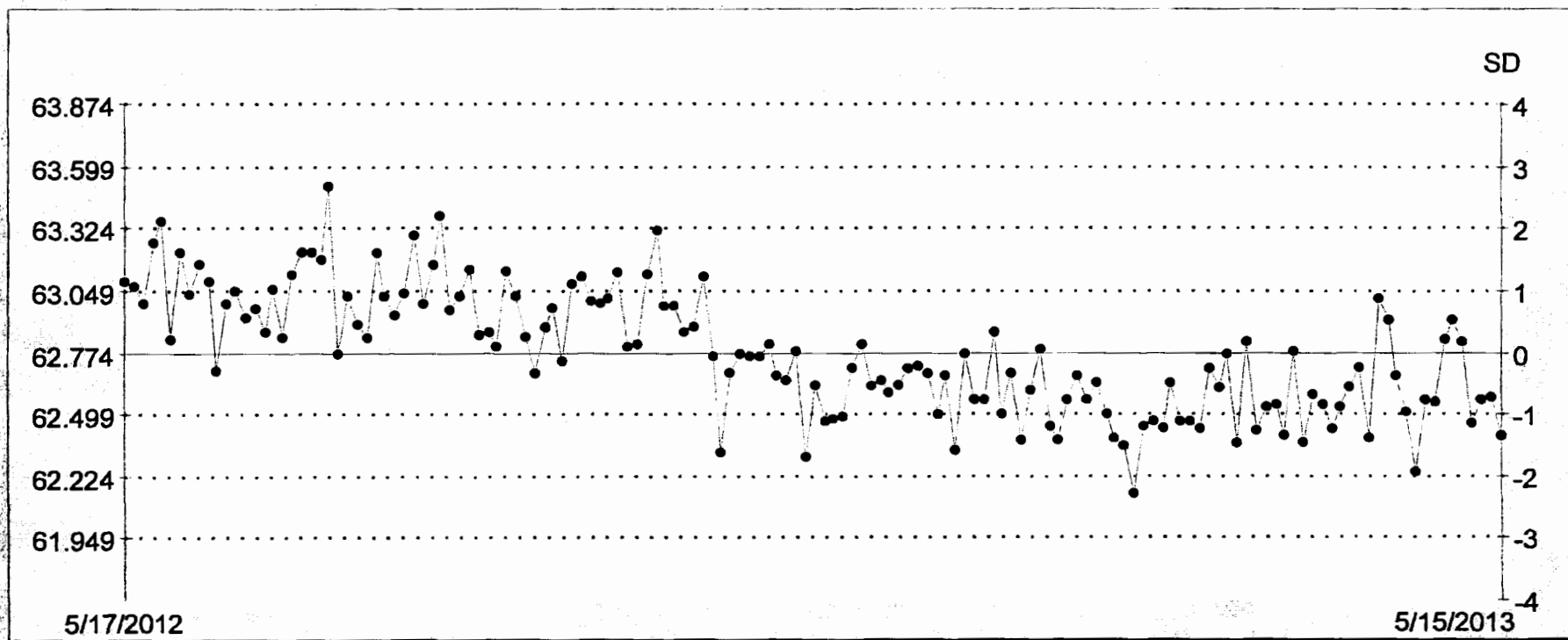
Date	Value	Valid Pt
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May 30, 2012	63.26	X
May 31, 2012	63.37	X
Jun 06, 2012	62.83	X
Jun 13, 2012	63.22	X
Jun 21, 2012	63.04	X
Jun 22, 2012	63.16	X
Jun 25, 2012	63.09	X
Jun 27, 2012	62.70	X
Jun 27, 2012	62.99	X
Jun 28, 2012	63.05	X
Jun 29, 2012	62.93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

Sep 28, 2012	63.03	X
Oct 01, 2012	62.85	X
Oct 04, 2012	62.68	X
Oct 05, 2012	62.88	X
Oct 06, 2012	62.98	X
Oct 11, 2012	62.74	X
Oct 12, 2012	63.08	X
Oct 13, 2012	63.12	X
Oct 17, 2012	63.00	X
Oct 19, 2012	63.00	X
Oct 22, 2012	63.02	X
Oct 23, 2012	63.13	X
Oct 23, 2012	62.80	X
Oct 23, 2012	62.81	X
Oct 23, 2012	63.13	X
Oct 25, 2012	63.32	X
Oct 27, 2012	62.99	X
Oct 31, 2012	62.98	X
Nov 02, 2012	62.87	X
Nov 02, 2012	62.89	X
Nov 04, 2012	63.11	X
Nov 05, 2012	62.76	X
Nov 10, 2012	62.33	X
Nov 12, 2012	62.69	X
Nov 12, 2012	62.77	X
Nov 13, 2012	62.76	X
Nov 14, 2012	62.75	X
Nov 15, 2012	62.81	X
Nov 18, 2012	62.68	X
Nov 19, 2012	62.65	X
Nov 19, 2012	62.78	X
Nov 20, 2012	62.30	X
Nov 21, 2012	62.63	X
Nov 23, 2012	62.47	X
Dec 04, 2012	62.48	X
Dec 08, 2012	62.49	X
Dec 12, 2012	62.70	X
Dec 14, 2012	62.81	X
Dec 15, 2012	62.63	X
Dec 21, 2012	62.66	X
Dec 21, 2012	62.60	X
Dec 31, 2012	62.63	X
Jan 02, 2013	62.70	X
Jan 09, 2013	62.72	X
Jan 10, 2013	62.69	X
Feb 01, 2013	62.50	X
Feb 02, 2013	62.68	X
Feb 06, 2013	62.34	X
Feb 08, 2013	62.77	X
Feb 08, 2013	62.57	X
Feb 15, 2013	62.57	X
Feb 17, 2013	62.87	X

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

3H Efficiency

Total # pts : 5623
Valid # pts : 148
Mean : 62.78
SD : 0.28



3H Background

Total # pts : 5549
 Valid # pts : 148
 Mean : 2.12
 SD : 0.16

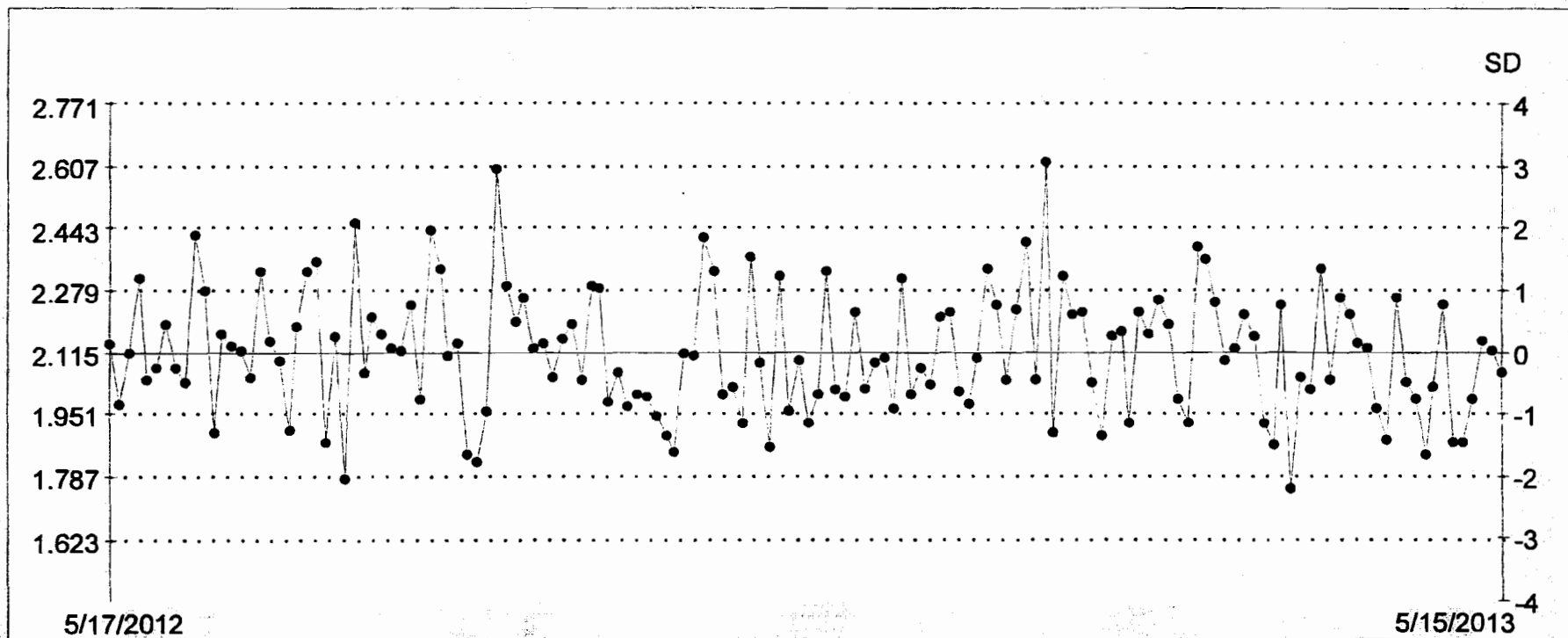
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May 23, 2012	2.11	X
May 30, 2012	2.31	X
May 31, 2012	2.04	X
Jun 06, 2012	2.07	X
Jun 13, 2012	2.19	X
Jun 21, 2012	2.08	X
Jun 22, 2012	2.04	X
Jun 25, 2012	2.43	X
Jun 27, 2012	2.28	X
Jun 27, 2012	1.90	X
Jun 28, 2012	2.16	X
Jun 29, 2012	2.13	X
Jun 30,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

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

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

3H Background

Total # pts : 5549
Valid # pts : 148
Mean : 2.12
SD : 0.16





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Tritium- Screening by Low Level Liquid Scintillation Counting



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Tritium-Screening by Low Level Liquid Scintillation Counting Samples

Procedures:

ARS-060

ARS-040

Section 14.1 Tritium Screen in Clean Water without Distillation

ARS File ID Numbers: ARS1-13-00743; 744; 745; 746; 747

ARS Batch ID: ARS1-B13-00776

	Sample ID:	COUNT TIME	CPMA	Background CPMA	Eff Nucl In A	Aliquot (grams)	ACTIVITY	units	MDA	Sample Must be analyzed as LSC-A-001
1	B13-00776-04	60	1.242	1.105	24.33	10.05	25.238	pCi/L	210.1066	NO
2	B13-00776-05	60	1.261	1.105	24.55	10.05	28.481	pCi/L	208.2238	NO
3	B13-00776-06	60	1.375	1.105	24.32	10.04	49.810	pCi/L	210.4023	NO
4	B13-00776-07	60	1.337	1.105	24.23	10.04	42.958	pCi/L	211.1839	NO
5	B13-00776-08	60	1.535	1.105	24.5	10.00	79.059	pCi/L	209.6919	NO
6	B13-00776-09	60	1.211	1.054	22.23	10.03	31.718	pCi/L	225.2463	NO
7	B13-00776-10	60	1.454	1.054	24.99	10.01	72.029	pCi/L	200.7695	NO
8	B13-00776-11	60	1.292	1.054	25.18	10.06	42.322	pCi/L	198.2642	NO
9	B13-00776-12	60	1.277	1.054	25.19	10.01	39.837	pCi/L	199.1754	NO
10	B13-00776-13	60	1.174	1.054	25.2	10.01	21.429	pCi/L	199.0964	NO
11	B13-00776-14	60	1.233	1.054	25.3	10.01	31.838	pCi/L	198.3094	NO
12	B13-00776-15	60	1.205	1.105	24.5	10.01	18.367	pCi/L	209.4825	NO
13	B13-00776-16	60	1.350	1.105	24.26	10.04	45.309	pCi/L	210.9227	NO
14	B13-00776-17	60	1.494	1.054	25.2	10.00	78.650	pCi/L	199.2955	NO
15	B13-00776-18	60	1.493	1.105	24.35	10.01	71.704	pCi/L	210.7729	NO
16	B13-00776-19	60	1.196	1.105	24.09	10.01	16.999	pCi/L	213.0478	NO
17	B13-00776-20	60	1.082	1.105	16.13	10.02	-6.410	pCi/L	317.8672	NO
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-B13-00776**

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

Matrix **AQ**

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B13-00776-01	LCS									
ARS1-B13-00776-02	LCSD									
ARS1-B13-00776-03	MBL									
ARS1-B13-00776-04	TRG				ARS1-13-00743	001	1	CAPA-13-29560	STD	05/13/13
ARS1-B13-00776-05	TRG				ARS1-13-00743	002	1	CAPA-13-29569	STD	05/13/13
ARS1-B13-00776-06	TRG				ARS1-13-00743	003	1	CAPA-13-29572	STD	05/13/13
ARS1-B13-00776-07	TRG				ARS1-13-00743	004	1	CAPA-13-29576	STD	05/13/13
ARS1-B13-00776-08	TRG				ARS1-13-00743	005	1	CAPA-13-29577	STD	05/13/13
ARS1-B13-00776-09	TRG				ARS1-13-00743	006	1	CAPA-13-29580	STD	05/13/13
ARS1-B13-00776-10	TRG				ARS1-13-00743	007	1	CAPA-13-29581	STD	05/13/13
ARS1-B13-00776-11	TRG				ARS1-13-00743	008	1	CAPA-13-29532	STD	05/13/13
ARS1-B13-00776-12	TRG				ARS1-13-00743	009	1	CAPA-13-29584	STD	05/13/13
ARS1-B13-00776-13	TRG				ARS1-13-00743	010	1	CAPA-13-29585	STD	05/13/13
ARS1-B13-00776-14	TRG				ARS1-13-00744	001	1	CAMO-13-29627	STD	05/13/13
ARS1-B13-00776-15	TRG				ARS1-13-00744	002	1	CAMO-13-29628	STD	05/13/13
ARS1-B13-00776-16	TRG				ARS1-13-00744	003	1	CAMO-13-29615	STD	05/13/13
ARS1-B13-00776-17	TRG				ARS1-13-00745	001	1	CAMO-13-29626	STD	05/13/13
ARS1-B13-00776-18	TRG				ARS1-13-00745	002	1	CAMO-13-29614	STD	05/13/13
ARS1-B13-00776-19	TRG				ARS1-13-00746	001	1	CAPA-13-29666	STD	05/13/13
ARS1-B13-00776-20	TRG				ARS1-13-00747	001	1	CAPA-13-29568	STD	05/13/13



134838

13-00747-001-1

WRAD



134832

13-00745-001-1

WRAD



134828

13-00744-001-1

WRAD



134824

13-00743-007-1

WRAD



134821

13-00743-004-1

WRAD



134818

13-00743-001-1

WRAD



134837

13-00746-001-1

WRAD



134831

13-00744-003-1

WRAD



134826

13-00743-009-1

WRAD



134823

13-00743-006-1

WRAD



134820

13-00743-003-1

WRAD



134834

13-00745-002-1

WRAD



134829

13-00744-002-1

WRAD



134825

13-00743-008-1

WRAD



134822

13-00743-005-1

WRAD



134819

13-00743-002-1

WRAD

510786

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
12418	ARS1-B13-00776	ARS1-B13-00776-01		1	g					AMRAD\PSIMS	04/18/2013 16:47:25
12419	ARS1-B13-00776	ARS1-B13-00776-02		1	g					AMRAD\PSIMS	04/18/2013 16:47:26
12420	ARS1-B13-00776	ARS1-B13-00776-03		1	g					AMRAD\PSIMS	04/18/2013 16:47:26
12421	ARS1-B13-00776	ARS1-B13-00776-04	CAPA-13-29560	10.05	g	134818				AMRAD\PSIMS	04/18/2013 16:47:26
12422	ARS1-B13-00776	ARS1-B13-00776-05	CAPA-13-29569	10.05	g	134819				AMRAD\PSIMS	04/18/2013 16:47:26
12423	ARS1-B13-00776	ARS1-B13-00776-06	CAPA-13-29572	10.04	g	134820				AMRAD\PSIMS	04/18/2013 16:47:26
12424	ARS1-B13-00776	ARS1-B13-00776-07	CAPA-13-29576	10.04	g	134821				AMRAD\PSIMS	04/18/2013 16:47:26
12425	ARS1-B13-00776	ARS1-B13-00776-08	CAPA-13-29577	10	g	134822				AMRAD\PSIMS	04/18/2013 16:47:26
12426	ARS1-B13-00776	ARS1-B13-00776-09	CAPA-13-29580	10.03	g	134823				AMRAD\PSIMS	04/18/2013 16:47:26
12427	ARS1-B13-00776	ARS1-B13-00776-10	CAPA-13-29581	10.01	g	134824				AMRAD\PSIMS	04/18/2013 16:47:26
12428	ARS1-B13-00776	ARS1-B13-00776-11	CAPA-13-29532	10.06	g	134825				AMRAD\PSIMS	04/18/2013 16:47:27
12429	ARS1-B13-00776	ARS1-B13-00776-12	CAPA-13-29584	10.01	g	134826				AMRAD\PSIMS	04/18/2013 16:47:27
12430	ARS1-B13-00776	ARS1-B13-00776-13	CAPA-13-29585	10.01	g	134827				AMRAD\PSIMS	04/18/2013 16:47:27
12431	ARS1-B13-00776	ARS1-B13-00776-14	CAMO-13-29627	10.01	g	134828				AMRAD\PSIMS	04/18/2013 16:47:27
12432	ARS1-B13-00776	ARS1-B13-00776-15	CAMO-13-29628	10.01	g	134829				AMRAD\PSIMS	04/18/2013 16:47:27
12433	ARS1-B13-00776	ARS1-B13-00776-16	CAMO-13-29615	10.04	g	134831				AMRAD\PSIMS	04/18/2013 16:47:27
12434	ARS1-B13-00776	ARS1-B13-00776-17	CAMO-13-29626	10	g	134832				AMRAD\PSIMS	04/18/2013 16:47:27
12435	ARS1-B13-00776	ARS1-B13-00776-18	CAMO-13-29614	10.01	g	134834				AMRAD\PSIMS	04/18/2013 16:47:28
12436	ARS1-B13-00776	ARS1-B13-00776-19	CAPA-13-29666	10.01	g	134837				AMRAD\PSIMS	04/18/2013 16:47:28
12437	ARS1-B13-00776	ARS1-B13-00776-20	CAPA-13-29568	10.02	g	134838				AMRAD\PSIMS	04/18/2013 16:47:28

SNC Protocol

Calibration Information

Software Version IC: 2.12

Software Version EC: 2.03

Instrument Model: Tri-Carb 3170TR/SL

Instrument Serial Number: 423814

3H Chi Square: 17.90 Date Processed: 4/18/2013 6:13:10 PM

14C Chi Square: 20.67 Date Processed: 4/18/2013 6:13:10 PM

3H E²/B (1-18.6 keV): 2106.82 Date Processed: 4/18/2013 6:13:10 PM14C E²/B (4-156 keV): 9089.70 Date Processed: 4/18/2013 6:13:10 PM

3H Efficiency (0-18.6 keV): 62.59 Date Processed: 4/18/2013 6:13:10 PM

14C Efficiency (0-156 keV): 95.87 Date Processed: 4/18/2013 6:13:10 PM

IPA Background Date Processed: 4/18/2013 6:13:10 PM

3H Background CPM (0-18.6 keV): 2.02 Date Processed: 4/18/2013 6:13:10 PM

14C Background CPM (0-156 keV): 2.26 Date Processed: 4/18/2013 6:13:10 PM

3H Calibration DPM: 268700

3H Reference Date: 9/2/2011

14C Calibration DPM: 127700

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

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

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

Assay Definition-

Assay Description:

LLH3 Assay in DPM Mode

Assay Type: DPM (Single)

Report Name: Report1

Output Data Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130418_1813

Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130418_1813\20130418_1813.results

RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130418_1813\LLH3.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3_2\20130418_1813\LLH3 Results.csv

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

Count Conditions-

Nuclide: Low Level H3

Quench Indicator: tSIE/AEC

External Std Terminator (sec): 0.5 2s%

Pre-Count Delay (min): 0.00

Quench Set:

Low Energy: ARS LL H3 10mL

Count Time (min): 60.00

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-

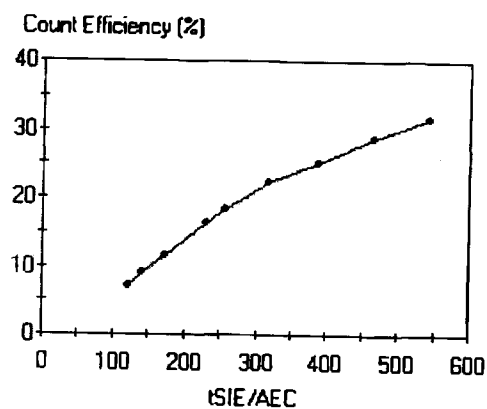
Half Life Correction: Off

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

A
B
C

Cycle 1 Results
Quench Curve Block Data

ARS LL H3 10mL in A



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

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

4/19/2013 11:03:53 PM
Protocol# 11 - Low Level H3_2.lsa

QuantaSmart (TM) - 2.03 - Serial# 423814

Page # 3
User: H3 Low Level

P#	S#	SMPL_ID	CPMA	DPM1	tSIE	Eff Nucl In A	Count Time	DATE	TIME	MESSAGES
11	1	BACKGROUND	1.054	4.22	387.90	24.97	60.00	4/19/2013	1:57:29 PM	
11	2	B13-00776-09	1.211	5.44	317.11	22.23	60.00	4/19/2013	3:06:50 PM	
11	3	B13-00776-10	1.454	5.82	388.22	24.99	60.00	4/19/2013	4:16:09 PM	
11	4	B13-00776-11	1.292	5.13	392.16	25.18	60.00	4/19/2013	5:25:30 PM	
11	5	B13-00776-12	1.277	5.07	392.52	25.19	60.00	4/19/2013	6:34:50 PM	
11	6	B13-00776-13	1.174	4.66	392.69	25.20	60.00	4/19/2013	7:44:09 PM	
11	7	B13-00776-14	1.233	4.87	394.81	25.30	60.00	4/19/2013	8:53:28 PM	
11	8	B13-00776-17	1.494	5.93	392.76	25.20	60.00	4/19/2013	10:02:46 PM	

P#	S#	SMPL_ID	CPMA	DPM1	tSIE	Eff Nucl In A	Count	Time	DATE	TIME	MESSAGES
11	1	BACKGROUND	1.105	4.59	364.87	24.08	60.00		4/18/2013	6:22:02 PM	
11	2	B13-00776-04	1.242	5.11	371.47	24.33	60.00		4/18/2013	7:31:25 PM	
11	3	B13-00776-05	1.261	5.13	377.09	24.55	60.00		4/18/2013	8:40:45 PM	
11	4	B13-00776-06	1.375	5.66	371.22	24.32	60.00		4/18/2013	9:50:05 PM	
11	5	B13-00776-07	1.337	5.52	368.80	24.23	60.00		4/18/2013	10:59:25 PM	
11	6	B13-00776-08	1.535	6.26	375.82	24.50	60.00		4/19/2013	12:08:47 AM	
Missing vial 7.											
Missing vial 8.											
Missing vial 9.											
Missing vial 10.											
Missing vial 11.											
Missing vial 12.											
11	13	B13-00776-15	1.205	4.92	375.88	24.50	60.00		4/19/2013	1:18:22 AM	
11	14	B13-00776-16	1.350	5.57	369.50	24.26	60.00		4/19/2013	2:27:43 AM	
11	15	B13-00776-17	4.678	19.35	367.52	24.18	60.00		4/19/2013	3:37:04 AM	
11	16	B13-00776-18	1.493	6.13	371.93	24.35	60.00		4/19/2013	4:46:22 AM	
11	17	B13-00776-19	1.196	4.97	365.19	24.09	60.00		4/19/2013	5:55:41 AM	
11	18	B13-00776-20	1.082	6.71	226.96	16.13	60.00		4/19/2013	7:05:00 AM	

Technical Notes



		Batch	ARS1-B13-00776		
		Analysis Code	LSC-A-021		
		Procedure No	ARS-054		
		Matrix	AQ		
#	Date	Dept	Batch Technical Notes		User ID
1	04/19/13 11:33	CHEMISTRY	Samples from batch B13-00776 were only screened for 60 minutes a piece.		AMRAD\PSIMS
2	04/19/13 11:41	CHEMISTRY	Screen was cut to 60min a piece per management.		AMRAD\PSIMS

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
4-18-13	10:28	B13-00776-11	1713-00776	1812	PDS
↓	↓	B13-00776-12		↓	PDS
↓	↓	B13-00776-13	↓	↓	PDS
↓	↓	B13-00776-14	↓	↓	PDS
↓	↓	B13-00776-15	↓	↓	PDS
↓	↓	B13-00776-16	↓	↓	PDS
↓	↓	B13-00776-17	↓	↓	PDS
↓	↓	B13-00776-18	↓	↓	PDS
↓	↓	B13-00776-19	↓	↓	PDS
↓	↓	B13-00776-20	↓	↓	PDS
4-19-13	12:10	SNCT16	QA	QA	PDS
↓	↓	Background	B13-00776		PDS
↓	↓	B13-00776-01	↓	↓	PDS
↓	↓	B13-00776-02	↓	↓	PDS
↓	↓	B13-00776-03	↓	↓	PDS
↓	↓	B13-00776-04	↓	↓	PDS
↓	↓	B13-00776-05	↓	↓	PDS
↓	↓	B13-00776-06	↓	↓	PDS
↓	↓	B13-00776-07	↓	↓	PDS
↓	↓	B13-00776-08	↓	↓	PDS
↓	↓	B13-00776-09	↓	↓	PDS
↓	↓	B13-00776-10	↓	↓	PDS
↓	↓	B13-00776-11	↓	↓	PDS
↓	↓	B13-00776-12	↓	↓	PDS
↓	↓	B13-00776-13	↓	↓	PDS
↓	↓	B13-00776-14	↓	↓	PDS
↓	↓	B13-00776-15	↓	↓	PDS
↓	↓	B13-00776-16	↓	↓	PDS
↓	↓	B13-00776-17	↓	↓	PDS
↓	↓	SNCT16	QA		4-19-13 PDS



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American Radiation Services Analytical Reports

for

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Tritium-Screening by Low Level Liquid Scintillation Counting Control Charts

3H Efficiency

Total # pts : 5603
Valid # pts : 138
Mean : 62.82
SD : 0.28

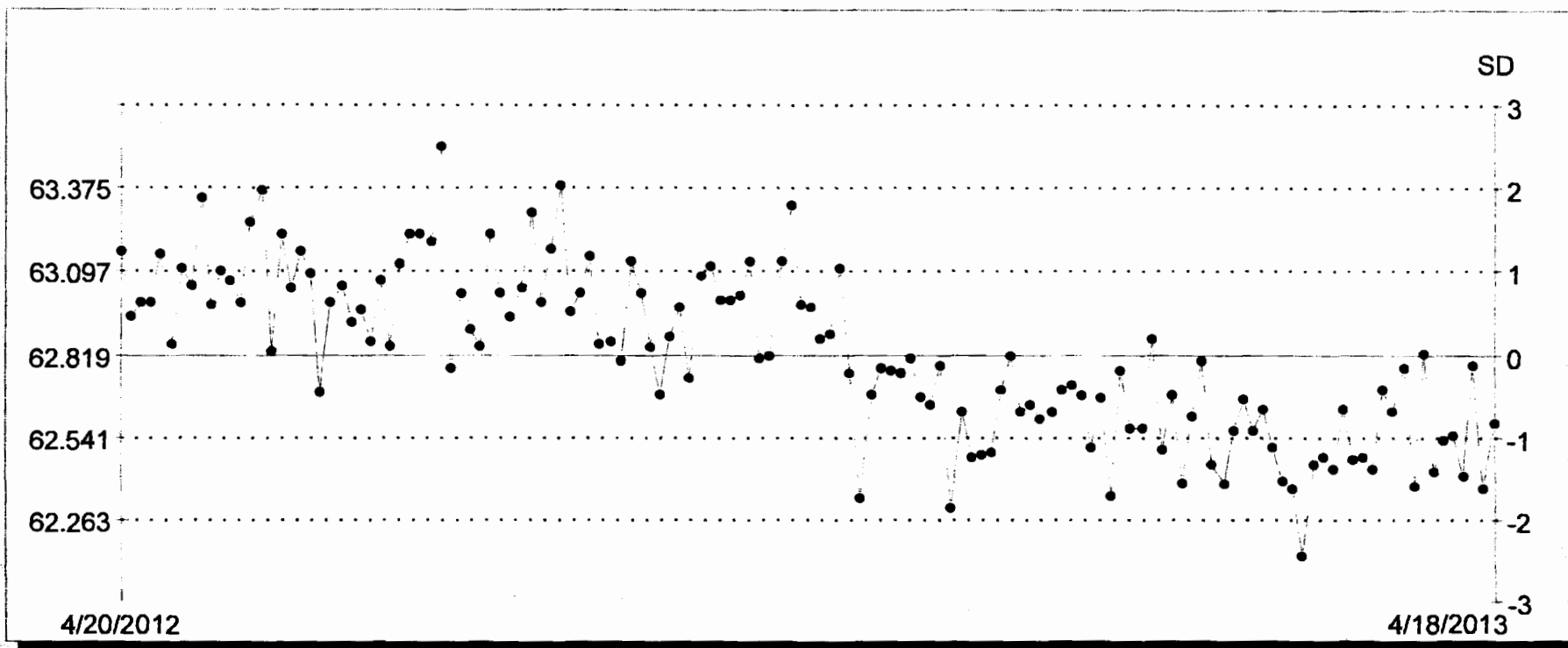
Date	Value	Valid Pt
Apr 20, 2012	63.16	X
Apr 23, 2012	62.95	X
Apr 26, 2012	62.99	X
Apr 27, 2012	62.99	X
Apr 30, 2012	63.16	X
May 01, 2012	62.85	X
May 03, 2012	63.11	X
May 07, 2012	63.05	X
May 09, 2012	63.34	X
May 14, 2012	62.99	X
May 17, 2012	63.10	X
May 17, 2012	63.07	X
May 23, 2012	62.99	X
May 30, 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
Sep 11, 2012	63.03	X
Sep 17, 2012	63.15	X
Sep 18, 2012	62.86	X
Sep 20, 2012	62.86	X
Sep 20, 2012	62.80	X
Sep 24, 2012	63.14	X
Sep 28, 2012	63.03	X
Oct 01, 2012	62.85	X
Oct 04, 2012	62.68	X
Oct 05, 2012	62.88	X
Oct 06, 2012	62.98	X
Oct 11, 2012	62.74	X
Oct 12, 2012	63.08	X
Oct 13, 2012	63.12	X
Oct 17, 2012	63.00	X
Oct 19, 2012	63.00	X
Oct 22, 2012	63.02	X
Oct 23, 2012	63.13	X
Oct 23, 2012	62.80	X
Oct 23, 2012	62.81	X
Oct 23, 2012	63.13	X
Oct 25, 2012	63.32	X
Oct 27, 2012	62.99	X
Oct 31, 2012	62.98	X
Nov 02, 2012	62.87	X
Nov 02, 2012	62.89	X
Nov 04, 2012	63.11	X
Nov 05, 2012	62.76	X
Nov 10, 2012	62.33	X
Nov 12, 2012	62.69	X
Nov 12, 2012	62.77	X
Nov 13, 2012	62.76	X
Nov 14, 2012	62.75	X
Nov 15, 2012	62.81	X
Nov 18, 2012	62.68	X
Nov 19, 2012	62.65	X
Nov 19, 2012	62.78	X
Nov 20, 2012	62.30	X
Nov 21, 2012	62.63	X
Nov 23, 2012	62.47	X
Dec 04, 2012	62.48	X
Dec 08, 2012	62.49	X
Dec 12, 2012	62.70	X
Dec 14, 2012	62.81	X
Dec 15, 2012	62.63	X
Dec 21, 2012	62.66	X
Dec 21, 2012	62.60	X
Dec 31, 2012	62.63	X

Jan 09, 2013	62.72	X
Jan 10, 2013	62.69	X
Feb 01, 2013	62.50	X
Feb 02, 2013	62.68	X
Feb 06, 2013	62.34	X
Feb 08, 2013	62.77	X
Feb 08, 2013	62.57	X
Feb 15, 2013	62.57	X
Feb 17, 2013	62.87	X
Feb 18, 2013	62.50	X
Feb 20, 2013	62.68	X
Feb 21, 2013	62.38	X
Feb 22, 2013	62.61	X
Feb 28, 2013	62.80	X
Mar 01, 2013	62.45	X
Mar 01, 2013	62.39	X
Mar 01, 2013	62.56	X
Mar 04, 2013	62.67	X
Mar 04, 2013	62.57	X
Mar 06, 2013	62.64	X
Mar 08, 2013	62.50	X
Mar 08, 2013	62.39	X
Mar 14, 2013	62.36	X
Mar 15, 2013	62.14	X
Mar 18, 2013	62.45	X
Mar 22, 2013	62.47	X
Mar 22, 2013	62.43	X
Mar 23, 2013	62.64	X
Mar 28, 2013	62.47	X
Mar 29, 2013	62.47	X
Apr 04, 2013	62.44	X
Apr 05, 2013	62.70	X
Apr 07, 2013	62.62	X
Apr 11, 2013	62.77	X
Apr 12, 2013	62.38	X
Apr 15, 2013	62.83	X
Apr 16, 2013	62.42	X
Apr 16, 2013	62.53	X
Apr 16, 2013	62.55	X
Apr 16, 2013	62.41	X
Apr 16, 2013	62.78	X
Apr 16, 2013	62.37	X
Apr 18, 2013	62.59	X

3H Efficiency

Total # pts : 5603
Valid # pts : 138
Mean : 62.82
SD : 0.28



3H Background

Total # pts : 5529
Valid # pts : 138
Mean : 2.13
SD : 0.16

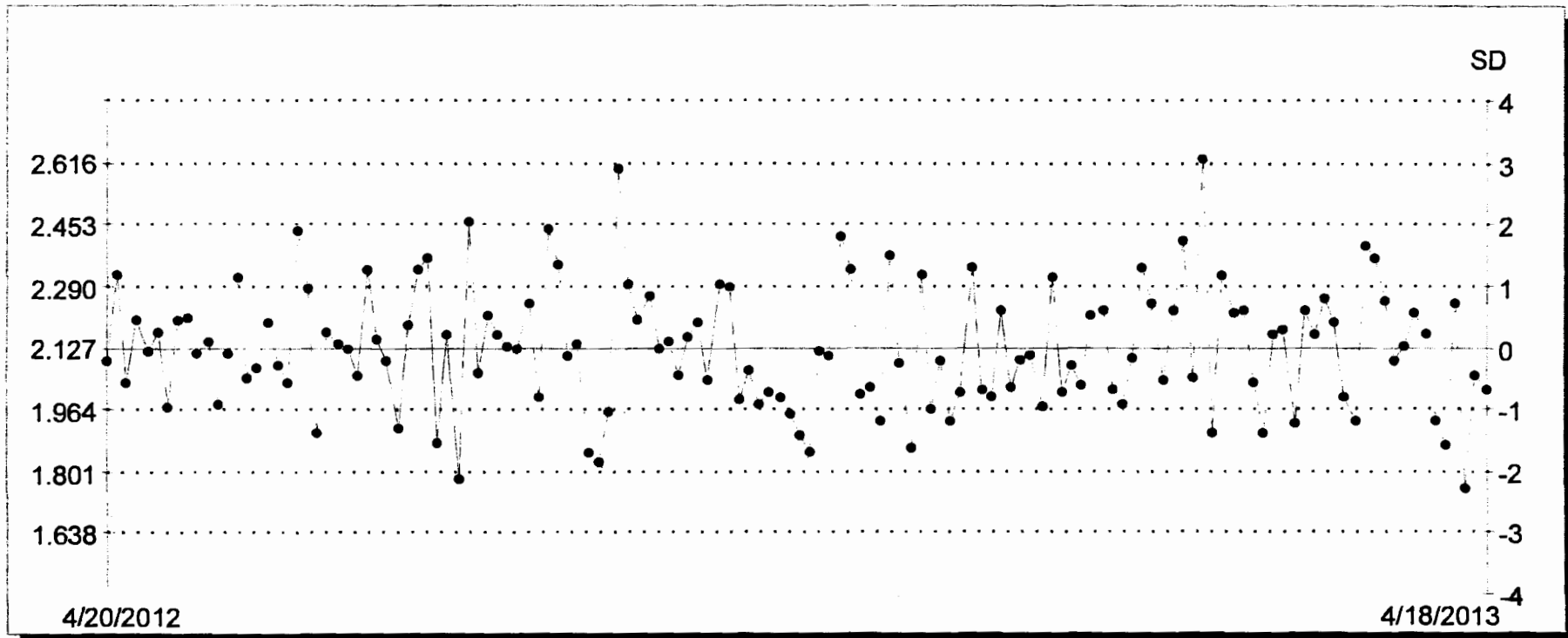
Date	Value	Valid Pt
Apr 20, 2012	2.09	X
Apr 23, 2012	2.32	X
Apr 26, 2012	2.03	X
Apr 27, 2012	2.20	X
Apr 30, 2012	2.12	X
May 01, 2012	2.17	X
May 03, 2012	1.97	X
May 07, 2012	2.20	X
May 09, 2012	2.20	X
May 14, 2012	2.11	X
May 17, 2012	2.14	X
May 17, 2012	1.98	X
May 23, 2012	2.11	X
May 30, 2012	2.31	X
May 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
Sep 11, 2012	2.11	X
Sep 17, 2012	2.14	X
Sep 18, 2012	1.85	X
Sep 20, 2012	1.83	X
Sep 20, 2012	1.96	X
Sep 24, 2012	2.60	X
Sep 28, 2012	2.29	X
Oct 01, 2012	2.20	X
Oct 04, 2012	2.26	X
Oct 05, 2012	2.13	X
Oct 06, 2012	2.14	X
Oct 11, 2012	2.05	X
Oct 12, 2012	2.15	X
Oct 13, 2012	2.19	X
Oct 17, 2012	2.04	X
Oct 19, 2012	2.29	X
Oct 22, 2012	2.29	X
Oct 23, 2012	1.99	X
Oct 23, 2012	2.06	X
Oct 23, 2012	1.98	X
Oct 23, 2012	2.01	X
Oct 25, 2012	2.00	X
Oct 27, 2012	1.95	X
Oct 31, 2012	1.89	X
Nov 02, 2012	1.85	X
Nov 02, 2012	2.11	X
Nov 04, 2012	2.11	X
Nov 05, 2012	2.42	X
Nov 10, 2012	2.33	X
Nov 12, 2012	2.00	X
Nov 12, 2012	2.02	X
Nov 13, 2012	1.93	X
Nov 14, 2012	2.37	X
Nov 15, 2012	2.09	X
Nov 18, 2012	1.86	X
Nov 19, 2012	2.32	X
Nov 19, 2012	1.96	X
Nov 20, 2012	2.09	X
Nov 21, 2012	1.93	X
Nov 23, 2012	2.01	X
Dec 04, 2012	2.34	X
Dec 08, 2012	2.02	X
Dec 08, 2012	2.00	X
Dec 14, 2012	2.22	X
Dec 15, 2012	2.02	X
Dec 21, 2012	2.09	X
Dec 21, 2012	2.10	X
Dec 31, 2012	1.97	X

Jan 09, 2013	2.01	X
Jan 10, 2013	2.08	X
Feb 01, 2013	2.03	X
Feb 02, 2013	2.21	X
Feb 06, 2013	2.22	X
Feb 08, 2013	2.01	X
Feb 08, 2013	1.98	X
Feb 15, 2013	2.10	X
Feb 17, 2013	2.34	X
Feb 18, 2013	2.25	X
Feb 20, 2013	2.04	X
Feb 21, 2013	2.23	X
Feb 22, 2013	2.41	X
Feb 28, 2013	2.04	X
Mar 01, 2013	2.62	X
Mar 01, 2013	1.90	X
Mar 01, 2013	2.32	X
Mar 04, 2013	2.22	X
Mar 04, 2013	2.22	X
Mar 06, 2013	2.04	X
Mar 08, 2013	1.90	X
Mar 08, 2013	2.16	X
Mar 14, 2013	2.17	X
Mar 15, 2013	1.93	X
Mar 18, 2013	2.22	X
Mar 22, 2013	2.16	X
Mar 22, 2013	2.25	X
Mar 23, 2013	2.19	X
Mar 28, 2013	1.99	X
Mar 29, 2013	1.93	X
Apr 04, 2013	2.40	X
Apr 05, 2013	2.36	X
Apr 07, 2013	2.25	X
Apr 11, 2013	2.09	X
Apr 12, 2013	2.13	X
Apr 15, 2013	2.22	X
Apr 16, 2013	2.16	X
Apr 16, 2013	1.93	X
Apr 16, 2013	1.87	X
Apr 16, 2013	2.24	X
Apr 16, 2013	1.75	X
Apr 16, 2013	2.05	X
Apr 18, 2013	2.02	X

3H Background

Total # pts : 5529
Valid # pts : 138
Mean : 2.13
SD : 0.16





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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Liquid Scintillation Counting

Calibration Information



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

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

Principal Radionuclide

H-3

ENTER -->

Half Life, Years

1.232E+01

OR -->

Half Life, Days

4.4998E+034.4998E+03Radionuclide H-3Dilution Reference Date 9/7/2012 10:40Dilution Activity 2.58 pCi per gram ==> dpm/g 5.73Verif. Date Decay Corrected 2.58 pCi per gram ==> dpm/g 5.72**Minimum of 3 Required**

Trial ID	Sample Counts	Count Time (min)	Detector	Efficiency	Bkg. (cpm)	Net Weight	Decay Corrected Activity Result (dpm/g)	Decay Corrected Activity Result (pCi/g)
S-0279-V1	15.91	1	LSC	0.3302	6.49	5.019	5.68	2.56
S-0279-V2	16.21	1	LSC	0.3291	6.49	5.018	5.89	2.65
S-0279-V3	15.76	1	LSC	0.3290	6.49	5.018	5.62	2.53
S-0279-V4	15.62	1	LSC	0.3293	6.49	5.008	5.54	2.49
S-0279-V5	15.76	1	LSC	0.3280	6.49	5.018	5.63	2.54

10% Max

PASS

Standard Deviation percent of known concentration

5% Max

PASS

Average

Two Sigma Uncertainty

Target Activity

% Diff

5.67 2.550.28 0.122.30% 2.30%5.72 2.58-0.91% -0.91%Verification Expiration Date: #####Prepared & Counted By [Signature]Date: 9/10/2012 20:16Verified & Approved By [Signature]Date: 9-11-12 0817QC Approval [Signature]Date: 9-11-12 0817**S-0279****H-3**Verified 9/10/12**SL**Expires 9/10/13Manufacturer **NIST SRM 4927F**Sol Matrix **H2O**Ref No **NIST SRM 4927F**Tech **Unknown**Parent ID **S-0237**

RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY

H-3 Standard Verification

Verifier's Name: Brian Steffens

Date: 9/7/2012

Pipettor ID: FJ40469

Pipettor ID: Auto-pipettor

Pipettor ID: na

Standard ID: S-0279

Standard ID: N/A

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

Weight of Standard		
15mL of Ultima Gold added to standard	S-0279-V1	5.019 g
	S-0279-V2	5.018 g
	S-0279-V3	5.018 g
	S-0279-V4	5.008 g
	S-0279-V5	5.018 g
		Balance ID: <u>H1331122173560P</u>

Assay Definition-

Assay Description:
H3 Normal Lvl

Assay Type: DPM (Single)
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\ARS\H-3 Normal 3\20120910_0931
Raw Results Path: C:\Packard\Tricarb\Results\ARS\H-3 Normal 3\20120910_0931\20120910_0931.results
RTF File Name: C:\Packard\Tricarb\Results\ARS\H-3 Normal 3\20120910_0931\H3 Results.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\ARS\H-3 Normal 3\20120910_0931\H3 Results.csv
Assay File Name: C:\Packard\TriCarb\Assays\H-3 Normal 3.lsa

Count Conditions-

Nuclide: H-3 Normal
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: UG STD H-3
Count Time (min): 120.00
Count Mode: Normal
Assay Count Cycles: 1 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

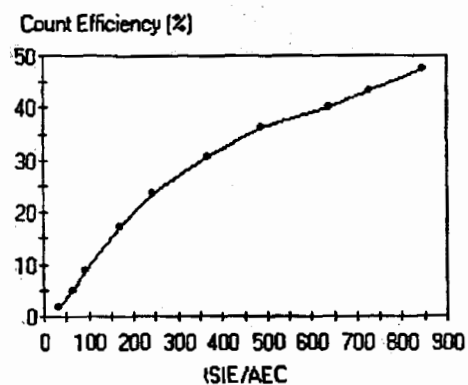
Half Life Correction: Off

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

A
B
C

Cycle 1 Results
Quench Curve Block Data

UG STD H-3 in A



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

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

9/10/2012 10:19:47 PM

QuantaSmart (TM) - 2.03 - Serial# 061533

Protocol# 54 - H-3 Normal 3.lsa

Page # 3

User: ARS

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

STD ID: S-0279

ARS INTERNATIONAL		Add/Edit Secondary Stds	Parent Standard Data			
Planning		Parent Solution Reference #	NIST SRM 4927F			
Planning Comments	Create a H3 LCS standard.	Parent Solution #	S-0237			
Target dpm/g (on dil. date)	5.5	Parent Principal Radionuclide	H-3	Half Life (Days)	4499.8089000	
Target Final volume mL	2000	Parent Reference Date	03/22/2010 10:10			
Appx mass g of Parent Sol'n	3.606433954	Parent Certified Act	3503.682716	Cert Act/Vol Units	dpm	g
Appx vol mL of Parent Sol'n	3.612937241	Parent Cert Act Uncert 1 Sigma	0.0036			
Expected Addition for Analysis g	5	Parent Sp. Gravity G/mL	0.9982			
Standards Preparation / Dilution		Parent Supplier	NIST SRM 4927F			
Secondary Solution #	6-0279	Parent Date Recvd	01/02/00			
Dilution Date (New Ref Date)	09/07/2012 10:40	Parent Received By	Unknown			
Ampoule, Empty (g)		Parent Cert Exp Date				
Ampoule /Solution Gross (g)		Parent Matrix	H2O			
Net Wt Removed (g)		Certified dpm/g At Ref Date	3503.682716			
Transfer Container, empty (g)	13.144	Certified dpm/g on 09/07/2012 10:40	3050.10438			
Container Plus Solution (g)	16.89	Parent Comments	Intermediate level H-3 standard for creating LCS solutions and matrix spikes. Dilution performed as stated above by B Steffens. -BJS 3/22/10			
Net Wt Transferred (g)	3.746					
DPM Xferred on 09/07/2012 10:40	11425.89101					
Diluent/matrix	DI H2O	Parent Tech	Unknown			
Diluent Density Cont, empty (g)		Is_Primary	FALSE			
Test Mass of 5 mL of Diluent (g)		Is_LCS	TRUE			
Diluent Density Test - (g/mL)		Is_Tracer	FALSE			
Dilution Empty Container Mass (g)	473.93	Is_Calib	FALSE			
Dilution Full Cont g (if measured)	2469.52					
Dilution Final Volume mL (if measured)	2000					
Final Dilution Density (g/mL)	0.997793					
Final Dilution Measured Mass g	1995.39					
Comments	H3 LCS standard. Dilution performed as stated above by B Steffens. -BJS 9/7/12					
Final Dilution dpm/g	5.725470166					
Final Dil New Ref Date/Time	09/07/2012 10:40					



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American Radiation Services Analytical Reports

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Report Compilation Checklist

ARS SDG: 13-00746 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	

802
Report Generator Signature

5-16-13
Date

James D. Lee 5-16-13
Management Review Signature Date



LSC
Technical Review Checklist

ARS SDG ARS1-13-00746

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: B13-00845 Batch B: N/A Batch C: N/A

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

A. RADIOCHEMICAL PREPARATION REVIEW

	Chemist Review			Verifier Review		
1) 100% of Manual Transcriptions Verified?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
2) 100% of Manual Calculations Verified?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
3) Blank Composition/Configuration Matches Calibration?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
4) Deviations from procedure are documented and verified?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
5) Appropriate Cocktail Selected?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
6) Sample Prep Anomaly? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes (See Tech Notes) NCR # (If initiated): _____						
<u>D. 8</u> Chemist Signature		<u>5-16-13</u> Date		<u>[Signature]</u> Verifier Review Signature		<u>5-16-13</u> Date

B. ANALYSIS REVIEW

	Analyst Review			QA Officer Review		
1) Calibrations Valid and Current?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
2) Backgrounds Valid and Current?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
3) Source Checks Completed and Acceptable?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
<u>[Signature]</u> Analyst Signature		<u>5-16-13</u> Date		<u>James D. [Signature]</u> QA Officer Signature		<u>5-16-13</u> Date

	Analyst Review			Technical Review		
4) Background Checks Complete and Acceptable?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
5) 100% of Manually Entered Parameters Verified Accurate?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
6) Appropriate QC samples initiated at required frequency?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
6) Test/Sample Specific Parameters (See ARS-059 for details)						
a) Analysis Parameters Checked and Correct and Peak Shapes are Acceptable?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
b) Spectra show no Evidence of Interferences?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
c) Sample Quench for All Samples within Range of Quench Curve?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
7) Analysis Anomaly? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes (See Comments) NCR # (If initiated): _____						
<u>D. 8</u> Analyst Signature		<u>5-16-13</u> Date		<u>[Signature]</u> Technical Reviewer Signature		<u>5-16-13</u> Date



LSC
Technical Review Checklist

ARS SDG <u>ARS1-13-00746</u>	
Sample Matrix: <u>AQ</u>	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: <u>B13-00776</u>	Batch B: _____ Batch C: _____
Test Method(s): <u>LSC-A-021</u>	_____

A. RADIOCHEMICAL PREPARATION REVIEW

	Chemist Review			Verifier Review		
1) 100% of Manual Transcriptions Verified?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
2) 100% of Manual Calculations Verified?	Yes	No	<u>N/A</u>	Yes	No	<u>N/A</u>
3) Blank Composition/Configuration Matches Calibration?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
4) Deviations from procedure are documented and verified?	Yes	No	<u>N/A</u>	Yes	No	<u>N/A</u>
5) Appropriate Cocktail Selected?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
6) Sample Prep Anomaly? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (See Tech Notes) NCR # (If initiated): _____						
Chemist Signature <u>[Signature]</u>		Date <u>4-18-13</u>		Verifier Review Signature <u>[Signature]</u>		Date <u>4-18-13</u>

B. ANALYSIS REVIEW

	Analyst Review			QA Officer Review		
1) Calibrations Valid and Current?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
2) Backgrounds Valid and Current?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
3) Source Checks Completed and Acceptable?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
		QA Officer Signature <u>James D. [Signature]</u>		Date <u>5-16-13</u>		
	Analyst Review			Technical Review		
4) Background Checks Complete and Acceptable?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
5) 100% of Manually Entered Parameters Verified Accurate?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
6) Appropriate QC samples initiated at required frequency?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
6) Test/Sample Specific Parameters (See ARS-059 for details)						
a) Analysis Parameters Checked and Correct and Peak Shapes are Acceptable?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
b) Spectra show no Evidence of Interferences?	<u>Yes</u>	No	N/A	<u>Yes</u>	No	N/A
c) Sample Quench for All Samples within Range of Quench Curve?	<u>Yes</u>	No	N/A	<u>Yes</u>	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>4-18-13</u>		Technical Reviewer Signature <u>[Signature]</u>		Date <u>5-13-13</u>

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	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	ARS1-13-00746		TAT Days	28	Project Type	Environmental
Sample Count	Rpt Level	4	Date Received	4/18/2013	COC Number	2013-736
Client	Los Alamos National Laboratory		Client Deadline	5/16/2013	PO Number	
Client Code	114		Internal Deadline	5/15/2013	Job Number	
Profile Number	PN-00094		Lab Deadline	5/13/2013	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	CAPA-13-29666	AQ	04/15/13 12:34 PM	04/15/13 12:34 PM	H	90	5	G6							
→	134816	1	1000.00				80	30		N	N/A				

SDG Report - Analysis Assignments

Temp SDG	ARS1-13-00746	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

ARS FILE TRACKING SHEET

SDG: ARS1-13-00746

Task	Date / Time	Initials
Date & Time Samples Received	04-18-13/11:55	WFW
ICOC Initiated/Storage Location: <u>G6</u>	04-18-13/15:14	WFW
Technical Checks Performed	<i>See Patch</i>	
Report Written / EDD Generated <u>5-16-13/1547</u> <u>SDL</u>	<u>5-16-13/1544</u>	<u>SDL</u>
Quality Assurance Checks Performed on Report	<u>5-16-13</u> <u>1551</u>	<u>JBT</u>
Management Checks Performed on Report		
<i>Preliminary Report Scan</i>		
Report E-mailed/Faxed		
Report Reviewed		
Report Mailed		
Invoice Completed Invoice #: _____		
Report Imaged		

SPECIAL REQUIREMENTS

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

NOTES

LANL

SDG: 4251-13-00746

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 _____
 Matrix AF AG BI

Exposure Rate Meter: <u>M3 242 861</u>		Serial No.: <u>PR 26 4266</u>		Calibration Due Date: <u>4-16-14</u>	
Count Rate Meter: <u>M2 154 859</u>		Serial No.: <u>PR184559</u>		Calibration Due Date: <u>4-16-14</u>	
Background Exposure Rate (μ R/hr) <u>30</u>		Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd) <u>36</u>		μ R/hr	
Background Count Rate (cpm) <u>80</u>		Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd) <u>90</u>		cpm	
		Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd) <u>80</u>		cpm	

[illegible]

Surveyors' Name: Wanda White

Date/Time Surveyed: 4-16-13 13:27