The order of this data package is as follows:

1. Chain-of-Custody/Lab Request
2. Copies of COCs
3. Validation Report
4. Laboratory analysis

Comments:

American Radiation

Baton Rouge LA

Chain of Custody/Analysis Request

COC/Lab Request #: 2018-1613-ARS

Client Contact:

Lab Agreement #: N/A

Project Number: KA0P

Analysis Turnaround Time:

24 Hour - ☐ Other - ☒

7 Days - ☐

14 Days - ☐

21 Days - ☐

28 Days - ☐

Site Name: Los Alamos National Laboratory

Rad Screening Info: Contam NO

Lab Reporting Limit Type: MDC

Field Sample ID	Sample Date	Sample Time	Sample Matrix	WSP-LL-H-3
CAWA-18-81	02/06/2018	11:24	W	1

Special Instructions:

Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:
	[illegible]	2/8/18 300			
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:

Shipping Classification Determination Checklist

Sampling Plan ID/Name: 11669 (R-68) **COC:** 2018-1613

TEST - Explosives	YES	NO
Samples collected from a WFO area? (TAs -8, 9, 11, 16, 37, 14, 15, 36, 22, 39, 40, and 49)		✓

Field Test for Explosives Results	YES	NO	NA
HE SPOT test result positive. **If YES - Do not transport.**		✓	

TEST - Chemical Preservation	YES	NO
Samples are chemically preserved?	✓	

Field Team Member Statement	YES	NO	NA
Chemical preservation exceeds limits given 40 CFR 136, Table II - Required Containers, Preservation Techniques and Holding Times (footnote 3). **If YES - Do not ship.**		✓	

TEST - Field Screen	YES	NO
The sample has field screening measurements of alpha and beta activity?		✓

Sample Activity (dpm/100cm²)		Shipment Activity (dpm*g/100cm²)		Sampled Location	YES	NO	NA
Alpha detectable	**AND**	Alpha ≥ 160,000	**AT**	TA-1 and adjacent hillsides, TA-21, Acid Canyon, MDA C at TA-50, Area G at TA-54, TA-48, or TA-49			✓
Alpha ≥ 125	**AND**	Alpha ≥ 1,250,000	**AT**	other locations			✓
Beta ≥ 1,500	**AND**	Beta ≥ 15,000,000	**AT**	any location			✓
The sample Alpha ≥ 16,000,000 dpm*g/100cm² or Beta ≥ 160,000,000 dpm*g/100cm². **If YES - Do not ship.**							✓
On the external surface of the sample container, alpha activity ≥ 24 dpm/cm², beta activity ≥ 240 dpm/cm², or surface activity ≥ 0.5 mR/hr. **If YES - Do not ship.**							✓
The sample is tentatively identified as DOT hazard Class 7 (Radioactive). The shipment is labeled *Radioactive Material, Excepted Package - Limited Quantity Material - UN2910*, based on field screening measurements of alpha and beta activity.							✓

TEST - Location	YES	NO
Prior analytical measurements of radioactive isotopes are available?	✓	

Sample Activity (pCi/g)		Shipment Activity (pCi)	YES	NO	NA
Am-241 ≥ 27 pCi/g	**AND**	Am-241 ≥ 270,000 pCi Total			
Cs-137 ≥ 270 pCi/g	**AND**	Cs-137 ≥ 270,000 pCi Total			
Pu-238 ≥ 27 pCi/g	**AND**	Pu-238 ≥ 270,000 pCi Total			
Pu-239/240 ≥ 27 pCi/g	**AND**	Pu-239/240 ≥ 270,000 pCi Total		✓	
Th-228 ≥ 27 pCi/g	**AND**	Th-228 ≥ 270,000 pCi Total			
U-234 ≥ 270 pCi/g	**AND**	U-234 ≥ 1,600,000,000 pCi Total			
U-238 ≥ 270 pCi/g	**AND**	U-238 ≥ unlimited			
H-3 ≥ 27,000,000 pCi/g	**AND**	H-3 ≥ 27,000,000,000 pCi Total			
Am-241, Pu-238, Pu-239/240, or Th 228 ≥ 27,000,000 pCi; or Cs-137 ≥ 270,000,000 pCi or U-234 ≥ 160,000,000 pCi; or H-3 ≥ 1 Ci. **If YES - Do not ship.**				✓	
The sample is tentatively identified as DOT hazard Class 7 (Radioactive). The shipment is labeled *Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910*, based on prior analytical measurements of radioactive isotopes.				✓	

TEST - AK	YES	NO	NA
The shippers documented knowledge of the sample positively identifies appropriate labeling.		✓	

Documented Field Team Member Statement	YES	NO	NA
The sample is tentatively identified as DOT hazard Class 7 (Radioactive). The shipment is labeled *Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910*, and the sample is submitted to ARS or RP for hazard classification analysis.			✓

These samples do not meet the criteria for classification in any hazard class according to regulation OSHA 29 CFR 1910.1200. The sample(s) contained in this shipment have been assigned a tentative proper DOT shipping name, hazard class, identification number, and packing group, based on the shipper's knowledge of the sample:

Hazard Assessment Completed	Date/Time
(Printed Name) Katrina Tow	2/6/18
(Signature) [signature]	1250

Hazard Assessment Reviewed	Date/Time
(Printed Name) Renee Orsbott	2/6/18
(Signature) Renee Orsbott	1252

R-68

DATA VALIDATION REPORT

Chain Of Custody No. 2018-1613-ARS

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
ARS1-18-00404	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
ARS1-18-00404	Generic:Low_Level_Tritium	ARS1-B18-	ARS1-B18-	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	CAWA-18-81	ARS1-B18-00376-11	REG	1	0	0	0
Generic:Low_Level_Tritium	RAD	LCS	ARS1-B18-00376-01	LCS	0	0	1	0
Generic:Low_Level_Tritium	RAD	LCSD	ARS1-B18-00376-02	LCSD	0	0	1	0
Generic:Low_Level_Tritium	RAD	MB	ARS1-B18-00376-03	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

No.

Only results shown in Section 13 'Display Flagged Data' are current as of this report generation. All other sections are valid for the date the COC data was inserted into EIM, and may have changed due to data updates in the intervening time.

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?

LCS Lab Sample	LCSD Lab	Analytical Method	Parameter Name	Lab Lot ID	Analysis	Sample Matrix	LCS Spike Recovery	LCSD Spike Recovery	Upper Limit	Lower Limit	Upper Rejection Limit	Lower Rejection Limit	RPD	RPD Limit
ARS1-B18-00376-01	ARS1-B18-00376-02	Generic:Low_Level_Tritium	Tritium	ARS1-B18-00376	04-11-2018	W	50.000	77.000	120.00	80.000		10	40.984	

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.

Only results shown in Section 13 'Display Flagged Data' are current as of this report generation. All other sections are valid for the date the COC data was inserted into EIM, and may have changed due to data updates in the intervening time.

DATA VALIDATION REPORT

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-68	2018-1613-ARS	CAWA-18-81	REG	INIT	RAD	Generic:Low_Level_Tritiu	Tritium	QU*	U	R5	N	-1.010	pCi/L	-1.010	pCi/L	3.248	0.955	W	02/06/2018		ARS1-B18-00376	VAL	Y

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
CAWA-18-81	R-68	REG	Generic:Low_Level_Tritium	0	1

Only results shown in Section 13 'Display Flagged Data' are current as of this report generation. All other sections are valid for the date the COC data was inserted into EIM, and may have changed due to data updates in the intervening time.

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 Number: 2018-1613

SDG: ARS1-18-00404

INTERNATIONAL

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 2018-1613

Original COC

American Radiation

Baton Rouge LA

Chain of Custody/Analysis Request

COC/Lab Request #: 2018-1613-ARS

Client Contact:

Lab Agreement #: ~~A~~ ADEP

Project Number:

Analysis Turnaround Time:

24 Hour - ☐ Other - ☒

7 Days - ☐

14 Days - ☐

21 Days - ☐

28 Days - ☐

Site Name: Los Alamos National Laboratory

Rad Screening Info: Lonka NO

Lab Reporting Limit Type: MDL

Field Sample ID	Sample Date	Sample Time	Sample Matrix	WSP-LL-H-3
CAWA-18-81	02/06/2018	11:24	W	1

Special Instructions:

Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:
	Melissa Martin	2/8/18 300		Morgan Cauthen	2-12-18 0800
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:
Relinquished by:	Print Name:	Date/Time:	Received by:	Print Name:	Date/Time:

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 2018-1613

Case Narrative

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

ARS Aleut Analytical

ARS International, LLC

Laboratory Analysis Report

ARS1-18-00404

Prepared for:

Los Alamos National Laboratory

Nita Patel
P.O. Box 1663
MS M992
Los Alamos, NM 87545

npatel@lanl.gov
sherwoods@lanl.gov

Phone: 505-665-9273
Fax: 505-665-9972

Project Manager Review

Notes: ARS International, LLC assumes no liability for the use or the 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

LELAP Cert# 01949

ARS Aleut Analytical

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

April 18, 2018

Nita Patel
Sherri Sherwood
Los Alamos National Laboratory
505-665-9273
npatel@lanl.gov

ARS SDG: **ARS1-18-00404**
COC Number: **2018-1613**
Charge Code: **ADEP**

Dear Nita,

On February 12, 2018, ARS Aleut Analytical, LLC received one (1) sample to be analyzed for Enriched H-3.

The samples were processed and counted using the appropriate equipment and techniques for these types of analyses. Results of all the analyses 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 255.381.2991 or email ProjectManagers@amrad.com.

Sincerely,

Susan Leese
Project Management
ARS Aleut Analytical, LLC

ARS Aleut Analytical

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

PROJECT SAMPLE IDENTIFICATION CROSS-REFERENCE
TO ARS SAMPLE LABORATORY IDs

Client Sample ID	ARS Aleut Analytical Sample ID
2018-1613	ARS1-18-00404-001

SAMPLE RECEIPT/PREP

The samples arrived in good condition. The samples were screened for radioactive contamination as per procedure **ARS-062 "Sample Receiving"**. Turnaround time was set at 40 calendar days.

ANALYTICAL METHODS

Enriched H-3 analysis was performed using **ARS-040, "Tritium Assay in Water Samples Using Electrolytic Enrichment".**

H-3 screening analysis was performed using **ARS-054, "Tritium in Water (EPA 906.0)".**

ANALYTICAL RESULTS

ARS1-B18-00376: LCS/LCSD recoveries are below the required 80-120% range. After technical review, data is being reported and qualified with a "Q".

RPD is elevated therefore data is qualified with a "*".

ARS Aleut Analytical Laboratory Management'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 client 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 Aleut Analytical	4-23-18

ARS Aleut Analytical

Notes (Case Narrative):

General Comments:

1.0) Soil and Sludge analysis are reported on a wet basis or an as received basis unless otherwise indicated.
2.0) Modified analysis procedures are procedures that are modified to meet the certain specifications. An example may be the use of a water method to analyze a solid matrix due to the lack of an officially recognized procedure for the analysis of the solid matrix. Modified analyses are indicated by the subsequent addition of "m" to the procedure number (i.e. 900.0M).
3.0) All NIOSH method results are reported without blank corrections applied.

Radiochemistry Comments:

1.0) All MDA/MDC values are calculated on a sample specific basis.
2.0) Data in this report are within the limits of uncertainty specified in the reference method unless otherwise specified.
3.0) Total activity is actually total gamma activity and is determined utilizing the prominent gamma emitters from the naturally occurring radioactive decay chains and other prominent radioactive nuclides. Total activity may be lower than the actual total activity due to the extent of secular equilibrium achieved in the various decay chains at the time of analysis. The total activity is not representative of nuclides that emit solely alpha or beta particles.
4.0) Ra-228 is determined via secular equilibrium with its daughter, Actinium 228 (Gamma Spectroscopy only).
5.0) U-238 is determined via secular equilibrium with its daughter, Thorium 234 (Gamma Spectroscopy only).
6.0) All gamma spectroscopy was performed utilizing high purity germanium detectors (**HPGe**).
7.0) ARS makes every attempt to match sample density to calibrated density; however, in some cases, it is not practical or possible to do so and data results may be affected (Gamma Spectroscopy only).
8.0) Gamma spectroscopy results are calculated values based on the **ORTEC**® GammaVision ENV32 Analysis Engine.
9.0) ACLASS DOD and ISO 17025 certification applies only to the following analytes and methods: Gross Alpha and Gross Beta (EPA 900, SM7110B&C, SW846 9310); Radium 226 (EPA 903, EPA 903.1, SM 7500 Ra-B, SW846 9315); Radium 228 (EPA 904, SM 7500 Ra-B SW846 9320); Iodine-131(EPA 901.1); Uranium by ICPMS (EPA 200.8); Strontium 89/90 (EPA 905, Eichrom SRW01, HASL 300 Sr-03-RC); Tritium (EPA 906, EPA 906M); Gamma Emitters (EPA 901.1, SM7120B, HASL 300 Ga-01-R); Americium-241, Curium 242/244, Plutonium 239/240 and 241, Thorium 228/230/232, Uranium 234/233 and 238 (Eichrom ACW03 VBS); Lead 210 (HASL 300 Pb-01-RC, Eichrom OTW01); Polonium 210 (HASL 300 Po-01-RC, HASL 300 Po-02-RC); Technetium-99 (Eichrom TCW02, Eichrom TCS01M).

Definitions:

CRDL	Contract Required Detection Limit
CSU	Combined Standard Uncertainty
DLC	Decision Level Concentration (ANSI N42.23) or critical level
DO	Duplicate Original
DUP	Method Duplicate
LCS/LCSD	Laboratory Control Sample/Laboratory Control Sample Duplicate
MDA	Minimum Detectable Activity
MDC	(Minimum Detectable Concentration) minimum concentration of the analyte that ARS can detect utilizing the specific analysis
MBL	Method Blank
MS/MSD	Matrix Spike/Matrix Spike Duplicate
N/A	Not Applicable
NP	Not Provided
NR	Not Referenced
LOD	Limit of Detection
LOQ	Limit of Quantitation
MCL	Maximum Contaminant Level

Data Qualifiers:

B	The analyte is found in both the associated method blank and the sample. This flag indicates probable blank contamination.
D	Sample analysis accomplished through dilution.
J	The reported result is an estimated value above the limit of detection but outside of quantitation range (e.g., matrix interference was observed).
Q	One or more quality control criteria failed (e.g., LCS recovery, surrogate spike recovery, or CCV recovery).
U	Activity is below the MDC, MDA, MDL, or LOD
N	The analyte is a tentatively identified compound using mass spectrometry or any non-customer requested compounds that are tentatively identified.
*	LCS/LCSD or MS/MSD fails RPD criteria.
S	Spike
SC	Subcontracted out to another qualified laboratory
H	Holding time exceeded
E	Exceeds MCL
**	Reporting Limit is higher than MCL; Target cannot be detected

INTERNATIONAL

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

ARS Aleut Analytical

2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • FAX (225) 381-2996

ARS Sample Delivery Group: ARS1-18-00404
Client Sample ID: CAWA-18-81
Sample Collection Date: 02/06/18
Sample Matrix: Aqueous
Percent Solids: N/A

Request or PO Number: 2018-1613-ARS
ARS Sample ID: ARS1-18-00404-001
Date Received: 02/12/18
Report Date: 04/13/18

Radiochemistry

Analysis Description	Analysis Results	CSU +/-1s	MDC	DLC	CRDL	Qual	Analysis Units	Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	-1.010	0.955	3.248	1.580	3.221	QU*	pCi/L	ARS-040/	04/13/18 12:42	MMORGAN	N/A

Notes: ARS Aleut Analytical, 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.

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ARS Aleut Analytical

QC Results per Analytical Batch

Analytical Batch	**ARS1-B18-00376**
SDG	**ARS1-18-00404**
Analysis	**Low Level Tritium by Electrolytic Enrichment**
Analysis Test Method	**ARS-040/**
Analysis Code	**LSC-LLH3-AQ**
Report Units	**pCi/L**

Acceptable QC Performance Ranges

QC Sample Type	Performance Items and Ranges		
Laboratory Control Sample	**Recovery (%):**	**> 80**	**< 120**
Matrix Spike	**Recovery (%):**	**> 60**	**< 140**
Duplicate	**Replicate Error Ratio (RER):**		**< 1**
	Duplicate Error Ratio (DER):		**< 3**
	Relative Percent Difference (RPD %):		**≤ 25**

Laboratory Control Sample

Analysis Date	04/11/18 09:14	**Analysis Technician**	MMORGAN

Analysis Batch Sample ID	QC Type	Analyte	Results	CSU (1s)	Expected Value	LCS Rec (%)	MDC
ARS1-B18-00376-02	**LCSD**	ENRICHED H-3	25.060	3.988	32.459	77.2	3.289

Duplicate RER/DER/RPD

Analysis Date	04/11/18 09:14	**Analysis Technician**	MMORGAN

Analyte	Results LCS	CSU LCS (1s)	Results LCSD	CSU LCSD (1s)	RER	DER	RPD
ENRICHED H-3	16.536	2.737	25.060	3.988	1.268	1.762	41.0

Method Blank

Analysis Date	04/11/18 14:57	**Analysis Technician**	MMORGAN

Analysis Batch Sample ID	QC Type	Analyte	Results	CSU (1s)	MDC	Qual
ARS1-B18-00376-03	**MBL**	ENRICHED H-3	-1.480	0.884	2.981	U

Notes: ARS Aleut Analytical, 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.

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Laboratory Records

Analytical Batch Report

ARS Aleut Analytical

Analysis Batch ID **ARS1-B18-00376**

Method ARS-040 **Analysis** LSC-LLH3-AQ **Matrix** AQ

Description Low Level Tritium by Electrolytic Enrichment

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Prep Code	Filtered	Client ID	Group Name	Lab Deadline
ARS1-B18-00376-01	LCS											
ARS1-B18-00376-02	LCSD											
ARS1-B18-00376-03	MBL											
ARS1-B18-00376-04	TRG				**ARS1-18-00398**	001	1			CAWA-18-72		03/21/18
ARS1-B18-00376-05	TRG				**ARS1-18-00398**	002	1			CAWA-18-75		03/21/18
ARS1-B18-00376-06	TRG				**ARS1-18-00398**	003	1			CAWA-18-78		03/21/18
ARS1-B18-00376-07	TRG				**ARS1-18-00398**	004	1			CAWA-18-129		03/21/18
ARS1-B18-00376-08	TRG				**ARS1-18-00402**	001	1			CAWA-18-34		03/21/18
ARS1-B18-00376-09	TRG				**ARS1-18-00403**	001	1			CrPZ-2-18-151284		03/21/18
ARS1-B18-00376-10	TRG				**ARS1-18-00403**	002	1			CrPZ-5-18-151305		03/21/18
ARS1-B18-00376-11	TRG				**ARS1-18-00404**	001	1			CAWA-18-81		03/21/18

ARS Aleut Analytical, LLC
Baton Rouge Laboratory

LCS Report
Analytical Batch: ARS1-B18-00376

Blind ID	ABatch Sample ID	Blind Group	Std ID	Isotope	Exp Addition (g)	Expected Value (pCi/g)	Empty Wt (g)	Gross Wt (g)	Net Wt (g)	Expected Value CT (pCi/g)	Mid Point Count Date	Known Value (pCi)	User ID	Mod Date
B-25085	ARS1-B18-00376-01	B-H3	S-0324	H-3	5	2.46675	17.0006	22.0082	5.0076	2.45537	04/11/2018	12.29552	MMORGAN	03/12/2018
B-25086	ARS1-B18-00376-02	B-H3	S-0324	H-3	5	2.46675	16.7401	21.7319	4.9918	2.45537	04/11/2018	12.25673	MMORGAN	03/12/2018

ARS-040

Tritium Assay in Water Samples Using Electrolytic Enrichment

Preparation Date: 03/22/2018 14:36

Prepared By: MMORGAN

Procedure Data

ABatch Sample ID	Type	SDG/Fraction	Tare Wt of Electrolysis Cell & Electrodes	Tare Wt Reservoir	Gross Weight of Sample Reservoir	Wt Sodium Peroxide	Gross Sample Added	Electrolysis Start Date & Time	Start AMP	Start Bath (C)	Electolysis End Date/Time	End Bath (C)
ARS1-B18-00376-01	LCS		324.8700	255.4000	631.2200	1.5000	375.8200	3/22/2018 3:36:00 PM	5.0000	2.0000	4/9/2018 11:00:00 AM	2.0000
ARS1-B18-00376-02	LCSD		326.2200	209.8400	587.4500	1.5000	377.6100	3/22/2018 3:36:00 PM	5.0000	2.0000	4/9/2018 11:00:00 AM	2.0000
ARS1-B18-00376-03	MBL		321.9400	226.2200	604.5700	1.5000	378.3500	3/22/2018 3:36:00 PM	5.0000	2.0000	4/9/2018 11:00:00 AM	2.0000
ARS1-B18-00376-04	TRG	ARS1-18-00398-001	325.5100	213.2500	589.2800	1.5000	376.0300	3/22/2018 3:36:00 PM	5.0000	2.0000	4/9/2018 11:00:00 AM	2.0000
ARS1-B18-00376-05	TRG	ARS1-18-00398-002	327.9900	214.2000	595.2700	1.5000	381.0700	3/22/2018 3:36:00 PM	5.0000	2.0000	4/9/2018 11:00:00 AM	2.0000
ARS1-B18-00376-06	TRG	ARS1-18-00398-003	317.1200	222.5400	601.3200	1.5000	378.7800	3/22/2018 3:36:00 PM	5.0000	2.0000	4/9/2018 11:00:00 AM	2.0000
ARS1-B18-00376-07	TRG	ARS1-18-00398-004	323.4400	219.3500	598.8000	1.5000	379.4500	3/22/2018 3:36:00 PM	5.0000	2.0000	4/9/2018 11:00:00 AM	2.0000
ARS1-B18-00376-08	TRG	ARS1-18-00402-001	323.8400	222.0800	598.6300	1.5000	376.5500	3/22/2018 3:36:00 PM	5.0000	2.0000	4/9/2018 11:00:00 AM	2.0000
ARS1-B18-00376-09	TRG	ARS1-18-00403-001	323.7000	232.8200	610.7800	1.5000	377.9600	3/22/2018 3:36:00 PM	5.0000	2.0000	4/9/2018 11:00:00 AM	2.0000
ARS1-B18-00376-10	TRG	ARS1-18-00403-002	323.4100	224.3600	604.2200	1.5000	379.8600	3/22/2018 3:36:00 PM	5.0000	2.0000	4/9/2018 11:00:00 AM	2.0000
ARS1-B18-00376-11	TRG	ARS1-18-00404-001	320.2300	209.7000	585.6500	1.5000	375.9500	3/22/2018 3:36:00 PM	5.0000	2.0000	4/9/2018 11:00:00 AM	2.0000

ARS-040

Tritium Assay in Water Samples Using Electrolytic Enrichment

Procedure Data

ABatch Sample ID	Type	End Wt of Cell + Resv + Sample	Gross Sample Recovered	Enrichment Factor	Tare Wt Cryo-distil flask	Gross Wt flask + Sample	Recovered Water	Tare Weight of LSC Vial	Vial + Sample	Net Sample	Gross Wt Vial + Dead Water If used	Net Dead Water Added
ARS1-B18-00376-01	LCS	595.3600	15.0900	24.9052	116.0800	129.9900	13.9100	6.6000	16.6700	10.0700	16.6700	0.0000
ARS1-B18-00376-02	LCSD	551.9300	15.8700	23.7940	125.6900	139.1300	13.4400	6.6800	16.7100	10.0300	16.7100	0.0000
ARS1-B18-00376-03	MBL	563.6000	15.4400	24.5045	109.4200	122.9700	13.5500	6.5500	16.5500	10.0000	16.5500	0.0000
ARS1-B18-00376-04	TRG	554.5600	15.8000	23.7994	126.3400	139.9800	13.6400	6.6300	16.6300	10.0000	16.6300	0.0000
ARS1-B18-00376-05	TRG	557.9000	15.7100	24.2565	129.8100	143.5400	13.7300	6.5700	16.5700	10.0000	16.5700	0.0000
ARS1-B18-00376-06	TRG	555.3500	15.6900	24.1415	120.9300	134.5800	13.6500	6.6900	16.7200	10.0300	16.7200	0.0000
ARS1-B18-00376-07	TRG	557.9300	15.1400	25.0627	122.8500	135.9500	13.1000	6.6000	16.6200	10.0200	16.6200	0.0000
ARS1-B18-00376-08	TRG	562.2200	16.3000	23.1012	128.5500	142.4400	13.8900	6.6000	16.6100	10.0100	16.6100	0.0000
ARS1-B18-00376-09	TRG	573.1500	16.6300	22.7276	99.9500	114.1300	14.1800	6.6200	16.6300	10.0100	16.6300	0.0000
ARS1-B18-00376-10	TRG	559.8200	12.0500	31.5237	110.4500	119.9300	9.4800	6.5600	15.9100	9.3500	17.2500	1.3400
ARS1-B18-00376-11	TRG	546.1500	16.2200	23.1782	106.8000	120.4500	13.6500	6.6300	16.6400	10.0100	16.6400	0.0000

Procedure Data

ABatch Sample ID	Type	Tare Wt b/f Cocktail	Gross Wt Vial + Cocktail	Net Wt of Cocktail Added
ARS1-B18-00376-01	LCS	16.6700	26.7600	10.0900
ARS1-B18-00376-02	LCSD	16.7100	26.7200	10.0100
ARS1-B18-00376-03	MBL	16.5500	26.6000	10.0500
ARS1-B18-00376-04	TRG	16.6300	26.6800	10.0500
ARS1-B18-00376-05	TRG	16.5700	26.5900	10.0200
ARS1-B18-00376-06	TRG	16.7200	26.7500	10.0300
ARS1-B18-00376-07	TRG	16.6200	26.6400	10.0200
ARS1-B18-00376-08	TRG	16.6100	26.6400	10.0300
ARS1-B18-00376-09	TRG	16.6300	26.6400	10.0100
ARS1-B18-00376-10	TRG	17.2500	27.2500	10.0000
ARS1-B18-00376-11	TRG	16.6400	26.6500	10.0100

Reagent Amounts

ABatch Sample ID	Type	SDG/Fraction	14.2.12 DISTILLAT - Ionize & add O to electrolysis - Sodium Peroxide (granular) Reagent Grade (g)	14.3.22 DISTILLATION - Add scint cocktail - Ultima Gold LLT Reagent Grade (mL)
ARS1-B18-00376-01	LCS		1.50	10.00
ARS1-B18-00376-02	LCSD		1.50	10.00
ARS1-B18-00376-03	MBL		1.50	10.00
ARS1-B18-00376-04	TRG	ARS1-18-00398-001	1.50	10.00
ARS1-B18-00376-05	TRG	ARS1-18-00398-002	1.50	10.00
ARS1-B18-00376-06	TRG	ARS1-18-00398-003	1.50	10.00
ARS1-B18-00376-07	TRG	ARS1-18-00398-004	1.50	10.00
ARS1-B18-00376-08	TRG	ARS1-18-00402-001	1.50	10.00
ARS1-B18-00376-09	TRG	ARS1-18-00403-001	1.50	10.00
ARS1-B18-00376-10	TRG	ARS1-18-00403-002	1.50	10.00
ARS1-B18-00376-11	TRG	ARS1-18-00404-001	1.50	10.00

Reagent Tracking

Procedure Section	Reagent ID
14.2.12 DISTILLAT - Ionize & add O to electrolysis	R17-00926
14.3.22 DISTILLATION - Add scint cocktail	R17-00665

Assay Definition

Assay Description:
LLH3 Assay in DPM Mode
Assay Type: DPM (Single)
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\ARS\Low Level H3\20180410_1319
Raw Results Path: C:\Packard\Tricarb\Results\ARS\Low Level H3\20180410_1319\20180410_1319.results
RTF File Name: C:\Packard\Tricarb\Results\ARS\Low Level H3\20180410_1319\LLH3.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\ARS\Low Level H3\20180410_1319\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: LLH3 10ml
Count Time (min): 330.00
Count Mode: Low Level
Assay Count Cycles: 1 Repeat Sample Count: 1
Number of Vials/Sample: 1 Calculate % Reference: Off

Background Subtract

Background Subtract: Off
Low CPM Threshold: Off
2 Sigma % Terminator: Off

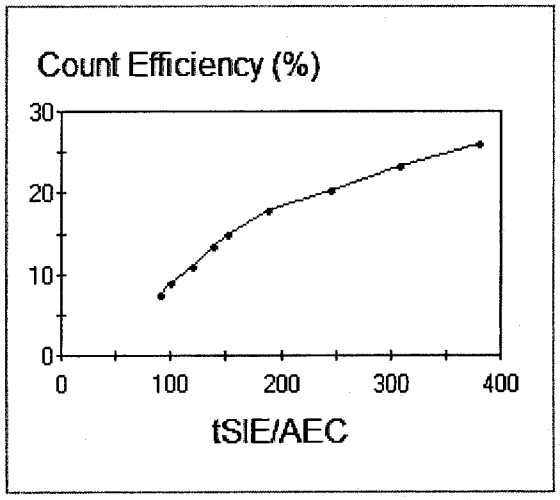
Regions	LL	UL
A	2.0	18.6
B	0.0	2000.0
C	0.0	2000.0

Count Corrections

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

Cycle 1 Results
Quench Curve Block Data

LLH3 10ml in A



Date Acquired: 08/18/2017
Date Modified:
LLH3 10ml in A

tSIE/AEC	Count Efficiency (%)
380.12	26.09
307.45	23.20
245.66	20.44
188.72	17.73
151.46	14.93
138.74	13.42
120.63	11.00
99.95	9.01
90.27	7.44

P#	S#	SMPL ID	CPMA	DPM1	tSIE	Eff Nucl In A	Count Time	DATE	TIME	MESSAGES
8	1	BACKGROUND	1.317	6.22	261.80	21.16	330.00	4/10/2018	7:02:30 PM	

8	2	B18-00376-01	2.942	13.88	262.76	21.20	330.00	4/11/2018	12:45:53 AM
8	3	B18-00376-02	3.619	17.32	255.95	20.90	330.00	4/11/2018	6:29:16 AM
8	4	B18-00376-03	1.167	5.48	265.20	21.31	330.00	4/11/2018	12:12:18 PM
8	5	B18-00376-04	1.003	4.76	259.85	21.07	330.00	4/11/2018	5:55:49 PM
8	6	B18-00376-05	1.138	5.45	255.40	20.87	330.00	4/11/2018	11:38:04 PM
8	7	B18-00376-06	1.280	5.77	284.28	22.16	330.00	4/12/2018	5:20:43 AM
8	8	B18-00376-07	1.226	5.83	258.85	21.03	330.00	4/12/2018	11:03:43 AM
8	9	B18-00376-08	2.016	9.57	259.55	21.06	330.00	4/12/2018	4:47:00 PM
8	10	B18-00376-09	7.944	37.88	257.70	20.97	330.00	4/12/2018	10:30:04 PM
8	11	B18-00376-10	1.805	8.77	248.81	20.58	330.00	4/13/2018	4:13:28 AM
8	12	B18-00376-11	1.223	5.86	255.40	20.87	330.00	4/13/2018	9:56:52 AM

LSC Instrument Data Transfer Report

\\Tricarb\ars\Low Level H3\20180410_

Batch Sample ID	Non-BKG Samples Transferred	Samples Eligible To Save	
ARS1-B18-00376	11	11	LSC 5

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	8		1	BACKGROUND	04/10/18 19:02	1.32	261.80	21.1600	330.00	ARS1-B18-00376		
ARS1-B18-00376-01	8		2	B18-00376-01	04/11/18 00:45	2.94	262.76	21.2000	330.00	ARS1-B18-00376		
ARS1-B18-00376-02	8		3	B18-00376-02	04/11/18 06:29	3.62	255.95	20.9000	330.00	ARS1-B18-00376		
ARS1-B18-00376-03	8		4	B18-00376-03	04/11/18 12:12	1.17	265.20	21.3100	330.00	ARS1-B18-00376		
ARS1-B18-00376-04	8		5	B18-00376-04	04/11/18 17:55	1.00	259.85	21.0700	330.00	ARS1-B18-00376	ARS1-18-00398	1
ARS1-B18-00376-05	8		6	B18-00376-05	04/11/18 23:38	1.14	255.40	20.8700	330.00	ARS1-B18-00376	ARS1-18-00398	1
ARS1-B18-00376-06	8		7	B18-00376-06	04/12/18 05:20	1.28	284.28	22.1600	330.00	ARS1-B18-00376	ARS1-18-00398	1
ARS1-B18-00376-07	8		8	B18-00376-07	04/12/18 11:03	1.23	258.85	21.0300	330.00	ARS1-B18-00376	ARS1-18-00398	1
ARS1-B18-00376-08	8		9	B18-00376-08	04/12/18 16:47	2.02	259.55	21.0600	330.00	ARS1-B18-00376	ARS1-18-00402	1
ARS1-B18-00376-09	8		10	B18-00376-09	04/12/18 22:30	7.94	257.70	20.9700	330.00	ARS1-B18-00376	ARS1-18-00403	1
ARS1-B18-00376-10	8		11	B18-00376-10	04/13/18 04:13	1.81	248.81	20.5800	330.00	ARS1-B18-00376	ARS1-18-00403	1
ARS1-B18-00376-11	8		12	B18-00376-11	04/13/18 09:56	1.22	255.40	20.8700	330.00	ARS1-B18-00376	ARS1-18-00404	1

ARS-040 Calculation Results	
ARS1-B18-00376	
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-LLH3-AQ	ARS1-B18-00376-01	375.820	1.500	15.090	1.539	13.551	0.036	21.880
LSC-LLH3-AQ	ARS1-B18-00376-02	377.610	1.500	15.870	1.539	14.331	0.038	20.829
LSC-LLH3-AQ	ARS1-B18-00376-03	378.350	1.500	15.440	1.539	13.901	0.037	21.489
LSC-LLH3-AQ	ARS1-B18-00376-04	376.030	1.500	15.800	1.539	14.261	0.038	20.844
LSC-LLH3-AQ	ARS1-B18-00376-05	381.070	1.500	15.710	1.539	14.171	0.037	21.241
LSC-LLH3-AQ	ARS1-B18-00376-06	378.780	1.500	15.690	1.539	14.151	0.037	21.147
LSC-LLH3-AQ	ARS1-B18-00376-07	379.450	1.500	15.140	1.539	13.601	0.036	22.005
LSC-LLH3-AQ	ARS1-B18-00376-08	376.550	1.500	16.300	1.539	14.761	0.039	20.191
LSC-LLH3-AQ	ARS1-B18-00376-09	377.960	1.500	16.630	1.539	15.091	0.040	19.838
LSC-LLH3-AQ	ARS1-B18-00376-10	379.860	1.500	12.050	1.539	10.511	0.028	28.220
LSC-LLH3-AQ	ARS1-B18-00376-11	375.950	1.500	16.220	1.539	14.681	0.039	20.266

ARS-040 Calculation Results	
ARS1-B18-00376	
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-LLH3-AQ	ARS1-B18-00376-01	2.942	1.317	262.760	0.212	0.01007	L	4/27/2017	4/11/2018	330.000
LSC-LLH3-AQ	ARS1-B18-00376-02	3.619	1.317	255.950	0.209	0.01003	L	4/27/2017	4/11/2018	330.000
LSC-LLH3-AQ	AR51-B18-00376-03	1.167	1.317	265.200	0.213	0.01000	L	3/22/2018	4/11/2018	330.000
LSC-LLH3-AQ	ARS1-B18-00376-04	1.003	1.317	259.850	0.211	0.01000	L	2/7/2018	4/11/2018	330.000
LSC-LLH3-AQ	ARS1-B18-00376-05	1.138	1.317	255.400	0.209	0.01000	L	2/7/2018	4/11/2018	330.000
LSC-LLH3-AQ	ARS1-B18-00376-06	1.280	1.317	284.280	0.222	0.01003	L	2/7/2018	4/12/2018	330.000
LSC-LLH3-AQ	ARS1-B18-00376-07	1.226	1.317	258.850	0.210	0.01002	L	2/7/2018	4/12/2018	330.000
LSC-LLH3-AQ	ARS1-B18-00376-08	2.016	1.317	259.550	0.211	0.01001	L	2/6/2018	4/12/2018	330.000
LSC-LLH3-AQ	ARS1-B18-00376-09	7.944	1.317	257.700	0.210	0.01001	L	2/1/2018	4/12/2018	330.000
LSC-LLH3-AQ	ARS1-B18-00376-10	1.805	1.317	248.810	0.206	0.00935	L	2/1/2018	4/13/2018	330.000
LSC-LLH3-AQ	ARS1-B18-00376-11	1.223	1.317	255.400	0.209	0.01001	L	2/6/2018	4/13/2018	330.000

ARS-040 Calculation Results	
ARS1-B18-00376	
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-LLH3-AQ	ARS1-B18-00376-01	330.000	0.94766	16.536	1.156	1.156	2.737	2.266	5.364	3.075	1.496	pCi
LSC-LLH3-AQ	ARS1-B18-00376-02	330.000	0.94766	25.060	1.331	1.331	3.988	2.609	7.816	3.289	1.600	pCi
LSC-LLH3-AQ	ARS1-B18-00376-03	330.000	0.99692	-1.480	0.856	0.856	0.884	1.678	1.733	2.981	1.450	pCi
LSC-LLH3-AQ	ARS1-B18-00376-04	330.000	0.99034	-3.252	0.868	0.868	0.996	1.702	1.952	3.129	1.522	pCi
LSC-LLH3-AQ	ARS1-B18-00376-05	330.000	0.99019	-1.837	0.885	0.885	0.927	1.735	1.817	3.101	1.508	pCi
LSC-LLH3-AQ	ARS1-B18-00376-06	330.000	0.99019	-0.358	0.859	0.859	0.860	1.683	1.686	2.924	1.422	pCi
LSC-LLH3-AQ	ARS1-B18-00376-07	330.000	0.99019	-0.893	0.861	0.861	0.872	1.688	1.708	2.964	1.442	pCi
LSC-LLH3-AQ	ARS1-B18-00376-08	330.000	0.99004	7.472	1.074	1.074	1.552	2.105	3.043	3.230	1.571	pCi
LSC-LLH3-AQ	ARS1-B18-00376-09	330.000	0.98912	72.474	1.832	1.832	11.024	3.591	21.608	3.304	1.607	pCi
LSC-LLH3-AQ	ARS1-B18-00376-10	330.000	0.98912	4.093	0.816	0.816	1.021	1.599	2.001	2.534	1.233	pCi
LSC-LLH3-AQ	ARS1-B18-00376-11	330.000	0.98989	-1.010	0.943	0.943	0.955	1.848	1.872	3.248	1.580	pCi

ARS-040 Calculation Results	
ARS1-B18-00376	
ACF	1
UCF	2.22
Sys Error	0.15

AnalysisCode	ABatchSampleID	AliquotReportUnits	UserID	ModDate
LSC-LLH3-AQ	ARS1-B18-00376-01	L	AMRAD\mmorgan	4/13/2018
LSC-LLH3-AQ	ARS1-B18-00376-02	L	AMRAD\mmorgan	4/13/2018
LSC-LLH3-AQ	ARS1-B18-00376-03	L	AMRAD\mmorgan	4/13/2018
LSC-LLH3-AQ	ARS1-B18-00376-04	L	AMRAD\mmorgan	4/13/2018
LSC-LLH3-AQ	ARS1-B18-00376-05	L	AMRAD\mmorgan	4/13/2018
LSC-LLH3-AQ	ARS1-B18-00376-06	L	AMRAD\mmorgan	4/13/2018
LSC-LLH3-AQ	ARS1-B18-00376-07	L	AMRAD\mmorgan	4/13/2018
LSC-LLH3-AQ	ARS1-B18-00376-08	L	AMRAD\mmorgan	4/13/2018
LSC-LLH3-AQ	ARS1-B18-00376-09	L	AMRAD\mmorgan	4/13/2018
LSC-LLH3-AQ	ARS1-B18-00376-10	L	AMRAD\mmorgan	4/13/2018
LSC-LLH3-AQ	ARS1-B18-00376-11	L	AMRAD\mmorgan	4/13/2018

Technical Note Report

ARS Aleut Analytical

ABATCH ARS1-B18-00376
Analysis Code LSC-LLH3-AQ
Procedure No ARS-040
Matrix AQ

#	Date	Dept	Technical Note	User ID
1	04/13/2018 1:37 PM	REPORTING	LCS/LCSD recoveries are below the required 80-120% range. After technical review, data is being reported and qualified with a "Q". RPD is elevated therefore data is qualified with a "*".	SLEESE

Liquid Scintillation Count Log

Date	Time	ARS Sample I.D. Number	Batch Fraction Number	Liquid Scintillation File Number	Technician Initials	Notes Identifier
3/26/2018	11:00	B18-00370	4	2113	MM	
3/26/2018	11:00	B18-00370	5	2113	MM	
3/26/2018	11:00	B18-00370	6	2113	MM	
3/26/2018	11:00	B18-00370	8	2113	MM	
3/26/2018	11:00	B18-00370	9	2113	MM	
3/26/2018	11:00	B18-00370	10	2113	MM	
3/27/2018	15:00	SNC163	QA	QA	MM	
3/27/2018	15:00	Background	N/A	N/A	MM	
3/27/2018	15:00	B18-00683	4	650	MM	
3/27/2018	15:00	B18-00683	5	650	MM	
3/28/2018	14:30	SNC163	QA	QA	MM	
3/28/2018	16:00	Background	N/A	N/A	MM	
3/28/2018	16:00	B18-00305	1	951	MM	
3/28/2018	16:00	B18-00305	2	951	MM	
3/28/2018	16:00	B18-00305	3	951	MM	
3/28/2018	16:00	B18-00305	4	951	MM	
3/28/2018	16:00	B18-00305	5	951	MM	
3/28/2018	16:00	B18-00305	6	951	MM	
3/29/2018	8:19	SNC163	QA	QA	BJS	
4/4/2018	15:30	SNC163	QA	QA	MM	
4/4/2018	16:00	Background	NA	NA	MM	
4/4/2018	16:00	B18-00372	1	1854	MM	
4/4/2018	16:00	B18-00372	2	1854	MM	
4/4/2018	16:00	B18-00372	3	1854	MM	
4/4/2018	16:00	B18-00372	4	1854	MM	
4/4/2018	16:00	B18-00372	5	1854	MM	
4/4/2018	16:00	B18-00372	6	1854	MM	
4/4/2018	16:00	B18-00372	7	1854	MM	
4/4/2018	16:00	B18-00372	8	1854	MM	
4/4/2018	16:00	B18-00372	9	1854	MM	
4/4/2018	16:00	B18-00372	10	1854	MM	
4/6/2018	16:49	SNC163	QA	QA	BJS	
4/9/2018	10:00	SNC163	QA	QA	MM	
4/9/2018	10:00	B18-00763	4	1135	MM	
4/9/2018	10:00	B18-00763	5	1135	MM	
4/9/2018	10:00	B18-00763	6	1135	MM	
4/9/2018	10:00	B18-00763	7	1135	MM	
4/9/2018	10:00	B18-00763	8	1135	MM	
4/9/2018	10:00	B18-00763	9	1135	MM	
4/9/2018	10:00	B18-00763	10	1135	MM	
4/9/2018	10:00	B18-00763	11	1135	MM	
4/9/2018	10:00	B18-00763	12	1135	MM	
4/9/2018	10:00	B18-00763	13	1135	MM	
4/10/2018	13:00	SNC163	QA	QA	MM	
4/10/2018	14:00	Background	N/A	N/A	MM	
4/10/2018	14:00	B18-00376	1	1319	MM	
4/10/2018	14:00	B18-00376	2	1319	MM	
4/10/2018	14:00	B18-00376	3	1319	MM	
4/10/2018	14:00	B18-00376	4	1319	MM	
4/10/2018	14:00	B18-00376	5	1319	MM	
4/10/2018	14:00	B18-00376	6	1319	MM	

Liquid Scintillation Count Log

Date	Time	ARS Sample I.D. Number	Batch Fraction Number	Liquid Scintillation File Number	Technician Initials	Notes Identifier
4/10/2018	14:00	B18-00376	7	1319	MM	
4/10/2018	14:00	B18-00376	8	1319	MM	
4/10/2018	14:00	B18-00376	9	1319	MM	
4/10/2018	14:00	B18-00376	10	1319	MM	
4/10/2018	14:00	B18-00376	11	1319	MM	

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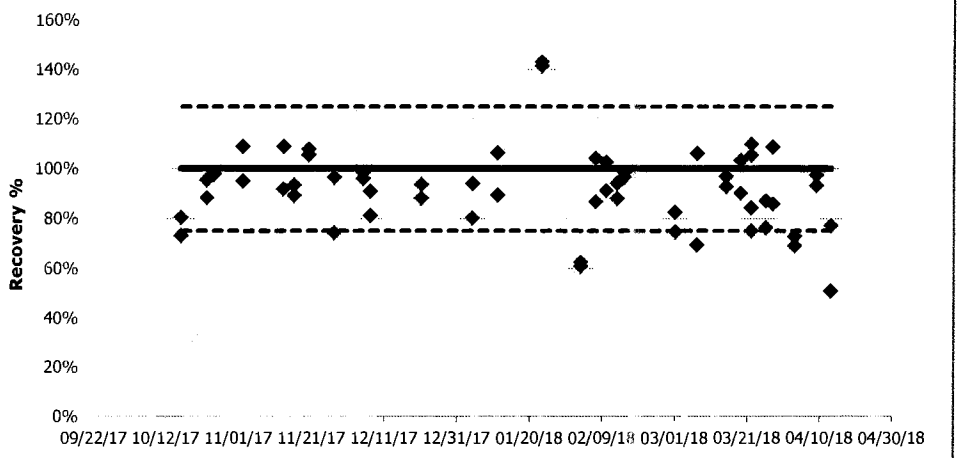
Low Level Tritium by Low Level Liquid Scintillation Counting

Control Charts

American Radiation Services
Baton Rouge Laboratory

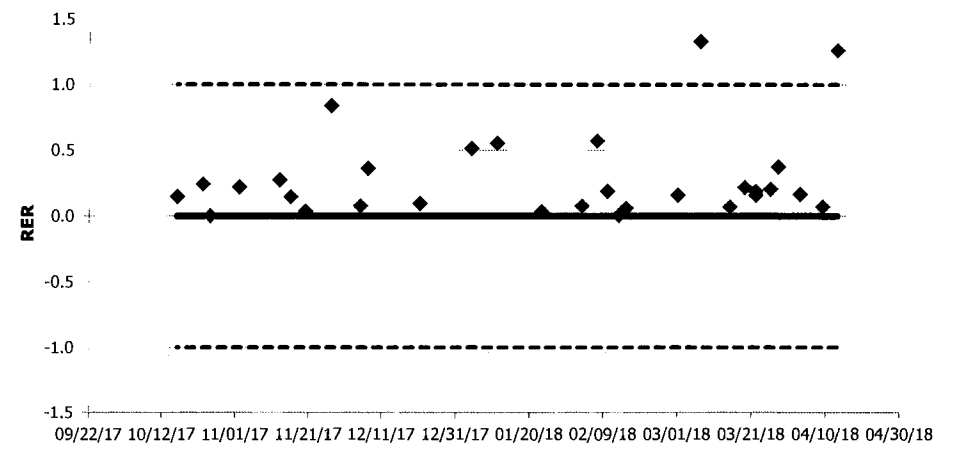
QC Chart

LLH-3 LCS



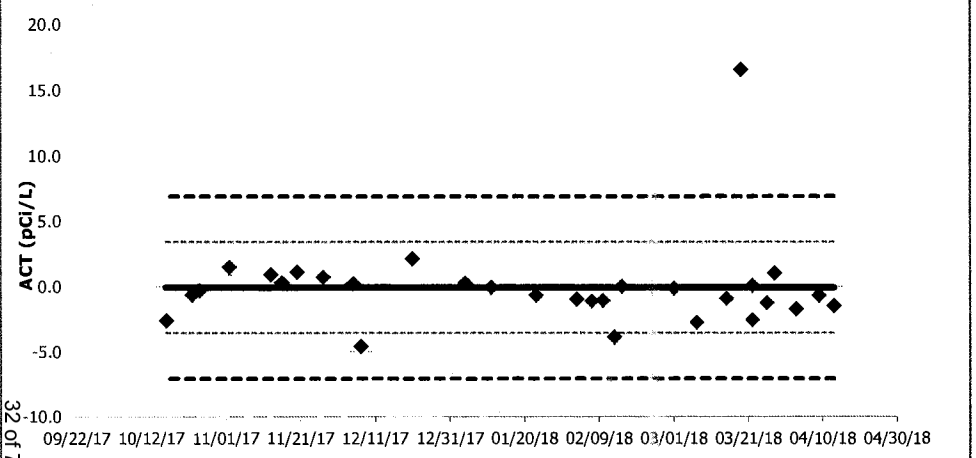
Average	STDEV	n	UCL	LCL
0.9181	0.1613	30	1.2500	0.7500

LLH-3 RER



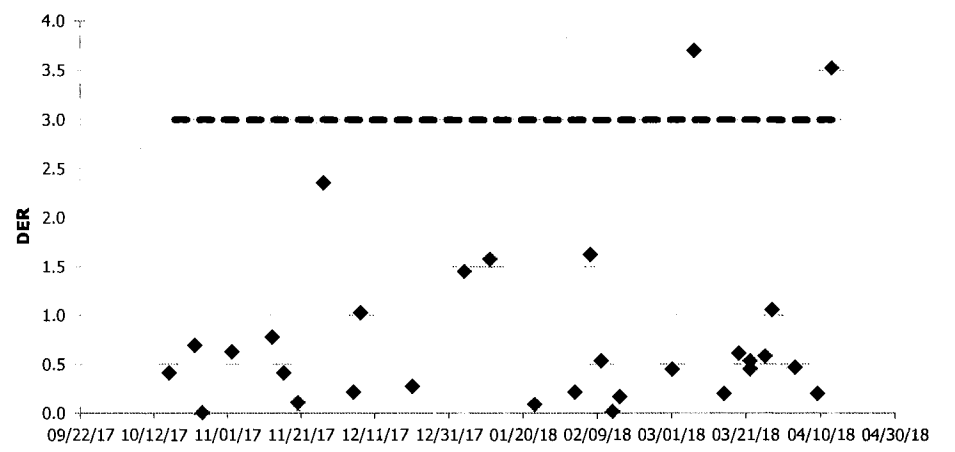
		n	UCL	LCL
		30	1.0000	-1.0000

LLH-3 Blank



Average	STDEV	n	UCL	LCL
-0.0843	3.4913	30	6.8984	-7.0670

LLH-3 DER

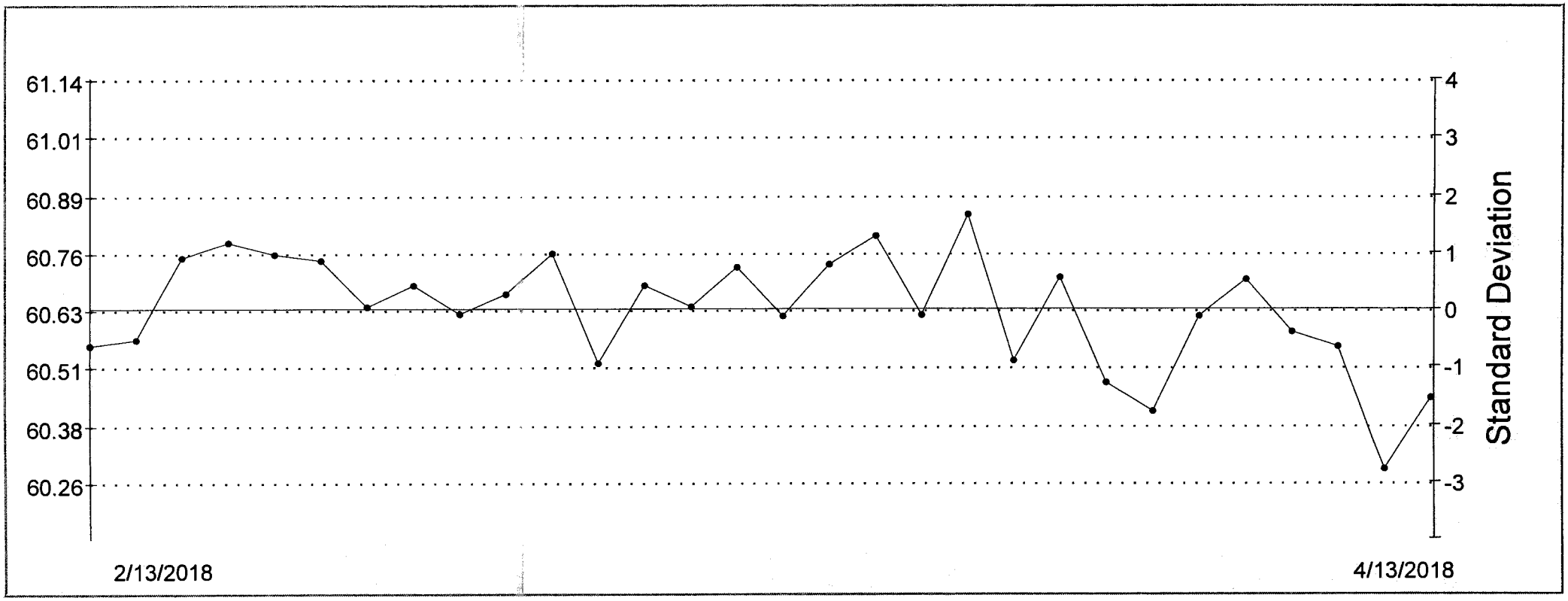


		n	UCL	
		30	3.0000	

3H Efficiency
Total # pts : 114
Valid # pts : 30
Mean : 60.64
SD : 0.13

Date	Value	Include
Feb 13, 2018	60.56	X
Feb 14, 2018	60.57	X
Feb 14, 2018	60.75	X
Feb 16, 2018	60.79	X
Feb 22, 2018	60.76	X
Feb 25, 2018	60.75	X
Feb 26, 2018	60.65	X
Feb 28, 2018	60.69	X
Mar 03, 2018	60.63	X
Mar 06, 2018	60.67	X
Mar 11, 2018	60.76	X
Mar 12, 2018	60.52	X
Mar 14, 2018	60.69	X
Mar 14, 2018	60.65	X
Mar 17, 2018	60.73	X
Mar 19, 2018	60.63	X
Mar 21, 2018	60.74	X
Mar 22, 2018	60.80	X
Mar 23, 2018	60.63	X
Mar 26, 2018	60.85	X
Mar 28, 2018	60.53	X
Mar 28, 2018	60.71	X
Mar 30, 2018	60.48	X
Apr 01, 2018	60.42	X
Apr 04, 2018	60.63	X
Apr 04, 2018	60.71	X
Apr 07, 2018	60.59	X
Apr 09, 2018	60.56	X
Apr 10, 2018	60.29	X
Apr 13, 2018	60.45	X

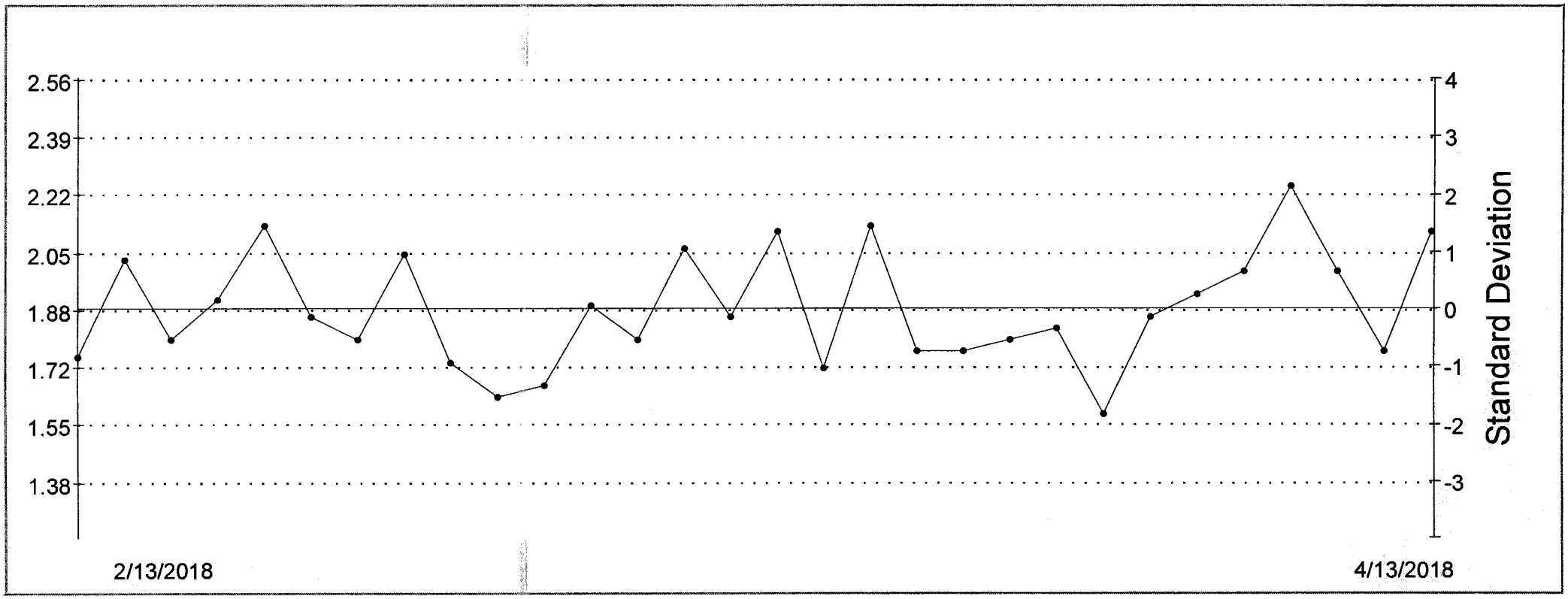
3H Efficiency
Total # pts : 114
Valid # pts : 30
Mean : 60.64
SD : 0.13



3H Background
Total # pts : 112
Valid # pts : 30
Mean : 1.89
SD : 0.17

Date	Value	Include
Feb 13, 2018	1.75	X
Feb 14, 2018	2.03	X
Feb 14, 2018	1.80	X
Feb 16, 2018	1.92	X
Feb 22, 2018	2.13	X
Feb 25, 2018	1.87	X
Feb 26, 2018	1.80	X
Feb 28, 2018	2.05	X
Mar 03, 2018	1.73	X
Mar 06, 2018	1.63	X
Mar 11, 2018	1.67	X
Mar 12, 2018	1.90	X
Mar 14, 2018	1.80	X
Mar 14, 2018	2.07	X
Mar 17, 2018	1.87	X
Mar 19, 2018	2.12	X
Mar 21, 2018	1.72	X
Mar 22, 2018	2.13	X
Mar 23, 2018	1.77	X
Mar 26, 2018	1.77	X
Mar 28, 2018	1.80	X
Mar 28, 2018	1.83	X
Mar 30, 2018	1.58	X
Apr 01, 2018	1.87	X
Apr 04, 2018	1.93	X
Apr 04, 2018	2.00	X
Apr 07, 2018	2.25	X
Apr 09, 2018	2.00	X
Apr 10, 2018	1.77	X
Apr 13, 2018	2.12	X

3H Background
Total # pts : 112
Valid # pts : 30
Mean : 1.89
SD : 0.17



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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

Tritium Screen in Clean Water without Distillation

ARS-040

ARS Batch ID: ARS1-B18-00339
ARS SDG ID(s): ARS1-18-00415

Sample ID:	Count Time	CPMA	Background CPMA	Eff Nucl In A	Aliquot (grams)	ACTIVITY	units	MDA	Sample Must be analyzed as LSC-A-001
ARS1-B18-00339-04	120	0.982	1.274	21.72	10.00	-60.558	pCi/L	126.6423	NO
ARS1-B18-00339-05	120	1.081	1.274	21.74	10.00	-39.989	pCi/L	126.5258	NO
ARS1-B18-00339-06	120	0.968	1.274	22.32	10.00	-61.755	pCi/L	123.2379	NO
ARS1-B18-00339-07	120	1.107	1.274	22.1	10.00	-34.039	pCi/L	124.4647	NO
ARS1-B18-00339-08	120	1.189	1.274	21.83	10.00	-17.539	pCi/L	126.0041	NO
ARS1-B18-00339-09	120	2.125	1.274	21.77	10.00	176.083	pCi/L	126.3514	YES, analyze by LSC-A-001.
ARS1-B18-00339-10	120	2.751	1.274	22.1	10.00	301.048	pCi/L	124.4647	YES, analyze by LSC-A-001.
ARS1-B18-00339-11	120	1.127	1.274	22.16	10.00	-29.881	pCi/L	124.1277	NO
ARS1-B18-00339-12	120	1.062	1.274	21.85	10.00	-43.705	pCi/L	125.8888	NO
B18-00339-09 recount	120	1.536	1.118	20.77	10.00	90.654	pCi/L	124.3715	NO
B18-00339-10 recount	120	1.144	1.118	20.93	10.00	5.596	pCi/L	123.4207	NO
						If activity is > 150 pCi/L, contact client before running by electrolytic enrichment			

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Tritium-Screening by Low Level Liquid Scintillation Counting

Laboratory Records

Analytical Batch Report

ARS Aleut Analytical

Analysis Batch ID **ARS1-B18-00339**

Method ARS-054 **Analysis** LSC-LLH3/SC-AQ **Matrix** AQ

Description Low Level Tritium Screening

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Prep Code	Filtered	Client ID	Group Name	Lab Deadline
ARS1-B18-00339-01	LCS											
ARS1-B18-00339-02	LCSD											
ARS1-B18-00339-03	MBL											
ARS1-B18-00339-04	TRG				**ARS1-18-00398**	001	1			CAWA-18-72		03/21/18
ARS1-B18-00339-05	TRG				**ARS1-18-00398**	002	1			CAWA-18-75		03/21/18
ARS1-B18-00339-06	TRG				**ARS1-18-00398**	003	1			CAWA-18-78		03/21/18
ARS1-B18-00339-07	TRG				**ARS1-18-00398**	004	1			CAWA-18-129		03/21/18
ARS1-B18-00339-08	TRG				**ARS1-18-00402**	001	1			CAWA-18-34		03/21/18
ARS1-B18-00339-09	TRG				**ARS1-18-00403**	001	1			CrPZ-2-18-151284		03/21/18
ARS1-B18-00339-10	TRG				**ARS1-18-00403**	002	1			CrPZ-5-18-151305		03/21/18
ARS1-B18-00339-11	TRG				**ARS1-18-00404**	001	1			CAWA-18-81		03/21/18
ARS1-B18-00339-12	TRG				**ARS1-18-00415**	003	1			GNO01-01.1802001-003 (USGS-1)		03/10/18

Assay Definition

Assay Description:
LLH3 Assay in DPM Mode
Assay Type: DPM (Single)
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\ARS\Low Level H3_3\20180216_1735
Raw Results Path: C:\Packard\Tricarb\Results\ARS\Low Level H3_3\20180216_1735\20180216_1735.results
RTF File Name: C:\Packard\Tricarb\Results\ARS\Low Level H3_3\20180216_1735\LLH3.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\ARS\Low Level H3_3\20180216_1735\LLH3 Results.csv
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3_3.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: LLH3 10ml
Count Time (min): 120.00
Count Mode: Low Level
Assay Count Cycles: 1 Repeat Sample Count: 1
Number of Vials/Sample: 1 Calculate % Reference: Off

Background Subtract

Background Subtract: Off
Low CPM Threshold: Off
2 Sigma % Terminator: Off

Regions	LL	UL
A	2.0	18.6
B	0.0	2000.0
C	0.0	2000.0

Count Corrections

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

Cycle 1 Results

P#	S#	SMPL ID	CPMA	DPM1	tSIE	Eff Nucl In A	Count Time	DATE	TIME	MESSAGES
5	1	BACKGROUND	1.118	5.33	257.78	20.98	120.00	2/16/2018	7:46:55 PM	
5	2	B18-00339-09	1.536	7.39	253.15	20.77	120.00	2/16/2018	9:58:11 PM	
5	3	B17-00339-10	1.144	5.47	256.70	20.93	120.00	2/17/2018	12:09:21 AM	

SNC Protocol

Calibration Information
Software Version IC: 5.2
Software Version EC: 5.2
Instrument Model: Tri-Carb 6220TR/SL
Instrument Serial Number: SGLO25170524
3H Chi Square: 16.67 Date Processed: 2/16/2018 5:35:13 PM
14C Chi Square: 15.58 Date Processed: 2/16/2018 5:35:13 PM
3H FOM (1-18.6 keV): 1927.88 Date Processed: 2/16/2018 5:35:13 PM
14C FOM (4-156 keV): 7333.73 Date Processed: 2/16/2018 5:35:13 PM
3H Efficiency (1-18.6 keV): 60.79 Date Processed: 2/16/2018 5:35:13 PM
14C Efficiency (4-156 keV): 92.50 Date Processed: 2/16/2018 5:35:13 PM
IPA Background Date Processed: 2/16/2018 5:35:13 PM
3H Background CPM (1-18.6 keV): 1.92 Date Processed: 2/16/2018 5:35:13 PM
14C Background CPM (4-156 keV): 1.17 Date Processed: 2/16/2018 5:35:13 PM
3H Calibration DPM: 276400
3H Reference Date: 1/26/2017
14C Calibration DPM: 118500

LSC Instrument Data Transfer Report

\\PACKARD3170_NEW\Results\ARS\Low Low Level Tritium

Batch Sample ID	Non-BKG Samples Transferred	Samples Eligible To Save	
ARS1-B18-00339	9	9	LSC 2

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	49		1	BACKGROUND	02/15/18 07:54	1.27	210.93	21.9200	120.00	ARS1-B18-00339		
ARS1-B18-00339-04	49		2	B18-00339-04	02/15/18 10:04	0.98	208.34	21.7200	120.00	ARS1-B18-00339	ARS1-18-00398	1
ARS1-B18-00339-05	49		3	B18-00339-05	02/15/18 12:14	1.08	208.56	21.7400	120.00	ARS1-B18-00339	ARS1-18-00398	1
ARS1-B18-00339-06	49		4	B18-00339-06	02/15/18 14:24	0.97	216.48	22.3200	120.00	ARS1-B18-00339	ARS1-18-00398	1
ARS1-B18-00339-07	49		5	B18-00339-07	02/15/18 16:34	1.11	213.44	22.1000	120.00	ARS1-B18-00339	ARS1-18-00398	1
ARS1-B18-00339-08	49		6	B18-00339-08	02/15/18 18:45	1.19	209.78	21.8300	120.00	ARS1-B18-00339	ARS1-18-00402	1
ARS1-B18-00339-09	49		7	B18-00339-09	02/15/18 20:55	2.13	208.91	21.7700	120.00	ARS1-B18-00339	ARS1-18-00403	1
ARS1-B18-00339-10	49		8	B18-00339-10	02/15/18 23:05	2.75	213.46	22.1000	120.00	ARS1-B18-00339	ARS1-18-00403	1
ARS1-B18-00339-11	49		9	B18-00339-11	02/16/18 01:15	1.13	214.18	22.1600	120.00	ARS1-B18-00339	ARS1-18-00404	1
ARS1-B18-00339-12	49		10	B18-00339-12	02/16/18 03:25	1.06	209.99	21.8500	120.00	ARS1-B18-00339	ARS1-18-00415	1

LSC Instrument Data Transfer Report

\\Tricarb\ars\Low Level H3_3\20180216

Batch Sample ID	Non-BKG Samples Transferred	Samples Eligible To Save
ARS1-B18-00339	2	2

LSC 5

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	5		1	BACKGROUND	02/16/18 19:46	1.12	257.78	20.9800	120.00	ARS1-B18-00339		
ARS1-B17-00339-10	5		3	B17-00339-10	02/17/18 00:09	1.14	256.70	20.9300	120.00	ARS1-B17-00339	ARS1-17-00499	1
ARS1-B18-00339-09	5		2	B18-00339-09	02/16/18 21:58	1.54	253.15	20.7700	120.00	ARS1-B18-00339	ARS1-18-00403	1

Assay Definition-

Assay Description:
Low Level H3

Assay Type: DPM (Single)
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\ARS\Low Low Level Tritium 3\20180215_0746
Raw Results Path: C:\Packard\Tricarb\Results\ARS\Low Low Level Tritium 3\20180215_0746\20180215_0746.results
RTF File Name: C:\Packard\Tricarb\Results\ARS\Low Low Level Tritium 3\20180215_0746\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\ARS\Low Low Level Tritium 3\20180215_0746\LLH3 Results.csv
Assay File Name: C:\Packard\TriCarb\Assays\Low Low Level Tritium 3.lsa

Count Conditions-

Nuclide: H-3 LL
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: ARS LL H3 10
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): 200

Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results

P#	S#	SMPL_ID	CPMA	DPM1	tSIE	Eff Nucl In A	Count Time	DATE	TIME	MESSAGES
49	1	BACKGROUND	1.274	5.814	210.93	21.92	120.00	2/15/2018	7:54:56 AM	
49	2	B18-00339-04	0.982	4.519	208.34	21.72	120.00	2/15/2018	10:04:55 AM	
49	3	B18-00339-05	1.081	4.970	208.56	21.74	120.00	2/15/2018	12:14:56 PM	
49	4	B18-00339-06	0.968	4.335	216.48	22.32	120.00	2/15/2018	2:24:58 PM	
49	5	B18-00339-07	1.107	5.009	213.44	22.10	120.00	2/15/2018	4:34:59 PM	
49	6	B18-00339-08	1.189	5.445	209.78	21.83	120.00	2/15/2018	6:45:00 PM	
49	7	B18-00339-09	2.125	9.761	208.91	21.77	120.00	2/15/2018	8:55:01 PM	
49	8	B18-00339-10	2.751	12.448	213.46	22.10	120.00	2/15/2018	11:05:03 PM	
49	9	B18-00339-11	1.127	5.086	214.18	22.16	120.00	2/16/2018	1:15:18 AM	
49	10	B18-00339-12	1.062	4.861	209.99	21.85	120.00	2/16/2018	3:25:25 AM	

ARS-054

Tritium in Water

Preparation Date: 02/13/2018 13:56

Prepared By: MMORGAN

Procedure Data

ABatch Sample ID	Client ID	Parent	ICOC ID	Aliquot 1 Vol/Wt	Aliquot 1 Units	Aliquot 2 Vol/Wt	Aliquot 2 Units
ARS1-B18-00339-01							
ARS1-B18-00339-02							
ARS1-B18-00339-03							
ARS1-B18-00339-04	CAWA-18-72		286557	0.0010	L		
ARS1-B18-00339-05	CAWA-18-75		286558	0.0010	L		
ARS1-B18-00339-06	CAWA-18-78		286559	0.0010	L		
ARS1-B18-00339-07	CAWA-18-129		286560	0.0010	L		
ARS1-B18-00339-08	CAWA-18-34		286561	0.0010	L		
ARS1-B18-00339-09	CrPZ-2-18-151284		286562	0.0010	L		
ARS1-B18-00339-10	CrPZ-5-18-151305		286563	0.0010	L		
ARS1-B18-00339-11	CAWA-18-81		286564	0.0010	L		
ARS1-B18-00339-12	GNO01-01.1802001-003 (USGS-1)		286566	0.0010	L		

Reagent Amounts

ABatch Sample ID	Client ID	14.1.5 OPTIONAL AQ W/O DIST - Add scint cocktai - Ultima Gold LLT Reagent Grade (mL)	User ID
ARS1-B18-00339-01		10.00	
ARS1-B18-00339-02		10.00	
ARS1-B18-00339-03		10.00	
ARS1-B18-00339-04	CAWA-18-72	10.00	
ARS1-B18-00339-05	CAWA-18-75	10.00	
ARS1-B18-00339-06	CAWA-18-78	10.00	
ARS1-B18-00339-07	CAWA-18-129	10.00	
ARS1-B18-00339-08	CAWA-18-34	10.00	
ARS1-B18-00339-09	CrPZ-2-18-151284	10.00	
ARS1-B18-00339-10	CrPZ-5-18-151305	10.00	
ARS1-B18-00339-11	CAWA-18-81	10.00	
ARS1-B18-00339-12	GNO01-01.1802001-003 (USGS-1)	10.00	

Reagent Tracking

Procedure Section	Reagent ID
14.1.5 OPTIONAL AQ W/O DIST - Add scint cocktai	R17-00665

Low Level Tritium pH Checks

SDG#	Fraction	pH	Date	Analyst
ARS1-18-00398	001	8	2-13-18	MM
	002	8	2-13-18	MM
	003	8	2-13-18	MM
	004	8	2-13-18	MM
ARS1-18-00402	001	8	2-13-18	MM
ARS1-18 00403	001	8	2-13-18	MM
	002	8	2-13-18	MM
ARS1-18-00404	001	8	2-13-18	MM
ARS1-18-00415	003	8	2-13-18	MM

N/A

2-13-18 MM

Liquid Scintillation Count Log

Date	Time	ARS Sample I.D. Number	Batch Fraction Number	Liquid Scintillation File Number	Technician Initials	Notes Identifier
2/2/2018	13:45	B17-02662	7	2006	MM	
2/2/2018	13:45	B17-02662	8	2006	MM	
2/2/2018	13:45	B17-02662	9	2006	MM	
2/2/2018	13:45	B17-02662	10	2006	MM	
2/2/2018	13:45	B17-02662	11	2006	MM	
2/2/2018	13:45	B17-02662	12	2006	MM	
2/2/2018	13:45	B17-02662	13	2006	MM	
2/2/2018	13:45	B17-02662	3	2006	MM	
2/5/2018	14:45	SNC163	QA	QA	MM	
2/5/2018	14:45	Background	N/A	N/A	MM	
2/5/2018	14:45	B17-02742	1	1828	MM	
2/5/2018	14:45	B17-02742	2	1828	MM	
2/5/2018	14:45	B17-02742	3	1828	MM	
2/5/2018	14:45	B17-02742	4	1828	MM	
2/5/2018	14:45	B17-02742	5	1828	MM	
2/5/2018	14:45	B17-02742	6	1828	MM	
2/5/2018	14:45	B17-02742	7	1828	MM	
2/5/2018	14:45	B17-02742	8	1828	MM	
2/5/2018	14:45	B17-02742	9	1828	MM	
2/5/2018	14:45	B17-02742	10	1828	MM	
2/8/2018	16:00	SNC163	QA	QA	MM	
2/8/2018	16:00	Background	N/A	N/A	MM	
2/8/2018	16:00	B17-02743	1	1056	MM	
2/8/2018	16:00	B17-02743	2	1056	MM	
2/8/2018	16:00	B17-02743	3	1056	MM	
2/8/2018	16:00	B17-02743	4	1056	MM	
2/8/2018	16:00	B17-02743	5	1056	MM	
2/8/2018	16:00	B17-02743	6	1056	MM	
2/12/2018	17:00	SNC163	QA	QA	MM	
2/12/2018	17:00	Background	N/A	N/A	MM	
2/12/2018	17:00	B17-02877	1	1105	MM	
2/12/2018	17:00	B17-02877	2	1105	MM	
2/12/2018	17:00	B17-02877	3	1105	MM	
2/12/2018	17:00	B17-02877	4	1105	MM	
2/12/2018	17:00	B17-02877	5	1105	MM	
2/12/2018	17:00	B17-02877	6	1105	MM	
2/12/2018	17:00	B17-02877	7	1105	MM	
2/14/2018	15:30	SNC163	QA	QA	MM	
2/14/2018	15:30	Background	N/A	1812	MM	
2/14/2018	15:30	B18-00121	1	1812	MM	
2/14/2018	15:30	B18-00121	2	1812	MM	
2/14/2018	15:30	B18-00121	3	1812	MM	
2/14/2018	15:30	B18-00121	4	1812	MM	
2/14/2018	15:30	B18-00121	5	1812	MM	
2/14/2018	15:30	B18-00121	6	1812	MM	
2/14/2018	15:30	B18-00121	7	1812	MM	
2/16/2018	12:30	SNC163	QA	QA	MM	
2/16/2018	12:30	Background	N/A	1735	MM	
2/16/2018	12:30	B18-00339	9	1735	MM	
2/16/2018	12:30	B18-00339	10	1735	MM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
12-13-18	1247	B18-00315-06	B18-00315	~~1527~~ 1428	[illegible]
↓	↓	↓ -07	↓	↓	[illegible]
12-13-18	1547	SNC 5	QA	QA	[illegible]
↓	↓	Background	B18 00308	1703	MM
↓	↓	B18-00308-04	↓	↓	MM
↓	↓	↓ -05	↓	↓	MM
↓	↓	↓ -06	↓	↓	MM
↓	↓	↓ -07	↓	↓	MM
↓	↓	↓ -08	↓	↓	MM
12-13-18	1600	SNC 5	QA	QA	MM
↓	↓	B18-00339-04	B18-00339	0746	MM
↓	↓	↓ -05	↓	↓	MM
↓	↓	↓ -06	↓	↓	MM
↓	↓	↓ -07	↓	↓	MM
↓	↓	↓ -08	↓	↓	MM
↓	↓	↓ -09	↓	↓	MM
↓	↓	↓ -10	↓	↓	MM
↓	↓	↓ -11	↓	↓	MM
↓	↓	↓ -12	↓	↓	MM
* ↓	↓	Background	↓	↓	MM

* Background placed ahead of B18-00339-04

Reviewed By: [illegible] Date: 4-13-18
Initials

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

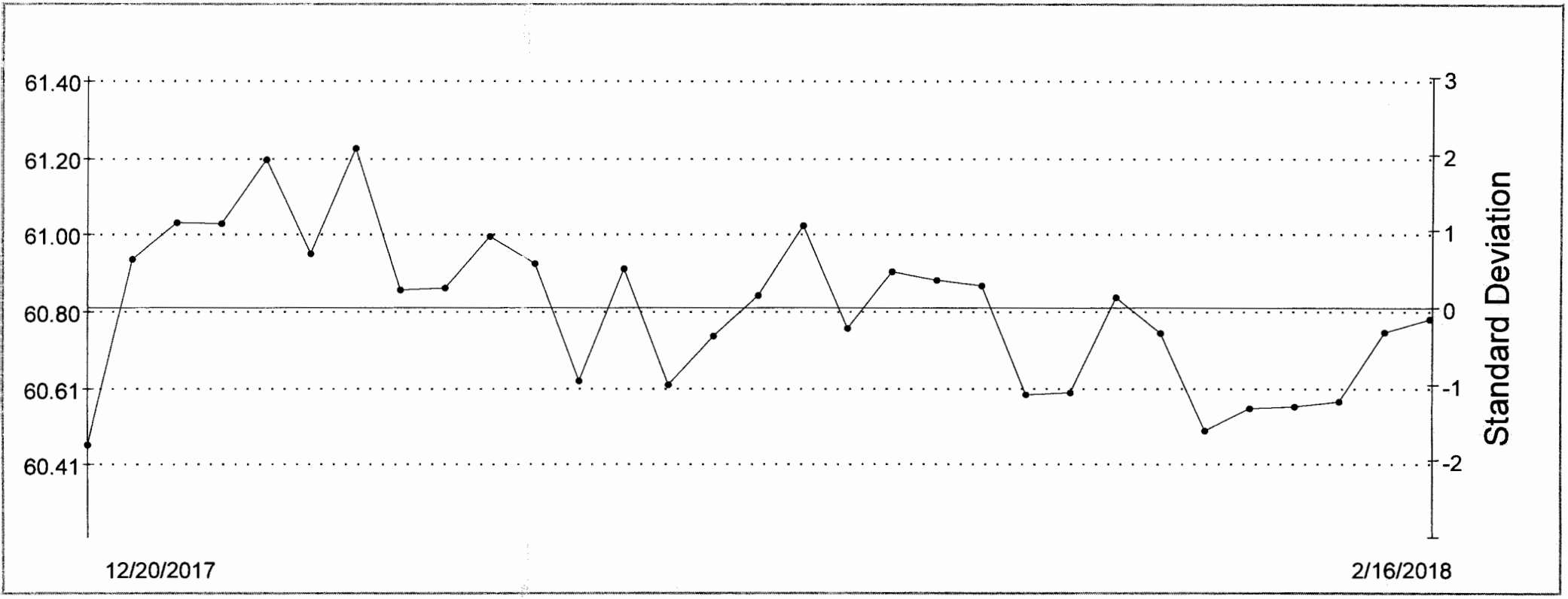
Control Charts

3H Efficiency
Total # pts : 88
Valid # pts : 31
Mean : 60.81
SD : 0.20

Date	Value	Include
Dec 20, 2017	60.46	X
Dec 22, 2017	60.94	X
Dec 27, 2017	61.04	X
Dec 31, 2017	61.03	X
Jan 03, 2018	61.20	X
Jan 04, 2018	60.96	X
Jan 06, 2018	61.23	X
Jan 08, 2018	60.86	X
Jan 10, 2018	60.87	X
Jan 11, 2018	61.00	X
Jan 14, 2018	60.93	X
Jan 15, 2018	60.63	X
Jan 15, 2018	60.92	X
Jan 16, 2018	60.62	X
Jan 18, 2018	60.74	X
Jan 20, 2018	60.85	X
Jan 22, 2018	61.03	X
Jan 26, 2018	60.76	X
Jan 26, 2018	60.91	X
Feb 01, 2018	60.89	X
Feb 02, 2018	60.87	X
Feb 02, 2018	60.59	X
Feb 05, 2018	60.60	X
Feb 06, 2018	60.84	X
Feb 09, 2018	60.75	X
Feb 11, 2018	60.50	X
Feb 12, 2018	60.56	X
Feb 13, 2018	60.56	X
Feb 14, 2018	60.57	X
Feb 14, 2018	60.75	X
Feb 16, 2018	60.79	X

3H Efficiency

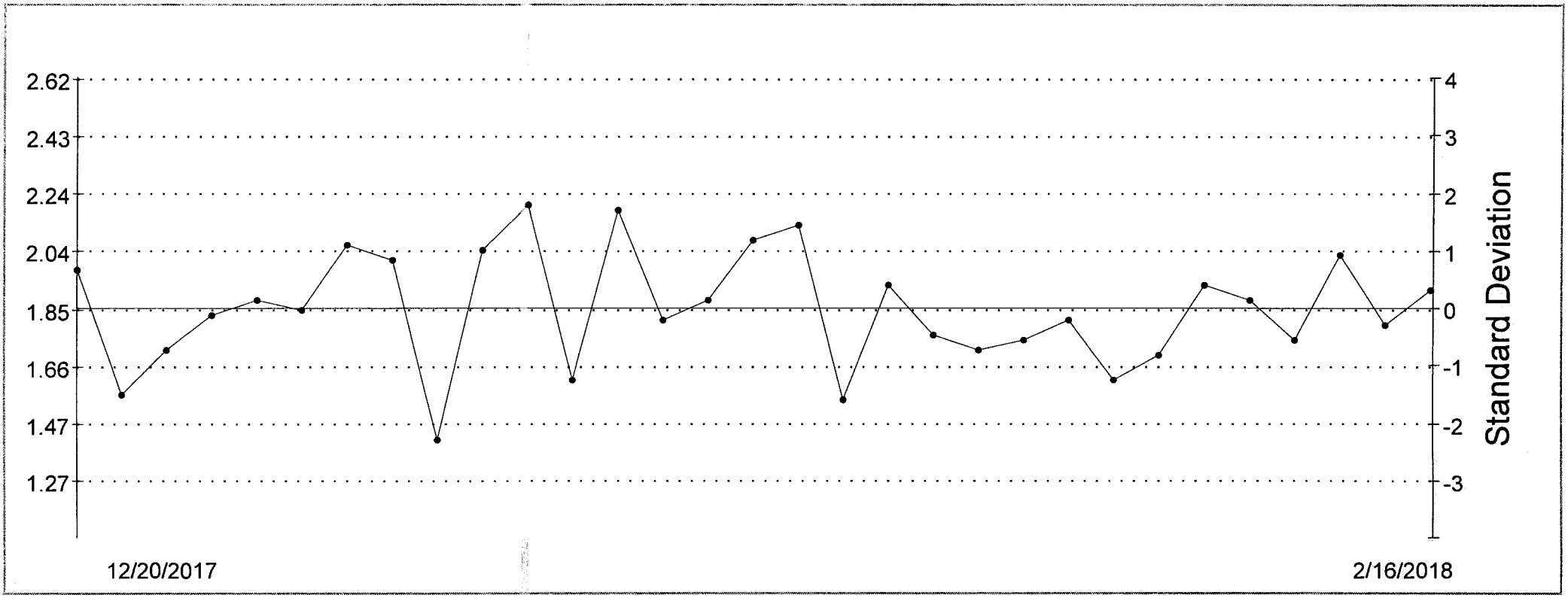
Total # pts	: 88
Valid # pts	: 31
Mean	: 60.81
SD	: 0.20



3H Background
Total # pts : 86
Valid # pts : 31
Mean : 1.85
SD : 0.19

Date	Value	Include
Dec 20, 2017	1.98	X
Dec 22, 2017	1.57	X
Dec 27, 2017	1.72	X
Dec 31, 2017	1.83	X
Jan 03, 2018	1.88	X
Jan 04, 2018	1.85	X
Jan 06, 2018	2.07	X
Jan 08, 2018	2.02	X
Jan 10, 2018	1.42	X
Jan 11, 2018	2.05	X
Jan 14, 2018	2.20	X
Jan 15, 2018	1.62	X
Jan 15, 2018	2.18	X
Jan 16, 2018	1.82	X
Jan 18, 2018	1.88	X
Jan 20, 2018	2.08	X
Jan 22, 2018	2.13	X
Jan 26, 2018	1.55	X
Jan 26, 2018	1.93	X
Feb 01, 2018	1.77	X
Feb 02, 2018	1.72	X
Feb 02, 2018	1.75	X
Feb 05, 2018	1.82	X
Feb 06, 2018	1.62	X
Feb 09, 2018	1.70	X
Feb 11, 2018	1.93	X
Feb 12, 2018	1.88	X
Feb 13, 2018	1.75	X
Feb 14, 2018	2.03	X
Feb 14, 2018	1.80	X
Feb 16, 2018	1.92	X

3H Background
Total # pts : 86
Valid # pts : 31
Mean : 1.85
SD : 0.19



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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: 4/27/2017 0:00 *date counted*
STANDARD REFERENCE #: [redacted]

Principal Radionuclide		Half Life, Years		Half Life, Days
H-3	*ENTER -->*	1.232E+01	*OR -->*	
		1.232E+01		4.4999E+03

Radionuclide: H-3 — Dilution Reference Date: 4/27/2017 0:00

Dilution Activity	2.59	pCi per gram ===> dpm/g	5.75
Verif. Date Decay Corrected	2.59	pCi per gram ===> dpm/g	5.75

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-0324-V2	17.76	1	LSC	0.3007	9.00	5.027	5.79	2.61
S-0324-V3	18.32	1	LSC	0.3033	9.00	5.071	6.06	2.73
S-0324-V4	17.74	1	LSC	0.3041	9.00	5.019	5.73	2.58
S-0324-V5	18.62	1	LSC	0.3036	9.00	5.008	6.33	2.85

		Average	5.98	2.69
		Two Sigma Uncertainty	0.54	0.24
10% Max	*PASS*	Standard Deviation percent of known concentration	4.77%	4.77%
		Target Activity	5.75	2.59
5% Max	*PASS*	% Diff	3.93%	3.93%

Verification Expiration Date: April 27, 2018

Prepared & Counted By _____ Date: 4/27/2017 0:00

Verified & Approved By _____ Date: 4-28-17

QC Approval _____ Date: 04-28-17

S-0324		
H-3	Verified	*4/28/17*
SL	**Expires**	**4/28/18**
Manufacturer	**NIST SRM 4927F**	
Sol Matrix	H2O	
Ref No	NIST SRM 4927F	
Tech	Unknown	
Parent ID	S-0316	

ARS INTERNATIONAL

RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY

Add / Edit *Secondary* Standards

Planning

Planning Comments	Create H-3 LCS standard
Target dpm/g (on dil. date)	6
Target Final Volume mL	2000.00
Appx mass g of Parent Sol'n	5.23779991812081
Appx vol ml of Parent Sol'n	5.24724495904709
Expected Addition for Analysis g	5

Standards Preparation / Dilution

Secondary Solution #	S-0324
Dilution Date (New Ref Date)	04/27/2017 0:00
Ampoule, Empty (g)	
Ampoule/Solution Gross (g)	
Net Wt Removed (g)	
Transfer Container, empty (g)	17.2688
Container Plus Solution(g)	22.2799
Net Wt Transferred (g)	5.0111
DPM Xferred On04/27/2017 0:00	11480.6218145069
Diluent/matrix	DI Water
Diluent Density Cont, empty (g)	1E-05
Test Mass of 5 ml of Diluent (g)	
Diluent Density Test - (g/mL)	
Dilution Empty Container Mass (g)	415.17
Dilution Full Cont g (if measured)	2411.11
Dilution Final Volume ml (if measured)	2000
Final Dilution Density (g/mL)	0.99797
Final Dilution Measured Mass g	1995.94
Comments	
Final Dilution dpm/g	5.75198744176021
Final Dil New Ref Date/Time	04/27/2017 0:00

Parent Standard Data

Parent Solution Reference #	NIST SRM 4927F		
Parent Solution #	S-0316		
Parent Principal Radionuclide	H-3	Half Life (Days)	4499.8
Parent Reference Date	08/10/2016 14:49		
Parent Certified Act	2384.43044412127	Cert 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	01/01/00		
Parent Received By	Unknown		
Parent Cert Exp Date			
Parent Matrix	H2O		
Certified dpm/g At Ref Date	607764.948573606		
Certified dpm/g On 04/27/2017 0:00	583960.313234318		
Parent Comments	Intermediate level H-3 standard for creating LCS solutions and matrix spikes. Dilution performed as stated above by Jacob Byrd- JPB 08/10/2016		
Parent Tech	Unknown		
Is Primary	FALSE		
Is LCS	TRUE		
Is Tracer	FALSE		
Is Calib	FALSE		

Assay Definition

Assay Description:
H3 Normal Lvl
Assay Type: DPM (Single)
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\ARS\H3 Normal Lvl 2\20170427_1250
Raw Results Path: C:\Packard\Tricarb\Results\ARS\H3 Normal Lvl 2\20170427_1250\20170427_1250.results
RTF File Name: C:\Packard\Tricarb\Results\ARS\H3 Normal Lvl 2\20170427_1250\H3 Results.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\ARS\H3 Normal Lvl 2\20170427_1250\H3 Results.csv
Assay File Name: C:\Packard\TriCarb\Assays\H3 Normal Lvl 2.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

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

Protocol# 11 - H3 Normal Lvl 2.lsa User: ARS

Cycle 1 Results

P#	S#	SMPL_ID	CPMA	DPM1	tSIE	Eff Nucl In A	Count Time	DATE	TIME	MESSAGES
11	1	BACKGROUND	9.00	29.71	381.35	30.28	120.00	4/27/2017	12:51:17 PM	
11	2	S-0234-V1	18.75	62.31	378.81	30.09	120.00	4/27/2017	3:03:56 PM	
11	3	S-0234-V2	17.76	59.04	378.52	30.07	120.00	4/27/2017	5:16:35 PM	
11	4	S-0234-V3	18.32	60.43	381.90	30.33	120.00	4/27/2017	7:29:15 PM	
11	5	S-0234-V4	17.74	58.34	382.99	30.41	120.00	4/27/2017	9:41:55 PM	
11	6	S-0234-V5	18.62	61.34	382.40	30.36	120.00	4/27/2017	11:54:37 PM	

0324

JB
04-28-17

0324 JB 04-28-17

S-0234 Verification Weights	
Tech:	JPB
Pippete:	FJ15820
Scale ID:	12332539
Standard ID:	S-0234
Sample ID	Std. Weight(g)
S-0234-V1	5.0073
S-0234-V2	5.0271
S-0234-V3	5.0171
S-0234-V4	5.0189
S-0234-V5	5.0077

JB 0324
04-28-17

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for

Los Alamos National Laboratory

Folder Duplicate

Report Compilation Checklist

ARS SDG: 18-00404 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)? Include subcontractor name and information	Yes No N/A	
4) Form 1s Present for all Samples and Tests? Note: Ensure original Subcontract Forms 1s included if applicable.	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? Include subcontractor QC reports if applicable	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 Ensure all original subcontractor information is included, if applicable	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 Ensure all original subcontractor information is included, if applicable	1st Reviewer	
17) Preparation Raw Data Present 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	

Report Generator Signature 4-18-18 Date

Management Review Signature Date

LSC
Technical Review Checklist

ARS INTERNATIONAL

ARS SDG ARS1-17-00404

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:** B17-00339	**Batch B:** N/A	**Batch C:** N/A
Test Method(s):	LSC-LLH3/SC-AQ	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): _____

Melissa Morgan 2-13-18
Chemist Signature **Date**

2-13-18
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

2-16-18
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

2/16/18

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

Melissa Morgan 2-16-18
Analyst Signature **Date**

N/A
Technicial Reviewer Signature **Date**

Batch A: B17-00339

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): _____

NA Project Manager Signature Date	NA QA Officer Signature Date

GENERAL COMMENTS

LSC
Technical Review Checklist

ARS SDG ARS1-18-00404

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:** B18-00376	**Batch B:** N/A	**Batch C:** N/A
Test Method(s):	LSC-LLH3-AQ	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): _____

Melissa Morgan 4-10-18
Chemist Signature **Date**

4-10-18
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

4-13-18
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): _____

Melissa Morgan 4-13-18
Analyst Signature **Date**

4-13-18
Technicial Reviewer Signature **Date**

Batch A: B18-00376

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): _____

SDH 4-18-18 narrative

Project Manager Signature: SDH Date: 4-18-18

QA Officer Signature: _____ Date: _____

GENERAL COMMENTS

SDG Report - Samples and Containers

SDG Specific Data

SDG	ARS1-18-00404	TAT Days	40	Project Type	Environmental
Sample Count	Rpt Level 4	Date Received	2/12/2018	COC Number	2018-1613-ARS
Client	Los Alamos National Laboratory	Client Deadline	3/24/2018	PO Number	
Client Code	114	Internal Deadline	3/23/2018	Job Number	
Profile Number	PN-00094	Lab Deadline	3/21/2018	Job Location	
Comment					

Samples and Containers Checked In Thus Far

FR	Name	Matrix	Start Date	End Date	Disp	Hold	Arch	Storage	Conductivity		Comments
001	CAWA-18-81	AQ	2/6/2018 11:24 AM	2/6/2018 11:24 AM	H	90	5	K6			
	IC_ID	Cnt	Volume (mL)	Container Type	pH Orig	pH Final	CPM	uR Hr	VOA	Head	Temp (C)
	286481	1	1000.00	HDP Container	7	7	80	20	N	N/A	0

SDG Report - Analysis Assignments

SDG	ARS1-18-00404	Sample Count	
Client	Los Alamos National Laboratory	Analysis Count	2-2

Sample Count Totals Per Analysis

Analysis Code	Analysis Description	In/Out	Samples Count
LSC-LLH3/SC-AQ	Low Level Tritium Screen in (Aqueous)	I	1
LSC-LLH3-AQ	Low Level Tritium by Enrichment Process in (Aqueous [AQ])	I	1

Analyses Assigned Per Fraction

Fraction	Analysis Code	X = Assigned
001	LSC-LLH3/SC-AQ	X
001	LSC-LLH3-AQ	X

DQO Report for SDG

ARS1-18-00404

Client Name: Los Alamos National Laboratory Profile Name: Nita Patel (Site Alias) Report Level: 4

Analysis Code	Prep Type	Units	Aliquot	Prep Code	Procedure	Count Time					
LSC-LLH3/SC-AQ	WRAD	pCi	L		ARS-054						
	Analyte			RDL	LCS LL/UL	MS LL/UL	RadY LL/UL	GravY LL/UL	RER	RPD	Surr LL/UL
	H-3			150 pCi/L	75/125	60/140	30/120	40/110	1	25	N/A
LSC-LLH3-AQ	WRAD	pCi	L	N/A	ARS-040						
	Analyte			RDL	LCS LL/UL	MS LL/UL	RadY LL/UL	GravY LL/UL	RER	RPD	Surr LL/UL
	Enriched H-3			3.221 pCi/L	80/120	60/140	30/120	40/110	1	25	N/A

Analysis Code	Fraction	Units	Aliquot	Conductivity	Analyte Count
LSC-LLH3/SC-AQ	001	pCi	L	N/A	1
		Group		Analyte	
				H-3	
LSC-LLH3-AQ	001	pCi	L	N/A	1
		Group		Analyte	
				Enriched H-3	

User: KRILEY Last Modified: 2/12/2018 10:28:47 AM

ARS FILE TRACKING SHEET

SDG: ARS1-18-00404

Task	Date / Time	Initials
Date & Time Samples Received	2/12/18 08:00	MC
ICOC Initiated/Storage Location: K6	2/12/18 10:18	MC
Technical Checks Performed	See Batch	
Report Written / EDD Generated 4-13-18/1401	4-13-18/1431	
Report / EDD Reviewed for accuracy and completeness	4-13-18 15:15	EDD Load
Quality Assurance Checks Performed on Report	4-23-18	
Management Checks Performed on Report	9:45	
Preliminary Report Scan	Na	—
Report E-mailed/Faxed		
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

COMPANY NAME: LANL

SDG: ARS1-18-00404

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 , UP , VG]

External and Internal Surveys

Exposure Rate Meter:	M3 269264	Serial No.:	PR 256427	Calibration Due Date:	3/13/18
Count Rate Meter:	M2 154859	Serial No.:	PR 121649	Calibration Due Date:	3/9/18

Background Exposure Rate (µR/hr)	20	Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd)	20	µR/hr
Background Count Rate (cpm)	80	Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd)	80	cpm
		Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd)	80	cpm

pH ≤ 2 is Acceptable

Acceptance Limits: <500 µR/hr, <100 cpm/cm²

Sample Label/Comments/Notes	pH Orig	pH Final	Mark if Preserve	Acid Lot #	Weight(g) / Volume(mL)	µR/hr	cpm
CAWA-18-81		MC 2-12-18			1000	20	80

Surveyors' Name: [signature]

Date/Time Surveyed: 2-12-18 0800

American Radiation

Baton Rouge LA

Chain of Custody/Analysis Request

COC/Lab Request #: 2018-1613-ARS

Client Contact:

Lab Agreement #: A

Project Number: ADEP

Analysis Turnaround Time:

24 Hour - ☐ Other - ☒

7 Days - ☐

14 Days - ☐

21 Days - ☐

28 Days - ☐

Site Name: Los Alamos National Laboratory

Rad Screening Info: Loaded NO

Lab Reporting Limit Type: MDL

Field Sample ID	Sample Date	Sample Time	Sample Matrix	WSP-LL-H-3
CAWA-18-81	02/06/2018	11:24	W	1

Special Instructions:

Relinquished by:	**Print Name:** Melissa Martin	**Date/Time:** 2/8/18 300	**Received by:**	**Print Name:** Morgan Conellison	**Date/Time:** 2-12-18 0800
Relinquished by:	**Print Name:**	**Date/Time:**	**Received by:**	**Print Name:**	**Date/Time:**
Relinquished by:	**Print Name:**	**Date/Time:**	**Received by:**	**Print Name:**	**Date/Time:**

ORIGIN ID:SAFA (505) 665-9966
KEITH GREENE
LOS ALAMOS NATL LAB.
TA00 BLDG 1237 DF J 03

LOS ALAMOS, NM 87545
UNITED STATES US

SHIP DATE: 08FEB16
ACTWGT: 57.0 LB MAN
CAD: 0014173/CAFE2616

BILL SENDER

TO DANNY COLEMAN
AMERICAN RADIATION SERVICES
2609 NORTH RIVER ROAD

PORT ALLEN LA 70767
(800) 401-4277
REF: P1080AX FRI RESWT10

FedEx Express

FRI - 09 FEB 10:30A
PRIORITY OVERNIGHT

TRK# 5908 1183 4345

XH OPLA

70767
MSY