Off Site

ENTERED

Los Alamos
NATIONAL LABORATORY
EST. 1943
Environmental Programs
P.O. Box 1663, MS M991
Los Alamos, New Mexico 87545
(505) 606-2337/FAX (505) 665-1812

National Nuclear Security Administration
Los Alamos Site Office, MS A316
Environmental Restoration Program
Los Alamos, New Mexico 87544
(505) 667-4255/FAX (505) 606-2132

Date: FEB 2 9 2012
Refer To: EP2012-0019

Mr. Brian Snyder, Water Division Director
Acting Public Utilities Division Director
Sangre de Cristo Water Division
City of Santa Fe
801 West San Mateo
P.O. Box 909
Santa Fe, New Mexico 87504

Subject: Update to Tritium Results Previously Reported to the City of Santa Fe

Dear Mr. Snyder:

Los Alamos National Laboratory (the Laboratory) conducts routine groundwater quality monitoring of the City of Santa Fe (the City) Buckman water supply wells according to the Laboratory's Sitewide Monitoring Program, City of Santa Fe Buckman Water Supply Wells, 2010–2011 Sampling and Analysis Plan.

Along with other analyses, groundwater samples are analyzed for low-level tritium using a method capable of obtaining a very low minimal detectable activity (MDA) of 2–3 pCi/L compared with U.S. Environmental Protection Agency (EPA) Method 906.0, Tritium in Drinking Water, which has a required detection limit of 1000 pCi/L. The lower MDA method, although not approved by EPA, is used to analyze groundwater samples for tritium to determine if the groundwater is isolated from relatively recent (the past 40 to 50 yr) precipitation that would contain elevated tritium from global aboveground nuclear testing.

In 2008, the Laboratory began using a new analytical laboratory, American Radiation Services (ARSL), for this analysis. In the latter half of 2010, the Laboratory was provided tritium results from ARSL that were higher than previously reported for wells with a history of lower levels or nondetects. In response to a request by the Laboratory, ARSL reviewed its history of analytical results and discovered that in some cases the incorrect method had been reported and that calculation and other errors had affected the reported analytical results, uncertainty, MDAs, and laboratory qualifiers. ARSL submitted a response to the Laboratory's request for corrective action resulting from calculation errors (Attachment 1) and new data reports with updated tritium results (Attachment 2).

35094

The attached table (Attachment 3) provides a list of all the tritium results analyzed by ARSL for samples from the City of Santa Fe Buckman water supply wells collected between September 2008 and May 2011. The table shows the original and the updated tritium results, uncertainty, MDAs, method, and laboratory qualifiers, where applicable. The accompanying CD includes the revised analytical data packages for cases where results were updated.

The updated tritium results will be added to the Laboratory's database. The original results will remain in the database but will be qualified as rejected. The Laboratory currently plans to make these changes in the Laboratory's database and within the RACER database, based on the City's February 1, 2012, correspondence.

If you have questions, please contact Steve Paris at (505) 606-0915 (smparis@lanl.gov) or David Rhodes at (505) 665-5325 (david.rhodes@nnsa.doe.gov).

Sincerely,

Michael J. Graham, Associate Director
Environmental Programs
Los Alamos National Laboratory

Sincerely,

George J. Rael, Assistant Manager
Environmental Projects Office
Los Alamos Site Office

MG/GR/CD/SP/DR:sm

Attachments: (1) ARS Response to Los Alamos National Laboratory Regarding Corrective Action Reporting for Low-Level Tritium Data
(2) CD with the Data Packages for the Updated Tritium Results (LA-UR-12-0298)
(3) Tritium Results Analyzed by ARSL for City of Santa Fe Buckman Water Supply Wells

Cy: (w/att.)
Laurie King, EPA Region 6, Dallas, TX
Neil Weber, San Ildefonso Pueblo
Alex Puglisi, City of Santa Fe, 801 West San Mateo, Santa Fe, NM 87505
Claudia Borchert, City of Santa Fe, 801 West San Mateo, Santa Fe, NM 87505
Michael Gonzales, City of Santa Fe, 801 West San Mateo, Santa Fe, NM 87505
John Kieling, NMED-HWB, 2905 Rodeo Park Drive East, Building 1, Santa Fe, NM 87505
Margaret Ryan, NMED-DWB, P.O. Box 5469, Santa Fe, NM 87502
Steve Yanicak, NMED-DOE-OB, MS M894
Hai Shen, DOE-LASO, MS A316
Cheryl Rodriguez, DOE-LASO, MS A316
Tom Carver, DOE-LASO, MS A316
David Rhodes, DOE-LASO, MS A316
Steve Paris, EP-CAP, MS M992
Suzanne Coyne, IRM-DCS, MS M992
William Alexander, EP-BPS, MS M992
RPF, MS M707 (electronic copy)

Cy: (w/o att.)
Tom Skibitski, NMED-OB, Santa Fe, NM (date-stamped letter emailed)
Annette Russell, DOE-LASO, MS A316 (date-stamped letter emailed)
Michael B. Mallory, PADOPS, A102 (date-stamped letter emailed)
Mike Brandt, ADESHQ, MS K491 (date-stamped letter emailed)
Mike Saladen, ENV-RCRA, MS K490 (date-stamped letter emailed)
David B. Rogers, EP-EI, MS M992 (date-stamped letter emailed)
Danny Katzman, EP-ET, MS M992 (date-stamped letter emailed)
Craig Douglass, EP-CAP, MS M996 (date-stamped letter emailed)
Dave McInroy, EP-CAP, MS M996 (date-stamped letter emailed)
Michael J. Graham, ADEP, MS M991 (date-stamped letter emailed)

AMRAD
AMERICAN RADIATION SERVICES, LLC

October 7, 2011

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

RE: CAR for Low Level Tritium Data

Dear Ms. Patel:

This letter is in response to the formal request by Mr. Lonnie Morris of AQA, dated September 7, 2011, asking ARS to investigate and perform corrective action in response to several calculation errors discovered in the review of recent Low Level Tritium data. These errors were discovered following an inquiry by Mr. Keith Greene of LANL, dated July 7, 2011, in which several increased activities were reported for a site that had traditionally yielded much lower results. As a result of this inquiry and the resulting discovery of calculation errors, Ms. Virgene Mulligan of ARS initiated a Non-Conformance report (NCR#11-1308, see attached) in an effort to determine the root cause of the issue. Due to the specialized nature of the test, the initial investigation included a review of all chemistry procedures and QC analysis, a review of all low level tritium data from January 2010 until present and a review of all low level tritium calculation spreadsheets. The initial investigation indicated that the chemistry was being performed correctly and that all QC criteria were in control, thus indicating that the errors were isolated to the calculation portion of the process. Ultimately, all low level tritium data dating back to January 2008 was reviewed for potential errors.

During this investigation, it was determined by ARS that two types of errors had occurred which resulted in the miscalculation of low level tritium data. The first type of error discovered was an inadvertent rounding factor that had been programmed into a controlled spreadsheet in April 2010. This spreadsheet had been programmed, verified, and released for use by Mr. Tony Byrd who was ARS's QA Manager at the time. The second type of error discovered was inadvertent typographically mistakes which were a direct result of manual data entry following the completion of the analysis. In most cases, the revised calculated activities were not significantly impacted by the errors; however, this was not always true. For example, several results that had previously been reported with activities higher than historical values, when recalculated using the corrected spreadsheet, yielded results that would now be considered non-detects.

As a result of these findings, ARS has initiated corrective actions in an effort to eliminate this problem. These actions include the review, correction, and re-submittal of all affected data and reports dating back to January 2008. ARS has also corrected the calculation spreadsheet and had the new spreadsheet manually verified by an independent party. As a more robust solution to the problem, ARS is currently in the process of having these calculations automated within its LIMS system. We plan to complete this programming in the early part of 2012. Until this

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programming is complete, ARS will have a second person perform a 100% review of all manual data entry associated with low level tritium calculations.

I sincerely apologize for any inconvenience that this situation may have caused or will cause in the future. We feel that the proposed corrective actions will eliminate the problem and prevent recurrence. In addition, we welcome any suggestions that can help improve the process. If I can be of further assistance, please feel free to contact me by email (jturner@amrad.com) or phone (225-381-2991).

Regards,

Jimmy Turner
Laboratory Manager
American Radiation Services, LLC

Attachment I

CAR 11-1308
LANL LLH3 Data

Description of Root Cause Investigation:

1) Existing and Prior Controlled spreadsheets used to calculate low level tritium activity were reviewed and evaluated to determine where the formula error occurred. This process determined that the error began in April 2010. All prior versions of spreadsheet did not contain the rounding function that has been in use since April 2010. In addition, existing spreadsheet was verified that all calculation cells were locked and password protected. Rounding error was not a result of inadvertent change.
2) Initially, all data from 2010 to 2011 was reviewed for typographical errors. All 13 columns of the spreadsheet where manual data entry occurs were reviewed against the raw data. This review was performed by Susan Leese of ARS. One error was found in 34 batches resulting in the incorrect reporting of 20 samples. This error occurred when the DPM values were entered into the average CPM column instead of the CPM values for the entire batch of samples. As a result of this finding, additional data from 2008 and 2009 was reviewed in the same manner. This review was conducted by Jimmy Turner of ARS and Lonnie Morris of AQA, each reviewing approximately 50% of the data. Typographical errors were found in 4 of 22 batches resulting in the incorrect reporting of 35 samples. These errors included incorrect activity reference dates and incorrect background values. None of these errors were caught during ARS's original review of data prior to release of final reports. In addition, more than 50% of the calculations were manually verified by Lonnie Morris of AQA and Susan Leese of ARS. No additional calculation errors were found, which confirmed that the spreadsheet in use prior to April 2010 was correct and did not contain any formulation errors.

Root Cause Investigation Results:

1) Spreadsheet placed in service in April 2010 by Tony Byrd contained an invalid formula in the average CPM column which caused the average CPM to round to the nearest whole number and thus calculate the results incorrectly. This error was isolated to this column of cells. All other formulas were correct.
2) Existing data review process for low level tritium does not include a 100 % review by a second person for manual data entry parameters. Since this process is manual there is high potential for human error. This process needs to be automated so that manual transcription errors do not occur.

Corrective Actions:

1)

A) Corrected existing spreadsheet to remove rounding formula from average CPM column so that calculation is performed correctly. Once completed, had an independent validator perform manual verification of all calculations. Once independent verification was completed, locked formula cells and password protected, and issued new spreadsheet for use. Also, previous version of spreadsheet was removed from use. Responsible Party: Virgene Mulligan, ARS, VP Laboratory Services. Independent Validator: Bob Shannon, Independent Contractor.

B) Recalculated all data from 2009 and 2010 using new spreadsheet and reported corrections on Form 1's to LANL. In addition, level IV data packages and EDD's will be revised and resubmitted to LANL by October 14, 2011. Responsible Party: Susan Leese, ARS, Project Manager.

C) Summarized before and after activities in a spreadsheet and submitted to LANL for review. Responsible Party: Susan Leese, ARS, Project Manager.

D) Program calculations and automate data reporting of Low Level Tritium analysis into TRAX Laboratory Information Management System so that a spreadsheet is no longer required. Once programmed, verify calculations are correct and release for use into the laboratory. Expected completion date is on or before March 31, 2012. Responsible Party: Virgene Mulligan, ARS, VP Laboratory Services and David Bowling, LIMS programmer.

2)

A) Compiled list of all low level tritium data for LANL from January 2008 thru March 2010 and submitted to Nita Patel and Lonnie Morris. Once compiled, list was split for review between Lonnie Morris and Jimmy Turner. All data was reviewed as stated above in the investigation, errors were corrected, and level IV data reports and EDD's were resubmitted to LANL. Responsible Party: Jimmy Turner, ARS, Laboratory Manager; Lonnie Morris, AQA; and Susan Leese, ARS, Project Manager.

B) See Item 1D above. Until completion of LIMS programming, data review procedure for manual data entry for Low Level Tritium will include a 100% review of all manually entered data by a second person. Manual review will be documented on printed spreadsheet by initials and date of person performing the review.

Nonconformance Report

NCR #: 11-1308
Assigned by QAO

Part A: Initiator (Deficiency Identification)

Describe Nonconformance:

1. Spreadsheet used for calculation of Low Level Tritium (LLH3) had cells formatted to round the values to the nearest whole number rather than using additional significant figures to calculate the activity of the LLH3.
2. DPM rather than CPM entered in spreadsheet for results reported for 17 samples from ARS batch ARS1-B10-05618 (LANL 11-473, 11-474, 11-571, 11-556, 11-564 (3 samples)).

Multiple	ARS-040
ARS Batch No.	ARS Procedure No.
Low Level Tritium	Electrolytic Enrichment
Analyte(s)	Method
Multiple - LANL	
ARS SDG(s)	

Virgene Mulligan	Virgene Mulligan	09-08-2011
Initiator's Signature	Name (print)	Date

Nonconformance Report

NCR #: 11-1308
Assigned by QAO

Part B: Responsible Manager (Investigation and Proposed Resolution)

1) Did this nonconformance affect analytical results? ◉ Yes ○ No

If Yes:

Identify affected client(s): LANL

ARS Sample ID(s) / SDG(s): Multiple

2) Is client contact required? ○ Yes (Part C Signature Required) ◉ No

3) Cause of Nonconformance:

All data calculations for Low Level Tritium are performed manually and are not connected in any way to the Laboratory Information Management System. The spreadsheets being used for LLH3 calculations had been manually verified and all cells had been locked and the spreadsheet was password protected. It is not clear how the rounding in the calculation occurred.

The DPM vs CPM issue occurred as a result of manual data entry. Values for the activity were very similar to the screening activity (i.e. LLH3 activity 93, screening activity 90); therefore, the fact that DPM rather than CPM was used in the calculations was not evident during data review.

4) Proposed Immediate Resolution Proposed Completion Date: 10-07-2011

Is retesting of sample required? ○ Yes ◉ No

Has Nonconformance item(s) been tagged Out of Service? ○ Yes ◉ N/A

Immediate Resolution Actions(s): *CAR Required* ◉ *Yes* ○ *No*

See attached

Long Term Action(s):

Susan Leese, Virgene Mulligan

Person(s) assigned to Implement Resolution

Virgene Mulligan

Responsible Manager's Signature

10-05-2011

Date

Nonconformance Report

NCR #: 11-1308
Assigned by QAO

Part C: QAO (Evaluation)

1) Route to Project Manager for Client Notification ☐ **N/A**

Project Manager's Signature — Date of Notification

2) Notify Regulation Body ☒ **N/A**

QAO's Signature — Date of Notification

3) Execute Immediate Resolution and Establish Completion Date ☐ **N/A**

Responsible Individual's Signature — Completion Date

4) Execute Corrective Action and Establish Completion Date ☐ **N/A**

Responsible Manager's Signature — Completion Date

5) Nonconformance Category (*Select Only One*)

○ PT Results	○ HS&E	○ Equipment
○ Batch QC Results	○ Contractual	○ Software
○ Instr. QC or Malfunction	○ Procedural	○ Prep
○ Missing or Defective Data	◉ Reporting Errors	○ Other

Additional Category Detail (e.g., Blank, LCS, Chemical Yield, Background, Lost Sample, etc?)

Verification

Immediate Resolution Verified Complete: 10-05-2011 (Date) ☐ **N/A**

Corrective Actions Verified Complete: (Date) ☐ **N/A**

OAO Comments:

QAO's Signature (Indicates NCR Complete) — Date

Nonconformance Report

NCR #: 11-1308
Assigned by QAO

Part D: Corrective Action Request

Responsible Manager (Investigation, Root Cause, and Proposed Corrective Actions(s))

1) Description of Root Cause Investigation

See attached

2) Results of Root Cause Determination

See Attached.

3) Proposed Corrective Action(s) and Preventive Measures
(Include Responsible Individual and Estimated Completion Date for each action)

See attached sheets

Responsible Manager's Signature

Date

Tritium Results Analyzed by ARSL[a] for City of Santa Fe Buckman Water Supply Wells Samples Collected between September 2008 and May 2011

Location	Sample Date	QC[b] Type	Sample ID	Original Result	Original Uncertainty	Original MDA[c]	Original Method	Original Qualifier	Updated Result	Updated Uncertainty	UpdatedMDA	Updated Method	Updated Qualifier	Unit
Buckman 1	09/03/08		Buckman1-08-14300	1.74	0.862	2.679	LLH3	U[d]	1.76	0.87	2.7	LLH3[e]	U	pCi/L
Buckman 1	06/08/10		Buckman1-10-16990	-2.938	0.734	2.107	LLH3	U	n/a[f]	n/a	n/a	n/a	n/a	pCi/L
Buckman 1	08/24/10		Buckman1-10-24996	3.927	0.894	2.139	LLH3		1.19	0.68	2.16	LLH3	U	pCi/L
Buckman 1	08/24/10	FD[g]	Buckman1-10-24999	3.033	0.702	1.66	LLH3		0.9	0.52	1.67	LLH3	U	pCi/L
Buckman 1	11/10/10		Buckman1-11-1944	3.448	0.926	2.395	LLH3		0.16	0.74	2.54	LLH3	U	pCi/L
Buckman 1	03/14/11		Buckman1-11-5682	2.969	0.83	2.171	LLH3		0.97	0.68	2.19	LLH3	U	pCi/L
Buckman 1	05/17/11		Buckman1-11-12475	0.447	0.607	2.044	LLH3	U	0.45	0.61	2.06	LLH3	U	pCi/L
Buckman 6	09/24/08		Buckman06-08-14219	-2.634	1.066	3.535	LLH3	U	-2.66	1.08	3.57	LLH3	U	pCi/L
Buckman 6	06/08/10		Buckman06-10-16992	-3.353	0.83	2.395	LLH3	U	n/a	n/a	n/a	n/a	n/a	pCi/L
Buckman 6	08/24/10		Buckman06-10-24997	2.459	0.575	1.341	LLH3		1.06	0.45	1.35	LLH3	U	pCi/L
Buckman 6	11/10/10		Buckman06-11-1970	3.321	0.894	2.299	LLH3		0.1	0.74	2.45	LLH3	U	pCi/L
Buckman 6	03/14/11		Buckman06-11-5683	3.576	0.99	2.618	LLH3		0.9	0.81	2.64	LLH3	U	pCi/L
Buckman 6	05/17/11		Buckman06-11-12478	0.032	0.575	1.98	LLH3	U	0.03	0.58	2	LLH3	U	pCi/L
Buckman 8	09/02/08		Buckman08-08-14298	0.779	0.872	2.88	LLH3	U	0.79	0.88	2.91	LLH3	U	pCi/L
Buckman 8	06/22/10		Buckman08-10-16994	2.267	0.798	2.395	LLH3	U	-0.23	0.71	2.42	LLH3	U	pCi/L
Buckman 8	08/24/10		Buckman08-10-24998	3.48	0.798	1.884	LLH3		1.19	0.6	1.9	LLH3	U	pCi/L
Buckman 8	11/10/10		Buckman08-11-2042	3.257	0.862	2.267	LLH3		1.87	0.81	2.42	LLH3	U	pCi/L
Buckman 8	03/14/11		Buckman08-11-5684	-2.491	0.798	2.586	LLH3		-0.81	0.81	2.61	LLH3	U	pCi/L
Buckman 8	05/17/11	FD	Buckman08-11-12485	0.671	0.575	1.884	LLH3	U	0.68	0.58	1.9	LLH3	U	pCi/L
Buckman 8	05/17/11		Buckman08-11-12481	0.511	0.639	2.171	LLH3	U	0.52	0.64	2.19	LLH3	U	pCi/L

[a] ARSL = American Radiation Services Laboratory.

[b] QC = Quality control.

[c] MDA = Minimum detectable activity.

[d] U = Not detected.

[e] LLH3 = Low-level tritium analysis.

[f] n/a = Not applicable. Original result is retained.

[g] FD = Field duplicate.

ARS INTERNATIONAL

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Request Number: 11-1637

Revised SDL 9-21-11

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 11-1637

Original COC

Wednesday, March 16, 2011

REQUEST NUMBER: 11-1637

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

These Samples are on:
LANL Request Number:11-1637
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples according to the schedule indicated:

SHIP DATE: 3/16/2011
TURNAROUND/REPORT DUE: 4/15/2011
TURNAROUND REQ'D: 30 Days

RAD SCREENING: Not Required
LAB REQUEST COMMENTS:

LANL ER SMO CONTACT:
Signature:

PRIORITY	METHOD CODE	CNTNR	SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	SPECIAL INSTRUCTIONS
	Generic:Low_Level_Tritium	1	Buckman1-11-5682	WG	3/14/2011	
		1	Buckman06-11-5683	WG	3/14/2011	
		1	Buckman08-11-5684	WG	3/14/2011	

Final Page of REQUEST NUMBER 11-1637

Wednesday, March 16, 2011

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 11-1637C

REQUEST NUMBER: 11-1637

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

TURNAROUND/REPORT DUE: 4/15/2011
TURNAROUND REQ'D: 30

LAB REQUEST COMMENTS:

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman1-11-5682	1	POLY	WSP-LL-H-3	None	WG
Buckman06-11-5683	1	POLY	WSP-LL-H-3	None	WG
Buckman08-11-5684	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:	Date	Time	Received By:	Date	Time
Signature			Signature		
Signature	3/16/11	1400	Signature	3-17-11	10:09
Signature			Signature		

Received for DISPOSAL By: **Date** **Time** **Remarks:**

Signature

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 11-1637

Case Narrative

ARS INTERNATIONAL

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1 (800) 401-4277 • Fax (225) 381-2996

June 24, 2011

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

Request Number: **11-1637**
LANL Sample ID: **Buckman1-11-5682; Buckman06-11-5683; Buckman08-11-5684.**

Dear Mr. Greene;

On March 17, 2011, ARS International received three (3) water samples to be analyzed for Low Level Tritium.

The samples underwent enrichment and were counted using the appropriate counting equipment and QA/QC for this type of analysis. Results of the analysis and QA/QC are attached in the data package.

The client and QA/QC samples were counted with a count time sufficient to meet quality control parameters for counting equipment and were within acceptance criteria and statistical sound detection limits.

If you have any questions please do not hesitate to call at 225.381.2991 or email LANL@amrad.com.

Sincerely,

Virgene Mulligan

Laboratory Management
ARS International

ARS INTERNATIONAL

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

COVER PAGE

PROJECT SAMPLE IDENTIFICATION CROSS-REFERENCE TO ARS SAMPLE LABORATORY IDs

Subcontract (LANL Agreement Number) 63641-001-10

Request Number	LANL PROJECT SAMPLE ID NUMBER	American Radiation Services SAMPLE ID NUMBER(S)
11-1637	Buckman1-11-5682	ARS1-11-00547-001
11-1637	Buckman06-11-5683	ARS1-11-00547-002
11-1637	Buckman08-11-5684	ARS1-11-00547-003

ANALYTICAL METHODS

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

ANALYTICAL RESULTS

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

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	Title	Date
Virgene Mulligan	Laboratory Management, ARS International	6-24-11

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

~~B10-01170~~ SDL 9-21-11

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

ARS Sample Delivery Group:	ARS1-11-00547	**Request or PO Number:**	11-1637
Client Sample ID:	Buckman1-11-5682	**ARS Sample ID:**	ARS1-11-00547-001
Sample Collection Date:	03/14/11	**Date Received:**	03/17/11
Sample Matrix:	Aqueous	**Report Date:**	08/18/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.300	0.210	0.680	0.330	U	TU	ARS-040	06/21/11 23:51	JR	NA

NOTES: Project Cost Code WEPR1158W100

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 the American Radiation Services, Inc.*

LELAP Certificate# 01949 NELAP Certificate # E87558

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ARS Sample Delivery Group:	ARS1-11-00547	**Request or PO Number:**	11-1637
Client Sample ID:	Buckman06-11-5683	**ARS Sample ID:**	ARS1-11-00547-002
Sample Collection Date:	03/14/11	**Date Received:**	03/17/11
Sample Matrix:	Aqueous	**Report Date:**	08/18/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.280	0.250	0.820	0.390	U	TU	ARS-040	06/22/11 03:04	JR	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

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

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ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-11-00547	**Request or PO Number:**	11-1637
Client Sample ID:	Buckman08-11-5684	**ARS Sample ID:**	ARS1-11-00547-003
Sample Collection Date:	03/14/11	**Date Received:**	03/17/11
Sample Matrix:	Aqueous	**Report Date:**	08/18/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	-0.250	0.250	0.810	0.390	U	TU	ARS-040	06/22/11 06:16	JR	NA

NOTES: Project Cost Code WEPR1158W100

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 NELAP Certificate # E87558

ARS INTERNATIONAL
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QC Results Report

Sample Delivery Group: ARS1-11-00547
Date Received: 3/17/2011

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-B11-01170	LCS	H3	7.120	1.120	0.710	8.128		TU	ARS-040	6/21/11 14:19	JR	88	75%-125%

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-B11-01170	MBL	H3	-0.020	0.190	0.640	NA	U	TU	ARS-040	6/21/11 20:40	JR

Sample RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER AcceptanceRange
ARS1-B11-01170	LCSD	H3	7.120	1.120	8.110	1.270		TU	ARS-040	6/21/11 17:29	JR	0.41	< 1

Sample DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER AcceptanceRange
ARS1-B11-01170	LCSD	H3	7.120	1.120	8.110	1.270		TU	ARS-040	6/21/11 17:29	JR	1.17	< 3

Susan Keese
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

Expected Value Calculations

LANL

ARS Batch Number: ARS1-B10 - 01170

			pCi/L				TU
LCS	**CALCULATED EXPECTED VALUE**	=	26.179				8.128
			Range	20.943	-	31.414	
LCSD	**CALCULATED EXPECTED VALUE**	=	26.162				8.122
			Range	20.930	-	31.395	

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Samples

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	ARS1-11-00547;548;549;601;602
ARS Batch ID Number	ARS1-B11-01170

Enrichment Factor Curve coeff. - Power y = a * x^b		Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	8.978E-01	a	-2.319E-06
b	-9.611E-01	b	2.724E-03
c		c	-1.060E+00
		d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	TU
Coverage Factor	1	UCF	7.151
		Aliquot must be entered in liters!!	

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
B11-01170-01	504.33	2.00	11.92	2.06	9.86	0.02	39.40	5.71	1.41	485.51	0.3009	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	7.12	0.33	0.33	1.12	0.71	0.34	TU
B11-01170-02	504.65	2.00	13.03	2.06	10.97	0.02	35.59	5.85	1.41	492.59	0.3022	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	8.11	0.37	0.37	1.27	0.78	0.38	TU
B11-01170-03	506.24	2.00	12.35	2.06	10.29	0.02	37.96	1.40	1.41	513.56	0.3058	0.00800	L	6/21/2011	6/21/2011	180	180	0.99999	-0.02	0.19	0.19	0.19	0.64	0.31	TU
B11-01170-04	506.02	2.02	11.63	2.08	9.55	0.02	40.77	1.60	1.41	406.43	0.2720	0.00804	L	3/14/2011	6/21/2011	180	180	0.98636	0.30	0.21	0.21	0.21	0.68	0.33	TU
B11-01170-05	503.20	2.01	13.71	2.07	11.64	0.02	33.52	1.56	1.41	410.46	0.2740	0.00807	L	3/14/2011	6/22/2011	180	180	0.98622	0.28	0.25	0.25	0.25	0.82	0.39	TU
B11-01170-06	505.38	2.00	13.63	2.06	11.57	0.02	33.86	1.28	1.41	411.21	0.2744	0.00803	L	3/14/2011	6/22/2011	180	180	0.98622	-0.25	0.23	0.23	0.24	0.81	0.39	TU
B11-01170-07	504.43	2.03	11.13	2.09	9.04	0.02	42.85	1.45	1.41	402.05	0.2699	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	0.06	0.19	0.19	0.19	0.66	0.32	TU
B11-01170-08	516.63	1.99	12.43	2.05	10.38	0.02	38.38	3.21	1.41	403.70	0.2707	0.00757	L	3/11/2011	6/22/2011	180	180	0.98581	3.24	0.29	0.29	0.57	0.77	0.37	TU
B11-01170-09	511.23	2.00	12.16	2.06	10.10	0.02	39.01	4.49	1.41	410.77	0.2742	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	5.10	0.30	0.30	0.82	0.71	0.34	TU
B11-01170-10	509.67	2.01	11.75	2.07	9.68	0.02	40.52	1.47	1.41	412.42	0.2750	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	0.09	0.20	0.20	0.20	0.68	0.33	TU
B11-01170-11	511.88	1.99	11.49	2.05	9.44	0.02	41.68	1.49	1.41	410.95	0.2743	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	0.12	0.20	0.20	0.20	0.66	0.32	TU
B11-01170-12	504.59	1.99	10.63	2.05	8.58	0.02	45.06	1.33	1.41	307.62	0.2155	0.00820	L	3/11/2011	6/23/2011	180	180	0.98568	-0.15	0.22	0.22	0.22	0.76	0.37	TU
B11-01170-13	508.51	2.00	11.07	2.06	9.01	0.02	43.31	1.50	1.41	422.58	0.2800	0.00800	L	3/10/2011	6/23/2011	180	180	0.98554	0.13	0.19	0.19	0.19	0.62	0.30	TU
B11-01170-14	507.87	2.02	11.43	2.08	9.35	0.02	41.75	1.36	1.41	415.81	0.2766	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-0.08	0.19	0.19	0.19	0.66	0.32	TU
B11-01170-17	498.51	2.00	10.47	2.06	8.41	0.02	45.40	1.37	1.41	414.25	0.2759	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-0.06	0.18	0.18	0.18	0.61	0.29	TU
B11-01170-18	501.98	2.00	11.43	2.06	9.37	0.02	41.20	1.32	1.41	422.34	0.2799	0.00800	L	3/18/2011	6/23/2011	180	180	0.98663	-0.14	0.19	0.19	0.19	0.66	0.32	TU
B11-01170-19	503.31	2.01	11.35	2.07	9.28	0.02	41.69	1.49	1.41	418.98	0.2782	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	0.12	0.19	0.19	0.19	0.65	0.31	TU
B11-01170-20	504.40	1.99	11.82	2.05	9.77	0.02	39.76	1.44	1.41	414.60	0.2761	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	0.04	0.20	0.20	0.20	0.69	0.33	TU
B11-01170-21	508.41	2.01	10.35	2.07	8.28	0.02	46.97	1.46	1.41	411.26	0.2744	0.00800	L	3/17/2011	6/23/2011	180	180	0.9865	0.06	0.17	0.17	0.17	0.59	0.28	TU
B11-01170-22	502.58	2.00	10.51	2.06	8.45	0.02	45.55	1.44	1.41	412.08	0.2748	0.00800	L	3/18/2011	6/24/2011	180	180	0.9865	0.04	0.18	0.18	0.18	0.60	0.29	TU
B11-01170-23	487.79	1.99	10.56	2.05	8.51	0.02	43.96	1.31	1.41	411.69	0.2746	0.00800	L	3/17/2011	6/24/2011	180	180	0.98636	-0.15	0.18	0.18	0.18	0.63	0.30	TU

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	ARS1-11-00547;548;549;601;602
ARS Batch ID Number	ARS1-B11-01170

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8.978E-01
b	-9.611E-01
c	

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	pCi
Coverage Factor	1	UCF	2.22

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
B11-01170-01	504.33	2.00	11.92	2.06	9.86	0.02	39.40	5.71	1.41	485.51	0.3009	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	22.95	1.06	1.06	3.60	2.28	1.10	pCi/L
B11-01170-02	504.65	2.00	13.03	2.06	10.97	0.02	35.59	5.85	1.41	492.59	0.3022	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	26.12	1.18	1.18	4.09	2.52	1.21	pCi/L
B11-01170-03	506.24	2.00	12.35	2.06	10.29	0.02	37.96	1.40	1.41	513.56	0.3058	0.00800	L	6/21/2011	6/21/2011	180	180	0.99999	-0.06	0.61	0.61	0.61	2.07	1.00	pCi/L
B11-01170-04	506.02	2.02	11.63	2.08	9.55	0.02	40.77	1.60	1.41	406.43	0.2720	0.00804	L	3/14/2011	6/21/2011	180	180	0.98636	0.96	0.66	0.66	0.68	2.19	1.06	pCi/L
B11-01170-05	503.20	2.01	13.71	2.07	11.64	0.02	33.52	1.56	1.41	410.46	0.2740	0.00807	L	3/14/2011	6/22/2011	180	180	0.98622	0.91	0.79	0.79	0.80	2.63	1.27	pCi/L
B11-01170-06	505.38	2.00	13.63	2.06	11.57	0.02	33.86	1.28	1.41	411.21	0.2744	0.00803	L	3/14/2011	6/22/2011	180	180	0.98622	-0.81	0.75	0.75	0.76	2.62	1.26	pCi/L
B11-01170-07	504.43	2.03	11.13	2.09	9.04	0.02	42.85	1.45	1.41	402.05	0.2699	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	0.18	0.62	0.62	0.62	2.11	1.02	pCi/L
B11-01170-08	516.63	1.99	12.43	2.05	10.38	0.02	38.38	3.21	1.41	403.70	0.2707	0.00757	L	3/11/2011	6/22/2011	180	180	0.98581	10.44	0.93	0.93	1.82	2.48	1.20	pCi/L
B11-01170-09	511.23	2.00	12.16	2.06	10.10	0.02	39.01	4.49	1.41	410.77	0.2742	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	16.43	0.97	0.97	2.65	2.28	1.10	pCi/L
B11-01170-10	509.67	2.01	11.75	2.07	9.68	0.02	40.52	1.47	1.41	412.42	0.2750	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	0.29	0.65	0.65	0.65	2.19	1.06	pCi/L
B11-01170-11	511.88	1.99	11.49	2.05	9.44	0.02	41.68	1.49	1.41	410.95	0.2743	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	0.38	0.63	0.63	0.64	2.14	1.03	pCi/L
B11-01170-12	504.59	1.99	10.63	2.05	8.58	0.02	45.06	1.33	1.41	307.62	0.2155	0.00820	L	3/11/2011	6/23/2011	180	180	0.98568	-0.48	0.71	0.71	0.71	2.45	1.18	pCi/L
B11-01170-13	508.51	2.00	11.07	2.06	9.01	0.02	43.31	1.50	1.41	422.58	0.2800	0.00800	L	3/10/2011	6/23/2011	180	180	0.98554	0.41	0.60	0.60	0.60	2.01	0.97	pCi/L
B11-01170-14	507.87	2.02	11.43	2.08	9.35	0.02	41.75	1.36	1.41	415.81	0.2766	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-0.26	0.61	0.61	0.62	2.11	1.02	pCi/L
B11-01170-17	498.51	2.00	10.47	2.06	8.41	0.02	45.40	1.37	1.41	414.25	0.2759	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-0.20	0.57	0.57	0.57	1.95	0.94	pCi/L
B11-01170-18	501.98	2.00	11.43	2.06	9.37	0.02	41.20	1.32	1.41	422.34	0.2799	0.00800	L	3/18/2011	6/23/2011	180	180	0.98663	-0.46	0.61	0.61	0.61	2.11	1.02	pCi/L
B11-01170-19	503.31	2.01	11.35	2.07	9.28	0.02	41.69	1.49	1.41	418.98	0.2782	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	0.38	0.63	0.63	0.63	2.10	1.01	pCi/L
B11-01170-20	504.40	1.99	11.82	2.05	9.77	0.02	39.76	1.44	1.41	414.60	0.2761	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	0.14	0.65	0.65	0.66	2.22	1.07	pCi/L
B11-01170-21	508.41	2.01	10.35	2.07	8.28	0.02	46.97	1.46	1.41	411.26	0.2744	0.00800	L	3/17/2011	6/23/2011	180	180	0.9865	0.21	0.56	0.56	0.56	1.89	0.91	pCi/L
B11-01170-22	502.58	2.00	10.51	2.06	8.45	0.02	45.55	1.44	1.41	412.08	0.2748	0.00800	L	3/18/2011	6/24/2011	180	180	0.9865	0.12	0.57	0.57	0.57	1.95	0.94	pCi/L
B11-01170-23	487.79	1.99	10.56	2.05	8.51	0.02	43.96	1.31	1.41	411.69	0.2746	0.00800	L	3/17/2011	6/24/2011	180	180	0.98636	-0.49	0.58	0.58	0.59	2.02	0.97	pCi/L

QC Evaluation

EPA Method: ARS-040
Batch ID: ARS1-B11-01170
SDG's: ARS1-11-00547; 548; 549; 601; 602

LCS	22.9500	**CSU (2s)**	7.0400
LCSD	26.1200	**CSU-D (2s)**	8.0200

DER = abs(LSC-LSCD) / sqr((2s CSU/2)^2)+((2s CSU-D/2)^2) *at 1 sigma* = **< 3**

DER 3.17 / 5.335775 = 0.594103 **< 3**

% RPD= ABS(LCS - LSCD) / (LCS+LCSD)/2 * 100 = **< 25%**

%RPD 3.17 / 24.535 *100 = 12.92032 **< 25%**

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

RER= abs((LCS-LCSD)) / (CSU)+(CSD) *at 2 sigma* = **<1** ***<--LANL Requirement***

RER = 3.17 / 15.0600 0.210491368 **<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	-0.06	1.19	2.07	
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 = -0.06
CSU = 1.19
Is ACT<1.65*CSU? **YES**

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B11-01170**

Method	ARS-054	Analysis	LSC-A-022	Matrix	AQ
Description	Low Level Tritium by Electrolytic Enrichment				

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B11-01170-01	LCS	B-11324								
ARS1-B11-01170-02	LCSD	B-11325								
ARS1-B11-01170-03	MBL									
ARS1-B11-01170-04	TRG				**ARS1-11-00547**	001	1	Buckman1-11-5682	STD	04/12/11
ARS1-B11-01170-05	TRG				**ARS1-11-00547**	002	1	Buckman06-11-5683	STD	04/12/11
ARS1-B11-01170-06	TRG				**ARS1-11-00547**	003	1	Buckman08-11-5684	STD	04/12/11
ARS1-B11-01170-07	TRG				**ARS1-11-00548**	001	1	CALA-11-5224	STD	04/12/11
ARS1-B11-01170-08	TRG				**ARS1-11-00548**	002	1	CALA-11-5227	STD	04/12/11
ARS1-B11-01170-09	TRG				**ARS1-11-00549**	001	1	CAPU-11-5282	STD	04/12/11
ARS1-B11-01170-10	TRG				**ARS1-11-00549**	002	1	CAPU-11-5283	STD	04/12/11
ARS1-B11-01170-11	TRG				**ARS1-11-00549**	003	1	CAPU-11-5290	STD	04/12/11
ARS1-B11-01170-12	TRG				**ARS1-11-00549**	004	1	CAPU-11-5296	STD	04/12/11
ARS1-B11-01170-13	TRG				**ARS1-11-00549**	005	1	CAPU-11-5301	STD	04/12/11
ARS1-B11-01170-14	TRG				**ARS1-11-00549**	006	1	CAPU-11-5304	STD	04/12/11
ARS1-B11-01170-17	TRG				**ARS1-11-00549**	009	1	CAPU-11-5292	STD	04/12/11
ARS1-B11-01170-18	TRG				**ARS1-11-00601**	001	1	CAPU-11-5264	STD	04/18/11
ARS1-B11-01170-19	TRG				**ARS1-11-00601**	002	1	CAPU-11-5269	STD	04/18/11
ARS1-B11-01170-20	TRG				**ARS1-11-00601**	003	1	CAPU-11-5298	STD	04/18/11
ARS1-B11-01170-21	TRG				**ARS1-11-00602**	001	1	CALA-11-5106	STD	04/18/11
ARS1-B11-01170-22	TRG				**ARS1-11-00602**	002	1	CALA-11-5110	STD	04/18/11
ARS1-B11-01170-23	TRG				**ARS1-11-00602**	003	1	CALA-11-5173	STD	04/18/11

89419 11-00547-001-1 **XRAD**

89420 11-00547-002-1 **XRAD**

89421 11-00547-003-1 **XRAD**

89422 11-00548-001-1 **XRAD**

89423 11-00548-002-1 **XRAD**

89424 11-00549-001-1 **XRAD**

89425 11-00549-002-1 **XRAD**

89426 11-00549-003-1 **XRAD**

89427 11-00549-004-1 **XRAD**

89428 11-00549-005-1 **XRAD**

89429 11-00549-006-1 **XRAD**

89430 11-00549-009-1 **XRAD**

89431 11-00601-001-1 **XRAD**

89432 11-00601-002-1 **XRAD**

89433 11-00601-003-1 **XRAD**

89434 11-00602-001-1 **XRAD**

89435 11-00602-002-1 **XRAD**

89436 11-00602-003-1 **XRAD**

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B11-01170**

Method	ARS-054	Analysis	LSC-A-022	Matrix	AQ
Description	Low Level Tritium by Electrolytic Enrichment				

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B11-01170-01	LCS	B-11324								
ARS1-B11-01170-02	LCSD	B-11325								
ARS1-B11-01170-03	MBL									
ARS1-B11-01170-04	TRG				**ARS1-11-00547**	001	1	Buckman1-11-5682	STD	04/12/11
ARS1-B11-01170-05	TRG				**ARS1-11-00547**	002	1	Buckman06-11-5683	STD	04/12/11
ARS1-B11-01170-06	TRG				**ARS1-11-00547**	003	1	Buckman08-11-5684	STD	04/12/11
ARS1-B11-01170-07	TRG				**ARS1-11-00548**	001	1	CALA-11-5224	STD	04/12/11
ARS1-B11-01170-08	TRG				**ARS1-11-00548**	002	1	CALA-11-5227	STD	04/12/11
ARS1-B11-01170-09	TRG				**ARS1-11-00549**	001	1	CAPU-11-5282	STD	04/12/11
ARS1-B11-01170-10	TRG				**ARS1-11-00549**	002	1	CAPU-11-5283	STD	04/12/11
ARS1-B11-01170-11	TRG				**ARS1-11-00549**	003	1	CAPU-11-5290	STD	04/12/11
ARS1-B11-01170-12	TRG				**ARS1-11-00549**	004	1	CAPU-11-5296	STD	04/12/11
ARS1-B11-01170-13	TRG				**ARS1-11-00549**	005	1	CAPU-11-5301	STD	04/12/11
ARS1-B11-01170-14	TRG				**ARS1-11-00549**	006	1	CAPU-11-5304	STD	04/12/11
ARS1-B11-01170-15	TRG				**ARS1-11-00549**	007	1	CAPU-11-5308	STD	04/12/11
ARS1-B11-01170-16	TRG				**ARS1-11-00549**	008	1	CAPU-11-5311	STD	04/12/11
ARS1-B11-01170-17	TRG				**ARS1-11-00549**	009	1	CAPU-11-5292	STD	04/12/11
ARS1-B11-01170-18	TRG				**ARS1-11-00601**	001	1	CAPU-11-5264	STD	04/18/11
ARS1-B11-01170-19	TRG				**ARS1-11-00601**	002	1	CAPU-11-5269	STD	04/18/11
ARS1-B11-01170-20	TRG				**ARS1-11-00601**	003	1	CAPU-11-5298	STD	04/18/11
ARS1-B11-01170-21	TRG				**ARS1-11-00602**	001	1	CALA-11-5106	STD	04/18/11
ARS1-B11-01170-22	TRG				**ARS1-11-00602**	002	1	CALA-11-5110	STD	04/18/11
ARS1-B11-01170-23	TRG				**ARS1-11-00602**	003	1	CALA-11-5173	STD	04/18/11

4-1-11 1134
JDR ARS1-B11-01170-15 and ARS1-B11-01170-16 deleted from current batch b/c samples failed screening criteria twice.

American Radiation Services
Baton Rouge Laboratory

LCS Report
Analytical Batch: ARS1-B11-01170

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-11324	ARS1-B11-01170	ARS1-B11-01170-01	B-H3	S-0206	H-3	5	2.698567445	17.31	22.31	5	VMULLIGAN	1/31/2011			
B-11325	ARS1-B11-01170	ARS1-B11-01170-02	B-H3	S-0206	H-3	5	2.698567445	17.35	22.35	5	VMULLIGAN	1/31/2011			

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
9028	ARS1-B11-01170	ARS1-B11-01170-01		8	g					JRABER	06/21/2011 10:46:42
9029	ARS1-B11-01170	ARS1-B11-01170-02		8	g					JRABER	06/21/2011 10:46:42
9030	ARS1-B11-01170	ARS1-B11-01170-03		8	g					JRABER	06/21/2011 10:46:42
9031	ARS1-B11-01170	ARS1-B11-01170-04	Buckman1-11-5682	8.04	g	89419				JRABER	06/21/2011 10:46:42
9032	ARS1-B11-01170	ARS1-B11-01170-05	Buckman06-11-5683	8.07	g	89420				JRABER	06/21/2011 10:46:42
9033	ARS1-B11-01170	ARS1-B11-01170-06	Buckman08-11-5684	8.03	g	89421				JRABER	06/21/2011 10:46:42
9034	ARS1-B11-01170	ARS1-B11-01170-07	CALA-11-5224	8	g	89422				JRABER	06/21/2011 10:46:43
9035	ARS1-B11-01170	ARS1-B11-01170-08	CALA-11-5227	7.57	g	89423				JRABER	06/21/2011 10:46:43
9036	ARS1-B11-01170	ARS1-B11-01170-09	CAPU-11-5282	8	g	89424				JRABER	06/21/2011 10:46:43
9037	ARS1-B11-01170	ARS1-B11-01170-10	CAPU-11-5283	8	g	89425				JRABER	06/21/2011 10:46:43
9038	ARS1-B11-01170	ARS1-B11-01170-11	CAPU-11-5290	8	g	89426				JRABER	06/21/2011 10:46:43
9039	ARS1-B11-01170	ARS1-B11-01170-12	CAPU-11-5296	8.2	g	89427				JRABER	06/21/2011 10:46:43
9040	ARS1-B11-01170	ARS1-B11-01170-13	CAPU-11-5301	8	g	89428				JRABER	06/21/2011 10:46:43
9041	ARS1-B11-01170	ARS1-B11-01170-14	CAPU-11-5304	8	g	89429				JRABER	06/21/2011 10:46:43
9042	ARS1-B11-01170	ARS1-B11-01170-17	CAPU-11-5292	8	g	89430				JRABER	06/21/2011 10:46:43
9043	ARS1-B11-01170	ARS1-B11-01170-18	CAPU-11-5264	8	g	89431				JRABER	06/21/2011 10:46:43
9044	ARS1-B11-01170	ARS1-B11-01170-19	CAPU-11-5269	8	g	89432				JRABER	06/21/2011 10:46:43
9045	ARS1-B11-01170	ARS1-B11-01170-20	CAPU-11-5298	8	g	89433				JRABER	06/21/2011 10:46:43
9046	ARS1-B11-01170	ARS1-B11-01170-21	CALA-11-5106	8	g	89434				JRABER	06/21/2011 10:46:43
9047	ARS1-B11-01170	ARS1-B11-01170-22	CALA-11-5110	8	g	89435				JRABER	06/21/2011 10:46:44
9048	ARS1-B11-01170	ARS1-B11-01170-23	CALA-11-5173	8	g	89436				JRABER	06/21/2011 10:46:44

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\20110621_1056
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\20110621_1056.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\LLH3.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL 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
Count Time (min): 180.00
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	0.0	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				

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\20110621_1056
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\20110621_1056.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\LLH3.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL 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
Count Time (min): 180.00
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	0.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

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

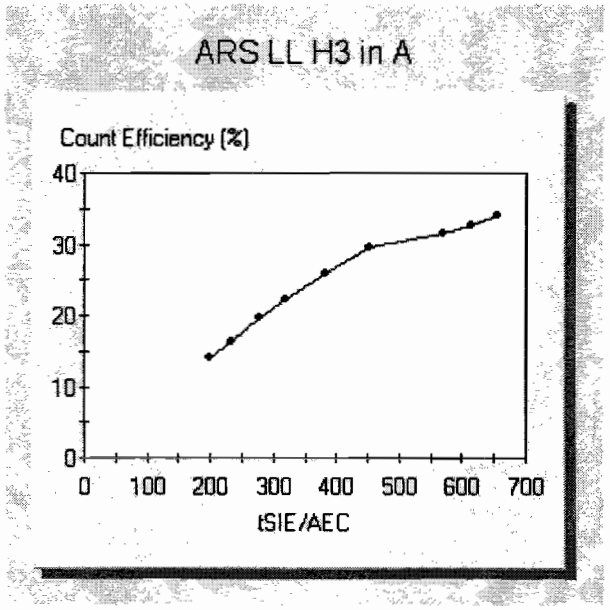
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 11/19/2010
Date Modified:
ARS LL H3 in A

tSIE/AEC	Count Efficiency (%)
655.11	34.08
613.27	32.77
569.42	31.54
454.14	29.55
383.12	26.06
318.52	22.25
280.21	19.79
235.97	16.48
199.12	13.98

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	180.00	6.915	25.08	413.84	27.57	6/21/2011	11:05:54 AM	*
2	2	B11-01170-01	180.00	5.712	18.98	485.51	30.09	6/21/2011	2:19:16 PM	
2	3	B11-01170-02	180.00	5.849	19.36	492.59	30.22	6/21/2011	5:29:53 PM	
2	4	B11-01170-03	180.00	1.403	4.59	513.56	30.58	6/21/2011	8:40:34 PM	
2	5	B11-01170-04	180.00	1.599	5.88	406.43	27.20	6/21/2011	11:51:14 PM	
2	6	B11-01170-05	180.00	1.555	5.67	410.46	27.40	6/22/2011	3:04:06 AM	
2	7	B11-01170-06	180.00	1.284	4.68	411.21	27.44	6/22/2011	6:16:52 AM	
2	8	B11-01170-07	180.00	1.452	5.38	402.05	26.99	6/22/2011	9:27:40 AM	
2	9	B11-01170-08	180.00	3.214	11.87	403.70	27.07	6/22/2011	12:38:13 PM	
2	10	B11-01170-09	180.00	4.492	16.39	410.77	27.42	6/22/2011	3:48:52 PM	
2	11	B11-01170-10	180.00	1.473	5.36	412.42	27.50	6/22/2011	6:59:28 PM	
2	12	B11-01170-11	180.00	1.491	5.44	410.95	27.43	6/22/2011	10:10:01 PM	
2	13	B11-01170-12	180.00	1.333	6.19	307.62	21.55	6/23/2011	1:20:41 AM	
2	14	B11-01170-13	180.00	1.503	5.37	422.58	28.00	6/23/2011	4:31:15 AM	
2	15	B11-01170-14	180.00	1.358	4.91	415.81	27.66	6/23/2011	7:41:49 AM	
2	16	B11-01170-17	180.00	1.372	4.97	414.25	27.59	6/23/2011	10:52:20 AM	
2	17	B11-01170-18	180.00	1.316	4.70	422.34	27.99	6/23/2011	2:02:50 PM	
2	18	B11-01170-19	180.00	1.491	5.36	418.98	27.82	6/23/2011	5:13:10 PM	
2	19	B11-01170-20	180.00	1.440	5.22	414.60	27.61	6/23/2011	8:23:44 PM	
2	20	B11-01170-21	180.00	1.458	5.31	411.26	27.44	6/23/2011	11:34:13 PM	
2	21	B11-01170-22	180.00	1.436	5.23	412.08	27.48	6/24/2011	2:44:47 AM	
2	22	B11-01170-23	180.00	1.314	4.78	411.69	27.46	6/24/2011	5:55:18 AM	
2	23	~~Sample #23~~	180.00	1.413	5.15	411.01	27.43	6/24/2011	9:05:49 AM	

2nd Background
8mL's of dead H_2O
w/ 12mL's cocktail

JDR 6-24-2011

Tritium Enrichment Data

Procedures: ARS-040

Date: 4/7/2011

ARS File ID Numbers: ARS1-11-00547; -11-00548; -11-00549; -11-0(

ARS Batch ID: ARS1-B11-01170

		Vf								Aliquot					
	A Batch ID:	Gross Sample Recovered	Enrichment factor	Cryo-Distil Flask #	Tare Wt Cryo-distil flask	Gross Wt flask + Sample	Recovered Water	Tare Weight of LSC Vial	Vial + Sample	Net Sample	*Wt of Vial, Sample& Dead Water Filler If used*	*Net Dead Water Added*	Tare Wt b/f Cocktail	Gross Wt Vial + Sample + Cocktail	Net Wt of Cocktail Added
1	ARS1-B11-01170-01	11.92	42.31	N/A,N/A	101.67	110.71	9.04	6.42	14.42	8.00	0.00	0.00	14.42	26.41	11.99
2	ARS1-B11-01170-02	13.03	38.73	N/A,N/A	116.55	125.71	9.16	6.42	14.42	8.00	0.00	0.00	14.42	26.42	12.00
3	ARS1-B11-01170-03	12.35	40.99	N/A,N/A	93.78	102.81	9.03	6.43	14.43	8.00	0.00	0.00	14.43	26.42	11.99
4	ARS1-B11-01170-04	11.63	43.51	N/A,N/A	99.80	108.08	8.28	6.51	14.55	8.04	0.00	0.00	14.55	26.55	12.00
5	ARS1-B11-01170-05	13.71	36.70	N/A,N/A	116.55	126.88	10.33	6.54	14.61	8.07	0.00	0.00	14.61	26.60	11.99
6	ARS1-B11-01170-06	13.63	37.08	N/A,N/A	93.06	101.87	8.81	6.60	14.63	8.03	0.00	0.00	14.63	26.63	12.00
7	ARS1-B11-01170-07	11.13	45.32	N/A,N/A	101.91	109.97	8.06	6.42	14.42	8.00	0.00	0.00	14.42	26.41	11.99
8	ARS1-B11-01170-08	12.43	41.56	N/A,N/A	93.79	101.46	7.67	6.41	13.98	7.57	14.46	0.48	14.46	26.45	11.99
9	ARS1-B11-01170-09	12.16	42.04	N/A,N/A	101.67	110.55	8.88	6.53	14.53	8.00	0.00	0.00	14.53	26.53	12.00
10	ARS1-B11-01170-10	11.75	43.38	N/A,N/A	97.03	105.03	8.00	6.42	14.42	8.00	0.00	0.00	14.42	26.41	11.99
11	ARS1-B11-01170-11	11.49	44.55	N/A,N/A	101.66	109.66	8.00	6.41	14.41	8.00	0.00	0.00	14.41	26.41	12.00
12	ARS1-B11-01170-12	10.63	47.47	N/A,N/A	93.05	101.07	8.02	6.43	14.63	8.20	0.00	0.00	14.63	26.62	11.99
13	ARS1-B11-01170-13	11.07	45.94	N/A,N/A	97.35	105.36	8.01	6.51	14.51	8.00	0.00	0.00	14.51	26.50	11.99
14	ARS1-B11-01170-14	11.43	44.43	N/A,N/A	99.51	107.51	8.00	6.53	14.53	8.00	0.00	0.00	14.53	26.54	12.01
15	ARS1-B11-01170-17	10.47	47.61	N/A,N/A	103.57	111.59	8.02	6.42	14.42	8.00	0.00	0.00	14.42	26.42	12.00
16	ARS1-B11-01170-18	11.43	43.92	N/A,N/A	107.38	115.39	8.01	6.42	14.42	8.00	0.00	0.00	14.42	26.41	11.99
17	ARS1-B11-01170-19	11.35	44.34	N/A,N/A	96.03	104.04	8.01	6.39	14.39	8.00	0.00	0.00	14.39	26.41	12.02
18	ARS1-B11-01170-20	11.82	42.67	N/A,N/A	94.03	102.05	8.02	6.43	14.43	8.00	0.00	0.00	14.43	26.42	11.99
19	ARS1-B11-01170-21	10.35	49.12	N/A,N/A	104.27	112.27	8.00	6.51	14.51	8.00	0.00	0.00	14.51	26.51	12.00
20	ARS1-B11-01170-22	10.51	47.82	N/A,N/A	109.54	117.55	8.01	6.53	14.53	8.00	0.00	0.00	14.53	26.53	12.00
21	ARS1-B11-01170-23	10.56	46.19	N/A,N/A	93.07	101.09	8.02	6.61	14.61	8.00	0.00	0.00	14.61	26.59	11.98
22		0.00	--				0.00			0.00		0.00			0.00
23		0.00	--				0.00			0.00		0.00			0.00
24		0.00	--				0.00			0.00		0.00			0.00
25		0.00	--				0.00			0.00		0.00			0.00
26		0.00	--				0.00			0.00		0.00			0.00
27		0.00	--				0.00			0.00		0.00			0.00
28		0.00	--				0.00			0.00		0.00			0.00
29		0.00	--				0.00			0.00		0.00			0.00

S:\Laboratory Department\LabDocuments\LowLevelTritium\2010 LowLevelTritiumData\ARS1-B11-01170

Chemist Signature: Jimmy D. Rabon

Tritium Enrichment Data

Procedures: **ARS-040**

Date: 4/7/2011

ARS File ID Numbers: ARS1-11-00547; -11-00548; -11-00549; -11-00601; -11-00602

ARS Batch ID: ARS1-B11-01170

	A Batch ID:	Enrichment Cell No.	Tare Wt of Electrolysis Cell & Electrodes	Tare Wt Reservoir	mi Wt Na_2O_2	Gross Weight of Sample Reservoir	Vi Gross Sample Added	Electrolysis Start Date & Time	Start AMP	Start Bath C°	Electolysis End Date & Time	End Bath C°	End Wt of Cell + Resv. + Sample
1	ARS1-B11-01170-01	1	331.17	199.48	2.00	703.81	504.33	4-6-11 1017	5.00	2.0	6-1-11 0947	2.0	542.57
2	ARS1-B11-01170-02	2	336.19	189.18	2.00	693.83	504.65	4-6-11 1108	5.00	2.0	6-1-11 0947	2.0	538.40
3	ARS1-B11-01170-03	7	334.91	191.91	2.00	698.15	506.24	4-6-11 1114	5.00	2.0	6-1-11 0947	2.0	539.17
4	ARS1-B11-01170-04	27	338.25	207.25	2.02	713.27	506.02	4-8-11 0957	5.00	2.0	6-1-11 0947	2.0	557.13
5	ARS1-B11-01170-05	41	331.36	192.60	2.01	695.80	503.20	4-8-11 0958	5.00	2.0	6-1-11 0947	2.0	537.67
6	ARS1-B11-01170-06	100	336.49	203.92	2.00	709.30	505.38	4-8-11 1000	5.00	2.0	6-1-11 0947	2.0	554.04
7	ARS1-B11-01170-07	34	337.04	198.83	2.03	703.26	504.43	4-8-11 1002	5.00	2.0	6-1-11 0947	2.0	547.00
8	ARS1-B11-01170-08	N/A	340.53	212.43	1.99	729.06	516.63	4-8-11 1003	5.00	2.0	6-1-11 0947	2.0	565.39
9	ARS1-B11-01170-09	N/A	334.61	186.13	2.00	697.36	511.23	4-8-11 1006	5.00	2.0	6-1-11 0947	2.0	532.90
10	ARS1-B11-01170-10	N/A	334.34	195.20	2.01	704.87	509.67	4-8-11 1049	5.00	2.0	6-1-11 0947	2.0	541.29
11	ARS1-B11-01170-11	N/A	335.39	195.03	1.99	706.91	511.88	4-8-11 1057	5.00	2.0	6-1-11 0947	2.0	541.91
12	ARS1-B11-01170-12	N/A	340.52	196.14	1.99	700.73	504.59	4-10-11 1149	5.00	2.0	6-1-11 0947	2.0	547.29
13	ARS1-B11-01170-13	N/A	332.00	207.84	2.00	716.35	508.51	4-10-11 1152	5.00	2.0	6-1-11 0947	2.0	550.91
14	ARS1-B11-01170-14	78	332.74	190.79	2.02	698.66	507.87	4-10-11 1154	5.00	2.0	6-1-11 0947	2.0	534.96
15	ARS1-B11-01170-17	N/A	327.23	189.21	2.00	687.72	498.51	4-10-11 1158	5.00	2.0	6-1-11 0947	2.0	526.91
16	ARS1-B11-01170-18	N/A	339.40	200.88	2.00	702.86	501.98	4-10-11 1204	5.00	2.0	6-1-11 0947	2.0	551.71
17	ARS1-B11-01170-19	47	334.25	199.16	2.01	702.47	503.31	4-11-11 1504	5.00	2.0	6-1-11 0947	2.0	544.76
18	ARS1-B11-01170-20	10	331.35	208.70	1.99	713.10	504.40	4-11-11 1509	5.00	2.0	6-1-11 0947	2.0	551.87
19	ARS1-B11-01170-21	62	334.10	211.86	2.01	720.27	508.41	4-11-11 1514	5.00	2.0	6-1-11 0947	2.0	556.31
20	ARS1-B11-01170-22	N/A	334.52	211.44	2.00	714.02	502.58	4-11-11 1519	5.00	2.0	6-1-11 0947	2.0	556.47
21	ARS1-B11-01170-23	N/A	330.41	191.21	1.99	679.00	487.79	4-11-11 1527	5.00	2.0	6-1-11 0947	2.0	532.18
22							0.00						
23							0.00						
24							0.00						
25							0.00						
26							0.00						
27							0.00						
28							0.00						
29							0.00						

Chemist Signature: Jerry D. Rabe

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
6-21-2011	0951	Background ~~B11-01170-0~~ JDR 6-21-11	B11-01170	1056	JDR
↓	↓	B11-01170-01	↓	↓	JDR
↓	↓	B11-01170-02	↓	↓	JDR
↓	↓	B11-01170-03	↓	↓	JDR
↓	↓	B11-01170-04	↓	↓	JDR
↓	↓	B11-01170-05	↓	↓	JDR
↓	↓	B11-01170-06	↓	↓	JDR
↓	↓	B11-01170-07	↓	↓	JDR
↓	↓	B11-01170-08	↓	↓	JDR
↓	↓	B11-01170-09	↓	↓	JDR
↓	↓	B11-01170-10	↓	↓	JDR
↓	↓	B11-01170-11	↓	↓	JDR
↓	↓	B11-01170-12	↓	↓	JDR
↓	↓	B11-01170-13	↓	↓	JDR
↓	↓	B11-01170-14	↓	↓	JDR
↓	↓	B11-01170-17	↓	↓	JDR
↓	↓	B11-01170-18	↓	↓	JDR
↓	↓	B11-01170-19	↓	↓	JDR
↓	↓	B11-01170-20	↓	↓	JDR
↓	↓	B11-01170-21	↓	↓	JDR

Reviewed By: LSW Date: 6-22-11
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
6-21-2011	0951	B11-01170-22	B11-01170	1056	JDR
↓	↓	B11-01170-23	↓	↓	JDR
↓	↓	2nd Background	↓	↓	JDR KSW 6-22-11
6-23-11	1608	SNC 51	QA	QA	
↓	↓	B11-02218-01	B11-02218		
↓	↓	B11-02218-02	↓		
↓	↓	B11-02218-03	↓		
↓	↓	B11-02218-04	↓		
↓	↓	B11-02218-05	↓		
↓	↓	B11-02218-06	↓		
↓	↓	B11-02218-07	↓		
↓	↓	B11-02218-08	↓		
↓	↓	B11-02218-09	↓		
↓	↓	KS 6-23-11 ~~B11-02218-10~~ B11-02218-10	↓		
↓	↓	B11-02218-11	↓		
↓	↓	B11-02218-12	↓		
↓	↓	KS 6-23-11 ~~B11-02218-13~~ B11-02218-13	↓		
↓	↓	B11-02218-14	↓		
↓	↓	B11-02218-15	↓		
↓	↓	B11-02218-16	↓		

NO DATA JDR 6-24-2011

Reviewed By: KSW Initials Date: 6-24-11

Standards Activity as of: 06/21/11 10:38

Active	Std ID	Isotope	PSCLT	Verification Date	Exp Date	Status	Ref Date	Ref ACT (dpm)	ACT at Date Above (dpm/g)	Halflife (days)	Parent ID	Expended Date	Comments
A	S-0195	Ra-226	PC			Not Ver	06/24/08	7.7832E+02	777.3081	5.840E+05			Primary Ra-226 standard for calibration.
A	S-0196	Ra-226	SLC			Not Ver	07/03/08	2.3567E+02	235.3681	5.840E+05	S-0195		Calibration standard for Ra-226.
A	S-0197	Ra-228	SL	11/11/10	11/11/11	OK	07/10/08	4.4972E+01	31.5281	2.100E+03	S-0127		LCS for Ra-228
A	S-0198	Ra-226	SL	09/24/09	09/24/10	EXP	07/07/08	1.4886E+03	1486.7317	5.840E+05	S-0193		Intermediate Ra-226 standard for use in creating LCS stock solutions
A	S-0199	Ni-63	SL	04/14/10	04/14/11	EXP	08/25/08	4.5399E+01	44.5225	3.660E+04	S-0178		Ni-63 LCS dilution with 7.5 mL of 2 mg/mL Ni carrier added to the soln
A	S-0200	Sr-89	PC			Not Ver	09/17/08	1.9942E+04	0.0200	5.053E+01			Primary Sr-89 calibration standard
A	S-0206	H-3	SL	05/14/10	05/14/11	EXP	02/25/09	6.6781E+00	5.8621	4.500E+03	S-0152		Use as H3LL LCS creation. Dilution performed as stated above by M Thib
A	S-0210	Ba-133	PT			Not Ver	05/15/09	7.6431E+02	665.4942	3.840E+03			Primary Ba-133 tracer
A	S-0211	Ba-133	ST			Not Ver	05/18/09	4.5236E+02	394.0898	3.840E+03	S-0210		Intermediate level tracer solution. Dilution performed as stated above
A	S-0212	Ba-133	SLT	05/21/09	05/21/10	EXP	05/18/09	9.9546E+00	8.6722	3.840E+03	S-0211		Ba-133 tracer solution. Dilution performed as stated above by B Steffe
A	S-0213	Ba-133	SLT	05/25/09	05/25/10	EXP	05/23/09	6.6543E+01	58.0236	3.840E+03	S-0211		
A	S-0215	C-14	P			Not Ver	09/03/90	5.4020E+04	53883.5736	2.082E+06			C-14 for Calibration use only (5 ml ampoule)
A	S-0216	AM-241	PL			Not Ver	05/16/07	1.0640E+02	105.7030	1.579E+05			Parent Am-241 Working Soln (Lq in 5 mL NIST borosilicate-glass ampoule
A	S-0218	C-14	SC	08/05/09	08/05/10	EXP	07/22/09	2.9419E+05	294121.4213	2.082E+06	S-0215		C-14 Calibration Standard. Used to prepare the C-14 standard in ampoule
A	S-0220	Am-241	P			Not Ver	08/19/09	2.6725E+01	26.6464	1.579E+05			No certificate for this standard on file in the QA office. NT1b is no
A	S-0221	Am-241	SL	08/05/10	08/05/11	OK	08/19/09	2.6725E+01	26.6464	1.579E+05	S-0220		NT1b Am-241 LCS standard. Activity determined by measuring a standard
A	S-0222	PU-242	PT	09/28/09	09/28/10	EXP	09/23/09	2.6314E+01	26.3142	1.365E+08			
A	S-0223	PU-242	SLT	10/06/10	10/06/11	OK	09/25/09	7.6699E+00	7.6699	1.365E+08	S-0222		Pu-242 tracer solution. Dilution performed as stated above by B Steffe
A	S-0224	Ra-226	SL	11/11/10	11/11/11	OK	11/04/09	6.4243E+01	64.1979	5.840E+05	S-0198		Ra-226 LCS stock solution. Dilution performed as stated above by B Ste
A	S-0225	Sr-89	PC			Not Ver	10/01/09	1.0276E+05	18.6437	5.053E+01			Primary Sr-89 standard. 5 ml liquid in flame sealed vial.
A	S-0226	PU-239	SC	11/19/09	11/19/10	EXP	11/16/09	1.9777E+03	1977.6410	8.807E+06	S-0186		Pu-239 calibration standard. Dilution performed as stated above by B S
A	S-0227	U-238	PC			Not Ver	05/17/07	1.7557E+02	175.5667	1.632E+12			Primary U-238 calibration standard. 5ml liquid in a flame sealed vial.
A	S-0228	U-238	SC	11/19/09	11/19/10	EXP	11/17/09	2.6904E+02	269.0445	1.632E+12	S-0227		Uranium standard for use in creating Alpha Spec check sources. Dilutio
A	S-0229	Sr-89	SC	11/18/09	07/28/10	EXP	11/18/09	1.7112E+04	5.9977	5.053E+01	S-0225		Sr-89 calibration standard. Dilution performed as stated above by B S
A	S-0230	U-238	PL			Not Ver	11/23/09	1.8617E+02	186.1684	1.632E+12			Primary U-238, 235, 234 standard. 5ml liquid in flame sealed vial.
A	S-0231	Th-230	SL	10/18/10	10/18/11	OK	02/19/10	1.2559E+01	12.5584	2.753E+07	S-0172		Primary Th-230 LCS standard. Dilution performed as stated above by B S
A	S-0232	Th-229	PT			Not Ver	01/28/05	1.1940E+02	119.3279	2.681E+06			
A	S-0233	Th-229	SLT	02/22/10	02/22/11	EXP	01/28/05	1.1940E+02	119.3279	2.681E+06	S-0232		Tracer Th-229 tracer standard. Dilution performed as stated above by B Steffe
A	S-0234	Sr-90	PL			Not Ver	03/04/10	4.5500E+02	440.8634	1.041E+04			Previously logged as T11c. Sr-90 standard to be used for creating LCS
A	S-0235	Sr-90	SL			Not Ver	03/12/10	4.4497E+01	43.1370	1.041E+04	S-0234		Primary Sr-90 LCS standard. Dilution performed as stated above by B St
A	S-0236	Sr-90	SL	03/08/11	03/08/12	OK	03/17/10	4.8169E+01	46.7126	1.041E+04	S-0160		Sr-90 LCS standard. Dilution performed as stated above by B Steffens.
A	S-0237	H-3	SL	03/25/11	03/25/12	OK	03/22/10	3.5037E+03	3266.0216	4.500E+03	S-0031		Intermediate level H-3 standard for creating LCS solutions and spikes
A	S-0240	Sr-90	SL	04/13/10	04/13/11	EXP	04/13/10	4.8132E+01	46.7612	1.041E+04	S-0160		Painesville Sr-90 LCS standard. Dilution performed as stated above by
A	S-0241	U-232	ST	06/11/10	06/11/11	EXP	06/09/10	9.1520E+00	9.0574	2.516E+04	S-0161		Primary U-232 tracer solution. Dilution performed as stated above by B
A	S-0242	Pu-239	PL			Not Ver	11/23/09	6.5202E+03	6519.8617	8.807E+06			Primary Pu-239 standard. 5ml liquid in flame sealed vial.
A	S-0243	Sr-90	PL	07/01/10	07/01/11	OK	07/01/09	1.3200E+00	1.2582	1.041E+04			Mapep air filter used as QC for LDEQ GB air filter particulate samples
A	S-0244	Th-230	PL	07/01/10	07/01/11	OK	07/01/09	6.5900E-01	0.6590	2.753E+07			Mapep air filter used as QC for LDEQ GB air filter particulate samples
A	S-0245	Fe-55	SC	08/18/10	08/18/11	OK	08/13/10	2.6617E+00	2.1375	9.860E+02	S-0183		Fe-55 LCS standard. Dilution performed as stated above by B Steffens
A	S-0246	Th-229	ST	10/18/10	10/18/11	OK	09/20/10	1.1204E+01	11.2036	2.681E+06	S-0233		Th-229 tracer standard. Dilution performed as stated above by B Steffe
A	S-0247	H-3	SL	10/13/10	10/13/11	OK	10/11/10	5.6100E+00	5.3956	4.500E+03	S-0237		Spike H-3 LCS standard. Dilution performed as stated above by B Steffe
A	S-0248	Pu-242	PT			Not Ver	01/01/10	2.6770E+01	26.7699	1.365E+08			Primary Pu-242 standard in flame-sealed 5 ml borosilicate glass ampoul
A	S-0249	C-14	PC			Not Ver	02/03/11	7.5143E+03	7513.9554	2.082E+06			Primary C-14 calibration standard.
A	S-0250	C-14	S	03/07/11	03/07/12	OK	02/17/11	4.7591E+00	4.7589	2.090E+06	S-0153		C-14 LCS standard. Dilution performed as stated above by B Steffens
A	S-0251	C-14	SC	03/07/11	03/07/12	OK	02/21/11	1.1123E+04	11122.4385	2.082E+06	S-0249		C-14 calibration standard. Dilution performed as stated above by B Ste
A	S-0252	Pu-242	ST	03/28/11	03/28/12	OK	03/28/11	7.9422E+00	7.9422	1.365E+08	S-0248		Pu-242 tracer solution. Dilution performed as stated above by B Steffe

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for

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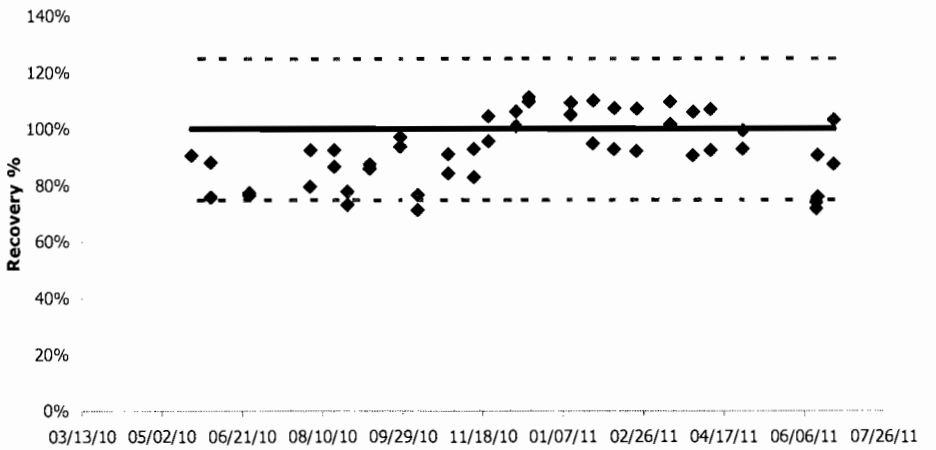
Low Level Tritium by Low Level Liquid Scintillation Counting

Control Charts

American Radiation Services
Baton Rouge Laboratory

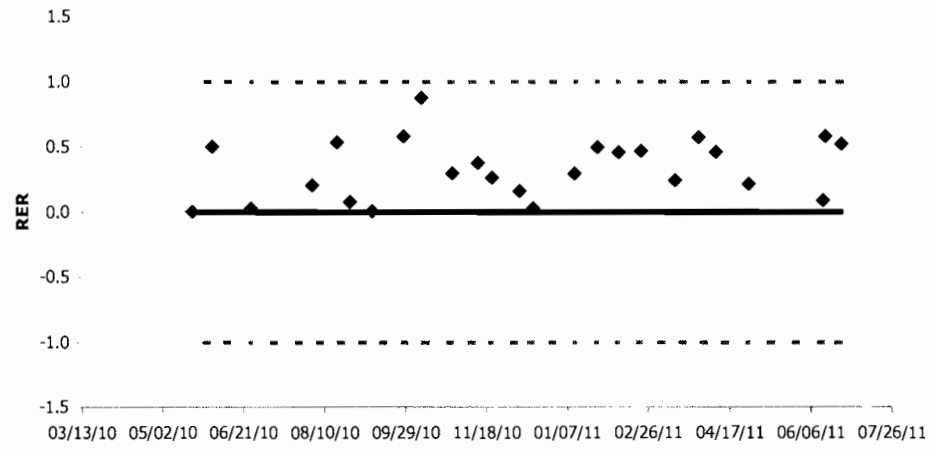
QC Chart

LLH-3 LCS



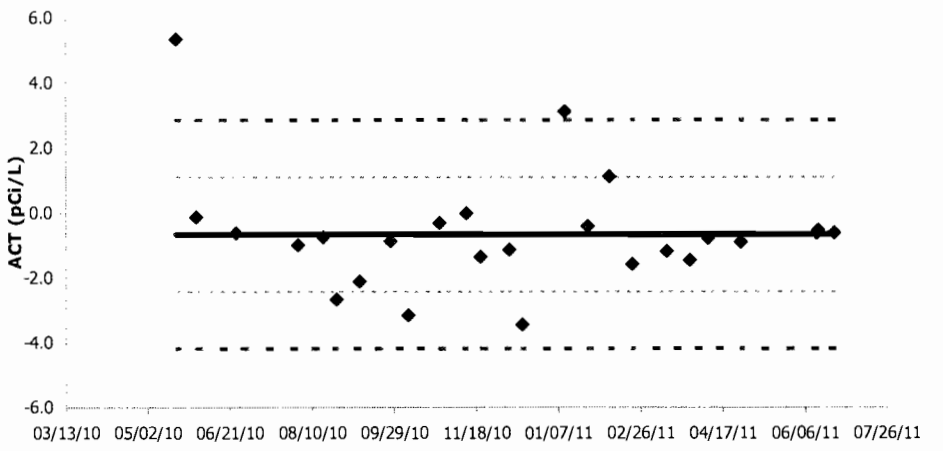
Average	STDEV	n	UCL	LCL
0.9270	0.1172	26	1.2500	0.7500

LLH-3 RER



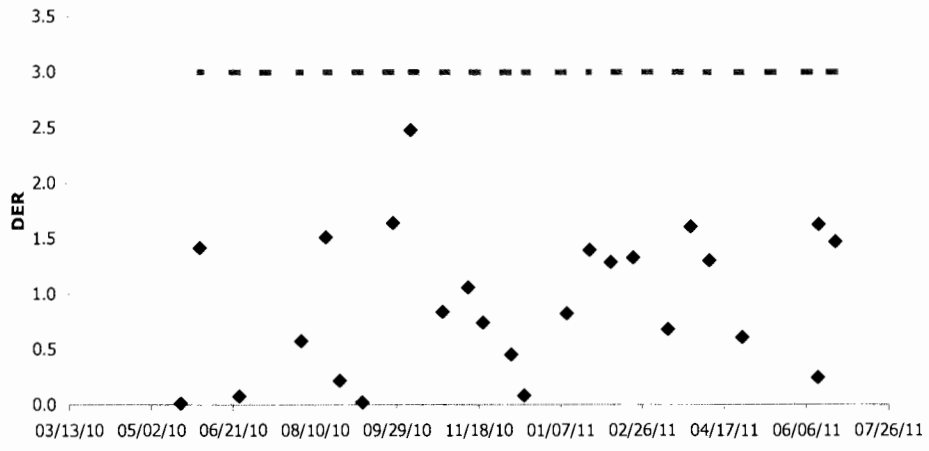
n	UCL	LCL
26	1.0000	-1.0000

LLH-3 Blank



Average	STDEV	n	UCL	LCL
-0.6638	1.7592	26	2.8546	-4.1823

LLH-3 DER

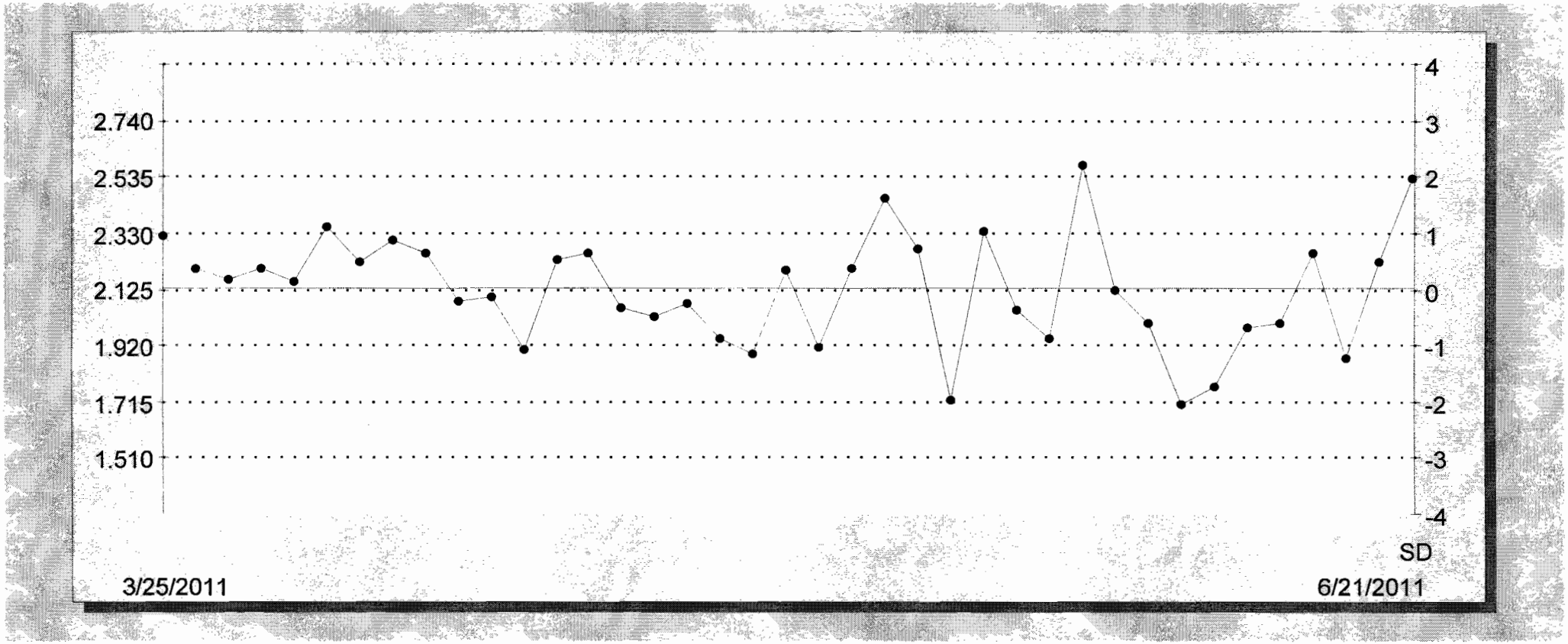


n	UCL
26	3.0000

3H Background
Total # pts : 5256
Valid # pts : 39
Mean : 2.12
SD : 0.20

Date	Value	Valid Pt
Mar 25, 2011	2.32	X
Mar 28, 2011	2.20	X
Apr 01, 2011	2.16	X
Apr 08, 2011	2.20	X
Apr 12, 2011	2.15	X
Apr 15, 2011	2.35	X
Apr 22, 2011	2.22	X
Apr 28, 2011	2.31	X
Apr 29, 2011	2.26	X
Apr 29, 2011	2.08	X
Apr 29, 2011	2.10	X
Apr 29, 2011	1.90	X
Apr 30, 2011	2.23	X
Apr 30, 2011	2.25	X
Apr 30, 2011	2.05	X
Apr 30, 2011	2.02	X
Apr 30, 2011	2.08	X
Apr 30, 2011	1.95	X
Apr 30, 2011	1.89	X
May 02, 2011	2.19	X
May 03, 2011	1.91	X
May 10, 2011	2.20	X
May 16, 2011	2.45	X
May 23, 2011	2.27	X
May 24, 2011	1.72	X
May 31, 2011	2.34	X
Jun 03, 2011	2.05	X
Jun 05, 2011	1.94	X
Jun 05, 2011	2.58	X
Jun 08, 2011	2.12	X
Jun 11, 2011	2.00	X
Jun 14, 2011	1.70	X
Jun 18, 2011	1.77	X
Jun 19, 2011	1.98	X
Jun 20, 2011	2.00	X
Jun 20, 2011	2.25	X
Jun 20, 2011	1.87	X
Jun 20, 2011	2.23	X
Jun 21, 2011	2.53	X

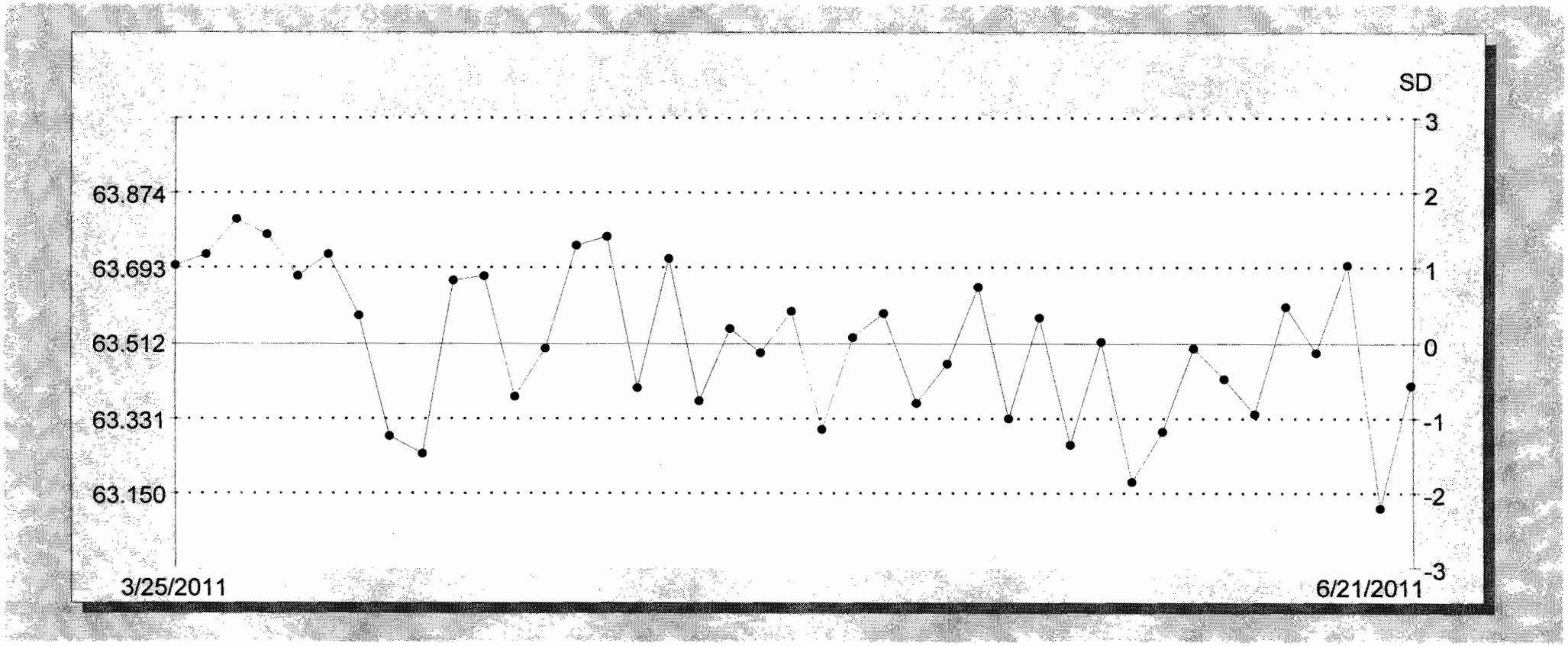
3H Background
Total # pts : 5256
Valid # pts : 39
Mean : 2.12
SD : 0.20



3H Efficiency
Total # pts : 5330
Valid # pts : 41
Mean : 63.51
SD : 0.18

Date	Value	Valid Pt
Mar 25, 2011	63.70	X
Mar 28, 2011	63.73	X
Apr 01, 2011	63.81	X
Apr 08, 2011	63.78	X
Apr 12, 2011	63.67	X
Apr 15, 2011	63.73	X
Apr 22, 2011	63.57	X
Apr 28, 2011	63.29	X
Apr 29, 2011	63.24	X
Apr 29, 2011	63.66	X
Apr 29, 2011	63.67	X
Apr 29, 2011	63.38	X
Apr 30, 2011	63.50	X
Apr 30, 2011	63.75	X
Apr 30, 2011	63.77	X
Apr 30, 2011	63.40	X
Apr 30, 2011	63.71	X
Apr 30, 2011	63.37	X
Apr 30, 2011	63.55	X
Apr 30, 2011	63.49	X
May 02, 2011	63.59	X
May 03, 2011	63.30	X
May 10, 2011	63.52	X
May 16, 2011	63.58	X
May 23, 2011	63.37	X
May 24, 2011	63.46	X
May 31, 2011	63.65	X
Jun 03, 2011	63.33	X
Jun 05, 2011	63.57	X
Jun 05, 2011	63.27	X
Jun 08, 2011	63.51	X
Jun 11, 2011	63.18	X
Jun 14, 2011	63.29	X
Jun 18, 2011	63.50	X
Jun 19, 2011	63.43	X
Jun 20, 2011	63.34	X
Jun 20, 2011	63.60	X
Jun 20, 2011	63.48	X
Jun 20, 2011	63.70	X
Jun 20, 2011	63.11	X
Jun 21, 2011	63.41	X

3H Efficiency
Total # pts : 5330
Valid # pts : 41
Mean : 63.51
SD : 0.18



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Tritium- Screening by Low Level Liquid Scintillation Counting

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

Samples

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

ARS File ID Numbers: ARS1-11-00547; 548; 549; 601; 602
ARS Batch ID: ARS1-B11-01169

	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	ARS1-B11-01169-04	120	1.653	1.621	31.95	5.02	8.987	pCi/L	192.6391	NO
2	ARS1-B11-01169-05	120	1.610	1.621	32	4.99	-3.103	pCi/L	193.4944	NO
3	ARS1-B11-01169-06	120	1.734	1.621	31.85	5.02	31.836	pCi/L	193.2439	NO
4	ARS1-B11-01169-07	120	1.751	1.621	31.86	5.00	36.760	pCi/L	193.956	NO
5	ARS1-B11-01169-08	120	1.646	1.621	31.93	5.01	7.040	pCi/L	193.1445	NO
6	ARS1-B11-01169-09	120	1.409	1.551	31.48	5.03	-40.395	pCi/L	191.0072	NO
7	ARS1-B11-01169-10	120	1.717	1.551	31.9	5.02	46.694	pCi/L	188.8678	NO
8	ARS1-B11-01169-11	120	1.623	1.551	31.59	5.00	20.533	pCi/L	191.4841	NO
9	ARS1-B11-01169-12	120	1.623	1.551	31.95	4.99	20.343	pCi/L	189.7059	NO
10	ARS1-B11-01169-13	120	1.690	1.551	31.75	5.02	39.284	pCi/L	189.7601	NO
11	ARS1-B11-01169-14	120	2.272	1.551	31.56	5.03	204.587	pCi/L	190.523	YES, analyze by LSC-A-001.
12	ARS1-B11-01169-15	120	2.751	1.621	31.96	5.02	317.260	pCi/L	192.5788	YES, analyze by LSC-A-001.
13	ARS1-B11-01169-16	120	3.108	1.621	31.6	5.00	423.937	pCi/L	195.5518	YES, analyze by LSC-A-001.
14	ARS1-B11-01169-17	120	1.520	1.621	31.97	5.01	-28.405	pCi/L	192.9028	NO
15	ARS1-B11-01169-18	120	1.866	1.621	31.78	5.00	69.453	pCi/L	194.4442	NO
16	ARS1-B11-01169-19	120	1.676	1.621	31.63	4.99	15.697	pCi/L	195.7579	NO
17	ARS1-B11-01169-20	120	1.959	1.621	32.12	5.03	94.237	pCi/L	191.2386	NO
18	ARS1-B11-01169-21	120	2.143	1.621	31.64	5.05	147.160	pCi/L	193.3709	NO
19	ARS1-B11-01169-22	120	1.921	1.621	31.59	5.03	85.045	pCi/L	194.4471	NO
20	ARS1-B11-01169-23	120	1.808	1.621	31.45	5.02	53.354	pCi/L	195.7017	NO
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!

per VM, please rescreen

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

ARS File ID Numbers: ARS1-11-00547; 548; 549; 601; 602.
ARS Batch ID: ARS1-B11-01169

	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	B11-01169-14	120	1.591	1.559	31.72	5.03	9.034	pCi/L	190.0338	NO
2	B11-01169-15	120	2.660	1.559	31.95	5.02	309.214	pCi/L	189.0416	YES, analyze by LSC-A-001.
3	B11-01169-16	120	2.919	1.559	32.06	5.00	382.166	pCi/L	189.1466	YES, analyze by LSC-A-001.
4							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
5							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
6							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
7							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
8							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
9							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
10							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
11							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
12							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
13							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
14							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
15							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
16							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
17							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
18							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
19							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
20							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
21							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
22							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
23							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!

ysm 4-1-11

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1 (800) 401-4277 • Fax (225) 381-2996

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

Analysis Batch ID **ARS1-B11-01169**

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

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B11-01169-01	LCS									
ARS1-B11-01169-02	LCSD									
ARS1-B11-01169-03	MBL									
ARS1-B11-01169-04	TRG				**ARS1-11-00547**	001	1	Buckman1-11-5682	STD	04/12/11
ARS1-B11-01169-05	TRG				**ARS1-11-00547**	002	1	Buckman06-11-5683	STD	04/12/11
ARS1-B11-01169-06	TRG				**ARS1-11-00547**	003	1	Buckman08-11-5684	STD	04/12/11
ARS1-B11-01169-07	TRG				**ARS1-11-00548**	001	1	CALA-11-5224	STD	04/12/11
ARS1-B11-01169-08	TRG				**ARS1-11-00548**	002	1	CALA-11-5227	STD	04/12/11
ARS1-B11-01169-09	TRG				**ARS1-11-00549**	001	1	CAPU-11-5282	STD	04/12/11
ARS1-B11-01169-10	TRG				**ARS1-11-00549**	002	1	CAPU-11-5283	STD	04/12/11
ARS1-B11-01169-11	TRG				**ARS1-11-00549**	003	1	CAPU-11-5290	STD	04/12/11
ARS1-B11-01169-12	TRG				**ARS1-11-00549**	004	1	CAPU-11-5296	STD	04/12/11
ARS1-B11-01169-13	TRG				**ARS1-11-00549**	005	1	CAPU-11-5301	STD	04/12/11
ARS1-B11-01169-14	TRG				**ARS1-11-00549**	006	1	CAPU-11-5304	STD	04/12/11
ARS1-B11-01169-15	TRG				**ARS1-11-00549**	007	1	CAPU-11-5308	STD	04/12/11
ARS1-B11-01169-16	TRG				**ARS1-11-00549**	008	1	CAPU-11-5311	STD	04/12/11
ARS1-B11-01169-17	TRG				**ARS1-11-00549**	009	1	CAPU-11-5292	STD	04/12/11
ARS1-B11-01169-18	TRG				**ARS1-11-00601**	001	1	CAPU-11-5264	STD	04/18/11
ARS1-B11-01169-19	TRG				**ARS1-11-00601**	002	1	CAPU-11-5269	STD	04/18/11
ARS1-B11-01169-20	TRG				**ARS1-11-00601**	003	1	CAPU-11-5298	STD	04/18/11
ARS1-B11-01169-21	TRG				**ARS1-11-00602**	001	1	CALA-11-5106	STD	04/18/11
ARS1-B11-01169-22	TRG				**ARS1-11-00602**	002	1	CALA-11-5110	STD	04/18/11
ARS1-B11-01169-23	TRG				**ARS1-11-00602**	003	1	CALA-11-5173	STD	04/18/11

82987 11-00547-001-1 **XRAD**
82988 11-00547-002-1 **XRAD**
82989 11-00547-003-1 **XRAD**
82990 11-00548-001-1 **XRAD**
82991 11-00548-002-1 **XRAD**
82992 11-00549-001-1 **XRAD**
82993 11-00549-002-1 **XRAD**
82994 11-00549-003-1 **XRAD**
82995 11-00549-004-1 **XRAD**
82996 11-00549-005-1 **XRAD**
82997 11-00549-006-1 **XRAD**
82998 11-00549-007-1 **XRAD**
82999 11-00549-008-1 **XRAD**
83000 11-00549-009-1 **XRAD**
83001 11-00601-001-1 **XRAD**
83002 11-00601-002-1 **XRAD**
83003 11-00601-003-1 **XRAD**
83004 11-00602-001-1 **XRAD**
83005 11-00602-002-1 **XRAD**
83006 11-00602-003-1 **XRAD**

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
8125	ARS1-B11-01169	ARS1-B11-01169-01		1	g					JRABER	03/25/2011 10:12:57
8126	ARS1-B11-01169	ARS1-B11-01169-02		1	g					JRABER	03/25/2011 10:12:57
8127	ARS1-B11-01169	ARS1-B11-01169-03		1	g					JRABER	03/25/2011 10:12:58
8128	ARS1-B11-01169	ARS1-B11-01169-04	Buckman1-11-5682	5.02	g	82987				JRABER	03/25/2011 10:12:58
8129	ARS1-B11-01169	ARS1-B11-01169-05	Buckman06-11-5683	4.99	g	82988				JRABER	03/25/2011 10:12:58
8130	ARS1-B11-01169	ARS1-B11-01169-06	Buckman08-11-5684	5.02	g	82989				JRABER	03/25/2011 10:12:58
8131	ARS1-B11-01169	ARS1-B11-01169-07	CALA-11-5224	5	g	82990				JRABER	03/25/2011 10:12:58
8132	ARS1-B11-01169	ARS1-B11-01169-08	CALA-11-5227	5.01	g	82991				JRABER	03/25/2011 10:12:58
8133	ARS1-B11-01169	ARS1-B11-01169-09	CAPU-11-5282	5.03	g	82992				JRABER	03/25/2011 10:12:58
8134	ARS1-B11-01169	ARS1-B11-01169-10	CAPU-11-5283	5.02	g	82993				JRABER	03/25/2011 10:12:58
8135	ARS1-B11-01169	ARS1-B11-01169-11	CAPU-11-5290	5	g	82994				JRABER	03/25/2011 10:12:59
8136	ARS1-B11-01169	ARS1-B11-01169-12	CAPU-11-5296	4.99	g	82995				JRABER	03/25/2011 10:12:59
8137	ARS1-B11-01169	ARS1-B11-01169-13	CAPU-11-5301	5.02	g	82996				JRABER	03/25/2011 10:12:59
8138	ARS1-B11-01169	ARS1-B11-01169-14	CAPU-11-5304	5.03	g	82997				JRABER	03/25/2011 10:12:59
8139	ARS1-B11-01169	ARS1-B11-01169-15	CAPU-11-5308	5.02	g	82998				JRABER	03/25/2011 10:12:59
8140	ARS1-B11-01169	ARS1-B11-01169-16	CAPU-11-5311	5	g	82999				JRABER	03/25/2011 10:12:59
8141	ARS1-B11-01169	ARS1-B11-01169-17	CAPU-11-5292	5.01	g	83000				JRABER	03/25/2011 10:13:00
8142	ARS1-B11-01169	ARS1-B11-01169-18	CAPU-11-5264	5	g	83001				JRABER	03/25/2011 10:13:00
8143	ARS1-B11-01169	ARS1-B11-01169-19	CAPU-11-5269	4.99	g	83002				JRABER	03/25/2011 10:13:00
8144	ARS1-B11-01169	ARS1-B11-01169-20	CAPU-11-5298	5.03	g	83003				JRABER	03/25/2011 10:13:00
8145	ARS1-B11-01169	ARS1-B11-01169-21	CALA-11-5106	5.05	g	83004				JRABER	03/25/2011 10:13:00
8146	ARS1-B11-01169	ARS1-B11-01169-22	CALA-11-5110	5.03	g	83005				JRABER	03/25/2011 10:13:00
8147	ARS1-B11-01169	ARS1-B11-01169-23	CALA-11-5173	5.02	g	83006				JRABER	03/25/2011 10:13:00

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\20110331_1144
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110331_1144\20110331_1144.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110331_1144\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110331_1144\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL 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
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	0.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

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

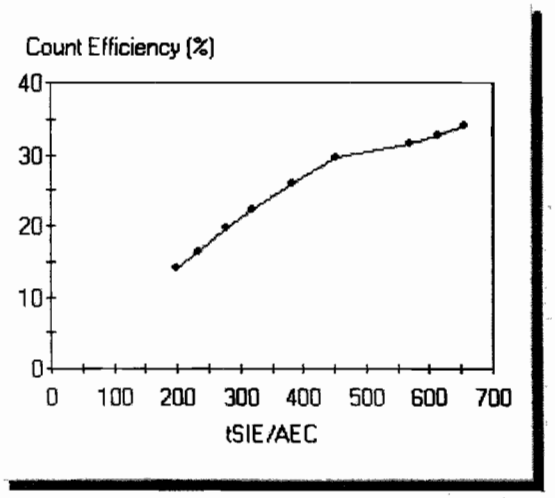
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 11/19/2010
Date Modified:
ARS LL H3 in A

tSIE/AEC	Count Efficiency (%)
655.11	34.08
613.27	32.77
569.42	31.54
454.14	29.55
383.12	26.06
318.52	22.25
280.21	19.79
235.97	16.48
199.12	13.98

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.559	5.00	550.14	31.21	3/31/2011	11:53:12 AM	
2	2	B11-01169-14	120.00	1.591	5.01	575.81	31.72	3/31/2011	2:03:15 PM	
2	3	B11-01169-15	120.00	2.660	8.33	583.86	31.95	3/31/2011	4:13:14 PM	
2	4	B11-01169-16	120.00	2.919	9.11	587.91	32.06	3/31/2011	6:23:11 PM	

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.621	5.08	582.21	31.90	3/28/2011	12:42:03 PM	
2	2	B11-01169-04	120.00	1.653	5.17	584.11	31.95	3/28/2011	2:52:00 PM	
2	3	B11-01169-05	120.00	1.610	5.03	585.73	32.00	3/28/2011	5:02:00 PM	
2	4	B11-01169-06	120.00	1.734	5.44	580.49	31.85	3/28/2011	7:12:01 PM	
2	5	B11-01169-07	120.00	1.751	5.50	580.93	31.86	3/28/2011	9:22:00 PM	
2	6	B11-01169-08	120.00	1.646	5.16	583.32	31.93	3/28/2011	11:32:01 PM	
Missing vial 7.										
Missing vial 8.										
Missing vial 9.										
Missing vial 10.										
Missing vial 11.										
Missing vial 12.										
2	13	B11-01169-15	120.00	2.751	8.61	584.35	31.96	3/29/2011	1:42:19 AM	
2	14	B11-01169-16	120.00	3.108	9.84	571.39	31.60	3/29/2011	3:52:19 AM	
2	15	B11-01169-17	120.00	1.520	4.75	584.76	31.97	3/29/2011	6:02:21 AM	
2	16	B11-01169-18	120.00	1.866	5.87	578.00	31.78	3/29/2011	8:12:22 AM	
2	17	B11-01169-19	120.00	1.676	5.30	572.50	31.63	3/29/2011	10:22:23 AM	
2	18	B11-01169-20	120.00	1.959	6.10	590.16	32.12	3/29/2011	12:32:24 PM	
2	19	B11-01169-21	120.00	2.143	6.77	572.98	31.64	3/29/2011	2:42:25 PM	
2	20	B11-01169-22	120.00	1.921	6.08	571.16	31.59	3/29/2011	4:52:25 PM	
2	21	B11-01169-23	120.00	1.808	5.75	564.03	31.45	3/29/2011	7:02:25 PM	

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.551	4.97	551.24	31.23	3/30/2011	8:28:07 AM	
2	2	B11-01169-09	120.00	1.409	4.48	565.67	31.48	3/30/2011	10:38:10 AM	
2	3	B11-01169-10	120.00	1.717	5.38	582.20	31.90	3/30/2011	12:48:11 PM	
2	4	B11-01169-11	120.00	1.623	5.14	571.10	31.59	3/30/2011	2:58:10 PM	
2	5	B11-01169-12	120.00	1.623	5.08	584.03	31.95	3/30/2011	5:08:09 PM	
2	6	B11-01169-13	120.00	1.690	5.32	577.03	31.75	3/30/2011	7:18:09 PM	
2	7	B11-01169-14	120.00	2.272	7.20	570.12	31.56	3/30/2011	9:28:10 PM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
3-23-11	1505	B11-01049-07	B11-01049	1920	[illegible]
↓	↓	B11-01049-08	↓	↓	[illegible]
↓	↓	B11-01049-09	↓	↓	[illegible]
↓	↓	B11-01049-10	↓	↓	[illegible]
↓	↓	B11-01049-11	↓	↓	[illegible]
↓	↓	B11-01049-12	↓	↓	[illegible]
↓	↓	B11-01049-13	↓	↓	[illegible]
↓	↓	B11-01049-14	↓	↓	[illegible]
↓	↓	B11-01049-15	↓	↓	[illegible]
↓	↓	B11-01049-16	↓	↓	[illegible]
↓	↓	B11-01049-17	↓	↓	[illegible]
3-28-11	0855	SNC 51	QA	QA	JDR
↓	↓	Background	B11-01169	1233	JDR
↓	↓	B11-01169-04	↓	↓	JDR
↓	↓	B11-01169-05	↓	↓	JDR
↓	↓	B11-01169-06	↓	↓	JDR
↓	↓	B11-01169-07	↓	↓	JDR
↓	↓	B11-01169-08	↓	↓	JDR
↓	↓	~~B11-01169-09~~ SKIPPED JDR	↓ 3-30-2011	↓	JDR
↓	↓	B11-01169-10	↓	↓	JDR

Reviewed By: LSW Initials Date: 3-29-11

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
3-28-11	0855	~~B11-01169-11~~ SKIPPED	~~B11-01169~~	1233	JDR
↓	↓	B11-01169-12	↓	JDR	JDR
↓	↓	B11-01169-13	↓	↓	3-30-2011
↓	↓	B11-01169-14	↓	↓	JDR
↓	↓	B11-01169-15	↓	↓	JDR
↓	↓	B11-01169-16	↓	↓	JDR
↓	↓	B11-01169-17	↓	↓	JDR
↓	↓	B11-01169-18	↓	↓	JDR
↓	↓	B11-01169-19	↓	↓	JDR
↓	↓	B11-01169-20	↓	↓	JDR
↓	↓	B11-01169-21	↓	↓	JDR
↓	↓	B11-01169-22	↓	↓	JDR
↓	↓	B11-01169-23	↓	↓	JDR LSW 3-29-11
3-30-2011	0816	Background ~~B11-01169~~ JDR 3-30-11	B11-01169	0819	JDR
↓	↓	B11-01169-09	↓	↓	JDR
↓	↓	B11-01169-10	↓	↓	JDR
↓	↓	B11-01169-11	↓	↓	JDR
↓	↓	B11-01169-12	↓	↓	JDR
↓	↓	B11-01169-13	↓	↓	JDR
↓	↓	B11-01169-14	↓	↓	JDR

Reviewed By: LSW Date: 4-5-11
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
3-31-11	1141	Background	B11-01169	1144	JDR
↓	↓	B11-01169-14	↓	↓	JDR
↓	↓	B11-01169-15	↓	↓	JDR
↓	↓	B11-01169-16	↓	↓	JDR
4-1-11	0827	SNC 51	QA	QA	JDR
↓	↓	Background	B11-00550	1013	JDR
↓	↓	B11-00550-01	↓	↓	JDR
↓	↓	B11-00550-02	↓	↓	JDR
↓	↓	B11-00550-03	↓	↓	JDR
↓	↓	B11-00550-04	↓	↓	JDR
↓	↓	B11-00550-05	↓	↓	JDR
↓	↓	B11-00550-06	↓	↓	JDR
↓	↓	B11-00550-07	↓	↓	JDR
↓	↓	B11-00550-08	↓	↓	JDR
↓	↓	B11-00550-09	↓	↓	JDR
↓	↓	B11-00550-10	JDR	↓	JDR
↓	↓	B11-00550-11	↓	4-3-11 ↓	JDR
↓	↓	B11-00550-12	↓	↓	JDR
↓	↓	B11-00550-13	↓	↓	JDR
↓	↓	B11-00550-14	↓	↓	JDR

SKIPPED

Reviewed By: LSW Date: 4-5-11
Initials

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

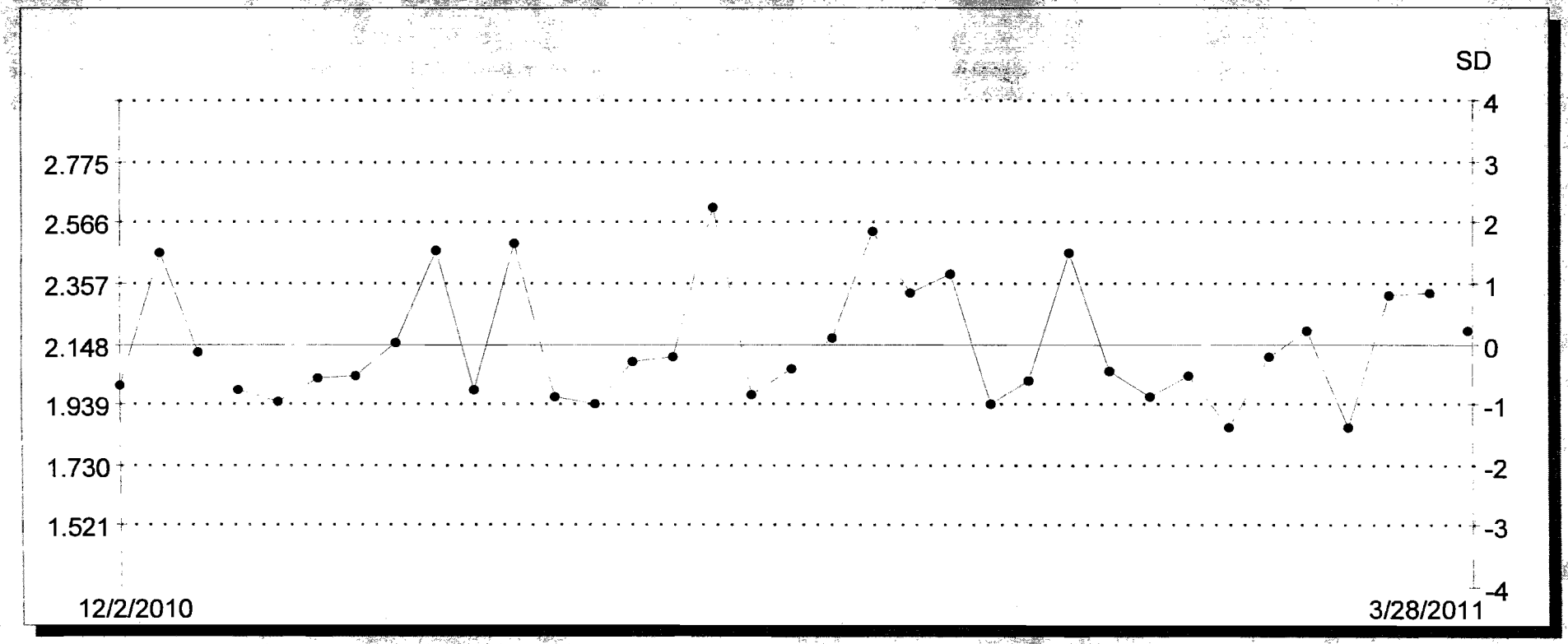
Tritium-Screening by Low Level Liquid Scintillation Counting

Control Charts

3H Background
Total # pts : 5219
Valid # pts : 35
Mean : 2.15
SD : 0.21

Date	Value	Valid Pt
Dec 02, 2010	2.00	X
Dec 08, 2010	2.46	X
Dec 13, 2010	2.12	X
Dec 15, 2010	1.99	X
Dec 22, 2010	1.95	X
Dec 29, 2010	2.03	X
Dec 30, 2010	2.04	X
Jan 03, 2011	2.15	X
Jan 05, 2011	2.47	X
Jan 10, 2011	1.99	X
Jan 11, 2011	2.49	X
Jan 14, 2011	1.96	X
Jan 19, 2011	1.94	X
Jan 21, 2011	2.09	X
Jan 27, 2011	2.10	X
Jan 29, 2011	2.62	X
Feb 01, 2011	1.97	X
Feb 07, 2011	2.06	X
Feb 09, 2011	2.17	X
Feb 10, 2011	2.54	X
Feb 13, 2011	2.33	X
Feb 18, 2011	2.39	X
Feb 22, 2011	1.94	X
Feb 24, 2011	2.02	X
Feb 25, 2011	2.46	X
Feb 28, 2011	2.05	X
Mar 02, 2011	1.96	X
Mar 06, 2011	2.04	X
Mar 13, 2011	1.86	X
Mar 16, 2011	2.11	X
Mar 17, 2011	2.19	X
Mar 17, 2011	1.86	X
Mar 18, 2011	2.32	X
Mar 25, 2011	2.32	X
Mar 28, 2011	2.20	X

3H Background
Total # pts : 5219
Valid # pts : 35
Mean : 2.15
SD : 0.21

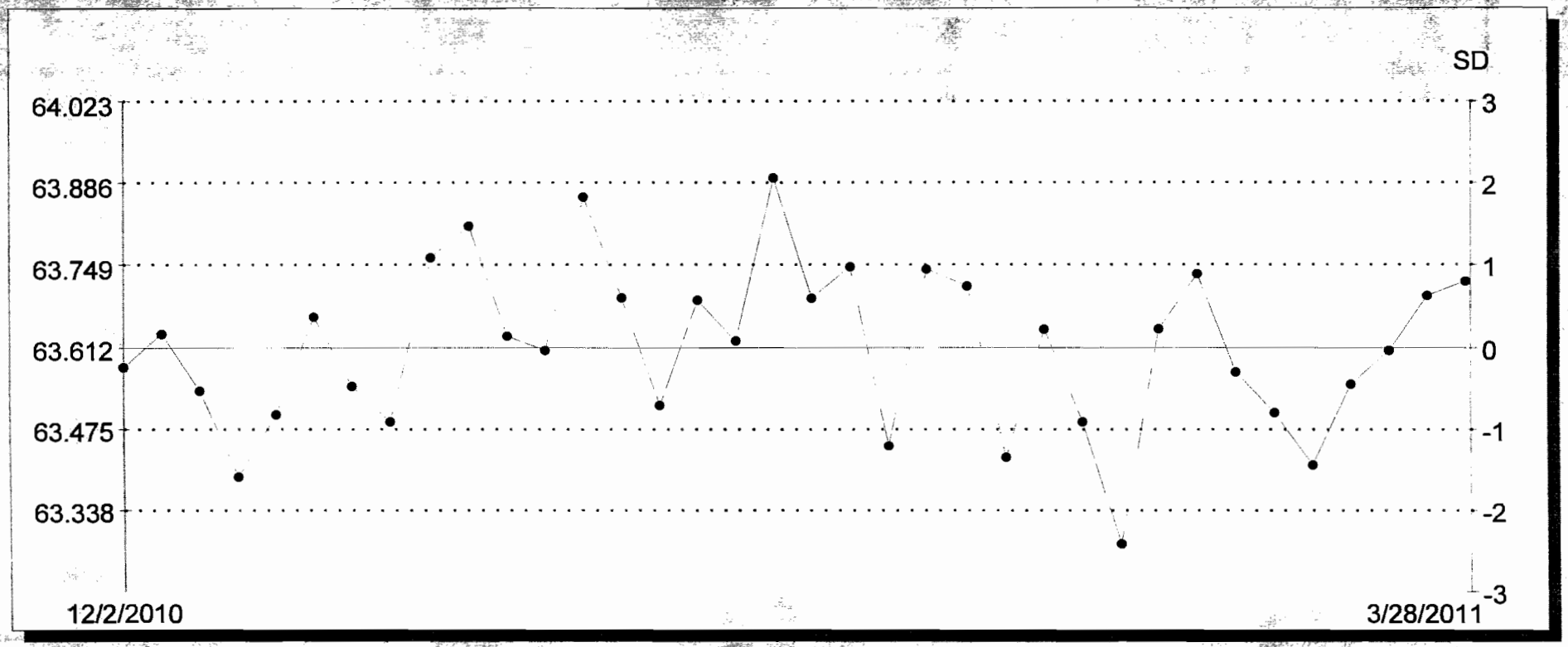


3H Efficiency
Total # pts : 5291
Valid # pts : 36
Mean : 63.61
SD : 0.14

Date	Value	Valid Pt
Dec 02, 2010	63.58	X
Dec 08, 2010	63.64	X
Dec 13, 2010	63.54	X
Dec 15, 2010	63.39	X
Dec 22, 2010	63.50	X
Dec 29, 2010	63.66	X
Dec 30, 2010	63.55	X
Jan 03, 2011	63.49	X
Jan 05, 2011	63.76	X
Jan 10, 2011	63.82	X
Jan 11, 2011	63.63	X
Jan 14, 2011	63.61	X
Jan 19, 2011	63.87	X
Jan 21, 2011	63.69	X
Jan 27, 2011	63.52	X
Jan 29, 2011	63.69	X
Feb 01, 2011	63.62	X
Feb 07, 2011	63.90	X
Feb 09, 2011	63.69	X
Feb 10, 2011	63.75	X
Feb 13, 2011	63.45	X
Feb 18, 2011	63.75	X
Feb 22, 2011	63.72	X
Feb 24, 2011	63.43	X
Feb 25, 2011	63.65	X
Feb 28, 2011	63.49	X
Mar 02, 2011	63.28	X
Mar 06, 2011	63.64	X
Mar 13, 2011	63.74	X
Mar 16, 2011	63.57	X
Mar 17, 2011	63.50	X
Mar 17, 2011	63.41	X
Mar 17, 2011	63.55	X
Mar 18, 2011	63.61	X
Mar 25, 2011	63.70	X
Mar 28, 2011	63.73	X

3H Efficiency

Total # pts	: 5291
Valid # pts	: 36
Mean	: 63.61
SD	: 0.14



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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: 5/13/2010 0:00 *date counted*
STANDARD REFERENCE #: S-0206

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

Radionuclide: H-3 Dilution Reference Date: 2/25/2009 8:30

Dilution Activity	3.01	pCi per gram ===> dpm/g	6.68
Verif. Date Decay Corrected	2.81	pCi per gram ===> dpm/g	6.24

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-0206-V1B	11.98	1	LSC	0.3328	1.62	5.040	6.18	2.78
S-0206-V2B	11.42	1	LSC	0.3186	1.62	5.010	6.13	2.76
S-0206-V3B	12.01	1	LSC	0.3360	1.62	4.990	6.19	2.79
S-0206-V4B	11.75	1	LSC	0.3275	1.62	5.010	6.17	2.78
S-0206-V5B	11.45	1	LSC	0.3196	1.62	5.020	6.13	2.76

Average	6.16	2.77
Two Sigma Uncertainty	0.06	0.02
Standard Deviation percent of known concentration	0.45%	0.45%
Target Activity	6.24	2.81
% Diff	-1.27%	-1.27%

10% Max *PASS*

5% Max *PASS*

Verification Expiration Date: May 13, 2011

Prepared & Counted By: Jeremy Raber Date: 5/13/2010 0:00

Verified & Approved By: Eugene Mulligan Date: 5/14/2010

QC Approval: Amy Engel Date: 5/14/2010

S-0206		
H-3	Verified	*5/14/10*
SL	**Expires**	**5/14/11**
Manufactuer	**NIST**	
Sol Matrix	H2O	
Ref No	NIST 4361C	
Tech	M. Thibodeaux	
Parent ID	S-0152	

ARS INTERNATIONAL

RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY

STD ID: S-0206

ARS INTERNATIONAL

Add/Edit Secondary Stds

Planning

Planning Comments	Create a Low Level H3 LCS solution.
Target dpm/g (on dil. date)	6.66
Target Final volume mL	500
Appx mass g of Parent Sol'n	49.8188436
Appx vol ml of Parent Sol'n	49.91868096
Expected Addition for Analysis g	5

Standards Preparation / Dilution

Secondary Solution #	S-0206
Dilution Date (New Ref Date)	02/25/2009 08:30
Ampoule, Empty (g)	
Ampoule /Solution Gross (g)	
Net Wt Removed (g)	
Transfer Container, empty (g)	103.64
Container Plus Solution (g)	153.45
Net Wt Transferred (g)	49.81
DPM Xferred on 02/25/2009 08:30	3329.408875
Diluent/matrix	Dead H2O
Diluent Density Cont, empty (g)	
Test Mass of 5 ml of Diluent (g)	
Diluent Density Test - (g/mL)	
Dilution Empty Container Mass (g)	198.75
Dilution Full Cont g (if measured)	697.31
Dilution Final Volume ml (if measured)	500
Final Dilution Density (g/mL)	0.99712
Final Dilution Measured Mass g	498.56
Comments	Use as H3LL LCS creation. Dilution performed as stated above by M Thibodeaux on 2/25/09. -BJS 2/25/09
Final Dilution dpm/g	6.678050535
Final Dil New Ref Date/Time	02/25/2009 08:30

Parent Standard Data

Parent Solution Reference #	NIST 4361C			
Parent Solution #	S-0152			
Parent Principal Radionuclide	H-3	Half Life (Days)	4499.8000000	
Parent Reference Date	09/03/1998 11:00			
Parent Certified Act	120.54	Certi Act/Vol Units	dpm	g
Parent Cert Act Uncert 1 Sigma	0.0076			
Parent Sp. Gravity G/Ml	0.998			
Parent Supplier	NIST			
Parent Date Recvd	12/04/06			
Parent Received By	LU			
Parent Cert Exp Date				
Parent Matrix	H2O			
Certified dpm/g At Ref Date	120.54			
Certified dpm/g on 02/25/2009 08:30	66.84217777			
Parent Comments	Liquid in a 500-ml borosilicate-glass medis bottle with teflon-lined screw cap. Approximately 500 grams			
Parent Tech	M. Thibodeaux			
Is_Primary	FALSE			
Is_LCS	TRUE			
Is_Tracer	FALSE			
Is_Calib	FALSE			

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for

Los Alamos National Laboratory

Folder Duplicate

Report Compilation Checklist

ARS SDG: 11-00547 **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~~	

Susan Reese 6-24-11
Report Generator Signature **Date**

VJM 6-24-11
Management Review Signature **Date**

ARS-059
07/03/2009

ARS INTERNATIONAL

LSC
Technical Review Checklist

ARS SDG ARS1-11-00547

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:**	ARS1-B11-01170	**Batch B:**	N/A	**Batch C:**	N/A
Test Method(s):		LSC-A-022		N/A		N/A

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Jimmy D. Raber 6-21-2011 — Chemist Signature, Date

Jamal Brown 6-21-11 — 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

VHM 6-24-11 — 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

N/A JOR 6-24-2011

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

Jimmy D. Raber 6-24-2011 — Analyst Signature, Date

N/A — Technicial Reviewer Signature, Date

ARS INTERNATIONAL

Batch A: ARS1-B11-01170

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): _____

Susan Leese 6-24-11
Project Manager Signature Date

VJM 6-24-11
QA Officer Signature Date

GENERAL COMMENTS

LSC
Technical Review Checklist

ARS SDG ARS1-11-00547

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:** ARS1-B11-01169 **Batch B:** N/A **Batch C:** N/A

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

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Chemist Signature: [signature] Date: 3-28-11

Verifier Review Signature: [signature] Date: 3-28-11

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

QA Officer Signature: [signature] Date: 6-24-11

	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

N/A 3-31-11

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

Analyst Signature: [signature] Date: 3-31-11

Technicial Reviewer Signature: N/A Date:

Batch A: ARS1-B11-01169

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): _____

Susan Leese 6-24-11
Project Manager Signature Date

[signature] 6-24-11
QA Officer Signature Date

GENERAL COMMENTS

SDG Report - Samples and Containers

SDG Specific Data

SDG	ARS1-11-00547	TAT Days	30	Project Type	Environmental
Sample Count	3 Rpt Level 4	Date Received	3/17/2011	COC Number	11-1637
Client	Los Alamos National Laboratory	Client Deadline	4/15/2011	PO Number	63641-001-10
Client Code	114	Internal Deadline	4/14/2011	Job Number	WEPR1158W100
Profile Number	PN-00094	Lab Deadline	4/12/2011	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	Buckman1-11-5682	AQ	03/14/11 12:00 PM	03/14/11 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	82442	1	1000.00				20	11		N	N/A				
002	Buckman06-11-5683	AQ	03/14/11 12:00 PM	03/14/11 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	82443	1	1000.00				20	12		N	N/A				
003	Buckman08-11-5684	AQ	03/14/11 12:00 PM	03/14/11 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	82444	1	1000.00				20	12		N	N/A				

SDG Report - Analysis Assignments

Temp SDG	ARS1-11-00547	Sample Count	3
Client	Los Alamos National Laboratory	Analysis Count	2-6

Samples Count Totals per Analysis

Analysis Code	Analysis Description	Samples Count
LSC-A-021	Low Level Tritium Screen in (Aqueous)	3
LSC-A-022	Low Level Tritium by Enrichment Process in (Aqueous [AQ])	3

Analyses Assigned Per Fraction

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

DQO Report for SDG
ARS1-11-00547

Analysis Code	Group	Isotope	Activity Units	Aliquot Units	ProcedureNo	RDL	LCS_LL	LCS_UL	MS_LL	MS_UL	RadY_LL	RadY_UL	GravY_LL	GravY_LL	RER	RPD	DiltionReq	RoughPrepReq	BlankCorrectionMDA	BlankCorrectionAll	CountTimeReq	AliquotRequired
LSC-A-021	STD	H-3		TU	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		TU	ARS-054	0.00E+00	75	125	60	140	30	110	40	110	1.00	25	FALSE	FALSE	FALSE	FALSE		

ARS FILE TRACKING SHEET

SDG: ARS1-11-00547

Task	Date / Time	Initials
Date & Time Samples Received	03-17-11/10:09	CWB
ICOC Initiated / Storage Location: LL3H	03-17-11/11:39	CWB
Technical Checks Performed	See Batch	—
Report Written / EDD Generated: 6-24-11/1357 (Date/Time) SDL (Initials)	6-24-11/1355	SDL
Quality Assurance Checks Performed on Report	6-24-11 1420	JYM
Management Check Performed on Report		
Preliminary Report Sent	na	—
Report E-mailed	6-24-11/1448	SDL
Report Faxed	na	—
Report Reviewed	7-28-11/1517	MB
Report Mailed	NA	
Invoice Completed Invoice #: 110132	6-30-11/1212	D
Report Imaged	7-28-11/1528	MB

SPECIAL REQUIREMENTS

Requirement	Yes	No
3 Hour Rush		✓
24 Hour Rush		✓
48 Hour Rush		✓
Special Invoicing *see notes* Mgmt. Approval:		✓

NOTES:

ARS-062
04/23/2010

COMPANY NAME: Los Alamos National Lab **SDG:** ARS1-1100547

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 3

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

External and Internal Surveys

Exposure Rate Meter:	M3 242861	Serial No.:	M44-2 PR264266	Calibration Due Date:	4-19-11
Count Rate Meter:	M2 154859	Serial No.:	M44-9 PR184559	Calibration Due Date:	4-6-11

Background Exposure Rate (µR/hr)	28	Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd)	12	µR/hr
Background Count Rate (cpm)	60	Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd)	20	cpm
		Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd)	20	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
Buckman1-11-5682					1000 mL	11	20
1061-5683					1000 mL	12	20
1081-5684					1000 mL	12	20

Surveyors Name: [signature] Date/Time Surveyed: 3-17-11 / 10:58

S:\Procedures_Controlled\Controlled Forms\ARS-062 Sample Receipt Inspection Form

Page 1 of 1

ARS INTERNATIONAL

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Request Number: 11-473

REVISED

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 11-473

Original COC

Thursday, November 11, 2010

REQUEST NUMBER: 11-473

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

These Samples are on:
LANL Request Number:11-473
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples according to the schedule indicated:

SHIP DATE: 11/11/2010
TURNAROUND/REPORT DUE: 12/11/2010
TURNAROUND REQ'D: 30 Days

RAD SCREENING: Yes, Below Background
LAB REQUEST COMMENTS:

LANL ER SMO CONTACT:
Signature:

PRIORITY	METHOD CODE	CNTNR	SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	SPECIAL INSTRUCTIONS
	Generic:Low_Level_Tritium	1	Buckman1-11-1944	WG	11/10/2010	
		1	Buckman06-11-1970	WG	11/10/2010	
		1	Buckman08-11-2042	WG	11/10/2010	

Final Page of REQUEST NUMBER 11-473

Thursday, November 11, 2010

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 11-473C

REQUEST NUMBER: 11-473

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806
LAB REQUEST COMMENTS:

TURNAROUND/REPORT DUE: 12/11/2010
TURNAROUND REQ'D: 30

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman1-11-1944	1	POLY	WSP-LL-H-3	None	WG
Buckman06-11-1970	1	POLY	WSP-LL-H-3	None	WG
Buckman08-11-2042	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:	Date	Time	Received By:	Date	Time
[illegible]	11/11/10	3:00	[illegible]	11-16-10	11:08
Printed Name / Signature			Printed Name / Signature		
Printed Name / Signature			Printed Name / Signature		
Printed Name / Signature			Printed Name / Signature		

Received for DISPOSAL By: **Date** **Time** **Remarks:**

Printed Name Signature

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: 11-473

Case Narrative

ARS INTERNATIONAL

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

March 14, 2011

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

Request Number: **11-473**
LANL Sample ID: Buckman1-11-1944; Buckman06-11-1970; Buckman08-11-2042.

Dear Mr. Greene;

On November 16, 2010, ARS International received three (3) water samples to be analyzed for Low Level Tritium.

The samples underwent enrichment and were counted using the appropriate counting equipment and QA/QC for this type of analysis. Results of the analysis and QA/QC are attached in the data package.

The client and QA/QC samples were counted with a count time sufficient to meet quality control parameters for counting equipment and were within acceptance criteria and statistical sound detection limits.

If you have any questions please do not hesitate to call at 225.381.2991 or email LANL@amrad.com.

Sincerely,

Eugene Mulligan

Laboratory Management
ARS International

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

COVER PAGE

PROJECT SAMPLE IDENTIFICATION
CROSS-REFERENCE
TO ARS SAMPLE LABORATORY IDs

Subcontract (LANL Agreement Number) 63641-001-10

Request Number	LANL PROJECT SAMPLE ID NUMBER	American Radiation Services SAMPLE ID NUMBER(S)
11-473	Buckman1-11-1944	ARS1-10-02491-001
11-473	Buckman06-11-1970	ARS1-10-02491-002
11-473	Buckman08-11-2042	ARS1-10-02491-003

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

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

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	Title	Date
Dwyane Mulligan	Laboratory Management, ARS International	3-14-11

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-10-02491	**Request or PO Number:**	11-473
Client Sample ID:	Buckman1-11-1944	**ARS Sample ID:**	ARS1-10-02491-001
Sample Collection Date:	11/10/10	**Date Received:**	11/16/10
Sample Matrix:	Aqueous	**Report Date:**	08/18/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.050	0.230	0.790	0.380	U	TU	ARS-040	03/04/11 00:00	JR	NA

NOTES: Project Cost Code WEPR 1158W100

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 NELAP Certificate # E87558

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-10-02491	**Request or PO Number:**	11-473
Client Sample ID:	Buckman06-11-1970	**ARS Sample ID:**	ARS1-10-02491-002
Sample Collection Date:	11/10/10	**Date Received:**	11/16/10
Sample Matrix:	Aqueous	**Report Date:**	08/18/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.030	0.230	0.760	0.370	U	TU	ARS-040	03/04/11 00:00	JR	NA

NOTES: Project Cost Code WEPR 1158W100

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 NELAP Certificate # E87558

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-10-02491	**Request or PO Number:**	11-473
Client Sample ID:	Buckman08-11-2042	**ARS Sample ID:**	ARS1-10-02491-003
Sample Collection Date:	11/10/10	**Date Received:**	11/16/10
Sample Matrix:	Aqueous	**Report Date:**	08/18/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.580	0.250	0.750	0.360	U	TU	ARS-040	03/04/11 00:00	JR	NA

NOTES: Project Cost Code WEPR 1158W100

Project Manager Review

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

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QC Results Report

Sample Delivery Group: ARS1-10-02491
Date Received: 11/16/2010

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-B10-05618	LCS	H3	8.130	1.260	0.770	8.340		TU	ARS-040	3/2/11 19:27	JR	97	75%-125%

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-B10-05618	MBL	H3	-0.610	0.210	0.680	NA	U	TU	ARS-040	3/3/11 7:52	JR

Sample RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER AcceptanceRange
ARS1-B10-05618	LCSD	H3	8.130	1.260	9.020	1.410		TU	ARS-040	3/3/11 1:40	JR	0.33	< 1

Sample DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER AcceptanceRange
ARS1-B10-05618	LCSD	H3	8.130	1.260	9.020	1.410		TU	ARS-040	3/3/11 1:40	JR	0.94	< 3

Project Manager Review

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

LELAP Certificate# 01949 NELAP Certificate # E87558

Expected Value Calculations LANL

ARS Batch Number: ARS1-B10 - 05618

LCS	**CALCULATED EXPECTED VALUE**	=	26.863	TU 8.340			
			Range	21.490	-	32.235	
LCSD	**CALCULATED EXPECTED VALUE**	=	26.822	8.327			
			Range	21.458	-	32.186	

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting Samples

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	10-02492; 2491; 2509; 2510; 2511
ARS Batch ID Number	ARS1-B10-05618

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8.978E-01
b	-9.611E-01
c	

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	TU
Coverage Factor	1	UCF	7.151
		Aliquot must be entered in liters!!	

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f'	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
ARS1-B10-05618-01	503.97	2.00	11.67	2.06	9.61	0.02	40.36	4.86	1.55	552.66	0.3125	0.00500	L	2/25/2009	3/2/2011	360	360	0.90311	8.13	0.33	0.33	1.26	0.77	0.37	TU
ARS1-B10-05618-02	504.74	2.00	12.50	2.06	10.44	0.02	37.33	4.96	1.55	559.26	0.3137	0.00500	L	2/25/2009	3/3/2011	360	360	0.90299	9.02	0.36	0.36	1.40	0.83	0.40	TU
ARS1-B10-05618-03	505.04	2.00	11.49	2.06	9.43	0.02	41.19	1.27	1.55	552.74	0.3125	0.00500	L	3/13/2011	3/3/2011	360	360	1.00137	-0.61	0.19	0.19	0.21	0.68	0.33	TU
ARS1-B10-05618-04	492.05	2.02	11.78	2.08	9.70	0.02	39.09	1.67	1.55	555.57	0.3130	0.00502	L	11/9/2010	3/3/2011	360	360	0.9843	0.28	0.22	0.22	0.22	0.72	0.35	TU
ARS1-B10-05618-05	500.17	2.01	9.69	2.07	7.62	0.02	50.08	39.77	1.55	566.39	0.3149	0.00503	L	11/10/2010	3/3/2011	360	360	0.98444	68.44	0.61	0.61	10.28	0.56	0.27	TU
ARS1-B10-05618-07	499.25	2.01	11.20	2.07	9.13	0.02	42.02	1.65	1.55	555.37	0.3130	0.00501	L	11/9/2010	3/4/2011	360	360	0.98417	0.22	0.20	0.20	0.21	0.67	0.33	TU
ARS1-B10-05618-08	496.29	2.00	10.23	2.06	8.17	0.02	46.49	1.57	1.55	552.08	0.3124	0.00389	L	11/10/2010	3/4/2011	360	360	0.9843	0.05	0.23	0.23	0.23	0.79	0.38	TU
ARS1-B10-05618-09	497.25	2.02	12.37	2.08	10.29	0.02	37.31	1.56	1.55	546.49	0.3115	0.00502	L	11/10/2010	3/4/2011	360	360	0.9843	0.03	0.23	0.23	0.23	0.76	0.37	TU
ARS1-B10-05618-10	493.65	2.00	12.04	2.06	9.98	0.02	38.16	1.79	1.55	548.40	0.3118	0.00500	L	11/10/2010	3/4/2011	360	360	0.9843	0.58	0.23	0.23	0.25	0.75	0.36	TU
ARS1-B10-05618-11	500.41	2.00	12.09	2.06	10.03	0.02	38.47	1.95	1.70	587.47	0.3205	0.00501	L	11/17/2010	3/8/2011	360	360	0.98471	0.57	0.23	0.23	0.25	0.75	0.37	TU
ARS1-B10-05618-12	492.12	1.99	12.67	2.05	10.62	0.02	35.84	1.86	1.70	576.12	0.3173	0.00502	L	11/17/2010	3/9/2011	360	360	0.98458	0.40	0.25	0.25	0.25	0.81	0.40	TU
ARS1-B10-05618-13	486.78	2.02	12.58	2.08	10.50	0.02	35.85	12.91	1.70	597.10	0.3232	0.00502	L	11/16/2010	3/9/2011	360	360	0.98444	27.37	0.49	0.49	4.14	0.80	0.39	TU
ARS1-B10-05618-15	496.95	2.00	11.59	2.06	9.53	0.02	40.14	2.46	1.70	587.77	0.3205	0.00501	L	11/11/2010	3/9/2011	360	360	0.98376	1.68	0.24	0.24	0.35	0.72	0.35	TU
ARS1-B10-05618-16	492.30	2.01	11.87	2.07	9.80	0.02	38.73	1.69	1.70	579.51	0.3182	0.00502	L	11/11/2010	3/9/2011	360	360	0.98376	-0.02	0.22	0.22	0.22	0.75	0.37	TU
ARS1-B10-05618-17	495.86	2.01	13.27	2.07	11.20	0.02	34.30	1.74	1.70	594.71	0.3225	0.00501	L	11/11/2010	3/10/2011	360	360	0.98362	0.10	0.25	0.25	0.25	0.84	0.41	TU
ARS1-B10-05618-18	500.10	2.00	11.54	2.06	9.48	0.02	40.59	4.73	1.70	582.89	0.3192	0.00501	L	11/11/2010	3/10/2011	360	360	0.98362	6.64	0.29	0.29	1.04	0.72	0.35	TU
ARS1-B10-05618-19	495.16	2.01	12.34	2.07	10.27	0.02	37.23	1.66	1.70	590.76	0.3214	0.00500	L	11/16/2010	3/10/2011	360	360	0.9843	-0.09	0.23	0.23	0.23	0.78	0.38	TU
ARS1-B10-05618-20	503.55	2.00	13.26	2.06	11.20	0.02	34.81	1.76	1.70	592.76	0.3219	0.00500	L	11/16/2010	3/10/2011	360	360	0.9843	0.15	0.25	0.25	0.25	0.83	0.41	TU
ARS1-B10-05618-21	502.44	2.00	11.78	2.06	9.72	0.02	39.81	1.64	1.70	581.40	0.3188	0.00501	L	11/12/2010	3/11/2011	360	360	0.98362	-0.13	0.22	0.22	0.22	0.73	0.36	TU
ARS1-B10-05618-22	498.54	2.00	11.73	2.06	9.67	0.02	39.71	1.81	1.70	582.46	0.3191	0.00502	L	11/12/2010	3/11/2011	360	360	0.98362	0.25	0.22	0.22	0.22	0.73	0.36	TU
ARS1-B10-05618-23	492.59	2.00	12.09	2.06	10.03	0.02	37.89	1.67	1.70	590.19	0.3212	0.00504	L	11/12/2010	3/11/2011	360	360	0.98362	-0.07	0.22	0.22	0.22	0.76	0.37	TU

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	10-02492; 2491; 2509; 2510; 2511
ARS Batch ID Number	ARS1-B10-05618

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8.978E-01
b	-9.611E-01
c	

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	**ACF (def. = 1)**	1
Syserror	0.15	**Reporting Units**	**pCi**
Coverage Factor	1	**UCF**	2.22

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
ARS1-B10-05618-01	503.97	2.00	11.67	2.06	9.61	0.02	40.36	4.86	1.55	552.66	0.3125	0.00500	L	2/25/2009	3/2/2011	360	360	0.90311	26.19	1.06	1.06	4.07	2.47	1.21	pCi/L
ARS1-B10-05618-02	504.74	2.00	12.50	2.06	10.44	0.02	37.33	4.96	1.55	559.26	0.3137	0.00500	L	2/25/2009	3/3/2011	360	360	0.90299	29.06	1.15	1.15	4.51	2.66	1.30	pCi/L
ARS1-B10-05618-03	505.04	2.00	11.49	2.06	9.43	0.02	41.19	1.27	1.55	552.74	0.3125	0.00500	L	3/13/2011	3/3/2011	360	360	1.00137	-1.95	0.62	0.62	0.68	2.19	1.07	pCi/L
ARS1-B10-05618-04	492.05	2.02	11.78	2.08	9.70	0.02	39.09	1.67	1.55	555.57	0.3130	0.00502	L	11/9/2010	3/3/2011	360	360	0.9843	0.90	0.70	0.70	0.72	2.33	1.14	pCi/L
ARS1-B10-05618-05	500.17	2.01	9.69	2.07	7.62	0.02	50.08	39.77	1.55	566.39	0.3149	0.00503	L	11/10/2010	3/3/2011	360	360	0.98444	220.47	1.95	1.95	33.13	1.80	0.88	pCi/L
ARS1-B10-05618-07	499.25	2.01	11.20	2.07	9.13	0.02	42.02	1.65	1.55	555.37	0.3130	0.00501	L	11/9/2010	3/4/2011	360	360	0.98417	0.70	0.65	0.65	0.66	2.17	1.06	pCi/L
ARS1-B10-05618-08	496.29	2.00	10.23	2.06	8.17	0.02	46.49	1.57	1.55	552.08	0.3124	0.00389	L	11/10/2010	3/4/2011	360	360	0.9843	0.17	0.75	0.75	0.75	2.53	1.24	pCi/L
ARS1-B10-05618-09	497.25	2.02	12.37	2.08	10.29	0.02	37.31	1.56	1.55	546.49	0.3115	0.00502	L	11/10/2010	3/4/2011	360	360	0.9843	0.09	0.73	0.73	0.73	2.45	1.20	pCi/L
ARS1-B10-05618-10	493.65	2.00	12.04	2.06	9.98	0.02	38.16	1.79	1.55	548.40	0.3118	0.00500	L	11/10/2010	3/4/2011	360	360	0.9843	1.85	0.74	0.74	0.79	2.41	1.17	pCi/L
ARS1-B10-05618-11	500.41	2.00	12.09	2.06	10.03	0.02	38.47	1.95	1.70	587.47	0.3205	0.00501	L	11/17/2010	3/8/2011	360	360	0.98471	1.85	0.75	0.75	0.80	2.42	1.18	pCi/L
ARS1-B10-05618-12	492.12	1.99	12.67	2.05	10.62	0.02	35.84	1.86	1.70	576.12	0.3173	0.00502	L	11/17/2010	3/9/2011	360	360	0.98458	1.28	0.80	0.80	0.82	2.62	1.28	pCi/L
ARS1-B10-05618-13	486.78	2.02	12.58	2.08	10.50	0.02	35.85	12.91	1.70	597.10	0.3232	0.00502	L	11/16/2010	3/9/2011	360	360	0.98444	88.18	1.58	1.58	13.32	2.57	1.26	pCi/L
ARS1-B10-05618-15	496.95	2.00	11.59	2.06	9.53	0.02	40.14	2.46	1.70	587.77	0.3205	0.00501	L	11/11/2010	3/9/2011	360	360	0.98376	5.40	0.76	0.76	1.11	2.32	1.14	pCi/L
ARS1-B10-05618-16	492.30	2.01	11.87	2.07	9.80	0.02	38.73	1.69	1.70	579.51	0.3182	0.00502	L	11/11/2010	3/9/2011	360	360	0.98376	-0.07	0.72	0.72	0.72	2.42	1.18	pCi/L
ARS1-B10-05618-17	495.86	2.01	13.27	2.07	11.20	0.02	34.30	1.74	1.70	594.71	0.3225	0.00501	L	11/11/2010	3/10/2011	360	360	0.98362	0.33	0.81	0.81	0.81	2.70	1.32	pCi/L
ARS1-B10-05618-18	500.10	2.00	11.54	2.06	9.48	0.02	40.59	4.73	1.70	582.89	0.3192	0.00501	L	11/11/2010	3/10/2011	360	360	0.98362	21.38	0.94	0.94	3.34	2.31	1.13	pCi/L
ARS1-B10-05618-19	495.16	2.01	12.34	2.07	10.27	0.02	37.23	1.66	1.70	590.76	0.3214	0.00500	L	11/16/2010	3/10/2011	360	360	0.9843	-0.31	0.74	0.74	0.74	2.50	1.22	pCi/L
ARS1-B10-05618-20	503.55	2.00	13.26	2.06	11.20	0.02	34.81	1.76	1.70	592.76	0.3219	0.00500	L	11/16/2010	3/10/2011	360	360	0.9843	0.49	0.80	0.80	0.80	2.67	1.31	pCi/L
ARS1-B10-05618-21	502.44	2.00	11.78	2.06	9.72	0.02	39.81	1.64	1.70	581.40	0.3188	0.00501	L	11/12/2010	3/11/2011	360	360	0.98362	-0.43	0.69	0.69	0.70	2.36	1.15	pCi/L
ARS1-B10-05618-22	498.54	2.00	11.73	2.06	9.67	0.02	39.71	1.81	1.70	582.46	0.3191	0.00502	L	11/12/2010	3/11/2011	360	360	0.98362	0.79	0.71	0.71	0.72	2.36	1.15	pCi/L
ARS1-B10-05618-23	492.59	2.00	12.09	2.06	10.03	0.02	37.89	1.67	1.70	590.19	0.3212	0.00504	L	11/12/2010	3/11/2011	360	360	0.98362	-0.22	0.72	0.72	0.72	2.44	1.19	pCi/L

QC Evaluation

EPA Method: ARS-040
Batch ID: ARS1-B10-05618
SDG's: ARS1-10-2492; 2491; 2509; 2510; 2511

LCS	26.1900	**CSU (2s)**	7.9700
LCSD	29.0600	**CSU-D (2s)**	8.8300

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

at 1 sigma

DER $\frac{2.87}{5.947474}$ = 0.482558 **< 3**

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

%RPD $\frac{2.87}{27.625}$ *100 = 10.38914 **< 25%**

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

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

at 2 sigma

RER = $\frac{2.87}{16.8000}$ 0.170833333 **<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	-1.95	1.34	2.19	
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 = -1.95
CSU = 1.34
Is ACT<1.65*CSU? YES

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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-05618**

Method **ARS-054** **Analysis** **LSC-A-022** **Matrix** **AQ**

Description **Low Level Tritium by Enrichment**

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-05618-01	LCS	B-11110								
ARS1-B10-05618-02	LCSD	B-11111								
ARS1-B10-05618-03	MBL									
ARS1-B10-05618-04	TRG				**ARS1-10-02492**	002	1	CAMO-11-1269	STD	12/07/10
ARS1-B10-05618-05	TRG				**ARS1-10-02492**	003	1	CAMO-11-1271	STD	12/07/10
ARS1-B10-05618-07	TRG				**ARS1-10-02492**	005	1	CAMO-11-1302	STD	12/07/10
ARS1-B10-05618-08	TRG				**ARS1-10-02491**	001	1	Buckman1-11-1944	STD	12/13/10
ARS1-B10-05618-09	TRG				**ARS1-10-02491**	002	1	Buckman06-11-1970	STD	12/13/10
ARS1-B10-05618-10	TRG				**ARS1-10-02491**	003	1	Buckman08-11-2042	STD	12/13/10
ARS1-B10-05618-11	TRG				**ARS1-10-02509**	001	1	CASA-11-1365	STD	12/14/10
ARS1-B10-05618-12	TRG				**ARS1-10-02509**	002	1	CASA-11-1367	STD	12/14/10
ARS1-B10-05618-13	TRG				**ARS1-10-02510**	001	1	CASA-11-1360	STD	12/14/10
ARS1-B10-05618-15	TRG				**ARS1-10-02510**	003	1	CASA-11-1371	STD	12/14/10
ARS1-B10-05618-16	TRG				**ARS1-10-02510**	004	1	CASA-11-1373	STD	12/14/10
ARS1-B10-05618-17	TRG				**ARS1-10-02510**	005	1	CASA-11-1374	STD	12/14/10
ARS1-B10-05618-18	TRG				**ARS1-10-02510**	006	1	CASA-11-1376	STD	12/14/10
ARS1-B10-05618-19	TRG				**ARS1-10-02510**	007	1	CASA-11-1379	STD	12/14/10
ARS1-B10-05618-20	TRG				**ARS1-10-02510**	008	1	CASA-11-1380	STD	12/14/10
ARS1-B10-05618-21	TRG				**ARS1-10-02511**	001	1	CAMO-11-1262	STD	12/14/10
ARS1-B10-05618-22	TRG				**ARS1-10-02511**	002	1	CAMO-11-1265	STD	12/14/10
ARS1-B10-05618-23	TRG				**ARS1-10-02511**	003	1	CAMO-11-1285	STD	12/14/10

82203 10-02492-002-1 **XRAD**

82204 10-02492-003-1 **XRAD**

82205 10-02492-005-1 **XRAD**

82206 10-02491-001-1 **XRAD**

82207 10-02491-002-1 **XRAD**

82208 10-02491-003-1 **XRAD**

82209 10-02509-001-1 **XRAD**

82210 10-02509-002-1 **XRAD**

82211 10-02510-001-1 **XRAD**

82212 10-02510-003-1 **XRAD**

82213 10-02510-004-1 **XRAD**

82214 10-02510-005-1 **XRAD**

82215 10-02510-006-1 **XRAD**

82216 10-02510-007-1 **XRAD**

82217 10-02510-008-1 **XRAD**

82218 10-02511-001-1 **XRAD**

82219 10-02511-002-1 **XRAD**

82220 10-02511-003-1 **XRAD**

LCS Report
Analytical Batch: ARS1-B10-05618

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-11110	ARS1-B10-05618	ARS1-B10-05618-01	B-H3	S-0206	H-3	5	2.721946554	17.18	22.22	5.04	TBYRD	12/6/2010			
B-11111	ARS1-B10-05618	ARS1-B10-05618-02	B-H3	S-0206	H-3	5	2.721946554	17.22	22.26	5.04	TBYRD	12/6/2010			

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
8011	ARS1-B10-05618	ARS1-B10-05618-01		5	g					JRABER	03/13/2011 17:01:16
8012	ARS1-B10-05618	ARS1-B10-05618-02		5	g					JRABER	03/13/2011 17:01:16
8013	ARS1-B10-05618	ARS1-B10-05618-03		5	g					JRABER	03/13/2011 17:01:16
8014	ARS1-B10-05618	ARS1-B10-05618-04	CAMO-11-1269	5.02	g	82203				JRABER	03/13/2011 17:01:16
8015	ARS1-B10-05618	ARS1-B10-05618-05	CAMO-11-1271	5.03	g	82204				JRABER	03/13/2011 17:01:17
8016	ARS1-B10-05618	ARS1-B10-05618-07	CAMO-11-1302	5.01	g	82205				JRABER	03/13/2011 17:01:17
8017	ARS1-B10-05618	ARS1-B10-05618-08	Buckman1-11-1944	3.89	g	82206				JRABER	03/13/2011 17:01:17
8018	ARS1-B10-05618	ARS1-B10-05618-09	Buckman06-11-1970	5.02	g	82207				JRABER	03/13/2011 17:01:18
8019	ARS1-B10-05618	ARS1-B10-05618-10	Buckman08-11-2042	5	g	82208				JRABER	03/13/2011 17:01:18
8020	ARS1-B10-05618	ARS1-B10-05618-11	CASA-11-1365	5.01	g	82209				JRABER	03/13/2011 17:01:18
8021	ARS1-B10-05618	ARS1-B10-05618-12	CASA-11-1367	5.02	g	82210				JRABER	03/13/2011 17:01:18
8022	ARS1-B10-05618	ARS1-B10-05618-13	CASA-11-1360	5.02	g	82211				JRABER	03/13/2011 17:01:19
8023	ARS1-B10-05618	ARS1-B10-05618-15	CASA-11-1371	5.01	g	82212				JRABER	03/13/2011 17:01:19
8024	ARS1-B10-05618	ARS1-B10-05618-16	CASA-11-1373	5.02	g	82213				JRABER	03/13/2011 17:01:20
8025	ARS1-B10-05618	ARS1-B10-05618-17	CASA-11-1374	5.01	g	82214				JRABER	03/13/2011 17:01:20
8026	ARS1-B10-05618	ARS1-B10-05618-18	CASA-11-1376	5.01	g	82215				JRABER	03/13/2011 17:01:20
8027	ARS1-B10-05618	ARS1-B10-05618-19	CASA-11-1379	5	g	82216				JRABER	03/13/2011 17:01:21
8028	ARS1-B10-05618	ARS1-B10-05618-20	CASA-11-1380	5	g	82217				JRABER	03/13/2011 17:01:21
8029	ARS1-B10-05618	ARS1-B10-05618-21	CAMO-11-1262	5.01	g	82218				JRABER	03/13/2011 17:01:21
8030	ARS1-B10-05618	ARS1-B10-05618-22	CAMO-11-1265	5.02	g	82219				JRABER	03/13/2011 17:01:21
8031	ARS1-B10-05618	ARS1-B10-05618-23	CAMO-11-1285	5.04	g	82220				JRABER	03/13/2011 17:01:22

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\20110302_1306
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110302_1306\20110302_1306.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110302_1306\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110302_1306\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL 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
Count Time (min): 360.00
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	0.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

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

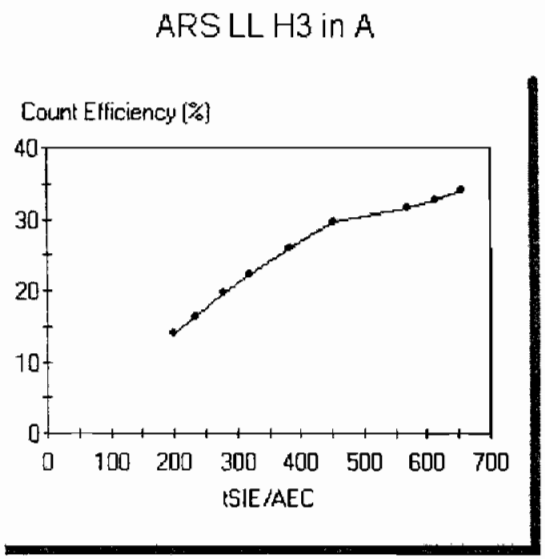
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 11/19/2010
Date Modified:
ARS LL H3 in A

tSIE/AEC	Count Efficiency (%)
655.11	34.08
613.27	32.77
569.42	31.54
454.14	29.55
383.12	26.06
318.52	22.25
280.21	19.79
235.97	16.48
199.12	13.98

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff	Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	360.00	1.700	5.32	583.51		31.94	3/8/2011	11:42:40 AM	
2	2	B10-05618-11	360.00	1.948	6.08	587.47		32.05	3/8/2011	5:54:51 PM	
2	3	B10-05618-12	360.00	1.862	5.87	576.12		31.73	3/9/2011	12:12:51 AM	
2	4	B10-05618-13	360.00	12.914	39.96	597.10		32.32	3/9/2011	6:30:49 AM	
2	5	B10-05618-15	360.00	2.459	7.67	587.77		32.05	3/9/2011	12:46:04 PM	
2	6	B10-05618-16	360.00	1.692	5.32	579.51		31.82	3/9/2011	6:58:27 PM	
2	7	B10-05618-17	360.00	1.741	5.40	594.71		32.25	3/10/2011	1:10:48 AM	
2	8	B10-05618-18	360.00	4.733	14.83	582.89		31.92	3/10/2011	7:23:05 AM	
2	9	B10-05618-19	360.00	1.659	5.16	590.76		32.14	3/10/2011	1:35:26 PM	
2	10	B10-05618-20	360.00	1.763	5.47	592.76		32.19	3/10/2011	7:47:41 PM	
2	11	B10-05618-21	360.00	1.642	5.15	581.40		31.88	3/11/2011	1:59:56 AM	
2	12	B10-05618-22	360.00	1.810	5.67	582.46		31.91	3/11/2011	8:12:07 AM	
Missing vial 13.											
2	14	~~Sample #14~~ B10-05618-23	360.00	1.666	5.19	590.19		32.12	3/11/2011	2:24:30 PM	

JDR 3-13-2011

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	360.00	1.549	5.06	515.36	30.61	3/2/2011	1:15:11 PM	
2	2	B10-05618-01	360.00	4.861	15.55	552.66	31.25	3/2/2011	7:27:35 PM	
2	3	B10-05618-02	360.00	4.962	15.82	559.26	31.37	3/3/2011	1:40:11 AM	
2	4	B10-05618-03	360.00	1.270	4.06	552.74	31.25	3/3/2011	7:52:42 AM	
2	5	B10-05618-04	360.00	1.672	5.34	555.57	31.30	3/3/2011	2:04:51 PM	
2	6	B10-05618-05	360.00	39.768	126.29	566.39	31.49	3/3/2011	8:16:54 PM	
2	7	B10-05618-07	360.00	1.650	5.27	555.37	31.30	3/4/2011	2:29:11 AM	
2	8	B10-05618-08	360.00	1.573	5.04	552.08	31.24	3/4/2011	8:41:15 AM	
2	9	B10-05618-09	360.00	1.555	4.99	546.49	31.15	3/4/2011	2:53:14 PM	
2	10	B10-05618-10	360.00	1.791	5.74	548.40	31.18	3/4/2011	9:05:24 PM	

Tritium Enrichment Data

Procedures: **ARS-040**

Date: 1/25/2011

ARS File ID Numbers: ARS1-10-02492; 02491; 02509; 02510; 02511

ARS Batch ID: ARS1-B10-05618

		Vf'								Aliquot					
	A Batch ID:	Gross Sample Recovered	Enrichment factor	Cryo-Distil Flask #	Tare Wt Cryo-distil flask	Gross Wt flask + Sample	Recovered Water	Tare Weight of LSC Vial	Vial + Sample	Net Sample	*Wt of Vial, Sample& Dead Water Filler if used*	*Net Dead Water Added*	Tare Wt b/f Cocktail	Gross Wt Vial + Sample + Cocktail	Net Wt of Cocktail Added
1	ARS1-B10-05618-01	11.67	43.19	N/A,N/A	101.30	107.24	5.94	6.61	11.61	5.00	0.00	0.00	11.61	26.60	14.99
2	ARS1-B10-05618-02	12.50	40.38	N/A,N/A	96.37	102.71	6.34	6.62	11.62	5.00	0.00	0.00	11.62	26.62	15.00
3	ARS1-B10-05618-03	11.49	43.95	N/A,N/A	116.24	122.64	6.40	6.47	11.47	5.00	0.00	0.00	11.47	26.46	14.99
4	ARS1-B10-05618-04	11.78	41.77	N/A,7	116.63	124.89	8.26	6.61	11.63	5.02	0.00	0.00	11.63	26.61	14.98
5	ARS1-B10-05618-05	9.69	51.62	N/A,N/A	100.72	106.88	6.16	6.48	11.51	5.03	0.00	0.00	11.51	26.55	15.04
6		0.00	–				0.00			0.00		0.00			0.00
7	ARS1-B10-05618-07	11.20	44.58	E,N/A	90.54	96.91	6.37	6.51	11.52	5.01	0.00	0.00	11.52	26.51	14.99
8	ARS1-B10-05618-08	10.23	48.51	N/A,11	100.68	104.61	3.93	6.47	10.36	3.89	11.47	1.11	11.47	26.51	15.04
9	ARS1-B10-05618-09	12.37	40.20	N/A,N/A	109.65	118.40	8.75	6.56	11.58	5.02	0.00	0.00	11.58	26.57	14.99
10	ARS1-B10-05618-10	12.04	41.00	N/A,N/A	107.46	115.83	8.37	6.60	11.60	5.00	0.00	0.00	11.60	26.61	15.01
11	ARS1-B10-05618-11	12.09	41.39	G,N/A	99.68	108.19	8.51	6.59	11.60	5.01	0.00	0.00	11.60	26.59	14.99
12	ARS1-B10-05618-12	12.67	38.84	N/A,7	116.64	125.45	8.81	6.48	11.50	5.02	0.00	0.00	11.50	26.49	14.99
13	ARS1-B10-05618-13	12.58	38.69	N/A,N/A	101.71	110.60	8.89	6.64	11.66	5.02	0.00	0.00	11.66	26.66	15.00
14		0.00	–				0.00			0.00		0.00			0.00
15	ARS1-B10-05618-15	11.59	42.88	N/A,N/A	92.13	99.84	7.71	6.84	11.85	5.01	0.00	0.00	11.85	26.86	15.01
16	ARS1-B10-05618-16	11.87	41.47	N/A,11	116.24	121.48	5.24	6.62	11.64	5.02	0.00	0.00	11.64	26.64	15.00
17	ARS1-B10-05618-17	13.27	37.37	N/A,N/A	91.48	101.14	9.66	6.67	11.68	5.01	0.00	0.00	11.68	26.67	14.99
18	ARS1-B10-05618-18	11.54	43.34	N/A,N/A	107.43	115.29	7.86	6.58	11.59	5.01	0.00	0.00	11.59	26.58	14.99
19	ARS1-B10-05618-19	12.34	40.13	N/A,N/A	121.80	130.53	8.73	6.52	11.52	5.00	0.00	0.00	11.52	26.51	14.99
20	ARS1-B10-05618-20	13.26	37.98	N/A,7	96.40	105.87	9.47	6.52	11.52	5.00	0.00	0.00	11.52	26.51	14.99
21	ARS1-B10-05618-21	11.78	42.65	G,N/A	99.83	108.11	8.28	6.50	11.51	5.01	0.00	0.00	11.51	26.51	15.00
22	ARS1-B10-05618-22	11.73	42.50	N/A,N/A	92.18	100.07	7.89	6.58	11.60	5.02	0.00	0.00	11.60	26.59	14.99
23	ARS1-B10-05618-23	12.09	40.74	N/A,11	116.23	121.43	5.20	6.50	11.54	5.04	0.00	0.00	11.54	26.53	14.99
24		0.00	–				0.00			0.00		0.00			0.00
25		0.00	–				0.00			0.00		0.00			0.00
26		0.00	–				0.00			0.00		0.00			0.00
27		0.00	–				0.00			0.00		0.00			0.00
28		0.00	–				0.00			0.00		0.00			0.00
29		0.00	–				0.00			0.00		0.00			0.00

Chemist Signature: Jonny D. Rahm

ARS, International
Port Allen Lab

Tritium Enrichment Data

Procedures: **ARS-040**

Date: 1/25/2011

ARS File ID Numbers: ARS1-10-02492; 02491; 02509; 02510; 02511

ARS Batch ID: ARS1-B10-05618

	A Batch ID:	Enrichment Cell No.	Tare Wt of Electrolysis Cell & Electrodes	Tare Wt Reservoir	mi Wt Na_2O_2	Gross Weight of Sample Reservoir	Vi Gross Sample Added	Electrolysis Start Date & Time	Start AMP	Start Bath C°	Electolysis End Date & Time	End Bath C°	End Wt of Cell + Resv. + Sample
1	ARS1-B10-05618-01	1	331.10	199.96	2.00	703.93	503.97	1-14-11 1427	5.00	2.0	2-10-11 0815	2.0	542.73
2	ARS1-B10-05618-02	2	336.73	189.29	2.00	694.03	504.74	1-14-11 1429	5.00	2.0	2-10-11 0824	2.0	538.52
3	ARS1-B10-05618-03	3	334.75	193.00	2.00	698.04	505.04	1-14-11 1439	5.00	2.0	2-10-11 0934	2.0	539.24
4	ARS1-B10-05618-04	77	335.44	200.65	2.02	692.70	492.05	1-15-11 1019	5.00	2.0	2-11-11 1007	2.0	547.87
5	ARS1-B10-05618-05	59	337.02	195.13	2.01	695.30	500.17	1-15-11 1026	5.00	2.0	2-11-11 0815	2.0	541.84
6							0.00						
7	ARS1-B10-05618-07	12	331.50	194.44	2.01	693.69	499.25	1-15-11 1033	5.00	2.0	2-12-11 1358	2.0	537.14
8	ARS1-B10-05618-08	68	334.86	194.80	2.00	691.09	496.29	1-15-11 1039	5.00	2.0	2-13-11 0815	2.0	539.89
9	ARS1-B10-05618-09	51	334.59	200.61	2.02	697.86	497.25	1-15-11 1101	5.00	2.0	2-13-11 0821	2.0	547.57
10	ARS1-B10-05618-10	95	334.30	195.64	2.00	689.29	493.65	1-15-11 1106	5.00	2.0	2-14-11 0901	2.0	541.98
11	ARS1-B10-05618-11	26	335.14	193.93	2.00	694.34	500.41	1-15-11 1113	5.00	2.0	2-15-11 0815	2.0	541.16
12	ARS1-B10-05618-12	28	332.11	195.01	1.99	687.13	492.12	1-15-11 1131	5.00	2.0	2-17-11 1143	2.0	539.79
13	ARS1-B10-05618-13	42	330.48	192.00	2.02	678.78	486.78	1-15-11 1136	5.00	2.0	2-17-11 1057	2.0	535.06
14							0.00						
15	ARS1-B10-05618-15	35	339.81	193.87	2.00	690.82	496.95	1-15-11 1649	5.00	2.0	2-19-11 1107	2.0	545.27
16	ARS1-B10-05618-16	61	335.70	207.28	2.01	699.58	492.30	2-1-11 1316	5.00	2.0	2-18-11 0819	2.0	554.85
17	ARS1-B10-05618-17	93	337.22	187.78	2.01	683.64	495.86	2-1-11 1328	5.00	2.0	2-19-11 1642	2.0	538.27
18	ARS1-B10-05618-18	6	331.11	198.44	2.00	698.54	500.10	2-1-11 1337	5.00	2.0	2-18-11 0815	2.0	541.09
19	ARS1-B10-05618-19	49	334.82	190.18	2.01	685.34	495.16	2-1-11 1405	5.00	2.0	2-19-11 1357	2.0	537.34
20	ARS1-B10-05618-20	76	333.96	186.75	2.00	690.30	503.55	2-1-11 1420	5.00	2.0	2-20-11 0815	2.0	533.97
21	ARS1-B10-05618-21	7	334.55	190.36	2.00	692.80	502.44	2-1-11 1430	5.00	2.0	2-20-11 1152	2.0	536.69
22	ARS1-B10-05618-22	50	332.03	201.04	2.00	699.58	498.54	2-1-11 1502	5.00	2.0	2-21-11 1324	2.0	544.80
23	ARS1-B10-05618-23	21	333.69	199.08	2.00	691.67	492.59	2-1-11 1523	5.00	2.0	2-20-11 1424	2.0	544.86
24							0.00						
25							0.00						
26							0.00						
27							0.00						
28							0.00						
29							0.00						

Chemist Signature: Jimmy D. Ralin

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
2-28-11	0940	S-0251-V4	C-14 Std verif	1118	[illegible]
↓	↓	S-0251-V5	↓	↓	[illegible]
3-1-11	1100 ~~1130~~ JR 3-1-11	Background ~~S-8~~ JR 3-1-11	C-14 Std. verif.	1101	[illegible]
↓	↓	S-0250-V1	↓	↓	[illegible]
↓	↓	S-0250-V2	↓	↓	[illegible]
↓	↓	S-0250-V3	↓	↓	[illegible]
↓	↓	S-0250-V4	↓	↓	[illegible]
↓	↓	S-0250-V5	↓	↓	[illegible]
↓	↓	S-0251-V1	↓	↓	[illegible]
↓	↓	S-0251-V2	↓	↓	[illegible]
↓	↓	S-0251-V3	↓	↓	[illegible]
↓	↓	S-0251-V4	↓	↓	[illegible]
↓	↓	S-0251-V5	↓	↓	[illegible]
3-2-2011	1118	SNC 51	QA	QA	JDR
↓	↓	Background	B10-05618	1306	JDR
↓	↓	B10-05618-01	↓	↓	JDR
↓	↓	B10-05618-02	↓	↓	JDR
↓	↓	B10-05618-03	↓	↓	JDR
↓	↓	B10-05618-04	↓	↓	JDR
↓	↓	B10-05618-05	↓	↓	JDR

Reviewed By: [illegible] Date: 3-9-11
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
3-2-2011	1118	B10-05618-07	B10-05618	1306	JDR
↓	↓	B10-05618-08	↓	↓	JDR
↓	↓	B10-05618-09	↓	↓	JDR
↓	↓	B10-05618-10	↓	↓	JDR
3-6-11	1510	SNC 51	QA	QA	JDR
↓	↓	Background	B11-00901	1703	JDR
↓	↓	B11-00901-04	↓	↓	JDR
↓	↓	B11-00901-05	↓	↓	JDR
↓	↓	B11-00901-06	↓	↓	JDR
↓	↓	B11-00901-07	↓	↓	JDR
↓	↓	B11-00901-08	↓	↓	JDR
↓	↓	B11-00901-09	↓	↓	JDR
↓	↓	B11-00901-10	↓	↓	JDR
↓	↓	B11-00901-11	↓	↓	JDR
↓	↓	B11-00901-12	↓	↓	JDR
↓	↓	B11-00901-13	↓	↓	JDR
↓	↓	B11-00901-14	↓	↓	JDR
↓	↓	B11-00901-15	↓	↓	JDR
↓	↓	B11-00901-16	↓	↓	JDR
↓	↓	B11-00901-17	↓	↓	JDR

Reviewed By: LSW Initials Date: 3-7-11

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
3-6-11	1510	B11-00901-18	B11-00901	1703	JDR
↓	↓	B11-00901-19	↓	↓	JDR
↓	↓	B11-00901-20	↓	↓	JDR
3-7-11 LSW ↓	↓	B11-00901-21	↓	↓	JDR
3-8-11	1133	B10-05618-11	B10-05618	1133	JDR
↓	↓	B10-05618-12	↓	↓	JDR
↓	↓	B10-05618-13	↓	↓	JDR
↓	↓	B10-05618-15	↓	↓	JDR
↓	↓	B10-05618-16	↓	↓	JDR
↓	↓	B10-05618-17	↓	↓	JDR
↓	↓	B10-05618-18	↓	↓	JDR
↓	↓	B10-05618-19	↓	↓	JDR
↓	↓	B10-05618-20	↓	↓	JDR
↓	↓	B10-05618-21	↓	↓	JDR
↓	↓	B10-05618-22	↓	↓	JDR
↓	↓	B10-05618-23	↓	↓	JDR
	N/A				
		JDR	3-13-2011		
				Data unavailable - LSW 3-14-11	

Reviewed By: LSW Date: 3-14-11
Initials

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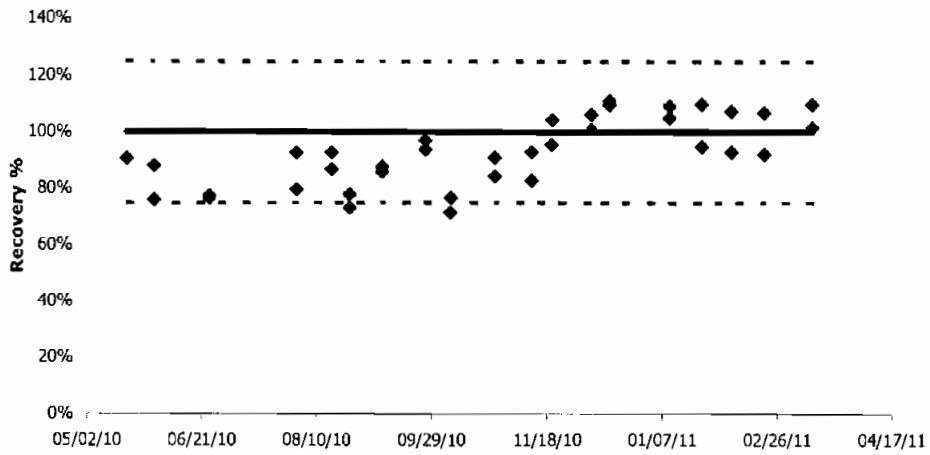
Low Level Tritium by Low Level Liquid Scintillation Counting

Control Charts

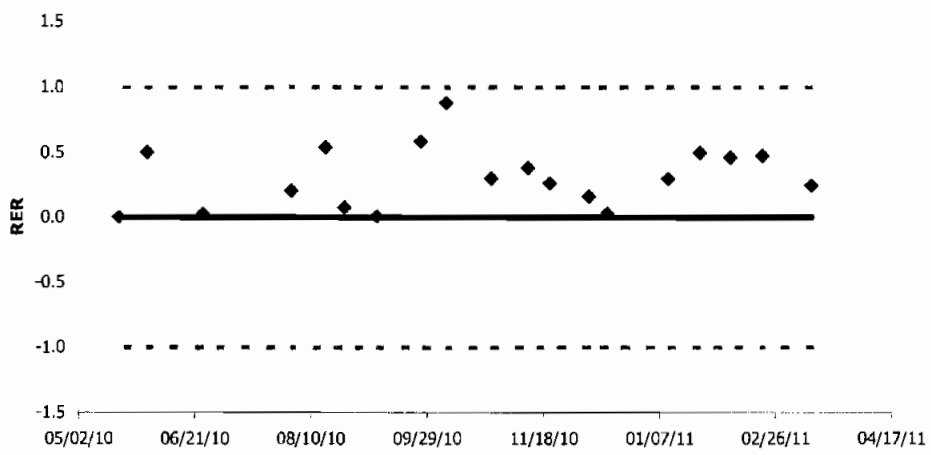
QC Chart

LLH-3 LCS



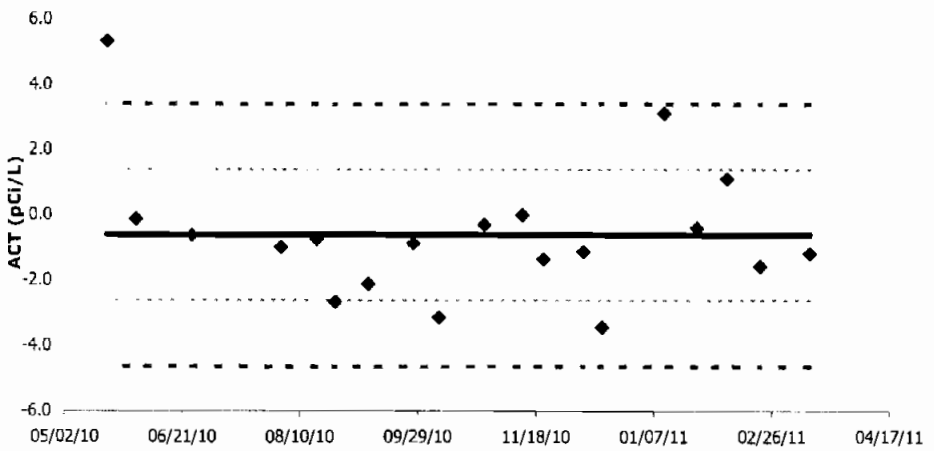
Average	STDEV	n	UCL	LCL
0.9323	0.1172	20	1.2500	0.7500

LLH-3 RER



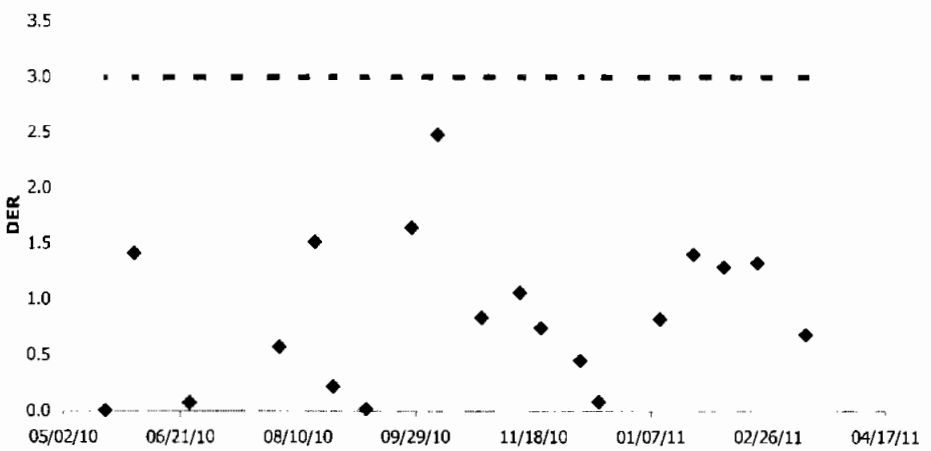
		n	UCL	LCL
		20	1.0000	-1.0000

LLH-3 Blank



Average	STDEV	n	UCL	LCL
-0.6165	2.0081	20	3.3998	-4.6328

LLH-3 DER



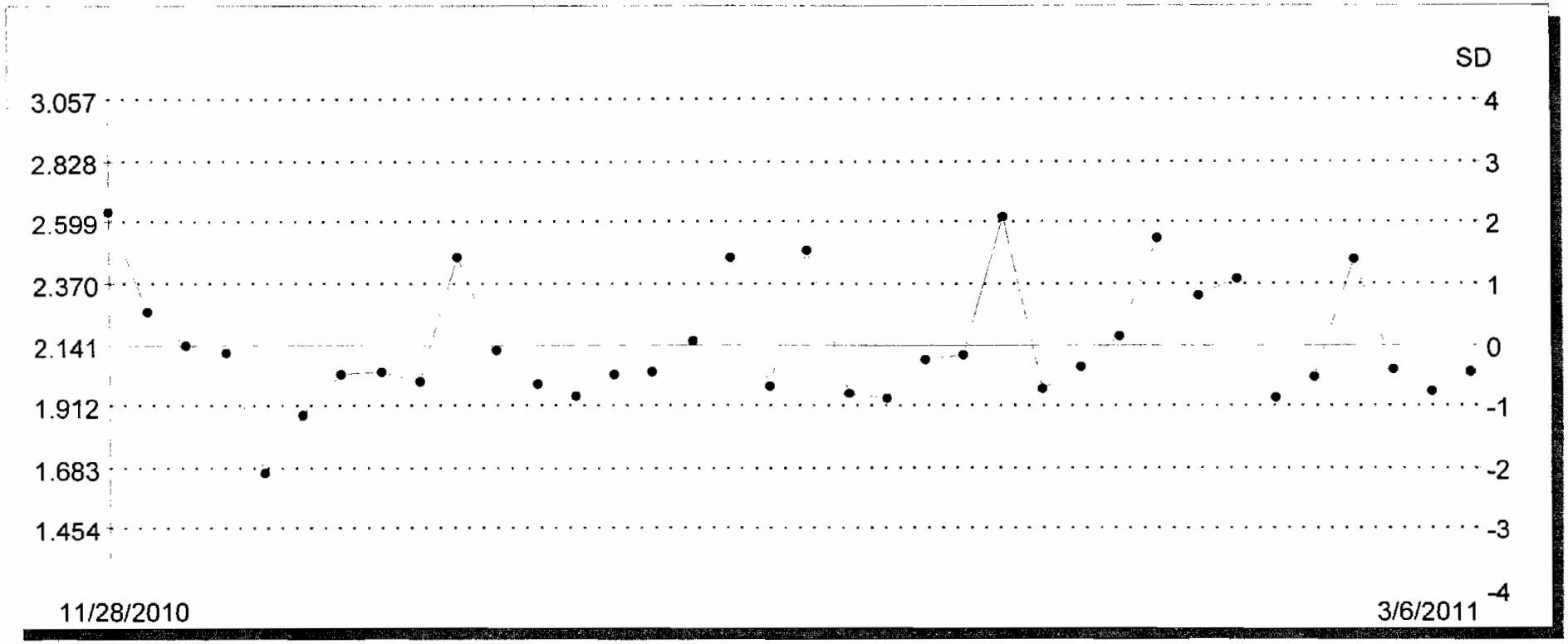
		n	UCL	
		20	3.0000	

3H Background
Total # pts : 5212
Valid # pts : 36
Mean : 2.14
SD : 0.23

Date	Value	Valid Pt
Nov 28, 2010	2.63	X
Nov 28, 2010	2.26	X
Nov 28, 2010	2.14	X
Nov 28, 2010	2.11	X
Nov 28, 2010	1.66	X
Nov 28, 2010	1.88	X
Nov 28, 2010	2.03	X
Nov 30, 2010	2.04	X
Dec 02, 2010	2.00	X
Dec 08, 2010	2.46	X
Dec 13, 2010	2.12	X
Dec 15, 2010	1.99	X
Dec 22, 2010	1.95	X
Dec 29, 2010	2.03	X
Dec 30, 2010	2.04	X
Jan 03, 2011	2.15	X
Jan 05, 2011	2.47	X
Jan 10, 2011	1.99	X
Jan 11, 2011	2.49	X
Jan 14, 2011	1.96	X
Jan 19, 2011	1.94	X
Jan 21, 2011	2.09	X
Jan 27, 2011	2.10	X
Jan 29, 2011	2.62	X
Feb 01, 2011	1.97	X
Feb 07, 2011	2.06	X
Feb 09, 2011	2.17	X
Feb 10, 2011	2.54	X
Feb 13, 2011	2.33	X
Feb 18, 2011	2.39	X
Feb 22, 2011	1.94	X
Feb 24, 2011	2.02	X
Feb 25, 2011	2.46	X
Feb 28, 2011	2.05	X
Mar 02, 2011	1.96	X
Mar 06, 2011	2.04	X

3H Background

Total # pts	: 5212
Valid # pts	: 36
Mean	: 2.14
SD	: 0.23

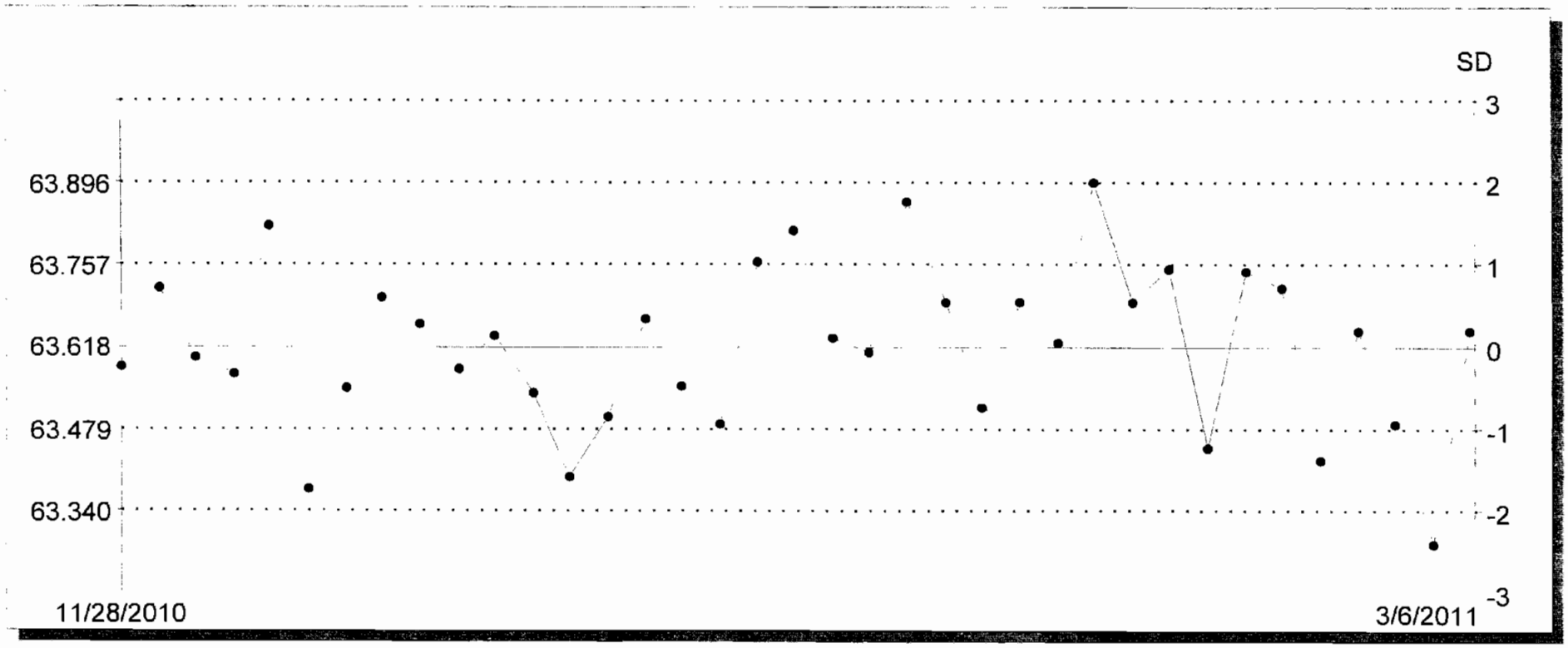


3H Efficiency
Total # pts : 5283
Valid # pts : 37
Mean : 63.62
SD : 0.14

Date	Value	Valid Pt
Nov 28, 2010	63.58	X
Nov 28, 2010	63.72	X
Nov 28, 2010	63.60	X
Nov 28, 2010	63.57	X
Nov 28, 2010	63.82	X
Nov 28, 2010	63.38	X
Nov 28, 2010	63.55	X
Nov 30, 2010	63.70	X
Nov 30, 2010	63.66	X
Dec 02, 2010	63.58	X
Dec 08, 2010	63.64	X
Dec 13, 2010	63.54	X
Dec 15, 2010	63.39	X
Dec 22, 2010	63.50	X
Dec 29, 2010	63.66	X
Dec 30, 2010	63.55	X
Jan 03, 2011	63.49	X
Jan 05, 2011	63.76	X
Jan 10, 2011	63.82	X
Jan 11, 2011	63.63	X
Jan 14, 2011	63.61	X
Jan 19, 2011	63.87	X
Jan 21, 2011	63.69	X
Jan 27, 2011	63.52	X
Jan 29, 2011	63.69	X
Feb 01, 2011	63.62	X
Feb 07, 2011	63.90	X
Feb 09, 2011	63.69	X
Feb 10, 2011	63.75	X
Feb 13, 2011	63.45	X
Feb 18, 2011	63.75	X
Feb 22, 2011	63.72	X
Feb 24, 2011	63.43	X
Feb 25, 2011	63.65	X
Feb 28, 2011	63.49	X
Mar 02, 2011	63.28	X
Mar 06, 2011	63.64	X

3H Efficiency

Total # pts	: 5283
Valid # pts	: 37
Mean	: 63.62
SD	: 0.14



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Tritium- Screening by Low Level Liquid Scintillation Counting

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for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

Samples

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

ARS File ID Numbers: ARS1-10-02492; 2509; 2510; 2511
ARS Batch ID: ARS1-B10-05617

	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	B10-05617-04	120	1.490	1.181	30.72	5.01	90.437	pCi/L	172.3216	NO
2	B10-05617-05	120	1.996	1.181	30.91	5.00	237.539	pCi/L	171.6049	~~YES, analyze by LSC-A-001~~. NO JB 12-13-10
3	B10-05617-06	120	2.554	1.181	31.29	5.05	391.400	pCi/L	167.8424	YES, analyze by LSC-A-001.
4	B10-05617-07	120	1.371	1.181	31.08	5.00	55.074	pCi/L	170.6663	NO
5	B10-05617-08	120	1.404	1.181	30.74	5.04	64.836	pCi/L	171.1844	NO
6	B10-05617-09	120	1.407	1.181	30.72	5.03	65.882	pCi/L	171.6364	NO
7	B10-05617-10	120	1.365	1.181	31.26	5.03	52.712	pCi/L	168.6715	NO
8	B10-05617-11	120	1.256	1.181	30.91	5.01	21.816	pCi/L	171.2624	NO
9	B10-05617-12	120	1.472	1.181	30.93	5.02	84.422	pCi/L	170.8107	NO
10	B10-05617-13	120	1.823	1.181	30.98	5.00	186.694	pCi/L	171.2172	~~YES, analyze by LSC-A-001~~. NO JB 12-13-10
11	B10-05617-14	120	3.169	1.181	30.83	5.04	576.314	pCi/L	170.6847	YES, analyze by LSC-A-001.
12	B10-05617-15	120	1.593	1.181	30.96	5.05	118.700	pCi/L	169.6314	NO
13	B10-05617-16	120	1.407	1.181	30.96	5.00	65.763	pCi/L	171.3278	NO
14	B10-05617-17	120	1.577	1.181	30.95	5.00	115.269	pCi/L	171.3831	NO
15	B10-05617-18	120	1.547	1.181	30.99	5.01	106.186	pCi/L	170.8203	NO
16	B10-05617-19	120	1.451	1.181	30.85	5.00	78.847	pCi/L	171.9387	NO
17	B10-05617-20	120	1.649	1.181	30.98	5.01	135.823	pCi/L	170.8754	NO
18	B10-05617-21	120	1.452	1.181	31	5.00	78.756	pCi/L	171.1067	NO
19	B10-05617-22	120	1.501	1.181	30.88	5.02	92.986	pCi/L	171.0873	NO
20	B10-05617-23	120	1.586	1.181	30.97	5.03	117.110	pCi/L	170.2509	NO
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

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-05617**

Method **ARS-054** **Analysis** **LSC-A-021** **Matrix** **AQ**

Description **Low Level Tritium Screen**

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-05617-01	LCS									
ARS1-B10-05617-02	LCSD									
ARS1-B10-05617-03	MBL									
ARS1-B10-05617-04	TRG				**ARS1-10-02492**	002	1	CAMO-11-1269	STD	12/07/10
ARS1-B10-05617-05	TRG				**ARS1-10-02492**	003	1	CAMO-11-1271	STD	12/07/10
ARS1-B10-05617-06	TRG				**ARS1-10-02492**	004	1	CAMO-11-1273	STD	12/07/10
ARS1-B10-05617-07	TRG				**ARS1-10-02492**	005	1	CAMO-11-1302	STD	12/07/10
ARS1-B10-05617-08	TRG				**ARS1-10-02491**	001	1	Buckman1-11-1944	STD	12/13/10
ARS1-B10-05617-09	TRG				**ARS1-10-02491**	002	1	Buckman06-11-1970	STD	12/13/10
ARS1-B10-05617-10	TRG				**ARS1-10-02491**	003	1	Buckman08-11-2042	STD	12/13/10
ARS1-B10-05617-11	TRG				**ARS1-10-02509**	001	1	CASA-11-1365	STD	12/14/10
ARS1-B10-05617-12	TRG				**ARS1-10-02509**	002	1	CASA-11-1367	STD	12/14/10
ARS1-B10-05617-13	TRG				**ARS1-10-02510**	001	1	CASA-11-1360	STD	12/14/10
ARS1-B10-05617-14	TRG				**ARS1-10-02510**	002	1	CASA-11-1363	STD	12/14/10
ARS1-B10-05617-15	TRG				**ARS1-10-02510**	003	1	CASA-11-1371	STD	12/14/10
ARS1-B10-05617-16	TRG				**ARS1-10-02510**	004	1	CASA-11-1373	STD	12/14/10
ARS1-B10-05617-17	TRG				**ARS1-10-02510**	005	1	CASA-11-1374	STD	12/14/10
ARS1-B10-05617-18	TRG				**ARS1-10-02510**	006	1	CASA-11-1376	STD	12/14/10
ARS1-B10-05617-19	TRG				**ARS1-10-02510**	007	1	CASA-11-1379	STD	12/14/10
ARS1-B10-05617-20	TRG				**ARS1-10-02510**	008	1	CASA-11-1380	STD	12/14/10
ARS1-B10-05617-21	TRG				**ARS1-10-02511**	001	1	CAMO-11-1262	STD	12/14/10
ARS1-B10-05617-22	TRG				**ARS1-10-02511**	002	1	CAMO-11-1265	STD	12/14/10
ARS1-B10-05617-23	TRG				**ARS1-10-02511**	003	1	CAMO-11-1285	STD	12/14/10

76448 10-02492-002-1 **XRAD**
76449 10-02492-003-1 **XRAD**
76450 10-02492-004-1 **XRAD**
76451 10-02492-005-1 **XRAD**
76452 10-02491-001-1 **XRAD**
76453 10-02491-002-1 **XRAD**
76454 10-02491-003-1 **XRAD**
76455 10-02509-001-1 **XRAD**
76456 10-02509-002-1 **XRAD**
76457 10-02510-001-1 **XRAD**
76458 10-02510-002-1 **XRAD**
76459 10-02510-003-1 **XRAD**
76460 10-02510-004-1 **XRAD**
76461 10-02510-005-1 **XRAD**
76462 10-02510-006-1 **XRAD**
76463 10-02510-007-1 **XRAD**
76464 10-02510-008-1 **XRAD**
76465 10-02511-001-1 **XRAD**
76466 10-02511-002-1 **XRAD**
76467 10-02511-003-1 **XRAD**

42 of 69

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
7145	ARS1-B10-05617	ARS1-B10-05617-01		1	g					JRABER	12/07/2010 14:45:34
7146	ARS1-B10-05617	ARS1-B10-05617-02		1	g					JRABER	12/07/2010 14:45:34
7147	ARS1-B10-05617	ARS1-B10-05617-03		1	g					JRABER	12/07/2010 14:45:34
7148	ARS1-B10-05617	ARS1-B10-05617-04	CAMO-11-1269	5.01	g	76448				JRABER	12/07/2010 14:45:34
7149	ARS1-B10-05617	ARS1-B10-05617-05	CAMO-11-1271	5	g	76449				JRABER	12/07/2010 14:45:34
7150	ARS1-B10-05617	ARS1-B10-05617-06	CAMO-11-1273	5.05	g	76450				JRABER	12/07/2010 14:45:34
7151	ARS1-B10-05617	ARS1-B10-05617-07	CAMO-11-1302	5	g	76451				JRABER	12/07/2010 14:45:34
7152	ARS1-B10-05617	ARS1-B10-05617-08	Buckman1-11-1944	5.04	g	76452				JRABER	12/07/2010 14:45:34
7153	ARS1-B10-05617	ARS1-B10-05617-09	Buckman06-11-1970	5.03	g	76453				JRABER	12/07/2010 14:45:35
7154	ARS1-B10-05617	ARS1-B10-05617-10	Buckman08-11-2042	5.03	g	76454				JRABER	12/07/2010 14:45:35
7155	ARS1-B10-05617	ARS1-B10-05617-11	CASA-11-1365	5.01	g	76455				JRABER	12/07/2010 14:45:35
7156	ARS1-B10-05617	ARS1-B10-05617-12	CASA-11-1367	5.02	g	76456				JRABER	12/07/2010 14:45:35
7157	ARS1-B10-05617	ARS1-B10-05617-13	CASA-11-1360	5	g	76457				JRABER	12/07/2010 14:45:35
7158	ARS1-B10-05617	ARS1-B10-05617-14	CASA-11-1363	5.04	g	76458				JRABER	12/07/2010 14:45:35
7159	ARS1-B10-05617	ARS1-B10-05617-15	CASA-11-1371	5.05	g	76459				JRABER	12/07/2010 14:45:35
7160	ARS1-B10-05617	ARS1-B10-05617-16	CASA-11-1373	5	g	76460				JRABER	12/07/2010 14:45:36
7161	ARS1-B10-05617	ARS1-B10-05617-17	CASA-11-1374	5	g	76461				JRABER	12/07/2010 14:45:36
7162	ARS1-B10-05617	ARS1-B10-05617-18	CASA-11-1376	5.01	g	76462				JRABER	12/07/2010 14:45:36
7163	ARS1-B10-05617	ARS1-B10-05617-19	CASA-11-1379	5	g	76463				JRABER	12/07/2010 14:45:36
7164	ARS1-B10-05617	ARS1-B10-05617-20	CASA-11-1380	5.01	g	76464				JRABER	12/07/2010 14:45:36
7165	ARS1-B10-05617	ARS1-B10-05617-21	CAMO-11-1262	5	g	76465				JRABER	12/07/2010 14:45:36
7166	ARS1-B10-05617	ARS1-B10-05617-22	CAMO-11-1265	5.02	g	76466				JRABER	12/07/2010 14:45:36
7167	ARS1-B10-05617	ARS1-B10-05617-23	CAMO-11-1285	5.03	g	76467				JRABER	12/07/2010 14:45:37

Low Low Level H-3 Testing

Assay Definition-

Assay Description:
Low Low Level Tritium

Assay Type: DPM (Single)
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\ARS\Low Low Level Tritium\20101208_1858
Raw Results Path: C:\Packard\Tricarb\Results\ARS\Low Low Level Tritium\20101208_1858\20101208_1858.results
RTF File Name: C:\Packard\Tricarb\Results\ARS\Low Low Level Tritium\20101208_1858\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\ARS\Low Low Level Tritium\20101208_1858\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Low Level Tritium.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
Count Time (min): 120.00
Count Mode: Low Level
Assay Count Cycles: 1 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

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

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

Count Corrections-

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

Half Life-

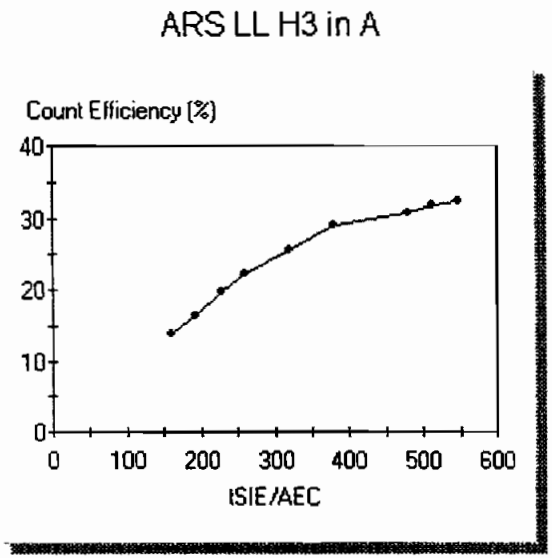
Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

Low Low Level H-3 Testing

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 11/30/2010
Date Modified:
ARS LL H3 in A

tSIE/AEC	Count Efficiency (%)
548.77	32.48
512.15	31.92
480.70	30.66
380.48	28.98
321.20	25.72
261.54	22.30
228.13	19.65
193.83	16.47
159.53	13.75

Low Low Level H-3 Testing

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
41	1	BACKGROUND	120.00	1.181	3.807	489.61	31.02	12/8/2010	7:08:03 PM	
41	2	B10-05617-04	120.00	1.490	4.850	482.20	30.72	12/8/2010	9:18:35 PM	
41	3	B10-05617-05	120.00	1.996	6.456	486.94	30.91	12/8/2010	11:29:03 PM	
41	4	B10-05617-06	120.00	2.554	8.162	496.49	31.29	12/9/2010	1:41:15 AM	
41	5	B10-05617-07	120.00	1.371	4.411	491.05	31.08	12/9/2010	3:53:24 AM	
41	6	B10-05617-08	120.00	1.404	4.568	482.73	30.74	12/9/2010	6:03:54 AM	
41	7	B10-05617-09	120.00	1.407	4.579	482.15	30.72	12/9/2010	8:14:22 AM	
41	8	B10-05617-10	120.00	1.365	4.367	495.56	31.26	12/9/2010	10:24:50 AM	
41	9	B10-05617-11	120.00	1.256	4.065	486.87	30.91	12/9/2010	12:35:19 PM	
41	10	B10-05617-12	120.00	1.472	4.759	487.48	30.93	12/9/2010	2:45:50 PM	
41	11	B10-05617-13	120.00	1.823	5.885	488.76	30.98	12/9/2010	4:56:21 PM	
41	12	B10-05617-14	120.00	3.169	10.277	484.93	30.83	12/9/2010	7:06:54 PM	
41	13	B10-05617-15	120.00	1.593	5.145	488.24	30.96	12/9/2010	9:19:07 PM	
41	14	B10-05617-16	120.00	1.407	4.546	488.17	30.96	12/9/2010	11:29:39 PM	
41	15	B10-05617-17	120.00	1.577	5.096	487.86	30.95	12/10/2010	1:40:09 AM	
41	16	B10-05617-18	120.00	1.547	4.993	488.86	30.99	12/10/2010	3:50:40 AM	
41	17	B10-05617-19	120.00	1.451	4.701	485.54	30.85	12/10/2010	6:01:11 AM	
41	18	B10-05617-20	120.00	1.649	5.322	488.64	30.98	12/10/2010	8:11:43 AM	
41	19	B10-05617-21	120.00	1.452	4.684	489.24	31.00	12/10/2010	10:22:14 AM	
41	20	B10-05617-22	120.00	1.501	4.862	486.08	30.88	12/10/2010	12:32:46 PM	
41	21	B10-05617-23	120.00	1.586	5.122	488.33	30.97	12/10/2010	2:43:18 PM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
12-3-10	1437	B10-05533-06	B10-05533	0949	[illegible]
↓	↓	B10-05533-07	↓	↓	[illegible]
↓	↓	B10-05533-08	↓	↓	[illegible]
↓	↓	B10-05533-09	↓	↓	[illegible] LSW 12-06-10
12-7-2010	1457	SNC 117	QA	QA	JDR
↓	↓	Background	B10-05617	1858	JDR
↓	↓	B10-05617-04	↓	↓	JDR
↓	↓	B10-05617-05	↓	↓	JDR
↓	↓	B10-05617-06	↓	↓	JDR
↓	↓	B10-05617-07	↓	↓	JDR
↓	↓	B10-05617-08	↓	↓	JDR
↓	↓	B10-05617-09	↓	↓	JDR
↓	↓	B10-05617-10	↓	↓	JDR
↓	↓	B10-05617-11	↓	↓	JDR
↓	↓	B10-05617-12	↓	↓	JDR
↓	↓	B10-05617-13	↓	↓	JDR
↓	↓	B10-05617-14	↓	↓	JDR
↓	↓	B10-05617-15	↓	↓	JDR
↓	↓	B10-05617-16	↓	↓	JDR
↓	↓	B10-05617-17	↓	↓	JDR

Reviewed By: LSW Date: 12-15-10
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
12-7-10	1457	B10-05617-18	B10-05617	1858	JDR
↓	↓	B10-05617-19	↓	↓	JDR
↓	↓	B10-05617-20	↓	↓	JDR
↓	↓	B10-05617-21	↓	↓	JDR
↓	↓	B10-05617-22	↓	↓	JDR
↓	↓	B10-05617-23	↓	↓	JDR
12-9-10	1259	Background	B10-05546	1645	JDR
↓	↓	B10-05546-01	↓	↓	JDR
↓	↓	B10-05546-02	↓	↓	JDR
↓	↓	B10-05546-03	↓	↓	JDR
↓	↓	B10-05546-04	↓	↓	JDR
↓	↓	B10-05546-05	↓	↓	JDR
↓	↓	B10-05546-06	↓	↓	JDR
↓	↓	B10-05546-07	↓	↓	JDR
↓	↓	B10-05546-08	↓	↓	JDR
↓	↓	B10-05546-09	↓	↓	JDR
↓	↓	B10-05546-10	↓	↓	JDR
↓	↓	B10-05546-11	↓	↓	JDR
↓	↓	B10-05546-12	↓	↓	JDR
↓	↓	B10-05546-13	↓	↓	JDR

LSW 12-10-10

Reviewed By: LSW Date: 12-15-10
Initials

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

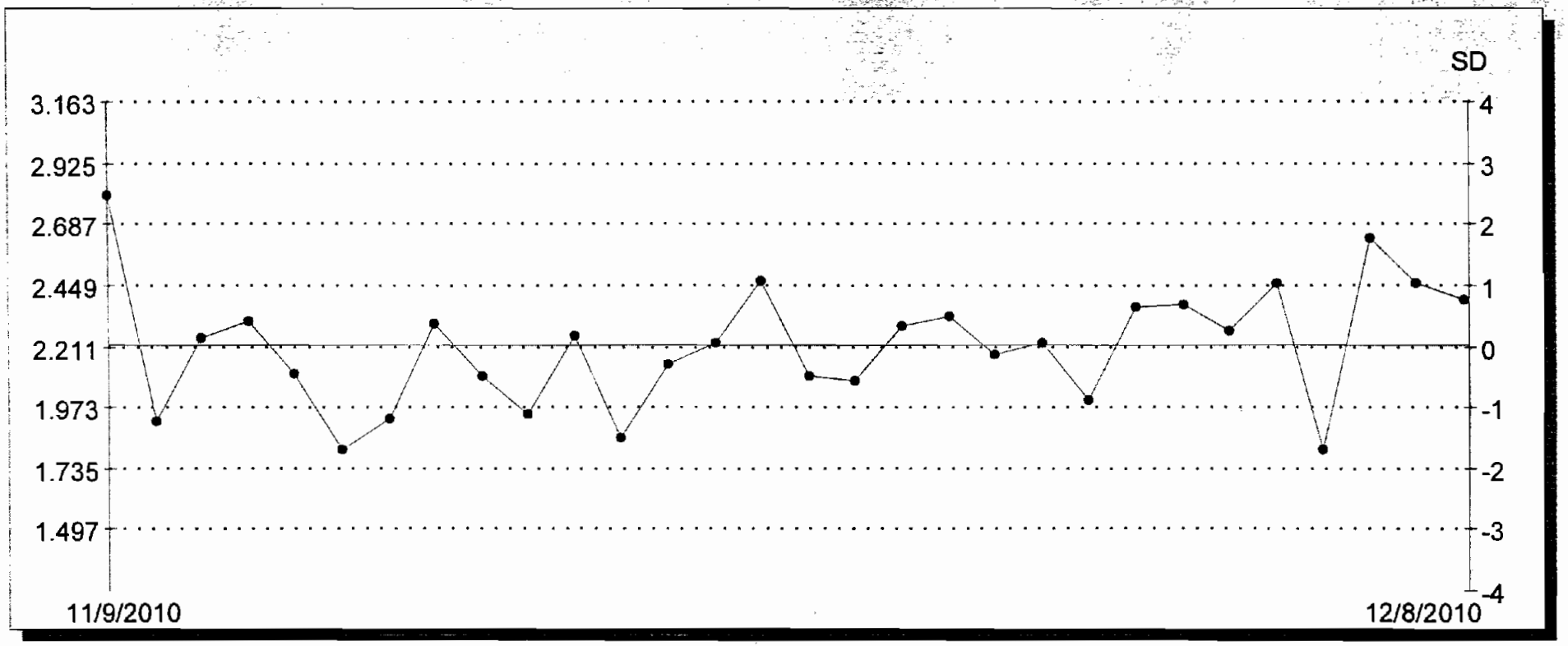
Control Charts

3H Background
Total # pts : 1507
Valid # pts : 30
Mean : 2.21
SD : 0.24

Date	Value	Valid Pt
Nov 09, 2010	2.80	X
Nov 10, 2010	1.92	X
Nov 11, 2010	2.24	X
Nov 15, 2010	2.31	X
Nov 16, 2010	2.10	X
Nov 17, 2010	1.80	X
Nov 17, 2010	1.93	X
Nov 17, 2010	2.30	X
Nov 17, 2010	2.09	X
Nov 17, 2010	1.94	X
Nov 22, 2010	2.25	X
Nov 25, 2010	1.85	X
Nov 28, 2010	2.14	X
Nov 28, 2010	2.23	X
Nov 28, 2010	2.47	X
Nov 28, 2010	2.09	X
Nov 28, 2010	2.08	X
Nov 28, 2010	2.29	X
Nov 29, 2010	2.33	X
Nov 29, 2010	2.18	X
Nov 29, 2010	2.22	X
Nov 29, 2010	2.01	X
Nov 29, 2010	2.36	X
Nov 29, 2010	2.38	X
Nov 30, 2010	2.28	X
Nov 30, 2010	2.45	X
Nov 30, 2010	1.81	X
Dec 02, 2010	2.63	X
Dec 05, 2010	2.46	X
Dec 08, 2010	2.39	X

3H Background

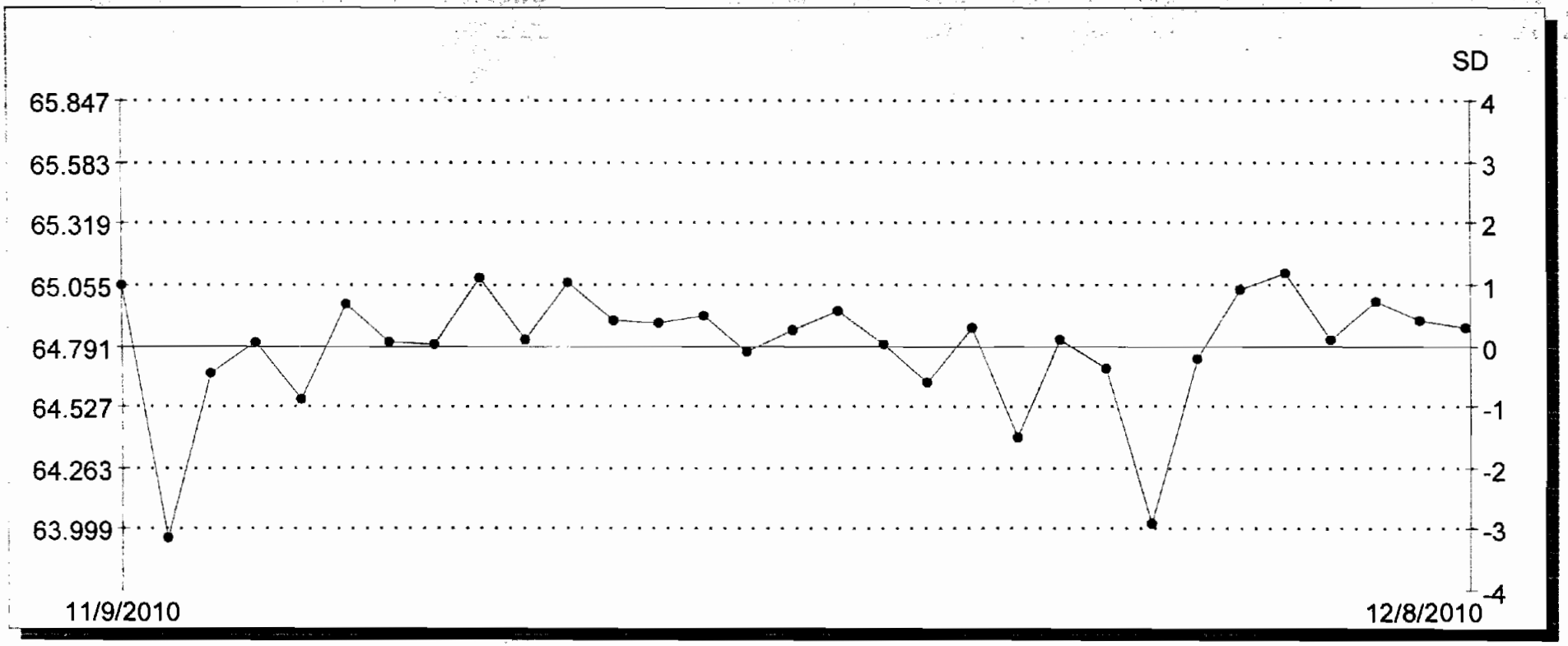
Total # pts	: 1507
Valid # pts	: 30
Mean	: 2.21
SD	: 0.24



3H Efficiency
Total # pts : 1545
Valid # pts : 31
Mean : 64.79
SD : 0.26

Date	Value	Valid Pt
Nov 09, 2010	65.05	X
Nov 10, 2010	63.96	X
Nov 11, 2010	64.67	X
Nov 15, 2010	64.81	X
Nov 16, 2010	64.56	X
Nov 17, 2010	64.97	X
Nov 17, 2010	64.81	X
Nov 17, 2010	64.79	X
Nov 17, 2010	65.08	X
Nov 17, 2010	64.82	X
Nov 22, 2010	65.07	X
Nov 25, 2010	64.90	X
Nov 28, 2010	64.89	X
Nov 28, 2010	64.92	X
Nov 28, 2010	64.77	X
Nov 28, 2010	64.86	X
Nov 28, 2010	64.94	X
Nov 28, 2010	64.80	X
Nov 29, 2010	64.63	X
Nov 29, 2010	64.87	X
Nov 29, 2010	64.40	X
Nov 29, 2010	64.82	X
Nov 29, 2010	64.69	X
Nov 29, 2010	64.02	X
Nov 30, 2010	64.73	X
Nov 30, 2010	65.03	X
Nov 30, 2010	65.11	X
Nov 30, 2010	64.82	X
Dec 02, 2010	64.99	X
Dec 05, 2010	64.90	X
Dec 08, 2010	64.87	X

3H Efficiency
Total # pts : 1545
Valid # pts : 31
Mean : 64.79
SD : 0.26



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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: 5/13/2010 0:00 *date counted*
STANDARD REFERENCE #: S-0206

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

Radionuclide: H-3 Dilution Reference Date: 2/25/2009 8:30

Dilution Activity	3.01	pCi per gram ===> dpm/g	6.68
Verif. Date Decay Corrected	2.81	pCi per gram ===> dpm/g	6.24

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-0206-V1B	11.98	1	LSC	0.3328	1.62	5.040	6.18	2.78
S-0206-V2B	11.42	1	LSC	0.3186	1.62	5.010	6.13	2.76
S-0206-V3B	12.01	1	LSC	0.3360	1.62	4.990	6.19	2.79
S-0206-V4B	11.75	1	LSC	0.3275	1.62	5.010	6.17	2.78
S-0206-V5B	11.45	1	LSC	0.3196	1.62	5.020	6.13	2.76

	Average	6.16	2.77
	Two Sigma Uncertainty	0.06	0.02
10% Max *PASS*	Standard Deviation percent of known concentration	0.45%	0.45%
	Target Activity	6.24	2.81
5% Max *PASS*	% Diff	-1.27%	-1.27%

Verification Expiration Date: May 13, 2011

Prepared & Counted By: Jeremy Raber Date: 5/13/2010 0:00

Verified & Approved By: Eugene Mulligan Date: 5/14/2010

QC Approval: Amy Engel Date: 5/14/2010

S-0206		
H-3	Verified	*5/14/10*
SL	**Expires**	**5/14/11**
Manufactuer	**NIST**	
Sol Matrix	H2O	
Ref No	NIST 4361C	
Tech	M. Thibodeaux	
Parent ID	S-0152	

RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY

STD ID: S-0206

ARS INTERNATIONAL

Add/Edit *Secondary Stds*

Planning	
Planning Comments	Create a Low Level H3 LCS solution.
Target dpm/g (on dil. date)	6.66
Target Final volume mL	500
Appx mass g of Parent Sol'n	49.8188436
Appx vol ml of Parent Sol'n	49.91868096
Expected Addition for Analysis g	5

Standards Preparation / Dilution	
Secondary Solution #	S-0206
Dilution Date (New Ref Date)	02/25/2009 08:30
Ampoule, Empty (g)	
Ampoule /Solution Gross (g)	
Net Wt Removed (g)	
Transfer Container, empty (g)	103.64
Container Plus Solution (g)	153.45
Net Wt Transferred (g)	49.81
DPM Xferred on 02/25/2009 08:30	3329.408875
Diluent/matrix	Dead H2O
Diluent Density Cont, empty (g)	
Test Mass of 5 ml of Diluent (g)	
Diluent Density Test - (g/mL)	
Dilution Empty Container Mass (g)	198.75
Dilution Full Cont g (if measured)	697.31
Dilution Final Volume ml (if measured)	500
Final Dilution Density (g/mL)	0.99712
Final Dilution Measured Mass g	498.56
Comments	Use as H3LL LCS creation. Dilution performed as stated above by M Thibodeaux on 2/25/09. -BJS 2/25/09
Final Dilution dpm/g	6.678050535
Final Dil New Ref Date/Time	02/25/2009 08:30

Parent Standard Data

Parent Solution Reference #	NIST 4361C		
Parent Solution #	S-0152		
Parent Principal Radionuclide	H-3	Half Life (Days)	4499.8000000
Parent Reference Date	09/03/1998 11:00		
Parent Certified Act	120.54	Cert Act/Vol Units	dpm g
Parent Cert Act Uncert 1 Sigma	0.0076		
Parent Sp. Gravity G/Ml	0.998		
Parent Supplier	NIST		
Parent Date Recvd	12/04/06		
Parent Received By	LU		
Parent Cert Exp Data			
Parent Matrix	H2O		
Certified dpm/g At Ref Date	120.54		
Certified dpm/g on 02/25/2009 08:30	66.84217777		
Parent Comments	Liquid in a 500-ml borosilicate-glass media bottle with teflon-lined screw cap. Approximately 500 grams		
Parent Tech	M. Thibodeaux		
Is_Primary	FALSE		
Is_LCS	TRUE		
Is_Tracer	FALSE		
Is_Calib	FALSE		

Standards Activity as of: 03/02/11 08:49

Active	Std ID	Isotope	PSCLT	Verification Date	Exp Date	Status	Ref Date	Ref ACT (dpm)	ACT at Date Above (dpm/g)	Halflife (days)	Parent ID	Expended Date	Comments
A	S-0195	Ra-226	PC			Not Ver	06/24/08	7.7832E+02	777.4105	5.840E+05			Primary Ra-226 standard for calibration.
A	S-0196	Ra-226	SLC			Not Ver	07/03/08	2.3567E+02	235.3992	5.840E+05	S-0195		Calibration standard for Ra-226
A	S-0197	Ra-228	SL	11/11/10	11/11/11	OK	07/10/08	4.4972E+01	32.7047	2.100E+03	S-0127		LCS for Ra-228
A	S-0198	Ra-226	SL	09/24/09	09/24/10	EXP	07/07/08	1.4986E+03	1486.9276	5.840E+05	S-0193		[illegible]
A	S-0199	Ni-63	SL	04/14/10	04/14/11	OK	08/25/08	4.5399E+01	44.6162	3.660E+04	S-0178		Ni-63 LCS dilution with 7.5 mL of 2 mg/mL Ni carrier added to the soln
A	S-0200	Sr-89	PC			Not Ver	09/17/08	1.9942E+04	0.0916	5.053E-01			Primary Sr-89 calibration standard
A	S-0206	H-3	SL	05/14/10	05/14/11	OK	02/25/09	6.6781E+00	5.9632	4.500E+03	S-0152		Use as H3LL LCS creation. Dilution performed as stated above by M [illegible]ab
A	S-0210	Ba-133	PT			Not Ver	05/15/09	7.6431E+02	678.9627	3.840E+03			Primary Ba-133 tracer
A	S-0211	Ba-133	ST			Not Ver	05/18/09	4.5236E+02	402.0655	3.840E+03	S-0210		Intermediate level tracer solution. Dilution performed as stated above
A	S-0212	Ba-133	SLT	05/21/09	05/21/10	EXP	05/18/09	9.9546E+00	8.8477	3.840E+03	S-0211		[illegible]
A	S-0213	Ba-133	SLT	05/25/09	05/25/10	EXP	05/23/09	6.6543E+01	59.1979	3.840E+03	S-0211		
A	S-0215	C-14	P			Not Ver	09/03/90	5.4020E+04	53885.5647	2.082E+06			C-14 for Calibration use only (5 ml Ampoule)
A	S-0216	AM-241	P			Not Ver	05/16/07	1.0640E+02	105.7545	1.579E+05			Parent Am-241 Working Soln (1g in 5 ml NIST borosilicate-glass ampoule
A	S-0218	C-14	SC	08/05/09	08/05/10	EXP	07/22/09	2.0419E+05	294132.2897	2.082E+06	S-0215		[illegible]
A	S-0220	Am-241	P			Not Ver	08/19/09	2.6725E+01	26.6594	1.579E+05			No certificate for this standard on file in the QA office. NTIs is no
A	S-0221	Am-241	SL	08/05/10	08/05/11	OK	08/19/09	2.6725E+01	26.6594	1.579E+05	S-0220		[illegible]
A	S-0222	PU-242	PT	09/28/09	09/28/10	EXP	09/23/09	2.6314E+01	26.3142	1.365E+08			
A	S-0223	PU-242	SLT	10/06/10	10/06/11	OK	09/25/09	7.6699E+00	7.6699	1.365E+08	S-0222		[illegible]
A	S-0224	Ra-226	SL	11/11/10	11/11/11	OK	11/04/09	6.4243E+01	64.2063	5.840E+05	S-0198		Ra-226 LCS stock solution. Dilution performed as stated above by B Ste
A	S-0225	Sr-89	PC			Not Ver	10/01/09	1.0276E+05	85.4692	5.053E+01			Primary Sr-89 standard. 5 ml liquid in flame sealed vial.
A	S-0226	PU-239	SC	11/19/09	11/19/10	EXP	11/16/09	1.9777E+03	1977.6583	8.807E+06	S-0186		Pu-239 calibration standard. Dilution performed as stated above by B S
A	S-0227	U-238	PC			Not Ver	05/17/07	1.7557E+02	175.5667	1.632E+12			Primary U-238 calibration standard. 5ml liquid in flame sealed vial.
A	S-0228	U-238	SC	11/19/09	11/19/10	EXP	11/17/09	2.6904E+02	269.0445	1.632E+12	S-0227		Uranium standard for use in creating Alpha Spec check sources. Dilutio
A	S-0229	Sr-89	SC	11/18/09	07/28/10	EXP	11/18/09	1.7112E+04	27.4954	5.053E+01	S-0225		[illegible]
A	S-0230	U-238	PL			Not Ver	11/23/09	1.8617E+02	186.1684	1.632E+12			Primary U-238, 235, 234 standard. 5ml liquid in flame sealed vial.
A	S-0231	Th-230	SL	10/18/10	10/18/11	OK	02/19/10	1.2559E+01	12.5584	2.753E+07	S-0172		[illegible]
A	S-0232	Th-229	PT			Not Ver	01/28/05	1.1940E+02	119.3314	2.681E+06			
A	S-0233	Th-229	SLT	02/22/10	02/22/11	EXP	01/28/05	1.1940E+02	119.3314	2.681E+06	S-0232		[illegible]
A	S-0234	Sr-90	PL			Not Ver	03/04/10	4.5500E+02	444.1340	1.041E+04			Previously logged as T11c. Sr-90 standard to be used for creating LCS
A	S-0235	Sr-90	SL			Not Ver	03/12/10	4.4497E+01	43.4570	1.041E+04	S-0234		[illegible]
A	S-0236	Sr-90	SL	03/17/10	03/17/11	OK	03/17/10	4.8169E+01	47.0591	1.041E+04	S-0160		Sr-90 LCS standard. Dilution performed as stated above by B Steffens
A	S-0237	H-3	SL	03/22/10	03/22/11	OK	03/22/10	3.5037E+03	3322.3454	4.500E+03	S-0031		[illegible]
A	S-0240	Sr-90	SL	04/13/10	04/13/11	OK	04/13/10	4.8132E+01	47.1081	1.041E+04	S-0160		Painesville Sr-90 LCS standard. Dilution performed as stated above by
A	S-0241	U-232	ST	06/11/10	06/11/11	OK	06/09/10	9.1520E+00	9.0852	2.516E+04	S-0161		[illegible]
A	S-0242	Pu-239	PL			Not Ver	11/23/09	6.5202E+03	6519.9187	8.807E+06			Primary Pu-239 standard. 5ml liquid in flame sealed vial.
A	S-0243	Sr-90	PL	07/01/10	07/01/11	OK	07/01/09	1.3200E+00	1.2675	1.041E+04			[illegible]
A	S-0244	Th-230	PL	07/01/10	07/01/11	OK	07/01/09	6.5900E-01	0.6590	2.753E+07			Mapep air filter used as QC for LDEQ GB air filter particulate samples
A	S-0245	Fe-55	SC	08/18/10	08/18/11	OK	08/13/10	2.6617E+00	2.3109	9.860E+02	S-0183		[illegible]
A	S-0246	Th-229	ST	10/18/10	10/18/11	OK	09/20/10	1.1204E+01	11.2039	2.681E+06	S-0233		Th-229 tracer standard. Dilution performed as stated above by B Steffe
A	S-0247	H-3	SL	10/13/10	10/13/11	OK	10/11/10	5.6100E+00	5.4887	4.500E+03	S-0237		[illegible]
A	S-0248	Pu-242	PT			Not Ver	01/01/10	2.6770E+01	26.7699	1.365E+08			Primary Pu-242 standard in flame-sealed 5 ml borosilicate-glass ampoul
A	S-0249	C-14	PC			Not Ver	02/03/11	7.5243E+03	7514.2331	2.082E+06			Primary C-14 calibration standard.
A	S-0250	C-14	S	03/07/11	03/07/12	OK	02/17/11	4.7591E+00	4.7590	2.090E+06	S-0153		C-14 LCS standard. Dilution performed as stated above by B Steffens.
A	S-0251	C-14	SC	03/07/11	03/07/12	OK	02/21/11	1.1123E+04	11122.8495	2.082E+06	S-0249		[illegible]
I	S-0001	Am-241	S	04/30/08	04/30/09	EXP	03/16/06	5.1937E+01	51.5251	1.579E+05	S-0069	10/12/09	S-0001 Working level Am241 solution - Information entered from dilutio

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Folder Duplicate

Report Compilation Checklist

ARS SDG: 10-02491 **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~~	

Susan Weese 3-14-11
Report Generator Signature Date

[illegible] 3-14-11
Management Review Signature Date

ARS-059
07/03/2009

ARS INTERNATIONAL

LSC
Technical Review Checklist

ARS SDG ARS1-10-02491

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:**	ARS1-B10-05618	**Batch B:**	N/A	**Batch C:**	N/A
Test Method(s):		LSC-A-022		N/A		N/A

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Jimmy D. Rahm 3-2-2011
Chemist Signature Date

Sue Jones 3-2-11
Verifier Review Signature Date

B. ANALYSIS REVIEW

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

[signature] 3-14-11
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

N/A SDR 3-13-11

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

Jimmy D. Rahm 3-13-11
Analyst Signature Date

N/A
Technicial Reviewer Signature Date

Batch A: ARS1-B10-05618

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): _____

Project Manager Signature	Date	QA Officer Signature	Date
Susan Leex	3-14-11	[illegible]	3-14-11

GENERAL COMMENTS

LSC
Technical Review Checklist

ARS SDG ARS1-10-02491

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:**	ARS1-B10-05617	**Batch B:**	N/A	**Batch C:** N/A
Test Method(s):		LSC-A-021		N/A	N/A

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Jimmy D. Rahn 12-7-2010 — **Chemist Signature** **Date**

Jamal Brown 12-7-10 — **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

VPM — **QA Officer Signature** 3-14-4 — **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~~ JDR 12-12-10 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

N/A JDR 12-12-10

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

Jimmy D. Rahn 12-12-10 — **Analyst Signature** **Date**

N/A — **Technicial Reviewer Signature** **Date**

Batch A: ARS1-B10-05617

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): _____

Susan Reese 3-14-11
Project Manager Signature Date

VHM 3-14-11
QA Officer Signature Date

GENERAL COMMENTS

SDG Report - Samples and Containers

SDG Specific Data

SDG	ARS1-10-02491	TAT Days	30	Project Type	Environmental
Sample Count	Rpt Level 4	Date Received	11/16/2010	COC Number	11-473C
Client	Los Alamos National Laboratory	Client Deadline	12/16/2010	PO Number	63641-001-10
Client Code	114	Internal Deadline	12/15/2010	Job Number	WEPR1158W100
Profile Number	PN-00094	Lab Deadline	12/13/2010	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	Buckman1-11-1944	AQ	11/10/10 12:00 PM	11/10/10 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	75204	1	1000.00				30	13		N	N/A				
002	Buckman06-11-1970	AQ	11/10/10 12:00 PM	11/10/10 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	75205	1	1000.00				35	12		N	N/A				
003	Buckman08-11-2042	AQ	11/10/10 12:00 PM	11/10/10 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	75206	1	1000.00				30	13		N	N/A				

SDG Report - Analysis Assignments

Temp SDG	ARS1-10-02491	Sample Count	[illegible]
Client	Los Alamos National Laboratory	Analysis Count	2-6

Samples Count Totals per Analysis

Analysis Code	Analysis Description	Samples Count
LSC-A-021	Low Level Tritium Screen in (Aqueous)	3
LSC-A-022	Low Level Tritium by Enrichment Process in (Aqueous [AQ])	3

Analyses Assigned Per Fraction

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

DQO Report for SDG
ARS1-10-02491

Analysis Code	Group	Isotope	Activity Units	Aliquot Units	ProcedureNo	RDL	LCS_LL	LCS_UL	MS_LL	MS_UL	RadY_LL	RadY_UL	GravY_LL	GravY_LL	RER	RPD	DiltionReq	RoughPrepReq	BlankCorrectionMDA	BlankCorrectionAll	CountTimeReq	AliquotRequired
LSC-A-021	STC	H-3		TU	ARS-054	0.00E+00	75	125	60	140	30	110	40	110	1.00	25	FALSE	FALSE	FALSE	FALSE		
LSC-A-022	STC	Enriched H-3		TU	ARS-054	0.00E+00	75	125	60	140	30	110	40	110	1.00	25	FALSE	FALSE	FALSE	FALSE		

ARS FILE TRACKING SHEET

SDG: ARS1-10-02491

Task	Date / Time	Initials
Date & Time Samples Received	11-16-10/11:08	CWB
ICOC Initiated / Storage Location: LL3H	11-16-10/11:52	CWB
Technical Checks Performed	See Batch	—
Report Written / EDD Generated: 3-14-11 / 1120 | SDL (Date/Time, Initials)	3-14-11/1120	SDL
Quality Assurance Checks Performed on Report	3-14-11 1528	VM
Management Check Performed on Report		
Preliminary Report Sent		
Report E-mailed		
Report Faxed		
Report Reviewed		
Report Mailed		
Invoice Completed Invoice #:_____		
Report Imaged		

SPECIAL REQUIREMENTS

Requirement	Yes	No
3 Hour Rush		✓
24 Hour Rush		✓
48 Hour Rush		✓
Special Invoicing *see notes* Mgmt. Approval:_____		✓

NOTES:

ARS-062
04/23/2010

COMPANY NAME: Los Alamos National Lab. **SDG:** ARS1-10-02491

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 3

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

External and Internal Surveys

Exposure Rate Meter:	M3 242361	Serial No.:	M44-2 PR264266	Calibration Due Date:	4-19-11
Count Rate Meter:	M2 154859	Serial No.:	M44-9 PR184559	Calibration Due Date:	4/6-11

Background Exposure Rate (µR/hr)	22	Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd)	20	µR/hr
Background Count Rate (cpm)	50	Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd)	60	cpm
		Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd)	60	cpm

Sample Label/Comments/Notes	pH Orig (pH ≤ 2 is Acceptable)	pH Final	Mark if Preserve	Acid Lot #	Weight(g) / Volume(mL)	µR/hr (Acceptance Limits <500 µR/hr)	cpm (Acceptance Limits <100 cpm/cm²)
Buckman-11-1944					1000	13	30
Buckman-11-1970					1000	12	35
Buckman-11-2042					1000	13	30

Surveyors' Name: [signature] Date/Time Surveyed: 11-10-10 / 11:20

S:\Procedures_Controlled\Controlled Forms\ARS-062 Sample Receipt Inspection Form

DISCREPANT SAMPLE RECEIPT REPORT

For Sample Receiving Use

SDG: _____ **Receipt Date/Time:** _____/_____ **Matrix:** _____

Client Name: LANL

Problem Description:

The following; Buckman 06-11-1970, Buckman 08-11-2042, and Buckman 1-11-1944 are present but missing COC

For Project Manager Use

Client Notified (Y | N): _____ **Date/Time Client Notified:** 11·12·10 / 11:04

Client/PM Resolution:

emailed Keith & Joylene
They mailed us a COC for these
3 samples (Req # 11-473)

Client Notified that TAT Starts from Resolution of DSRR (Y | N): _____

Date/Time DSRR Resolved: 11·16·10 / 10:35 **PM Initials:** SDL

For Sample Receiving Use

Action Taken:

Receive the COC and checked in samples as normal.

Signature: [signature] **Date/Time:** 11/6/10 / 11:08
Sample Custodian

ARS-062-002 r1 S:\Procedures_Controlled/Control Forms

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Request Number: 10-4334 REVISED

2609 North River Road • Port Allen, Louisiana 70767
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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 10-4334

Original COC

Hard Copy Required

Wednesday, August 25, 2010

REQUEST NUMBER: 10-4334

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

These Samples are on:
LANL Request Number:10-4334
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples according to the schedule indicated:

SHIP DATE: 8/25/2010
TURNAROUND/REPORT DUE: 9/24/2010
TURNAROUND REQ'D: 30 Days

RAD SCREENING: Not Required
LAB REQUEST COMMENTS:

LANL ER SMO CONTACT:
Signature:

PRIORITY	METHOD CODE	CNTNR	SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	SPECIAL INSTRUCTIONS
	Generic:Low_Level_Tritium	1	Buckman1-10-24996	WG	8/24/2010	
		1	Buckman06-10-24997	WG	8/24/2010	
		1	Buckman08-10-24998	WG	8/24/2010	
		1	Buckman1-10-24999	WG	8/24/2010	

Final Page of REQUEST NUMBER 10-4334

Wednesday, August 25, 2010

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 10-4334

REQUEST NUMBER: 10-4334

LOS ALAMOS

NATIONAL LABORATORY

ATTN: Danny Coleman

American Radiation Services - Primary

1726 Wooddale Court

Baton Rouge, LA 70806

LAB REQUEST COMMENTS:

TURNAROUND/REPORT DUE: 9/24/2010

TURNAROUND REQ'D: 30

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman06-10-24997	1	POLY	WSP-LL-H-3	None	WG
Buckman1-10-24996	1	POLY	WSP-LL-H-3	None	WG
Buckman08-10-24998	1	POLY	WSP-LL-H-3	None	WG
Buckman1-10-24999	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:		Date	Time	Received By:		Date	Time
Printed Name	Signature			Printed Name	Signature		
		8/25/10	1400			8/26/10	10:48
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		

Received for DISPOSAL By:		Date	Time	Remarks:
Printed Name	Signature			

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 10-4334

Case Narrative

ARS INTERNATIONAL

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November 19, 2010

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

Request Number: **10-4334**
LANL Sample ID: Buckman1-10-24996; Buckman06-10-24997; Buckman08-10-24998; Buckman1-10-24999.

Dear Mr. Greene;

On August 26, 2010, ARS International received four (4) water samples to be analyzed for Low Level Tritium.

The samples were processed and counted using the appropriate counting equipment and QA/QC for this type of analysis. Results of the analysis and QA/QC are attached in the data package.

The client and QA/QC samples were counted with a count time sufficient to meet quality control parameters for counting equipment and were within acceptance criteria and statistical sound detection limits.

If you have any questions please do not hesitate to call at 225.381.2991 or email LANL@amrad.com.

Sincerely,

Laboratory Management
ARS International

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

COVER PAGE

PROJECT SAMPLE IDENTIFICATION
CROSS-REFERENCE
TO ARS SAMPLE LABORATORY IDs

Subcontract (LANL Agreement Number) 63641-001-10

Request Number	LANL PROJECT SAMPLE ID NUMBER	American Radiation Services SAMPLE ID NUMBER(S)
10-4334	Buckman1-10-24996	ARS1-10-01880-001
10-4334	Buckman06-10-24997	ARS1-10-01880-002
10-4334	Buckman08-10-24998	ARS1-10-01880-003
10-4334	Buckman1-10-24999	ARS1-10-01880-004

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	Title	Date
	Laboratory Management, ARS International	11-19-10

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-10-01880	**Request or PO Number:**	10-4334
Client Sample ID:	Buckman1-10-24996	**ARS Sample ID:**	ARS1-10-01880-001
Sample Collection Date:	08/24/10	**Date Received:**	08/26/10
Sample Matrix:	Aqueous	**Report Date:**	08/17/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.370	0.210	0.670	0.320	U	TU	ARS-040	11/15/10 00:00	JR	NA

NOTES: Project Cost Code: WEPR1158W100

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 NELAP Certificate # E87558

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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ARS Sample Delivery Group:	ARS1-10-01880	**Request or PO Number:**	10-4334
Client Sample ID:	Buckman06-10-24997	**ARS Sample ID:**	ARS1-10-01880-002
Sample Collection Date:	08/24/10	**Date Received:**	08/26/10
Sample Matrix:	Aqueous	**Report Date:**	08/17/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.330	0.140	0.420	0.200	U	TU	ARS-040	11/15/10 00:00	JR	NA

NOTES: Project Cost Code: WEPR1158W100

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 NELAP Certificate # E87558

ARS INTERNATIONAL

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ARS Sample Delivery Group:	ARS1-10-01880	**Request or PO Number:**	10-4334
Client Sample ID:	Buckman08-10-24998	**ARS Sample ID:**	ARS1-10-01880-003
Sample Collection Date:	08/24/10	**Date Received:**	08/26/10
Sample Matrix:	Aqueous	**Report Date:**	08/17/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.370	0.190	0.590	0.290	U	TU	ARS-040	11/15/10 00:00	JR	NA

NOTES: Project Cost Code: WEPR1158W100

Project Manager Review

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

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ARS INTERNATIONAL

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ARS Sample Delivery Group:	ARS1-10-01880	**Request or PO Number:**	10-4334
Client Sample ID:	Buckman1-10-24999	**ARS Sample ID:**	ARS1-10-01880-004
Sample Collection Date:	08/24/10	**Date Received:**	08/26/10
Sample Matrix:	Aqueous	**Report Date:**	08/17/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.280	0.160	0.520	0.250	U	TU	ARS-040	11/15/10 00:00	JR	NA

NOTES: Project Cost Code: WEPR1158W100

Project Manager Review

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

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QC Results Report

Sample Delivery Group: ARS1-10-01880
Date Received: 8/26/2010

Laboratory Control Sample Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1s)	MDC	Expected Value	Qual	Raport Units	Analysis Test Method	Analysis Date/Tima	Analysis Technician	Percent Recovery (%)	LCS Acceptance Range
ARS1-B10-04304	LCS	H3	6.980	1.080	0.610	8.428		TU	ARS-040	11/12/10 0:00	JR	83	75%-125%

Blank Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1s)	MDC	Expected Value	Qual	Raport Units	Analysis Test Method	Analysis Date/Time	Analysis Technician
ARS1-B10-04304	MBL	H3	-0.010	0.140	0.480	NA	U	TU	ARS-040	11/13/10 0:00	JR

Sample RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER AcceptanceRange
ARS1-B10-04304	LCSD	H3	6.980	1.080	7.840	1.210		TU	ARS-040	1/13/10 0:00	JR	0.38	< 1

Sample DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER AcceptanceRange
ARS1-B10-04304	LCSD	H3	6.980	1.080	7.840	1.210		TU	ARS-040	11/13/10 0:00	JR	1.06	< 3

Susan Reese
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

ARS1-B10-04304

Expected Value Calculations LANL

ARS Batch Number: ARS1-B09 - 00000

LCS	**CALCULATED EXPECTED VALUE**	=	27.148	8.428		
			Range	21.719	-	32.578
LCSD	**CALCULATED EXPECTED VALUE**	=	27.203	8.446		
			Range	21.763	-	32.644

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting Samples

QC Evaluation

EPA Method: ARS-040
Batch ID: ARS1-B10-04304
SDG's: ARS1-10-01833,34,78,80,81,1940,42

LCS	22.4900	**CSU (2s)**	6.8200
LCSD	25.2700	**CSU-D (2s)**	7.6500

DER = abs(LSC-LSCD) / sqr((2s CSU/2)^2)+((2s CSU-D/2)^2) *at 1 sigma* = **< 3**

DER 2.78 / 5.1243268 = 0.54251 **< 3**

% RPD= ABS(LCS - LSCD) / (LCS+LCSD)/2 * 100 = **< 25%**

%RPD 2.78 / 23.88 *100 = 11.64154 **< 25%**

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

RER= abs((LCS-LCSD)) / (CSU)+(CSD) *at 2 sigma* = **<1** ***<--LANL Requirement***

RER = 2.78 / 14.4700 0.192121631 **<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	-0.02	0.91	1.56	
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 = -0.02
CSU = 0.91
Is ACT<1.65*CSU? YES

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	10-01833,34,78,80,81,1940,42
ARS Batch ID Number	ARS1-B10-04304

Enrichment Factor Curve coeff. - Power y = a * x^b		Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	8.978E-01	a	-2.319E-06
b	-9.611E-01	b	2.724E-03
c		c	-1.060E+00
		d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	TU
Coverage Factor	1	UCF	7.151
		Aliquot must be entered in liters!!	

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
B10-04304-01	503.98	2.00	11.68	2.06	9.62	0.02	40.32	4.93	1.44	548.29	0.3763	0.00502	L	2/25/2009	11/12/2010	360	360	0.91699	6.98	0.27	0.27	1.08	0.61	0.29	TU
B10-04304-02	504.73	2.00	12.52	2.06	10.46	0.02	37.26	5.13	1.44	561.98	0.3823	0.00503	L	2/25/2009	11/13/2010	360	360	0.91686	7.84	0.29	0.29	1.21	0.64	0.31	TU
B10-04304-03	504.43	2.00	10.72	2.06	8.66	0.02	44.65	1.44	1.44	573.80	0.3909	0.00500	L	11/12/2010	11/13/2010	360	360	0.99984	-0.01	0.14	0.14	0.14	0.48	0.24	TU
B10-04304-04	439.06	2.00	13.00	2.06	10.94	0.02	31.21	1.73	1.44	469.52	0.3516	0.00504	L	8/12/2010	11/13/2010	360	360	0.98717	0.73	0.24	0.24	0.26	0.77	0.38	TU
B10-04304-05	434.68	2.00	11.29	2.06	9.23	0.02	36.40	1.72	1.44	542.71	0.3738	0.00502	L	8/12/2010	11/13/2010	360	360	0.98717	0.57	0.19	0.19	0.21	0.63	0.31	TU
B10-04304-06	505.23	2.00	12.76	2.06	10.70	0.02	36.49	1.60	1.44	553.33	0.3784	0.00503	L	8/12/2010	11/14/2010	360	360	0.98704	0.32	0.19	0.19	0.19	0.62	0.30	TU
B10-04304-07	514.04	2.02	12.22	2.08	10.14	0.02	39.07	1.78	1.44	542.14	0.3736	0.00390	L	8/13/2010	11/14/2010	360	360	0.98717	0.84	0.24	0.24	0.27	0.75	0.37	TU
B10-04304-08	498.85	2.01	12.00	2.07	9.93	0.02	38.73	1.60	1.44	545.04	0.3749	0.00502	L	8/19/2010	11/14/2010	360	360	0.98799	0.30	0.18	0.18	0.18	0.59	0.29	TU
B10-04304-09	511.47	2.00	12.02	2.06	9.96	0.02	39.55	1.68	1.44	550.45	0.3772	0.00504	L	8/24/2010	11/14/2010	360	360	0.98868	0.44	0.18	0.18	0.19	0.57	0.28	TU
B10-04304-10	513.78	2.00	13.76	2.06	11.70	0.02	34.03	1.61	1.44	550.37	0.3771	0.00500	L	8/24/2010	11/15/2010	360	360	0.98854	0.37	0.20	0.20	0.21	0.67	0.32	TU
B10-04304-11	497.63	2.00	9.17	2.06	7.11	0.01	53.27	1.68	1.44	558.84	0.3808	0.00502	L	8/24/2010	11/15/2010	360	360	0.98854	0.33	0.13	0.13	0.14	0.42	0.20	TU
B10-04304-12	496.49	2.00	12.16	2.06	10.10	0.02	37.93	1.63	1.44	553.46	0.3785	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	0.37	0.18	0.18	0.19	0.59	0.29	TU
B10-04304-13	504.53	2.00	10.60	2.06	8.54	0.02	45.26	1.61	1.44	520.46	0.3643	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	0.28	0.16	0.16	0.16	0.52	0.25	TU
B10-04304-14	498.72	2.00	10.79	2.06	8.73	0.02	43.82	33.03	1.44	528.97	0.3679	0.00321	L	8/23/2010	11/16/2010	360	360	0.98827	86.36	0.85	0.85	12.98	0.83	0.40	TU
B10-04304-15	503.50	2.00	11.38	2.06	9.32	0.02	41.53	13.51	1.44	563.13	0.3832	0.00500	L	8/20/2010	11/16/2010	360	360	0.98786	21.47	0.36	0.36	3.24	0.54	0.26	TU
B10-04304-16	496.97	2.00	12.38	2.06	10.32	0.02	37.19	16.02	1.44	522.23	0.3650	0.00501	L	6/23/2010	11/16/2010	360	360	0.98827	30.33	0.46	0.46	4.57	0.63	0.31	TU
B10-04304-17	493.93	2.00	13.81	2.06	11.75	0.02	32.63	1.67	1.44	550.07	0.3770	0.00503	L	8/25/2010	11/16/2010	360	360	0.98854	0.52	0.21	0.21	0.23	0.69	0.34	TU
B10-04304-20	491.77	2.00	9.83	2.06	7.77	0.02	48.36	4.70	1.44	557.68	0.3803	0.00503	L	8/31/2010	11/17/2010	360	360	0.98923	4.98	0.20	0.20	0.77	0.46	0.23	TU

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	10-01833,34,78,80,81,1940,42
ARS Batch ID Number	ARS1-B10-04304

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8.978E-01
b	-9.611E-01
c	

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	pCi
Coverage Factor	1	UCF	2.22

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
B10-04304-01	503.98	2.00	11.68	2.06	9.62	0.02	40.32	4.93	1.44	548.29	0.3763	0.00502	L	2/25/2009	11/12/2010	360	360	0.91699	22.49	0.86	0.86	3.48	1.95	0.95	pCi/L
B10-04304-02	504.73	2.00	12.52	2.06	10.46	0.02	37.26	5.13	1.44	561.98	0.3823	0.00503	L	2/25/2009	11/13/2010	360	360	0.91686	25.27	0.93	0.93	3.90	2.07	1.01	pCi/L
B10-04304-03	504.43	2.00	10.72	2.06	8.66	0.02	44.65	1.44	1.44	573.80	0.3909	0.00500	L	11/12/2010	11/13/2010	360	360	0.99984	-0.02	0.46	0.46	0.46	1.56	0.76	pCi/L
B10-04304-04	439.06	2.00	13.00	2.06	10.94	0.02	31.21	1.73	1.44	469.52	0.3516	0.00504	L	8/12/2010	11/13/2010	360	360	0.98717	2.36	0.77	0.77	0.85	2.49	1.22	pCi/L
B10-04304-05	434.68	2.00	11.29	2.06	9.23	0.02	36.40	1.72	1.44	542.71	0.3738	0.00502	L	8/12/2010	11/13/2010	360	360	0.98717	1.84	0.63	0.63	0.68	2.02	0.98	pCi/L
B10-04304-06	505.23	2.00	12.76	2.06	10.70	0.02	36.49	1.60	1.44	553.33	0.3784	0.00503	L	8/12/2010	11/14/2010	360	360	0.98704	1.03	0.60	0.60	0.62	1.99	0.97	pCi/L
B10-04304-07	514.04	2.02	12.22	2.08	10.14	0.02	39.07	1.78	1.44	542.14	0.3736	0.00390	L	8/13/2010	11/14/2010	360	360	0.98717	2.69	0.76	0.76	0.86	2.42	1.18	pCi/L
B10-04304-08	498.85	2.01	12.00	2.07	9.93	0.02	38.73	1.60	1.44	545.04	0.3749	0.00502	L	8/19/2010	11/14/2010	360	360	0.98799	0.98	0.58	0.58	0.59	1.89	0.92	pCi/L
B10-04304-09	511.47	2.00	12.02	2.06	9.96	0.02	39.55	1.68	1.44	550.45	0.3772	0.00504	L	8/24/2010	11/14/2010	360	360	0.98868	1.43	0.56	0.56	0.60	1.83	0.89	pCi/L
B10-04304-10	513.78	2.00	13.76	2.06	11.70	0.02	34.03	1.61	1.44	550.37	0.3771	0.00500	L	8/24/2010	11/15/2010	360	360	0.98854	1.18	0.65	0.65	0.68	2.15	1.05	pCi/L
B10-04304-11	497.63	2.00	9.17	2.06	7.11	0.01	53.27	1.68	1.44	558.84	0.3808	0.00502	L	8/24/2010	11/15/2010	360	360	0.98854	1.06	0.42	0.42	0.45	1.35	0.66	pCi/L
B10-04304-12	496.49	2.00	12.16	2.06	10.10	0.02	37.93	1.63	1.44	553.46	0.3785	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	1.18	0.59	0.59	0.61	1.91	0.93	pCi/L
B10-04304-13	504.53	2.00	10.60	2.06	8.54	0.02	45.26	1.61	1.44	520.46	0.3643	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	0.92	0.51	0.51	0.53	1.67	0.81	pCi/L
B10-04304-14	498.72	2.00	10.79	2.06	8.73	0.02	43.82	33.03	1.44	528.97	0.3679	0.00321	L	8/23/2010	11/16/2010	360	360	0.98827	278.20	2.73	2.73	41.82	2.66	1.30	pCi/L
B10-04304-15	503.50	2.00	11.38	2.06	9.32	0.02	41.53	13.51	1.44	563.13	0.3832	0.00500	L	8/20/2010	11/16/2010	360	360	0.98786	69.14	1.17	1.17	10.44	1.73	0.84	pCi/L
B10-04304-16	496.97	2.00	12.38	2.06	10.32	0.02	37.19	16.02	1.44	522.23	0.3650	0.00501	L	8/23/2010	11/16/2010	360	360	0.98827	97.70	1.48	1.48	14.73	2.03	0.99	pCi/L
B10-04304-17	493.93	2.00	13.81	2.06	11.75	0.02	32.63	1.67	1.44	550.07	0.3770	0.00503	L	8/25/2010	11/16/2010	360	360	0.98854	1.66	0.68	0.68	0.73	2.23	1.08	pCi/L
B10-04304-20	491.77	2.00	9.83	2.06	7.77	0.02	48.36	4.70	1.44	557.68	0.3803	0.00503	L	8/31/2010	11/17/2010	360	360	0.98923	16.03	0.64	0.64	2.49	1.49	0.73	pCi/L

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	10-01833,34,78,80,81,1940,42
ARS Batch ID Number	ARS1-B10-04304

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8.978E-01
b	-9.611E-01
c	

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	pCi
Coverage Factor	1.96	UCF	2.22

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1.96s CU	Combined Standard Uncertainty 1.96s CSU	Minimum Detectable Conc MDC	Decision Level Conc. DLC	Reporting Units Units
B10-04304-01	503.98	2.00	11.68	2.06	9.62	0.02	40.32	4.93	1.44	548.29	0.3763	0.00502	L	2/25/2009	11/12/2010	360	360	0.91699	22.49	0.86	1.68	6.82	1.95	0.95	pCi/L
B10-04304-02	504.73	2.00	12.52	2.06	10.46	0.02	37.26	5.13	1.44	561.98	0.3823	0.00503	L	2/25/2009	11/13/2010	360	360	0.91686	25.27	0.93	1.82	7.65	2.07	1.01	pCi/L
B10-04304-03	504.43	2.00	10.72	2.06	8.66	0.02	44.65	1.44	1.44	573.80	0.3909	0.00500	L	11/12/2010	11/13/2010	360	360	0.99984	-0.02	0.46	0.91	0.91	1.56	0.76	pCi/L
B10-04304-04	439.06	2.00	13.00	2.06	10.94	0.02	31.21	1.73	1.44	469.52	0.3516	0.00504	L	8/12/2010	11/13/2010	360	360	0.98717	2.36	0.77	1.52	1.67	2.49	1.22	pCi/L
B10-04304-05	434.68	2.00	11.29	2.06	9.23	0.02	36.40	1.72	1.44	542.71	0.3738	0.00502	L	8/12/2010	11/13/2010	360	360	0.98717	1.84	0.63	1.23	1.34	2.02	0.98	pCi/L
B10-04304-06	505.23	2.00	12.76	2.06	10.70	0.02	36.49	1.60	1.44	553.33	0.3784	0.00503	L	8/12/2010	11/14/2010	360	360	0.98704	1.03	0.60	1.18	1.22	1.99	0.97	pCi/L
B10-04304-07	514.04	2.02	12.22	2.08	10.14	0.02	39.07	1.78	1.44	542.14	0.3736	0.00390	L	8/13/2010	11/14/2010	360	360	0.98717	2.69	0.76	1.49	1.68	2.42	1.18	pCi/L
B10-04304-08	498.85	2.01	12.00	2.07	9.93	0.02	38.73	1.60	1.44	545.04	0.3749	0.00502	L	8/19/2010	11/14/2010	360	360	0.98799	0.98	0.58	1.13	1.16	1.89	0.92	pCi/L
B10-04304-09	511.47	2.00	12.02	2.06	9.96	0.02	39.55	1.68	1.44	550.45	0.3772	0.00504	L	8/24/2010	11/14/2010	360	360	0.98868	1.43	0.56	1.11	1.18	1.83	0.89	pCi/L
B10-04304-10	513.78	2.00	13.76	2.06	11.70	0.02	34.03	1.61	1.44	550.37	0.3771	0.00500	L	8/24/2010	11/15/2010	360	360	0.98854	1.18	0.65	1.28	1.33	2.15	1.05	pCi/L
B10-04304-11	497.63	2.00	9.17	2.06	7.11	0.01	53.27	1.68	1.44	558.84	0.3808	0.00502	L	8/24/2010	11/15/2010	360	360	0.98854	1.06	0.42	0.82	0.87	1.35	0.66	pCi/L
B10-04304-12	496.49	2.00	12.16	2.06	10.10	0.02	37.93	1.63	1.44	553.46	0.3785	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	1.18	0.59	1.15	1.20	1.91	0.93	pCi/L
B10-04304-13	504.53	2.00	10.60	2.06	8.54	0.02	45.26	1.61	1.44	520.46	0.3643	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	0.92	0.51	1.00	1.03	1.67	0.81	pCi/L
B10-04304-14	498.72	2.00	10.79	2.06	8.73	0.02	43.82	33.03	1.44	528.97	0.3679	0.00321	L	8/23/2010	11/16/2010	360	360	0.98827	278.20	2.73	5.34	81.96	2.66	1.30	pCi/L
B10-04304-15	503.50	2.00	11.38	2.06	9.32	0.02	41.53	13.51	1.44	563.13	0.3832	0.00500	L	8/20/2010	11/16/2010	360	360	0.98786	69.14	1.17	2.29	20.46	1.73	0.84	pCi/L
B10-04304-16	496.97	2.00	12.38	2.06	10.32	0.02	37.19	16.02	1.44	522.23	0.3650	0.00501	L	8/23/2010	11/16/2010	360	360	0.98827	97.70	1.48	2.89	28.87	2.03	0.99	pCi/L
B10-04304-17	493.93	2.00	13.81	2.06	11.75	0.02	32.63	1.67	1.44	550.07	0.3770	0.00503	L	8/25/2010	11/16/2010	360	360	0.98854	1.66	0.68	1.34	1.43	2.23	1.08	pCi/L
B10-04304-20	491.77	2.00	9.83	2.06	7.77	0.02	48.36	4.70	1.44	557.68	0.3803	0.00503	L	8/31/2010	11/17/2010	360	360	0.98923	16.03	0.64	1.26	4.88	1.49	0.73	pCi/L

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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-04304**

Method **ARS-054** **Analysis** **LSC-A-022** **Matrix** **AQ**

Description **Low Level Tritium by Enrichment**

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-04304-01	LCS	B-10212								
ARS1-B10-04304-02	LCSD	B-10213								
ARS1-B10-04304-03	MBL									
ARS1-B10-04304-04	DUP									
ARS1-B10-04304-05	DO				**ARS1-10-01833**	001	1	CAPA-10-24119	STD	09/14/10
ARS1-B10-04304-06	TRG				**ARS1-10-01833**	002	1	CAPA-10-24120	STD	09/14/10
ARS1-B10-04304-07	TRG				**ARS1-10-01833**	003	1	CAPA-10-24143	STD	09/14/10
ARS1-B10-04304-08	TRG				**ARS1-10-01834**	001	1	CAPA-10-24872	STD	09/14/10
ARS1-B10-04304-09	TRG				**ARS1-10-01878**	001	1	CAPA-10-24868	STD	09/21/10
ARS1-B10-04304-10	TRG				**ARS1-10-01880**	001	1	Buckman1-10-24996	STD	09/21/10
ARS1-B10-04304-11	TRG				**ARS1-10-01880**	002	1	Buckman06-10-24997	STD	09/21/10
ARS1-B10-04304-12	TRG				**ARS1-10-01880**	003	1	Buckman08-10-24998	STD	09/21/10
ARS1-B10-04304-13	TRG				**ARS1-10-01880**	004	1	Buckman1-10-24999	STD	09/21/10
ARS1-B10-04304-14	TRG				**ARS1-10-01881**	001	1	CAPU-10-25281	STD	09/21/10
ARS1-B10-04304-15	TRG				**ARS1-10-01942**	001	1	CALA-10-24991	STD	09/21/10
ARS1-B10-04304-16	TRG				**ARS1-10-01942**	002	1	CALA-10-25201	STD	09/21/10
ARS1-B10-04304-17	TRG				**ARS1-10-01942**	003	1	CALA-10-25215	STD	09/21/10
ARS1-B10-04304-20	TRG				**ARS1-10-01940**	001	1	CAWA-10-26041	STD	09/28/10

75023
10-01833-001-1
XRAD

75024
10-01833-002-1
XRAD

75025
10-01833-003-1
XRAD

75026
10-01834-001-1
XRAD

75027
10-01878-001-1
XRAD

75028
10-01880-001-1
XRAD

75029
10-01880-002-1
XRAD

75030
10-01880-003-1
XRAD

75031
10-01880-004-1
XRAD

75032
10-01881-001-1
XRAD

75033
10-01942-001-1
XRAD

75036
10-01942-002-1
XRAD

75038
10-01942-003-1
XRAD

75040
10-01940-001-1
XRAD

LCS Report
Analytical Batch: ARS1-B10-04304

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-10212	ARS1-B10-04304	ARS1-B10-04304-01	B-H3	S-0206	H-3	5	2.808406639	13.2909	18.299	5.0081	WSTICKLE	5/17/2010			
B-10213	ARS1-B10-04304	ARS1-B10-04304-02	B-H3	S-0206	H-3	5	2.808406639	13.2585	18.2842	5.0257	WSTICKLE	5/17/2010			

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
6897	ARS1-B10-04304	ARS1-B10-04304-01		5.02	g					JRABER	11/12/2010 14:09:03
6898	ARS1-B10-04304	ARS1-B10-04304-02		5.03	g					JRABER	11/12/2010 14:09:04
6899	ARS1-B10-04304	ARS1-B10-04304-03		5	g					JRABER	11/12/2010 14:09:04
6900	ARS1-B10-04304	ARS1-B10-04304-04		5.04	g					JRABER	11/12/2010 14:09:04
6901	ARS1-B10-04304	ARS1-B10-04304-05	CAPA-10-24119	5.02	g	75023				JRABER	11/12/2010 14:09:04
6902	ARS1-B10-04304	ARS1-B10-04304-06	CAPA-10-24120	5.03	g	75024				JRABER	11/12/2010 14:09:04
6903	ARS1-B10-04304	ARS1-B10-04304-07	CAPA-10-24143	3.9	g	75025				JRABER	11/12/2010 14:09:04
6904	ARS1-B10-04304	ARS1-B10-04304-08	CAPA-10-24872	5.02	g	75026				JRABER	11/12/2010 14:09:04
6905	ARS1-B10-04304	ARS1-B10-04304-09	CAPA-10-24868	5.04	g	75027				JRABER	11/12/2010 14:09:04
6906	ARS1-B10-04304	ARS1-B10-04304-10	Buckman1-10-24996	5	g	75028				JRABER	11/12/2010 14:09:05
6907	ARS1-B10-04304	ARS1-B10-04304-11	Buckman06-10-24997	5.02	g	75029				JRABER	11/12/2010 14:09:05
6908	ARS1-B10-04304	ARS1-B10-04304-12	Buckman08-10-24998	5.01	g	75030				JRABER	11/12/2010 14:09:05
6909	ARS1-B10-04304	ARS1-B10-04304-13	Buckman1-10-24999	5.01	g	75031				JRABER	11/12/2010 14:09:05
6910	ARS1-B10-04304	ARS1-B10-04304-14	CAPU-10-25281	3.21	g	75032				JRABER	11/12/2010 14:09:05
6911	ARS1-B10-04304	ARS1-B10-04304-15	CALA-10-24991	5	g	75033				JRABER	11/12/2010 14:09:05
6912	ARS1-B10-04304	ARS1-B10-04304-16	CALA-10-25201	5.01	g	75036				JRABER	11/12/2010 14:09:05
6913	ARS1-B10-04304	ARS1-B10-04304-17	CALA-10-25215	5.03	g	75038				JRABER	11/12/2010 14:09:06
6914	ARS1-B10-04304	ARS1-B10-04304-20	CAWA-10-26041	5.03	g	75040				JRABER	11/12/2010 14:09:06

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\20101112_1141
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20101112_1141\20101112_1141.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20101112_1141\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20101112_1141\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL H3
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: LL H3 PLASTIC
Count Time (min): 360.00
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	0.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

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

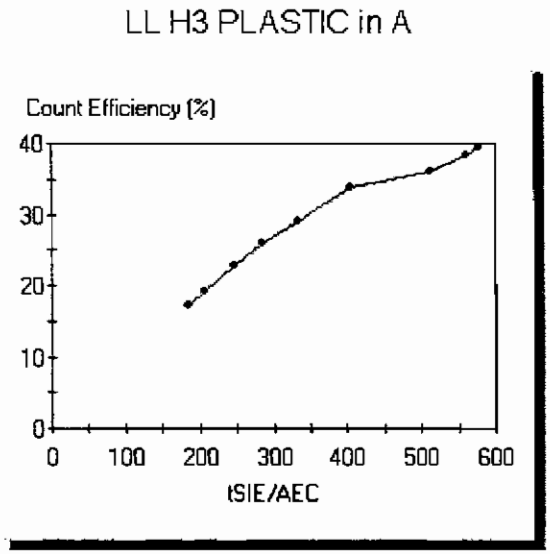
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 09/08/2009
Date Modified:
LL H3 PLASTIC in A

tSIE/AEC	Count Efficiency (%)
577.71	39.37
561.32	38.19
514.09	36.15
404.21	33.71
334.90	29.12
284.93	26.04
246.14	22.78
207.51	19.18
185.88	17.18

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	360.00	1.444	3.84	549.14	37.66	11/12/2010	11:50:04 AM	
2	2	B10-04304-01	360.00	4.932	13.11	548.29	37.63	11/12/2010	6:02:12 PM	
2	3	B10-04304-02	360.00	5.129	13.42	561.98	38.23	11/13/2010	12:14:37 AM	
2	4	B10-04304-03	360.00	1.444	3.69	573.80	39.09	11/13/2010	6:26:55 AM	
2	5	B10-04304-04	360.00	1.732	4.93	469.52	35.16	11/13/2010	12:39:19 PM	
2	6	B10-04304-05	360.00	1.717	4.59	542.71	37.38	11/13/2010	6:57:17 PM	
2	7	B10-04304-06	360.00	1.596	4.22	553.33	37.84	11/14/2010	1:13:38 AM	
2	8	B10-04304-07	360.00	1.783	4.77	542.14	37.36	11/14/2010	7:28:39 AM	
2	9	B10-04304-08	360.00	1.603	4.28	545.04	37.49	11/14/2010	1:44:04 PM	
2	10	B10-04304-09	360.00	1.679	4.45	550.45	37.72	11/14/2010	7:57:08 PM	
2	11	B10-04304-10	360.00	1.614	4.28	550.37	37.71	11/15/2010	2:09:21 AM	
2	12	B10-04304-11	360.00	1.680	4.41	558.84	38.08	11/15/2010	8:21:27 AM	
2	13	B10-04304-12	360.00	1.625	4.29	553.46	37.85	11/15/2010	2:33:52 PM	
2	14	B10-04304-13	360.00	1.612	4.42	520.46	36.43	11/15/2010	8:46:08 PM	
2	15	B10-04304-14	360.00	33.032	89.78	528.97	36.79	11/16/2010	2:58:26 AM	
2	16	B10-04304-15	360.00	13.506	35.25	563.13	38.32	11/16/2010	9:10:53 AM	
2	17	B10-04304-16	360.00	16.023	43.90	522.23	36.50	11/16/2010	3:23:12 PM	
2	18	B10-04304-17	360.00	1.664	4.41	550.07	37.70	11/16/2010	9:35:34 PM	
2	19	B10-04304-20	360.00	4.701	12.36	557.68	38.03	11/17/2010	3:47:46 AM	

ARS, International
Port Allen Lab

Tritium Enrichment Data

Printed 11/12/2010 1 49 PM

Procedures: ARS-040

Date: 10/4/2010

ARS File ID Numbers: ARS1-10-01833, 1834, 1878, 1880, 1881, 1942, 1940

ARS Batch ID: ARS1-B10-04304

	A Batch ID:	Enrichment Cell No.	Tare Wt of Electrolysis Cell & Electrodes	Tare Wt Reservoir	m_i Wt Na_2O_2	V_f Gross Weight of Sample Reservoir	V_f Gross Sample Added	Electrolysis Start Date & Time	Start AMP	Start Bath C°	Electolysis End Date & Time	End Bath C°	End Wt of Cell + Resv. + Sample	V_r Gross Sample Recovered	V_r [redacted]	Cryo-Distil Flask #	Tare Wt Cryo-distil flask	Gross Wt flask + Sample	[redacted]	Tare Weight of LSC Vial	Vial + Sample	Aliquot Net Sample	Wt of Vial, Sample & Deod Water Filter if used	Net Deod Water Added	Tare Wt b/f Cocktail	Gross Wt Vial + Sample + Cocktail
1	ARS1-B10-04304-01	50	331 09	198.86	2.00	703 94	[redacted]	10-5-2010 0945	5.00	2 0	10-30-10 1436	2.0	542 73	11.88	[redacted]	N/A,N/A	96.59	103.73	[redacted]	6.40	11.42	5.02	0.00	0.00	11.42	26 43
2	ARS1-B10-04304-02	60	336 77	189 32	2 00	694 05	[redacted]	10-5-2010 0948	5.00	2 0	10-29-10 0815	2.0	538.61	12.52	[redacted]	N/A,N/A	96 42	104.75	[redacted]	6 52	11.55	5.03	0.00	0.00	11.55	28 55
3	ARS1-B10-04304-03	78	334.77	193 74	2 00	898 17	[redacted]	10-5-2010 1018	5.00	2 0	10-30-10 1015	2.0	539 23	10.72	[redacted]	N/A,N/A	102.36	109.39	[redacted]	6 46	11 46	5.00	0.00	0.00	11 46	26 48
4	ARS1-B10-04304-04	68	337 19	195 41	2 00	834 47	[redacted]	10-6-2010 0952	5.00	2.0	11-2-10 1218	2 0	545.60	13.00	[redacted]	N/A,C	96 58	105.37	[redacted]	6 43	11 47	5.04	0.00	0.00	11.47	26.50
5	ARS1-B10-04304-05	59	338 40	191 74	2 00	626 42	[redacted]	10-6-2010 1002	5.00	2.0	11-2-10 1502	2 0	541 43	11.29	[redacted]	N/A,N/A	99 74	108.16	[redacted]	6.41	11.43	5.02	0.00	0.00	11 43	26 45
6	ARS1-B10-04304-06	82	336 32	194 86	2 00	700 09	[redacted]	10-4-2010 1546	5.00	2 0	11-1-10 1609	2 0	543.94	12.76	[redacted]	N/A,7	116 59	125.91	[redacted]	6 46	11.49	5.03	0.00	0.00	11 49	26 52
7	ARS1-B10-04304-07	67	332 60	194 21	2 02	706 25	[redacted]	10-4-2010 1552	5.00	2.0	11-1-10 0813	2.0	539.03	12.22	[redacted]	N/A,11	98 00	101.97	[redacted]	6 47	10 37	3.90	11.54	1.17	11.54	26.58
8	ARS1-B10-04304-08	77	337 82	191.29	2.01	690 14	[redacted]	10-4-2010 1603	5.00	2 0	11-2-10 1405	2 0	541.21	12.00	[redacted]	G N/A	99 62	108.20	[redacted]	6.42	11 44	5.02	0.00	0.00	11 44	26 45
9	ARS1-B10-04304-09	35	343 07	206 76	2.00	718.23	[redacted]	10-4-2010 1612	5.00	2 0	11-2-10 1438	2 0	561.85	12.02	[redacted]	A,C	98 16	107.02	[redacted]	6.53	11.57	5.04	0.00	0.00	11 57	26 58
10	ARS1-B10-04304-10	12	332.20	190 91	2 00	704 68	[redacted]	10-6-2010 1011	5.00	2 0	11-3-10 0845	2.0	536.87	13.76	[redacted]	N/A,N/A	108 10	118.28	[redacted]	6 43	11.43	5.00	0.00	0.00	11 43	28 44
11	ARS1-B10-04304-11	83	340.46	190 57	2 00	688.20	[redacted]	10-7-2010 1016	5.00	2 0	11-4-10 1458	2.0	540 20	9.17	[redacted]	N/A,N/A	101.72	107.56	[redacted]	6 60	11.52	5.02	0.00	0.00	11 52	26.53
12	ARS1-B10-04304-12	70	338 04	157 91	2 00	654 40	[redacted]	10-7-2010 1018	5.00	2 0	11-4-10 0816	2 0	508 11	12.16	[redacted]	N/A,C	105 63	114.27	[redacted]	6.46	11.49	5.01	0.00	0.00	11 49	26 53
13	ARS1-B10-04304-13	100	337 52	190 43	2 00	684 96	[redacted]	10-7-2010 1023	5.00	2 0	11-4-10 0846	2 0	538.55	10.80	[redacted]	G,7	94 44	101.77	[redacted]	6 77	11 78	5.01	0.00	0.00	11 78	26 83
14	ARS1-B10-04304-14	26	334 44	186 08	2.00	684 80	[redacted]	10-7-2010 1031	5 00	2 0	11-4-10 0915	2.0	531 31	10.79	[redacted]	N/A,11	98.00	101.25	[redacted]	6 38	9.59	3.21	11.40	1.81	11.40	26 44
15	ARS1-B10-04304-15	74	341 30	195 51	2 00	699 01	[redacted]	10-8-2010 0946	5 00	2 0	11-5-10 1623	2 0	548 19	11.38	[redacted]	A,N/A	100 52	107.75	[redacted]	6.53	11.53	5.00	0.00	0.00	11 53	26 56
16	ARS1-B10-04304-16	95	331.83	192.46	2 00	689 43	[redacted]	10-8-2010 0951	5 00	2 0	11-6-10 0825	2.0	536.67	12.38	[redacted]	N/A,N/A	101 73	110.14	[redacted]	6 39	11.40	5.01	0.00	0.00	11.40	26 43
17	ARS1-B10-04304-17	42	333.22	201.82	2.00	695 75	[redacted]	10-8-2010 0953	5 00	2.0	11-6-10 0815	2 0	548 85	13.81	[redacted]	N/A,N/A	117.22	127.44	[redacted]	6 45	11 48	5.03	0.00	0.00	11 48	26.49
18	ARS1-B10-04304-20	25	334 78	200 82	2 00	692.59	[redacted]	10-8-2010 1002	5 00	2 0	11-6-10 1546	2 0	545.43	9.83	[redacted]	A,N/A	100 54	106.82	[redacted]	6 77	11.80	5.03	0.00	0.00	11 80	26 80
19														0.00								0.00		0.00		

Chemist Signature

Chemist Signature

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
11-9-2010	0810	B10-04096-09	B10-04096	0951	JDR
↓	↓	B10-04096-10	↓	↓	JDR
↓	↓	B10-04096-11	↓	↓	JDR
11-11-2010	0759	SNC 51	QA	QA	JDR
↓	↓	Background	B10-04096	0918	JDR
↓	↓	B10-04096-11	↓	↓	JDR
11-12-10	0915	SNC 51	QA	QA	JDR
↓	↓	Background	B 04304	1911	JDR
↓	↓	B10-04304-61	↓	↓	JDR
↓	↓	B10-04304-62	↓	↓	JDR
↓	↓	B10-04304-63	↓	↓	JDR
↓	↓	B10-04304-64	↓	↓	JDR
↓	↓	B10-04304-65	↓	↓	JDR
↓	↓	B10-04304-66	↓	↓	JDR
↓	↓	B10-04304-67	↓	↓	JDR
↓	↓	B10-04304-68	↓	↓	JDR
↓	↓	B10-04304-69	↓	↓	JDR
↓	↓	B10-04304-10	↓	↓	JDR
↓	↓	B10-04304-11	↓	↓	JDR
↓	↓	B10-04304-12	↓	↓	JDR

LSW 11-12-1

Reviewed By: LSW Initials Date: 11-16-10

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
11-17-10	1145	Bio 04304-13	Bio 04304	[illegible]	JDR
↓	↓	Bio 04304-14	↓	↓	JDR
↓	↓	Bio 04304-15	↓	↓	JDR
↓	↓	Bio 04304-16	↓	↓	JDR
↓	↓	Bio 04304-17	↓	↓	JDR
↓	↓	Bio 04304-[illegible]	↓	↓	JDR
11-17-2010	1604	SNC 51	QA	QA	JDR
↓	↓	Background	Bio-05208		JDR
↓	↓	Bio-05208-04	↓		JDR
↓	↓	Bio-05208-05	↓		JDR
↓	↓	Bio-05208-06	↓		JDR
↓	↓	Bio-05208-07	↓		JDR
↓	↓	Bio-05208-08	↓		JDR
↓	↓	Bio-05208-09	↓		JDR
↓	↓	Bio-05208-10	↓		JDR
↓	↓	Bio-05208-11	↓		JDR
↓	↓	Bio-05208-12	↓		JDR
↓	↓	Bio-05208-13	↓		JDR
↓	↓	Bio-05208-14	↓		JDR
↓	↓	Bio-05208-15	↓		JDR

LSW 11-16-10

LSW 11-17-10 data not available

Reviewed By: NB Initials Date: 11-19-10

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-04304**

Method	ARS-054	Analysis	LSC-A-022	Matrix	AQ
Description	Low Level Tritium by Enrichment				

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3
ARS1-B10-04304-01	LCS	B-10212		
ARS1-B10-04304-02	LCSD	B-10213		
ARS1-B10-04304-03	MBL			
ARS1-B10-04304-04	DUP			
ARS1-B10-04304-05	DO			
ARS1-B10-04304-06	TRG			
ARS1-B10-04304-07	TRG			
ARS1-B10-04304-08	TRG			
ARS1-B10-04304-09	TRG			
ARS1-B10-04304-10	TRG			
ARS1-B10-04304-11	TRG			
ARS1-B10-04304-12	TRG			
ARS1-B10-04304-13	TRG			
ARS1-B10-04304-14	TRG			
ARS1-B10-04304-15	TRG			
ARS1-B10-04304-16	TRG			
ARS1-B10-04304-17	TRG			
ARS1-B10-04304-18	TRG			
ARS1-B10-04304-19	TRG			
ARS1-B10-04304-20	TRG			

SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-10-01833	001	1	CAPA-10-24119	STD	09/14/10
ARS1-10-01833	002	1	CAPA-10-24120	STD	09/14/10
ARS1-10-01833	003	1	CAPA-10-24143	STD	09/14/10
ARS1-10-01834	001	1	CAPA-10-24872	STD	09/14/10
ARS1-10-01878	001	1	CAPA-10-24868	STD	09/21/10
ARS1-10-01880	001	1	Buckman1-10-24996	STD	09/21/10
ARS1-10-01880	002	1	Buckman06-10-24997	STD	09/21/10
ARS1-10-01880	003	1	Buckman08-10-24998	STD	09/21/10
ARS1-10-01880	004	1	Buckman1-10-24999	STD	09/21/10
ARS1-10-01881	001	1	CAPU-10-25281	STD	09/21/10
ARS1-10-01942	001	1	CALA-10-24991	STD	09/21/10
ARS1-10-01942	002	1	CALA-10-25201	STD	09/21/10
ARS1-10-01942	003	1	CALA-10-25215	STD	09/21/10
ARS1-10-01942	004	1	CALA-10-25510	STD	09/21/10
ARS1-10-01942	005	1	CALA-10-25204	STD	09/21/10
ARS1-10-01940	001	1	CAWA-10-26041	STD	09/28/10

9-22-2010
1514: these 2 samples were deleted as instructed by Susan Leese.

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

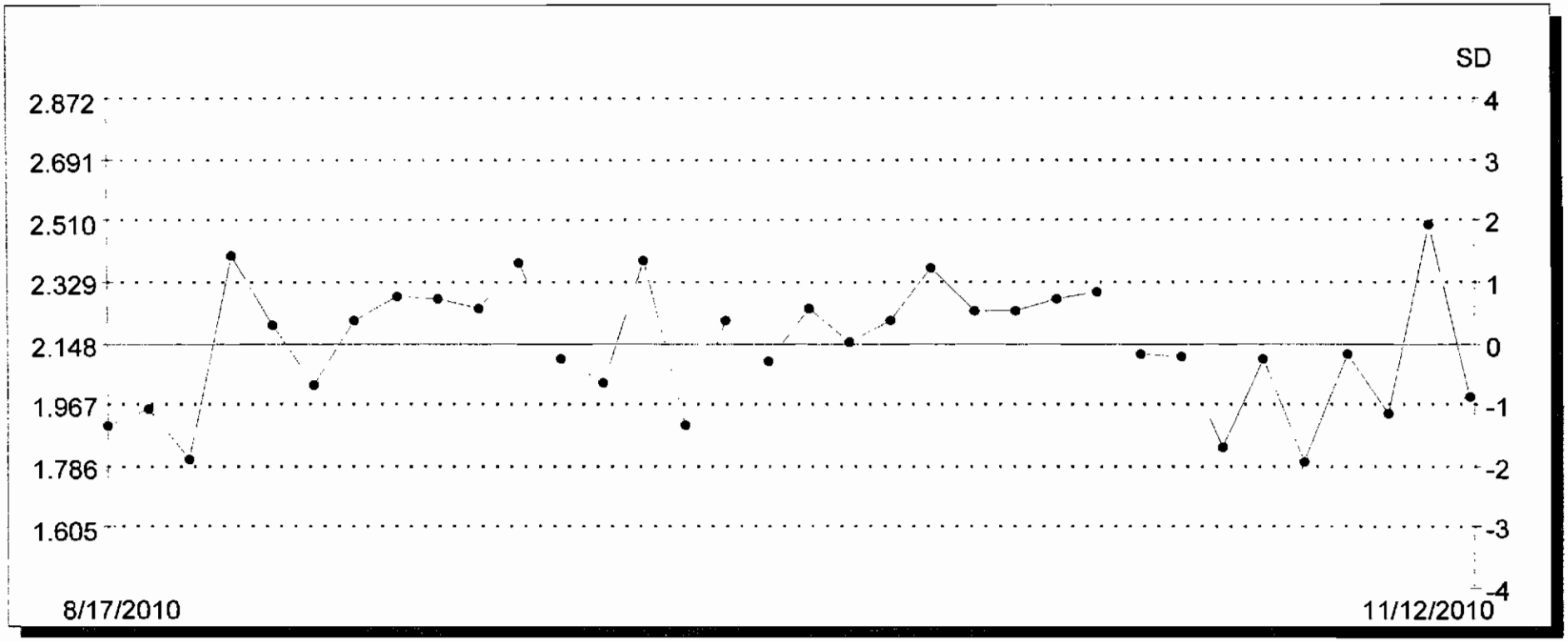
Control Charts

3H Background
Total # pts : 5164
Valid # pts : 34
Mean : 2.15
SD : 0.18

Date	Value	Valid Pt
Aug 17, 2010	1.90	X
Aug 23, 2010	1.96	X
Aug 24, 2010	1.81	X
Aug 26, 2010	2.41	X
Aug 27, 2010	2.21	X
Aug 30, 2010	2.03	X
Aug 31, 2010	2.22	X
Aug 31, 2010	2.29	X
Sep 07, 2010	2.28	X
Sep 08, 2010	2.25	X
Sep 09, 2010	2.39	X
Sep 09, 2010	2.10	X
Sep 13, 2010	2.03	X
Sep 14, 2010	2.39	X
Sep 15, 2010	1.91	X
Sep 20, 2010	2.22	X
Sep 20, 2010	2.10	X
Sep 22, 2010	2.25	X
Sep 27, 2010	2.15	X
Sep 29, 2010	2.22	X
Oct 01, 2010	2.37	X
Oct 08, 2010	2.25	X
Oct 12, 2010	2.24	X
Oct 15, 2010	2.28	X
Oct 18, 2010	2.30	X
Oct 19, 2010	2.12	X
Oct 22, 2010	2.11	X
Oct 23, 2010	1.84	X
Oct 25, 2010	2.10	X
Oct 27, 2010	1.80	X
Nov 04, 2010	2.12	X
Nov 09, 2010	1.94	X
Nov 11, 2010	2.50	X
Nov 12, 2010	1.99	X

3H Background

Total # pts	: 5164
Valid # pts	: 34
Mean	: 2.15
SD	: 0.18

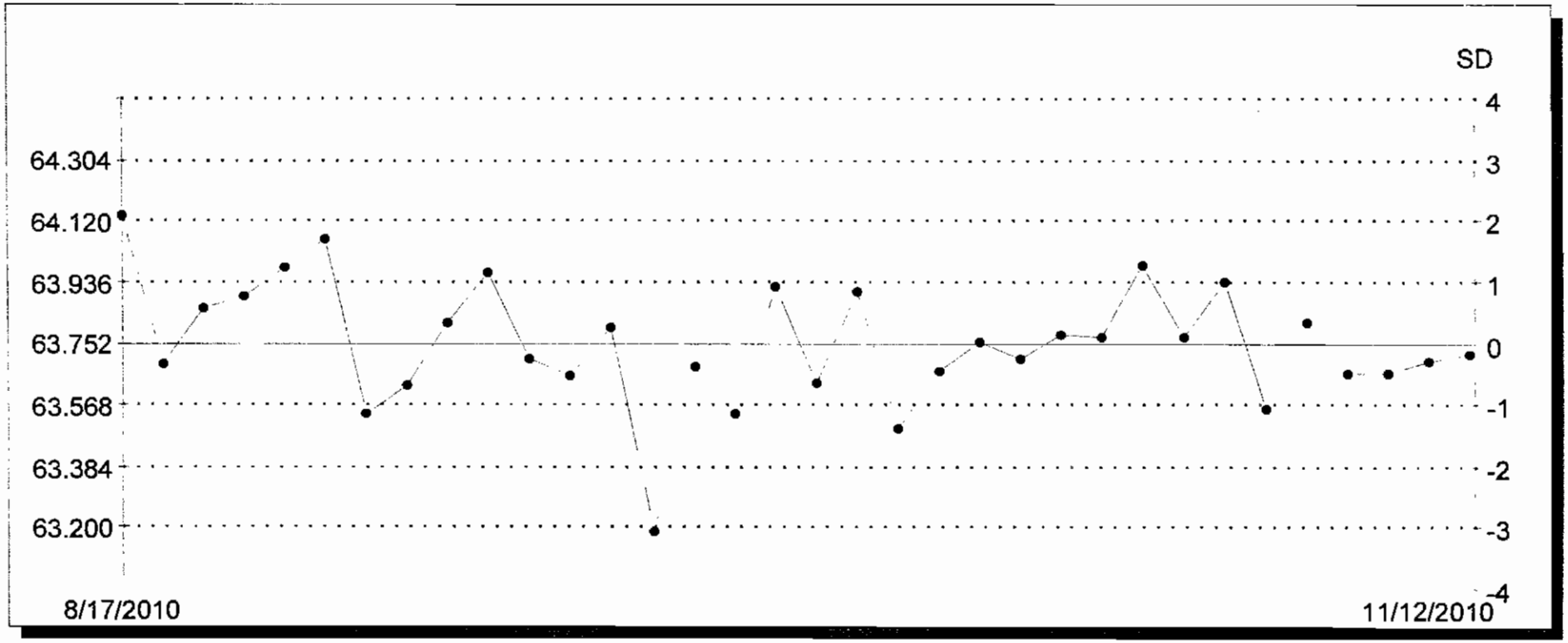


3H Efficiency
Total # pts : 5234
Valid # pts : 34
Mean : 63.75
SD : 0.18

Date	Value	Valid Pt
Aug 17, 2010	64.14	X
Aug 23, 2010	63.69	X
Aug 24, 2010	63.86	X
Aug 26, 2010	63.89	X
Aug 27, 2010	63.97	X
Aug 30, 2010	64.06	X
Aug 31, 2010	63.54	X
Aug 31, 2010	63.62	X
Sep 07, 2010	63.81	X
Sep 08, 2010	63.96	X
Sep 09, 2010	63.70	X
Sep 09, 2010	63.65	X
Sep 13, 2010	63.80	X
Sep 14, 2010	63.19	X
Sep 15, 2010	63.68	X
Sep 20, 2010	63.54	X
Sep 20, 2010	63.92	X
Sep 22, 2010	63.63	X
Sep 27, 2010	63.91	X
Sep 29, 2010	63.50	X
Oct 01, 2010	63.67	X
Oct 08, 2010	63.75	X
Oct 12, 2010	63.71	X
Oct 15, 2010	63.78	X
Oct 18, 2010	63.77	X
Oct 19, 2010	63.99	X
Oct 22, 2010	63.77	X
Oct 23, 2010	63.94	X
Oct 25, 2010	63.56	X
Oct 27, 2010	63.81	X
Nov 04, 2010	63.66	X
Nov 09, 2010	63.66	X
Nov 11, 2010	63.70	X
Nov 12, 2010	63.72	X

3H Efficiency

Total # pts	: 5234
Valid # pts	: 34
Mean	: 63.75
SD	: 0.18



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Tritium- Screening by Low Level Liquid Scintillation Counting

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting Samples

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

ARS File ID Numbers: ARS1-10-01833; 01834; 01878; 01880; 01881; 01942; 01940.
ARS Batch ID: ARS1-B10-04303

	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	B10-04303-04	120	1 799	1.898	38.71	5.03	-22.903	pCi/L	171.2768	NO
2	B10-04303-05	120	1.842	1.898	38.44	5.04	-13.020	pCi/L	172.1376	NO
3	B10-04303-06	120	1 750	1.898	37.77	5.00	-35.301	pCi/L	176.5927	NO
4	B10-04303-07	120	1 713	1.898	38.62	5.03	-42.898	pCi/L	171.6759	NO
5	B10-04303-08	120	1.651	1.898	38.22	4.99	-58.338	pCi/L	174.8632	NO
6	B10-04303-09	120	1 576	1.898	38.54	5.01	-75.120	pCi/L	172.719	NO
7	B10-04303-10	120	1.556	1.898	38.77	5.01	-79.312	pCi/L	171.6944	NO
8	B10-04303-11	120	1 708	1.898	38.25	5.01	-44.661	pCi/L	174.0286	NO
9	B10-04303-12	120	1.797	1.898	39.04	5.02	-23.214	pCi/L	170.1673	NO
10	B10-04303-13	120	2.705	1.898	38.73	5.03	186.597	pCi/L	171.1883	~~YES, analyze by LSC-A-001.~~ Process via
11	B10-04303-14	120	1.830	1.898	38.49	5.01	-15.884	pCi/L	172.9434	NO LSC-A-022
12	B10-04303-15	120	2.048	1 898	39.17	5.00	34.500	pCi/L	170.281	NO
13	B10-04303-16	120	1.430	1.898	38.73	5.00	-108.862	pCi/L	172.2155	NO JB 9-13-10
14	B10-04303-17	120	1.801	1.898	37.11	5.00	-23.548	pCi/L	179.7334	NO
15	B10-04303-18	120	2.049	1.898	38 64	5.01	35.136	pCi/L	172.2721	NO
16	B10-04303-19	120	1.879	1.898	38 44	5.00	-4.453	pCi/L	173.5147	NO
17							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
18							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
19							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
20							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
21							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
22							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
23							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!

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American Radiation Services Analytical Reports

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Tritium-Screening by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-04303**

Method ARS-054 **Analysis** LSC-A-021 **Matrix** AQ

Description Low Level Tritium Screen

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3
ARS1-B10-04303-01	LCS			
ARS1-B10-04303-02	LCSD			
ARS1-B10-04303-03	MBL			
ARS1-B10-04303-04	TRG			
ARS1-B10-04303-05	TRG			
ARS1-B10-04303-06	TRG			
ARS1-B10-04303-07	TRG			
ARS1-B10-04303-08	TRG			
ARS1-B10-04303-09	TRG			
ARS1-B10-04303-10	TRG			
ARS1-B10-04303-11	TRG			
ARS1-B10-04303-12	TRG			
ARS1-B10-04303-13	TRG			
ARS1-B10-04303-14	TRG			
ARS1-B10-04303-15	TRG			
ARS1-B10-04303-16	TRG			
ARS1-B10-04303-17	TRG			
ARS1-B10-04303-18	TRG			
ARS1-B10-04303-19	TRG			

SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-10-01833	001	1	CAPA-10-24119	STD	09/14/10
ARS1-10-01833	002	1	CAPA-10-24120	STD	09/14/10
ARS1-10-01833	003	1	CAPA-10-24143	STD	09/14/10
ARS1-10-01834	001	1	CAPA-10-24872	STD	09/14/10
ARS1-10-01878	001	1	CAPA-10-24868	STD	09/21/10
ARS1-10-01880	001	1	Buckman1-10-24996	STD	09/21/10
ARS1-10-01880	002	1	Buckman06-10-24997	STD	09/21/10
ARS1-10-01880	003	1	Buckman08-10-24998	STD	09/21/10
ARS1-10-01880	004	1	Buckman1-10-24999	STD	09/21/10
ARS1-10-01881	001	1	CAPU-10-25281	STD	09/21/10
ARS1-10-01942	001	1	CALA-10-24991	STD	09/21/10
ARS1-10-01942	002	1	CALA-10-25201	STD	09/21/10
ARS1-10-01942	003	1	CALA-10-25215	STD	09/21/10
ARS1-10-01942	004	1	CALA-10-25510	STD	09/21/10
ARS1-10-01942	005	1	CALA-10-25204	STD	09/21/10
ARS1-10-01940	001	1	CAWA-10-26041	STD	09/28/10

69621
10-01833-001-1
XRAD

69622
10-01833-002-1
XRAD

69623
10-01833-003-1
XRAD

69624
10-01834-001-1
XRAD

69625
10-01878-001-1
XRAD

69626
10-01880-001-1
XRAD

69627
10-01880-002-1
XRAD

69628
10-01880-003-1
XRAD

69629
10-01880-004-1
XRAD

69630
10-01881-001-1
XRAD

69631
10-01942-001-1
XRAD

69632
10-01942-002-1
XRAD

69633
10-01942-003-1
XRAD

69634
10-01942-004-1
XRAD

69635
10-01942-005-1
XRAD

69636
10-01940-001-1
XRAD

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
6308	ARS1-B10-04303	ARS1-B10-04303-01		1	g					JRABER	09/08/2010 11:42:48
6309	ARS1-B10-04303	ARS1-B10-04303-02		1	g					JRABER	09/08/2010 11:42:48
6310	ARS1-B10-04303	ARS1-B10-04303-03		1	g					JRABER	09/08/2010 11:42:48
6311	ARS1-B10-04303	ARS1-B10-04303-04	CAPA-10-24119	5.03	g	69621				JRABER	09/08/2010 11:42:48
6312	ARS1-B10-04303	ARS1-B10-04303-05	CAPA-10-24120	5.04	g	69622				JRABER	09/08/2010 11:42:48
6313	ARS1-B10-04303	ARS1-B10-04303-06	CAPA-10-24143	5	g	69623				JRABER	09/08/2010 11:42:48
6314	ARS1-B10-04303	ARS1-B10-04303-07	CAPA-10-24872	5.03	g	69624				JRABER	09/08/2010 11:42:48
6315	ARS1-B10-04303	ARS1-B10-04303-08	CAPA-10-24868	4.99	g	69625				JRABER	09/08/2010 11:42:48
6316	ARS1-B10-04303	ARS1-B10-04303-09	Buckman1-10-24996	5.01	g	69626				JRABER	09/08/2010 11:42:49
6317	ARS1-B10-04303	ARS1-B10-04303-10	Buckman06-10-24997	5.01	g	69627				JRABER	09/08/2010 11:42:49
6318	ARS1-B10-04303	ARS1-B10-04303-11	Buckman08-10-24998	5.01	g	69628				JRABER	09/08/2010 11:42:49
6319	ARS1-B10-04303	ARS1-B10-04303-12	Buckman1-10-24999	5.02	g	69629				JRABER	09/08/2010 11:42:49
6320	ARS1-B10-04303	ARS1-B10-04303-13	CAPU-10-25281	5.03	g	69630				JRABER	09/08/2010 11:42:49
6321	ARS1-B10-04303	ARS1-B10-04303-14	CALA-10-24991	5.01	g	69631				JRABER	09/08/2010 11:42:49
6322	ARS1-B10-04303	ARS1-B10-04303-15	CALA-10-25201	5	g	69632				JRABER	09/08/2010 11:42:49
6323	ARS1-B10-04303	ARS1-B10-04303-16	CALA-10-25215	5	g	69633				JRABER	09/08/2010 11:42:50
6324	ARS1-B10-04303	ARS1-B10-04303-17	CALA-10-25510	5	g	69634				JRABER	09/08/2010 11:42:50
6325	ARS1-B10-04303	ARS1-B10-04303-18	CALA-10-25204	5.01	g	69635				JRABER	09/08/2010 11:42:50
6326	ARS1-B10-04303	ARS1-B10-04303-19	CAWA-10-26041	5	g	69636				JRABER	09/08/2010 11:42:50

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\20100909_1235
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100909_1235\20100909_1235.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100909_1235\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100909_1235\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL H3
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: LL H3 PLASTIC
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	0.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

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

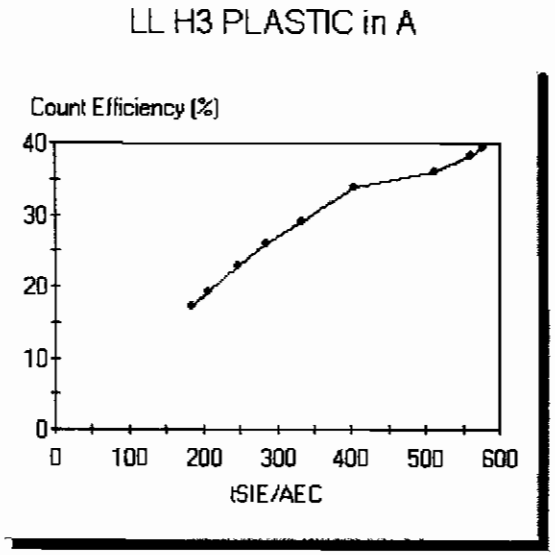
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 09/08/2009
Date Modified:
LL H3 PLASTIC in A

tSIE/AEC	Count Efficiency (%)
577.71	39.37
561.32	38.19
514.09	36.15
404.21	33.71
334.90	29.12
284.93	26.04
246.14	22.78
207.51	19.18
185.88	17.18

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.898	4.97	561.12	38.18	9/9/2010	12:44:42 PM	
2	2	B10-04303-04	120.00	1.799	4.65	568.57	38.71	9/9/2010	2:56:43 PM	
2	3	B10-04303-05	120.00	1.842	4.79	564.86	38.44	9/9/2010	5:08:42 PM	
2	4	B10-04303-06	120.00	1.750	4.63	551.57	37.77	9/9/2010	7:20:42 PM	
2	5	B10-04303-07	120.00	1.713	4.44	567.35	38.62	9/9/2010	9:32:39 PM	
2	6	B10-04303-08	120.00	1.651	4.32	561.78	38.22	9/9/2010	11:44:35 PM	
2	7	B10-04303-09	120.00	1.576	4.09	566.26	38.54	9/10/2010	1:56:27 AM	
2	8	B10-04303-10	120.00	1.556	4.01	569.33	38.77	9/10/2010	4:07:21 AM	
2	9	B10-04303-11	120.00	1.708	4.47	562.23	38.25	9/10/2010	6:17:31 AM	
2	10	B10-04303-12	120.00	1.797	4.60	573.13	39.04	9/10/2010	8:27:34 AM	
2	11	B10-04303-13	120.00	2.705	6.99	568.75	38.73	9/10/2010	10:37:37 AM	
2	12	B10-04303-14	120.00	1.830	4.75	565.52	38.49	9/10/2010	12:47:42 PM	
2	13	B10-04303-15	120.00	2.048	5.23	574.95	39.17	9/10/2010	2:57:50 PM	
2	14	B10-04303-16	120.00	1.430	3.69	568.88	38.73	9/10/2010	5:07:52 PM	
2	15	B10-04303-17	120.00	1.801	4.85	536.44	37.11	9/10/2010	7:17:56 PM	
2	16	B10-04303-18	120.00	2.049	5.30	567.62	38.64	9/10/2010	9:28:00 PM	
2	17	B10-04303-19	120.00	1.879	4.89	564.82	38.44	9/10/2010	11:38:03 PM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
9-9-2010	1100	SWC 51	QA	QA	JDR
↓	↓	Background	B10-04303	1235	JDR
↓	↓	B10-04303-04	↓	↓	JDR
↓	↓	B10-04303-05	↓	↓	JDR
↓	↓	B10-04303-06	↓	↓	JDR
↓	↓	B10-04303-07	↓	↓	JDR
↓	↓	B10-04303-08	↓	↓	JDR
↓	↓	B10-04303-09	↓	↓	JDR
↓	↓	B10-04303-10	↓	↓	JDR
↓	↓	B10-04303-11	↓	↓	JDR
↓	↓	B10-04303-12	↓	↓	JDR
↓	↓	B10-04303-13	↓	↓	JDR
↓	↓	B10-04303-14	↓	↓	JDR
↓	↓	B10-04303-15	↓	↓	JDR
↓	↓	B10-04303-16	↓	↓	JDR
↓	↓	B10-04303-17	↓	↓	JDR
↓	↓	B10-04303-18	↓	↓	JDR
↓	↓	B10-04303-19	↓	↓	JDR
9-10-10	1316	Background	10-01870 NTC ~~[illegible]~~ 9-9-10 NI-63	0139	[illegible]
↓	↓	LCS	↓	↓	[illegible]

Reviewed By: LSW Date: 10-14-10
Initials

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

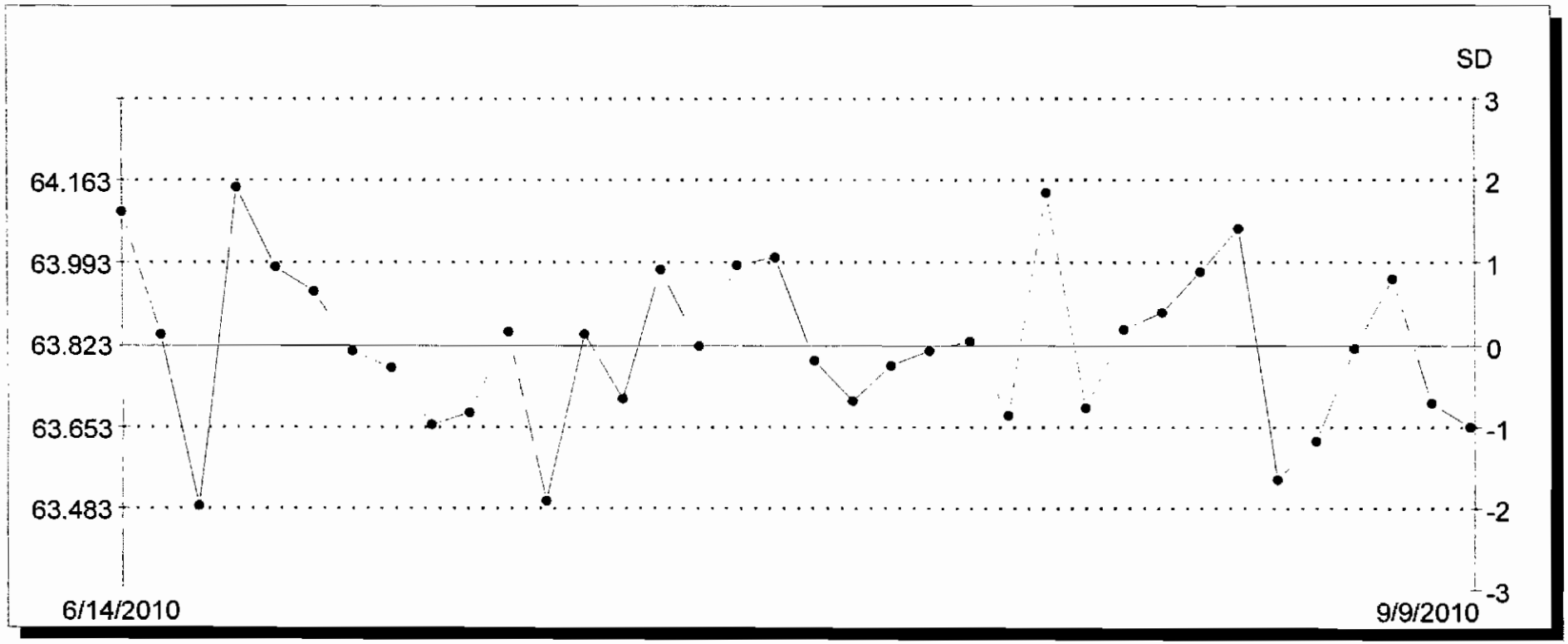
Control Charts

3H Efficiency
Total # pts : 5212
Valid # pts : 36
Mean : 63.82
SD : 0.17

Date	Value	Valid Pt
Jun 14, 2010	64.10	X
Jun 15, 2010	63.84	X
Jun 16, 2010	63.49	X
Jun 17, 2010	64.15	X
Jun 20, 2010	63.98	X
Jun 21, 2010	63.94	X
Jun 21, 2010	63.81	X
Jun 21, 2010	63.78	X
Jun 21, 2010	63.66	X
Jun 21, 2010	63.68	X
Jun 21, 2010	63.85	X
Jun 21, 2010	63.50	X
Jun 28, 2010	63.84	X
Jul 06, 2010	63.71	X
Jul 07, 2010	63.98	X
Jul 12, 2010	63.82	X
Jul 19, 2010	63.99	X
Jul 20, 2010	64.00	X
Jul 21, 2010	63.79	X
Jul 23, 2010	63.71	X
Jul 26, 2010	63.78	X
Jul 28, 2010	63.81	X
Aug 03, 2010	63.83	X
Aug 09, 2010	63.67	X
Aug 17, 2010	64.14	X
Aug 23, 2010	63.69	X
Aug 24, 2010	63.86	X
Aug 26, 2010	63.89	X
Aug 27, 2010	63.97	X
Aug 30, 2010	64.06	X
Aug 31, 2010	63.54	X
Aug 31, 2010	63.62	X
Sep 07, 2010	63.81	X
Sep 08, 2010	63.96	X
Sep 09, 2010	63.70	X
Sep 09, 2010	63.65	X

3H Efficiency

Total # pts	: 5212
Valid # pts	: 36
Mean	: 63.82
SD	: 0.17

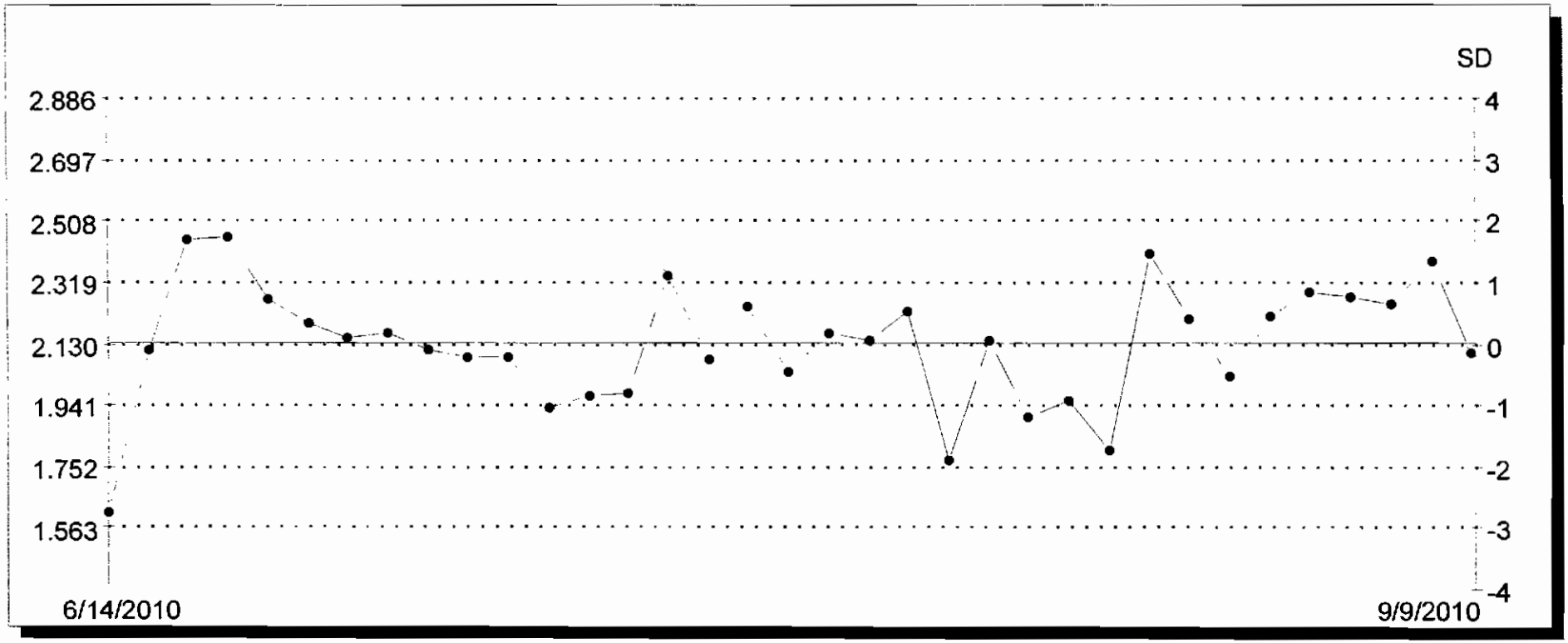


3H Background
Total # pts : 5142
Valid # pts : 35
Mean : 2.13
SD : 0.19

Date	Value	Valid Pt
Jun 14, 2010	1.61	X
Jun 15, 2010	2.11	X
Jun 16, 2010	2.45	X
Jun 17, 2010	2.46	X
Jun 20, 2010	2.27	X
Jun 21, 2010	2.19	X
Jun 21, 2010	2.15	X
Jun 21, 2010	2.16	X
Jun 21, 2010	2.11	X
Jun 21, 2010	2.09	X
Jun 21, 2010	2.09	X
Jun 28, 2010	1.94	X
Jul 06, 2010	1.97	X
Jul 07, 2010	1.98	X
Jul 12, 2010	2.34	X
Jul 19, 2010	2.09	X
Jul 20, 2010	2.25	X
Jul 21, 2010	2.05	X
Jul 23, 2010	2.17	X
Jul 26, 2010	2.14	X
Jul 28, 2010	2.23	X
Aug 03, 2010	1.77	X
Aug 09, 2010	2.14	X
Aug 17, 2010	1.90	X
Aug 23, 2010	1.96	X
Aug 24, 2010	1.81	X
Aug 26, 2010	2.41	X
Aug 27, 2010	2.21	X
Aug 30, 2010	2.03	X
Aug 31, 2010	2.22	X
Aug 31, 2010	2.29	X
Sep 07, 2010	2.28	X
Sep 08, 2010	2.25	X
Sep 09, 2010	2.39	X
Sep 09, 2010	2.10	X

3H Background

Total # pts	: 5142
Valid # pts	: 35
Mean	: 2.13
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 5/13/2010 0:00 *date counted*
STANDARD REFERENCE # S-0206

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

Radionuclide H-3 **Dilution Reference Date** 2/25/2009 8:30

Dilution Activity 3.01 pCi per gram ===> dpm/g 6.68
Verif. Date Decay Corrected 2.81 pCi per gram ===> dpm/g 6.24

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-0206-V1B	11.98	1	LSC	0.3328	1.62	5.040	6.18	2.78
S-0206-V2B	11.42	1	LSC	0.3186	1.62	5.010	6.13	2.76
S-0206-V3B	12.01	1	LSC	0.3360	1.62	4.990	6.19	2.79
S-0206-V4B	11.75	1	LSC	0.3275	1.62	5.010	6.17	2.78
S-0206-V5B	11.45	1	LSC	0.3196	1.62	5.020	6.13	2.76

		Average	6.16	2.77
		Two Sigma Uncertainty	0.06	0.02
10% Max	*PASS*	Standard Deviation percent of known concentration	0.45%	0.45%
		Target Activity	6.24	2.81
5% Max	*PASS*	% Diff	-1.27%	-1.27%

Verification Expiration Date: May 13, 2011

Prepared & Counted By Jeremy Raber Date: 5/13/2010 0:00
Verified & Approved By Virgene Mulligan Date: 5/14/2010
QC Approval [signature] Date: 5/14/2010

S-0206		
H-3	Verified	*5/14/10*
SL	**Expires**	**5/14/11**
Manufactuer	**NIST**	
Sol Matrix	H2O	
Ref No	NIST 4361C	
Tech	M. Thibodeaux	
Parent ID	S-0152	

ARS INTERNATIONAL
RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY

STD ID: S-0206

ARS INTERNATIONAL	Add/Edit *Secondary Stds*	Parent Standard Data				
Planning		Parent Solution Reference #	NIST 4361C			
Planning Comments	**Create a Low Level H3 LCS solution.**	Parent Solution #	S-0152			
Target dpm/g (on dil. date)	6.66	Parent Principal Radionuclide	H-3	Half Life (Days)	4499.8000000	
Target Final volume mL	500	Parent Reference Date	09/03/1998 11:00			
Appx mass g of Parent Sol'n	49.8188436	Parent Certified Act	120.54	Certi Act/Vol Units	dpm	g
Appx vol ml of Parent Sol'n	49.91868096	Parent Cert Act Uncert 1 Sigma	0.0076			
Expected Addition for Analysis g	5	Parent Sp. Gravity G/Ml	0.998			
Standards Preparation / Dilution		Parent Supplier	NIST			
Secondary Solution #	S-0206	Parent Date Recvd	12/04/06			
Dilution Date (New Ref Date)	02/25/2009 08:30	Parent Received By	LU			
Ampoule, Empty (g)		Parent Cert Exp Date				
Ampoule /Solution Gross (g)		Parent Matrix	H2O			
Net Wt Removed (g)		Certified dpm/g At Ref Date	120.54			
Transfer Container, empty (g)	103.64	Certified dpm/g on 02/25/2009 08:30	66.84217777			
Container Plus Solution (g)	153.45	Parent Comments	Liquid in a 500-ml borosilicate-glass media bottle with teflon-lined screw cap. Approximately 500 grams			
Net Wt Transferred (g)	49.81					
DPM Xferred on 02/25/2009 08:30	3329.408875					
Diluent/matrix	Dead H2O	Parent Tech	M. Thibodeaux			
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)	198.75	Is_Calib	FALSE			
Dilution Full Cont g (if measured)	697.31					
Dilution Final Volume ml (if measured)	500					
Final Dilution Density (g/mL)	0.99712					
Final Dilution Measured Mass g	498.56					
Comments	**Use as H3LL LCS creation. Dilution performed as stated above by M Thibodeaux on 2/25/09. -BJS 2/25/09**					
Final Dilution dpm/g	6.678050535					
Final Dil New Ref Date/Time	02/25/2009 08:30					

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

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Report Compilation Checklist

ARS SDG: 10-01880 **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~~	

Susan Geese 11.19.10
Report Generator Signature **Date**

11-19-10
Management Review Signature **Date**

ARS-059
07/03/2009

ARS INTERNATIONAL

LSC
Technical Review Checklist

ARS SDG ARS1-10-01880

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:**	ARS1-B10-04304	**Batch B:**	N/A	**Batch C:**	N/A
Test Method(s):		LSC-A-022		N/A		N/A

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Jimmy D. Rahn 11-12-2010
Chemist Signature **Date**

Jamaal Brown 11-12-10
Verifier Review Signature **Date**

B. ANALYSIS REVIEW

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

[signature] 11-19-10
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

N/A JDR 11-17-2010

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

Jimmy D. Rahn 11-17-2010
Analyst Signature **Date**

N/A
Technicial Reviewer Signature **Date**

Batch A: ARS1-B10-04304

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): _____

Project Manager Signature	Date	QA Officer Signature	Date
Susan Reese	11.19.10	[illegible]	11-19-10

GENERAL COMMENTS

LSC
Technical Review Checklist

ARS SDG ARS1-10-01880

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:** ARS1-B10-04303	**Batch B:** N/A	**Batch C:** N/A
Test Method(s):	LSC-A-021	N/A	N/A

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Jimmy D. Rahn 9-9-2010 — **Chemist Signature** **Date**

Jamaal Brown 9-9-10 — **Verifier Review Signature** **Date**

B. ANALYSIS REVIEW

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

[signature] — **QA Officer Signature** 11-19-10 — **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

N/A JPR 9-13-10

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

Jimmy D. Rahn 9-13-2010 — **Analyst Signature** **Date**

N/A — **Technicial Reviewer Signature** **Date**

Batch A: ARS1-B10-04303

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):		

Project Manager Signature	Date	QA Officer Signature	Date
Susan Lee	11·19·10	[illegible]	11-19-10

GENERAL COMMENTS

DQO Report for SDG
ARS1-10-01880

Analysis Code	Group	Isotope	Activity Units	Aliquot Units	ProcedureNo	RDL	LCS_LL	LCS_UL	MS_LL	MS_UL	RadY_LL	RadY_UL	GravY_LL	GravY_LL	RER	RPD	DilitionReq	RoughPrepReq	BlankCorrectionMDA	BlankCorrectionAll	CountTimeReq	AliquotRequired
LSC-A-021	STC	H-3		TU	ARS-054	0 00E+00	75	125	60	140	30	110	40	110	1 00	25	FALSE	FALSE	FALSE	FALSE		
LSC-A-022	STC	Enriched H-3		TU	ARS-054	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	ARS1-10-01880	TAT Days	30	Project Type	Environmental
Sample Count	Rpt Level 4	Date Received	8/26/2010	COC Number	10-4334C
Client	Los Alamos National Laboratory	Client Deadline	9/24/2010	PO Number	63641-001-10
Client Code	114	Internal Deadline	9/23/2010	Job Number	WEPR115BW100
Profile Number	PN-00094	Lab Deadline	9/21/2010	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	Buckman1-10-24996	AQ	08/24/10 12:00 PM	08/24/10 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	68677	1	1000.00				60	18		Y	N/A				
002	Buckman06-10-24997	AQ	08/24/10 12:00 PM	08/24/10 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	68678	1	1000.00				65	18		Y	N/A				
003	Buckman08-10-24998	AQ	08/24/10 12:00 PM	08/24/10 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	68679	1	1000.00				70	17		N	N/A				
004	Buckman1-10-24999	AQ	08/24/10 12:00 PM	08/24/10 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	68680	1	1000.00				70	17		N	N/A				

SDG Report - Analysis Assignments

Temp SDG	ARS1-10-01880	Sample Count	
Client	Los Alamos National Laboratory	Analysis Count	2-8

Samples Count Totals per Analysis

Analysis Code	Analysis Description	Samples Count
LSC-A-021	Low Level Tritium Screen In (Aqueous)	4
LSC-A-022	Low Level Tritium by Enrichment Process In (Aqueous [AQ])	4

Analyses Assigned Per Fraction

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

ARS FILE TRACKING SHEET

SDG: ARS1-10-01880

Task	Date / Time	Initials
Date & Time Samples Received	8-26-10 10:48	CWB
ICOC Initiated / Storage Location: LL3H	8-26-10 15:43	CWB
Technical Checks Performed	See Batch	—
Report Written / EDD Generated: ____/____|____ Date/Time Initials	11.19.10|1407	SDL
Quality Assurance Checks Performed on Report	11-19-10 1642	[illegible]
Management Check Performed on Report		
Preliminary Report Sent		
Report E-mailed		
Report Faxed		
Report Reviewed		
Report Mailed		
Invoice Completed Invoice #:_____		
Report Imaged		

SPECIAL REQUIREMENTS

Requirement	Yes	No
3 Hour Rush		✓
24 Hour Rush		✓
48 Hour Rush		✓
Special Invoicing *see notes* Mgmt. Approval:_____		✓

NOTES:

ARS-062
04/23/2010

COMPANY NAME: LANL **SDG:** ARS1-10-01880

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~~ SKG 8-26-10	☑ 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 4

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

External and Internal Surveys

Exposure Rate Meter: M3 242861 Serial No.: M44-2PR264266 Calibration Due Date: 4-19-11

Count Rate Meter: M2 64859 Serial No.: M44-9PR264266 184559 CB 8-26-10 Calibration Due Date: 4-6-11

Background Exposure Rate (µR/hr): 18 Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd): 22 µR/hr

Background Count Rate (cpm): 65 Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd): 70 cpm

Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd): 50 cpm

Sample Label/Comments/Notes	pH Orig (pH ≤ 2 is Acceptable)	pH Final	Mark if Preserve	Acid Lot #	Weight(g) / Volume(mL)	µR/hr (Acceptance Limits <500 µR/hr)	cpm (Acceptance Limits <100 cpm/cm²)
Buckman 1-10-24996					1000	18	60
Buckman 06-10-24997					1000	18	65
Buckman 04-10-24998					1000	17	70
Buckman 1-~~10~~ 18-24999 SKG 8-26-10					1000	17	70

Surveyors' Name: [signature] Date/Time Surveyed: 11:56 8-26-10

S:\Procedures_Controlled\Controlled Forms\ARS-062 Sample Receipt Inspection Form Page 1 of ___

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Request Number: 10-3478 REVISED

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 10-3478

Original COC

Wednesday, June 23, 2010

REQUEST NUMBER: 10-3478

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

These Samples are on:
LANL Request Number:10-3478
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples according to the schedule indicated:

SHIP DATE: 6/23/2010
TURNAROUND/REPORT DUE: 7/23/2010
TURNAROUND REQ'D: 30 Days

RAD SCREENING: Yes, Below Background
LAB REQUEST COMMENTS:

LANL ER SMO CONTACT:
Signature:

PRIORITY	METHOD CODE	CNTNR	SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	SPECIAL INSTRUCTIONS
	Generic:Low_Level_Tritium	1	Buckman08-10-16994	WG	6/22/2010	

Final Page of REQUEST NUMBER 10-3478

Wednesday, June 23, 2010

LOS ALAMOS
NATIONAL LABORATORY

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 10-3478C

REQUEST NUMBER: 10-3478

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

TURNAROUND/REPORT DUE: 7/23/2010
TURNAROUND REQ'D: 30

LAB REQUEST COMMENTS:

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman08-10-16994	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:		Date	Time	Received By:		Date	Time
[illegible]		6/23/10	3:00	Heath Pass	Heath Pass	6-24-10	10:10
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		

Received for DISPOSAL By: **Date** **Time** **Remarks:**

Printed Name Signature

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 10-3478

Case Narrative

ARS INTERNATIONAL

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

September 29, 2010

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

Request Number: **10-3478**
LANL Sample ID: Buckman08-10-16994

Dear Mr. Greene;

On June 24, 2010, ARS International received one (1) water sample to be analyzed for Low Level Tritium.

The samples were processed and counted using the appropriate counting equipment and QA/QC for this type of analysis. Results of the analysis and QA/QC are attached in the data package.

The client and QA/QC samples were counted with a count time sufficient to meet quality control parameters for counting equipment and were within acceptance criteria and statistical sound detection limits.

If you have any questions please do not hesitate to call at 225.381.2991 or email LANL@amrad.com.

Sincerely,

Laboratory Management
ARS International

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

COVER PAGE

PROJECT SAMPLE IDENTIFICATION CROSS-REFERENCE TO ARS SAMPLE LABORATORY IDs

Subcontract (LANL Agreement Number) 63641-001-10

Request Number	LANL PROJECT SAMPLE ID NUMBER	American Radiation Services SAMPLE ID NUMBER(S)
10-3478	Buckman08-10-16994	ARS1-10-01408-001

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	Title	Date
	Laboratory Management, ARS International	9-29-10

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-10-01408	**Request or PO Number:**	10-3478
Client Sample ID:	BUCKMAN08-10-16994	**ARS Sample ID:**	ARS1-10-01408-001
Sample Collection Date:	06/22/10	**Date Received:**	06/24/10
Sample Matrix:	Aqueous	**Report Date:**	08/18/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	-0.070	0.220	0.750	0.360	U	TU	ARS-040	09/27/10 00:00	JR	NA

NOTES: Project Cost Code WEPR1158W100

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 NELAP Certificate # E87558

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

QC Results Report

Sample Delivery Group: ARS1-B10-03243
Date Received:

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-B10-03243	LCS	H3	8.240	1.270	0.630	8.489		TU	ARS-040	9/21/10 0:00	JR	97	75%-125%

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-B10-03243	MBL	H3	-0.270	0.170	0.550	NA	U	TU	ARS-040	9/21/10 0:00	JR

Sample RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER AcceptanceRange
ARS1-B10-03243	LCSD	H3	8.240	1.270	8.010	1.230		TU	ARS-040	9/21/10 0:00	JR	0.09	< 1

Sample DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER AcceptanceRange
ARS1-B10-03243	LCSD	H3	8.240	1.270	8.010	1.230		TU	ARS-040	9/21/10 0:00	JR	0.26	< 3

Project Manager Review

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

LELAP Certificate# 01949 NELAP Certificate # E87558

Expected Value Calculations LANL

ARS Batch Number: ARS1-B09 - 03243

			pCi/L	TU
LCS	**CALCULATED EXPECTED VALUE**	=	27.344	8.489
		Range	21.875 -	32.813
LCSD	**CALCULATED EXPECTED VALUE**	=	27.194	8.443
		Range	21.756 -	32.633

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Samples

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	ARS1-10-01366;1375;1407;1408
ARS Batch ID Number	ARS1-B10-03243

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8 978E-01
b	-9 611E-01
c	

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	**ACF (def. = 1)**	1
Syserror	0.15	**Reporting Units**	TU
Coverage Factor	1	**UCF**	7.151
		Aliquot must be entered in liters!!	

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
ARS1-B10-03243-01	505.85	2.01	11.16	2.07	9.09	0.02	42.73	6.03	1.72	533.75	0.3700	0.00501	L	2/25/2009	9/21/2010	360	360	0.92362	8.24	0.28	0.28	1.27	0.63	0.31	TU
ARS1-B10-03243-02	507.30	2.02	11.04	2.08	8.96	0.02	43.45	5.95	1.72	528.99	0.3679	0.00500	L	2/25/2009	9/21/2010	360	360	0.92362	8.01	0.28	0.28	1.23	0.62	0.30	TU
ARS1-B10-03243-03	513.93	2.02	10.80	2.08	8.72	0.02	45.16	1 56	1.72	524.85	0.3662	0.00502	L	9/27/2010	9/21/2010	360	360	1.00081	-0.27	0.16	0.16	0.17	0.55	0.27	TU
ARS1-B10-03243-04	456.76	2.00	12.28	2.06	10.22	0.02	34.61	1.61	1.72	522.56	0.3652	0.00438	L	6/15/2010	9/21/2010	360	360	0.98649	-0.28	0.25	0.25	0.25	0.84	0.41	TU
ARS1-B10-03243-05	501.93	2.00	11.46	2.06	9.40	0.02	41 07	17.74	1.72	539.43	0.3724	0.00504	L	6/15/2010	9/22/2010	360	360	0.98635	29.47	0.43	0.43	4.44	0.61	0.30	TU
ARS1-B10-03243-06	487.31	2 02	8.61	2.08	6.53	0.01	56.66	1.50	1.69	503.87	0.3592	0.00477	L	6/11/2010	9/22/2010	360	360	0.98581	-0.28	0.14	0.14	0.14	0.48	0.23	TU
ARS1-B10-03243-07	517.96	2.00	13.47	2.06	11.41	0.02	35.13	1 48	1.69	542.02	0.3736	0.00500	L	6/9/2010	9/23/2010	360	360	0.9854	-0.45	0.20	0.20	0.21	0.71	0.34	TU
ARS1-B10-03243-08	502.50	2.01	12.58	2.07	10.51	0.02	36.93	1 51	1.69	483.29	0.3547	0.00501	L	6/9/2010	9/23/2010	360	360	0.9854	-0.39	0.20	0.20	0.21	0.71	0.34	TU
ARS1-B10-03243-09	507.44	2.00	12.86	2.06	10.80	0.02	36.32	1.62	1.69	525.59	0.3665	0.00501	L	6/9/2010	9/23/2010	360	360	0.9854	-0.15	0.20	0.20	0.21	0.69	0.34	TU
ARS1-B10-03243-10	502.62	2.00	11 97	2.06	9.91	0.02	39.09	1.51	1.69	519.41	0.3638	0.00502	L	6/14/2010	9/24/2010	360	360	0.98594	-0.36	0.19	0.19	0.19	0.65	0.32	TU
ARS1-B10-03243-11	508.30	2.00	11.45	2.06	9.39	0.02	41.61	1.54	1.69	517.85	0.3631	0.00502	L	6/9/2010	9/24/2010	360	360	0.98526	-0.28	0.18	0.18	0.18	0.61	0.30	TU
ARS1-B10-03243-12	526.71	2.00	12.79	2.06	10.73	0.02	37.88	1.57	1.72	543.02	0.3740	0.00503	L	6/9/2010	9/22/2010	360	360	0.98553	-0.30	0.19	0.19	0.20	0.66	0.32	TU
ARS1-B10-03243-13	504.27	2.00	12.11	2.06	10.05	0.02	38.68	1.64	1.69	539.59	0.3725	0.00502	L	6/11/2010	9/24/2010	360	360	0.98553	-0.10	0.19	0.19	0.19	0.64	0.31	TU
ARS1-B10-03243-14	499.24	2.01	11.92	2.07	9.85	0.02	39.06	1.66	1.69	536.32	0.3711	0.00500	L	6/11/2010	9/24/2010	360	360	0.98553	-0.06	0.19	0.19	0.19	0.64	0.31	TU
ARS1-B10-03243-15	499.62	2.00	13.59	2.06	11.53	0.02	33.60	1.60	1.69	534.24	0.3702	0.00501	L	6/17/2010	9/25/2010	360	360	0.98622	-0.20	0.22	0.22	0.22	0.74	0.36	TU
ARS1-B10-03243-16	509.75	2.01	10.24	2.07	8.17	0.02	47.70	5.95	1.69	544.95	0.3748	0.00502	L	6/16/2010	9/25/2010	360	360	0.98608	6.73	0.23	0.23	1.04	0.52	0.25	TU
ARS1-B10-03243-17	499.44	2.00	12.43	2.06	10.37	0.02	37.19	5.64	1.69	539.42	0.3724	0.00502	L	6/16/2010	9/25/2010	360	360	0.98608	8.06	0.29	0.29	1.24	0.67	0.33	TU
ARS1-B10-03243-18	497.13	2.01	11.17	2.07	9.10	0.02	41 98	6.68	1.69	503.66	0.3592	0.00379	L	6/18/2010	9/25/2010	360	360	0.98635	12.38	0.38	0.38	1.90	0.81	0.40	TU
ARS1-B10-03243-19	494.18	2.00	11.25	2.06	9.19	0.02	41.35	1 64	1.69	533.83	0.3700	0.00501	L	6/18/2010	9/26/2010	360	360	0.98622	-0.09	0.18	0.18	0.18	0.60	0.29	TU
ARS1-B10-03243-20	501.88	2.00	11.78	2.06	9.72	0.02	39.76	1.60	1.69	529.51	0.3682	0.00501	L	6/18/2010	9/26/2010	360	360	0.98622	-0.17	0.18	0.18	0.19	0.63	0.31	TU
ARS1-B10-03243-21	499.91	2.00	11.93	2.06	9.87	0.02	39.03	1.69	1.69	539.34	0.3724	0.00501	L	6/18/2010	9/26/2010	360	360	0.98622	0.00	0.19	0.19	0.19	0.64	0.31	TU
ARS1-B10-03243-22	508.29	2.01	13.97	2.07	11.90	0.02	33.14	1.61	1.69	537.05	0.3714	0.00502	L	6/18/2010	9/26/2010	360	360	0.98622	-0.18	0.22	0.22	0.22	0.75	0.37	TU
ARS1-B10-03243-23	504.90	2.00	13.84	2.06	11.78	0.02	33.25	1.66	1.69	537.16	0.3715	0.00502	L	6/22/2010	9/27/2010	360	360	0.98663	-0.07	0.22	0.22	0.22	0.75	0.36	TU

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	ARS1-10-01366;1375;1407;1408
ARS Batch ID Number	ARS1-B10-03243

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8.978E-01
b	-9.611E-01
c	

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	**ACF (def. = 1)**	1
Syserror	0.15	**Reporting Units**	pCi
Coverage Factor	1	**UCF**	2.22

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
ARS1-B10-03243-01	505.85	2.01	11.16	2.07	9.09	0.02	42.73	6.03	1.72	533.75	0.3700	0.00501	L	2/25/2009	9/21/2010	360	360	0.92362	26.55	0.90	0.90	4.08	2.03	0.99	pCi/L
ARS1-B10-03243-02	507.30	2.02	11.04	2.08	8.96	0.02	43.45	5.95	1.72	528.99	0.3679	0.00500	L	2/25/2009	9/21/2010	360	360	0.92362	25.81	0.89	0.89	3.97	2.01	0.98	pCi/L
ARS1-B10-03243-03	513.93	2.02	10.80	2.08	8.72	0.02	45.16	1.56	1.72	524.85	0.3662	0.00502	L	9/27/2010	9/21/2010	360	360	1.00081	-0.87	0.52	0.52	0.53	1.78	0.87	pCi/L
ARS1-B10-03243-04	456.76	2.00	12.28	2.06	10.22	0.02	34.61	1.61	1.72	522.56	0.3652	0.00438	L	6/15/2010	9/21/2010	360	360	0.98649	-0.91	0.79	0.79	0.80	2.71	1.33	pCi/L
ARS1-B10-03243-05	501.93	2.00	11.46	2.06	9.40	0.02	41.07	17.74	1.72	539.43	0.3724	0.00504	L	6/15/2010	9/22/2010	360	360	0.98635	94.92	1.38	1.38	14.30	1.95	0.95	pCi/L
ARS1-B10-03243-06	487.31	2.02	8.61	2.08	6.53	0.01	56.66	1.50	1.69	503.87	0.3592	0.00477	L	6/11/2010	9/22/2010	360	360	0.98581	-0.89	0.44	0.44	0.46	1.54	0.75	pCi/L
ARS1-B10-03243-07	517.96	2.00	13.47	2.06	11.41	0.02	35.13	1.48	1.69	542.02	0.3736	0.00500	L	6/9/2010	9/23/2010	360	360	0.9854	-1.46	0.65	0.65	0.69	2.27	1.11	pCi/L
ARS1-B10-03243-08	502.50	2.01	12.58	2.07	10.51	0.02	36.93	1.51	1.69	483.29	0.3547	0.00501	L	6/9/2010	9/23/2010	360	360	0.9854	-1.25	0.66	0.66	0.68	2.27	1.11	pCi/L
ARS1-B10-03243-09	507.44	2.00	12.86	2.06	10.80	0.02	36.32	1.62	1.69	525.59	0.3665	0.00501	L	6/9/2010	9/23/2010	360	360	0.9854	-0.48	0.66	0.66	0.66	2.24	1.09	pCi/L
ARS1-B10-03243-10	502.62	2.00	11.97	2.06	9.91	0.02	39.09	1.51	1.69	519.41	0.3638	0.00502	L	6/14/2010	9/24/2010	360	360	0.98594	-1.15	0.60	0.60	0.63	2.09	1.02	pCi/L
ARS1-B10-03243-11	508.30	2.00	11.45	2.06	9.39	0.02	41.61	1.54	1.69	517.85	0.3631	0.00502	L	6/9/2010	9/24/2010	360	360	0.98526	-0.90	0.57	0.57	0.59	1.97	0.96	pCi/L
ARS1-B10-03243-12	526.71	2.00	12.79	2.06	10.73	0.02	37.88	1.57	1.72	543.02	0.3740	0.00503	L	6/9/2010	9/22/2010	360	360	0.98553	-0.96	0.61	0.61	0.63	2.11	1.03	pCi/L
ARS1-B10-03243-13	504.27	2.00	12.11	2.06	10.05	0.02	38.68	1.64	1.69	539.59	0.3725	0.00502	L	6/11/2010	9/24/2010	360	360	0.98553	-0.32	0.61	0.61	0.61	2.06	1.01	pCi/L
ARS1-B10-03243-14	499.24	2.01	11.92	2.07	9.85	0.02	39.06	1.66	1.69	536.32	0.3711	0.00500	L	6/11/2010	9/24/2010	360	360	0.98553	-0.19	0.61	0.61	0.61	2.06	1.01	pCi/L
ARS1-B10-03243-15	499.62	2.00	13.59	2.06	11.53	0.02	33.60	1.60	1.69	534.24	0.3702	0.00501	L	6/17/2010	9/25/2010	360	360	0.98622	-0.66	0.70	0.70	0.71	2.39	1.17	pCi/L
ARS1-B10-03243-16	509.75	2.01	10.24	2.07	8.17	0.02	47.70	5.95	1.69	544.95	0.3748	0.00502	L	6/16/2010	9/25/2010	360	360	0.98608	21.68	0.74	0.74	3.34	1.66	0.81	pCi/L
ARS1-B10-03243-17	499.44	2.00	12.43	2.06	10.37	0.02	37.19	5.64	1.69	539.42	0.3724	0.00502	L	6/16/2010	9/25/2010	360	360	0.98608	25.95	0.94	0.94	4.00	2.14	1.05	pCi/L
ARS1-B10-03243-18	497.13	2.01	11.17	2.07	9.10	0.02	41.98	6.68	1.69	503.66	0.3592	0.00379	L	6/18/2010	9/25/2010	360	360	0.98635	39.88	1.22	1.22	6.10	2.61	1.27	pCi/L
ARS1-B10-03243-19	494.18	2.00	11.25	2.06	9.19	0.02	41.35	1.64	1.69	533.83	0.3700	0.00501	L	6/18/2010	9/26/2010	360	360	0.98622	-0.30	0.57	0.57	0.57	1.94	0.95	pCi/L
ARS1-B10-03243-20	501.88	2.00	11.78	2.06	9.72	0.02	39.76	1.60	1.69	529.51	0.3682	0.00501	L	6/18/2010	9/26/2010	360	360	0.98622	-0.56	0.60	0.60	0.60	2.03	0.99	pCi/L
ARS1-B10-03243-21	499.91	2.00	11.93	2.06	9.87	0.02	39.03	1.69	1.69	539.34	0.3724	0.00501	L	6/18/2010	9/26/2010	360	360	0.98622	0.00	0.61	0.61	0.61	2.05	1.00	pCi/L
ARS1-B10-03243-22	508.29	2.01	13.97	2.07	11.90	0.02	33.14	1.61	1.69	537.05	0.3714	0.00502	L	6/18/2010	9/26/2010	360	360	0.98622	-0.59	0.71	0.71	0.71	2.41	1.18	pCi/L
ARS1-B10-03243-23	504.90	2.00	13.84	2.06	11.78	0.02	33.25	1.66	1.69	537.16	0.3715	0.00502	L	6/22/2010	9/27/2010	360	360	0.98663	-0.22	0.71	0.71	0.71	2.40	1.17	pCi/L

QC Evaluation

EPA Method: ARS-040
Batch ID: ARS1-B10-03243
SDG's: ARS1-10-01366; 1375; 1407; 1408

LCS	26.5500	**CSU (2s)**	8.0100
LCSD	25.5100	**CSU-D (2s)**	7.7000

DER = abs(LSC-LSCD) / sqr((2s CSU/2)^2)+((2s CSU-D/2)^2) *at 1 sigma* = **< 3**

DER 1.04 / 5.555405 = 0.187205 **< 3**

% RPD= ABS(LCS - LSCD) / (LCS+LCSD)/2 * 100 = **< 25%**

%RPD 1.04 / 26.03 *100 = 3.99539 **< 25%**

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

RER= abs((LCS-LCSD)) / (CSU)+(CSD) *at 2 sigma* = **<1** ***<--LANL Requirement***

RER = 1.04 / 15.7100 0.066199873 **<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	-0.87	1.05	1.78	
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 = -0.87
CSU = 1.05
Is ACT<1.65*CSU? YES

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-03243**

Method ARS-054 **Analysis** LSC-A-022 **Matrix** AQ

Description TRITIUM IN WATER

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3		SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-03243-01	LCS	B-10230									
ARS1-B10-03243-02	LCSD	B-10231									
ARS1-B10-03243-03	MBL										
ARS1-B10-03243-04	DUP										
ARS1-B10-03243-05	TRG				63283	ARS1-10-01366	001	1	CAPA-10-17584	STD	07/13/10
ARS1-B10-03243-06	DO				63284	ARS1-10-01366	002	1	CAPA-10-17601	STD	07/13/10
ARS1-B10-03243-07	TRG				63285	ARS1-10-01366	003	1	CAPA-10-17672	STD	07/13/10
ARS1-B10-03243-08	TRG				63286	ARS1-10-01366	004	1	CAPA-10-17734	STD	07/13/10
ARS1-B10-03243-09	TRG				63287	ARS1-10-01366	005	1	CAPA-10-17737	STD	07/13/10
ARS1-B10-03243-10	TRG				63288	ARS1-10-01366	006	1	CAPA-10-17856	STD	07/13/10
ARS1-B10-03243-11	TRG				63289	ARS1-10-01366	007	1	CAPA-10-17898	STD	07/13/10
ARS1-B10-03243-12	TRG				63290	ARS1-10-01366	008	1	CAPA-10-17910	STD	07/13/10
ARS1-B10-03243-13	TRG				63291	ARS1-10-01366	009	1	CAPA-10-17914	STD	07/13/10
ARS1-B10-03243-14	TRG				63412	ARS1-10-01375	001	1	GW56-10-15470	STD	07/13/10
ARS1-B10-03243-15	TRG				63413	ARS1-10-01375	002	1	GW56-10-15471	STD	07/13/10
ARS1-B10-03243-16	TRG				63699	ARS1-10-01407	001	1	CAPA-10-17577	STD	07/20/10
ARS1-B10-03243-17	TRG				63700	ARS1-10-01407	002	1	CAPA-10-17580	STD	07/20/10
ARS1-B10-03243-18	TRG				63701	ARS1-10-01407	003	1	CAPA-10-17949	STD	07/20/10
ARS1-B10-03243-19	TRG				63702	ARS1-10-01407	004	1	CAPA-10-18473	STD	07/20/10
ARS1-B10-03243-20	TRG				63703	ARS1-10-01407	005	1	CAPA-10-18479	STD	07/20/10
ARS1-B10-03243-21	TRG				63704	ARS1-10-01407	006	1	CAPA-10-19017	STD	07/20/10
ARS1-B10-03243-22	TRG				63705	ARS1-10-01407	007	1	CAPA-10-19021	STD	07/20/10
ARS1-B10-03243-23	TRG				63706	ARS1-10-01408	001	1	BUCKMAN08-10-16994	STD	07/20/10

71369 10-01366-001-1 XRAD
71370 10-01366-002-1 XRAD
71371 10-01366-003-1 XRAD
71372 10-01366-004-1 XRAD
71373 10-01366-005-1 XRAD
71374 10-01366-006-1 XRAD
71375 10-01366-007-1 XRAD
71376 10-01366-008-1 XRAD
71377 10-01366-009-1 XRAD
71378 10-01375-001-1 XRAD
71379 10-01375-002-1 XRAD
71380 10-01407-001-1 XRAD
71381 10-01407-002-1 XRAD
71382 10-01407-003-1 XRAD
71383 10-01407-004-1 XRAD
71384 10-01407-005-1 XRAD
71385 10-01407-006-1 XRAD
71386 10-01407-007-1 XRAD
71387 10-01408-001-1 XRAD

American Radiation Services
Baton Rouge Laboratory

LCS Report
Analytical Batch: ARS1-B10-03243

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-10230	ARS1-B10-03243	ARS1-B10-03243-01	B-H3	S-0206	H-3	5	2.808406639	13.2224	18.2442	5.0218	WSTICKLE	5/17/2010			
B-10231	ARS1-B10-03243	ARS1-B10-03243-02	B-H3	S-0206	H-3	5	2.808406639	13.3064	18.315	5.0086	WSTICKLE	5/17/2010			

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
6477	ARS1-B10-03243	ARS1-B10-03243-01		5.01	g					JRABER	09/27/2010 08:54:26
6478	ARS1-B10-03243	ARS1-B10-03243-02		5	g					JRABER	09/27/2010 08:54:26
6479	ARS1-B10-03243	ARS1-B10-03243-03		5.02	g					JRABER	09/27/2010 08:54:26
6480	ARS1-B10-03243	ARS1-B10-03243-04		4.38	g					JRABER	09/27/2010 08:54:26
6481	ARS1-B10-03243	ARS1-B10-03243-05	CAPA-10-17584	5.04	g	71369				JRABER	09/27/2010 08:54:26
6482	ARS1-B10-03243	ARS1-B10-03243-06	CAPA-10-17601	4.77	g	71370				JRABER	09/27/2010 08:54:27
6483	ARS1-B10-03243	ARS1-B10-03243-07	CAPA-10-17672	5	g	71371				JRABER	09/27/2010 08:54:27
6484	ARS1-B10-03243	ARS1-B10-03243-08	CAPA-10-17734	5.01	g	71372				JRABER	09/27/2010 08:54:28
6485	ARS1-B10-03243	ARS1-B10-03243-09	CAPA-10-17737	5.01	g	71373				JRABER	09/27/2010 08:54:29
6486	ARS1-B10-03243	ARS1-B10-03243-10	CAPA-10-17856	5.02	g	71374				JRABER	09/27/2010 08:54:29
6487	ARS1-B10-03243	ARS1-B10-03243-11	CAPA-10-17898	5.02	g	71375				JRABER	09/27/2010 08:54:29
6488	ARS1-B10-03243	ARS1-B10-03243-12	CAPA-10-17910	5.03	g	71376				JRABER	09/27/2010 08:54:30
6489	ARS1-B10-03243	ARS1-B10-03243-13	CAPA-10-17914	5.02	g	71377				JRABER	09/27/2010 08:54:30
6490	ARS1-B10-03243	ARS1-B10-03243-14	GW56-10-15470	5	g	71378				JRABER	09/27/2010 08:54:31
6491	ARS1-B10-03243	ARS1-B10-03243-15	GW56-10-15471	5.01	g	71379				JRABER	09/27/2010 08:54:31
6492	ARS1-B10-03243	ARS1-B10-03243-16	CAPA-10-17577	5.02	g	71380				JRABER	09/27/2010 08:54:32
6493	ARS1-B10-03243	ARS1-B10-03243-17	CAPA-10-17580	5.02	g	71381				JRABER	09/27/2010 08:54:32
6494	ARS1-B10-03243	ARS1-B10-03243-18	CAPA-10-17949	3.79	g	71382				JRABER	09/27/2010 08:54:33
6495	ARS1-B10-03243	ARS1-B10-03243-19	CAPA-10-18473	5.01	g	71383				JRABER	09/27/2010 08:54:33
6496	ARS1-B10-03243	ARS1-B10-03243-20	CAPA-10-18479	5.01	g	71384				JRABER	09/27/2010 08:54:34
6497	ARS1-B10-03243	ARS1-B10-03243-21	CAPA-10-19017	5.01	g	71385				JRABER	09/27/2010 08:54:34
6498	ARS1-B10-03243	ARS1-B10-03243-22	CAPA-10-19021	5.02	g	71386				JRABER	09/27/2010 08:54:35
6499	ARS1-B10-03243	ARS1-B10-03243-23	BUCKMAN08-10-16994	5.02	g	71387				JRABER	09/27/2010 08:54:35

ARS. International
Port Allen Lab

Tritium Enrichment Data

Printed: 9/24/2010 4:38 PM

Procedures: ARS-040

Date: 8/6/2010

ARS File ID Numbers: ARS1-10-01366, 1375, 1407, 1408

ARS Batch ID: ARS1-B10-03243

	A Batch ID:	Enrichment Cell No.	Tare Wt of Electrolysis Cell & Electrodes	Tare Wt Reservoir	m_i Wt Na_2O_2	Gross Weight of Sample Reservoir	V_i Gross Sample Added	Electrolysis Start Date & Time	Start AMP	Start Bath C°	Electolysis End Date & Time	End Bath C°	End Wt of Cell + Resv. + Sample	V_r Gross Sample Recovered	Enrichment Factor	Cryo-Distil Flask #	Tare Wt Cryo-distil flask	Gross Wt flask + Sample	Recovered Water	Tare Weight of LSC Vial	Vial + Sample	Aliquot Net Sample	Wt of Vial, Sample& Dead Water Filler if used	Net Dead Water Added	Tare Wt b/f Cocktail	Gross Wt Vial + Sample + Cocktail
1	ARS1-B10-03243-01	3	336.42	198.04	2.01	703.89	505.85	8-6-2010 1009	5.00	2.0	9-2-2010 0913	2.0	545.62	**11.16**	45.93	N/A,N/A	108.05	115.73	7.68	6.33	11.34	**5.01**	0.00	**0.00**	11.34	26.39
2	ARS1-B10-03243-02	37	338.74	194.23	2.02	701.53	507.30	8-6-2010 1015	5.00	2.0	9-2-2010 1419	2.0	544.01	**11.04**	45.95	N/A,N/A	101.81	109.49	7.68	6.44	11.44	**5.00**	0.00	**0.00**	11.44	26.50
3	ARS1-B10-03243-03	41	332.29	188.80	2.02	702.73	513.93	8-6-2010 1018	5.00	2.0	9-4-2010 1318	2.0	531.89	**10.80**	47.68	N/A,7	111.93	120.12	8.19	6.43	11.45	**5.02**	0.00	**0.00**	11.45	26.49
4	ARS1-B10-03243-04	87	336.06	187.52	2.00	644.28	456.76	8-6-2010 1042	5.00	2.0	9-3-2010 1013	2.0	535.86	**12.28**	37.20	N/A,11	120.82	125.22	4.40	6.41	10.79	**4.38**	11.41	**0.82**	11.41	26.43
5	ARS1-B10-03243-05	90	336.81	191.09	2.00	693.02	501.93	8-6-2010 1045	5.00	2.0	9-2-2010 1115	2.0	539.36	**11.46**	43.80	5,N/A	97.91	105.71	7.80	6.41	11.45	**5.04**	0.00	**0.00**	11.45	26.46
6	ARS1-B10-03243-06	89	337.06	191.93	2.02	659.24	467.31	8-6-2010 1058	5.00	2.0	9-4-2010 0825	2.0	537.60	**8.61**	54.28	G,N/A	99.80	104.63	4.83	6.44	11.21	**4.77**	11.46	**0.27**	11.48	26.51
7	ARS1-B10-03243-07	48	336.06	191.70	2.00	709.66	517.96	8-6-2010 1135	5.00	2.0	9-5-2010 1425	2.0	541.23	**13.47**	38.46	N/A,N/A	107.40	117.27	9.87	6.58	11.58	**5.00**	0.00	**0.00**	11.58	26.61
8	ARS1-B10-03243-08	47	336.52	200.60	2.01	703.10	502.50	8-6-2010 1142	5.00	2.0	9-5-2010 1547	2.0	549.70	**12.58**	39.24	N/A,N/A	99.15	107.66	8.51	6.35	11.36	**5.01**	0.00	**0.00**	11.36	26.42
9	ARS1-B10-03243-09	91	335.10	187.11	2.00	694.55	507.44	8-6-2010 1151	5.00	2.0	9-6-2010 1302	2.0	535.07	**12.86**	39.46	N/A,N/A	117.09	126.56	9.47	6.47	11.48	**5.01**	0.00	**0.00**	11.48	26.52
10	ARS1-B10-03243-10	69	335.03	194.95	2.00	697.47	502.58	8-6-2010 1345	5.00	2.0	9-4-2010 1546	2.0	541.95	**11.97**	41.96	N/A,N/A	101.72	110.07	8.35	6.44	11.46	**5.02**	0.00	**0.00**	11.46	26.50
11	ARS1-B10-03243-11	71	340.75	195.29	2.00	703.59	508.30	8-6-2010 1352	5.00	2.0	9-6-2010 1549	2.0	547.49	**11.45**	44.39	N/A,7	116.60	124.28	7.68	6.58	11.60	**5.02**	0.00	**0.00**	11.60	26.63
12	ARS1-B10-03243-12	97	335.46	194.51	2.00	721.22	526.71	8-6-2010 1358	5.00	2.0	9-4-2010 0857	2.0	542.76	**12.79**	41.16	5,N/A	97.92	106.78	8.86	6.43	11.46	**5.03**	0.00	**0.00**	11.46	26.48
13	ARS1-B10-03243-13	50	335.18	203.13	2.00	707.40	504.27	8-6-2010 1650	5.00	2.0	9-5-2010 1346	2.0	550.43	**12.11**	41.64	G,N/A	99.08	107.30	8.22	6.61	11.63	**5.02**	0.00	**0.00**	11.63	26.66
14	ARS1-B10-03243-14	60	338.07	157.72	2.01	656.96	499.24	8-16-2010 1423	5.00	2.0	9-6-2010 1642	2.0	507.71	**11.92**	41.86	N/A,N/A	101.63	110.01	8.38	6.41	11.41	**5.00**	0.00	**0.00**	11.41	26.44
15	ARS1-B10-03243-15	6	332.41	205.42	2.00	705.04	499.62	8-16-2010 v 143	5.00	2.0	9-4-2010 0912	2.0	551.42	**13.59**	36.76	N/A,C	105.66	113.71	8.05	6.44	11.45	**5.01**	0.00	**0.00**	11.45	26.48
16	ARS1-B10-03243-16	78	334.02	200.63	2.01	710.38	500.75	8-6-2010 1653	5.00	2.0	9-5-2010 1323	2.0	544.89	**10.24**	49.78	N/A,N/A	117.22	124.23	7.01	6.75	11.77	**5.02**	0.00	**0.00**	11.77	26.81
17	ARS1-B10-03243-17	29	336.87	188.47	2.00	687.91	499.44	8-6-2010 1658	5.00	2.0	9-5-2010 1246	2.0	537.77	**12.43**	40.16	N/A,N/A	101.60	110.68	9.08	6.54	11.56	**5.02**	0.00	**0.00**	11.56	26.59
18	ARS1-B10-03243-18	22	336.88	191.63	2.01	688.76	497.13	8-16-2010 1435	5.00	2.0	9-4-2010 1346	2.0	539.68	**11.17**	44.51	N/A,11	115.09	119.00	3.91	6.54	10.33	**3.79**	11.72	**-1.39**	11.72	26.74
19	ARS1-B10-03243-19	54	334.98	191.30	2.00	665.48	494.18	8-16-2010 1443	5.00	2.0	9-6-2010 1014	2.0	537.53	**11.25**	43.93	N/A,7	116.59	124.13	7.54	6.40	11.41	**5.01**	0.00	**0.00**	11.41	26.49
20	ARS1-B10-03243-20	61	335.40	195.37	2.00	697.25	501.88	8-16-2010 1458	5.00	2.0	9-6-2010 0945	2.0	542.55	**11.78**	42.60	N/A,N/A	108.11	116.49	8.38	6.39	11.40	**5.01**	0.00	**0.00**	11.40	26.43
21	ARS1-B10-03243-21	86	335.35	196.51	2.00	696.42	499.91	8-16-2010 1506	5.00	2.0	9-7-2010 1643	2.0	543.79	**11.93**	41.90	N/A,C	99.15	107.41	8.26	6.52	11.53	**5.01**	0.00	**0.00**	11.53	26.55
22	ARS1-B10-03243-22	39	335.25	187.58	2.01	695.88	508.29	8-16-2010 1514	5.00	2.0	9-7-2010 1649	2.0	536.81	**13.97**	36.38	5,N/A	97.82	107.94	10.12	6.44	11.46	**5.02**	0.00	**0.00**	11.46	26.48
23	ARS1-B10-03243-23	92	336.66	195.48	2.00	700.38	504.90	8-16-2010 1521	5.00	2.0	9-8-2010 0849	2.0	545.98	**13.84**	36.48	G,N/A	99.80	109.33	9.53	6.43	11.45	**5.02**	0.00	**0.00**	11.45	26.48

S:\Laboratory Department\LabDocuments\LowLevelTritium\2010 LowLevelTritiumData\ARS1-B10-03243

Chemist Signature: Jimmy D. Rabon

Tritium Enrichment Data

Net Wt of Cocktail Added
15.05
15.06
15.04
15.02
15.01
15.03
15.03
15.06
15.04
15.03
15.03
15.02
15.03
15.03
15.03
15.04
15.03
15.02
15.06
15.03
15.02
15.04
15.05

Chemist Signature: Jeremy D. Rahm

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\20100920_1928
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100920_1928\20100920_1928.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100920_1928\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100920_1928\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL H3
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: LL H3 PLASTIC
Count Time (min): 360.00
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	0.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

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

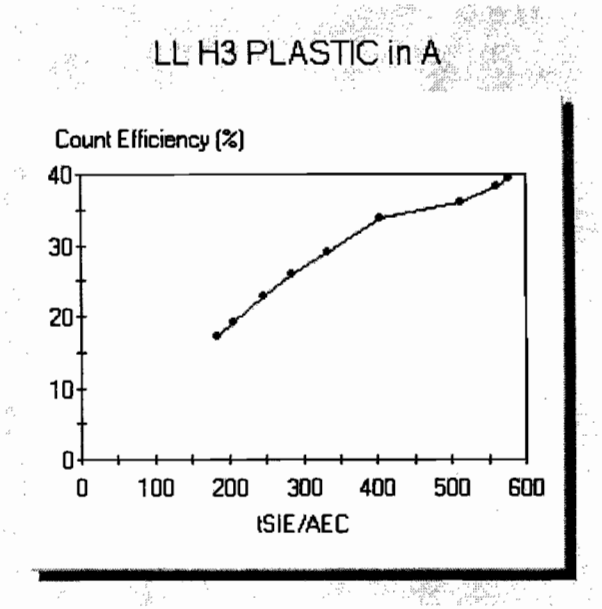
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 09/08/2009
Date Modified:
LL H3 PLASTIC in A

tSIE/AEC	Count Efficiency (%)
577.71	39.37
561.32	38.19
514.09	36.15
404.21	33.71
334.90	29.12
284.93	26.04
246.14	22.78
207.51	19.18
185.88	17.18

Protocol# 2 - Low Level H3.lsa User: H3 Low Level

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	360.00	1.716	4.62	537.43	37.16	9/20/2010	7:37:37 PM	
2	2	B10-03243-01	360.00	6.033	16.30	533.75	37.00	9/21/2010	1:55:30 AM	
2	3	B10-03243-02	360.00	5.953	16.18	528.99	36.79	9/21/2010	8:11:53 AM	
2	4	B10-03243-03	360.00	1.564	4.27	524.85	36.62	9/21/2010	2:26:13 PM	
2	5	B10-03243-04	360.00	1.611	4.41	522.56	36.52	9/21/2010	8:39:13 PM	
2	6	B10-03243-05	360.00	17.744	47.64	539.43	37.24	9/22/2010	2:51:44 AM	
Missing vial 7.										
Missing vial 8.										
Missing vial 9.										
Missing vial 10.										
Missing vial 11.										
Missing vial 12.										
2	13	B10-03243-12	360.00	1.574	4.21	543.02	37.40	9/22/2010	9:04:49 AM	

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	360.00	1.685	4.68	508.34	36.02	9/22/2010	5:17:05 PM	
2	2	B10-03243-06	360.00	1.498	4.17	503.87	35.92	9/22/2010	11:29:18 PM	
2	3	B10-03243-07	360.00	1.477	3.95	542.02	37.36	9/23/2010	5:41:33 AM	
2	4	B10-03243-08	360.00	1.510	4.26	483.29	35.47	9/23/2010	11:53:50 AM	
2	5	B10-03243-09	360.00	1.621	4.42	525.59	36.65	9/23/2010	6:06:09 PM	
2	6	B10-03243-10	360.00	1.511	4.15	519.41	36.38	9/24/2010	12:18:26 AM	
2	7	B10-03243-11	360.00	1.538	4.24	517.85	36.31	9/24/2010	6:30:41 AM	
2	8	B10-03243-13	360.00	1.635	4.39	539.59	37.25	9/24/2010	12:42:55 PM	
2	9	B10-03243-14	360.00	1.661	4.48	536.32	37.11	9/24/2010	6:55:09 PM	
2	10	B10-03243-15	360.00	1.601	4.33	534.24	37.02	9/25/2010	1:07:26 AM	
2	11	B10-03243-16	360.00	5.946	15.86	544.95	37.48	9/25/2010	7:19:39 AM	
2	12	B10-03243-17	360.00	5.636	15.13	539.42	37.24	9/25/2010	1:31:53 PM	
2	13	B10-03243-18	360.00	6.681	18.60	503.66	35.92	9/25/2010	7:44:21 PM	
2	14	B10-03243-19	360.00	1.637	4.42	533.83	37.00	9/26/2010	1:56:34 AM	
2	15	B10-03243-20	360.00	1.595	4.33	529.51	36.82	9/26/2010	8:08:50 AM	
2	16	B10-03243-21	360.00	1.691	4.54	539.34	37.24	9/26/2010	2:21:07 PM	
2	17	B10-03243-22	360.00	1.608	4.33	537.05	37.14	9/26/2010	8:33:20 PM	
2	18	B10-03243-23	360.00	1.664	4.48	537.16	37.15	9/27/2010	2:45:36 AM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
9-20-10	0944	S-0112-R2	Veris.	1139	[illegible]
↓	↓	S-0112-R3	↓	↓	[illegible]
↓	↓	S-0112-R4	↓	↓	[illegible]
↓	↓	S-0112-R5	↓	↓	[illegible]
9-20-2010	0955	SNC 51	QA	QA	JDR
↓	↓	Background	Bio-03243	1928	JDR
↓	↓	Bio-03243-01	↓	↓	JDR
↓	↓	Bio-03243-02	↓	↓	JDR
↓	↓	Bio-03243-03	↓	↓	JDR
↓	↓	Bio-03243-04	↓	↓	JDR
↓	↓	Bio-03243-05	↓	↓	JDR
↓	↓	Bio-03243-06	↓	↓	JDR
↓	↓	Bio-03243-07	↓	↓	JDR
↓	↓	Bio-03243-08	↓	↓	JDR
↓	↓	Bio-03243-09	↓	↓	JDR
↓	↓	Bio-03243-10	↓	↓	JDR
↓	↓	Bio-03243-11	↓	↓	JDR
↓	↓	Bio-03243-12	↓	↓	JDR
↓	↓	Bio-03243-13	↓	↓	JDR
↓	↓	Bio-03243-14	↓	↓	JDR

SKIPPED 9-22-2010

Reviewed By: [illegible] Date: 9-27-10
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
9-20-10	0955	B10-03243-15	B10-03243	1928	JDR
↓	↓	B10-03243-16	↓	↓	JDR
↓	↓	B10-03243-17	↓	↓	JDR
↓	↓	B10-03243-18	↓	↓	JDR
↓	↓	B10-03243-19	↓	↓	JDR
↓	↓	B10-03243-20	↓	↓	JDR
↓	↓	B10-03243-21	↓	↓	JDR
↓	↓	B10-03243-22	↓	↓	JDR
↓	↓	B10-03243-23	↓	↓	JDR
JDR 9-22-2010 ~~9-22-2010~~					
	N/A				
		JDR			
		9-27-2010			

Reviewed By: JD Date: 9-27-10
Initials

Technical Notes

Batch	ARS1-B10-03243
Analysis Code	LSC-A-022
Procedure No	ARS-054
Matrix	AQ

#	Date	Dept	Batch Technical Notes	User ID
1	08/11/10 09:35	CHEMISTRY	Samples B10-03243-14 and B10-03243-15 both had large amounts of solids in sample. Possibility that this may cause quenching if not all solids are removed by primary distillation.	JRABER
2	08/16/10 11:06	CHEMISTRY	Chiller operating bath was turned off while enrichment continued for all samples in batch. This lasted approximately 8-10 hours. I am unsure what affect if any this will have on analysis.	JRABER
3	08/20/10 08:57	CHEMISTRY	Voltage was NOT decreased to 2.8V for sample B10-03243-06 during enrichment. Only approx 4mL of sample is left in enrichment cell. I am unsure what affect this may have on analysis. If this causes duplicate criteria to fail, then I suggest using LCS and LCSD.	JRABER
4	09/22/10 16:23	CHEMISTRY	During counting, samples B10-03243-06 though B10-03243-11 were skipped by liquid scintillation counter.	JRABER

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

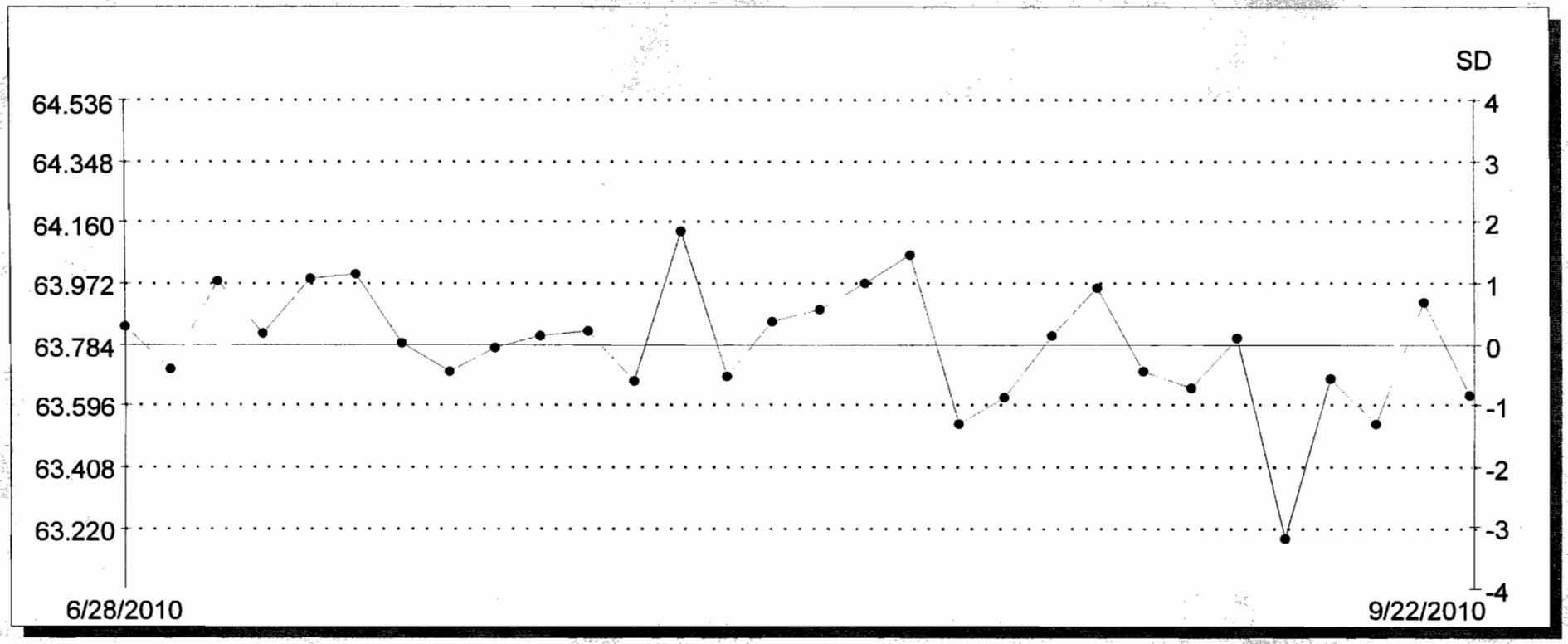
Low Level Tritium by Low Level Liquid Scintillation Counting

Control Charts

3H Efficiency
Total # pts : 5218
Valid # pts : 30
Mean : 63.79
SD : 0.19

Date	Value	Valid Pt
Jun 28, 2010	63.84	X
Jul 06, 2010	63.71	X
Jul 07, 2010	63.98	X
Jul 12, 2010	63.82	X
Jul 19, 2010	63.99	X
Jul 20, 2010	64.00	X
Jul 21, 2010	63.79	X
Jul 23, 2010	63.71	X
Jul 26, 2010	63.78	X
Jul 28, 2010	63.81	X
Aug 03, 2010	63.83	X
Aug 09, 2010	63.67	X
Aug 17, 2010	64.14	X
Aug 23, 2010	63.69	X
Aug 24, 2010	63.86	X
Aug 26, 2010	63.89	X
Aug 27, 2010	63.97	X
Aug 30, 2010	64.06	X
Aug 31, 2010	63.54	X
Aug 31, 2010	63.62	X
Sep 07, 2010	63.81	X
Sep 08, 2010	63.96	X
Sep 09, 2010	63.70	X
Sep 09, 2010	63.65	X
Sep 13, 2010	63.80	X
Sep 14, 2010	63.19	X
Sep 15, 2010	63.68	X
Sep 20, 2010	63.54	X
Sep 20, 2010	63.92	X
Sep 22, 2010	63.63	X

3H Efficiency
Total # pts : 5218
Valid # pts : 30
Mean : 63.79
SD : 0.19

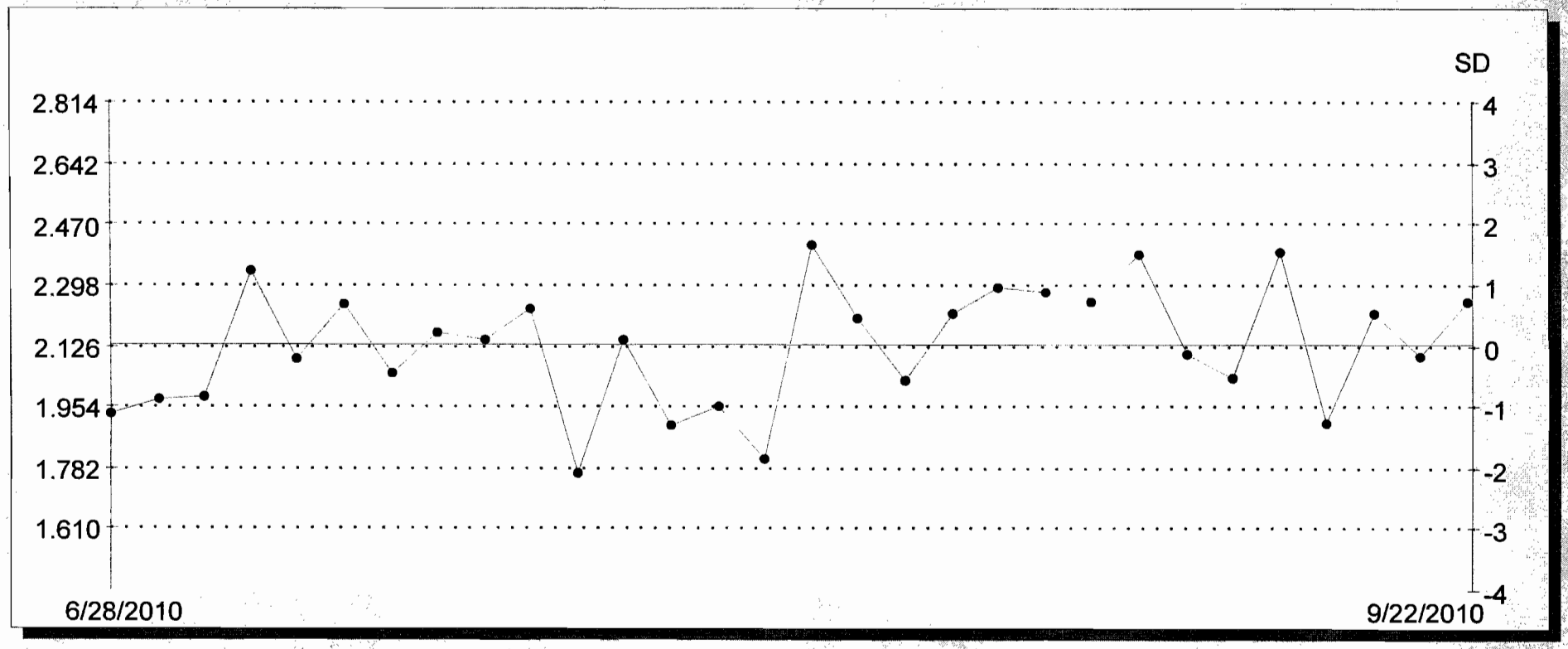


3H Background
Total # pts : 5148
Valid # pts : 30
Mean : 2.13
SD : 0.17

Date	Value	Valid Pt
Jun 28, 2010	1.94	X
Jul 06, 2010	1.97	X
Jul 07, 2010	1.98	X
Jul 12, 2010	2.34	X
Jul 19, 2010	2.09	X
Jul 20, 2010	2.25	X
Jul 21, 2010	2.05	X
Jul 23, 2010	2.17	X
Jul 26, 2010	2.14	X
Jul 28, 2010	2.23	X
Aug 03, 2010	1.77	X
Aug 09, 2010	2.14	X
Aug 17, 2010	1.90	X
Aug 23, 2010	1.96	X
Aug 24, 2010	1.81	X
Aug 26, 2010	2.41	X
Aug 27, 2010	2.21	X
Aug 30, 2010	2.03	X
Aug 31, 2010	2.22	X
Aug 31, 2010	2.29	X
Sep 07, 2010	2.28	X
Sep 08, 2010	2.25	X
Sep 09, 2010	2.39	X
Sep 09, 2010	2.10	X
Sep 13, 2010	2.03	X
Sep 14, 2010	2.39	X
Sep 15, 2010	1.91	X
Sep 20, 2010	2.22	X
Sep 20, 2010	2.10	X
Sep 22, 2010	2.25	X

3H Background

Total # pts	: 5148
Valid # pts	: 30
Mean	: 2.13
SD	: 0.17



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Tritium- Screening by Low Level Liquid Scintillation Counting

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American Radiation Services Analytical Reports

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Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

Samples

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

ARS File ID Numbers: ARS1-10-01366, 1375, 1407, 1408.
ARS Batch ID: ARS1-B10-03242

	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	B10-03242-04	120	1.979	1.915	37.88	5.04	15.100	pCi/L	175.4392	NO
2	B10-03242-05	120	1.553	1.915	37.92	5.03	-85.491	pCi/L	175.6025	NO
3	B10-03242-06	120	1.487	1.915	38.17	5.04	-100.216	pCi/L	174.1062	NO
4	B10-03242-07	120	1.642	1.915	38.94	5.00	-63.160	pCi/L	172.0288	NO
5	B10-03242-08	120	1.428	1.915	38.29	4.99	-114.813	pCi/L	175.2997	NO
6	B10-03242-09	120	1.639	1.915	39.16	4.98	-63.751	pCi/L	171.7493	NO
7	B10-03242-10	120	1.585	1.915	37.76	5.03	-78.264	pCi/L	176.3466	NO
8	B10-03242-11	120	1.380	1.915	38.69	4.97	-125.327	pCi/L	174.1855	NO
9	B10-03242-12	120	1.722	1.915	37.94	5.04	-45.465	pCi/L	175.1617	NO
10	B10-03242-13	120	1.304	1.915	34.76	5.06	-156.480	pCi/L	190.4306	NO
11	B10-03242-14	120	0.941	1.915	22.65	5.02	-385.864	pCi/L	294.5745	NO
12	B10-03242-15	120	1.540	1.915	37.93	4.97	-89.606	pCi/L	177.6756	NO
13	B10-03242-16	120	1.526	1.915	38.48	5.06	-89.993	pCi/L	172.021	NO
14	B10-03242-17	120	1.782	1.915	38.25	5.05	-31.015	pCi/L	173.398	NO
15	B10-03242-18	120	1.583	1.915	37.64	5.05	-78.676	pCi/L	176.2082	NO
16	B10-03242-19	120	1.432	1.915	38.26	5.01	-113.504	pCi/L	174.7368	NO
17	B10-03242-20	120	1.723	1.915	37.58	4.98	-46.213	pCi/L	178.9703	NO
18	B10-03242-21	120	1.656	1.915	38.16	5.00	-61.146	pCi/L	175.5451	NO
19	B10-03242-22	120	1.735	1.915	38.18	4.96	-42.816	pCi/L	176.8681	NO
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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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-03242**

Method	ARS-054	Analysis	LSC-A-021	Matrix	AQ
Description	TRITIUM IN WATER				

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-03242-01	LCS									
ARS1-B10-03242-02	LCSD									
ARS1-B10-03242-03	MBL									
ARS1-B10-03242-04	TRG				**ARS1-10-01366**	001	1	CAPA-10-17584		07/13/10
ARS1-B10-03242-05	TRG				**ARS1-10-01366**	002	1	CAPA-10-17601		07/13/10
ARS1-B10-03242-06	TRG				**ARS1-10-01366**	003	1	CAPA-10-17672		07/13/10
ARS1-B10-03242-07	TRG				**ARS1-10-01366**	004	1	CAPA-10-17734		07/13/10
ARS1-B10-03242-08	TRG				**ARS1-10-01366**	005	1	CAPA-10-17737		07/13/10
ARS1-B10-03242-09	TRG				**ARS1-10-01366**	006	1	CAPA-10-17856		07/13/10
ARS1-B10-03242-10	TRG				**ARS1-10-01366**	007	1	CAPA-10-17898		07/13/10
ARS1-B10-03242-11	TRG				**ARS1-10-01366**	008	1	CAPA-10-17910		07/13/10
ARS1-B10-03242-12	TRG				**ARS1-10-01366**	009	1	CAPA-10-17914		07/13/10
ARS1-B10-03242-13	TRG				**ARS1-10-01375**	001	1	GW56-10-15470		07/13/10
ARS1-B10-03242-14	TRG				**ARS1-10-01375**	002	1	GW56-10-15471		07/13/10
ARS1-B10-03242-15	TRG				**ARS1-10-01407**	001	1	CAPA-10-17577		07/20/10
ARS1-B10-03242-16	TRG				**ARS1-10-01407**	002	1	CAPA-10-17580		07/20/10
ARS1-B10-03242-17	TRG				**ARS1-10-01407**	003	1	CAPA-10-17949		07/20/10
ARS1-B10-03242-18	TRG				**ARS1-10-01407**	004	1	CAPA-10-18473		07/20/10
ARS1-B10-03242-19	TRG				**ARS1-10-01407**	005	1	CAPA-10-18479		07/20/10
ARS1-B10-03242-20	TRG				**ARS1-10-01407**	006	1	CAPA-10-19017		07/20/10
ARS1-B10-03242-21	TRG				**ARS1-10-01407**	007	1	CAPA-10-19021		07/20/10
ARS1-B10-03242-22	TRG				**ARS1-10-01408**	001	1	BUCKMAN08-10-16994		07/20/10

63283 10-01366-001-1 **ORIG**

63284 10-01366-002-1 **ORIG**

63285 10-01366-003-1 **ORIG**

63286 10-01366-004-1 **ORIG**

63287 10-01366-005-1 **ORIG**

63288 10-01366-006-1 **ORIG**

63289 10-01366-007-1 **ORIG**

63290 10-01366-008-1 **ORIG**

63291 10-01366-009-1 **ORIG**

63412 10-01375-001-1 **ORIG**

63413 10-01375-002-1 **ORIG**

63699 10-01407-001-1 **ORIG**

63700 10-01407-002-1 **ORIG**

63701 10-01407-003-1 **ORIG**

63702 10-01407-004-1 **ORIG**

63703 10-01407-005-1 **ORIG**

63704 10-01407-006-1 **ORIG**

63705 10-01407-007-1 **ORIG**

63706 10-01408-001-1 **ORIG**

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
5796	ARS1-B10-03242	ARS1-B10-03242-01		1	g					JRABER	06/28/2010 17:01:54
5797	ARS1-B10-03242	ARS1-B10-03242-02		1	g					JRABER	06/28/2010 17:01:54
5798	ARS1-B10-03242	ARS1-B10-03242-03		1	g					JRABER	06/28/2010 17:01:54
5799	ARS1-B10-03242	ARS1-B10-03242-04	CAPA-10-17584	5.04	g	63968				JRABER	06/28/2010 17:01:54
5800	ARS1-B10-03242	ARS1-B10-03242-05	CAPA-10-17601	5.03	g	63969				JRABER	06/28/2010 17:01:54
5801	ARS1-B10-03242	ARS1-B10-03242-06	CAPA-10-17672	5.04	g	63970				JRABER	06/28/2010 17:01:54
5802	ARS1-B10-03242	ARS1-B10-03242-07	CAPA-10-17734	5	g	63971				JRABER	06/28/2010 17:01:54
5803	ARS1-B10-03242	ARS1-B10-03242-08	CAPA-10-17737	4.99	g	63972				JRABER	06/28/2010 17:01:54
5804	ARS1-B10-03242	ARS1-B10-03242-09	CAPA-10-17856	4.98	g	63973				JRABER	06/28/2010 17:01:55
5805	ARS1-B10-03242	ARS1-B10-03242-10	CAPA-10-17898	5.03	g	63974				JRABER	06/28/2010 17:01:55
5806	ARS1-B10-03242	ARS1-B10-03242-11	CAPA-10-17910	4.97	g	63975				JRABER	06/28/2010 17:01:55
5807	ARS1-B10-03242	ARS1-B10-03242-12	CAPA-10-17914	5.04	g	63976				JRABER	06/28/2010 17:01:55
5808	ARS1-B10-03242	ARS1-B10-03242-13	GW56-10-15470	5.06	g	63977				JRABER	06/28/2010 17:01:55
5809	ARS1-B10-03242	ARS1-B10-03242-14	GW56-10-15471	5.02	g	63978				JRABER	06/28/2010 17:01:55
5810	ARS1-B10-03242	ARS1-B10-03242-15	CAPA-10-17577	4.97	g	63979				JRABER	06/28/2010 17:01:55
5811	ARS1-B10-03242	ARS1-B10-03242-16	CAPA-10-17580	5.06	g	63980				JRABER	06/28/2010 17:01:55
5812	ARS1-B10-03242	ARS1-B10-03242-17	CAPA-10-17949	5.05	g	63981				JRABER	06/28/2010 17:01:55
5813	ARS1-B10-03242	ARS1-B10-03242-18	CAPA-10-18473	5.05	g	63982				JRABER	06/28/2010 17:01:55
5814	ARS1-B10-03242	ARS1-B10-03242-19	CAPA-10-18479	5.01	g	63983				JRABER	06/28/2010 17:01:56
5815	ARS1-B10-03242	ARS1-B10-03242-20	CAPA-10-19017	4.98	g	63984				JRABER	06/28/2010 17:01:56
5816	ARS1-B10-03242	ARS1-B10-03242-21	CAPA-10-19021	5	g	63985				JRABER	06/28/2010 17:01:56
5817	ARS1-B10-03242	ARS1-B10-03242-22	BUCKMAN08-10-16994	4.96	g	63986				JRABER	06/28/2010 17:01:56

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\20100707_1326
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100707_1326\20100707_1326.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100707_1326\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100707_1326\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL H3
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: LL H3 PLASTIC
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	0.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

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

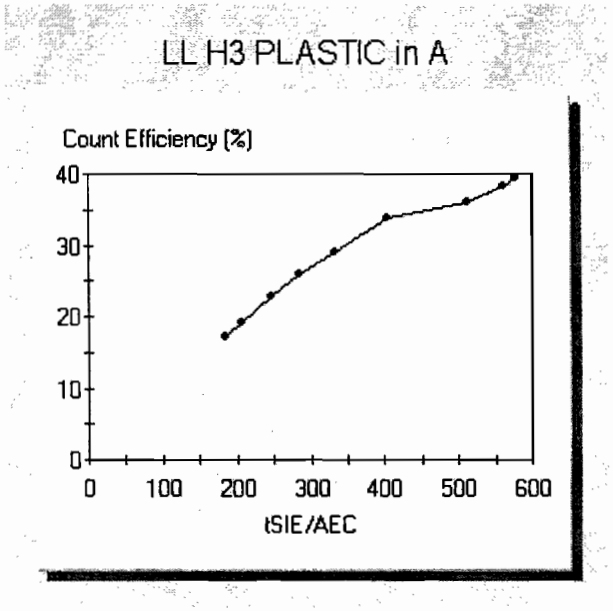
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 09/08/2009
Date Modified:
LL H3 PLASTIC in A

tSIE/AEC	Count Efficiency (%)
577.71	39.37
561.32	38.19
514.09	36.15
404.21	33.71
334.90	29.12
284.93	26.04
246.14	22.78
207.51	19.18
185.88	17.18

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.915	4.92	571.89	38.95	7/7/2010	1:35:32 PM	
2	2	B10-03242-04	120.00	1.979	5.22	554.11	37.88	7/7/2010	3:47:30 PM	
2	3	B10-03242-05	120.00	1.553	4.10	555.15	37.92	7/7/2010	5:58:41 PM	
2	4	B10-03242-06	120.00	1.487	3.89	560.88	38.17	7/7/2010	8:10:35 PM	
2	5	B10-03242-07	120.00	1.642	4.22	571.65	38.94	7/7/2010	10:20:47 PM	
2	6	B10-03242-08	120.00	1.428	3.73	562.78	38.29	7/8/2010	12:30:55 AM	
2	7	B10-03242-09	120.00	1.639	4.19	574.69	39.16	7/8/2010	2:41:02 AM	
2	8	B10-03242-10	120.00	1.585	4.20	551.52	37.76	7/8/2010	4:51:06 AM	
2	9	B10-03242-11	120.00	1.380	3.57	568.32	38.69	7/8/2010	7:01:08 AM	
2	10	B10-03242-12	120.00	1.722	4.54	555.51	37.94	7/8/2010	9:11:12 AM	
2	11	B10-03242-13	120.00	1.304	3.75	451.64	34.76	7/8/2010	11:21:14 AM	
2	12	B10-03242-14	120.00	0.941	4.16	244.73	22.65	7/8/2010	1:31:12 PM	
2	13	B10-03242-15	120.00	1.540	4.06	555.31	37.93	7/8/2010	3:41:16 PM	
2	14	B10-03242-16	120.00	1.526	3.97	565.33	38.48	7/8/2010	5:51:18 PM	
2	15	B10-03242-17	120.00	1.782	4.66	562.20	38.25	7/8/2010	8:01:21 PM	
2	16	B10-03242-18	120.00	1.583	4.21	548.61	37.64	7/8/2010	10:11:23 PM	
2	17	B10-03242-19	120.00	1.432	3.74	562.39	38.26	7/9/2010	12:21:25 AM	
2	18	B10-03242-20	120.00	1.723	4.59	547.21	37.58	7/9/2010	2:31:27 AM	
2	19	B10-03242-21	120.00	1.656	4.34	560.62	38.16	7/9/2010	4:41:27 AM	
2	20	B10-03242-22	120.00	1.735	4.54	561.14	38.18	7/9/2010	6:51:28 AM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
7-1-10	1620	BIO-02889-11	BIO-02889	1622	JDR
↓	↓	BIO-02889-13	↓	↓	JDR
↓	↓	BIO-02889-14	↓	↓	JDR
↓	↓	BIO-02889-15	↓	↓	JDR
↓	↓	BIO-02889-15	↓	↓	JDR
↓	↓	BIO-02889-19	↓	↓	JDR
↓	↓	BIO-02889-20	↓	↓	JDR
↓	↓	BIO-02889-22	↓	↓	JDR
7-6-10	0945	SNC 51	QA	QA	JDR
↓	↓	Background	BIO-02889	1022	JDR
↓	↓	BIO-02889-19	BIO-02889	↓	JDR
↓	↓	BIO-02889-20	↓	↓	JDR
↓	↓	BIO-02889-22	↓	↓	JDR
7-7-2010	1140	SNC 51	QA	QA	JDR
↓	↓	Background	BIO-03242	1326	JDR
↓	↓	BIO-03242-04	↓	↓	JDR
↓	↓	BIO-03242-05	↓	↓	JDR
↓	↓	BIO-03242-06	↓	↓	JDR
↓	↓	BIO-03242-07	↓	↓	JDR
↓	↓	BIO-03242-08	↓	↓	JDR

E-13

Reviewed By: JD Date: 9-29-10
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
7-7-10	1140	B10-03242-09	B10-03242	1326	JDR
↓	↓	B10-03242-10	↓	↓	JDR
↓	↓	B10-03242-11	↓	↓	JDR
↓	↓	B10-03242-12	↓	↓	JDR
↓	↓	B10-03242-13	↓	↓	JDR
↓	↓	B10-03242-14	↓	↓	JDR
↓	↓	B10-03242-15	↓	↓	JDR
↓	↓	B10-03242-16	↓	↓	JDR
↓	↓	B10-03242-17	↓	↓	JDR
↓	↓	B10-03242-18	↓	↓	JDR
↓	↓	B10-03242-19	↓	↓	JDR
↓	↓	B10-03242-20	↓	↓	JDR
↓	↓	B10-03242-21	↓	↓	JDR
↓	↓	B10-03242-22	↓	↓	JDR

Reviewed By: JB Date: 9-29-10
Initials

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

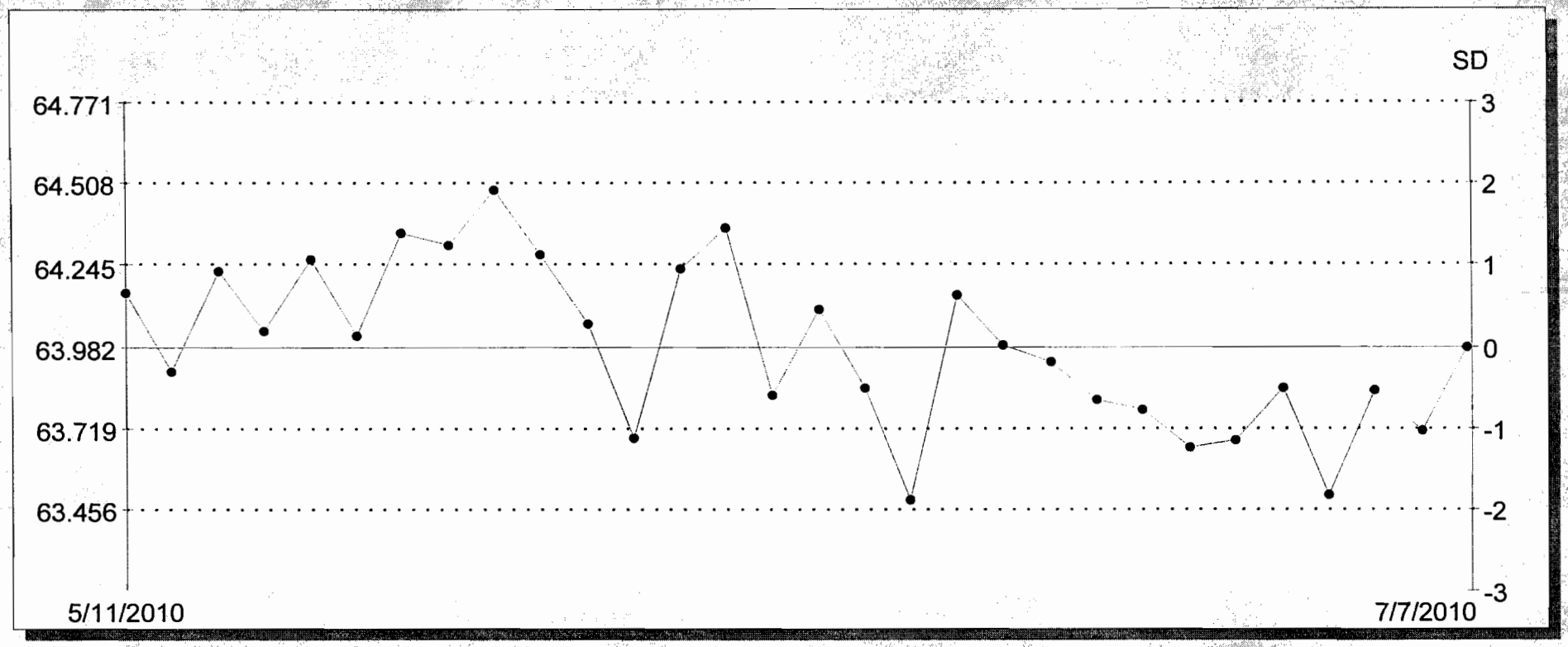
Tritium-Screening by Low Level Liquid Scintillation Counting

Control Charts

3H Efficiency
Total # pts : 5191
Valid # pts : 30
Mean : 63.98
SD : 0.26

Date	Value	Valid Pt
May 11, 2010	64.16	X
May 12, 2010	63.90	X
May 12, 2010	64.23	X
May 13, 2010	64.04	X
May 14, 2010	64.26	X
May 18, 2010	64.01	X
May 24, 2010	64.35	X
May 29, 2010	64.31	X
May 30, 2010	64.49	X
May 30, 2010	64.28	X
Jun 01, 2010	64.05	X
Jun 04, 2010	63.68	X
Jun 07, 2010	64.23	X
Jun 08, 2010	64.37	X
Jun 11, 2010	63.82	X
Jun 14, 2010	64.10	X
Jun 15, 2010	63.84	X
Jun 16, 2010	63.49	X
Jun 17, 2010	64.15	X
Jun 20, 2010	63.98	X
Jun 21, 2010	63.94	X
Jun 21, 2010	63.81	X
Jun 21, 2010	63.78	X
Jun 21, 2010	63.66	X
Jun 21, 2010	63.68	X
Jun 21, 2010	63.85	X
Jun 21, 2010	63.50	X
Jun 28, 2010	63.84	X
Jul 06, 2010	63.71	X
Jul 07, 2010	63.98	X

3H Efficiency
Total # pts : 5191
Valid # pts : 30
Mean : 63.98
SD : 0.26

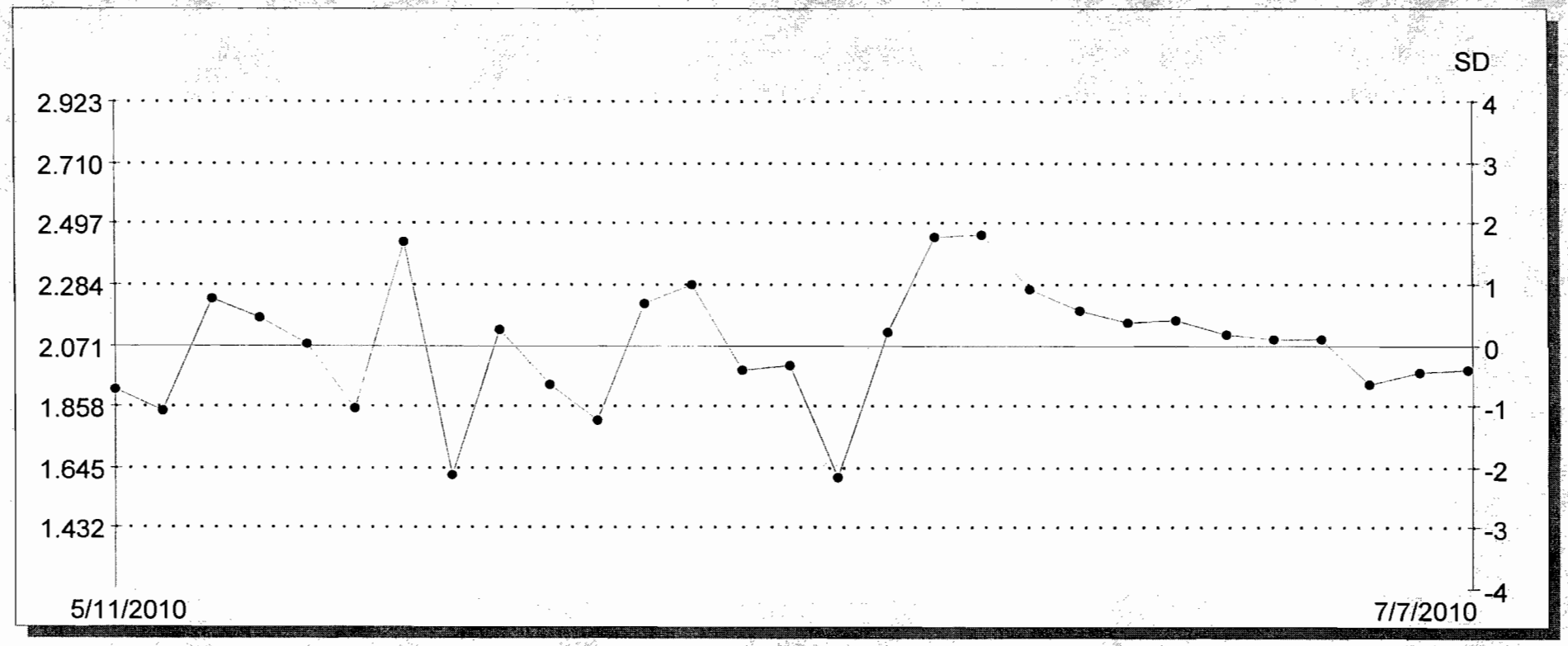


3H Background
Total # pts : 5121
Valid # pts : 29
Mean : 2.07
SD : 0.21

Date	Value	Valid Pt
May 11, 2010	1.92	X
May 12, 2010	1.85	X
May 12, 2010	2.23	X
May 13, 2010	2.17	X
May 14, 2010	2.08	X
May 18, 2010	1.85	X
May 24, 2010	2.43	X
May 29, 2010	1.62	X
May 30, 2010	2.13	X
May 30, 2010	1.93	X
Jun 01, 2010	1.81	X
Jun 04, 2010	2.21	X
Jun 07, 2010	2.28	X
Jun 08, 2010	1.99	X
Jun 11, 2010	2.00	X
Jun 14, 2010	1.61	X
Jun 15, 2010	2.11	X
Jun 16, 2010	2.45	X
Jun 17, 2010	2.46	X
Jun 20, 2010	2.27	X
Jun 21, 2010	2.19	X
Jun 21, 2010	2.15	X
Jun 21, 2010	2.16	X
Jun 21, 2010	2.11	X
Jun 21, 2010	2.09	X
Jun 21, 2010	2.09	X
Jun 28, 2010	1.94	X
Jul 06, 2010	1.97	X
Jul 07, 2010	1.98	X

3H Background

Total # pts	: 5121
Valid # pts	: 29
Mean	: 2.07
SD	: 0.21



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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: 5/13/2010 0:00 *date counted*
STANDARD REFERENCE #: S-0206

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

Radionuclide: H-3 Dilution Reference Date: 2/25/2009 8:30

Dilution Activity	3.01	pCi per gram ===> dpm/g	6.68
Verif. Date Decay Corrected	2.81	pCi per gram ===> dpm/g	6.24

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-0206-V1B	11.98	1	LSC	0.3328	1.62	5.040	6.18	2.78
S-0206-V2B	11.42	1	LSC	0.3186	1.62	5.010	6.13	2.76
S-0206-V3B	12.01	1	LSC	0.3360	1.62	4.990	6.19	2.79
S-0206-V4B	11.75	1	LSC	0.3275	1.62	5.010	6.17	2.78
S-0206-V5B	11.45	1	LSC	0.3196	1.62	5.020	6.13	2.76

Average	6.16	2.77
Two Sigma Uncertainty	0.06	0.02
Standard Deviation percent of known concentration	0.45%	0.45%
Target Activity	6.24	2.81
% Diff	-1.27%	-1.27%

10% Max *PASS*

5% Max *PASS*

Verification Expiration Date: May 13, 2011

Prepared & Counted By: Jeremy Raber Date: 5/13/2010 0:00

Verified & Approved By: Eugene Mulligan Date: 5/14/2010

QC Approval: Amy Engel Date: 5/14/2010

S-0206		
H-3	Verified	*5/14/10*
SL	**Expires**	**5/14/11**
Manufactuer	**NIST**	
Sol Matrix	H2O	
Ref No	NIST 4361C	
Tech	M Thibodeaux	
Parent ID	S-0152	

ARS INTERNATIONAL

RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY

STD ID: S-0206

ARS INTERNATIONAL

Add/Edit *Secondary Stds*

Planning

Planning Comments	**Create a Low Level H3 LCS solution.**
Target dpm/g (on dil. date)	**6.66**
Target Final volume mL	**500**
Appx mass g of Parent Sol'n	**49.8188436**
Appx vol ml of Parent Sol'n	**49.91868096**
Expected Addition for Analysis g	**5**

Standards Preparation / Dilution

Secondary Solution #	**S-0206**
Dilution Date (New Ref Date)	**02/25/2009 08:30**
Ampoule, Empty (g)	
Ampoule /Solution Gross (g)	
Net Wt Removed (g)	
Transfer Container, empty (g)	**103.64**
Container Plus Solution (g)	**153.45**
Net Wt Transferred (g)	**49.81**
DPM Xferred on 02/25/2009 08:30	**3329.408875**
Diluent/matrix	**Dead H2O**
Diluent Density Cont, empty (g)	
Test Mass of 5 ml of Diluent (g)	
Diluent Density Test - (g/mL)	
Dilution Empty Container Mass (g)	**198.75**
Dilution Full Cont g (if measured)	**697.31**
Dilution Final Volume ml (if measured)	**500**
Final Dilution Density (g/mL)	**0.99712**
Final Dilution Measured Mass g	**498.56**
Comments	**Use as H3LL LCS creation. Dilution performed as stated above by M Thibodeaux on 2/25/09. -BJS 2/25/09**
Final Dilution dpm/g	**6.678050535**
Final Dil New Ref Date/Time	**02/25/2009 08:30**

Parent Standard Data

Parent Solution Reference #	**NIST 4361C**			
Parent Solution #	**S-0152**			
Parent Principal Radionuclide	**H-3**	Half Life (Days)	**4499.8000000**	
Parent Reference Date	**09/03/1998 11:00**			
Parent Certified Act	**120.54**	Certi Act/Vol Units	**dpm**	**g**
Parent Cert Act Uncert 1 Sigma	**0.0076**			
Parent Sp. Gravity G/Ml	**0.998**			
Parent Supplier	**NIST**			
Parent Date Recvd	**12/04/06**			
Parent Received By	**LU**			
Parent Cert Exp Date				
Parent Matrix	**H2O**			
Certified dpm/g At Ref Date	**120.54**			
Certified dpm/g on 02/25/2009 08 30	**66.84217777**			
Parent Comments	Liquid in a 500-ml borosilicate-glass medis bottle with teflon-lined screw cap. Approximately 500 grams			
Parent Tech	**M. Thibodeaux**			
Is_Primary	**FALSE**			
Is_LCS	**TRUE**			
Is_Tracer	**FALSE**			
Is_Calib	**FALSE**			

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Folder Duplicate

ARS INTERNATIONAL

Report Compilation Checklist

ARS SDG: 10-01408 **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~~	

Report Generator Signature — Date: 9-28-10

Management Review Signature — Date: 9-29-10

ARS INTERNATIONAL

LSC
Technical Review Checklist

ARS SDG ARS1-10-01408

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:**	ARS1-B10-03242	**Batch B:**	N/A	**Batch C:**	N/A
Test Method(s):		LSC-A-021		N/A		N/A

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Jimmy D. Rahn 7-5-2010
Chemist Signature Date

Jamaal Brown 7-7-10
Verifier Review Signature Date

B. ANALYSIS REVIEW

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

[signature] 9-29-10
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

JDR 7-9-2010

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

Jimmy D. Rahn 7-9-2010
Analyst Signature Date

N/A
Technicial Reviewer Signature Date

Batch A: ARS1-B10-03242

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): _____

Project Manager Signature	Date	QA Officer Signature	Date
Susan Lee	9-28-10	JBoyd	9-29-10

GENERAL COMMENTS

LSC
Technical Review Checklist

ARS SDG ARS1-10-01408

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:** ARS1-B10-03243 **Batch B:** N/A **Batch C:** N/A

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

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Jimmy D. Rahm 9-20-2010 — Chemist Signature, Date

Jamaal Brown 9-20-10 — 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

QA Officer Signature, Date: 9-29-10

	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): _____

Jimmy D. Rahm 9-27-2010 — Analyst Signature, Date

N/A — Technicial Reviewer Signature, Date

Batch A: ARS1-B10-03243

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): _____

Project Manager Signature	Date	QA Officer Signature	Date
Susan Giese	9-28-10	[illegible]	9-29-10

GENERAL COMMENTS

DQO Report for SDG
ARS1-10-01408

Analysis Code	Group	Isotope	Activity Units	Aliquot Units	ProcedureNo	RDL	LCS_LL	LCS_UL	MS_LL	MS_UL	RadY_LL	RadY_UL	GravY_LL	GravY_LL	RER	RPD	DiltionReq	RoughPrepReq	BlankCorrectionMDA	BlankCorrectionAll	CountTimeReq	AliquotRequired
LSC-A-021	STD	H-3		TU	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		TU	ARS-054	0.00E+00	75	125	60	140	30	110	40	110	1.00	25	FALSE	FALSE	FALSE	FALSE		

SDG Report - Analysis Assignments

Temp SDG	ARS1-10-01408	Sample Count	1
Client	Los Alamos National Laboratory	Analysis Count	2-2

Samples Count Totals per Analysis

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

Analyses Assigned Per Fraction

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

SDG Report - Samples and Containers

SDG Specific Data

SDG	ARS1-10-01408	TAT Days	30	Project Type	Environmental
Sample Count	1 Rpt Level 4	Date Received	6/24/2010	COC Number	10-3478
Client	Los Alamos National Laboratory	Client Deadline	7/23/2010	PO Number	WEPR1158W100
Client Code	114	Internal Deadline	7/22/2010	Job Number	63641-001-10
Profile Number	PN-00094	Lab Deadline	7/20/2010	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	BUCKMAN08-10-16997	AQ	06/22/10 12:00 PM	06/22/10 12:00 PM	H	90	5	E3							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	63706	1	1108.00				50	28		N	N/A				

ARS FILE TRACKING SHEET

SDG: 10-01408

Task	Date / Time	Initials
Date & Time Samples Received	06-24-10/10:10	N.P
ICOC Initiated / Storage Location: E3	06-24-10/16:20	N.P.
Technical Checks Performed	— See batch —	
Report Written / EDD Generated: 9-28-10/1423 | SDL (Date/Time, Initials)	9-28-10/1421	SDL
Quality Assurance Checks Performed on Report	— NA —	
Management Check Performed on Report	9-28-10 0955	[illegible]
Preliminary Report Sent		
Report E-mailed	9-29-10/956	SDL
Report Faxed	— NA —	
Report Reviewed	10-6-10/1600	MC
Report Mailed	NA.	
Invoice Completed Invoice #: 1001911	9-30-10/0842	[illegible]
Report Imaged	10-6-10/1616	MC

SPECIAL REQUIREMENTS

Requirement	Yes	No
3 Hour Rush		✓
24 Hour Rush		✓
48 Hour Rush		✓
Special Invoicing *see notes* Mgmt. Approval:		✓

NOTES:

ARS-062
04/23/2010

COMPANY NAME: LANL **SDG:** 10-0190

SHIPPING CONTAINER

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

COC PRESENT WITH SAMPLES

COC	☑ Yes	☐ No

SAMPLE CONTAINER(S)

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

Samples Rcv: 1

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

External and Internal Surveys

Exposure Rate Meter:	M3242861	Serial No.:	442PR264266	Calibration Due Date:	4-19-11
Count Rate Meter:	D2154859	Serial No.:	442PR184559	Calibration Due Date:	4-6-11
Background Exposure Rate (µR/hr)	26	Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd)	26	µR/hr	
Background Count Rate (cpm)	50	Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd)	50	cpm	
		Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd)	50	cpm	

Sample Label/Comments/Notes	pH Orig (pH ≤ 2 is Acceptable)	pH Final	Mark if Preserve	Acid Lot #	Weight(g) / Volume(mL)	µR/hr (Acceptance Limits <500 µR/hr)	cpm (Acceptance Limits <100 cpm/cm²)
Beckman 08-10-16994	—	N/A	—	—	1108	28	50

Surveyors' Name: Heath Pa

Date/Time Surveyed: 6-24-10 15:49

Wednesday, June 23, 2010

REQUEST NUMBER: 10-3478

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

These Samples are on:
LANL Request Number:10-3478
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples according to the schedule indicated:

SHIP DATE: 6/23/2010
TURNAROUND/REPORT DUE: 7/23/2010
TURNAROUND REQ'D: 30 Days

RAD SCREENING: Yes, Below Background
LAB REQUEST COMMENTS:

LANL ER SMO CONTACT:
Signature:

PRIORITY	METHOD CODE	CNTNR	SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	SPECIAL INSTRUCTIONS
	Generic:Low_Level_Tritium	1	Buckman08-10-16994	WG	6/22/2010	

Final Page of REQUEST NUMBER 10-3478

Wednesday, June 23, 2010

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 10-3478C

REQUEST NUMBER: 10-3478

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806
LAB REQUEST COMMENTS:

TURNAROUND/REPORT DUE: 7/23/2010
TURNAROUND REQ'D: 30

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman08-10-16994	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:		Date	Time	Received By:		Date	Time
[illegible]		6/23/10	3:00	Heath Pass	Heath Pass	6-24-10	10:10
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		

Received for DISPOSAL By:	Date	Time	Remarks:
Printed Name	Signature		

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Request Number: 10-4334 REVISED

2609 North River Road • Port Allen, Louisiana 70767
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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 10-4334

Original COC

Hard Copy Required

Wednesday, August 25, 2010

REQUEST NUMBER: 10-4334

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

These Samples are on:
LANL Request Number:10-4334
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples according to the schedule indicated:

SHIP DATE: 8/25/2010
TURNAROUND/REPORT DUE: 9/24/2010
TURNAROUND REQ'D: 30 Days

RAD SCREENING: Not Required
LAB REQUEST COMMENTS:

LANL ER SMO CONTACT:
Signature:

PRIORITY	METHOD CODE	CNTNR	SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	SPECIAL INSTRUCTIONS
	Generic:Low_Level_Tritium	1	Buckman1-10-24996	WG	8/24/2010	
		1	Buckman06-10-24997	WG	8/24/2010	
		1	Buckman08-10-24998	WG	8/24/2010	
		1	Buckman1-10-24999	WG	8/24/2010	

Final Page of REQUEST NUMBER 10-4334

Wednesday, August 25, 2010

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 10-4334

REQUEST NUMBER: 10-4334

LOS ALAMOS

NATIONAL LABORATORY

ATTN: Danny Coleman

American Radiation Services - Primary

1726 Wooddale Court

Baton Rouge, LA 70806

LAB REQUEST COMMENTS:

TURNAROUND/REPORT DUE: 9/24/2010

TURNAROUND REQ'D: 30

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman06-10-24997	1	POLY	WSP-LL-H-3	None	WG
Buckman1-10-24996	1	POLY	WSP-LL-H-3	None	WG
Buckman08-10-24998	1	POLY	WSP-LL-H-3	None	WG
Buckman1-10-24999	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:		Date	Time	Received By:		Date	Time
Printed Name	Signature			Printed Name	Signature		
		8/25/10	1400			8/26/10	10:48
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		

Received for DISPOSAL By:		Date	Time	Remarks:
Printed Name	Signature			

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 10-4334

Case Narrative

ARS INTERNATIONAL

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

November 19, 2010

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

Request Number: **10-4334**
LANL Sample ID: Buckman1-10-24996; Buckman06-10-24997; Buckman08-10-24998; Buckman1-10-24999.

Dear Mr. Greene;

On August 26, 2010, ARS International received four (4) water samples to be analyzed for Low Level Tritium.

The samples were processed and counted using the appropriate counting equipment and QA/QC for this type of analysis. Results of the analysis and QA/QC are attached in the data package.

The client and QA/QC samples were counted with a count time sufficient to meet quality control parameters for counting equipment and were within acceptance criteria and statistical sound detection limits.

If you have any questions please do not hesitate to call at 225.381.2991 or email LANL@amrad.com.

Sincerely,

Laboratory Management
ARS International

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

COVER PAGE

PROJECT SAMPLE IDENTIFICATION
CROSS-REFERENCE
TO ARS SAMPLE LABORATORY IDs

Subcontract (LANL Agreement Number) 63641-001-10

Request Number	LANL PROJECT SAMPLE ID NUMBER	American Radiation Services SAMPLE ID NUMBER(S)
10-4334	Buckman1-10-24996	ARS1-10-01880-001
10-4334	Buckman06-10-24997	ARS1-10-01880-002
10-4334	Buckman08-10-24998	ARS1-10-01880-003
10-4334	Buckman1-10-24999	ARS1-10-01880-004

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	Title	Date
	Laboratory Management, ARS International	11-19-10

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-10-01880	**Request or PO Number:**	10-4334
Client Sample ID:	Buckman1-10-24996	**ARS Sample ID:**	ARS1-10-01880-001
Sample Collection Date:	08/24/10	**Date Received:**	08/26/10
Sample Matrix:	Aqueous	**Report Date:**	08/17/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.370	0.210	0.670	0.320	U	TU	ARS-040	11/15/10 00:00	JR	NA

NOTES: Project Cost Code: WEPR1158W100

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 NELAP Certificate # E87558

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-10-01880	**Request or PO Number:**	10-4334
Client Sample ID:	Buckman06-10-24997	**ARS Sample ID:**	ARS1-10-01880-002
Sample Collection Date:	08/24/10	**Date Received:**	08/26/10
Sample Matrix:	Aqueous	**Report Date:**	08/17/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.330	0.140	0.420	0.200	U	TU	ARS-040	11/15/10 00:00	JR	NA

NOTES: Project Cost Code: WEPR1158W100

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 NELAP Certificate # E87558

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-10-01880	**Request or PO Number:**	10-4334
Client Sample ID:	Buckman08-10-24998	**ARS Sample ID:**	ARS1-10-01880-003
Sample Collection Date:	08/24/10	**Date Received:**	08/26/10
Sample Matrix:	Aqueous	**Report Date:**	08/17/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.370	0.190	0.590	0.290	U	TU	ARS-040	11/15/10 00:00	JR	NA

NOTES: Project Cost Code: WEPR1158W100

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 NELAP Certificate # E87558

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-10-01880	**Request or PO Number:**	10-4334
Client Sample ID:	Buckman1-10-24999	**ARS Sample ID:**	ARS1-10-01880-004
Sample Collection Date:	08/24/10	**Date Received:**	08/26/10
Sample Matrix:	Aqueous	**Report Date:**	08/17/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.280	0.160	0.520	0.250	U	TU	ARS-040	11/15/10 00:00	JR	NA

NOTES: Project Cost Code: WEPR1158W100

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 NELAP Certificate # E87558

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

QC Results Report

Sample Delivery Group: ARS1-10-01880
Date Received: 8/26/2010

Laboratory Control Sample Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1s)	MDC	Expected Value	Qual	Raport Units	Analysis Test Method	Analysis Date/Tima	Analysis Technician	Percent Recovery (%)	LCS Acceptance Range
ARS1-B10-04304	LCS	H3	6.980	1.080	0.610	8.428		TU	ARS-040	11/12/10 0:00	JR	83	75%-125%

Blank Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1s)	MDC	Expected Value	Qual	Raport Units	Analysis Test Method	Analysis Date/Time	Analysis Technician
ARS1-B10-04304	MBL	H3	-0.010	0.140	0.480	NA	U	TU	ARS-040	11/13/10 0:00	JR

Sample RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER AcceptanceRange
ARS1-B10-04304	LCSD	H3	6.980	1.080	7.840	1.210		TU	ARS-040	1/13/10 0:00	JR	0.38	< 1

Sample DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER AcceptanceRange
ARS1-B10-04304	LCSD	H3	6.980	1.080	7.840	1.210		TU	ARS-040	11/13/10 0:00	JR	1.06	< 3

Susan Reese
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

ARS1-B10-04304

Expected Value Calculations LANL

ARS Batch Number: ARS1-B09 - 00000

LCS	**CALCULATED EXPECTED VALUE**	=	27.148	8.428		
			Range	21.719	-	32.578
LCSD	**CALCULATED EXPECTED VALUE**	=	27.203	8.446		
			Range	21.763	-	32.644

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting Samples

QC Evaluation

EPA Method: ARS-040
Batch ID: ARS1-B10-04304
SDG's: ARS1-10-01833,34,78,80,81,1940,42

LCS	22.4900	**CSU (2s)**	6.8200
LCSD	25.2700	**CSU-D (2s)**	7.6500

DER = abs(LSC-LSCD) / sqr((2s CSU/2)^2)+((2s CSU-D/2)^2) *at 1 sigma* = **< 3**

DER 2.78 / 5.1243268 = 0.54251 **< 3**

% RPD= ABS(LCS - LSCD) / (LCS+LCSD)/2 * 100 = **< 25%**

%RPD 2.78 / 23.88 *100 = 11.64154 **< 25%**

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

RER= abs((LCS-LCSD)) / (CSU)+(CSD) *at 2 sigma* = **<1** ***<--LANL Requirement***

RER = 2.78 / 14.4700 0.192121631 **<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	-0.02	0.91	1.56	
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 = -0.02
CSU = 0.91
Is ACT<1.65*CSU? YES

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	10-01833,34,78,80,81,1940,42
ARS Batch ID Number	ARS1-B10-04304

Enrichment Factor Curve coeff. - Power y = a * x^b		Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	8.978E-01	a	-2.319E-06
b	-9.611E-01	b	2.724E-03
c		c	-1.060E+00
		d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	TU
Coverage Factor	1	UCF	7.151
		Aliquot must be entered in liters!!	

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
B10-04304-01	503.98	2.00	11.68	2.06	9.62	0.02	40.32	4.93	1.44	548.29	0.3763	0.00502	L	2/25/2009	11/12/2010	360	360	0.91699	6.98	0.27	0.27	1.08	0.61	0.29	TU
B10-04304-02	504.73	2.00	12.52	2.06	10.46	0.02	37.26	5.13	1.44	561.98	0.3823	0.00503	L	2/25/2009	11/13/2010	360	360	0.91686	7.84	0.29	0.29	1.21	0.64	0.31	TU
B10-04304-03	504.43	2.00	10.72	2.06	8.66	0.02	44.65	1.44	1.44	573.80	0.3909	0.00500	L	11/12/2010	11/13/2010	360	360	0.99984	-0.01	0.14	0.14	0.14	0.48	0.24	TU
B10-04304-04	439.06	2.00	13.00	2.06	10.94	0.02	31.21	1.73	1.44	469.52	0.3516	0.00504	L	8/12/2010	11/13/2010	360	360	0.98717	0.73	0.24	0.24	0.26	0.77	0.38	TU
B10-04304-05	434.68	2.00	11.29	2.06	9.23	0.02	36.40	1.72	1.44	542.71	0.3738	0.00502	L	8/12/2010	11/13/2010	360	360	0.98717	0.57	0.19	0.19	0.21	0.63	0.31	TU
B10-04304-06	505.23	2.00	12.76	2.06	10.70	0.02	36.49	1.60	1.44	553.33	0.3784	0.00503	L	8/12/2010	11/14/2010	360	360	0.98704	0.32	0.19	0.19	0.19	0.62	0.30	TU
B10-04304-07	514.04	2.02	12.22	2.08	10.14	0.02	39.07	1.78	1.44	542.14	0.3736	0.00390	L	8/13/2010	11/14/2010	360	360	0.98717	0.84	0.24	0.24	0.27	0.75	0.37	TU
B10-04304-08	498.85	2.01	12.00	2.07	9.93	0.02	38.73	1.60	1.44	545.04	0.3749	0.00502	L	8/19/2010	11/14/2010	360	360	0.98799	0.30	0.18	0.18	0.18	0.59	0.29	TU
B10-04304-09	511.47	2.00	12.02	2.06	9.96	0.02	39.55	1.68	1.44	550.45	0.3772	0.00504	L	8/24/2010	11/14/2010	360	360	0.98868	0.44	0.18	0.18	0.19	0.57	0.28	TU
B10-04304-10	513.78	2.00	13.76	2.06	11.70	0.02	34.03	1.61	1.44	550.37	0.3771	0.00500	L	8/24/2010	11/15/2010	360	360	0.98854	0.37	0.20	0.20	0.21	0.67	0.32	TU
B10-04304-11	497.63	2.00	9.17	2.06	7.11	0.01	53.27	1.68	1.44	558.84	0.3808	0.00502	L	8/24/2010	11/15/2010	360	360	0.98854	0.33	0.13	0.13	0.14	0.42	0.20	TU
B10-04304-12	496.49	2.00	12.16	2.06	10.10	0.02	37.93	1.63	1.44	553.46	0.3785	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	0.37	0.18	0.18	0.19	0.59	0.29	TU
B10-04304-13	504.53	2.00	10.60	2.06	8.54	0.02	45.26	1.61	1.44	520.46	0.3643	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	0.28	0.16	0.16	0.16	0.52	0.25	TU
B10-04304-14	498.72	2.00	10.79	2.06	8.73	0.02	43.82	33.03	1.44	528.97	0.3679	0.00321	L	8/23/2010	11/16/2010	360	360	0.98827	86.36	0.85	0.85	12.98	0.83	0.40	TU
B10-04304-15	503.50	2.00	11.38	2.06	9.32	0.02	41.53	13.51	1.44	563.13	0.3832	0.00500	L	8/20/2010	11/16/2010	360	360	0.98786	21.47	0.36	0.36	3.24	0.54	0.26	TU
B10-04304-16	496.97	2.00	12.38	2.06	10.32	0.02	37.19	16.02	1.44	522.23	0.3650	0.00501	L	6/23/2010	11/16/2010	360	360	0.98827	30.33	0.46	0.46	4.57	0.63	0.31	TU
B10-04304-17	493.93	2.00	13.81	2.06	11.75	0.02	32.63	1.67	1.44	550.07	0.3770	0.00503	L	8/25/2010	11/16/2010	360	360	0.98854	0.52	0.21	0.21	0.23	0.69	0.34	TU
B10-04304-20	491.77	2.00	9.83	2.06	7.77	0.02	48.36	4.70	1.44	557.68	0.3803	0.00503	L	8/31/2010	11/17/2010	360	360	0.98923	4.98	0.20	0.20	0.77	0.46	0.23	TU

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	10-01833,34,78,80,81,1940,42
ARS Batch ID Number	ARS1-B10-04304

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8.978E-01
b	-9.611E-01
c	

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	pCi
Coverage Factor	1	UCF	2.22

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
B10-04304-01	503.98	2.00	11.68	2.06	9.62	0.02	40.32	4.93	1.44	548.29	0.3763	0.00502	L	2/25/2009	11/12/2010	360	360	0.91699	22.49	0.86	0.86	3.48	1.95	0.95	pCi/L
B10-04304-02	504.73	2.00	12.52	2.06	10.46	0.02	37.26	5.13	1.44	561.98	0.3823	0.00503	L	2/25/2009	11/13/2010	360	360	0.91686	25.27	0.93	0.93	3.90	2.07	1.01	pCi/L
B10-04304-03	504.43	2.00	10.72	2.06	8.66	0.02	44.65	1.44	1.44	573.80	0.3909	0.00500	L	11/12/2010	11/13/2010	360	360	0.99984	-0.02	0.46	0.46	0.46	1.56	0.76	pCi/L
B10-04304-04	439.06	2.00	13.00	2.06	10.94	0.02	31.21	1.73	1.44	469.52	0.3516	0.00504	L	8/12/2010	11/13/2010	360	360	0.98717	2.36	0.77	0.77	0.85	2.49	1.22	pCi/L
B10-04304-05	434.68	2.00	11.29	2.06	9.23	0.02	36.40	1.72	1.44	542.71	0.3738	0.00502	L	8/12/2010	11/13/2010	360	360	0.98717	1.84	0.63	0.63	0.68	2.02	0.98	pCi/L
B10-04304-06	505.23	2.00	12.76	2.06	10.70	0.02	36.49	1.60	1.44	553.33	0.3784	0.00503	L	8/12/2010	11/14/2010	360	360	0.98704	1.03	0.60	0.60	0.62	1.99	0.97	pCi/L
B10-04304-07	514.04	2.02	12.22	2.08	10.14	0.02	39.07	1.78	1.44	542.14	0.3736	0.00390	L	8/13/2010	11/14/2010	360	360	0.98717	2.69	0.76	0.76	0.86	2.42	1.18	pCi/L
B10-04304-08	498.85	2.01	12.00	2.07	9.93	0.02	38.73	1.60	1.44	545.04	0.3749	0.00502	L	8/19/2010	11/14/2010	360	360	0.98799	0.98	0.58	0.58	0.59	1.89	0.92	pCi/L
B10-04304-09	511.47	2.00	12.02	2.06	9.96	0.02	39.55	1.68	1.44	550.45	0.3772	0.00504	L	8/24/2010	11/14/2010	360	360	0.98868	1.43	0.56	0.56	0.60	1.83	0.89	pCi/L
B10-04304-10	513.78	2.00	13.76	2.06	11.70	0.02	34.03	1.61	1.44	550.37	0.3771	0.00500	L	8/24/2010	11/15/2010	360	360	0.98854	1.18	0.65	0.65	0.68	2.15	1.05	pCi/L
B10-04304-11	497.63	2.00	9.17	2.06	7.11	0.01	53.27	1.68	1.44	558.84	0.3808	0.00502	L	8/24/2010	11/15/2010	360	360	0.98854	1.06	0.42	0.42	0.45	1.35	0.66	pCi/L
B10-04304-12	496.49	2.00	12.16	2.06	10.10	0.02	37.93	1.63	1.44	553.46	0.3785	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	1.18	0.59	0.59	0.61	1.91	0.93	pCi/L
B10-04304-13	504.53	2.00	10.60	2.06	8.54	0.02	45.26	1.61	1.44	520.46	0.3643	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	0.92	0.51	0.51	0.53	1.67	0.81	pCi/L
B10-04304-14	498.72	2.00	10.79	2.06	8.73	0.02	43.82	33.03	1.44	528.97	0.3679	0.00321	L	8/23/2010	11/16/2010	360	360	0.98827	278.20	2.73	2.73	41.82	2.66	1.30	pCi/L
B10-04304-15	503.50	2.00	11.38	2.06	9.32	0.02	41.53	13.51	1.44	563.13	0.3832	0.00500	L	8/20/2010	11/16/2010	360	360	0.98786	69.14	1.17	1.17	10.44	1.73	0.84	pCi/L
B10-04304-16	496.97	2.00	12.38	2.06	10.32	0.02	37.19	16.02	1.44	522.23	0.3650	0.00501	L	8/23/2010	11/16/2010	360	360	0.98827	97.70	1.48	1.48	14.73	2.03	0.99	pCi/L
B10-04304-17	493.93	2.00	13.81	2.06	11.75	0.02	32.63	1.67	1.44	550.07	0.3770	0.00503	L	8/25/2010	11/16/2010	360	360	0.98854	1.66	0.68	0.68	0.73	2.23	1.08	pCi/L
B10-04304-20	491.77	2.00	9.83	2.06	7.77	0.02	48.36	4.70	1.44	557.68	0.3803	0.00503	L	8/31/2010	11/17/2010	360	360	0.98923	16.03	0.64	0.64	2.49	1.49	0.73	pCi/L

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	10-01833,34,78,80,81,1940,42
ARS Batch ID Number	ARS1-B10-04304

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8.978E-01
b	-9.611E-01
c	

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	pCi
Coverage Factor	1.96	UCF	2.22

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1.96s CU	Combined Standard Uncertainty 1.96s CSU	Minimum Detectable Conc MDC	Decision Level Conc. DLC	Reporting Units Units
B10-04304-01	503.98	2.00	11.68	2.06	9.62	0.02	40.32	4.93	1.44	548.29	0.3763	0.00502	L	2/25/2009	11/12/2010	360	360	0.91699	22.49	0.86	1.68	6.82	1.95	0.95	pCi/L
B10-04304-02	504.73	2.00	12.52	2.06	10.46	0.02	37.26	5.13	1.44	561.98	0.3823	0.00503	L	2/25/2009	11/13/2010	360	360	0.91686	25.27	0.93	1.82	7.65	2.07	1.01	pCi/L
B10-04304-03	504.43	2.00	10.72	2.06	8.66	0.02	44.65	1.44	1.44	573.80	0.3909	0.00500	L	11/12/2010	11/13/2010	360	360	0.99984	-0.02	0.46	0.91	0.91	1.56	0.76	pCi/L
B10-04304-04	439.06	2.00	13.00	2.06	10.94	0.02	31.21	1.73	1.44	469.52	0.3516	0.00504	L	8/12/2010	11/13/2010	360	360	0.98717	2.36	0.77	1.52	1.67	2.49	1.22	pCi/L
B10-04304-05	434.68	2.00	11.29	2.06	9.23	0.02	36.40	1.72	1.44	542.71	0.3738	0.00502	L	8/12/2010	11/13/2010	360	360	0.98717	1.84	0.63	1.23	1.34	2.02	0.98	pCi/L
B10-04304-06	505.23	2.00	12.76	2.06	10.70	0.02	36.49	1.60	1.44	553.33	0.3784	0.00503	L	8/12/2010	11/14/2010	360	360	0.98704	1.03	0.60	1.18	1.22	1.99	0.97	pCi/L
B10-04304-07	514.04	2.02	12.22	2.08	10.14	0.02	39.07	1.78	1.44	542.14	0.3736	0.00390	L	8/13/2010	11/14/2010	360	360	0.98717	2.69	0.76	1.49	1.68	2.42	1.18	pCi/L
B10-04304-08	498.85	2.01	12.00	2.07	9.93	0.02	38.73	1.60	1.44	545.04	0.3749	0.00502	L	8/19/2010	11/14/2010	360	360	0.98799	0.98	0.58	1.13	1.16	1.89	0.92	pCi/L
B10-04304-09	511.47	2.00	12.02	2.06	9.96	0.02	39.55	1.68	1.44	550.45	0.3772	0.00504	L	8/24/2010	11/14/2010	360	360	0.98868	1.43	0.56	1.11	1.18	1.83	0.89	pCi/L
B10-04304-10	513.78	2.00	13.76	2.06	11.70	0.02	34.03	1.61	1.44	550.37	0.3771	0.00500	L	8/24/2010	11/15/2010	360	360	0.98854	1.18	0.65	1.28	1.33	2.15	1.05	pCi/L
B10-04304-11	497.63	2.00	9.17	2.06	7.11	0.01	53.27	1.68	1.44	558.84	0.3808	0.00502	L	8/24/2010	11/15/2010	360	360	0.98854	1.06	0.42	0.82	0.87	1.35	0.66	pCi/L
B10-04304-12	496.49	2.00	12.16	2.06	10.10	0.02	37.93	1.63	1.44	553.46	0.3785	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	1.18	0.59	1.15	1.20	1.91	0.93	pCi/L
B10-04304-13	504.53	2.00	10.60	2.06	8.54	0.02	45.26	1.61	1.44	520.46	0.3643	0.00501	L	8/24/2010	11/15/2010	360	360	0.98854	0.92	0.51	1.00	1.03	1.67	0.81	pCi/L
B10-04304-14	498.72	2.00	10.79	2.06	8.73	0.02	43.82	33.03	1.44	528.97	0.3679	0.00321	L	8/23/2010	11/16/2010	360	360	0.98827	278.20	2.73	5.34	81.96	2.66	1.30	pCi/L
B10-04304-15	503.50	2.00	11.38	2.06	9.32	0.02	41.53	13.51	1.44	563.13	0.3832	0.00500	L	8/20/2010	11/16/2010	360	360	0.98786	69.14	1.17	2.29	20.46	1.73	0.84	pCi/L
B10-04304-16	496.97	2.00	12.38	2.06	10.32	0.02	37.19	16.02	1.44	522.23	0.3650	0.00501	L	8/23/2010	11/16/2010	360	360	0.98827	97.70	1.48	2.89	28.87	2.03	0.99	pCi/L
B10-04304-17	493.93	2.00	13.81	2.06	11.75	0.02	32.63	1.67	1.44	550.07	0.3770	0.00503	L	8/25/2010	11/16/2010	360	360	0.98854	1.66	0.68	1.34	1.43	2.23	1.08	pCi/L
B10-04304-20	491.77	2.00	9.83	2.06	7.77	0.02	48.36	4.70	1.44	557.68	0.3803	0.00503	L	8/31/2010	11/17/2010	360	360	0.98923	16.03	0.64	1.26	4.88	1.49	0.73	pCi/L

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1 (800) 401-4277 • Fax (225) 381-2996

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-04304**

Method **ARS-054** **Analysis** **LSC-A-022** **Matrix** **AQ**

Description **Low Level Tritium by Enrichment**

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-04304-01	LCS	B-10212								
ARS1-B10-04304-02	LCSD	B-10213								
ARS1-B10-04304-03	MBL									
ARS1-B10-04304-04	DUP									
ARS1-B10-04304-05	DO				**ARS1-10-01833**	001	1	CAPA-10-24119	STD	09/14/10
ARS1-B10-04304-06	TRG				**ARS1-10-01833**	002	1	CAPA-10-24120	STD	09/14/10
ARS1-B10-04304-07	TRG				**ARS1-10-01833**	003	1	CAPA-10-24143	STD	09/14/10
ARS1-B10-04304-08	TRG				**ARS1-10-01834**	001	1	CAPA-10-24872	STD	09/14/10
ARS1-B10-04304-09	TRG				**ARS1-10-01878**	001	1	CAPA-10-24868	STD	09/21/10
ARS1-B10-04304-10	TRG				**ARS1-10-01880**	001	1	Buckman1-10-24996	STD	09/21/10
ARS1-B10-04304-11	TRG				**ARS1-10-01880**	002	1	Buckman06-10-24997	STD	09/21/10
ARS1-B10-04304-12	TRG				**ARS1-10-01880**	003	1	Buckman08-10-24998	STD	09/21/10
ARS1-B10-04304-13	TRG				**ARS1-10-01880**	004	1	Buckman1-10-24999	STD	09/21/10
ARS1-B10-04304-14	TRG				**ARS1-10-01881**	001	1	CAPU-10-25281	STD	09/21/10
ARS1-B10-04304-15	TRG				**ARS1-10-01942**	001	1	CALA-10-24991	STD	09/21/10
ARS1-B10-04304-16	TRG				**ARS1-10-01942**	002	1	CALA-10-25201	STD	09/21/10
ARS1-B10-04304-17	TRG				**ARS1-10-01942**	003	1	CALA-10-25215	STD	09/21/10
ARS1-B10-04304-20	TRG				**ARS1-10-01940**	001	1	CAWA-10-26041	STD	09/28/10

75023
10-01833-001-1
XRAD

75024
10-01833-002-1
XRAD

75025
10-01833-003-1
XRAD

75026
10-01834-001-1
XRAD

75027
10-01878-001-1
XRAD

75028
10-01880-001-1
XRAD

75029
10-01880-002-1
XRAD

75030
10-01880-003-1
XRAD

75031
10-01880-004-1
XRAD

75032
10-01881-001-1
XRAD

75033
10-01942-001-1
XRAD

75036
10-01942-002-1
XRAD

75038
10-01942-003-1
XRAD

75040
10-01940-001-1
XRAD

LCS Report
Analytical Batch: ARS1-B10-04304

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-10212	ARS1-B10-04304	ARS1-B10-04304-01	B-H3	S-0206	H-3	5	2.808406639	13.2909	18.299	5.0081	WSTICKLE	5/17/2010			
B-10213	ARS1-B10-04304	ARS1-B10-04304-02	B-H3	S-0206	H-3	5	2.808406639	13.2585	18.2842	5.0257	WSTICKLE	5/17/2010			

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
6897	ARS1-B10-04304	ARS1-B10-04304-01		5.02	g					JRABER	11/12/2010 14:09:03
6898	ARS1-B10-04304	ARS1-B10-04304-02		5.03	g					JRABER	11/12/2010 14:09:04
6899	ARS1-B10-04304	ARS1-B10-04304-03		5	g					JRABER	11/12/2010 14:09:04
6900	ARS1-B10-04304	ARS1-B10-04304-04		5.04	g					JRABER	11/12/2010 14:09:04
6901	ARS1-B10-04304	ARS1-B10-04304-05	CAPA-10-24119	5.02	g	75023				JRABER	11/12/2010 14:09:04
6902	ARS1-B10-04304	ARS1-B10-04304-06	CAPA-10-24120	5.03	g	75024				JRABER	11/12/2010 14:09:04
6903	ARS1-B10-04304	ARS1-B10-04304-07	CAPA-10-24143	3.9	g	75025				JRABER	11/12/2010 14:09:04
6904	ARS1-B10-04304	ARS1-B10-04304-08	CAPA-10-24872	5.02	g	75026				JRABER	11/12/2010 14:09:04
6905	ARS1-B10-04304	ARS1-B10-04304-09	CAPA-10-24868	5.04	g	75027				JRABER	11/12/2010 14:09:04
6906	ARS1-B10-04304	ARS1-B10-04304-10	Buckman1-10-24996	5	g	75028				JRABER	11/12/2010 14:09:05
6907	ARS1-B10-04304	ARS1-B10-04304-11	Buckman06-10-24997	5.02	g	75029				JRABER	11/12/2010 14:09:05
6908	ARS1-B10-04304	ARS1-B10-04304-12	Buckman08-10-24998	5.01	g	75030				JRABER	11/12/2010 14:09:05
6909	ARS1-B10-04304	ARS1-B10-04304-13	Buckman1-10-24999	5.01	g	75031				JRABER	11/12/2010 14:09:05
6910	ARS1-B10-04304	ARS1-B10-04304-14	CAPU-10-25281	3.21	g	75032				JRABER	11/12/2010 14:09:05
6911	ARS1-B10-04304	ARS1-B10-04304-15	CALA-10-24991	5	g	75033				JRABER	11/12/2010 14:09:05
6912	ARS1-B10-04304	ARS1-B10-04304-16	CALA-10-25201	5.01	g	75036				JRABER	11/12/2010 14:09:05
6913	ARS1-B10-04304	ARS1-B10-04304-17	CALA-10-25215	5.03	g	75038				JRABER	11/12/2010 14:09:06
6914	ARS1-B10-04304	ARS1-B10-04304-20	CAWA-10-26041	5.03	g	75040				JRABER	11/12/2010 14:09:06

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\20101112_1141
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20101112_1141\20101112_1141.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20101112_1141\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20101112_1141\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL H3
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: LL H3 PLASTIC
Count Time (min): 360.00
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	0.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

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

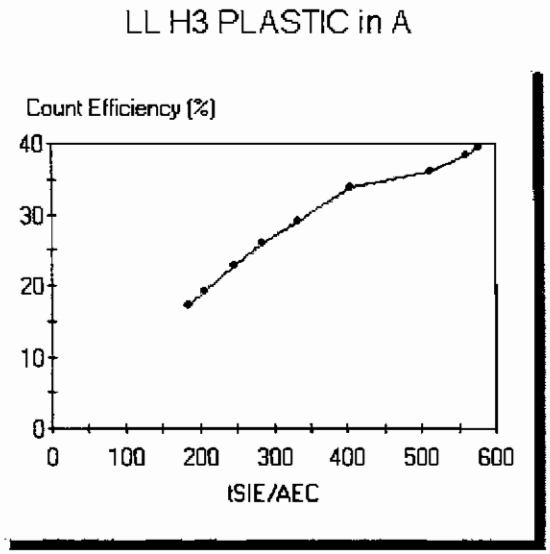
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 09/08/2009
Date Modified:
LL H3 PLASTIC in A

tSIE/AEC	Count Efficiency (%)
577.71	39.37
561.32	38.19
514.09	36.15
404.21	33.71
334.90	29.12
284.93	26.04
246.14	22.78
207.51	19.18
185.88	17.18

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	360.00	1.444	3.84	549.14	37.66	11/12/2010	11:50:04 AM	
2	2	B10-04304-01	360.00	4.932	13.11	548.29	37.63	11/12/2010	6:02:12 PM	
2	3	B10-04304-02	360.00	5.129	13.42	561.98	38.23	11/13/2010	12:14:37 AM	
2	4	B10-04304-03	360.00	1.444	3.69	573.80	39.09	11/13/2010	6:26:55 AM	
2	5	B10-04304-04	360.00	1.732	4.93	469.52	35.16	11/13/2010	12:39:19 PM	
2	6	B10-04304-05	360.00	1.717	4.59	542.71	37.38	11/13/2010	6:57:17 PM	
2	7	B10-04304-06	360.00	1.596	4.22	553.33	37.84	11/14/2010	1:13:38 AM	
2	8	B10-04304-07	360.00	1.783	4.77	542.14	37.36	11/14/2010	7:28:39 AM	
2	9	B10-04304-08	360.00	1.603	4.28	545.04	37.49	11/14/2010	1:44:04 PM	
2	10	B10-04304-09	360.00	1.679	4.45	550.45	37.72	11/14/2010	7:57:08 PM	
2	11	B10-04304-10	360.00	1.614	4.28	550.37	37.71	11/15/2010	2:09:21 AM	
2	12	B10-04304-11	360.00	1.680	4.41	558.84	38.08	11/15/2010	8:21:27 AM	
2	13	B10-04304-12	360.00	1.625	4.29	553.46	37.85	11/15/2010	2:33:52 PM	
2	14	B10-04304-13	360.00	1.612	4.42	520.46	36.43	11/15/2010	8:46:08 PM	
2	15	B10-04304-14	360.00	33.032	89.78	528.97	36.79	11/16/2010	2:58:26 AM	
2	16	B10-04304-15	360.00	13.506	35.25	563.13	38.32	11/16/2010	9:10:53 AM	
2	17	B10-04304-16	360.00	16.023	43.90	522.23	36.50	11/16/2010	3:23:12 PM	
2	18	B10-04304-17	360.00	1.664	4.41	550.07	37.70	11/16/2010	9:35:34 PM	
2	19	B10-04304-20	360.00	4.701	12.36	557.68	38.03	11/17/2010	3:47:46 AM	

ARS, International
Port Allen Lab

Tritium Enrichment Data

Printed 11/12/2010 1 49 PM

Procedures: ARS-040

Date: 10/4/2010

ARS File ID Numbers: ARS1-10-01833, 1834, 1878, 1880, 1881, 1942, 1940

ARS Batch ID: ARS1-B10-04304

	A Batch ID:	Enrichment Cell No.	Tare Wt of Electrolysis Cell & Electrodes	Tare Wt Reservoir	m_i Wt Na_2O_2	V_f Gross Weight of Sample Reservoir	V_f Gross Sample Added	Electrolysis Start Date & Time	Start AMP	Start Bath C°	Electolysis End Date & Time	End Bath C°	End Wt of Cell + Resv. + Sample	V_r Gross Sample Recovered	V_r [redacted]	Cryo-Distil Flask #	Tare Wt Cryo-distil flask	Gross Wt flask + Sample	[redacted]	Tare Weight of LSC Vial	Vial + Sample	Aliquot Net Sample	Wt of Vial, Sample & Deod Water Filter if used	Net Deod Water Added	Tare Wt b/f Cocktail	Gross Wt Vial + Sample + Cocktail
1	ARS1-B10-04304-01	50	331 09	198.86	2.00	703 94	[redacted]	10-5-2010 0945	5.00	2 0	10-30-10 1436	2.0	542 73	11.88	[redacted]	N/A,N/A	96.59	103.73	[redacted]	6.40	11.42	5.02	0.00	0.00	11.42	26 43
2	ARS1-B10-04304-02	60	336 77	189 32	2 00	694 05	[redacted]	10-5-2010 0948	5.00	2 0	10-29-10 0815	2.0	538.61	12.52	[redacted]	N/A,N/A	96 42	104.75	[redacted]	6 52	11.55	5.03	0.00	0.00	11.55	28 55
3	ARS1-B10-04304-03	78	334.77	193 74	2 00	898 17	[redacted]	10-5-2010 1018	5.00	2 0	10-30-10 1015	2.0	539 23	10.72	[redacted]	N/A,N/A	102.36	109.39	[redacted]	6 46	11 46	5.00	0.00	0.00	11 46	26 48
4	ARS1-B10-04304-04	68	337 19	195 41	2 00	834 47	[redacted]	10-6-2010 0952	5.00	2.0	11-2-10 1218	2 0	545.60	13.00	[redacted]	N/A,C	96 58	105.37	[redacted]	6 43	11 47	5.04	0.00	0.00	11.47	26.50
5	ARS1-B10-04304-05	59	338 40	191 74	2 00	626 42	[redacted]	10-6-2010 1002	5.00	2.0	11-2-10 1502	2 0	541 43	11.29	[redacted]	N/A,N/A	99 74	108.16	[redacted]	6.41	11.43	5.02	0.00	0.00	11 43	26 45
6	ARS1-B10-04304-06	82	336 32	194 86	2 00	700 09	[redacted]	10-4-2010 1546	5.00	2 0	11-1-10 1609	2 0	543.94	12.76	[redacted]	N/A,7	116 59	125.91	[redacted]	6 46	11.49	5.03	0.00	0.00	11 49	26 52
7	ARS1-B10-04304-07	67	332 60	194 21	2 02	706 25	[redacted]	10-4-2010 1552	5.00	2.0	11-1-10 0813	2.0	539.03	12.22	[redacted]	N/A,11	98 00	101.97	[redacted]	6 47	10 37	3.90	11.54	1.17	11.54	26.58
8	ARS1-B10-04304-08	77	337 82	191.29	2.01	690 14	[redacted]	10-4-2010 1603	5.00	2 0	11-2-10 1405	2 0	541.21	12.00	[redacted]	G N/A	99 62	108.20	[redacted]	6.42	11 44	5.02	0.00	0.00	11 44	26 45
9	ARS1-B10-04304-09	35	343 07	206 76	2.00	718.23	[redacted]	10-4-2010 1612	5.00	2 0	11-2-10 1438	2 0	561.85	12.02	[redacted]	A,C	98 16	107.02	[redacted]	6.53	11.57	5.04	0.00	0.00	11 57	26 58
10	ARS1-B10-04304-10	12	332.20	190 91	2 00	704 68	[redacted]	10-6-2010 1011	5.00	2 0	11-3-10 0845	2.0	536.87	13.76	[redacted]	N/A,N/A	108 10	118.28	[redacted]	6 43	11.43	5.00	0.00	0.00	11 43	28 44
11	ARS1-B10-04304-11	83	340.46	190 57	2 00	688.20	[redacted]	10-7-2010 1016	5.00	2 0	11-4-10 1458	2.0	540 20	9.17	[redacted]	N/A,N/A	101.72	107.56	[redacted]	6 60	11.52	5.02	0.00	0.00	11 52	26.53
12	ARS1-B10-04304-12	70	338 04	157 91	2 00	654 40	[redacted]	10-7-2010 1018	5.00	2 0	11-4-10 0816	2 0	508 11	12.16	[redacted]	N/A,C	105 63	114.27	[redacted]	6.46	11.49	5.01	0.00	0.00	11 49	26 53
13	ARS1-B10-04304-13	100	337 52	190 43	2 00	684 96	[redacted]	10-7-2010 1023	5.00	2 0	11-4-10 0846	2 0	538.55	10.80	[redacted]	G,7	94 44	101.77	[redacted]	6 77	11 78	5.01	0.00	0.00	11 78	26 83
14	ARS1-B10-04304-14	26	334 44	186 08	2.00	684 80	[redacted]	10-7-2010 1031	5 00	2 0	11-4-10 0915	2.0	531 31	10.79	[redacted]	N/A,11	98.00	101.25	[redacted]	6 38	9.59	3.21	11.40	1.81	11.40	26 44
15	ARS1-B10-04304-15	74	341 30	195 51	2 00	699 01	[redacted]	10-8-2010 0946	5 00	2 0	11-5-10 1623	2 0	548 19	11.38	[redacted]	A,N/A	100 52	107.75	[redacted]	6.53	11.53	5.00	0.00	0.00	11 53	26 56
16	ARS1-B10-04304-16	95	331.83	192.46	2 00	689 43	[redacted]	10-8-2010 0951	5 00	2 0	11-6-10 0825	2.0	536.67	12.38	[redacted]	N/A,N/A	101 73	110.14	[redacted]	6 39	11.40	5.01	0.00	0.00	11.40	26 43
17	ARS1-B10-04304-17	42	333.22	201.82	2.00	695 75	[redacted]	10-8-2010 0953	5 00	2.0	11-6-10 0815	2 0	548 85	13.81	[redacted]	N/A,N/A	117.22	127.44	[redacted]	6 45	11 48	5.03	0.00	0.00	11 48	26.49
18	ARS1-B10-04304-20	25	334 78	200 82	2 00	692.59	[redacted]	10-8-2010 1002	5 00	2 0	11-6-10 1546	2 0	545.43	9.83	[redacted]	A,N/A	100 54	106.82	[redacted]	6 77	11.80	5.03	0.00	0.00	11 80	26 80
19														0.00								0.00		0.00		

Chemist Signature

Chemist Signature

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
11-9-2010	0810	B10-04096-09	B10-04096	0951	JDR
↓	↓	B10-04096-10	↓	↓	JDR
↓	↓	B10-04096-11	↓	↓	JDR
11-11-2010	0759	SNC 51	QA	QA	JDR
↓	↓	Background	B10-04096	0918	JDR
↓	↓	B10-04096-11	↓	↓	JDR
11-12-10	0915	SNC 51	QA	QA	JDR
↓	↓	Background	B 04304	1911	JDR
↓	↓	B10-04304-61	↓	↓	JDR
↓	↓	B10-04304-62	↓	↓	JDR
↓	↓	B10-04304-63	↓	↓	JDR
↓	↓	B10-04304-64	↓	↓	JDR
↓	↓	B10-04304-65	↓	↓	JDR
↓	↓	B10-04304-66	↓	↓	JDR
↓	↓	B10-04304-67	↓	↓	JDR
↓	↓	B10-04304-68	↓	↓	JDR
↓	↓	B10-04304-69	↓	↓	JDR
↓	↓	B10-04304-10	↓	↓	JDR
↓	↓	B10-04304-11	↓	↓	JDR
↓	↓	B10-04304-12	↓	↓	JDR

LSW 11-12-1

Reviewed By: LSW Initials Date: 11-16-10

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
11-17-10	1145	Bio 04304-13	Bio 04304	[illegible]	JDR
↓	↓	Bio 04304-14	↓	↓	JDR
↓	↓	Bio 04304-15	↓	↓	JDR
↓	↓	Bio 04304-16	↓	↓	JDR
↓	↓	Bio 04304-17	↓	↓	JDR
↓	↓	Bio 04304-[illegible]	↓	↓	JDR
11-17-2010	1604	SNC 51	QA	QA	JDR
↓	↓	Background	Bio-05208		JDR
↓	↓	Bio-05208-04	↓		JDR
↓	↓	Bio-05208-05	↓		JDR
↓	↓	Bio-05208-06	↓		JDR
↓	↓	Bio-05208-07	↓		JDR
↓	↓	Bio-05208-08	↓		JDR
↓	↓	Bio-05208-09	↓		JDR
↓	↓	Bio-05208-10	↓		JDR
↓	↓	Bio-05208-11	↓		JDR
↓	↓	Bio-05208-12	↓		JDR
↓	↓	Bio-05208-13	↓		JDR
↓	↓	Bio-05208-14	↓		JDR
↓	↓	Bio-05208-15	↓		JDR

LSW 11-16-10

LSW 11-17-10 data not available

Reviewed By: NB Initials Date: 11-19-10

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-04304**

Method	ARS-054	Analysis	LSC-A-022	Matrix	AQ
Description	Low Level Tritium by Enrichment				

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3
ARS1-B10-04304-01	LCS	B-10212		
ARS1-B10-04304-02	LCSD	B-10213		
ARS1-B10-04304-03	MBL			
ARS1-B10-04304-04	DUP			
ARS1-B10-04304-05	DO			
ARS1-B10-04304-06	TRG			
ARS1-B10-04304-07	TRG			
ARS1-B10-04304-08	TRG			
ARS1-B10-04304-09	TRG			
ARS1-B10-04304-10	TRG			
ARS1-B10-04304-11	TRG			
ARS1-B10-04304-12	TRG			
ARS1-B10-04304-13	TRG			
ARS1-B10-04304-14	TRG			
ARS1-B10-04304-15	TRG			
ARS1-B10-04304-16	TRG			
ARS1-B10-04304-17	TRG			
ARS1-B10-04304-18	TRG			
ARS1-B10-04304-19	TRG			
ARS1-B10-04304-20	TRG			

SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-10-01833	001	1	CAPA-10-24119	STD	09/14/10
ARS1-10-01833	002	1	CAPA-10-24120	STD	09/14/10
ARS1-10-01833	003	1	CAPA-10-24143	STD	09/14/10
ARS1-10-01834	001	1	CAPA-10-24872	STD	09/14/10
ARS1-10-01878	001	1	CAPA-10-24868	STD	09/21/10
ARS1-10-01880	001	1	Buckman1-10-24996	STD	09/21/10
ARS1-10-01880	002	1	Buckman06-10-24997	STD	09/21/10
ARS1-10-01880	003	1	Buckman08-10-24998	STD	09/21/10
ARS1-10-01880	004	1	Buckman1-10-24999	STD	09/21/10
ARS1-10-01881	001	1	CAPU-10-25281	STD	09/21/10
ARS1-10-01942	001	1	CALA-10-24991	STD	09/21/10
ARS1-10-01942	002	1	CALA-10-25201	STD	09/21/10
ARS1-10-01942	003	1	CALA-10-25215	STD	09/21/10
ARS1-10-01942	004	1	CALA-10-25510	STD	09/21/10
ARS1-10-01942	005	1	CALA-10-25204	STD	09/21/10
ARS1-10-01940	001	1	CAWA-10-26041	STD	09/28/10

9-22-2010
1514: these 2 samples were deleted as instructed by Susan Leese.

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Low Level Tritium by Low Level Liquid Scintillation Counting

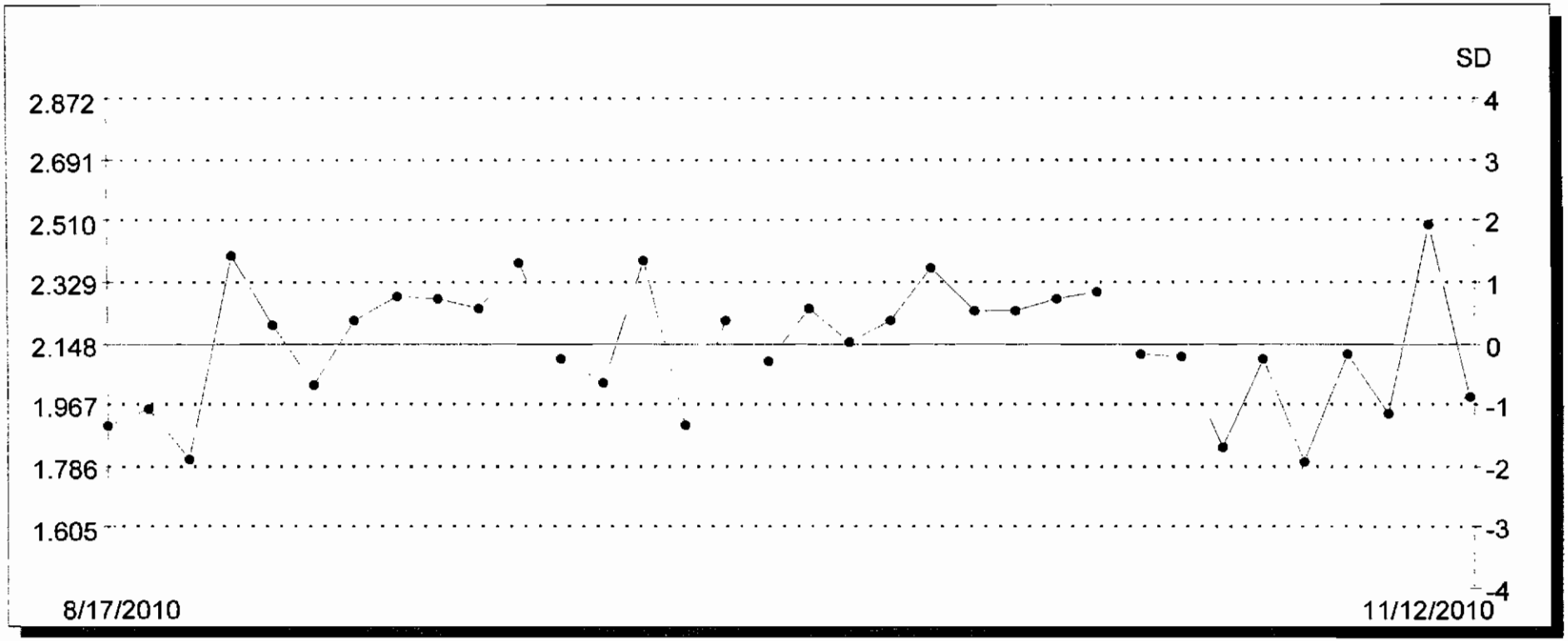
Control Charts

3H Background
Total # pts : 5164
Valid # pts : 34
Mean : 2.15
SD : 0.18

Date	Value	Valid Pt
Aug 17, 2010	1.90	X
Aug 23, 2010	1.96	X
Aug 24, 2010	1.81	X
Aug 26, 2010	2.41	X
Aug 27, 2010	2.21	X
Aug 30, 2010	2.03	X
Aug 31, 2010	2.22	X
Aug 31, 2010	2.29	X
Sep 07, 2010	2.28	X
Sep 08, 2010	2.25	X
Sep 09, 2010	2.39	X
Sep 09, 2010	2.10	X
Sep 13, 2010	2.03	X
Sep 14, 2010	2.39	X
Sep 15, 2010	1.91	X
Sep 20, 2010	2.22	X
Sep 20, 2010	2.10	X
Sep 22, 2010	2.25	X
Sep 27, 2010	2.15	X
Sep 29, 2010	2.22	X
Oct 01, 2010	2.37	X
Oct 08, 2010	2.25	X
Oct 12, 2010	2.24	X
Oct 15, 2010	2.28	X
Oct 18, 2010	2.30	X
Oct 19, 2010	2.12	X
Oct 22, 2010	2.11	X
Oct 23, 2010	1.84	X
Oct 25, 2010	2.10	X
Oct 27, 2010	1.80	X
Nov 04, 2010	2.12	X
Nov 09, 2010	1.94	X
Nov 11, 2010	2.50	X
Nov 12, 2010	1.99	X

3H Background

Total # pts	: 5164
Valid # pts	: 34
Mean	: 2.15
SD	: 0.18

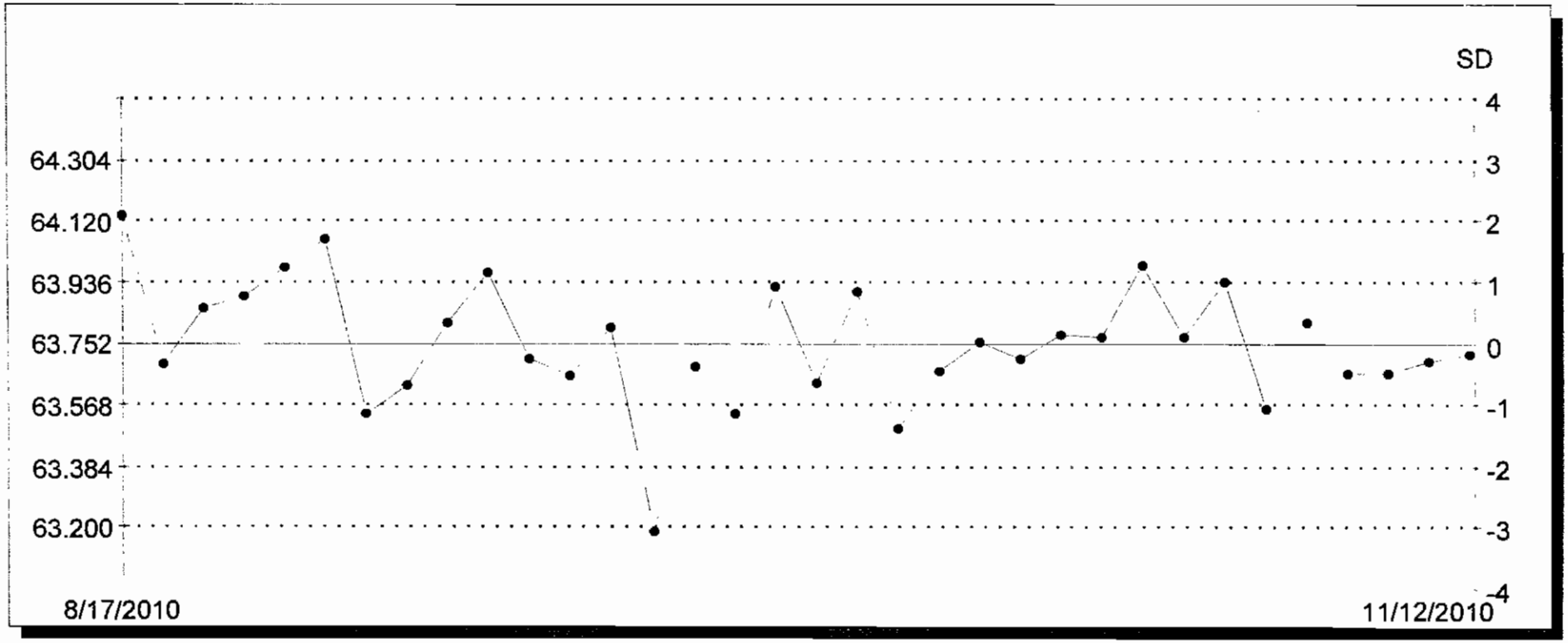


3H Efficiency
Total # pts : 5234
Valid # pts : 34
Mean : 63.75
SD : 0.18

Date	Value	Valid Pt
Aug 17, 2010	64.14	X
Aug 23, 2010	63.69	X
Aug 24, 2010	63.86	X
Aug 26, 2010	63.89	X
Aug 27, 2010	63.97	X
Aug 30, 2010	64.06	X
Aug 31, 2010	63.54	X
Aug 31, 2010	63.62	X
Sep 07, 2010	63.81	X
Sep 08, 2010	63.96	X
Sep 09, 2010	63.70	X
Sep 09, 2010	63.65	X
Sep 13, 2010	63.80	X
Sep 14, 2010	63.19	X
Sep 15, 2010	63.68	X
Sep 20, 2010	63.54	X
Sep 20, 2010	63.92	X
Sep 22, 2010	63.63	X
Sep 27, 2010	63.91	X
Sep 29, 2010	63.50	X
Oct 01, 2010	63.67	X
Oct 08, 2010	63.75	X
Oct 12, 2010	63.71	X
Oct 15, 2010	63.78	X
Oct 18, 2010	63.77	X
Oct 19, 2010	63.99	X
Oct 22, 2010	63.77	X
Oct 23, 2010	63.94	X
Oct 25, 2010	63.56	X
Oct 27, 2010	63.81	X
Nov 04, 2010	63.66	X
Nov 09, 2010	63.66	X
Nov 11, 2010	63.70	X
Nov 12, 2010	63.72	X

3H Efficiency

Total # pts	: 5234
Valid # pts	: 34
Mean	: 63.75
SD	: 0.18



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Tritium- Screening by Low Level Liquid Scintillation Counting

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for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting Samples

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

ARS File ID Numbers: ARS1-10-01833; 01834; 01878; 01880; 01881; 01942; 01940.
ARS Batch ID: ARS1-B10-04303

	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	B10-04303-04	120	1 799	1.898	38.71	5.03	-22.903	pCi/L	171.2768	NO
2	B10-04303-05	120	1.842	1.898	38.44	5.04	-13.020	pCi/L	172.1376	NO
3	B10-04303-06	120	1 750	1.898	37.77	5.00	-35.301	pCi/L	176.5927	NO
4	B10-04303-07	120	1 713	1.898	38.62	5.03	-42.898	pCi/L	171.6759	NO
5	B10-04303-08	120	1.651	1.898	38.22	4.99	-58.338	pCi/L	174.8632	NO
6	B10-04303-09	120	1 576	1.898	38.54	5.01	-75.120	pCi/L	172.719	NO
7	B10-04303-10	120	1.556	1.898	38.77	5.01	-79.312	pCi/L	171.6944	NO
8	B10-04303-11	120	1 708	1.898	38.25	5.01	-44.661	pCi/L	174.0286	NO
9	B10-04303-12	120	1.797	1.898	39.04	5.02	-23.214	pCi/L	170.1673	NO
10	B10-04303-13	120	2.705	1.898	38.73	5.03	186.597	pCi/L	171.1883	~~YES, analyze by LSC-A-001.~~ Process via
11	B10-04303-14	120	1.830	1.898	38.49	5.01	-15.884	pCi/L	172.9434	NO LSC-A-022
12	B10-04303-15	120	2.048	1 898	39.17	5.00	34.500	pCi/L	170.281	NO
13	B10-04303-16	120	1.430	1.898	38.73	5.00	-108.862	pCi/L	172.2155	NO JB 9-13-10
14	B10-04303-17	120	1.801	1.898	37.11	5.00	-23.548	pCi/L	179.7334	NO
15	B10-04303-18	120	2.049	1.898	38 64	5.01	35.136	pCi/L	172.2721	NO
16	B10-04303-19	120	1.879	1.898	38 44	5.00	-4.453	pCi/L	173.5147	NO
17							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
18							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
19							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
20							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
21							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
22							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
23							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!

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American Radiation Services Analytical Reports

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Tritium-Screening by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-04303**

Method ARS-054 **Analysis** LSC-A-021 **Matrix** AQ

Description Low Level Tritium Screen

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3
ARS1-B10-04303-01	LCS			
ARS1-B10-04303-02	LCSD			
ARS1-B10-04303-03	MBL			
ARS1-B10-04303-04	TRG			
ARS1-B10-04303-05	TRG			
ARS1-B10-04303-06	TRG			
ARS1-B10-04303-07	TRG			
ARS1-B10-04303-08	TRG			
ARS1-B10-04303-09	TRG			
ARS1-B10-04303-10	TRG			
ARS1-B10-04303-11	TRG			
ARS1-B10-04303-12	TRG			
ARS1-B10-04303-13	TRG			
ARS1-B10-04303-14	TRG			
ARS1-B10-04303-15	TRG			
ARS1-B10-04303-16	TRG			
ARS1-B10-04303-17	TRG			
ARS1-B10-04303-18	TRG			
ARS1-B10-04303-19	TRG			

SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-10-01833	001	1	CAPA-10-24119	STD	09/14/10
ARS1-10-01833	002	1	CAPA-10-24120	STD	09/14/10
ARS1-10-01833	003	1	CAPA-10-24143	STD	09/14/10
ARS1-10-01834	001	1	CAPA-10-24872	STD	09/14/10
ARS1-10-01878	001	1	CAPA-10-24868	STD	09/21/10
ARS1-10-01880	001	1	Buckman1-10-24996	STD	09/21/10
ARS1-10-01880	002	1	Buckman06-10-24997	STD	09/21/10
ARS1-10-01880	003	1	Buckman08-10-24998	STD	09/21/10
ARS1-10-01880	004	1	Buckman1-10-24999	STD	09/21/10
ARS1-10-01881	001	1	CAPU-10-25281	STD	09/21/10
ARS1-10-01942	001	1	CALA-10-24991	STD	09/21/10
ARS1-10-01942	002	1	CALA-10-25201	STD	09/21/10
ARS1-10-01942	003	1	CALA-10-25215	STD	09/21/10
ARS1-10-01942	004	1	CALA-10-25510	STD	09/21/10
ARS1-10-01942	005	1	CALA-10-25204	STD	09/21/10
ARS1-10-01940	001	1	CAWA-10-26041	STD	09/28/10

69621
10-01833-001-1
XRAD

69622
10-01833-002-1
XRAD

69623
10-01833-003-1
XRAD

69624
10-01834-001-1
XRAD

69625
10-01878-001-1
XRAD

69626
10-01880-001-1
XRAD

69627
10-01880-002-1
XRAD

69628
10-01880-003-1
XRAD

69629
10-01880-004-1
XRAD

69630
10-01881-001-1
XRAD

69631
10-01942-001-1
XRAD

69632
10-01942-002-1
XRAD

69633
10-01942-003-1
XRAD

69634
10-01942-004-1
XRAD

69635
10-01942-005-1
XRAD

69636
10-01940-001-1
XRAD

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
6308	ARS1-B10-04303	ARS1-B10-04303-01		1	g					JRABER	09/08/2010 11:42:48
6309	ARS1-B10-04303	ARS1-B10-04303-02		1	g					JRABER	09/08/2010 11:42:48
6310	ARS1-B10-04303	ARS1-B10-04303-03		1	g					JRABER	09/08/2010 11:42:48
6311	ARS1-B10-04303	ARS1-B10-04303-04	CAPA-10-24119	5.03	g	69621				JRABER	09/08/2010 11:42:48
6312	ARS1-B10-04303	ARS1-B10-04303-05	CAPA-10-24120	5.04	g	69622				JRABER	09/08/2010 11:42:48
6313	ARS1-B10-04303	ARS1-B10-04303-06	CAPA-10-24143	5	g	69623				JRABER	09/08/2010 11:42:48
6314	ARS1-B10-04303	ARS1-B10-04303-07	CAPA-10-24872	5.03	g	69624				JRABER	09/08/2010 11:42:48
6315	ARS1-B10-04303	ARS1-B10-04303-08	CAPA-10-24868	4.99	g	69625				JRABER	09/08/2010 11:42:48
6316	ARS1-B10-04303	ARS1-B10-04303-09	Buckman1-10-24996	5.01	g	69626				JRABER	09/08/2010 11:42:49
6317	ARS1-B10-04303	ARS1-B10-04303-10	Buckman06-10-24997	5.01	g	69627				JRABER	09/08/2010 11:42:49
6318	ARS1-B10-04303	ARS1-B10-04303-11	Buckman08-10-24998	5.01	g	69628				JRABER	09/08/2010 11:42:49
6319	ARS1-B10-04303	ARS1-B10-04303-12	Buckman1-10-24999	5.02	g	69629				JRABER	09/08/2010 11:42:49
6320	ARS1-B10-04303	ARS1-B10-04303-13	CAPU-10-25281	5.03	g	69630				JRABER	09/08/2010 11:42:49
6321	ARS1-B10-04303	ARS1-B10-04303-14	CALA-10-24991	5.01	g	69631				JRABER	09/08/2010 11:42:49
6322	ARS1-B10-04303	ARS1-B10-04303-15	CALA-10-25201	5	g	69632				JRABER	09/08/2010 11:42:49
6323	ARS1-B10-04303	ARS1-B10-04303-16	CALA-10-25215	5	g	69633				JRABER	09/08/2010 11:42:50
6324	ARS1-B10-04303	ARS1-B10-04303-17	CALA-10-25510	5	g	69634				JRABER	09/08/2010 11:42:50
6325	ARS1-B10-04303	ARS1-B10-04303-18	CALA-10-25204	5.01	g	69635				JRABER	09/08/2010 11:42:50
6326	ARS1-B10-04303	ARS1-B10-04303-19	CAWA-10-26041	5	g	69636				JRABER	09/08/2010 11:42:50

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\20100909_1235
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100909_1235\20100909_1235.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100909_1235\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100909_1235\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL H3
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: LL H3 PLASTIC
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	0.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

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

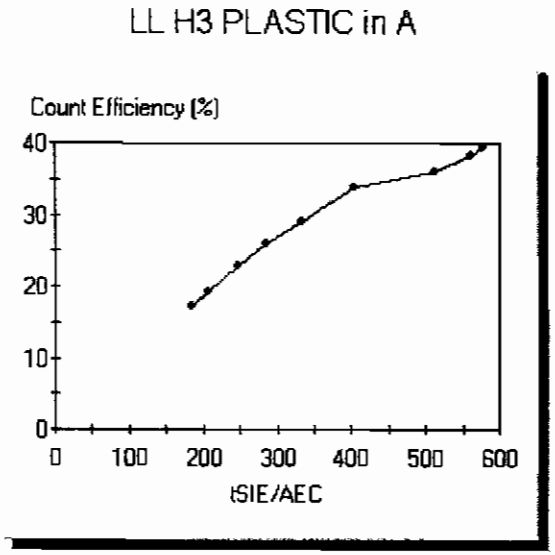
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 09/08/2009
Date Modified:
LL H3 PLASTIC in A

tSIE/AEC	Count Efficiency (%)
577.71	39.37
561.32	38.19
514.09	36.15
404.21	33.71
334.90	29.12
284.93	26.04
246.14	22.78
207.51	19.18
185.88	17.18

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.898	4.97	561.12	38.18	9/9/2010	12:44:42 PM	
2	2	B10-04303-04	120.00	1.799	4.65	568.57	38.71	9/9/2010	2:56:43 PM	
2	3	B10-04303-05	120.00	1.842	4.79	564.86	38.44	9/9/2010	5:08:42 PM	
2	4	B10-04303-06	120.00	1.750	4.63	551.57	37.77	9/9/2010	7:20:42 PM	
2	5	B10-04303-07	120.00	1.713	4.44	567.35	38.62	9/9/2010	9:32:39 PM	
2	6	B10-04303-08	120.00	1.651	4.32	561.78	38.22	9/9/2010	11:44:35 PM	
2	7	B10-04303-09	120.00	1.576	4.09	566.26	38.54	9/10/2010	1:56:27 AM	
2	8	B10-04303-10	120.00	1.556	4.01	569.33	38.77	9/10/2010	4:07:21 AM	
2	9	B10-04303-11	120.00	1.708	4.47	562.23	38.25	9/10/2010	6:17:31 AM	
2	10	B10-04303-12	120.00	1.797	4.60	573.13	39.04	9/10/2010	8:27:34 AM	
2	11	B10-04303-13	120.00	2.705	6.99	568.75	38.73	9/10/2010	10:37:37 AM	
2	12	B10-04303-14	120.00	1.830	4.75	565.52	38.49	9/10/2010	12:47:42 PM	
2	13	B10-04303-15	120.00	2.048	5.23	574.95	39.17	9/10/2010	2:57:50 PM	
2	14	B10-04303-16	120.00	1.430	3.69	568.88	38.73	9/10/2010	5:07:52 PM	
2	15	B10-04303-17	120.00	1.801	4.85	536.44	37.11	9/10/2010	7:17:56 PM	
2	16	B10-04303-18	120.00	2.049	5.30	567.62	38.64	9/10/2010	9:28:00 PM	
2	17	B10-04303-19	120.00	1.879	4.89	564.82	38.44	9/10/2010	11:38:03 PM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
9-9-2010	1100	SWC 51	QA	QA	JDR
↓	↓	Background	B10-04303	1235	JDR
↓	↓	B10-04303-04	↓	↓	JDR
↓	↓	B10-04303-05	↓	↓	JDR
↓	↓	B10-04303-06	↓	↓	JDR
↓	↓	B10-04303-07	↓	↓	JDR
↓	↓	B10-04303-08	↓	↓	JDR
↓	↓	B10-04303-09	↓	↓	JDR
↓	↓	B10-04303-10	↓	↓	JDR
↓	↓	B10-04303-11	↓	↓	JDR
↓	↓	B10-04303-12	↓	↓	JDR
↓	↓	B10-04303-13	↓	↓	JDR
↓	↓	B10-04303-14	↓	↓	JDR
↓	↓	B10-04303-15	↓	↓	JDR
↓	↓	B10-04303-16	↓	↓	JDR
↓	↓	B10-04303-17	↓	↓	JDR
↓	↓	B10-04303-18	↓	↓	JDR
↓	↓	B10-04303-19	↓	↓	JDR
9-10-10	1316	Background	10-01870 NTC ~~[illegible]~~ 9-9-10 NI-63	0139	[illegible]
↓	↓	LCS	↓	↓	[illegible]

Reviewed By: LSW Date: 10-14-10
Initials

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

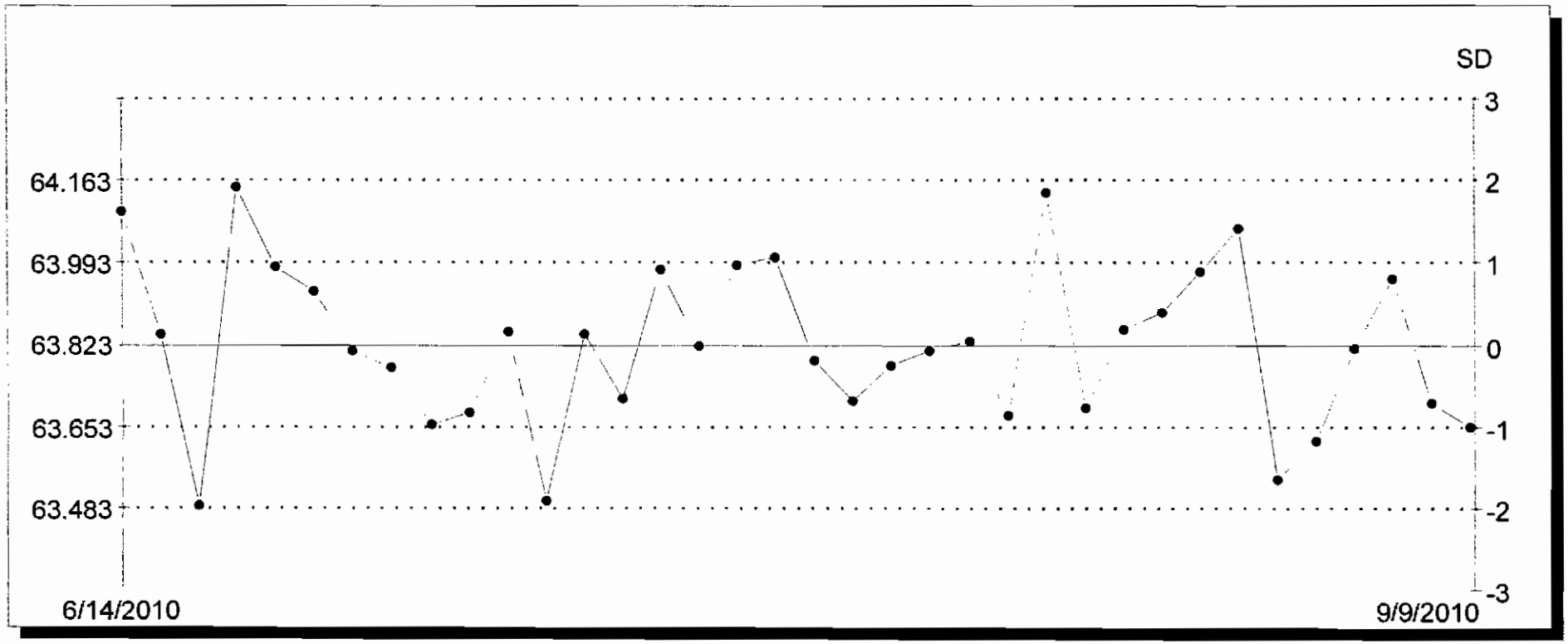
Control Charts

3H Efficiency
Total # pts : 5212
Valid # pts : 36
Mean : 63.82
SD : 0.17

Date	Value	Valid Pt
Jun 14, 2010	64.10	X
Jun 15, 2010	63.84	X
Jun 16, 2010	63.49	X
Jun 17, 2010	64.15	X
Jun 20, 2010	63.98	X
Jun 21, 2010	63.94	X
Jun 21, 2010	63.81	X
Jun 21, 2010	63.78	X
Jun 21, 2010	63.66	X
Jun 21, 2010	63.68	X
Jun 21, 2010	63.85	X
Jun 21, 2010	63.50	X
Jun 28, 2010	63.84	X
Jul 06, 2010	63.71	X
Jul 07, 2010	63.98	X
Jul 12, 2010	63.82	X
Jul 19, 2010	63.99	X
Jul 20, 2010	64.00	X
Jul 21, 2010	63.79	X
Jul 23, 2010	63.71	X
Jul 26, 2010	63.78	X
Jul 28, 2010	63.81	X
Aug 03, 2010	63.83	X
Aug 09, 2010	63.67	X
Aug 17, 2010	64.14	X
Aug 23, 2010	63.69	X
Aug 24, 2010	63.86	X
Aug 26, 2010	63.89	X
Aug 27, 2010	63.97	X
Aug 30, 2010	64.06	X
Aug 31, 2010	63.54	X
Aug 31, 2010	63.62	X
Sep 07, 2010	63.81	X
Sep 08, 2010	63.96	X
Sep 09, 2010	63.70	X
Sep 09, 2010	63.65	X

3H Efficiency

Total # pts	: 5212
Valid # pts	: 36
Mean	: 63.82
SD	: 0.17

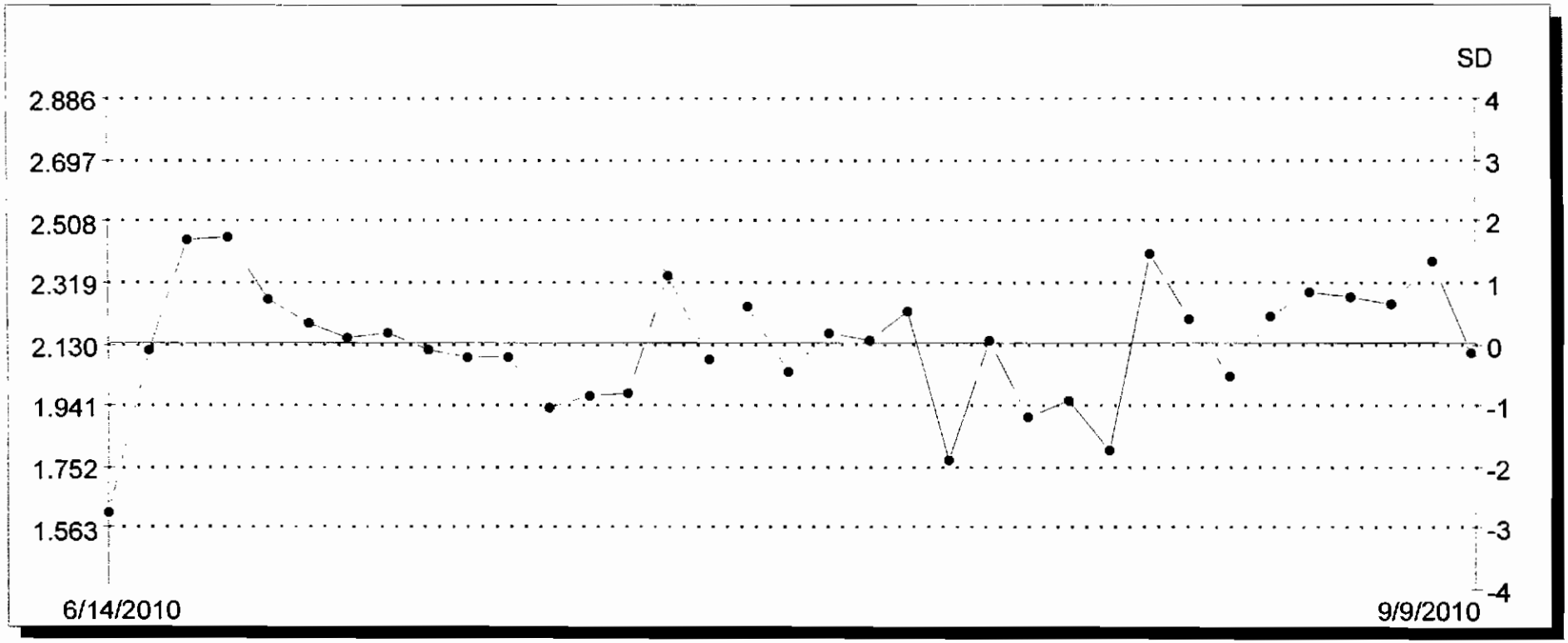


3H Background
Total # pts : 5142
Valid # pts : 35
Mean : 2.13
SD : 0.19

Date	Value	Valid Pt
Jun 14, 2010	1.61	X
Jun 15, 2010	2.11	X
Jun 16, 2010	2.45	X
Jun 17, 2010	2.46	X
Jun 20, 2010	2.27	X
Jun 21, 2010	2.19	X
Jun 21, 2010	2.15	X
Jun 21, 2010	2.16	X
Jun 21, 2010	2.11	X
Jun 21, 2010	2.09	X
Jun 21, 2010	2.09	X
Jun 28, 2010	1.94	X
Jul 06, 2010	1.97	X
Jul 07, 2010	1.98	X
Jul 12, 2010	2.34	X
Jul 19, 2010	2.09	X
Jul 20, 2010	2.25	X
Jul 21, 2010	2.05	X
Jul 23, 2010	2.17	X
Jul 26, 2010	2.14	X
Jul 28, 2010	2.23	X
Aug 03, 2010	1.77	X
Aug 09, 2010	2.14	X
Aug 17, 2010	1.90	X
Aug 23, 2010	1.96	X
Aug 24, 2010	1.81	X
Aug 26, 2010	2.41	X
Aug 27, 2010	2.21	X
Aug 30, 2010	2.03	X
Aug 31, 2010	2.22	X
Aug 31, 2010	2.29	X
Sep 07, 2010	2.28	X
Sep 08, 2010	2.25	X
Sep 09, 2010	2.39	X
Sep 09, 2010	2.10	X

3H Background

Total # pts	: 5142
Valid # pts	: 35
Mean	: 2.13
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 5/13/2010 0:00 *date counted*
STANDARD REFERENCE # S-0206

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

Radionuclide H-3 **Dilution Reference Date** 2/25/2009 8:30

Dilution Activity 3.01 pCi per gram ===> dpm/g 6.68
Verif. Date Decay Corrected 2.81 pCi per gram ===> dpm/g 6.24

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-0206-V1B	11.98	1	LSC	0.3328	1.62	5.040	6.18	2.78
S-0206-V2B	11.42	1	LSC	0.3186	1.62	5.010	6.13	2.76
S-0206-V3B	12.01	1	LSC	0.3360	1.62	4.990	6.19	2.79
S-0206-V4B	11.75	1	LSC	0.3275	1.62	5.010	6.17	2.78
S-0206-V5B	11.45	1	LSC	0.3196	1.62	5.020	6.13	2.76

		Average	6.16	2.77
		Two Sigma Uncertainty	0.06	0.02
10% Max	*PASS*	Standard Deviation percent of known concentration	0.45%	0.45%
		Target Activity	6.24	2.81
5% Max	*PASS*	% Diff	-1.27%	-1.27%

Verification Expiration Date: May 13, 2011

Prepared & Counted By Jeremy Raber Date: 5/13/2010 0:00
Verified & Approved By Virgene Mulligan Date: 5/14/2010
QC Approval [signature] Date: 5/14/2010

S-0206		
H-3	Verified	*5/14/10*
SL	**Expires**	**5/14/11**
Manufactuer	**NIST**	
Sol Matrix	H2O	
Ref No	NIST 4361C	
Tech	M. Thibodeaux	
Parent ID	S-0152	

ARS INTERNATIONAL
RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY

STD ID: S-0206

ARS INTERNATIONAL	Add/Edit *Secondary Stds*	Parent Standard Data				
Planning		Parent Solution Reference #	NIST 4361C			
Planning Comments	**Create a Low Level H3 LCS solution.**	Parent Solution #	S-0152			
Target dpm/g (on dil. date)	6.66	Parent Principal Radionuclide	H-3	Half Life (Days)	4499.8000000	
Target Final volume mL	500	Parent Reference Date	09/03/1998 11:00			
Appx mass g of Parent Sol'n	49.8188436	Parent Certified Act	120.54	Certi Act/Vol Units	dpm	g
Appx vol ml of Parent Sol'n	49.91868096	Parent Cert Act Uncert 1 Sigma	0.0076			
Expected Addition for Analysis g	5	Parent Sp. Gravity G/Ml	0.998			
Standards Preparation / Dilution		Parent Supplier	NIST			
Secondary Solution #	S-0206	Parent Date Recvd	12/04/06			
Dilution Date (New Ref Date)	02/25/2009 08:30	Parent Received By	LU			
Ampoule, Empty (g)		Parent Cert Exp Date				
Ampoule /Solution Gross (g)		Parent Matrix	H2O			
Net Wt Removed (g)		Certified dpm/g At Ref Date	120.54			
Transfer Container, empty (g)	103.64	Certified dpm/g on 02/25/2009 08:30	66.84217777			
Container Plus Solution (g)	153.45	Parent Comments	Liquid in a 500-ml borosilicate-glass media bottle with teflon-lined screw cap. Approximately 500 grams			
Net Wt Transferred (g)	49.81					
DPM Xferred on 02/25/2009 08:30	3329.408875					
Diluent/matrix	Dead H2O	Parent Tech	M. Thibodeaux			
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)	198.75	Is_Calib	FALSE			
Dilution Full Cont g (if measured)	697.31					
Dilution Final Volume ml (if measured)	500					
Final Dilution Density (g/mL)	0.99712					
Final Dilution Measured Mass g	498.56					
Comments	**Use as H3LL LCS creation. Dilution performed as stated above by M Thibodeaux on 2/25/09. -BJS 2/25/09**					
Final Dilution dpm/g	6.678050535					
Final Dil New Ref Date/Time	02/25/2009 08:30					

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Folder Duplicate

Report Compilation Checklist

ARS SDG: 10-01880 **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~~	

Susan Geese 11.19.10
Report Generator Signature **Date**

11-19-10
Management Review Signature **Date**

ARS-059
07/03/2009

ARS INTERNATIONAL

LSC
Technical Review Checklist

ARS SDG ARS1-10-01880

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:**	ARS1-B10-04304	**Batch B:**	N/A	**Batch C:**	N/A
Test Method(s):		LSC-A-022		N/A		N/A

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Jimmy D. Rahn 11-12-2010
Chemist Signature **Date**

Jamaal Brown 11-12-10
Verifier Review Signature **Date**

B. ANALYSIS REVIEW

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

[signature] 11-19-10
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

N/A JDR 11-17-2010

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

Jimmy D. Rahn 11-17-2010
Analyst Signature **Date**

N/A
Technicial Reviewer Signature **Date**

Batch A: ARS1-B10-04304

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): _____

Project Manager Signature	Date	QA Officer Signature	Date
Susan Reese	11.19.10	[illegible]	11-19-10

GENERAL COMMENTS

LSC
Technical Review Checklist

ARS SDG ARS1-10-01880

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:** ARS1-B10-04303	**Batch B:** N/A	**Batch C:** N/A
Test Method(s):	LSC-A-021	N/A	N/A

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Jimmy D. Rahn 9-9-2010 — **Chemist Signature** **Date**

Jamaal Brown 9-9-10 — **Verifier Review Signature** **Date**

B. ANALYSIS REVIEW

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

[signature] — **QA Officer Signature** 11-19-10 — **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

N/A JPR 9-13-10

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

Jimmy D. Rahn 9-13-2010 — **Analyst Signature** **Date**

N/A — **Technicial Reviewer Signature** **Date**

Batch A: ARS1-B10-04303

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):		

Project Manager Signature	Date	QA Officer Signature	Date
Susan Lee	11·19·10	[illegible]	11-19-10

GENERAL COMMENTS

DQO Report for SDG
ARS1-10-01880

Analysis Code	Group	Isotope	Activity Units	Aliquot Units	ProcedureNo	RDL	LCS_LL	LCS_UL	MS_LL	MS_UL	RadY_LL	RadY_UL	GravY_LL	GravY_LL	RER	RPD	DilitionReq	RoughPrepReq	BlankCorrectionMDA	BlankCorrectionAll	CountTimeReq	AliquotRequired
LSC-A-021	STC	H-3		TU	ARS-054	0 00E+00	75	125	60	140	30	110	40	110	1 00	25	FALSE	FALSE	FALSE	FALSE		
LSC-A-022	STC	Enriched H-3		TU	ARS-054	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	ARS1-10-01880	TAT Days	30	Project Type	Environmental
Sample Count	Rpt Level 4	Date Received	8/26/2010	COC Number	10-4334C
Client	Los Alamos National Laboratory	Client Deadline	9/24/2010	PO Number	63641-001-10
Client Code	114	Internal Deadline	9/23/2010	Job Number	WEPR115BW100
Profile Number	PN-00094	Lab Deadline	9/21/2010	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	Buckman1-10-24996	AQ	08/24/10 12:00 PM	08/24/10 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	68677	1	1000.00				60	18		Y	N/A				
002	Buckman06-10-24997	AQ	08/24/10 12:00 PM	08/24/10 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	68678	1	1000.00				65	18		Y	N/A				
003	Buckman08-10-24998	AQ	08/24/10 12:00 PM	08/24/10 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	68679	1	1000.00				70	17		N	N/A				
004	Buckman1-10-24999	AQ	08/24/10 12:00 PM	08/24/10 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	68680	1	1000.00				70	17		N	N/A				

SDG Report - Analysis Assignments

Temp SDG	ARS1-10-01880	Sample Count	
Client	Los Alamos National Laboratory	Analysis Count	2-8

Samples Count Totals per Analysis

Analysis Code	Analysis Description	Samples Count
LSC-A-021	Low Level Tritium Screen In (Aqueous)	4
LSC-A-022	Low Level Tritium by Enrichment Process In (Aqueous [AQ])	4

Analyses Assigned Per Fraction

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

ARS FILE TRACKING SHEET

SDG: ARS1-10-01880

Task	Date / Time	Initials
Date & Time Samples Received	8-26-10 10:48	CWB
ICOC Initiated / Storage Location: LL3H	8-26-10 15:43	CWB
Technical Checks Performed	See Batch	—
Report Written / EDD Generated: ____/____|____ Date/Time Initials	11.19.10|1407	SDL
Quality Assurance Checks Performed on Report	11-19-10 1642	[illegible]
Management Check Performed on Report		
Preliminary Report Sent		
Report E-mailed		
Report Faxed		
Report Reviewed		
Report Mailed		
Invoice Completed Invoice #:_____		
Report Imaged		

SPECIAL REQUIREMENTS

Requirement	Yes	No
3 Hour Rush		✓
24 Hour Rush		✓
48 Hour Rush		✓
Special Invoicing *see notes* Mgmt. Approval:_____		✓

NOTES:

ARS-062
04/23/2010

COMPANY NAME: LANL **SDG:** ARS1-10-01880

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~~ SKG 8-26-10	☑ 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 4

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

External and Internal Surveys

Exposure Rate Meter: M3 242861 Serial No.: M44-2PR264266 Calibration Due Date: 4-19-11

Count Rate Meter: M2 64859 Serial No.: M44-9PR264266 184559 CB 8-26-10 Calibration Due Date: 4-6-11

Background Exposure Rate (µR/hr): 18 Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd): 22 µR/hr

Background Count Rate (cpm): 65 Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd): 70 cpm

Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd): 50 cpm

Sample Label/Comments/Notes	pH Orig (pH ≤ 2 is Acceptable)	pH Final	Mark if Preserve	Acid Lot #	Weight(g) / Volume(mL)	µR/hr (Acceptance Limits <500 µR/hr)	cpm (Acceptance Limits <100 cpm/cm²)
Buckman 1-10-24996					1000	18	60
Buckman 06-10-24997					1000	18	65
Buckman 04-10-24998					1000	17	70
Buckman 1-~~10~~ 18-24999 SKG 8-26-10					1000	17	70

Surveyors' Name: [signature] Date/Time Surveyed: 11:56 8-26-10

S:\Procedures_Controlled\Controlled Forms\ARS-062 Sample Receipt Inspection Form Page 1 of ___

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for

Los Alamos National Laboratory

Request Number: 10-3478 REVISED

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 10-3478

Original COC

Wednesday, June 23, 2010

REQUEST NUMBER: 10-3478

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

These Samples are on:
LANL Request Number:10-3478
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples according to the schedule indicated:

SHIP DATE: 6/23/2010
TURNAROUND/REPORT DUE: 7/23/2010
TURNAROUND REQ'D: 30 Days

RAD SCREENING: Yes, Below Background
LAB REQUEST COMMENTS:

LANL ER SMO CONTACT:
Signature:

PRIORITY	METHOD CODE	CNTNR	SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	SPECIAL INSTRUCTIONS
	Generic:Low_Level_Tritium	1	Buckman08-10-16994	WG	6/22/2010	

Final Page of REQUEST NUMBER 10-3478

Wednesday, June 23, 2010

LOS ALAMOS
NATIONAL LABORATORY

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 10-3478C

REQUEST NUMBER: 10-3478

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

TURNAROUND/REPORT DUE: 7/23/2010
TURNAROUND REQ'D: 30

LAB REQUEST COMMENTS:

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman08-10-16994	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:		Date	Time	Received By:		Date	Time
[illegible]		6/23/10	3:00	Heath Pass	Heath Pass	6-24-10	10:10
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		

Received for DISPOSAL By: **Date** **Time** **Remarks:**

Printed Name Signature

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: 10-3478

Case Narrative

ARS INTERNATIONAL

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

September 29, 2010

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

Request Number: **10-3478**
LANL Sample ID: Buckman08-10-16994

Dear Mr. Greene;

On June 24, 2010, ARS International received one (1) water sample to be analyzed for Low Level Tritium.

The samples were processed and counted using the appropriate counting equipment and QA/QC for this type of analysis. Results of the analysis and QA/QC are attached in the data package.

The client and QA/QC samples were counted with a count time sufficient to meet quality control parameters for counting equipment and were within acceptance criteria and statistical sound detection limits.

If you have any questions please do not hesitate to call at 225.381.2991 or email LANL@amrad.com.

Sincerely,

Laboratory Management
ARS International

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COVER PAGE

PROJECT SAMPLE IDENTIFICATION CROSS-REFERENCE TO ARS SAMPLE LABORATORY IDs

Subcontract (LANL Agreement Number) 63641-001-10

Request Number	LANL PROJECT SAMPLE ID NUMBER	American Radiation Services SAMPLE ID NUMBER(S)
10-3478	Buckman08-10-16994	ARS1-10-01408-001

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	Title	Date
	Laboratory Management, ARS International	9-29-10

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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ARS Sample Delivery Group:	ARS1-10-01408	**Request or PO Number:**	10-3478
Client Sample ID:	BUCKMAN08-10-16994	**ARS Sample ID:**	ARS1-10-01408-001
Sample Collection Date:	06/22/10	**Date Received:**	06/24/10
Sample Matrix:	Aqueous	**Report Date:**	08/18/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	-0.070	0.220	0.750	0.360	U	TU	ARS-040	09/27/10 00:00	JR	NA

NOTES: Project Cost Code WEPR1158W100

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 NELAP Certificate # E87558

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

QC Results Report

Sample Delivery Group: ARS1-B10-03243
Date Received:

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-B10-03243	LCS	H3	8.240	1.270	0.630	8.489		TU	ARS-040	9/21/10 0:00	JR	97	75%-125%

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-B10-03243	MBL	H3	-0.270	0.170	0.550	NA	U	TU	ARS-040	9/21/10 0:00	JR

Sample RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER AcceptanceRange
ARS1-B10-03243	LCSD	H3	8.240	1.270	8.010	1.230		TU	ARS-040	9/21/10 0:00	JR	0.09	< 1

Sample DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER AcceptanceRange
ARS1-B10-03243	LCSD	H3	8.240	1.270	8.010	1.230		TU	ARS-040	9/21/10 0:00	JR	0.26	< 3

Project Manager Review

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

LELAP Certificate# 01949 NELAP Certificate # E87558

Expected Value Calculations LANL

ARS Batch Number: ARS1-B09 - 03243

			pCi/L	TU
LCS	**CALCULATED EXPECTED VALUE**	=	27.344	8.489
		Range	21.875 -	32.813
LCSD	**CALCULATED EXPECTED VALUE**	=	27.194	8.443
		Range	21.756 -	32.633

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Samples

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	ARS1-10-01366;1375;1407;1408
ARS Batch ID Number	ARS1-B10-03243

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8 978E-01
b	-9 611E-01
c	

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	**ACF (def. = 1)**	1
Syserror	0.15	**Reporting Units**	TU
Coverage Factor	1	**UCF**	7.151
		Aliquot must be entered in liters!!	

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
ARS1-B10-03243-01	505.85	2.01	11.16	2.07	9.09	0.02	42.73	6.03	1.72	533.75	0.3700	0.00501	L	2/25/2009	9/21/2010	360	360	0.92362	8.24	0.28	0.28	1.27	0.63	0.31	TU
ARS1-B10-03243-02	507.30	2.02	11.04	2.08	8.96	0.02	43.45	5.95	1.72	528.99	0.3679	0.00500	L	2/25/2009	9/21/2010	360	360	0.92362	8.01	0.28	0.28	1.23	0.62	0.30	TU
ARS1-B10-03243-03	513.93	2.02	10.80	2.08	8.72	0.02	45.16	1 56	1.72	524.85	0.3662	0.00502	L	9/27/2010	9/21/2010	360	360	1.00081	-0.27	0.16	0.16	0.17	0.55	0.27	TU
ARS1-B10-03243-04	456.76	2.00	12.28	2.06	10.22	0.02	34.61	1.61	1.72	522.56	0.3652	0.00438	L	6/15/2010	9/21/2010	360	360	0.98649	-0.28	0.25	0.25	0.25	0.84	0.41	TU
ARS1-B10-03243-05	501.93	2.00	11.46	2.06	9.40	0.02	41 07	17.74	1.72	539.43	0.3724	0.00504	L	6/15/2010	9/22/2010	360	360	0.98635	29.47	0.43	0.43	4.44	0.61	0.30	TU
ARS1-B10-03243-06	487.31	2 02	8.61	2.08	6.53	0.01	56.66	1.50	1.69	503.87	0.3592	0.00477	L	6/11/2010	9/22/2010	360	360	0.98581	-0.28	0.14	0.14	0.14	0.48	0.23	TU
ARS1-B10-03243-07	517.96	2.00	13.47	2.06	11.41	0.02	35.13	1 48	1.69	542.02	0.3736	0.00500	L	6/9/2010	9/23/2010	360	360	0.9854	-0.45	0.20	0.20	0.21	0.71	0.34	TU
ARS1-B10-03243-08	502.50	2.01	12.58	2.07	10.51	0.02	36.93	1 51	1.69	483.29	0.3547	0.00501	L	6/9/2010	9/23/2010	360	360	0.9854	-0.39	0.20	0.20	0.21	0.71	0.34	TU
ARS1-B10-03243-09	507.44	2.00	12.86	2.06	10.80	0.02	36.32	1.62	1.69	525.59	0.3665	0.00501	L	6/9/2010	9/23/2010	360	360	0.9854	-0.15	0.20	0.20	0.21	0.69	0.34	TU
ARS1-B10-03243-10	502.62	2.00	11 97	2.06	9.91	0.02	39.09	1.51	1.69	519.41	0.3638	0.00502	L	6/14/2010	9/24/2010	360	360	0.98594	-0.36	0.19	0.19	0.19	0.65	0.32	TU
ARS1-B10-03243-11	508.30	2.00	11.45	2.06	9.39	0.02	41.61	1.54	1.69	517.85	0.3631	0.00502	L	6/9/2010	9/24/2010	360	360	0.98526	-0.28	0.18	0.18	0.18	0.61	0.30	TU
ARS1-B10-03243-12	526.71	2.00	12.79	2.06	10.73	0.02	37.88	1.57	1.72	543.02	0.3740	0.00503	L	6/9/2010	9/22/2010	360	360	0.98553	-0.30	0.19	0.19	0.20	0.66	0.32	TU
ARS1-B10-03243-13	504.27	2.00	12.11	2.06	10.05	0.02	38.68	1.64	1.69	539.59	0.3725	0.00502	L	6/11/2010	9/24/2010	360	360	0.98553	-0.10	0.19	0.19	0.19	0.64	0.31	TU
ARS1-B10-03243-14	499.24	2.01	11.92	2.07	9.85	0.02	39.06	1.66	1.69	536.32	0.3711	0.00500	L	6/11/2010	9/24/2010	360	360	0.98553	-0.06	0.19	0.19	0.19	0.64	0.31	TU
ARS1-B10-03243-15	499.62	2.00	13.59	2.06	11.53	0.02	33.60	1.60	1.69	534.24	0.3702	0.00501	L	6/17/2010	9/25/2010	360	360	0.98622	-0.20	0.22	0.22	0.22	0.74	0.36	TU
ARS1-B10-03243-16	509.75	2.01	10.24	2.07	8.17	0.02	47.70	5.95	1.69	544.95	0.3748	0.00502	L	6/16/2010	9/25/2010	360	360	0.98608	6.73	0.23	0.23	1.04	0.52	0.25	TU
ARS1-B10-03243-17	499.44	2.00	12.43	2.06	10.37	0.02	37.19	5.64	1.69	539.42	0.3724	0.00502	L	6/16/2010	9/25/2010	360	360	0.98608	8.06	0.29	0.29	1.24	0.67	0.33	TU
ARS1-B10-03243-18	497.13	2.01	11.17	2.07	9.10	0.02	41 98	6.68	1.69	503.66	0.3592	0.00379	L	6/18/2010	9/25/2010	360	360	0.98635	12.38	0.38	0.38	1.90	0.81	0.40	TU
ARS1-B10-03243-19	494.18	2.00	11.25	2.06	9.19	0.02	41.35	1 64	1.69	533.83	0.3700	0.00501	L	6/18/2010	9/26/2010	360	360	0.98622	-0.09	0.18	0.18	0.18	0.60	0.29	TU
ARS1-B10-03243-20	501.88	2.00	11.78	2.06	9.72	0.02	39.76	1.60	1.69	529.51	0.3682	0.00501	L	6/18/2010	9/26/2010	360	360	0.98622	-0.17	0.18	0.18	0.19	0.63	0.31	TU
ARS1-B10-03243-21	499.91	2.00	11.93	2.06	9.87	0.02	39.03	1.69	1.69	539.34	0.3724	0.00501	L	6/18/2010	9/26/2010	360	360	0.98622	0.00	0.19	0.19	0.19	0.64	0.31	TU
ARS1-B10-03243-22	508.29	2.01	13.97	2.07	11.90	0.02	33.14	1.61	1.69	537.05	0.3714	0.00502	L	6/18/2010	9/26/2010	360	360	0.98622	-0.18	0.22	0.22	0.22	0.75	0.37	TU
ARS1-B10-03243-23	504.90	2.00	13.84	2.06	11.78	0.02	33.25	1.66	1.69	537.16	0.3715	0.00502	L	6/22/2010	9/27/2010	360	360	0.98663	-0.07	0.22	0.22	0.22	0.75	0.36	TU

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	ARS1-10-01366;1375;1407;1408
ARS Batch ID Number	ARS1-B10-03243

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8.978E-01
b	-9.611E-01
c	

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	**ACF (def. = 1)**	1
Syserror	0.15	**Reporting Units**	pCi
Coverage Factor	1	**UCF**	2.22

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
ARS1-B10-03243-01	505.85	2.01	11.16	2.07	9.09	0.02	42.73	6.03	1.72	533.75	0.3700	0.00501	L	2/25/2009	9/21/2010	360	360	0.92362	26.55	0.90	0.90	4.08	2.03	0.99	pCi/L
ARS1-B10-03243-02	507.30	2.02	11.04	2.08	8.96	0.02	43.45	5.95	1.72	528.99	0.3679	0.00500	L	2/25/2009	9/21/2010	360	360	0.92362	25.81	0.89	0.89	3.97	2.01	0.98	pCi/L
ARS1-B10-03243-03	513.93	2.02	10.80	2.08	8.72	0.02	45.16	1.56	1.72	524.85	0.3662	0.00502	L	9/27/2010	9/21/2010	360	360	1.00081	-0.87	0.52	0.52	0.53	1.78	0.87	pCi/L
ARS1-B10-03243-04	456.76	2.00	12.28	2.06	10.22	0.02	34.61	1.61	1.72	522.56	0.3652	0.00438	L	6/15/2010	9/21/2010	360	360	0.98649	-0.91	0.79	0.79	0.80	2.71	1.33	pCi/L
ARS1-B10-03243-05	501.93	2.00	11.46	2.06	9.40	0.02	41.07	17.74	1.72	539.43	0.3724	0.00504	L	6/15/2010	9/22/2010	360	360	0.98635	94.92	1.38	1.38	14.30	1.95	0.95	pCi/L
ARS1-B10-03243-06	487.31	2.02	8.61	2.08	6.53	0.01	56.66	1.50	1.69	503.87	0.3592	0.00477	L	6/11/2010	9/22/2010	360	360	0.98581	-0.89	0.44	0.44	0.46	1.54	0.75	pCi/L
ARS1-B10-03243-07	517.96	2.00	13.47	2.06	11.41	0.02	35.13	1.48	1.69	542.02	0.3736	0.00500	L	6/9/2010	9/23/2010	360	360	0.9854	-1.46	0.65	0.65	0.69	2.27	1.11	pCi/L
ARS1-B10-03243-08	502.50	2.01	12.58	2.07	10.51	0.02	36.93	1.51	1.69	483.29	0.3547	0.00501	L	6/9/2010	9/23/2010	360	360	0.9854	-1.25	0.66	0.66	0.68	2.27	1.11	pCi/L
ARS1-B10-03243-09	507.44	2.00	12.86	2.06	10.80	0.02	36.32	1.62	1.69	525.59	0.3665	0.00501	L	6/9/2010	9/23/2010	360	360	0.9854	-0.48	0.66	0.66	0.66	2.24	1.09	pCi/L
ARS1-B10-03243-10	502.62	2.00	11.97	2.06	9.91	0.02	39.09	1.51	1.69	519.41	0.3638	0.00502	L	6/14/2010	9/24/2010	360	360	0.98594	-1.15	0.60	0.60	0.63	2.09	1.02	pCi/L
ARS1-B10-03243-11	508.30	2.00	11.45	2.06	9.39	0.02	41.61	1.54	1.69	517.85	0.3631	0.00502	L	6/9/2010	9/24/2010	360	360	0.98526	-0.90	0.57	0.57	0.59	1.97	0.96	pCi/L
ARS1-B10-03243-12	526.71	2.00	12.79	2.06	10.73	0.02	37.88	1.57	1.72	543.02	0.3740	0.00503	L	6/9/2010	9/22/2010	360	360	0.98553	-0.96	0.61	0.61	0.63	2.11	1.03	pCi/L
ARS1-B10-03243-13	504.27	2.00	12.11	2.06	10.05	0.02	38.68	1.64	1.69	539.59	0.3725	0.00502	L	6/11/2010	9/24/2010	360	360	0.98553	-0.32	0.61	0.61	0.61	2.06	1.01	pCi/L
ARS1-B10-03243-14	499.24	2.01	11.92	2.07	9.85	0.02	39.06	1.66	1.69	536.32	0.3711	0.00500	L	6/11/2010	9/24/2010	360	360	0.98553	-0.19	0.61	0.61	0.61	2.06	1.01	pCi/L
ARS1-B10-03243-15	499.62	2.00	13.59	2.06	11.53	0.02	33.60	1.60	1.69	534.24	0.3702	0.00501	L	6/17/2010	9/25/2010	360	360	0.98622	-0.66	0.70	0.70	0.71	2.39	1.17	pCi/L
ARS1-B10-03243-16	509.75	2.01	10.24	2.07	8.17	0.02	47.70	5.95	1.69	544.95	0.3748	0.00502	L	6/16/2010	9/25/2010	360	360	0.98608	21.68	0.74	0.74	3.34	1.66	0.81	pCi/L
ARS1-B10-03243-17	499.44	2.00	12.43	2.06	10.37	0.02	37.19	5.64	1.69	539.42	0.3724	0.00502	L	6/16/2010	9/25/2010	360	360	0.98608	25.95	0.94	0.94	4.00	2.14	1.05	pCi/L
ARS1-B10-03243-18	497.13	2.01	11.17	2.07	9.10	0.02	41.98	6.68	1.69	503.66	0.3592	0.00379	L	6/18/2010	9/25/2010	360	360	0.98635	39.88	1.22	1.22	6.10	2.61	1.27	pCi/L
ARS1-B10-03243-19	494.18	2.00	11.25	2.06	9.19	0.02	41.35	1.64	1.69	533.83	0.3700	0.00501	L	6/18/2010	9/26/2010	360	360	0.98622	-0.30	0.57	0.57	0.57	1.94	0.95	pCi/L
ARS1-B10-03243-20	501.88	2.00	11.78	2.06	9.72	0.02	39.76	1.60	1.69	529.51	0.3682	0.00501	L	6/18/2010	9/26/2010	360	360	0.98622	-0.56	0.60	0.60	0.60	2.03	0.99	pCi/L
ARS1-B10-03243-21	499.91	2.00	11.93	2.06	9.87	0.02	39.03	1.69	1.69	539.34	0.3724	0.00501	L	6/18/2010	9/26/2010	360	360	0.98622	0.00	0.61	0.61	0.61	2.05	1.00	pCi/L
ARS1-B10-03243-22	508.29	2.01	13.97	2.07	11.90	0.02	33.14	1.61	1.69	537.05	0.3714	0.00502	L	6/18/2010	9/26/2010	360	360	0.98622	-0.59	0.71	0.71	0.71	2.41	1.18	pCi/L
ARS1-B10-03243-23	504.90	2.00	13.84	2.06	11.78	0.02	33.25	1.66	1.69	537.16	0.3715	0.00502	L	6/22/2010	9/27/2010	360	360	0.98663	-0.22	0.71	0.71	0.71	2.40	1.17	pCi/L

QC Evaluation

EPA Method: ARS-040
Batch ID: ARS1-B10-03243
SDG's: ARS1-10-01366; 1375; 1407; 1408

LCS	26.5500	**CSU (2s)**	8.0100
LCSD	25.5100	**CSU-D (2s)**	7.7000

DER = abs(LSC-LSCD) / sqr((2s CSU/2)^2)+((2s CSU-D/2)^2) *at 1 sigma* = **< 3**

DER 1.04 / 5.555405 = 0.187205 **< 3**

% RPD= ABS(LCS - LSCD) / (LCS+LCSD)/2 * 100 = **< 25%**

%RPD 1.04 / 26.03 *100 = 3.99539 **< 25%**

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

RER= abs((LCS-LCSD)) / (CSU)+(CSD) *at 2 sigma* = **<1** ***<--LANL Requirement***

RER = 1.04 / 15.7100 0.066199873 **<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	-0.87	1.05	1.78	
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 = -0.87
CSU = 1.05
Is ACT<1.65*CSU? YES

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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-03243**

Method ARS-054 **Analysis** LSC-A-022 **Matrix** AQ

Description TRITIUM IN WATER

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3		SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-03243-01	LCS	B-10230									
ARS1-B10-03243-02	LCSD	B-10231									
ARS1-B10-03243-03	MBL										
ARS1-B10-03243-04	DUP										
ARS1-B10-03243-05	TRG				63283	ARS1-10-01366	001	1	CAPA-10-17584	STD	07/13/10
ARS1-B10-03243-06	DO				63284	ARS1-10-01366	002	1	CAPA-10-17601	STD	07/13/10
ARS1-B10-03243-07	TRG				63285	ARS1-10-01366	003	1	CAPA-10-17672	STD	07/13/10
ARS1-B10-03243-08	TRG				63286	ARS1-10-01366	004	1	CAPA-10-17734	STD	07/13/10
ARS1-B10-03243-09	TRG				63287	ARS1-10-01366	005	1	CAPA-10-17737	STD	07/13/10
ARS1-B10-03243-10	TRG				63288	ARS1-10-01366	006	1	CAPA-10-17856	STD	07/13/10
ARS1-B10-03243-11	TRG				63289	ARS1-10-01366	007	1	CAPA-10-17898	STD	07/13/10
ARS1-B10-03243-12	TRG				63290	ARS1-10-01366	008	1	CAPA-10-17910	STD	07/13/10
ARS1-B10-03243-13	TRG				63291	ARS1-10-01366	009	1	CAPA-10-17914	STD	07/13/10
ARS1-B10-03243-14	TRG				63412	ARS1-10-01375	001	1	GW56-10-15470	STD	07/13/10
ARS1-B10-03243-15	TRG				63413	ARS1-10-01375	002	1	GW56-10-15471	STD	07/13/10
ARS1-B10-03243-16	TRG				63699	ARS1-10-01407	001	1	CAPA-10-17577	STD	07/20/10
ARS1-B10-03243-17	TRG				63700	ARS1-10-01407	002	1	CAPA-10-17580	STD	07/20/10
ARS1-B10-03243-18	TRG				63701	ARS1-10-01407	003	1	CAPA-10-17949	STD	07/20/10
ARS1-B10-03243-19	TRG				63702	ARS1-10-01407	004	1	CAPA-10-18473	STD	07/20/10
ARS1-B10-03243-20	TRG				63703	ARS1-10-01407	005	1	CAPA-10-18479	STD	07/20/10
ARS1-B10-03243-21	TRG				63704	ARS1-10-01407	006	1	CAPA-10-19017	STD	07/20/10
ARS1-B10-03243-22	TRG				63705	ARS1-10-01407	007	1	CAPA-10-19021	STD	07/20/10
ARS1-B10-03243-23	TRG				63706	ARS1-10-01408	001	1	BUCKMAN08-10-16994	STD	07/20/10

71369 10-01366-001-1 XRAD
71370 10-01366-002-1 XRAD
71371 10-01366-003-1 XRAD
71372 10-01366-004-1 XRAD
71373 10-01366-005-1 XRAD
71374 10-01366-006-1 XRAD
71375 10-01366-007-1 XRAD
71376 10-01366-008-1 XRAD
71377 10-01366-009-1 XRAD
71378 10-01375-001-1 XRAD
71379 10-01375-002-1 XRAD
71380 10-01407-001-1 XRAD
71381 10-01407-002-1 XRAD
71382 10-01407-003-1 XRAD
71383 10-01407-004-1 XRAD
71384 10-01407-005-1 XRAD
71385 10-01407-006-1 XRAD
71386 10-01407-007-1 XRAD
71387 10-01408-001-1 XRAD

American Radiation Services
Baton Rouge Laboratory

LCS Report
Analytical Batch: ARS1-B10-03243

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-10230	ARS1-B10-03243	ARS1-B10-03243-01	B-H3	S-0206	H-3	5	2.808406639	13.2224	18.2442	5.0218	WSTICKLE	5/17/2010			
B-10231	ARS1-B10-03243	ARS1-B10-03243-02	B-H3	S-0206	H-3	5	2.808406639	13.3064	18.315	5.0086	WSTICKLE	5/17/2010			

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
6477	ARS1-B10-03243	ARS1-B10-03243-01		5.01	g					JRABER	09/27/2010 08:54:26
6478	ARS1-B10-03243	ARS1-B10-03243-02		5	g					JRABER	09/27/2010 08:54:26
6479	ARS1-B10-03243	ARS1-B10-03243-03		5.02	g					JRABER	09/27/2010 08:54:26
6480	ARS1-B10-03243	ARS1-B10-03243-04		4.38	g					JRABER	09/27/2010 08:54:26
6481	ARS1-B10-03243	ARS1-B10-03243-05	CAPA-10-17584	5.04	g	71369				JRABER	09/27/2010 08:54:26
6482	ARS1-B10-03243	ARS1-B10-03243-06	CAPA-10-17601	4.77	g	71370				JRABER	09/27/2010 08:54:27
6483	ARS1-B10-03243	ARS1-B10-03243-07	CAPA-10-17672	5	g	71371				JRABER	09/27/2010 08:54:27
6484	ARS1-B10-03243	ARS1-B10-03243-08	CAPA-10-17734	5.01	g	71372				JRABER	09/27/2010 08:54:28
6485	ARS1-B10-03243	ARS1-B10-03243-09	CAPA-10-17737	5.01	g	71373				JRABER	09/27/2010 08:54:29
6486	ARS1-B10-03243	ARS1-B10-03243-10	CAPA-10-17856	5.02	g	71374				JRABER	09/27/2010 08:54:29
6487	ARS1-B10-03243	ARS1-B10-03243-11	CAPA-10-17898	5.02	g	71375				JRABER	09/27/2010 08:54:29
6488	ARS1-B10-03243	ARS1-B10-03243-12	CAPA-10-17910	5.03	g	71376				JRABER	09/27/2010 08:54:30
6489	ARS1-B10-03243	ARS1-B10-03243-13	CAPA-10-17914	5.02	g	71377				JRABER	09/27/2010 08:54:30
6490	ARS1-B10-03243	ARS1-B10-03243-14	GW56-10-15470	5	g	71378				JRABER	09/27/2010 08:54:31
6491	ARS1-B10-03243	ARS1-B10-03243-15	GW56-10-15471	5.01	g	71379				JRABER	09/27/2010 08:54:31
6492	ARS1-B10-03243	ARS1-B10-03243-16	CAPA-10-17577	5.02	g	71380				JRABER	09/27/2010 08:54:32
6493	ARS1-B10-03243	ARS1-B10-03243-17	CAPA-10-17580	5.02	g	71381				JRABER	09/27/2010 08:54:32
6494	ARS1-B10-03243	ARS1-B10-03243-18	CAPA-10-17949	3.79	g	71382				JRABER	09/27/2010 08:54:33
6495	ARS1-B10-03243	ARS1-B10-03243-19	CAPA-10-18473	5.01	g	71383				JRABER	09/27/2010 08:54:33
6496	ARS1-B10-03243	ARS1-B10-03243-20	CAPA-10-18479	5.01	g	71384				JRABER	09/27/2010 08:54:34
6497	ARS1-B10-03243	ARS1-B10-03243-21	CAPA-10-19017	5.01	g	71385				JRABER	09/27/2010 08:54:34
6498	ARS1-B10-03243	ARS1-B10-03243-22	CAPA-10-19021	5.02	g	71386				JRABER	09/27/2010 08:54:35
6499	ARS1-B10-03243	ARS1-B10-03243-23	BUCKMAN08-10-16994	5.02	g	71387				JRABER	09/27/2010 08:54:35

ARS. International
Port Allen Lab

Tritium Enrichment Data

Printed: 9/24/2010 4:38 PM

Procedures: ARS-040

Date: 8/6/2010

ARS File ID Numbers: ARS1-10-01366, 1375, 1407, 1408

ARS Batch ID: ARS1-B10-03243

	A Batch ID:	Enrichment Cell No.	Tare Wt of Electrolysis Cell & Electrodes	Tare Wt Reservoir	m_i Wt Na_2O_2	Gross Weight of Sample Reservoir	V_i Gross Sample Added	Electrolysis Start Date & Time	Start AMP	Start Bath C°	Electolysis End Date & Time	End Bath C°	End Wt of Cell + Resv. + Sample	V_r Gross Sample Recovered	Enrichment Factor	Cryo-Distil Flask #	Tare Wt Cryo-distil flask	Gross Wt flask + Sample	Recovered Water	Tare Weight of LSC Vial	Vial + Sample	Aliquot Net Sample	Wt of Vial, Sample& Dead Water Filler if used	Net Dead Water Added	Tare Wt b/f Cocktail	Gross Wt Vial + Sample + Cocktail
1	ARS1-B10-03243-01	3	336.42	198.04	2.01	703.89	505.85	8-6-2010 1009	5.00	2.0	9-2-2010 0913	2.0	545.62	**11.16**	45.93	N/A,N/A	108.05	115.73	7.68	6.33	11.34	**5.01**	0.00	**0.00**	11.34	26.39
2	ARS1-B10-03243-02	37	338.74	194.23	2.02	701.53	507.30	8-6-2010 1015	5.00	2.0	9-2-2010 1419	2.0	544.01	**11.04**	45.95	N/A,N/A	101.81	109.49	7.68	6.44	11.44	**5.00**	0.00	**0.00**	11.44	26.50
3	ARS1-B10-03243-03	41	332.29	188.80	2.02	702.73	513.93	8-6-2010 1018	5.00	2.0	9-4-2010 1318	2.0	531.89	**10.80**	47.68	N/A,7	111.93	120.12	8.19	6.43	11.45	**5.02**	0.00	**0.00**	11.45	26.49
4	ARS1-B10-03243-04	87	336.06	187.52	2.00	644.28	456.76	8-6-2010 1042	5.00	2.0	9-3-2010 1013	2.0	535.86	**12.28**	37.20	N/A,11	120.82	125.22	4.40	6.41	10.79	**4.38**	11.41	**0.82**	11.41	26.43
5	ARS1-B10-03243-05	90	336.81	191.09	2.00	693.02	501.93	8-6-2010 1045	5.00	2.0	9-2-2010 1115	2.0	539.36	**11.46**	43.80	5,N/A	97.91	105.71	7.80	6.41	11.45	**5.04**	0.00	**0.00**	11.45	26.46
6	ARS1-B10-03243-06	89	337.06	191.93	2.02	659.24	467.31	8-6-2010 1058	5.00	2.0	9-4-2010 0825	2.0	537.60	**8.61**	54.28	G,N/A	99.80	104.63	4.83	6.44	11.21	**4.77**	11.46	**0.27**	11.48	26.51
7	ARS1-B10-03243-07	48	336.06	191.70	2.00	709.66	517.96	8-6-2010 1135	5.00	2.0	9-5-2010 1425	2.0	541.23	**13.47**	38.46	N/A,N/A	107.40	117.27	9.87	6.58	11.58	**5.00**	0.00	**0.00**	11.58	26.61
8	ARS1-B10-03243-08	47	336.52	200.60	2.01	703.10	502.50	8-6-2010 1142	5.00	2.0	9-5-2010 1547	2.0	549.70	**12.58**	39.24	N/A,N/A	99.15	107.66	8.51	6.35	11.36	**5.01**	0.00	**0.00**	11.36	26.42
9	ARS1-B10-03243-09	91	335.10	187.11	2.00	694.55	507.44	8-6-2010 1151	5.00	2.0	9-6-2010 1302	2.0	535.07	**12.86**	39.46	N/A,N/A	117.09	126.56	9.47	6.47	11.48	**5.01**	0.00	**0.00**	11.48	26.52
10	ARS1-B10-03243-10	69	335.03	194.95	2.00	697.47	502.58	8-6-2010 1345	5.00	2.0	9-4-2010 1546	2.0	541.95	**11.97**	41.96	N/A,N/A	101.72	110.07	8.35	6.44	11.46	**5.02**	0.00	**0.00**	11.46	26.50
11	ARS1-B10-03243-11	71	340.75	195.29	2.00	703.59	508.30	8-6-2010 1352	5.00	2.0	9-6-2010 1549	2.0	547.49	**11.45**	44.39	N/A,7	116.60	124.28	7.68	6.58	11.60	**5.02**	0.00	**0.00**	11.60	26.63
12	ARS1-B10-03243-12	97	335.46	194.51	2.00	721.22	526.71	8-6-2010 1358	5.00	2.0	9-4-2010 0857	2.0	542.76	**12.79**	41.16	5,N/A	97.92	106.78	8.86	6.43	11.46	**5.03**	0.00	**0.00**	11.46	26.48
13	ARS1-B10-03243-13	50	335.18	203.13	2.00	707.40	504.27	8-6-2010 1650	5.00	2.0	9-5-2010 1346	2.0	550.43	**12.11**	41.64	G,N/A	99.08	107.30	8.22	6.61	11.63	**5.02**	0.00	**0.00**	11.63	26.66
14	ARS1-B10-03243-14	60	338.07	157.72	2.01	656.96	499.24	8-16-2010 1423	5.00	2.0	9-6-2010 1642	2.0	507.71	**11.92**	41.86	N/A,N/A	101.63	110.01	8.38	6.41	11.41	**5.00**	0.00	**0.00**	11.41	26.44
15	ARS1-B10-03243-15	6	332.41	205.42	2.00	705.04	499.62	8-16-2010 v 143	5.00	2.0	9-4-2010 0912	2.0	551.42	**13.59**	36.76	N/A,C	105.66	113.71	8.05	6.44	11.45	**5.01**	0.00	**0.00**	11.45	26.48
16	ARS1-B10-03243-16	78	334.02	200.63	2.01	710.38	500.75	8-6-2010 1653	5.00	2.0	9-5-2010 1323	2.0	544.89	**10.24**	49.78	N/A,N/A	117.22	124.23	7.01	6.75	11.77	**5.02**	0.00	**0.00**	11.77	26.81
17	ARS1-B10-03243-17	29	336.87	188.47	2.00	687.91	499.44	8-6-2010 1658	5.00	2.0	9-5-2010 1246	2.0	537.77	**12.43**	40.16	N/A,N/A	101.60	110.68	9.08	6.54	11.56	**5.02**	0.00	**0.00**	11.56	26.59
18	ARS1-B10-03243-18	22	336.88	191.63	2.01	688.76	497.13	8-16-2010 1435	5.00	2.0	9-4-2010 1346	2.0	539.68	**11.17**	44.51	N/A,11	115.09	119.00	3.91	6.54	10.33	**3.79**	11.72	**-1.39**	11.72	26.74
19	ARS1-B10-03243-19	54	334.98	191.30	2.00	665.48	494.18	8-16-2010 1443	5.00	2.0	9-6-2010 1014	2.0	537.53	**11.25**	43.93	N/A,7	116.59	124.13	7.54	6.40	11.41	**5.01**	0.00	**0.00**	11.41	26.49
20	ARS1-B10-03243-20	61	335.40	195.37	2.00	697.25	501.88	8-16-2010 1458	5.00	2.0	9-6-2010 0945	2.0	542.55	**11.78**	42.60	N/A,N/A	108.11	116.49	8.38	6.39	11.40	**5.01**	0.00	**0.00**	11.40	26.43
21	ARS1-B10-03243-21	86	335.35	196.51	2.00	696.42	499.91	8-16-2010 1506	5.00	2.0	9-7-2010 1643	2.0	543.79	**11.93**	41.90	N/A,C	99.15	107.41	8.26	6.52	11.53	**5.01**	0.00	**0.00**	11.53	26.55
22	ARS1-B10-03243-22	39	335.25	187.58	2.01	695.88	508.29	8-16-2010 1514	5.00	2.0	9-7-2010 1649	2.0	536.81	**13.97**	36.38	5,N/A	97.82	107.94	10.12	6.44	11.46	**5.02**	0.00	**0.00**	11.46	26.48
23	ARS1-B10-03243-23	92	336.66	195.48	2.00	700.38	504.90	8-16-2010 1521	5.00	2.0	9-8-2010 0849	2.0	545.98	**13.84**	36.48	G,N/A	99.80	109.33	9.53	6.43	11.45	**5.02**	0.00	**0.00**	11.45	26.48

S:\Laboratory Department\LabDocuments\LowLevelTritium\2010 LowLevelTritiumData\ARS1-B10-03243

Chemist Signature: Jimmy D. Rabon

Tritium Enrichment Data

Net Wt of Cocktail Added
15.05
15.06
15.04
15.02
15.01
15.03
15.03
15.06
15.04
15.03
15.03
15.02
15.03
15.03
15.03
15.04
15.03
15.02
15.06
15.03
15.02
15.04
15.05

Chemist Signature: Jeremy D. Rahm

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\20100920_1928
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100920_1928\20100920_1928.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100920_1928\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100920_1928\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL H3
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: LL H3 PLASTIC
Count Time (min): 360.00
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	0.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

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

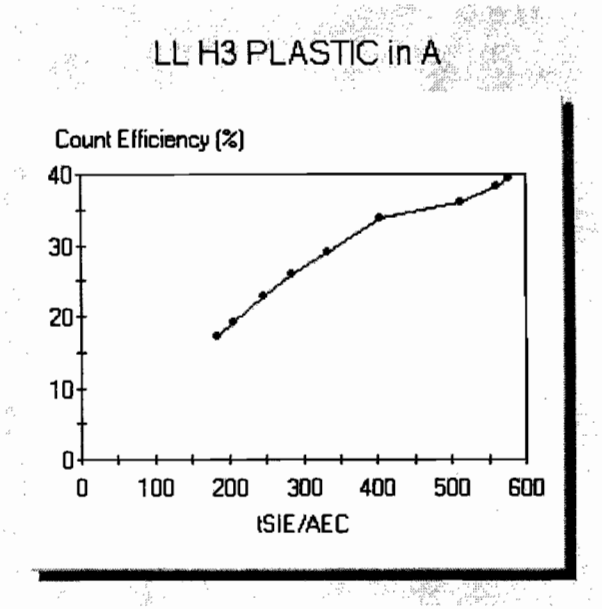
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 09/08/2009
Date Modified:
LL H3 PLASTIC in A

tSIE/AEC	Count Efficiency (%)
577.71	39.37
561.32	38.19
514.09	36.15
404.21	33.71
334.90	29.12
284.93	26.04
246.14	22.78
207.51	19.18
185.88	17.18

Protocol# 2 - Low Level H3.lsa User: H3 Low Level

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	360.00	1.716	4.62	537.43	37.16	9/20/2010	7:37:37 PM	
2	2	B10-03243-01	360.00	6.033	16.30	533.75	37.00	9/21/2010	1:55:30 AM	
2	3	B10-03243-02	360.00	5.953	16.18	528.99	36.79	9/21/2010	8:11:53 AM	
2	4	B10-03243-03	360.00	1.564	4.27	524.85	36.62	9/21/2010	2:26:13 PM	
2	5	B10-03243-04	360.00	1.611	4.41	522.56	36.52	9/21/2010	8:39:13 PM	
2	6	B10-03243-05	360.00	17.744	47.64	539.43	37.24	9/22/2010	2:51:44 AM	
Missing vial 7.										
Missing vial 8.										
Missing vial 9.										
Missing vial 10.										
Missing vial 11.										
Missing vial 12.										
2	13	B10-03243-12	360.00	1.574	4.21	543.02	37.40	9/22/2010	9:04:49 AM	

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	360.00	1.685	4.68	508.34	36.02	9/22/2010	5:17:05 PM	
2	2	B10-03243-06	360.00	1.498	4.17	503.87	35.92	9/22/2010	11:29:18 PM	
2	3	B10-03243-07	360.00	1.477	3.95	542.02	37.36	9/23/2010	5:41:33 AM	
2	4	B10-03243-08	360.00	1.510	4.26	483.29	35.47	9/23/2010	11:53:50 AM	
2	5	B10-03243-09	360.00	1.621	4.42	525.59	36.65	9/23/2010	6:06:09 PM	
2	6	B10-03243-10	360.00	1.511	4.15	519.41	36.38	9/24/2010	12:18:26 AM	
2	7	B10-03243-11	360.00	1.538	4.24	517.85	36.31	9/24/2010	6:30:41 AM	
2	8	B10-03243-13	360.00	1.635	4.39	539.59	37.25	9/24/2010	12:42:55 PM	
2	9	B10-03243-14	360.00	1.661	4.48	536.32	37.11	9/24/2010	6:55:09 PM	
2	10	B10-03243-15	360.00	1.601	4.33	534.24	37.02	9/25/2010	1:07:26 AM	
2	11	B10-03243-16	360.00	5.946	15.86	544.95	37.48	9/25/2010	7:19:39 AM	
2	12	B10-03243-17	360.00	5.636	15.13	539.42	37.24	9/25/2010	1:31:53 PM	
2	13	B10-03243-18	360.00	6.681	18.60	503.66	35.92	9/25/2010	7:44:21 PM	
2	14	B10-03243-19	360.00	1.637	4.42	533.83	37.00	9/26/2010	1:56:34 AM	
2	15	B10-03243-20	360.00	1.595	4.33	529.51	36.82	9/26/2010	8:08:50 AM	
2	16	B10-03243-21	360.00	1.691	4.54	539.34	37.24	9/26/2010	2:21:07 PM	
2	17	B10-03243-22	360.00	1.608	4.33	537.05	37.14	9/26/2010	8:33:20 PM	
2	18	B10-03243-23	360.00	1.664	4.48	537.16	37.15	9/27/2010	2:45:36 AM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
9-20-10	0944	S-0112-R2	Veris.	1139	[illegible]
↓	↓	S-0112-R3	↓	↓	[illegible]
↓	↓	S-0112-R4	↓	↓	[illegible]
↓	↓	S-0112-R5	↓	↓	[illegible]
9-20-2010	0955	SNC 51	QA	QA	JDR
↓	↓	Background	Bio-03243	1928	JDR
↓	↓	Bio-03243-01	↓	↓	JDR
↓	↓	Bio-03243-02	↓	↓	JDR
↓	↓	Bio-03243-03	↓	↓	JDR
↓	↓	Bio-03243-04	↓	↓	JDR
↓	↓	Bio-03243-05	↓	↓	JDR
↓	↓	Bio-03243-06	↓	↓	JDR
↓	↓	Bio-03243-07	↓	↓	JDR
↓	↓	Bio-03243-08	↓	↓	JDR
↓	↓	Bio-03243-09	↓	↓	JDR
↓	↓	Bio-03243-10	↓	↓	JDR
↓	↓	Bio-03243-11	↓	↓	JDR
↓	↓	Bio-03243-12	↓	↓	JDR
↓	↓	Bio-03243-13	↓	↓	JDR
↓	↓	Bio-03243-14	↓	↓	JDR

SKIPPED 9-22-2010

Reviewed By: [illegible] Date: 9-27-10
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
9-20-10	0955	B10-03243-15	B10-03243	1928	JDR
↓	↓	B10-03243-16	↓	↓	JDR
↓	↓	B10-03243-17	↓	↓	JDR
↓	↓	B10-03243-18	↓	↓	JDR
↓	↓	B10-03243-19	↓	↓	JDR
↓	↓	B10-03243-20	↓	↓	JDR
↓	↓	B10-03243-21	↓	↓	JDR
↓	↓	B10-03243-22	↓	↓	JDR
↓	↓	B10-03243-23	↓	↓	JDR
JDR 9-22-2010 ~~9-22-2010~~					
	N/A				
		JDR			
		9-27-2010			

Reviewed By: JD Date: 9-27-10
Initials

Technical Notes

Batch	ARS1-B10-03243
Analysis Code	LSC-A-022
Procedure No	ARS-054
Matrix	AQ

#	Date	Dept	Batch Technical Notes	User ID
1	08/11/10 09:35	CHEMISTRY	Samples B10-03243-14 and B10-03243-15 both had large amounts of solids in sample. Possibility that this may cause quenching if not all solids are removed by primary distillation.	JRABER
2	08/16/10 11:06	CHEMISTRY	Chiller operating bath was turned off while enrichment continued for all samples in batch. This lasted approximately 8-10 hours. I am unsure what affect if any this will have on analysis.	JRABER
3	08/20/10 08:57	CHEMISTRY	Voltage was NOT decreased to 2.8V for sample B10-03243-06 during enrichment. Only approx 4mL of sample is left in enrichment cell. I am unsure what affect this may have on analysis. If this causes duplicate criteria to fail, then I suggest using LCS and LCSD.	JRABER
4	09/22/10 16:23	CHEMISTRY	During counting, samples B10-03243-06 though B10-03243-11 were skipped by liquid scintillation counter.	JRABER

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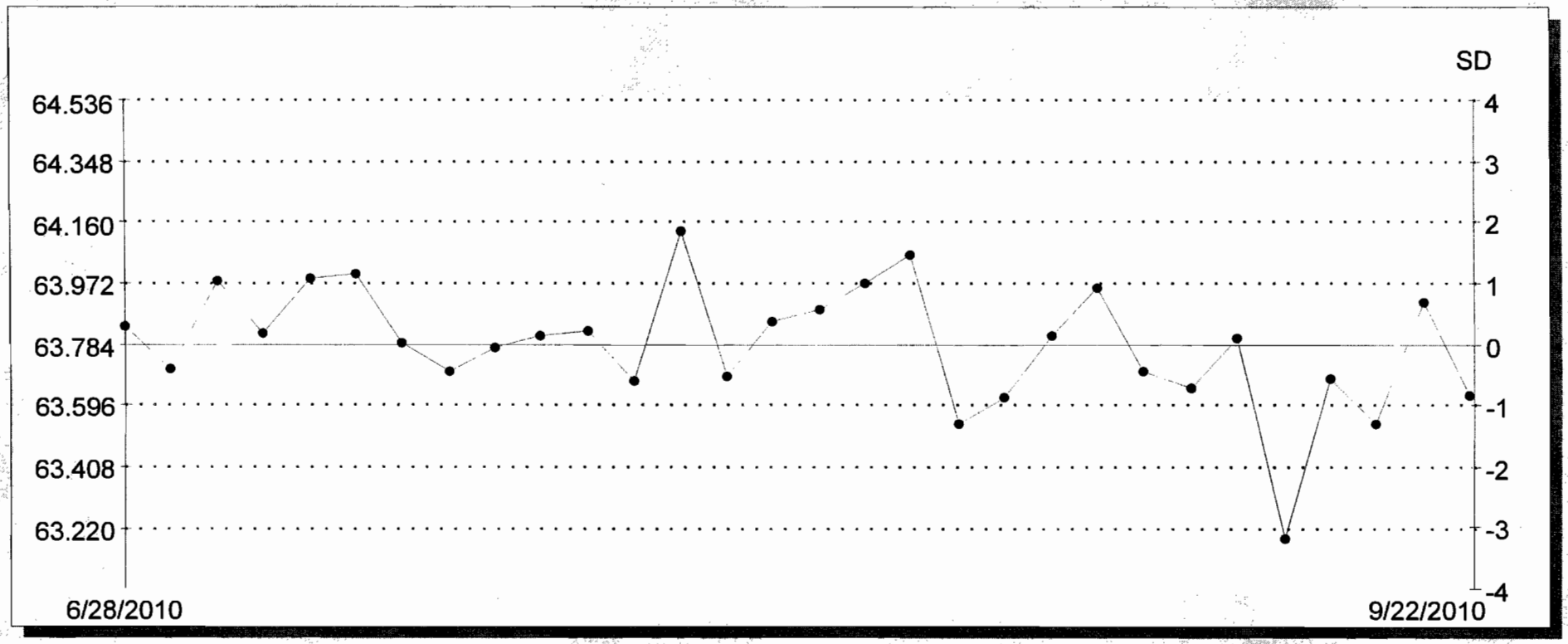
Low Level Tritium by Low Level Liquid Scintillation Counting

Control Charts

3H Efficiency
Total # pts : 5218
Valid # pts : 30
Mean : 63.79
SD : 0.19

Date	Value	Valid Pt
Jun 28, 2010	63.84	X
Jul 06, 2010	63.71	X
Jul 07, 2010	63.98	X
Jul 12, 2010	63.82	X
Jul 19, 2010	63.99	X
Jul 20, 2010	64.00	X
Jul 21, 2010	63.79	X
Jul 23, 2010	63.71	X
Jul 26, 2010	63.78	X
Jul 28, 2010	63.81	X
Aug 03, 2010	63.83	X
Aug 09, 2010	63.67	X
Aug 17, 2010	64.14	X
Aug 23, 2010	63.69	X
Aug 24, 2010	63.86	X
Aug 26, 2010	63.89	X
Aug 27, 2010	63.97	X
Aug 30, 2010	64.06	X
Aug 31, 2010	63.54	X
Aug 31, 2010	63.62	X
Sep 07, 2010	63.81	X
Sep 08, 2010	63.96	X
Sep 09, 2010	63.70	X
Sep 09, 2010	63.65	X
Sep 13, 2010	63.80	X
Sep 14, 2010	63.19	X
Sep 15, 2010	63.68	X
Sep 20, 2010	63.54	X
Sep 20, 2010	63.92	X
Sep 22, 2010	63.63	X

3H Efficiency
Total # pts : 5218
Valid # pts : 30
Mean : 63.79
SD : 0.19

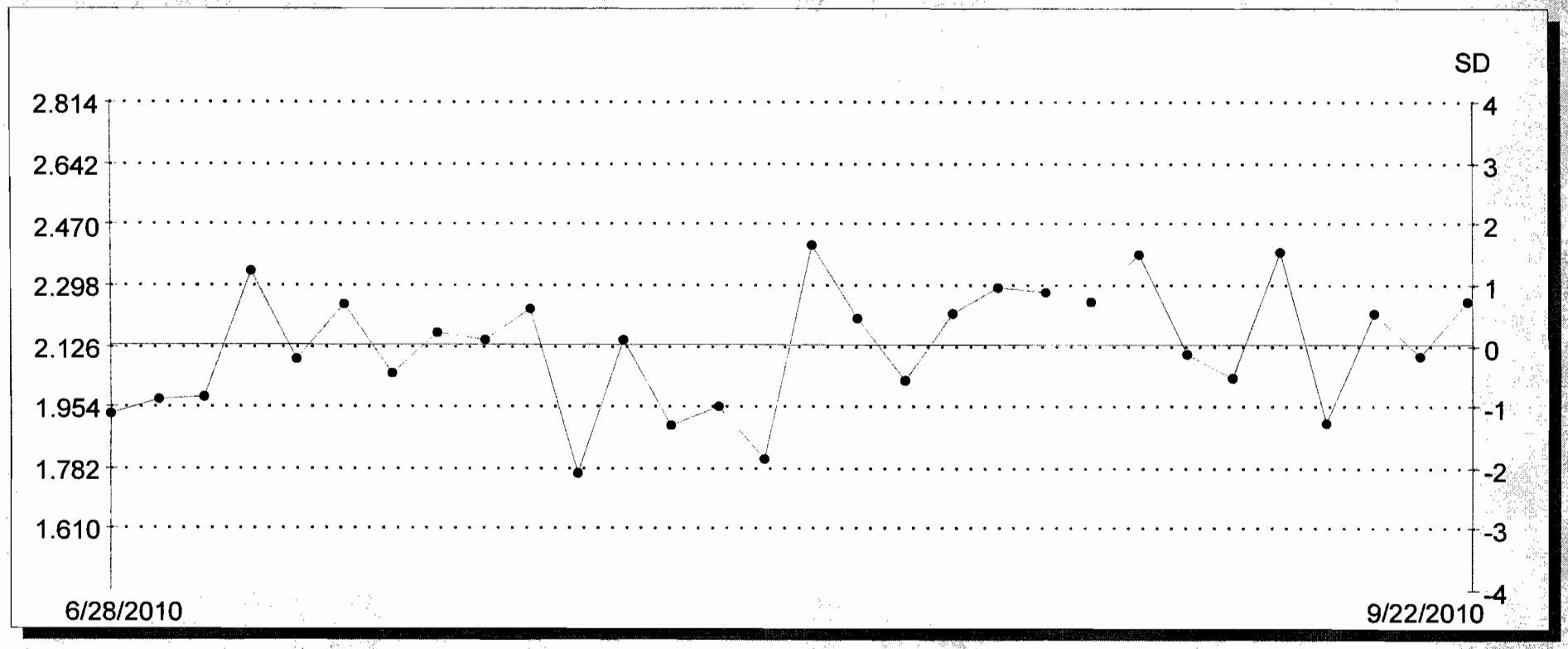


3H Background
Total # pts : 5148
Valid # pts : 30
Mean : 2.13
SD : 0.17

Date	Value	Valid Pt
Jun 28, 2010	1.94	X
Jul 06, 2010	1.97	X
Jul 07, 2010	1.98	X
Jul 12, 2010	2.34	X
Jul 19, 2010	2.09	X
Jul 20, 2010	2.25	X
Jul 21, 2010	2.05	X
Jul 23, 2010	2.17	X
Jul 26, 2010	2.14	X
Jul 28, 2010	2.23	X
Aug 03, 2010	1.77	X
Aug 09, 2010	2.14	X
Aug 17, 2010	1.90	X
Aug 23, 2010	1.96	X
Aug 24, 2010	1.81	X
Aug 26, 2010	2.41	X
Aug 27, 2010	2.21	X
Aug 30, 2010	2.03	X
Aug 31, 2010	2.22	X
Aug 31, 2010	2.29	X
Sep 07, 2010	2.28	X
Sep 08, 2010	2.25	X
Sep 09, 2010	2.39	X
Sep 09, 2010	2.10	X
Sep 13, 2010	2.03	X
Sep 14, 2010	2.39	X
Sep 15, 2010	1.91	X
Sep 20, 2010	2.22	X
Sep 20, 2010	2.10	X
Sep 22, 2010	2.25	X

3H Background

Total # pts	: 5148
Valid # pts	: 30
Mean	: 2.13
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

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

ARS File ID Numbers: ARS1-10-01366, 1375, 1407, 1408.
ARS Batch ID: ARS1-B10-03242

	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	B10-03242-04	120	1.979	1.915	37.88	5.04	15.100	pCi/L	175.4392	NO
2	B10-03242-05	120	1.553	1.915	37.92	5.03	-85.491	pCi/L	175.6025	NO
3	B10-03242-06	120	1.487	1.915	38.17	5.04	-100.216	pCi/L	174.1062	NO
4	B10-03242-07	120	1.642	1.915	38.94	5.00	-63.160	pCi/L	172.0288	NO
5	B10-03242-08	120	1.428	1.915	38.29	4.99	-114.813	pCi/L	175.2997	NO
6	B10-03242-09	120	1.639	1.915	39.16	4.98	-63.751	pCi/L	171.7493	NO
7	B10-03242-10	120	1.585	1.915	37.76	5.03	-78.264	pCi/L	176.3466	NO
8	B10-03242-11	120	1.380	1.915	38.69	4.97	-125.327	pCi/L	174.1855	NO
9	B10-03242-12	120	1.722	1.915	37.94	5.04	-45.465	pCi/L	175.1617	NO
10	B10-03242-13	120	1.304	1.915	34.76	5.06	-156.480	pCi/L	190.4306	NO
11	B10-03242-14	120	0.941	1.915	22.65	5.02	-385.864	pCi/L	294.5745	NO
12	B10-03242-15	120	1.540	1.915	37.93	4.97	-89.606	pCi/L	177.6756	NO
13	B10-03242-16	120	1.526	1.915	38.48	5.06	-89.993	pCi/L	172.021	NO
14	B10-03242-17	120	1.782	1.915	38.25	5.05	-31.015	pCi/L	173.398	NO
15	B10-03242-18	120	1.583	1.915	37.64	5.05	-78.676	pCi/L	176.2082	NO
16	B10-03242-19	120	1.432	1.915	38.26	5.01	-113.504	pCi/L	174.7368	NO
17	B10-03242-20	120	1.723	1.915	37.58	4.98	-46.213	pCi/L	178.9703	NO
18	B10-03242-21	120	1.656	1.915	38.16	5.00	-61.146	pCi/L	175.5451	NO
19	B10-03242-22	120	1.735	1.915	38.18	4.96	-42.816	pCi/L	176.8681	NO
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

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-03242**

Method	ARS-054	Analysis	LSC-A-021	Matrix	AQ
Description	TRITIUM IN WATER				

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-03242-01	LCS									
ARS1-B10-03242-02	LCSD									
ARS1-B10-03242-03	MBL									
ARS1-B10-03242-04	TRG				**ARS1-10-01366**	001	1	CAPA-10-17584		07/13/10
ARS1-B10-03242-05	TRG				**ARS1-10-01366**	002	1	CAPA-10-17601		07/13/10
ARS1-B10-03242-06	TRG				**ARS1-10-01366**	003	1	CAPA-10-17672		07/13/10
ARS1-B10-03242-07	TRG				**ARS1-10-01366**	004	1	CAPA-10-17734		07/13/10
ARS1-B10-03242-08	TRG				**ARS1-10-01366**	005	1	CAPA-10-17737		07/13/10
ARS1-B10-03242-09	TRG				**ARS1-10-01366**	006	1	CAPA-10-17856		07/13/10
ARS1-B10-03242-10	TRG				**ARS1-10-01366**	007	1	CAPA-10-17898		07/13/10
ARS1-B10-03242-11	TRG				**ARS1-10-01366**	008	1	CAPA-10-17910		07/13/10
ARS1-B10-03242-12	TRG				**ARS1-10-01366**	009	1	CAPA-10-17914		07/13/10
ARS1-B10-03242-13	TRG				**ARS1-10-01375**	001	1	GW56-10-15470		07/13/10
ARS1-B10-03242-14	TRG				**ARS1-10-01375**	002	1	GW56-10-15471		07/13/10
ARS1-B10-03242-15	TRG				**ARS1-10-01407**	001	1	CAPA-10-17577		07/20/10
ARS1-B10-03242-16	TRG				**ARS1-10-01407**	002	1	CAPA-10-17580		07/20/10
ARS1-B10-03242-17	TRG				**ARS1-10-01407**	003	1	CAPA-10-17949		07/20/10
ARS1-B10-03242-18	TRG				**ARS1-10-01407**	004	1	CAPA-10-18473		07/20/10
ARS1-B10-03242-19	TRG				**ARS1-10-01407**	005	1	CAPA-10-18479		07/20/10
ARS1-B10-03242-20	TRG				**ARS1-10-01407**	006	1	CAPA-10-19017		07/20/10
ARS1-B10-03242-21	TRG				**ARS1-10-01407**	007	1	CAPA-10-19021		07/20/10
ARS1-B10-03242-22	TRG				**ARS1-10-01408**	001	1	BUCKMAN08-10-16994		07/20/10

63283 10-01366-001-1 **ORIG**

63284 10-01366-002-1 **ORIG**

63285 10-01366-003-1 **ORIG**

63286 10-01366-004-1 **ORIG**

63287 10-01366-005-1 **ORIG**

63288 10-01366-006-1 **ORIG**

63289 10-01366-007-1 **ORIG**

63290 10-01366-008-1 **ORIG**

63291 10-01366-009-1 **ORIG**

63412 10-01375-001-1 **ORIG**

63413 10-01375-002-1 **ORIG**

63699 10-01407-001-1 **ORIG**

63700 10-01407-002-1 **ORIG**

63701 10-01407-003-1 **ORIG**

63702 10-01407-004-1 **ORIG**

63703 10-01407-005-1 **ORIG**

63704 10-01407-006-1 **ORIG**

63705 10-01407-007-1 **ORIG**

63706 10-01408-001-1 **ORIG**

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
5796	ARS1-B10-03242	ARS1-B10-03242-01		1	g					JRABER	06/28/2010 17:01:54
5797	ARS1-B10-03242	ARS1-B10-03242-02		1	g					JRABER	06/28/2010 17:01:54
5798	ARS1-B10-03242	ARS1-B10-03242-03		1	g					JRABER	06/28/2010 17:01:54
5799	ARS1-B10-03242	ARS1-B10-03242-04	CAPA-10-17584	5.04	g	63968				JRABER	06/28/2010 17:01:54
5800	ARS1-B10-03242	ARS1-B10-03242-05	CAPA-10-17601	5.03	g	63969				JRABER	06/28/2010 17:01:54
5801	ARS1-B10-03242	ARS1-B10-03242-06	CAPA-10-17672	5.04	g	63970				JRABER	06/28/2010 17:01:54
5802	ARS1-B10-03242	ARS1-B10-03242-07	CAPA-10-17734	5	g	63971				JRABER	06/28/2010 17:01:54
5803	ARS1-B10-03242	ARS1-B10-03242-08	CAPA-10-17737	4.99	g	63972				JRABER	06/28/2010 17:01:54
5804	ARS1-B10-03242	ARS1-B10-03242-09	CAPA-10-17856	4.98	g	63973				JRABER	06/28/2010 17:01:55
5805	ARS1-B10-03242	ARS1-B10-03242-10	CAPA-10-17898	5.03	g	63974				JRABER	06/28/2010 17:01:55
5806	ARS1-B10-03242	ARS1-B10-03242-11	CAPA-10-17910	4.97	g	63975				JRABER	06/28/2010 17:01:55
5807	ARS1-B10-03242	ARS1-B10-03242-12	CAPA-10-17914	5.04	g	63976				JRABER	06/28/2010 17:01:55
5808	ARS1-B10-03242	ARS1-B10-03242-13	GW56-10-15470	5.06	g	63977				JRABER	06/28/2010 17:01:55
5809	ARS1-B10-03242	ARS1-B10-03242-14	GW56-10-15471	5.02	g	63978				JRABER	06/28/2010 17:01:55
5810	ARS1-B10-03242	ARS1-B10-03242-15	CAPA-10-17577	4.97	g	63979				JRABER	06/28/2010 17:01:55
5811	ARS1-B10-03242	ARS1-B10-03242-16	CAPA-10-17580	5.06	g	63980				JRABER	06/28/2010 17:01:55
5812	ARS1-B10-03242	ARS1-B10-03242-17	CAPA-10-17949	5.05	g	63981				JRABER	06/28/2010 17:01:55
5813	ARS1-B10-03242	ARS1-B10-03242-18	CAPA-10-18473	5.05	g	63982				JRABER	06/28/2010 17:01:55
5814	ARS1-B10-03242	ARS1-B10-03242-19	CAPA-10-18479	5.01	g	63983				JRABER	06/28/2010 17:01:56
5815	ARS1-B10-03242	ARS1-B10-03242-20	CAPA-10-19017	4.98	g	63984				JRABER	06/28/2010 17:01:56
5816	ARS1-B10-03242	ARS1-B10-03242-21	CAPA-10-19021	5	g	63985				JRABER	06/28/2010 17:01:56
5817	ARS1-B10-03242	ARS1-B10-03242-22	BUCKMAN08-10-16994	4.96	g	63986				JRABER	06/28/2010 17:01:56

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\20100707_1326
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100707_1326\20100707_1326.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100707_1326\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20100707_1326\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL H3
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: LL H3 PLASTIC
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	0.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

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

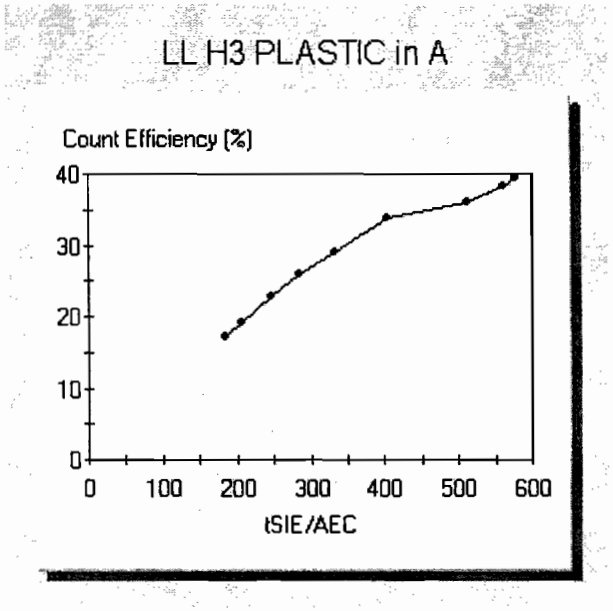
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 09/08/2009
Date Modified:
LL H3 PLASTIC in A

tSIE/AEC	Count Efficiency (%)
577.71	39.37
561.32	38.19
514.09	36.15
404.21	33.71
334.90	29.12
284.93	26.04
246.14	22.78
207.51	19.18
185.88	17.18

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.915	4.92	571.89	38.95	7/7/2010	1:35:32 PM	
2	2	B10-03242-04	120.00	1.979	5.22	554.11	37.88	7/7/2010	3:47:30 PM	
2	3	B10-03242-05	120.00	1.553	4.10	555.15	37.92	7/7/2010	5:58:41 PM	
2	4	B10-03242-06	120.00	1.487	3.89	560.88	38.17	7/7/2010	8:10:35 PM	
2	5	B10-03242-07	120.00	1.642	4.22	571.65	38.94	7/7/2010	10:20:47 PM	
2	6	B10-03242-08	120.00	1.428	3.73	562.78	38.29	7/8/2010	12:30:55 AM	
2	7	B10-03242-09	120.00	1.639	4.19	574.69	39.16	7/8/2010	2:41:02 AM	
2	8	B10-03242-10	120.00	1.585	4.20	551.52	37.76	7/8/2010	4:51:06 AM	
2	9	B10-03242-11	120.00	1.380	3.57	568.32	38.69	7/8/2010	7:01:08 AM	
2	10	B10-03242-12	120.00	1.722	4.54	555.51	37.94	7/8/2010	9:11:12 AM	
2	11	B10-03242-13	120.00	1.304	3.75	451.64	34.76	7/8/2010	11:21:14 AM	
2	12	B10-03242-14	120.00	0.941	4.16	244.73	22.65	7/8/2010	1:31:12 PM	
2	13	B10-03242-15	120.00	1.540	4.06	555.31	37.93	7/8/2010	3:41:16 PM	
2	14	B10-03242-16	120.00	1.526	3.97	565.33	38.48	7/8/2010	5:51:18 PM	
2	15	B10-03242-17	120.00	1.782	4.66	562.20	38.25	7/8/2010	8:01:21 PM	
2	16	B10-03242-18	120.00	1.583	4.21	548.61	37.64	7/8/2010	10:11:23 PM	
2	17	B10-03242-19	120.00	1.432	3.74	562.39	38.26	7/9/2010	12:21:25 AM	
2	18	B10-03242-20	120.00	1.723	4.59	547.21	37.58	7/9/2010	2:31:27 AM	
2	19	B10-03242-21	120.00	1.656	4.34	560.62	38.16	7/9/2010	4:41:27 AM	
2	20	B10-03242-22	120.00	1.735	4.54	561.14	38.18	7/9/2010	6:51:28 AM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
7-1-10	1620	BIO-02889-11	BIO-02889	1622	JDR
↓	↓	BIO-02889-13	↓	↓	JDR
↓	↓	BIO-02889-14	↓	↓	JDR
↓	↓	BIO-02889-15	↓	↓	JDR
↓	↓	BIO-02889-15	↓	↓	JDR
↓	↓	BIO-02889-19	↓	↓	JDR
↓	↓	BIO-02889-20	↓	↓	JDR
↓	↓	BIO-02889-22	↓	↓	JDR
7-6-10	0945	SNC 51	QA	QA	JDR
↓	↓	Background	BIO-02889	1022	JDR
↓	↓	BIO-02889-19	BIO-02889	↓	JDR
↓	↓	BIO-02889-20	↓	↓	JDR
↓	↓	BIO-02889-22	↓	↓	JDR
7-7-2010	1140	SNC 51	QA	QA	JDR
↓	↓	Background	BIO-03242	1326	JDR
↓	↓	BIO-03242-04	↓	↓	JDR
↓	↓	BIO-03242-05	↓	↓	JDR
↓	↓	BIO-03242-06	↓	↓	JDR
↓	↓	BIO-03242-07	↓	↓	JDR
↓	↓	BIO-03242-08	↓	↓	JDR

E-13

Reviewed By: JD Date: 9-29-10
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
7-7-10	1140	B10-03242-09	B10-03242	1326	JDR
↓	↓	B10-03242-10	↓	↓	JDR
↓	↓	B10-03242-11	↓	↓	JDR
↓	↓	B10-03242-12	↓	↓	JDR
↓	↓	B10-03242-13	↓	↓	JDR
↓	↓	B10-03242-14	↓	↓	JDR
↓	↓	B10-03242-15	↓	↓	JDR
↓	↓	B10-03242-16	↓	↓	JDR
↓	↓	B10-03242-17	↓	↓	JDR
↓	↓	B10-03242-18	↓	↓	JDR
↓	↓	B10-03242-19	↓	↓	JDR
↓	↓	B10-03242-20	↓	↓	JDR
↓	↓	B10-03242-21	↓	↓	JDR
↓	↓	B10-03242-22	↓	↓	JDR

Reviewed By: JB Date: 9-29-10
Initials

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

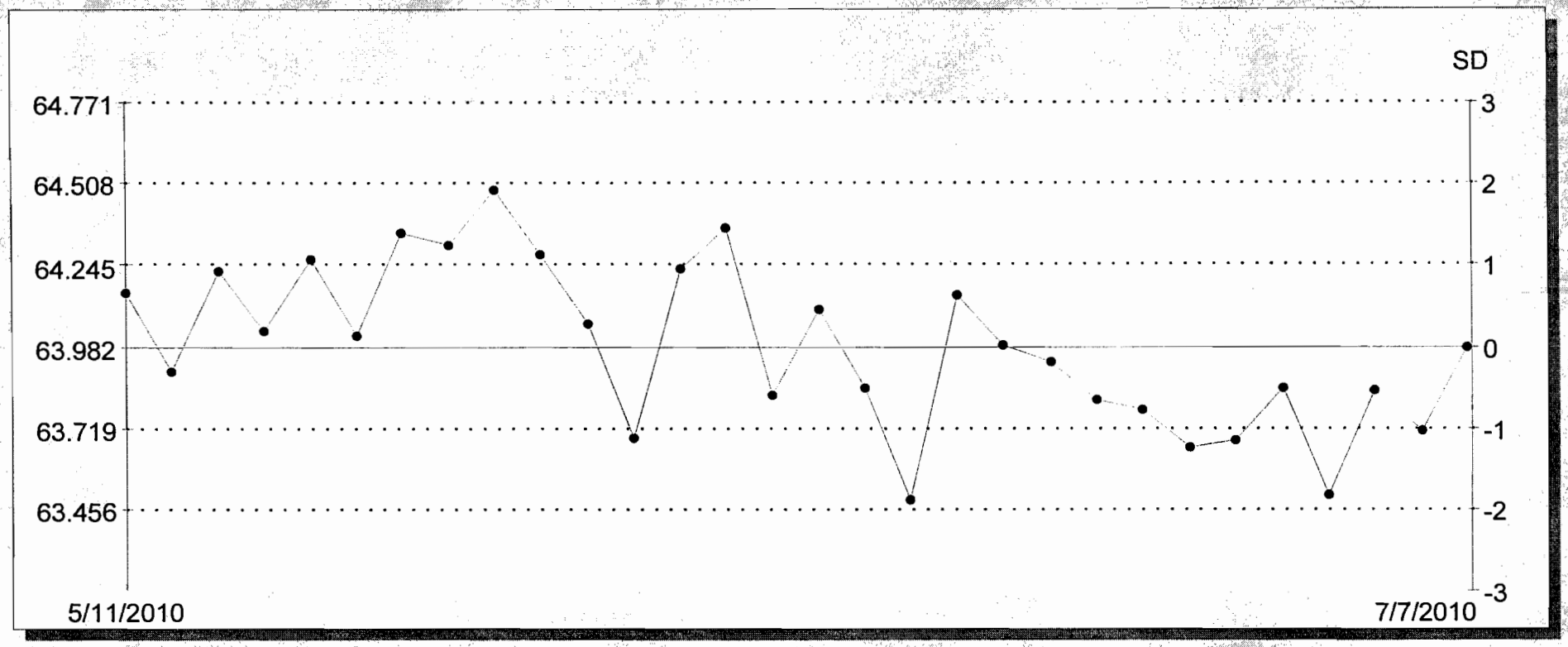
Tritium-Screening by Low Level Liquid Scintillation Counting

Control Charts

3H Efficiency
Total # pts : 5191
Valid # pts : 30
Mean : 63.98
SD : 0.26

Date	Value	Valid Pt
May 11, 2010	64.16	X
May 12, 2010	63.90	X
May 12, 2010	64.23	X
May 13, 2010	64.04	X
May 14, 2010	64.26	X
May 18, 2010	64.01	X
May 24, 2010	64.35	X
May 29, 2010	64.31	X
May 30, 2010	64.49	X
May 30, 2010	64.28	X
Jun 01, 2010	64.05	X
Jun 04, 2010	63.68	X
Jun 07, 2010	64.23	X
Jun 08, 2010	64.37	X
Jun 11, 2010	63.82	X
Jun 14, 2010	64.10	X
Jun 15, 2010	63.84	X
Jun 16, 2010	63.49	X
Jun 17, 2010	64.15	X
Jun 20, 2010	63.98	X
Jun 21, 2010	63.94	X
Jun 21, 2010	63.81	X
Jun 21, 2010	63.78	X
Jun 21, 2010	63.66	X
Jun 21, 2010	63.68	X
Jun 21, 2010	63.85	X
Jun 21, 2010	63.50	X
Jun 28, 2010	63.84	X
Jul 06, 2010	63.71	X
Jul 07, 2010	63.98	X

3H Efficiency
Total # pts : 5191
Valid # pts : 30
Mean : 63.98
SD : 0.26

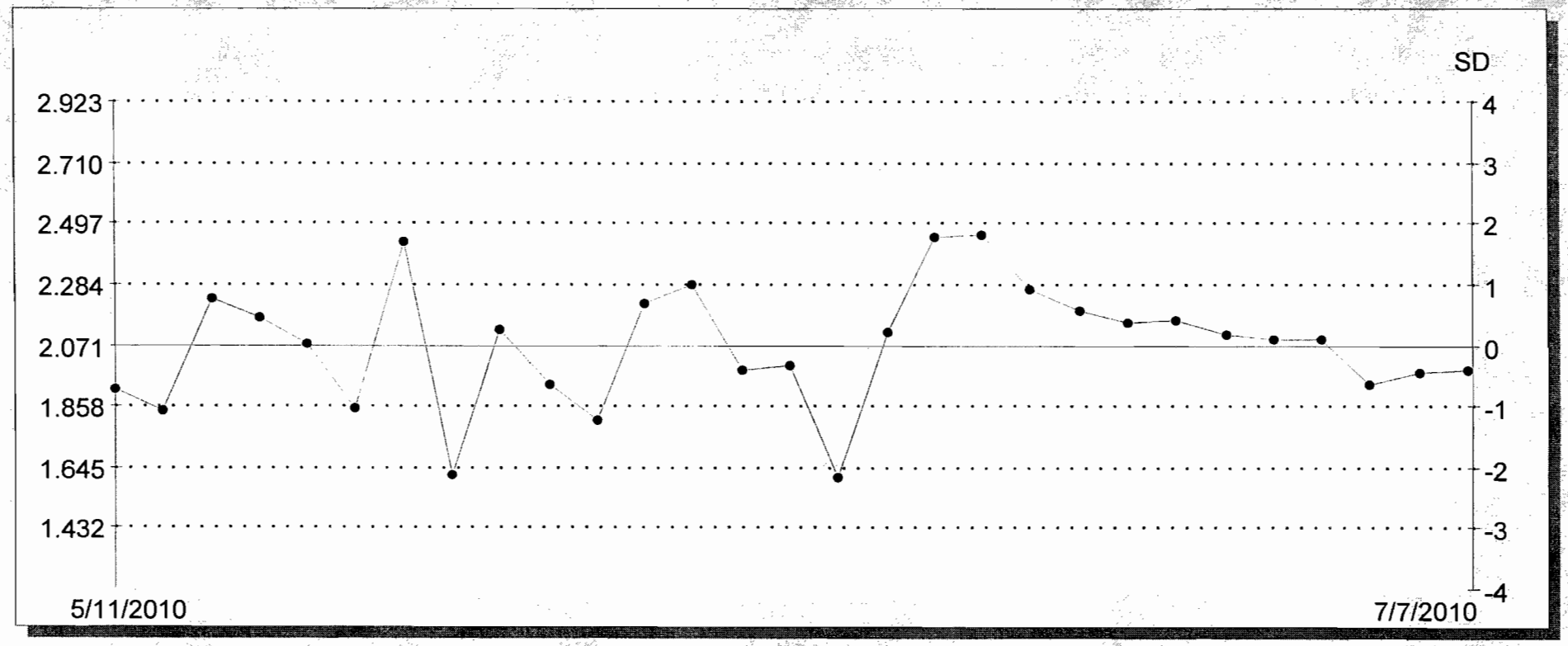


3H Background
Total # pts : 5121
Valid # pts : 29
Mean : 2.07
SD : 0.21

Date	Value	Valid Pt
May 11, 2010	1.92	X
May 12, 2010	1.85	X
May 12, 2010	2.23	X
May 13, 2010	2.17	X
May 14, 2010	2.08	X
May 18, 2010	1.85	X
May 24, 2010	2.43	X
May 29, 2010	1.62	X
May 30, 2010	2.13	X
May 30, 2010	1.93	X
Jun 01, 2010	1.81	X
Jun 04, 2010	2.21	X
Jun 07, 2010	2.28	X
Jun 08, 2010	1.99	X
Jun 11, 2010	2.00	X
Jun 14, 2010	1.61	X
Jun 15, 2010	2.11	X
Jun 16, 2010	2.45	X
Jun 17, 2010	2.46	X
Jun 20, 2010	2.27	X
Jun 21, 2010	2.19	X
Jun 21, 2010	2.15	X
Jun 21, 2010	2.16	X
Jun 21, 2010	2.11	X
Jun 21, 2010	2.09	X
Jun 21, 2010	2.09	X
Jun 28, 2010	1.94	X
Jul 06, 2010	1.97	X
Jul 07, 2010	1.98	X

3H Background

Total # pts	: 5121
Valid # pts	: 29
Mean	: 2.07
SD	: 0.21



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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: 5/13/2010 0:00 *date counted*
STANDARD REFERENCE #: S-0206

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

Radionuclide: H-3 Dilution Reference Date: 2/25/2009 8:30

Dilution Activity	3.01	pCi per gram ===> dpm/g	6.68
Verif. Date Decay Corrected	2.81	pCi per gram ===> dpm/g	6.24

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-0206-V1B	11.98	1	LSC	0.3328	1.62	5.040	6.18	2.78
S-0206-V2B	11.42	1	LSC	0.3186	1.62	5.010	6.13	2.76
S-0206-V3B	12.01	1	LSC	0.3360	1.62	4.990	6.19	2.79
S-0206-V4B	11.75	1	LSC	0.3275	1.62	5.010	6.17	2.78
S-0206-V5B	11.45	1	LSC	0.3196	1.62	5.020	6.13	2.76

Average	6.16	2.77
Two Sigma Uncertainty	0.06	0.02
Standard Deviation percent of known concentration	0.45%	0.45%
Target Activity	6.24	2.81
% Diff	-1.27%	-1.27%

10% Max *PASS*

5% Max *PASS*

Verification Expiration Date: May 13, 2011

Prepared & Counted By: Jeremy Raber Date: 5/13/2010 0:00

Verified & Approved By: Eugene Mulligan Date: 5/14/2010

QC Approval: Amy Engel Date: 5/14/2010

S-0206		
H-3	Verified	*5/14/10*
SL	**Expires**	**5/14/11**
Manufactuer	**NIST**	
Sol Matrix	H2O	
Ref No	NIST 4361C	
Tech	M Thibodeaux	
Parent ID	S-0152	

ARS INTERNATIONAL

RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY

STD ID: S-0206

ARS INTERNATIONAL

Add/Edit *Secondary Stds*

Planning

Planning Comments	**Create a Low Level H3 LCS solution.**
Target dpm/g (on dil. date)	**6.66**
Target Final volume mL	**500**
Appx mass g of Parent Sol'n	**49.8188436**
Appx vol ml of Parent Sol'n	**49.91868096**
Expected Addition for Analysis g	**5**

Standards Preparation / Dilution

Secondary Solution #	**S-0206**
Dilution Date (New Ref Date)	**02/25/2009 08:30**
Ampoule, Empty (g)	
Ampoule /Solution Gross (g)	
Net Wt Removed (g)	
Transfer Container, empty (g)	**103.64**
Container Plus Solution (g)	**153.45**
Net Wt Transferred (g)	**49.81**
DPM Xferred on 02/25/2009 08:30	**3329.408875**
Diluent/matrix	**Dead H2O**
Diluent Density Cont, empty (g)	
Test Mass of 5 ml of Diluent (g)	
Diluent Density Test - (g/mL)	
Dilution Empty Container Mass (g)	**198.75**
Dilution Full Cont g (if measured)	**697.31**
Dilution Final Volume ml (if measured)	**500**
Final Dilution Density (g/mL)	**0.99712**
Final Dilution Measured Mass g	**498.56**
Comments	**Use as H3LL LCS creation. Dilution performed as stated above by M Thibodeaux on 2/25/09. -BJS 2/25/09**
Final Dilution dpm/g	**6.678050535**
Final Dil New Ref Date/Time	**02/25/2009 08:30**

Parent Standard Data

Parent Solution Reference #	**NIST 4361C**			
Parent Solution #	**S-0152**			
Parent Principal Radionuclide	**H-3**	Half Life (Days)	**4499.8000000**	
Parent Reference Date	**09/03/1998 11:00**			
Parent Certified Act	**120.54**	Certi Act/Vol Units	**dpm**	**g**
Parent Cert Act Uncert 1 Sigma	**0.0076**			
Parent Sp. Gravity G/Ml	**0.998**			
Parent Supplier	**NIST**			
Parent Date Recvd	**12/04/06**			
Parent Received By	**LU**			
Parent Cert Exp Date				
Parent Matrix	**H2O**			
Certified dpm/g At Ref Date	**120.54**			
Certified dpm/g on 02/25/2009 08 30	**66.84217777**			
Parent Comments	Liquid in a 500-ml borosilicate-glass medis bottle with teflon-lined screw cap. Approximately 500 grams			
Parent Tech	**M. Thibodeaux**			
Is_Primary	**FALSE**			
Is_LCS	**TRUE**			
Is_Tracer	**FALSE**			
Is_Calib	**FALSE**			

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American Radiation Services Analytical Reports

for

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ARS INTERNATIONAL

Report Compilation Checklist

ARS SDG: 10-01408 **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~~	

Report Generator Signature — Date: 9-28-10

Management Review Signature — Date: 9-29-10

ARS INTERNATIONAL

LSC
Technical Review Checklist

ARS SDG ARS1-10-01408

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:**	ARS1-B10-03242	**Batch B:**	N/A	**Batch C:**	N/A
Test Method(s):		LSC-A-021		N/A		N/A

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Jimmy D. Rahn 7-5-2010
Chemist Signature Date

Jamaal Brown 7-7-10
Verifier Review Signature Date

B. ANALYSIS REVIEW

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

[signature] 9-29-10
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

JDR 7-9-2010

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

Jimmy D. Rahn 7-9-2010
Analyst Signature Date

N/A
Technicial Reviewer Signature Date

Batch A: ARS1-B10-03242

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): _____

Project Manager Signature	Date	QA Officer Signature	Date
Susan Lee	9-28-10	JBoyd	9-29-10

GENERAL COMMENTS

LSC
Technical Review Checklist

ARS SDG ARS1-10-01408

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:** ARS1-B10-03243 **Batch B:** N/A **Batch C:** N/A

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

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Jimmy D. Rahm 9-20-2010 — Chemist Signature, Date

Jamaal Brown 9-20-10 — 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

QA Officer Signature, Date: 9-29-10

	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): _____

Jimmy D. Rahm 9-27-2010 — Analyst Signature, Date

N/A — Technicial Reviewer Signature, Date

Batch A: ARS1-B10-03243

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): _____

Project Manager Signature	Date	QA Officer Signature	Date
Susan Giese	9-28-10	[illegible]	9-29-10

GENERAL COMMENTS

DQO Report for SDG
ARS1-10-01408

Analysis Code	Group	Isotope	Activity Units	Aliquot Units	ProcedureNo	RDL	LCS_LL	LCS_UL	MS_LL	MS_UL	RadY_LL	RadY_UL	GravY_LL	GravY_LL	RER	RPD	DiltionReq	RoughPrepReq	BlankCorrectionMDA	BlankCorrectionAll	CountTimeReq	AliquotRequired
LSC-A-021	STD	H-3		TU	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		TU	ARS-054	0.00E+00	75	125	60	140	30	110	40	110	1.00	25	FALSE	FALSE	FALSE	FALSE		

SDG Report - Analysis Assignments

Temp SDG	ARS1-10-01408	Sample Count	1
Client	Los Alamos National Laboratory	Analysis Count	2-2

Samples Count Totals per Analysis

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

Analyses Assigned Per Fraction

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

SDG Report - Samples and Containers

SDG Specific Data

SDG	ARS1-10-01408	TAT Days	30	Project Type	Environmental
Sample Count	1 Rpt Level 4	Date Received	6/24/2010	COC Number	10-3478
Client	Los Alamos National Laboratory	Client Deadline	7/23/2010	PO Number	WEPR1158W100
Client Code	114	Internal Deadline	7/22/2010	Job Number	63641-001-10
Profile Number	PN-00094	Lab Deadline	7/20/2010	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	BUCKMAN08-10-16997	AQ	06/22/10 12:00 PM	06/22/10 12:00 PM	H	90	5	E3							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	63706	1	1108.00				50	28		N	N/A				

ARS FILE TRACKING SHEET

SDG: 10-01408

Task	Date / Time	Initials
Date & Time Samples Received	06-24-10/10:10	N.P
ICOC Initiated / Storage Location: E3	06-24-10/16:20	N.P.
Technical Checks Performed	— See batch —	
Report Written / EDD Generated: 9-28-10/1423 | SDL (Date/Time, Initials)	9-28-10/1421	SDL
Quality Assurance Checks Performed on Report	— NA —	
Management Check Performed on Report	9-28-10 0955	[illegible]
Preliminary Report Sent		
Report E-mailed	9-29-10/956	SDL
Report Faxed	— NA —	
Report Reviewed	10-6-10/1600	MC
Report Mailed	NA.	
Invoice Completed Invoice #: 1001911	9-30-10/0842	[illegible]
Report Imaged	10-6-10/1616	MC

SPECIAL REQUIREMENTS

Requirement	Yes	No
3 Hour Rush		✓
24 Hour Rush		✓
48 Hour Rush		✓
Special Invoicing *see notes* Mgmt. Approval:		✓

NOTES:

ARS-062
04/23/2010

COMPANY NAME: LANL **SDG:** 10-0190

SHIPPING CONTAINER

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

COC PRESENT WITH SAMPLES

COC	☑ Yes	☐ No

SAMPLE CONTAINER(S)

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

Samples Rcv: 1

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

External and Internal Surveys

Exposure Rate Meter:	M3242861	Serial No.:	442PR264266	Calibration Due Date:	4-19-11
Count Rate Meter:	D2154859	Serial No.:	442PR184559	Calibration Due Date:	4-6-11
Background Exposure Rate (µR/hr)	26	Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd)	26	µR/hr	
Background Count Rate (cpm)	50	Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd)	50	cpm	
		Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd)	50	cpm	

Sample Label/Comments/Notes	pH Orig (pH ≤ 2 is Acceptable)	pH Final	Mark if Preserve	Acid Lot #	Weight(g) / Volume(mL)	µR/hr (Acceptance Limits <500 µR/hr)	cpm (Acceptance Limits <100 cpm/cm²)
Beckman 08-10-16994	—	N/A	—	—	1108	28	50

Surveyors' Name: Heath Pa

Date/Time Surveyed: 6-24-10 15:49

Wednesday, June 23, 2010

REQUEST NUMBER: 10-3478

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

These Samples are on:
LANL Request Number:10-3478
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples according to the schedule indicated:

SHIP DATE: 6/23/2010
TURNAROUND/REPORT DUE: 7/23/2010
TURNAROUND REQ'D: 30 Days

RAD SCREENING: Yes, Below Background
LAB REQUEST COMMENTS:

LANL ER SMO CONTACT:
Signature:

PRIORITY	METHOD CODE	CNTNR	SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	SPECIAL INSTRUCTIONS
	Generic:Low_Level_Tritium	1	Buckman08-10-16994	WG	6/22/2010	

Final Page of REQUEST NUMBER 10-3478

Wednesday, June 23, 2010

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 10-3478C

REQUEST NUMBER: 10-3478

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806
LAB REQUEST COMMENTS:

TURNAROUND/REPORT DUE: 7/23/2010
TURNAROUND REQ'D: 30

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman08-10-16994	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:		Date	Time	Received By:		Date	Time
[illegible]		6/23/10	3:00	Heath Pass	Heath Pass	6-24-10	10:10
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		
Printed Name	Signature			Printed Name	Signature		

Received for DISPOSAL By:	Date	Time	Remarks:
Printed Name	Signature		

ARS INTERNATIONAL

2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Request Number: 11-1637

Revised SDL 9-21-11

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 11-1637

Original COC

Wednesday, March 16, 2011

REQUEST NUMBER: 11-1637

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

These Samples are on:
LANL Request Number:11-1637
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples according to the schedule indicated:

SHIP DATE: 3/16/2011
TURNAROUND/REPORT DUE: 4/15/2011
TURNAROUND REQ'D: 30 Days

RAD SCREENING: Not Required
LAB REQUEST COMMENTS:

LANL ER SMO CONTACT:
Signature:

PRIORITY	METHOD CODE	CNTNR	SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	SPECIAL INSTRUCTIONS
	Generic:Low_Level_Tritium	1	Buckman1-11-5682	WG	3/14/2011	
		1	Buckman06-11-5683	WG	3/14/2011	
		1	Buckman08-11-5684	WG	3/14/2011	

Final Page of REQUEST NUMBER 11-1637

Wednesday, March 16, 2011

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 11-1637C

REQUEST NUMBER: 11-1637

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

TURNAROUND/REPORT DUE: 4/15/2011
TURNAROUND REQ'D: 30

LAB REQUEST COMMENTS:

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman1-11-5682	1	POLY	WSP-LL-H-3	None	WG
Buckman06-11-5683	1	POLY	WSP-LL-H-3	None	WG
Buckman08-11-5684	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:	Date	Time	Received By:	Date	Time
Signature			Signature		
Signature	3/16/11	1400	Signature	3-17-11	10:09
Signature			Signature		

Received for DISPOSAL By: **Date** **Time** **Remarks:**

Signature

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 11-1637

Case Narrative

ARS INTERNATIONAL

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June 24, 2011

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

Request Number: **11-1637**
LANL Sample ID: **Buckman1-11-5682; Buckman06-11-5683; Buckman08-11-5684.**

Dear Mr. Greene;

On March 17, 2011, ARS International received three (3) water samples to be analyzed for Low Level Tritium.

The samples underwent enrichment and were counted using the appropriate counting equipment and QA/QC for this type of analysis. Results of the analysis and QA/QC are attached in the data package.

The client and QA/QC samples were counted with a count time sufficient to meet quality control parameters for counting equipment and were within acceptance criteria and statistical sound detection limits.

If you have any questions please do not hesitate to call at 225.381.2991 or email LANL@amrad.com.

Sincerely,

Virgene Mulligan

Laboratory Management
ARS International

ARS INTERNATIONAL

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

COVER PAGE

PROJECT SAMPLE IDENTIFICATION CROSS-REFERENCE TO ARS SAMPLE LABORATORY IDs

Subcontract (LANL Agreement Number) 63641-001-10

Request Number	LANL PROJECT SAMPLE ID NUMBER	American Radiation Services SAMPLE ID NUMBER(S)
11-1637	Buckman1-11-5682	ARS1-11-00547-001
11-1637	Buckman06-11-5683	ARS1-11-00547-002
11-1637	Buckman08-11-5684	ARS1-11-00547-003

ANALYTICAL METHODS

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

ANALYTICAL RESULTS

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

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	Title	Date
Virgene Mulligan	Laboratory Management, ARS International	6-24-11

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

~~B10-01170~~ SDL 9-21-11

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

ARS Sample Delivery Group:	ARS1-11-00547	**Request or PO Number:**	11-1637
Client Sample ID:	Buckman1-11-5682	**ARS Sample ID:**	ARS1-11-00547-001
Sample Collection Date:	03/14/11	**Date Received:**	03/17/11
Sample Matrix:	Aqueous	**Report Date:**	08/18/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.300	0.210	0.680	0.330	U	TU	ARS-040	06/21/11 23:51	JR	NA

NOTES: Project Cost Code WEPR1158W100

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 the American Radiation Services, Inc.*

LELAP Certificate# 01949 NELAP Certificate # E87558

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-11-00547	**Request or PO Number:**	11-1637
Client Sample ID:	Buckman06-11-5683	**ARS Sample ID:**	ARS1-11-00547-002
Sample Collection Date:	03/14/11	**Date Received:**	03/17/11
Sample Matrix:	Aqueous	**Report Date:**	08/18/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.280	0.250	0.820	0.390	U	TU	ARS-040	06/22/11 03:04	JR	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

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

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ARS Sample Delivery Group:	ARS1-11-00547	**Request or PO Number:**	11-1637
Client Sample ID:	Buckman08-11-5684	**ARS Sample ID:**	ARS1-11-00547-003
Sample Collection Date:	03/14/11	**Date Received:**	03/17/11
Sample Matrix:	Aqueous	**Report Date:**	08/18/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	-0.250	0.250	0.810	0.390	U	TU	ARS-040	06/22/11 06:16	JR	NA

NOTES: Project Cost Code WEPR1158W100

Project Manager Review

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

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ARS INTERNATIONAL
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QC Results Report

Sample Delivery Group: ARS1-11-00547
Date Received: 3/17/2011

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-B11-01170	LCS	H3	7.120	1.120	0.710	8.128		TU	ARS-040	6/21/11 14:19	JR	88	75%-125%

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-B11-01170	MBL	H3	-0.020	0.190	0.640	NA	U	TU	ARS-040	6/21/11 20:40	JR

Sample RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER AcceptanceRange
ARS1-B11-01170	LCSD	H3	7.120	1.120	8.110	1.270		TU	ARS-040	6/21/11 17:29	JR	0.41	< 1

Sample DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER AcceptanceRange
ARS1-B11-01170	LCSD	H3	7.120	1.120	8.110	1.270		TU	ARS-040	6/21/11 17:29	JR	1.17	< 3

Susan Keese
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

Expected Value Calculations

LANL

ARS Batch Number: ARS1-B10 - 01170

			pCi/L				TU
LCS	**CALCULATED EXPECTED VALUE**	=	26.179				8.128
			Range	20.943	-	31.414	
LCSD	**CALCULATED EXPECTED VALUE**	=	26.162				8.122
			Range	20.930	-	31.395	

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Samples

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	ARS1-11-00547;548;549;601;602
ARS Batch ID Number	ARS1-B11-01170

Enrichment Factor Curve coeff. - Power y = a * x^b		Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	8.978E-01	a	-2.319E-06
b	-9.611E-01	b	2.724E-03
c		c	-1.060E+00
		d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	TU
Coverage Factor	1	UCF	7.151
		Aliquot must be entered in liters!!	

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
B11-01170-01	504.33	2.00	11.92	2.06	9.86	0.02	39.40	5.71	1.41	485.51	0.3009	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	7.12	0.33	0.33	1.12	0.71	0.34	TU
B11-01170-02	504.65	2.00	13.03	2.06	10.97	0.02	35.59	5.85	1.41	492.59	0.3022	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	8.11	0.37	0.37	1.27	0.78	0.38	TU
B11-01170-03	506.24	2.00	12.35	2.06	10.29	0.02	37.96	1.40	1.41	513.56	0.3058	0.00800	L	6/21/2011	6/21/2011	180	180	0.99999	-0.02	0.19	0.19	0.19	0.64	0.31	TU
B11-01170-04	506.02	2.02	11.63	2.08	9.55	0.02	40.77	1.60	1.41	406.43	0.2720	0.00804	L	3/14/2011	6/21/2011	180	180	0.98636	0.30	0.21	0.21	0.21	0.68	0.33	TU
B11-01170-05	503.20	2.01	13.71	2.07	11.64	0.02	33.52	1.56	1.41	410.46	0.2740	0.00807	L	3/14/2011	6/22/2011	180	180	0.98622	0.28	0.25	0.25	0.25	0.82	0.39	TU
B11-01170-06	505.38	2.00	13.63	2.06	11.57	0.02	33.86	1.28	1.41	411.21	0.2744	0.00803	L	3/14/2011	6/22/2011	180	180	0.98622	-0.25	0.23	0.23	0.24	0.81	0.39	TU
B11-01170-07	504.43	2.03	11.13	2.09	9.04	0.02	42.85	1.45	1.41	402.05	0.2699	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	0.06	0.19	0.19	0.19	0.66	0.32	TU
B11-01170-08	516.63	1.99	12.43	2.05	10.38	0.02	38.38	3.21	1.41	403.70	0.2707	0.00757	L	3/11/2011	6/22/2011	180	180	0.98581	3.24	0.29	0.29	0.57	0.77	0.37	TU
B11-01170-09	511.23	2.00	12.16	2.06	10.10	0.02	39.01	4.49	1.41	410.77	0.2742	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	5.10	0.30	0.30	0.82	0.71	0.34	TU
B11-01170-10	509.67	2.01	11.75	2.07	9.68	0.02	40.52	1.47	1.41	412.42	0.2750	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	0.09	0.20	0.20	0.20	0.68	0.33	TU
B11-01170-11	511.88	1.99	11.49	2.05	9.44	0.02	41.68	1.49	1.41	410.95	0.2743	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	0.12	0.20	0.20	0.20	0.66	0.32	TU
B11-01170-12	504.59	1.99	10.63	2.05	8.58	0.02	45.06	1.33	1.41	307.62	0.2155	0.00820	L	3/11/2011	6/23/2011	180	180	0.98568	-0.15	0.22	0.22	0.22	0.76	0.37	TU
B11-01170-13	508.51	2.00	11.07	2.06	9.01	0.02	43.31	1.50	1.41	422.58	0.2800	0.00800	L	3/10/2011	6/23/2011	180	180	0.98554	0.13	0.19	0.19	0.19	0.62	0.30	TU
B11-01170-14	507.87	2.02	11.43	2.08	9.35	0.02	41.75	1.36	1.41	415.81	0.2766	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-0.08	0.19	0.19	0.19	0.66	0.32	TU
B11-01170-17	498.51	2.00	10.47	2.06	8.41	0.02	45.40	1.37	1.41	414.25	0.2759	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-0.06	0.18	0.18	0.18	0.61	0.29	TU
B11-01170-18	501.98	2.00	11.43	2.06	9.37	0.02	41.20	1.32	1.41	422.34	0.2799	0.00800	L	3/18/2011	6/23/2011	180	180	0.98663	-0.14	0.19	0.19	0.19	0.66	0.32	TU
B11-01170-19	503.31	2.01	11.35	2.07	9.28	0.02	41.69	1.49	1.41	418.98	0.2782	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	0.12	0.19	0.19	0.19	0.65	0.31	TU
B11-01170-20	504.40	1.99	11.82	2.05	9.77	0.02	39.76	1.44	1.41	414.60	0.2761	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	0.04	0.20	0.20	0.20	0.69	0.33	TU
B11-01170-21	508.41	2.01	10.35	2.07	8.28	0.02	46.97	1.46	1.41	411.26	0.2744	0.00800	L	3/17/2011	6/23/2011	180	180	0.9865	0.06	0.17	0.17	0.17	0.59	0.28	TU
B11-01170-22	502.58	2.00	10.51	2.06	8.45	0.02	45.55	1.44	1.41	412.08	0.2748	0.00800	L	3/18/2011	6/24/2011	180	180	0.9865	0.04	0.18	0.18	0.18	0.60	0.29	TU
B11-01170-23	487.79	1.99	10.56	2.05	8.51	0.02	43.96	1.31	1.41	411.69	0.2746	0.00800	L	3/17/2011	6/24/2011	180	180	0.98636	-0.15	0.18	0.18	0.18	0.63	0.30	TU

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	ARS1-11-00547;548;549;601;602
ARS Batch ID Number	ARS1-B11-01170

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8.978E-01
b	-9.611E-01
c	

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	pCi
Coverage Factor	1	UCF	2.22

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
B11-01170-01	504.33	2.00	11.92	2.06	9.86	0.02	39.40	5.71	1.41	485.51	0.3009	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	22.95	1.06	1.06	3.60	2.28	1.10	pCi/L
B11-01170-02	504.65	2.00	13.03	2.06	10.97	0.02	35.59	5.85	1.41	492.59	0.3022	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	26.12	1.18	1.18	4.09	2.52	1.21	pCi/L
B11-01170-03	506.24	2.00	12.35	2.06	10.29	0.02	37.96	1.40	1.41	513.56	0.3058	0.00800	L	6/21/2011	6/21/2011	180	180	0.99999	-0.06	0.61	0.61	0.61	2.07	1.00	pCi/L
B11-01170-04	506.02	2.02	11.63	2.08	9.55	0.02	40.77	1.60	1.41	406.43	0.2720	0.00804	L	3/14/2011	6/21/2011	180	180	0.98636	0.96	0.66	0.66	0.68	2.19	1.06	pCi/L
B11-01170-05	503.20	2.01	13.71	2.07	11.64	0.02	33.52	1.56	1.41	410.46	0.2740	0.00807	L	3/14/2011	6/22/2011	180	180	0.98622	0.91	0.79	0.79	0.80	2.63	1.27	pCi/L
B11-01170-06	505.38	2.00	13.63	2.06	11.57	0.02	33.86	1.28	1.41	411.21	0.2744	0.00803	L	3/14/2011	6/22/2011	180	180	0.98622	-0.81	0.75	0.75	0.76	2.62	1.26	pCi/L
B11-01170-07	504.43	2.03	11.13	2.09	9.04	0.02	42.85	1.45	1.41	402.05	0.2699	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	0.18	0.62	0.62	0.62	2.11	1.02	pCi/L
B11-01170-08	516.63	1.99	12.43	2.05	10.38	0.02	38.38	3.21	1.41	403.70	0.2707	0.00757	L	3/11/2011	6/22/2011	180	180	0.98581	10.44	0.93	0.93	1.82	2.48	1.20	pCi/L
B11-01170-09	511.23	2.00	12.16	2.06	10.10	0.02	39.01	4.49	1.41	410.77	0.2742	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	16.43	0.97	0.97	2.65	2.28	1.10	pCi/L
B11-01170-10	509.67	2.01	11.75	2.07	9.68	0.02	40.52	1.47	1.41	412.42	0.2750	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	0.29	0.65	0.65	0.65	2.19	1.06	pCi/L
B11-01170-11	511.88	1.99	11.49	2.05	9.44	0.02	41.68	1.49	1.41	410.95	0.2743	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	0.38	0.63	0.63	0.64	2.14	1.03	pCi/L
B11-01170-12	504.59	1.99	10.63	2.05	8.58	0.02	45.06	1.33	1.41	307.62	0.2155	0.00820	L	3/11/2011	6/23/2011	180	180	0.98568	-0.48	0.71	0.71	0.71	2.45	1.18	pCi/L
B11-01170-13	508.51	2.00	11.07	2.06	9.01	0.02	43.31	1.50	1.41	422.58	0.2800	0.00800	L	3/10/2011	6/23/2011	180	180	0.98554	0.41	0.60	0.60	0.60	2.01	0.97	pCi/L
B11-01170-14	507.87	2.02	11.43	2.08	9.35	0.02	41.75	1.36	1.41	415.81	0.2766	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-0.26	0.61	0.61	0.62	2.11	1.02	pCi/L
B11-01170-17	498.51	2.00	10.47	2.06	8.41	0.02	45.40	1.37	1.41	414.25	0.2759	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-0.20	0.57	0.57	0.57	1.95	0.94	pCi/L
B11-01170-18	501.98	2.00	11.43	2.06	9.37	0.02	41.20	1.32	1.41	422.34	0.2799	0.00800	L	3/18/2011	6/23/2011	180	180	0.98663	-0.46	0.61	0.61	0.61	2.11	1.02	pCi/L
B11-01170-19	503.31	2.01	11.35	2.07	9.28	0.02	41.69	1.49	1.41	418.98	0.2782	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	0.38	0.63	0.63	0.63	2.10	1.01	pCi/L
B11-01170-20	504.40	1.99	11.82	2.05	9.77	0.02	39.76	1.44	1.41	414.60	0.2761	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	0.14	0.65	0.65	0.66	2.22	1.07	pCi/L
B11-01170-21	508.41	2.01	10.35	2.07	8.28	0.02	46.97	1.46	1.41	411.26	0.2744	0.00800	L	3/17/2011	6/23/2011	180	180	0.9865	0.21	0.56	0.56	0.56	1.89	0.91	pCi/L
B11-01170-22	502.58	2.00	10.51	2.06	8.45	0.02	45.55	1.44	1.41	412.08	0.2748	0.00800	L	3/18/2011	6/24/2011	180	180	0.9865	0.12	0.57	0.57	0.57	1.95	0.94	pCi/L
B11-01170-23	487.79	1.99	10.56	2.05	8.51	0.02	43.96	1.31	1.41	411.69	0.2746	0.00800	L	3/17/2011	6/24/2011	180	180	0.98636	-0.49	0.58	0.58	0.59	2.02	0.97	pCi/L

QC Evaluation

EPA Method: ARS-040
Batch ID: ARS1-B11-01170
SDG's: ARS1-11-00547; 548; 549; 601; 602

LCS	22.9500	**CSU (2s)**	7.0400
LCSD	26.1200	**CSU-D (2s)**	8.0200

DER = abs(LSC-LSCD) / sqr((2s CSU/2)^2)+((2s CSU-D/2)^2) *at 1 sigma* = **< 3**

DER 3.17 / 5.335775 = 0.594103 **< 3**

% RPD= ABS(LCS - LSCD) / (LCS+LCSD)/2 * 100 = **< 25%**

%RPD 3.17 / 24.535 *100 = 12.92032 **< 25%**

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

RER= abs((LCS-LCSD)) / (CSU)+(CSD) *at 2 sigma* = **<1** ***<--LANL Requirement***

RER = 3.17 / 15.0600 0.210491368 **<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	-0.06	1.19	2.07	
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 = -0.06
CSU = 1.19
Is ACT<1.65*CSU? **YES**

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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B11-01170**

Method	ARS-054	Analysis	LSC-A-022	Matrix	AQ
Description	Low Level Tritium by Electrolytic Enrichment				

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B11-01170-01	LCS	B-11324								
ARS1-B11-01170-02	LCSD	B-11325								
ARS1-B11-01170-03	MBL									
ARS1-B11-01170-04	TRG				**ARS1-11-00547**	001	1	Buckman1-11-5682	STD	04/12/11
ARS1-B11-01170-05	TRG				**ARS1-11-00547**	002	1	Buckman06-11-5683	STD	04/12/11
ARS1-B11-01170-06	TRG				**ARS1-11-00547**	003	1	Buckman08-11-5684	STD	04/12/11
ARS1-B11-01170-07	TRG				**ARS1-11-00548**	001	1	CALA-11-5224	STD	04/12/11
ARS1-B11-01170-08	TRG				**ARS1-11-00548**	002	1	CALA-11-5227	STD	04/12/11
ARS1-B11-01170-09	TRG				**ARS1-11-00549**	001	1	CAPU-11-5282	STD	04/12/11
ARS1-B11-01170-10	TRG				**ARS1-11-00549**	002	1	CAPU-11-5283	STD	04/12/11
ARS1-B11-01170-11	TRG				**ARS1-11-00549**	003	1	CAPU-11-5290	STD	04/12/11
ARS1-B11-01170-12	TRG				**ARS1-11-00549**	004	1	CAPU-11-5296	STD	04/12/11
ARS1-B11-01170-13	TRG				**ARS1-11-00549**	005	1	CAPU-11-5301	STD	04/12/11
ARS1-B11-01170-14	TRG				**ARS1-11-00549**	006	1	CAPU-11-5304	STD	04/12/11
ARS1-B11-01170-17	TRG				**ARS1-11-00549**	009	1	CAPU-11-5292	STD	04/12/11
ARS1-B11-01170-18	TRG				**ARS1-11-00601**	001	1	CAPU-11-5264	STD	04/18/11
ARS1-B11-01170-19	TRG				**ARS1-11-00601**	002	1	CAPU-11-5269	STD	04/18/11
ARS1-B11-01170-20	TRG				**ARS1-11-00601**	003	1	CAPU-11-5298	STD	04/18/11
ARS1-B11-01170-21	TRG				**ARS1-11-00602**	001	1	CALA-11-5106	STD	04/18/11
ARS1-B11-01170-22	TRG				**ARS1-11-00602**	002	1	CALA-11-5110	STD	04/18/11
ARS1-B11-01170-23	TRG				**ARS1-11-00602**	003	1	CALA-11-5173	STD	04/18/11

89419 11-00547-001-1 **XRAD**

89420 11-00547-002-1 **XRAD**

89421 11-00547-003-1 **XRAD**

89422 11-00548-001-1 **XRAD**

89423 11-00548-002-1 **XRAD**

89424 11-00549-001-1 **XRAD**

89425 11-00549-002-1 **XRAD**

89426 11-00549-003-1 **XRAD**

89427 11-00549-004-1 **XRAD**

89428 11-00549-005-1 **XRAD**

89429 11-00549-006-1 **XRAD**

89430 11-00549-009-1 **XRAD**

89431 11-00601-001-1 **XRAD**

89432 11-00601-002-1 **XRAD**

89433 11-00601-003-1 **XRAD**

89434 11-00602-001-1 **XRAD**

89435 11-00602-002-1 **XRAD**

89436 11-00602-003-1 **XRAD**

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B11-01170**

Method	ARS-054	Analysis	LSC-A-022	Matrix	AQ
Description	Low Level Tritium by Electrolytic Enrichment				

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B11-01170-01	LCS	B-11324								
ARS1-B11-01170-02	LCSD	B-11325								
ARS1-B11-01170-03	MBL									
ARS1-B11-01170-04	TRG				**ARS1-11-00547**	001	1	Buckman1-11-5682	STD	04/12/11
ARS1-B11-01170-05	TRG				**ARS1-11-00547**	002	1	Buckman06-11-5683	STD	04/12/11
ARS1-B11-01170-06	TRG				**ARS1-11-00547**	003	1	Buckman08-11-5684	STD	04/12/11
ARS1-B11-01170-07	TRG				**ARS1-11-00548**	001	1	CALA-11-5224	STD	04/12/11
ARS1-B11-01170-08	TRG				**ARS1-11-00548**	002	1	CALA-11-5227	STD	04/12/11
ARS1-B11-01170-09	TRG				**ARS1-11-00549**	001	1	CAPU-11-5282	STD	04/12/11
ARS1-B11-01170-10	TRG				**ARS1-11-00549**	002	1	CAPU-11-5283	STD	04/12/11
ARS1-B11-01170-11	TRG				**ARS1-11-00549**	003	1	CAPU-11-5290	STD	04/12/11
ARS1-B11-01170-12	TRG				**ARS1-11-00549**	004	1	CAPU-11-5296	STD	04/12/11
ARS1-B11-01170-13	TRG				**ARS1-11-00549**	005	1	CAPU-11-5301	STD	04/12/11
ARS1-B11-01170-14	TRG				**ARS1-11-00549**	006	1	CAPU-11-5304	STD	04/12/11
ARS1-B11-01170-15	TRG				**ARS1-11-00549**	007	1	CAPU-11-5308	STD	04/12/11
ARS1-B11-01170-16	TRG				**ARS1-11-00549**	008	1	CAPU-11-5311	STD	04/12/11
ARS1-B11-01170-17	TRG				**ARS1-11-00549**	009	1	CAPU-11-5292	STD	04/12/11
ARS1-B11-01170-18	TRG				**ARS1-11-00601**	001	1	CAPU-11-5264	STD	04/18/11
ARS1-B11-01170-19	TRG				**ARS1-11-00601**	002	1	CAPU-11-5269	STD	04/18/11
ARS1-B11-01170-20	TRG				**ARS1-11-00601**	003	1	CAPU-11-5298	STD	04/18/11
ARS1-B11-01170-21	TRG				**ARS1-11-00602**	001	1	CALA-11-5106	STD	04/18/11
ARS1-B11-01170-22	TRG				**ARS1-11-00602**	002	1	CALA-11-5110	STD	04/18/11
ARS1-B11-01170-23	TRG				**ARS1-11-00602**	003	1	CALA-11-5173	STD	04/18/11

4-1-11 1134
JDR ARS1-B11-01170-15 and ARS1-B11-01170-16 deleted from current batch b/c samples failed screening criteria twice.

American Radiation Services
Baton Rouge Laboratory

LCS Report
Analytical Batch: ARS1-B11-01170

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-11324	ARS1-B11-01170	ARS1-B11-01170-01	B-H3	S-0206	H-3	5	2.698567445	17.31	22.31	5	VMULLIGAN	1/31/2011			
B-11325	ARS1-B11-01170	ARS1-B11-01170-02	B-H3	S-0206	H-3	5	2.698567445	17.35	22.35	5	VMULLIGAN	1/31/2011			

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
9028	ARS1-B11-01170	ARS1-B11-01170-01		8	g					JRABER	06/21/2011 10:46:42
9029	ARS1-B11-01170	ARS1-B11-01170-02		8	g					JRABER	06/21/2011 10:46:42
9030	ARS1-B11-01170	ARS1-B11-01170-03		8	g					JRABER	06/21/2011 10:46:42
9031	ARS1-B11-01170	ARS1-B11-01170-04	Buckman1-11-5682	8.04	g	89419				JRABER	06/21/2011 10:46:42
9032	ARS1-B11-01170	ARS1-B11-01170-05	Buckman06-11-5683	8.07	g	89420				JRABER	06/21/2011 10:46:42
9033	ARS1-B11-01170	ARS1-B11-01170-06	Buckman08-11-5684	8.03	g	89421				JRABER	06/21/2011 10:46:42
9034	ARS1-B11-01170	ARS1-B11-01170-07	CALA-11-5224	8	g	89422				JRABER	06/21/2011 10:46:43
9035	ARS1-B11-01170	ARS1-B11-01170-08	CALA-11-5227	7.57	g	89423				JRABER	06/21/2011 10:46:43
9036	ARS1-B11-01170	ARS1-B11-01170-09	CAPU-11-5282	8	g	89424				JRABER	06/21/2011 10:46:43
9037	ARS1-B11-01170	ARS1-B11-01170-10	CAPU-11-5283	8	g	89425				JRABER	06/21/2011 10:46:43
9038	ARS1-B11-01170	ARS1-B11-01170-11	CAPU-11-5290	8	g	89426				JRABER	06/21/2011 10:46:43
9039	ARS1-B11-01170	ARS1-B11-01170-12	CAPU-11-5296	8.2	g	89427				JRABER	06/21/2011 10:46:43
9040	ARS1-B11-01170	ARS1-B11-01170-13	CAPU-11-5301	8	g	89428				JRABER	06/21/2011 10:46:43
9041	ARS1-B11-01170	ARS1-B11-01170-14	CAPU-11-5304	8	g	89429				JRABER	06/21/2011 10:46:43
9042	ARS1-B11-01170	ARS1-B11-01170-17	CAPU-11-5292	8	g	89430				JRABER	06/21/2011 10:46:43
9043	ARS1-B11-01170	ARS1-B11-01170-18	CAPU-11-5264	8	g	89431				JRABER	06/21/2011 10:46:43
9044	ARS1-B11-01170	ARS1-B11-01170-19	CAPU-11-5269	8	g	89432				JRABER	06/21/2011 10:46:43
9045	ARS1-B11-01170	ARS1-B11-01170-20	CAPU-11-5298	8	g	89433				JRABER	06/21/2011 10:46:43
9046	ARS1-B11-01170	ARS1-B11-01170-21	CALA-11-5106	8	g	89434				JRABER	06/21/2011 10:46:43
9047	ARS1-B11-01170	ARS1-B11-01170-22	CALA-11-5110	8	g	89435				JRABER	06/21/2011 10:46:44
9048	ARS1-B11-01170	ARS1-B11-01170-23	CALA-11-5173	8	g	89436				JRABER	06/21/2011 10:46:44

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\20110621_1056
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\20110621_1056.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\LLH3.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL 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
Count Time (min): 180.00
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	0.0	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				

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\20110621_1056
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\20110621_1056.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\LLH3.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110621_1056\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL 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
Count Time (min): 180.00
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	0.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

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

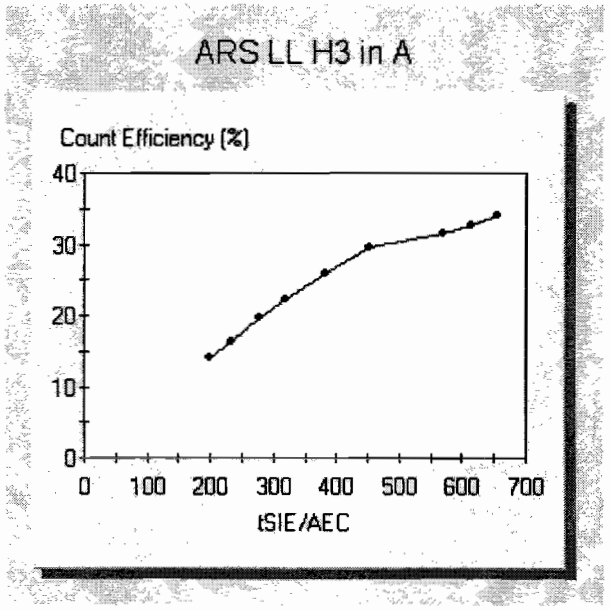
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 11/19/2010
Date Modified:
ARS LL H3 in A

tSIE/AEC	Count Efficiency (%)
655.11	34.08
613.27	32.77
569.42	31.54
454.14	29.55
383.12	26.06
318.52	22.25
280.21	19.79
235.97	16.48
199.12	13.98

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	180.00	6.915	25.08	413.84	27.57	6/21/2011	11:05:54 AM	*
2	2	B11-01170-01	180.00	5.712	18.98	485.51	30.09	6/21/2011	2:19:16 PM	
2	3	B11-01170-02	180.00	5.849	19.36	492.59	30.22	6/21/2011	5:29:53 PM	
2	4	B11-01170-03	180.00	1.403	4.59	513.56	30.58	6/21/2011	8:40:34 PM	
2	5	B11-01170-04	180.00	1.599	5.88	406.43	27.20	6/21/2011	11:51:14 PM	
2	6	B11-01170-05	180.00	1.555	5.67	410.46	27.40	6/22/2011	3:04:06 AM	
2	7	B11-01170-06	180.00	1.284	4.68	411.21	27.44	6/22/2011	6:16:52 AM	
2	8	B11-01170-07	180.00	1.452	5.38	402.05	26.99	6/22/2011	9:27:40 AM	
2	9	B11-01170-08	180.00	3.214	11.87	403.70	27.07	6/22/2011	12:38:13 PM	
2	10	B11-01170-09	180.00	4.492	16.39	410.77	27.42	6/22/2011	3:48:52 PM	
2	11	B11-01170-10	180.00	1.473	5.36	412.42	27.50	6/22/2011	6:59:28 PM	
2	12	B11-01170-11	180.00	1.491	5.44	410.95	27.43	6/22/2011	10:10:01 PM	
2	13	B11-01170-12	180.00	1.333	6.19	307.62	21.55	6/23/2011	1:20:41 AM	
2	14	B11-01170-13	180.00	1.503	5.37	422.58	28.00	6/23/2011	4:31:15 AM	
2	15	B11-01170-14	180.00	1.358	4.91	415.81	27.66	6/23/2011	7:41:49 AM	
2	16	B11-01170-17	180.00	1.372	4.97	414.25	27.59	6/23/2011	10:52:20 AM	
2	17	B11-01170-18	180.00	1.316	4.70	422.34	27.99	6/23/2011	2:02:50 PM	
2	18	B11-01170-19	180.00	1.491	5.36	418.98	27.82	6/23/2011	5:13:10 PM	
2	19	B11-01170-20	180.00	1.440	5.22	414.60	27.61	6/23/2011	8:23:44 PM	
2	20	B11-01170-21	180.00	1.458	5.31	411.26	27.44	6/23/2011	11:34:13 PM	
2	21	B11-01170-22	180.00	1.436	5.23	412.08	27.48	6/24/2011	2:44:47 AM	
2	22	B11-01170-23	180.00	1.314	4.78	411.69	27.46	6/24/2011	5:55:18 AM	
2	23	~~Sample #23~~	180.00	1.413	5.15	411.01	27.43	6/24/2011	9:05:49 AM	

2nd Background
8mL's of dead H_2O
w/ 12mL's cocktail

JDR 6-24-2011

Tritium Enrichment Data

Procedures: ARS-040

Date: 4/7/2011

ARS File ID Numbers: ARS1-11-00547; -11-00548; -11-00549; -11-0(

ARS Batch ID: ARS1-B11-01170

		Vf								Aliquot					
	A Batch ID:	Gross Sample Recovered	Enrichment factor	Cryo-Distil Flask #	Tare Wt Cryo-distil flask	Gross Wt flask + Sample	Recovered Water	Tare Weight of LSC Vial	Vial + Sample	Net Sample	*Wt of Vial, Sample& Dead Water Filler If used*	*Net Dead Water Added*	Tare Wt b/f Cocktail	Gross Wt Vial + Sample + Cocktail	Net Wt of Cocktail Added
1	ARS1-B11-01170-01	11.92	42.31	N/A,N/A	101.67	110.71	9.04	6.42	14.42	8.00	0.00	0.00	14.42	26.41	11.99
2	ARS1-B11-01170-02	13.03	38.73	N/A,N/A	116.55	125.71	9.16	6.42	14.42	8.00	0.00	0.00	14.42	26.42	12.00
3	ARS1-B11-01170-03	12.35	40.99	N/A,N/A	93.78	102.81	9.03	6.43	14.43	8.00	0.00	0.00	14.43	26.42	11.99
4	ARS1-B11-01170-04	11.63	43.51	N/A,N/A	99.80	108.08	8.28	6.51	14.55	8.04	0.00	0.00	14.55	26.55	12.00
5	ARS1-B11-01170-05	13.71	36.70	N/A,N/A	116.55	126.88	10.33	6.54	14.61	8.07	0.00	0.00	14.61	26.60	11.99
6	ARS1-B11-01170-06	13.63	37.08	N/A,N/A	93.06	101.87	8.81	6.60	14.63	8.03	0.00	0.00	14.63	26.63	12.00
7	ARS1-B11-01170-07	11.13	45.32	N/A,N/A	101.91	109.97	8.06	6.42	14.42	8.00	0.00	0.00	14.42	26.41	11.99
8	ARS1-B11-01170-08	12.43	41.56	N/A,N/A	93.79	101.46	7.67	6.41	13.98	7.57	14.46	0.48	14.46	26.45	11.99
9	ARS1-B11-01170-09	12.16	42.04	N/A,N/A	101.67	110.55	8.88	6.53	14.53	8.00	0.00	0.00	14.53	26.53	12.00
10	ARS1-B11-01170-10	11.75	43.38	N/A,N/A	97.03	105.03	8.00	6.42	14.42	8.00	0.00	0.00	14.42	26.41	11.99
11	ARS1-B11-01170-11	11.49	44.55	N/A,N/A	101.66	109.66	8.00	6.41	14.41	8.00	0.00	0.00	14.41	26.41	12.00
12	ARS1-B11-01170-12	10.63	47.47	N/A,N/A	93.05	101.07	8.02	6.43	14.63	8.20	0.00	0.00	14.63	26.62	11.99
13	ARS1-B11-01170-13	11.07	45.94	N/A,N/A	97.35	105.36	8.01	6.51	14.51	8.00	0.00	0.00	14.51	26.50	11.99
14	ARS1-B11-01170-14	11.43	44.43	N/A,N/A	99.51	107.51	8.00	6.53	14.53	8.00	0.00	0.00	14.53	26.54	12.01
15	ARS1-B11-01170-17	10.47	47.61	N/A,N/A	103.57	111.59	8.02	6.42	14.42	8.00	0.00	0.00	14.42	26.42	12.00
16	ARS1-B11-01170-18	11.43	43.92	N/A,N/A	107.38	115.39	8.01	6.42	14.42	8.00	0.00	0.00	14.42	26.41	11.99
17	ARS1-B11-01170-19	11.35	44.34	N/A,N/A	96.03	104.04	8.01	6.39	14.39	8.00	0.00	0.00	14.39	26.41	12.02
18	ARS1-B11-01170-20	11.82	42.67	N/A,N/A	94.03	102.05	8.02	6.43	14.43	8.00	0.00	0.00	14.43	26.42	11.99
19	ARS1-B11-01170-21	10.35	49.12	N/A,N/A	104.27	112.27	8.00	6.51	14.51	8.00	0.00	0.00	14.51	26.51	12.00
20	ARS1-B11-01170-22	10.51	47.82	N/A,N/A	109.54	117.55	8.01	6.53	14.53	8.00	0.00	0.00	14.53	26.53	12.00
21	ARS1-B11-01170-23	10.56	46.19	N/A,N/A	93.07	101.09	8.02	6.61	14.61	8.00	0.00	0.00	14.61	26.59	11.98
22		0.00	--				0.00			0.00		0.00			0.00
23		0.00	--				0.00			0.00		0.00			0.00
24		0.00	--				0.00			0.00		0.00			0.00
25		0.00	--				0.00			0.00		0.00			0.00
26		0.00	--				0.00			0.00		0.00			0.00
27		0.00	--				0.00			0.00		0.00			0.00
28		0.00	--				0.00			0.00		0.00			0.00
29		0.00	--				0.00			0.00		0.00			0.00

S:\Laboratory Department\LabDocuments\LowLevelTritium\2010 LowLevelTritiumData\ARS1-B11-01170

Chemist Signature: Jimmy D. Rabon

Tritium Enrichment Data

Procedures: **ARS-040**

Date: 4/7/2011

ARS File ID Numbers: ARS1-11-00547; -11-00548; -11-00549; -11-00601; -11-00602

ARS Batch ID: ARS1-B11-01170

	A Batch ID:	Enrichment Cell No.	Tare Wt of Electrolysis Cell & Electrodes	Tare Wt Reservoir	mi Wt Na_2O_2	Gross Weight of Sample Reservoir	Vi Gross Sample Added	Electrolysis Start Date & Time	Start AMP	Start Bath C°	Electolysis End Date & Time	End Bath C°	End Wt of Cell + Resv. + Sample
1	ARS1-B11-01170-01	1	331.17	199.48	2.00	703.81	504.33	4-6-11 1017	5.00	2.0	6-1-11 0947	2.0	542.57
2	ARS1-B11-01170-02	2	336.19	189.18	2.00	693.83	504.65	4-6-11 1108	5.00	2.0	6-1-11 0947	2.0	538.40
3	ARS1-B11-01170-03	7	334.91	191.91	2.00	698.15	506.24	4-6-11 1114	5.00	2.0	6-1-11 0947	2.0	539.17
4	ARS1-B11-01170-04	27	338.25	207.25	2.02	713.27	506.02	4-8-11 0957	5.00	2.0	6-1-11 0947	2.0	557.13
5	ARS1-B11-01170-05	41	331.36	192.60	2.01	695.80	503.20	4-8-11 0958	5.00	2.0	6-1-11 0947	2.0	537.67
6	ARS1-B11-01170-06	100	336.49	203.92	2.00	709.30	505.38	4-8-11 1000	5.00	2.0	6-1-11 0947	2.0	554.04
7	ARS1-B11-01170-07	34	337.04	198.83	2.03	703.26	504.43	4-8-11 1002	5.00	2.0	6-1-11 0947	2.0	547.00
8	ARS1-B11-01170-08	N/A	340.53	212.43	1.99	729.06	516.63	4-8-11 1003	5.00	2.0	6-1-11 0947	2.0	565.39
9	ARS1-B11-01170-09	N/A	334.61	186.13	2.00	697.36	511.23	4-8-11 1006	5.00	2.0	6-1-11 0947	2.0	532.90
10	ARS1-B11-01170-10	N/A	334.34	195.20	2.01	704.87	509.67	4-8-11 1049	5.00	2.0	6-1-11 0947	2.0	541.29
11	ARS1-B11-01170-11	N/A	335.39	195.03	1.99	706.91	511.88	4-8-11 1057	5.00	2.0	6-1-11 0947	2.0	541.91
12	ARS1-B11-01170-12	N/A	340.52	196.14	1.99	700.73	504.59	4-10-11 1149	5.00	2.0	6-1-11 0947	2.0	547.29
13	ARS1-B11-01170-13	N/A	332.00	207.84	2.00	716.35	508.51	4-10-11 1152	5.00	2.0	6-1-11 0947	2.0	550.91
14	ARS1-B11-01170-14	78	332.74	190.79	2.02	698.66	507.87	4-10-11 1154	5.00	2.0	6-1-11 0947	2.0	534.96
15	ARS1-B11-01170-17	N/A	327.23	189.21	2.00	687.72	498.51	4-10-11 1158	5.00	2.0	6-1-11 0947	2.0	526.91
16	ARS1-B11-01170-18	N/A	339.40	200.88	2.00	702.86	501.98	4-10-11 1204	5.00	2.0	6-1-11 0947	2.0	551.71
17	ARS1-B11-01170-19	47	334.25	199.16	2.01	702.47	503.31	4-11-11 1504	5.00	2.0	6-1-11 0947	2.0	544.76
18	ARS1-B11-01170-20	10	331.35	208.70	1.99	713.10	504.40	4-11-11 1509	5.00	2.0	6-1-11 0947	2.0	551.87
19	ARS1-B11-01170-21	62	334.10	211.86	2.01	720.27	508.41	4-11-11 1514	5.00	2.0	6-1-11 0947	2.0	556.31
20	ARS1-B11-01170-22	N/A	334.52	211.44	2.00	714.02	502.58	4-11-11 1519	5.00	2.0	6-1-11 0947	2.0	556.47
21	ARS1-B11-01170-23	N/A	330.41	191.21	1.99	679.00	487.79	4-11-11 1527	5.00	2.0	6-1-11 0947	2.0	532.18
22							0.00						
23							0.00						
24							0.00						
25							0.00						
26							0.00						
27							0.00						
28							0.00						
29							0.00						

Chemist Signature: Jerry D. Rabe

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
6-21-2011	0951	Background ~~B11-01170-0~~ JDR 6-21-11	B11-01170	1056	JDR
↓	↓	B11-01170-01	↓	↓	JDR
↓	↓	B11-01170-02	↓	↓	JDR
↓	↓	B11-01170-03	↓	↓	JDR
↓	↓	B11-01170-04	↓	↓	JDR
↓	↓	B11-01170-05	↓	↓	JDR
↓	↓	B11-01170-06	↓	↓	JDR
↓	↓	B11-01170-07	↓	↓	JDR
↓	↓	B11-01170-08	↓	↓	JDR
↓	↓	B11-01170-09	↓	↓	JDR
↓	↓	B11-01170-10	↓	↓	JDR
↓	↓	B11-01170-11	↓	↓	JDR
↓	↓	B11-01170-12	↓	↓	JDR
↓	↓	B11-01170-13	↓	↓	JDR
↓	↓	B11-01170-14	↓	↓	JDR
↓	↓	B11-01170-17	↓	↓	JDR
↓	↓	B11-01170-18	↓	↓	JDR
↓	↓	B11-01170-19	↓	↓	JDR
↓	↓	B11-01170-20	↓	↓	JDR
↓	↓	B11-01170-21	↓	↓	JDR

Reviewed By: LSW Date: 6-22-11
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
6-21-2011	0951	B11-01170-22	B11-01170	1056	JDR
↓	↓	B11-01170-23	↓	↓	JDR
↓	↓	2nd Background	↓	↓	JDR KSW 6-22-11
6-23-11	1608	SNC 51	QA	QA	
↓	↓	B11-02218-01	B11-02218		
↓	↓	B11-02218-02	↓		
↓	↓	B11-02218-03	↓		
↓	↓	B11-02218-04	↓		
↓	↓	B11-02218-05	↓		
↓	↓	B11-02218-06	↓		
↓	↓	B11-02218-07	↓		
↓	↓	B11-02218-08	↓		
↓	↓	B11-02218-09	↓		
↓	↓	KS 6-23-11 ~~B11-02218-10~~ B11-02218-10	↓		
↓	↓	B11-02218-11	↓		
↓	↓	B11-02218-12	↓		
↓	↓	KS 6-23-11 ~~B11-02218-13~~ B11-02218-13	↓		
↓	↓	B11-02218-14	↓		
↓	↓	B11-02218-15	↓		
↓	↓	B11-02218-16	↓		

NO DATA JDR 6-24-2011

Reviewed By: KSW Initials Date: 6-24-11

Standards Activity as of: 06/21/11 10:38

Active	Std ID	Isotope	PSCLT	Verification Date	Exp Date	Status	Ref Date	Ref ACT (dpm)	ACT at Date Above (dpm/g)	Halflife (days)	Parent ID	Expended Date	Comments
A	S-0195	Ra-226	PC			Not Ver	06/24/08	7.7832E+02	777.3081	5.840E+05			Primary Ra-226 standard for calibration.
A	S-0196	Ra-226	SLC			Not Ver	07/03/08	2.3567E+02	235.3681	5.840E+05	S-0195		Calibration standard for Ra-226.
A	S-0197	Ra-228	SL	11/11/10	11/11/11	OK	07/10/08	4.4972E+01	31.5281	2.100E+03	S-0127		LCS for Ra-228
A	S-0198	Ra-226	SL	09/24/09	09/24/10	EXP	07/07/08	1.4886E+03	1486.7317	5.840E+05	S-0193		Intermediate Ra-226 standard for use in creating LCS stock solutions
A	S-0199	Ni-63	SL	04/14/10	04/14/11	EXP	08/25/08	4.5399E+01	44.5225	3.660E+04	S-0178		Ni-63 LCS dilution with 7.5 mL of 2 mg/mL Ni carrier added to the soln
A	S-0200	Sr-89	PC			Not Ver	09/17/08	1.9942E+04	0.0200	5.053E+01			Primary Sr-89 calibration standard
A	S-0206	H-3	SL	05/14/10	05/14/11	EXP	02/25/09	6.6781E+00	5.8621	4.500E+03	S-0152		Use as H3LL LCS creation. Dilution performed as stated above by M Thib
A	S-0210	Ba-133	PT			Not Ver	05/15/09	7.6431E+02	665.4942	3.840E+03			Primary Ba-133 tracer
A	S-0211	Ba-133	ST			Not Ver	05/18/09	4.5236E+02	394.0898	3.840E+03	S-0210		Intermediate level tracer solution. Dilution performed as stated above
A	S-0212	Ba-133	SLT	05/21/09	05/21/10	EXP	05/18/09	9.9546E+00	8.6722	3.840E+03	S-0211		Ba-133 tracer solution. Dilution performed as stated above by B Steffe
A	S-0213	Ba-133	SLT	05/25/09	05/25/10	EXP	05/23/09	6.6543E+01	58.0236	3.840E+03	S-0211		
A	S-0215	C-14	P			Not Ver	09/03/90	5.4020E+04	53883.5736	2.082E+06			C-14 for Calibration use only (5 ml ampoule)
A	S-0216	AM-241	PL			Not Ver	05/16/07	1.0640E+02	105.7030	1.579E+05			Parent Am-241 Working Soln (Lq in 5 mL NIST borosilicate-glass ampoule
A	S-0218	C-14	SC	08/05/09	08/05/10	EXP	07/22/09	2.9419E+05	294121.4213	2.082E+06	S-0215		C-14 Calibration Standard. Used to prepare the C-14 standard in ampoule
A	S-0220	Am-241	P			Not Ver	08/19/09	2.6725E+01	26.6464	1.579E+05			No certificate for this standard on file in the QA office. NT1b is no
A	S-0221	Am-241	SL	08/05/10	08/05/11	OK	08/19/09	2.6725E+01	26.6464	1.579E+05	S-0220		NT1b Am-241 LCS standard. Activity determined by measuring a standard
A	S-0222	PU-242	PT	09/28/09	09/28/10	EXP	09/23/09	2.6314E+01	26.3142	1.365E+08			
A	S-0223	PU-242	SLT	10/06/10	10/06/11	OK	09/25/09	7.6699E+00	7.6699	1.365E+08	S-0222		Pu-242 tracer solution. Dilution performed as stated above by B Steffe
A	S-0224	Ra-226	SL	11/11/10	11/11/11	OK	11/04/09	6.4243E+01	64.1979	5.840E+05	S-0198		Ra-226 LCS stock solution. Dilution performed as stated above by B Ste
A	S-0225	Sr-89	PC			Not Ver	10/01/09	1.0276E+05	18.6437	5.053E+01			Primary Sr-89 standard. 5 ml liquid in flame sealed vial.
A	S-0226	PU-239	SC	11/19/09	11/19/10	EXP	11/16/09	1.9777E+03	1977.6410	8.807E+06	S-0186		Pu-239 calibration standard. Dilution performed as stated above by B S
A	S-0227	U-238	PC			Not Ver	05/17/07	1.7557E+02	175.5667	1.632E+12			Primary U-238 calibration standard. 5ml liquid in a flame sealed vial.
A	S-0228	U-238	SC	11/19/09	11/19/10	EXP	11/17/09	2.6904E+02	269.0445	1.632E+12	S-0227		Uranium standard for use in creating Alpha Spec check sources. Dilutio
A	S-0229	Sr-89	SC	11/18/09	07/28/10	EXP	11/18/09	1.7112E+04	5.9977	5.053E+01	S-0225		Sr-89 calibration standard. Dilution performed as stated above by B S
A	S-0230	U-238	PL			Not Ver	11/23/09	1.8617E+02	186.1684	1.632E+12			Primary U-238, 235, 234 standard. 5ml liquid in flame sealed vial.
A	S-0231	Th-230	SL	10/18/10	10/18/11	OK	02/19/10	1.2559E+01	12.5584	2.753E+07	S-0172		Primary Th-230 LCS standard. Dilution performed as stated above by B S
A	S-0232	Th-229	PT			Not Ver	01/28/05	1.1940E+02	119.3279	2.681E+06			
A	S-0233	Th-229	SLT	02/22/10	02/22/11	EXP	01/28/05	1.1940E+02	119.3279	2.681E+06	S-0232		Tracer Th-229 tracer standard. Dilution performed as stated above by B Steffe
A	S-0234	Sr-90	PL			Not Ver	03/04/10	4.5500E+02	440.8634	1.041E+04			Previously logged as T11c. Sr-90 standard to be used for creating LCS
A	S-0235	Sr-90	SL			Not Ver	03/12/10	4.4497E+01	43.1370	1.041E+04	S-0234		Primary Sr-90 LCS standard. Dilution performed as stated above by B St
A	S-0236	Sr-90	SL	03/08/11	03/08/12	OK	03/17/10	4.8169E+01	46.7126	1.041E+04	S-0160		Sr-90 LCS standard. Dilution performed as stated above by B Steffens.
A	S-0237	H-3	SL	03/25/11	03/25/12	OK	03/22/10	3.5037E+03	3266.0216	4.500E+03	S-0031		Intermediate level H-3 standard for creating LCS solutions and spikes
A	S-0240	Sr-90	SL	04/13/10	04/13/11	EXP	04/13/10	4.8132E+01	46.7612	1.041E+04	S-0160		Painesville Sr-90 LCS standard. Dilution performed as stated above by
A	S-0241	U-232	ST	06/11/10	06/11/11	EXP	06/09/10	9.1520E+00	9.0574	2.516E+04	S-0161		Primary U-232 tracer solution. Dilution performed as stated above by B
A	S-0242	Pu-239	PL			Not Ver	11/23/09	6.5202E+03	6519.8617	8.807E+06			Primary Pu-239 standard. 5ml liquid in flame sealed vial.
A	S-0243	Sr-90	PL	07/01/10	07/01/11	OK	07/01/09	1.3200E+00	1.2582	1.041E+04			Mapep air filter used as QC for LDEQ GB air filter particulate samples
A	S-0244	Th-230	PL	07/01/10	07/01/11	OK	07/01/09	6.5900E-01	0.6590	2.753E+07			Mapep air filter used as QC for LDEQ GB air filter particulate samples
A	S-0245	Fe-55	SC	08/18/10	08/18/11	OK	08/13/10	2.6617E+00	2.1375	9.860E+02	S-0183		Fe-55 LCS standard. Dilution performed as stated above by B Steffens
A	S-0246	Th-229	ST	10/18/10	10/18/11	OK	09/20/10	1.1204E+01	11.2036	2.681E+06	S-0233		Th-229 tracer standard. Dilution performed as stated above by B Steffe
A	S-0247	H-3	SL	10/13/10	10/13/11	OK	10/11/10	5.6100E+00	5.3956	4.500E+03	S-0237		Spike H-3 LCS standard. Dilution performed as stated above by B Steffe
A	S-0248	Pu-242	PT			Not Ver	01/01/10	2.6770E+01	26.7699	1.365E+08			Primary Pu-242 standard in flame-sealed 5 ml borosilicate glass ampoul
A	S-0249	C-14	PC			Not Ver	02/03/11	7.5143E+03	7513.9554	2.082E+06			Primary C-14 calibration standard.
A	S-0250	C-14	S	03/07/11	03/07/12	OK	02/17/11	4.7591E+00	4.7589	2.090E+06	S-0153		C-14 LCS standard. Dilution performed as stated above by B Steffens
A	S-0251	C-14	SC	03/07/11	03/07/12	OK	02/21/11	1.1123E+04	11122.4385	2.082E+06	S-0249		C-14 calibration standard. Dilution performed as stated above by B Ste
A	S-0252	Pu-242	ST	03/28/11	03/28/12	OK	03/28/11	7.9422E+00	7.9422	1.365E+08	S-0248		Pu-242 tracer solution. Dilution performed as stated above by B Steffe

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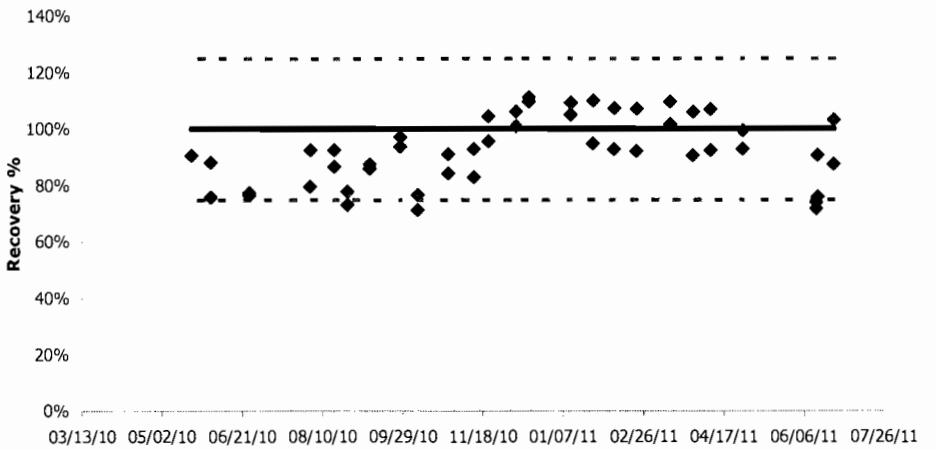
Low Level Tritium by Low Level Liquid Scintillation Counting

Control Charts

American Radiation Services
Baton Rouge Laboratory

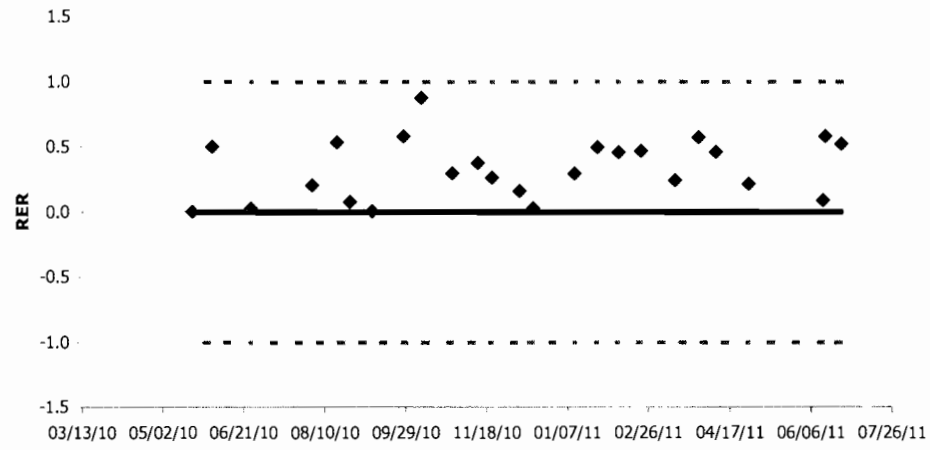
QC Chart

LLH-3 LCS



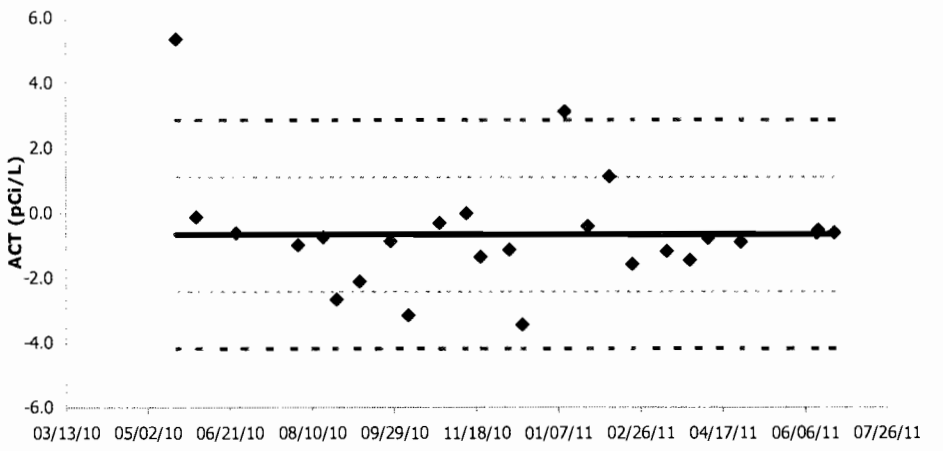
Average	STDEV	n	UCL	LCL
0.9270	0.1172	26	1.2500	0.7500

LLH-3 RER



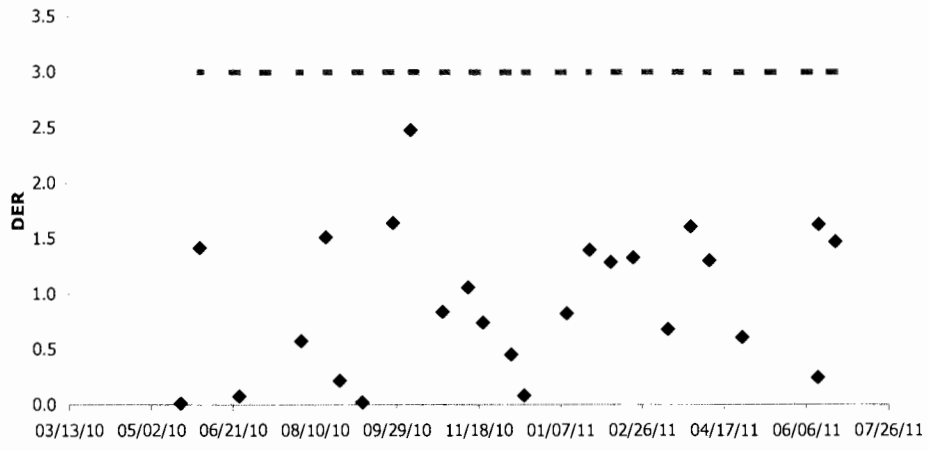
n	UCL	LCL
26	1.0000	-1.0000

LLH-3 Blank



Average	STDEV	n	UCL	LCL
-0.6638	1.7592	26	2.8546	-4.1823

LLH-3 DER

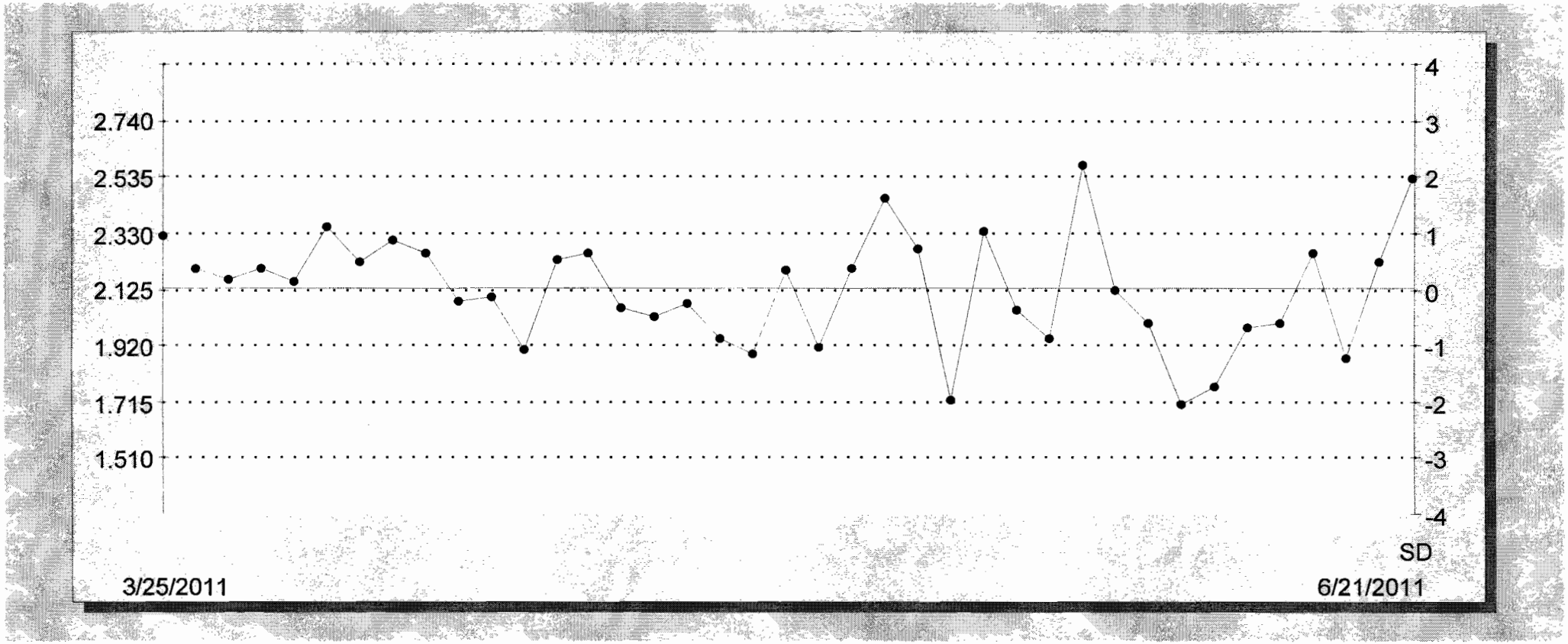


n	UCL
26	3.0000

3H Background
Total # pts : 5256
Valid # pts : 39
Mean : 2.12
SD : 0.20

Date	Value	Valid Pt
Mar 25, 2011	2.32	X
Mar 28, 2011	2.20	X
Apr 01, 2011	2.16	X
Apr 08, 2011	2.20	X
Apr 12, 2011	2.15	X
Apr 15, 2011	2.35	X
Apr 22, 2011	2.22	X
Apr 28, 2011	2.31	X
Apr 29, 2011	2.26	X
Apr 29, 2011	2.08	X
Apr 29, 2011	2.10	X
Apr 29, 2011	1.90	X
Apr 30, 2011	2.23	X
Apr 30, 2011	2.25	X
Apr 30, 2011	2.05	X
Apr 30, 2011	2.02	X
Apr 30, 2011	2.08	X
Apr 30, 2011	1.95	X
Apr 30, 2011	1.89	X
May 02, 2011	2.19	X
May 03, 2011	1.91	X
May 10, 2011	2.20	X
May 16, 2011	2.45	X
May 23, 2011	2.27	X
May 24, 2011	1.72	X
May 31, 2011	2.34	X
Jun 03, 2011	2.05	X
Jun 05, 2011	1.94	X
Jun 05, 2011	2.58	X
Jun 08, 2011	2.12	X
Jun 11, 2011	2.00	X
Jun 14, 2011	1.70	X
Jun 18, 2011	1.77	X
Jun 19, 2011	1.98	X
Jun 20, 2011	2.00	X
Jun 20, 2011	2.25	X
Jun 20, 2011	1.87	X
Jun 20, 2011	2.23	X
Jun 21, 2011	2.53	X

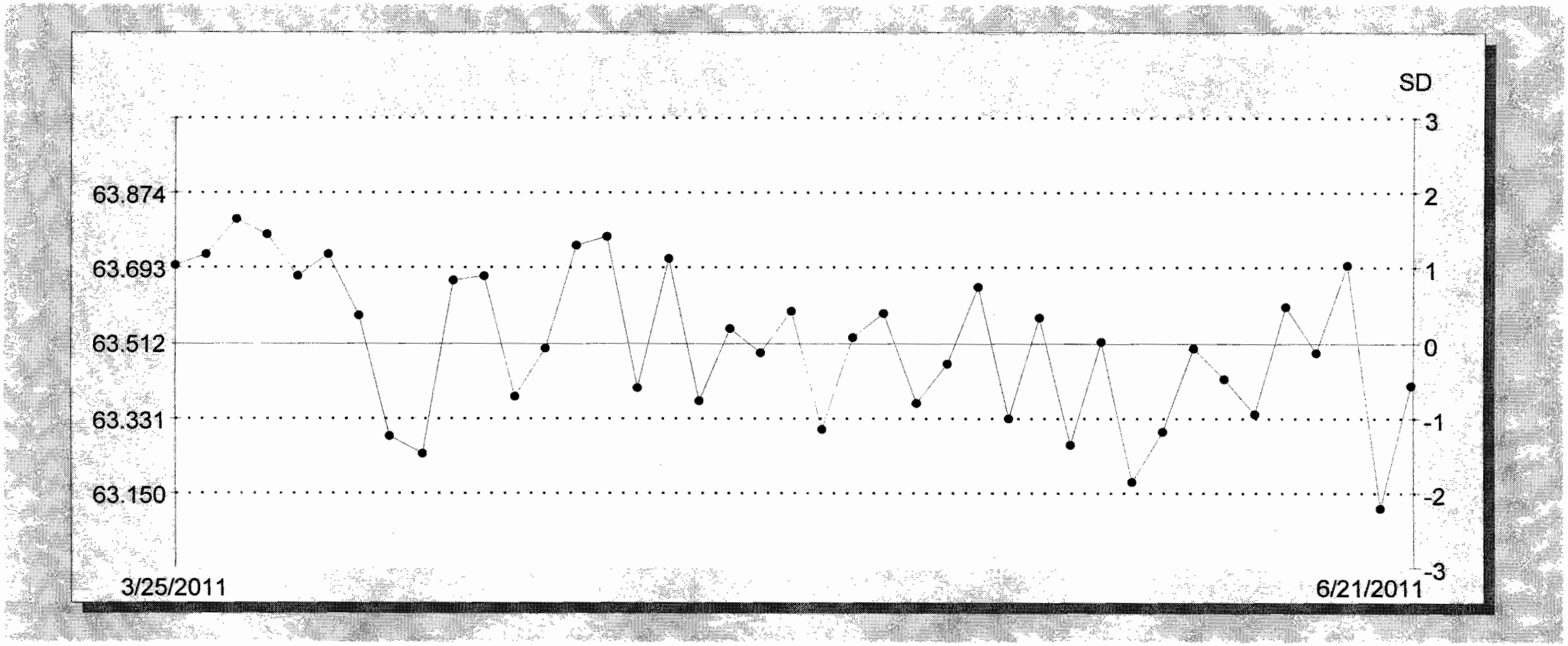
3H Background
Total # pts : 5256
Valid # pts : 39
Mean : 2.12
SD : 0.20



3H Efficiency
Total # pts : 5330
Valid # pts : 41
Mean : 63.51
SD : 0.18

Date	Value	Valid Pt
Mar 25, 2011	63.70	X
Mar 28, 2011	63.73	X
Apr 01, 2011	63.81	X
Apr 08, 2011	63.78	X
Apr 12, 2011	63.67	X
Apr 15, 2011	63.73	X
Apr 22, 2011	63.57	X
Apr 28, 2011	63.29	X
Apr 29, 2011	63.24	X
Apr 29, 2011	63.66	X
Apr 29, 2011	63.67	X
Apr 29, 2011	63.38	X
Apr 30, 2011	63.50	X
Apr 30, 2011	63.75	X
Apr 30, 2011	63.77	X
Apr 30, 2011	63.40	X
Apr 30, 2011	63.71	X
Apr 30, 2011	63.37	X
Apr 30, 2011	63.55	X
Apr 30, 2011	63.49	X
May 02, 2011	63.59	X
May 03, 2011	63.30	X
May 10, 2011	63.52	X
May 16, 2011	63.58	X
May 23, 2011	63.37	X
May 24, 2011	63.46	X
May 31, 2011	63.65	X
Jun 03, 2011	63.33	X
Jun 05, 2011	63.57	X
Jun 05, 2011	63.27	X
Jun 08, 2011	63.51	X
Jun 11, 2011	63.18	X
Jun 14, 2011	63.29	X
Jun 18, 2011	63.50	X
Jun 19, 2011	63.43	X
Jun 20, 2011	63.34	X
Jun 20, 2011	63.60	X
Jun 20, 2011	63.48	X
Jun 20, 2011	63.70	X
Jun 20, 2011	63.11	X
Jun 21, 2011	63.41	X

3H Efficiency
Total # pts : 5330
Valid # pts : 41
Mean : 63.51
SD : 0.18



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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: ARS1-11-00547; 548; 549; 601; 602
ARS Batch ID: ARS1-B11-01169

	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	ARS1-B11-01169-04	120	1.653	1.621	31.95	5.02	8.987	pCi/L	192.6391	NO
2	ARS1-B11-01169-05	120	1.610	1.621	32	4.99	-3.103	pCi/L	193.4944	NO
3	ARS1-B11-01169-06	120	1.734	1.621	31.85	5.02	31.836	pCi/L	193.2439	NO
4	ARS1-B11-01169-07	120	1.751	1.621	31.86	5.00	36.760	pCi/L	193.956	NO
5	ARS1-B11-01169-08	120	1.646	1.621	31.93	5.01	7.040	pCi/L	193.1445	NO
6	ARS1-B11-01169-09	120	1.409	1.551	31.48	5.03	-40.395	pCi/L	191.0072	NO
7	ARS1-B11-01169-10	120	1.717	1.551	31.9	5.02	46.694	pCi/L	188.8678	NO
8	ARS1-B11-01169-11	120	1.623	1.551	31.59	5.00	20.533	pCi/L	191.4841	NO
9	ARS1-B11-01169-12	120	1.623	1.551	31.95	4.99	20.343	pCi/L	189.7059	NO
10	ARS1-B11-01169-13	120	1.690	1.551	31.75	5.02	39.284	pCi/L	189.7601	NO
11	ARS1-B11-01169-14	120	2.272	1.551	31.56	5.03	204.587	pCi/L	190.523	YES, analyze by LSC-A-001.
12	ARS1-B11-01169-15	120	2.751	1.621	31.96	5.02	317.260	pCi/L	192.5788	YES, analyze by LSC-A-001.
13	ARS1-B11-01169-16	120	3.108	1.621	31.6	5.00	423.937	pCi/L	195.5518	YES, analyze by LSC-A-001.
14	ARS1-B11-01169-17	120	1.520	1.621	31.97	5.01	-28.405	pCi/L	192.9028	NO
15	ARS1-B11-01169-18	120	1.866	1.621	31.78	5.00	69.453	pCi/L	194.4442	NO
16	ARS1-B11-01169-19	120	1.676	1.621	31.63	4.99	15.697	pCi/L	195.7579	NO
17	ARS1-B11-01169-20	120	1.959	1.621	32.12	5.03	94.237	pCi/L	191.2386	NO
18	ARS1-B11-01169-21	120	2.143	1.621	31.64	5.05	147.160	pCi/L	193.3709	NO
19	ARS1-B11-01169-22	120	1.921	1.621	31.59	5.03	85.045	pCi/L	194.4471	NO
20	ARS1-B11-01169-23	120	1.808	1.621	31.45	5.02	53.354	pCi/L	195.7017	NO
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!

per VM, please rescreen

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

ARS File ID Numbers: ARS1-11-00547; 548; 549; 601; 602.
ARS Batch ID: ARS1-B11-01169

	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	B11-01169-14	120	1.591	1.559	31.72	5.03	9.034	pCi/L	190.0338	NO
2	B11-01169-15	120	2.660	1.559	31.95	5.02	309.214	pCi/L	189.0416	YES, analyze by LSC-A-001.
3	B11-01169-16	120	2.919	1.559	32.06	5.00	382.166	pCi/L	189.1466	YES, analyze by LSC-A-001.
4							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
5							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
6							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
7							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
8							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
9							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
10							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
11							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
12							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
13							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
14							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
15							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
16							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
17							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
18							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
19							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
20							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
21							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
22							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!
23							#DIV/0!	pCi/L	#DIV/0!	#DIV/0!

ysm 4-1-11

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Tritium-Screening by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

Analysis Batch ID **ARS1-B11-01169**

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

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B11-01169-01	LCS									
ARS1-B11-01169-02	LCSD									
ARS1-B11-01169-03	MBL									
ARS1-B11-01169-04	TRG				**ARS1-11-00547**	001	1	Buckman1-11-5682	STD	04/12/11
ARS1-B11-01169-05	TRG				**ARS1-11-00547**	002	1	Buckman06-11-5683	STD	04/12/11
ARS1-B11-01169-06	TRG				**ARS1-11-00547**	003	1	Buckman08-11-5684	STD	04/12/11
ARS1-B11-01169-07	TRG				**ARS1-11-00548**	001	1	CALA-11-5224	STD	04/12/11
ARS1-B11-01169-08	TRG				**ARS1-11-00548**	002	1	CALA-11-5227	STD	04/12/11
ARS1-B11-01169-09	TRG				**ARS1-11-00549**	001	1	CAPU-11-5282	STD	04/12/11
ARS1-B11-01169-10	TRG				**ARS1-11-00549**	002	1	CAPU-11-5283	STD	04/12/11
ARS1-B11-01169-11	TRG				**ARS1-11-00549**	003	1	CAPU-11-5290	STD	04/12/11
ARS1-B11-01169-12	TRG				**ARS1-11-00549**	004	1	CAPU-11-5296	STD	04/12/11
ARS1-B11-01169-13	TRG				**ARS1-11-00549**	005	1	CAPU-11-5301	STD	04/12/11
ARS1-B11-01169-14	TRG				**ARS1-11-00549**	006	1	CAPU-11-5304	STD	04/12/11
ARS1-B11-01169-15	TRG				**ARS1-11-00549**	007	1	CAPU-11-5308	STD	04/12/11
ARS1-B11-01169-16	TRG				**ARS1-11-00549**	008	1	CAPU-11-5311	STD	04/12/11
ARS1-B11-01169-17	TRG				**ARS1-11-00549**	009	1	CAPU-11-5292	STD	04/12/11
ARS1-B11-01169-18	TRG				**ARS1-11-00601**	001	1	CAPU-11-5264	STD	04/18/11
ARS1-B11-01169-19	TRG				**ARS1-11-00601**	002	1	CAPU-11-5269	STD	04/18/11
ARS1-B11-01169-20	TRG				**ARS1-11-00601**	003	1	CAPU-11-5298	STD	04/18/11
ARS1-B11-01169-21	TRG				**ARS1-11-00602**	001	1	CALA-11-5106	STD	04/18/11
ARS1-B11-01169-22	TRG				**ARS1-11-00602**	002	1	CALA-11-5110	STD	04/18/11
ARS1-B11-01169-23	TRG				**ARS1-11-00602**	003	1	CALA-11-5173	STD	04/18/11

82987 11-00547-001-1 **XRAD**
82988 11-00547-002-1 **XRAD**
82989 11-00547-003-1 **XRAD**
82990 11-00548-001-1 **XRAD**
82991 11-00548-002-1 **XRAD**
82992 11-00549-001-1 **XRAD**
82993 11-00549-002-1 **XRAD**
82994 11-00549-003-1 **XRAD**
82995 11-00549-004-1 **XRAD**
82996 11-00549-005-1 **XRAD**
82997 11-00549-006-1 **XRAD**
82998 11-00549-007-1 **XRAD**
82999 11-00549-008-1 **XRAD**
83000 11-00549-009-1 **XRAD**
83001 11-00601-001-1 **XRAD**
83002 11-00601-002-1 **XRAD**
83003 11-00601-003-1 **XRAD**
83004 11-00602-001-1 **XRAD**
83005 11-00602-002-1 **XRAD**
83006 11-00602-003-1 **XRAD**

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
8125	ARS1-B11-01169	ARS1-B11-01169-01		1	g					JRABER	03/25/2011 10:12:57
8126	ARS1-B11-01169	ARS1-B11-01169-02		1	g					JRABER	03/25/2011 10:12:57
8127	ARS1-B11-01169	ARS1-B11-01169-03		1	g					JRABER	03/25/2011 10:12:58
8128	ARS1-B11-01169	ARS1-B11-01169-04	Buckman1-11-5682	5.02	g	82987				JRABER	03/25/2011 10:12:58
8129	ARS1-B11-01169	ARS1-B11-01169-05	Buckman06-11-5683	4.99	g	82988				JRABER	03/25/2011 10:12:58
8130	ARS1-B11-01169	ARS1-B11-01169-06	Buckman08-11-5684	5.02	g	82989				JRABER	03/25/2011 10:12:58
8131	ARS1-B11-01169	ARS1-B11-01169-07	CALA-11-5224	5	g	82990				JRABER	03/25/2011 10:12:58
8132	ARS1-B11-01169	ARS1-B11-01169-08	CALA-11-5227	5.01	g	82991				JRABER	03/25/2011 10:12:58
8133	ARS1-B11-01169	ARS1-B11-01169-09	CAPU-11-5282	5.03	g	82992				JRABER	03/25/2011 10:12:58
8134	ARS1-B11-01169	ARS1-B11-01169-10	CAPU-11-5283	5.02	g	82993				JRABER	03/25/2011 10:12:58
8135	ARS1-B11-01169	ARS1-B11-01169-11	CAPU-11-5290	5	g	82994				JRABER	03/25/2011 10:12:59
8136	ARS1-B11-01169	ARS1-B11-01169-12	CAPU-11-5296	4.99	g	82995				JRABER	03/25/2011 10:12:59
8137	ARS1-B11-01169	ARS1-B11-01169-13	CAPU-11-5301	5.02	g	82996				JRABER	03/25/2011 10:12:59
8138	ARS1-B11-01169	ARS1-B11-01169-14	CAPU-11-5304	5.03	g	82997				JRABER	03/25/2011 10:12:59
8139	ARS1-B11-01169	ARS1-B11-01169-15	CAPU-11-5308	5.02	g	82998				JRABER	03/25/2011 10:12:59
8140	ARS1-B11-01169	ARS1-B11-01169-16	CAPU-11-5311	5	g	82999				JRABER	03/25/2011 10:12:59
8141	ARS1-B11-01169	ARS1-B11-01169-17	CAPU-11-5292	5.01	g	83000				JRABER	03/25/2011 10:13:00
8142	ARS1-B11-01169	ARS1-B11-01169-18	CAPU-11-5264	5	g	83001				JRABER	03/25/2011 10:13:00
8143	ARS1-B11-01169	ARS1-B11-01169-19	CAPU-11-5269	4.99	g	83002				JRABER	03/25/2011 10:13:00
8144	ARS1-B11-01169	ARS1-B11-01169-20	CAPU-11-5298	5.03	g	83003				JRABER	03/25/2011 10:13:00
8145	ARS1-B11-01169	ARS1-B11-01169-21	CALA-11-5106	5.05	g	83004				JRABER	03/25/2011 10:13:00
8146	ARS1-B11-01169	ARS1-B11-01169-22	CALA-11-5110	5.03	g	83005				JRABER	03/25/2011 10:13:00
8147	ARS1-B11-01169	ARS1-B11-01169-23	CALA-11-5173	5.02	g	83006				JRABER	03/25/2011 10:13:00

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\20110331_1144
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110331_1144\20110331_1144.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110331_1144\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110331_1144\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL 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
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	0.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

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

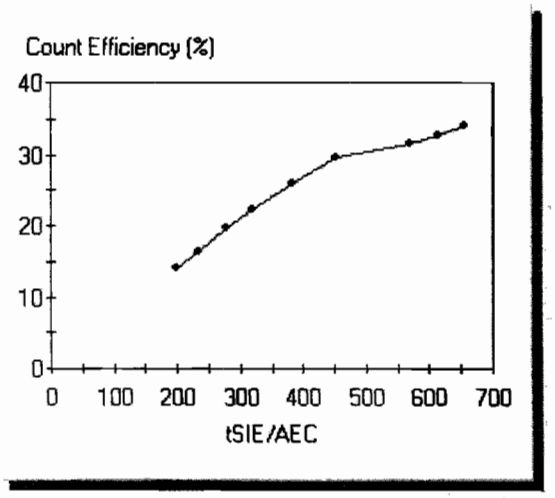
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 11/19/2010
Date Modified:
ARS LL H3 in A

tSIE/AEC	Count Efficiency (%)
655.11	34.08
613.27	32.77
569.42	31.54
454.14	29.55
383.12	26.06
318.52	22.25
280.21	19.79
235.97	16.48
199.12	13.98

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.559	5.00	550.14	31.21	3/31/2011	11:53:12 AM	
2	2	B11-01169-14	120.00	1.591	5.01	575.81	31.72	3/31/2011	2:03:15 PM	
2	3	B11-01169-15	120.00	2.660	8.33	583.86	31.95	3/31/2011	4:13:14 PM	
2	4	B11-01169-16	120.00	2.919	9.11	587.91	32.06	3/31/2011	6:23:11 PM	

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.621	5.08	582.21	31.90	3/28/2011	12:42:03 PM	
2	2	B11-01169-04	120.00	1.653	5.17	584.11	31.95	3/28/2011	2:52:00 PM	
2	3	B11-01169-05	120.00	1.610	5.03	585.73	32.00	3/28/2011	5:02:00 PM	
2	4	B11-01169-06	120.00	1.734	5.44	580.49	31.85	3/28/2011	7:12:01 PM	
2	5	B11-01169-07	120.00	1.751	5.50	580.93	31.86	3/28/2011	9:22:00 PM	
2	6	B11-01169-08	120.00	1.646	5.16	583.32	31.93	3/28/2011	11:32:01 PM	
Missing vial 7.										
Missing vial 8.										
Missing vial 9.										
Missing vial 10.										
Missing vial 11.										
Missing vial 12.										
2	13	B11-01169-15	120.00	2.751	8.61	584.35	31.96	3/29/2011	1:42:19 AM	
2	14	B11-01169-16	120.00	3.108	9.84	571.39	31.60	3/29/2011	3:52:19 AM	
2	15	B11-01169-17	120.00	1.520	4.75	584.76	31.97	3/29/2011	6:02:21 AM	
2	16	B11-01169-18	120.00	1.866	5.87	578.00	31.78	3/29/2011	8:12:22 AM	
2	17	B11-01169-19	120.00	1.676	5.30	572.50	31.63	3/29/2011	10:22:23 AM	
2	18	B11-01169-20	120.00	1.959	6.10	590.16	32.12	3/29/2011	12:32:24 PM	
2	19	B11-01169-21	120.00	2.143	6.77	572.98	31.64	3/29/2011	2:42:25 PM	
2	20	B11-01169-22	120.00	1.921	6.08	571.16	31.59	3/29/2011	4:52:25 PM	
2	21	B11-01169-23	120.00	1.808	5.75	564.03	31.45	3/29/2011	7:02:25 PM	

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	120.00	1.551	4.97	551.24	31.23	3/30/2011	8:28:07 AM	
2	2	B11-01169-09	120.00	1.409	4.48	565.67	31.48	3/30/2011	10:38:10 AM	
2	3	B11-01169-10	120.00	1.717	5.38	582.20	31.90	3/30/2011	12:48:11 PM	
2	4	B11-01169-11	120.00	1.623	5.14	571.10	31.59	3/30/2011	2:58:10 PM	
2	5	B11-01169-12	120.00	1.623	5.08	584.03	31.95	3/30/2011	5:08:09 PM	
2	6	B11-01169-13	120.00	1.690	5.32	577.03	31.75	3/30/2011	7:18:09 PM	
2	7	B11-01169-14	120.00	2.272	7.20	570.12	31.56	3/30/2011	9:28:10 PM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
3-23-11	1505	B11-01049-07	B11-01049	1920	[illegible]
↓	↓	B11-01049-08	↓	↓	[illegible]
↓	↓	B11-01049-09	↓	↓	[illegible]
↓	↓	B11-01049-10	↓	↓	[illegible]
↓	↓	B11-01049-11	↓	↓	[illegible]
↓	↓	B11-01049-12	↓	↓	[illegible]
↓	↓	B11-01049-13	↓	↓	[illegible]
↓	↓	B11-01049-14	↓	↓	[illegible]
↓	↓	B11-01049-15	↓	↓	[illegible]
↓	↓	B11-01049-16	↓	↓	[illegible]
↓	↓	B11-01049-17	↓	↓	[illegible]
3-28-11	0855	SNC 51	QA	QA	JDR
↓	↓	Background	B11-01169	1233	JDR
↓	↓	B11-01169-04	↓	↓	JDR
↓	↓	B11-01169-05	↓	↓	JDR
↓	↓	B11-01169-06	↓	↓	JDR
↓	↓	B11-01169-07	↓	↓	JDR
↓	↓	B11-01169-08	↓	↓	JDR
↓	↓	~~B11-01169-09~~ SKIPPED JDR	↓ 3-30-2011	↓	JDR
↓	↓	B11-01169-10	↓	↓	JDR

Reviewed By: LSW Initials Date: 3-29-11

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
3-28-11	0855	~~B11-01169-11~~ SKIPPED	~~B11-01169~~	1233	JDR
↓	↓	B11-01169-12	↓	JDR	JDR
↓	↓	B11-01169-13	↓	↓	3-30-2011
↓	↓	B11-01169-14	↓	↓	JDR
↓	↓	B11-01169-15	↓	↓	JDR
↓	↓	B11-01169-16	↓	↓	JDR
↓	↓	B11-01169-17	↓	↓	JDR
↓	↓	B11-01169-18	↓	↓	JDR
↓	↓	B11-01169-19	↓	↓	JDR
↓	↓	B11-01169-20	↓	↓	JDR
↓	↓	B11-01169-21	↓	↓	JDR
↓	↓	B11-01169-22	↓	↓	JDR
↓	↓	B11-01169-23	↓	↓	JDR LSW 3-29-11
3-30-2011	0816	Background ~~B11-01169~~ JDR 3-30-11	B11-01169	0819	JDR
↓	↓	B11-01169-09	↓	↓	JDR
↓	↓	B11-01169-10	↓	↓	JDR
↓	↓	B11-01169-11	↓	↓	JDR
↓	↓	B11-01169-12	↓	↓	JDR
↓	↓	B11-01169-13	↓	↓	JDR
↓	↓	B11-01169-14	↓	↓	JDR

Reviewed By: LSW Date: 4-5-11
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
3-31-11	1141	Background	B11-01169	1144	JDR
↓	↓	B11-01169-14	↓	↓	JDR
↓	↓	B11-01169-15	↓	↓	JDR
↓	↓	B11-01169-16	↓	↓	JDR
4-1-11	0827	SNC 51	QA	QA	JDR
↓	↓	Background	B11-00550	1013	JDR
↓	↓	B11-00550-01	↓	↓	JDR
↓	↓	B11-00550-02	↓	↓	JDR
↓	↓	B11-00550-03	↓	↓	JDR
↓	↓	B11-00550-04	↓	↓	JDR
↓	↓	B11-00550-05	↓	↓	JDR
↓	↓	B11-00550-06	↓	↓	JDR
↓	↓	B11-00550-07	↓	↓	JDR
↓	↓	B11-00550-08	↓	↓	JDR
↓	↓	B11-00550-09	↓	↓	JDR
↓	↓	B11-00550-10	JDR	↓	JDR
↓	↓	B11-00550-11	↓	4-3-11 ↓	JDR
↓	↓	B11-00550-12	↓	↓	JDR
↓	↓	B11-00550-13	↓	↓	JDR
↓	↓	B11-00550-14	↓	↓	JDR

SKIPPED

Reviewed By: LSW Date: 4-5-11
Initials

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

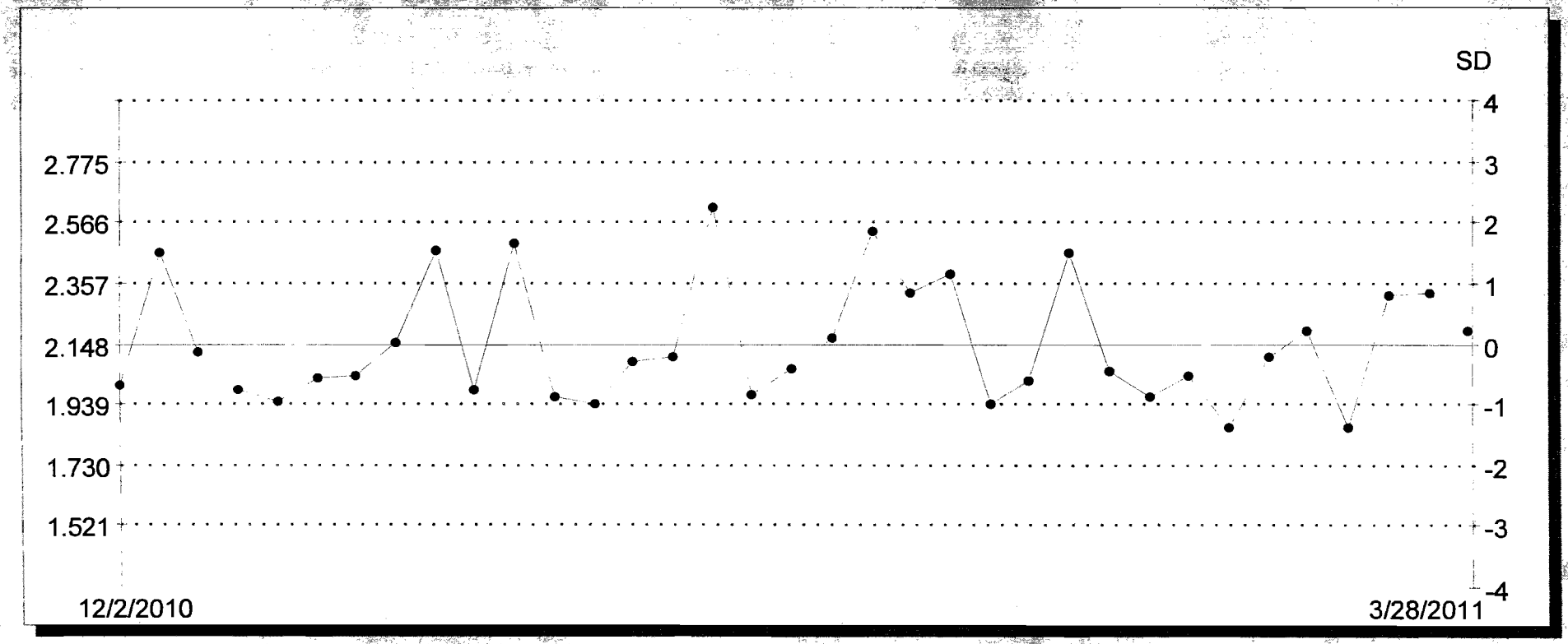
Tritium-Screening by Low Level Liquid Scintillation Counting

Control Charts

3H Background
Total # pts : 5219
Valid # pts : 35
Mean : 2.15
SD : 0.21

Date	Value	Valid Pt
Dec 02, 2010	2.00	X
Dec 08, 2010	2.46	X
Dec 13, 2010	2.12	X
Dec 15, 2010	1.99	X
Dec 22, 2010	1.95	X
Dec 29, 2010	2.03	X
Dec 30, 2010	2.04	X
Jan 03, 2011	2.15	X
Jan 05, 2011	2.47	X
Jan 10, 2011	1.99	X
Jan 11, 2011	2.49	X
Jan 14, 2011	1.96	X
Jan 19, 2011	1.94	X
Jan 21, 2011	2.09	X
Jan 27, 2011	2.10	X
Jan 29, 2011	2.62	X
Feb 01, 2011	1.97	X
Feb 07, 2011	2.06	X
Feb 09, 2011	2.17	X
Feb 10, 2011	2.54	X
Feb 13, 2011	2.33	X
Feb 18, 2011	2.39	X
Feb 22, 2011	1.94	X
Feb 24, 2011	2.02	X
Feb 25, 2011	2.46	X
Feb 28, 2011	2.05	X
Mar 02, 2011	1.96	X
Mar 06, 2011	2.04	X
Mar 13, 2011	1.86	X
Mar 16, 2011	2.11	X
Mar 17, 2011	2.19	X
Mar 17, 2011	1.86	X
Mar 18, 2011	2.32	X
Mar 25, 2011	2.32	X
Mar 28, 2011	2.20	X

3H Background
Total # pts : 5219
Valid # pts : 35
Mean : 2.15
SD : 0.21

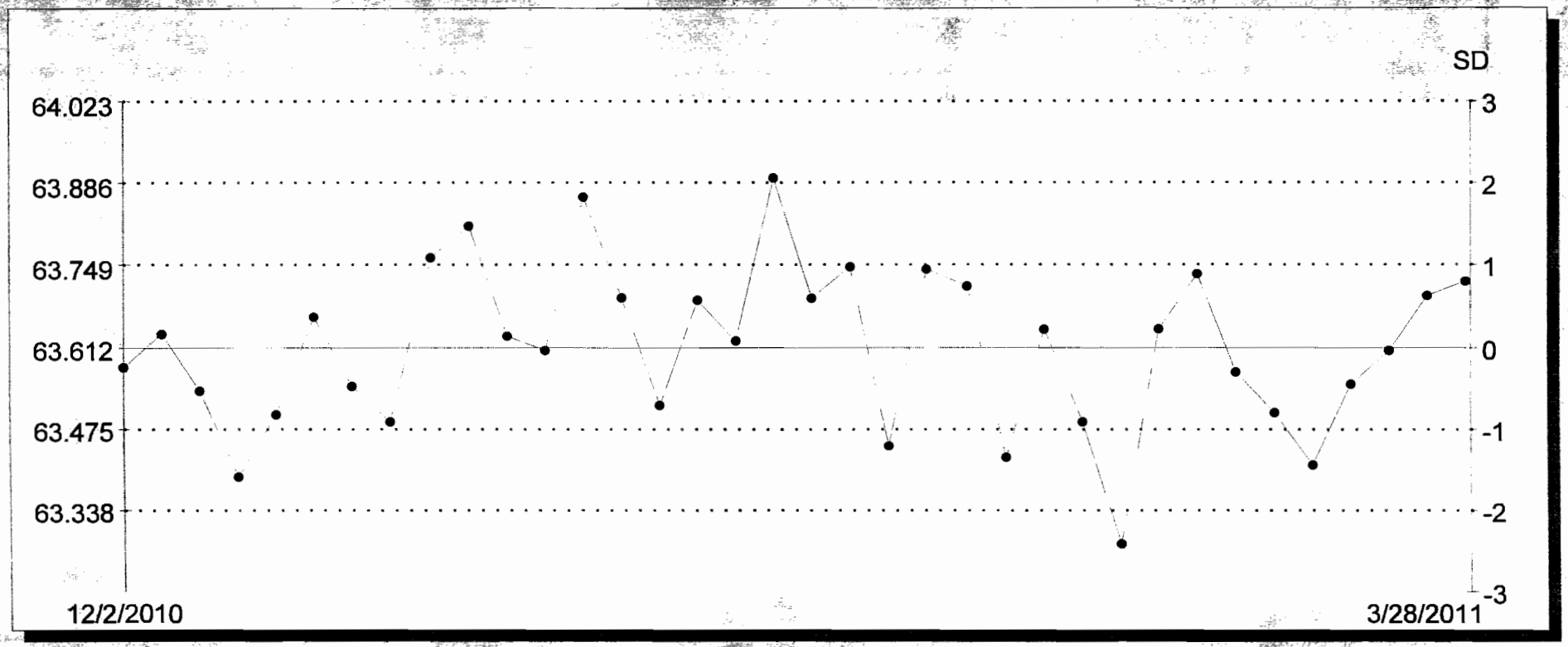


3H Efficiency
Total # pts : 5291
Valid # pts : 36
Mean : 63.61
SD : 0.14

Date	Value	Valid Pt
Dec 02, 2010	63.58	X
Dec 08, 2010	63.64	X
Dec 13, 2010	63.54	X
Dec 15, 2010	63.39	X
Dec 22, 2010	63.50	X
Dec 29, 2010	63.66	X
Dec 30, 2010	63.55	X
Jan 03, 2011	63.49	X
Jan 05, 2011	63.76	X
Jan 10, 2011	63.82	X
Jan 11, 2011	63.63	X
Jan 14, 2011	63.61	X
Jan 19, 2011	63.87	X
Jan 21, 2011	63.69	X
Jan 27, 2011	63.52	X
Jan 29, 2011	63.69	X
Feb 01, 2011	63.62	X
Feb 07, 2011	63.90	X
Feb 09, 2011	63.69	X
Feb 10, 2011	63.75	X
Feb 13, 2011	63.45	X
Feb 18, 2011	63.75	X
Feb 22, 2011	63.72	X
Feb 24, 2011	63.43	X
Feb 25, 2011	63.65	X
Feb 28, 2011	63.49	X
Mar 02, 2011	63.28	X
Mar 06, 2011	63.64	X
Mar 13, 2011	63.74	X
Mar 16, 2011	63.57	X
Mar 17, 2011	63.50	X
Mar 17, 2011	63.41	X
Mar 17, 2011	63.55	X
Mar 18, 2011	63.61	X
Mar 25, 2011	63.70	X
Mar 28, 2011	63.73	X

3H Efficiency

Total # pts	: 5291
Valid # pts	: 36
Mean	: 63.61
SD	: 0.14



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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: 5/13/2010 0:00 *date counted*
STANDARD REFERENCE #: S-0206

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

Radionuclide: H-3 Dilution Reference Date: 2/25/2009 8:30

Dilution Activity	3.01	pCi per gram ===> dpm/g	6.68
Verif. Date Decay Corrected	2.81	pCi per gram ===> dpm/g	6.24

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-0206-V1B	11.98	1	LSC	0.3328	1.62	5.040	6.18	2.78
S-0206-V2B	11.42	1	LSC	0.3186	1.62	5.010	6.13	2.76
S-0206-V3B	12.01	1	LSC	0.3360	1.62	4.990	6.19	2.79
S-0206-V4B	11.75	1	LSC	0.3275	1.62	5.010	6.17	2.78
S-0206-V5B	11.45	1	LSC	0.3196	1.62	5.020	6.13	2.76

Average	6.16	2.77
Two Sigma Uncertainty	0.06	0.02
Standard Deviation percent of known concentration	0.45%	0.45%
Target Activity	6.24	2.81
% Diff	-1.27%	-1.27%

10% Max *PASS*

5% Max *PASS*

Verification Expiration Date: May 13, 2011

Prepared & Counted By: Jeremy Raber Date: 5/13/2010 0:00

Verified & Approved By: Eugene Mulligan Date: 5/14/2010

QC Approval: Amy Engel Date: 5/14/2010

S-0206		
H-3	Verified	*5/14/10*
SL	**Expires**	**5/14/11**
Manufactuer	**NIST**	
Sol Matrix	H2O	
Ref No	NIST 4361C	
Tech	M. Thibodeaux	
Parent ID	S-0152	

ARS INTERNATIONAL

RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY

STD ID: S-0206

ARS INTERNATIONAL

Add/Edit Secondary Stds

Planning

Planning Comments	Create a Low Level H3 LCS solution.
Target dpm/g (on dil. date)	6.66
Target Final volume mL	500
Appx mass g of Parent Sol'n	49.8188436
Appx vol ml of Parent Sol'n	49.91868096
Expected Addition for Analysis g	5

Standards Preparation / Dilution

Secondary Solution #	S-0206
Dilution Date (New Ref Date)	02/25/2009 08:30
Ampoule, Empty (g)	
Ampoule /Solution Gross (g)	
Net Wt Removed (g)	
Transfer Container, empty (g)	103.64
Container Plus Solution (g)	153.45
Net Wt Transferred (g)	49.81
DPM Xferred on 02/25/2009 08:30	3329.408875
Diluent/matrix	Dead H2O
Diluent Density Cont, empty (g)	
Test Mass of 5 ml of Diluent (g)	
Diluent Density Test - (g/mL)	
Dilution Empty Container Mass (g)	198.75
Dilution Full Cont g (if measured)	697.31
Dilution Final Volume ml (if measured)	500
Final Dilution Density (g/mL)	0.99712
Final Dilution Measured Mass g	498.56
Comments	Use as H3LL LCS creation. Dilution performed as stated above by M Thibodeaux on 2/25/09. -BJS 2/25/09
Final Dilution dpm/g	6.678050535
Final Dil New Ref Date/Time	02/25/2009 08:30

Parent Standard Data

Parent Solution Reference #	NIST 4361C			
Parent Solution #	S-0152			
Parent Principal Radionuclide	H-3	Half Life (Days)	4499.8000000	
Parent Reference Date	09/03/1998 11:00			
Parent Certified Act	120.54	Certi Act/Vol Units	dpm	g
Parent Cert Act Uncert 1 Sigma	0.0076			
Parent Sp. Gravity G/Ml	0.998			
Parent Supplier	NIST			
Parent Date Recvd	12/04/06			
Parent Received By	LU			
Parent Cert Exp Date				
Parent Matrix	H2O			
Certified dpm/g At Ref Date	120.54			
Certified dpm/g on 02/25/2009 08:30	66.84217777			
Parent Comments	Liquid in a 500-ml borosilicate-glass medis bottle with teflon-lined screw cap. Approximately 500 grams			
Parent Tech	M. Thibodeaux			
Is_Primary	FALSE			
Is_LCS	TRUE			
Is_Tracer	FALSE			
Is_Calib	FALSE			

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Folder Duplicate

Report Compilation Checklist

ARS SDG: 11-00547 **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~~	

Susan Reese 6-24-11
Report Generator Signature **Date**

VJM 6-24-11
Management Review Signature **Date**

ARS-059
07/03/2009

ARS INTERNATIONAL

LSC
Technical Review Checklist

ARS SDG ARS1-11-00547

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:**	ARS1-B11-01170	**Batch B:**	N/A	**Batch C:**	N/A
Test Method(s):		LSC-A-022		N/A		N/A

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Jimmy D. Raber 6-21-2011 — Chemist Signature, Date

Jamal Brown 6-21-11 — 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

VHM 6-24-11 — 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

N/A JOR 6-24-2011

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

Jimmy D. Raber 6-24-2011 — Analyst Signature, Date

N/A — Technicial Reviewer Signature, Date

ARS INTERNATIONAL

Batch A: ARS1-B11-01170

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): _____

Susan Leese 6-24-11
Project Manager Signature Date

VJM 6-24-11
QA Officer Signature Date

GENERAL COMMENTS

LSC
Technical Review Checklist

ARS SDG ARS1-11-00547

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:** ARS1-B11-01169 **Batch B:** N/A **Batch C:** N/A

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

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Chemist Signature: [signature] Date: 3-28-11

Verifier Review Signature: [signature] Date: 3-28-11

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

QA Officer Signature: [signature] Date: 6-24-11

	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

N/A 3-31-11

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

Analyst Signature: [signature] Date: 3-31-11

Technicial Reviewer Signature: N/A Date:

Batch A: ARS1-B11-01169

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): _____

Susan Leese 6-24-11
Project Manager Signature Date

[signature] 6-24-11
QA Officer Signature Date

GENERAL COMMENTS

SDG Report - Samples and Containers

SDG Specific Data

SDG	ARS1-11-00547	TAT Days	30	Project Type	Environmental
Sample Count	3 Rpt Level 4	Date Received	3/17/2011	COC Number	11-1637
Client	Los Alamos National Laboratory	Client Deadline	4/15/2011	PO Number	63641-001-10
Client Code	114	Internal Deadline	4/14/2011	Job Number	WEPR1158W100
Profile Number	PN-00094	Lab Deadline	4/12/2011	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	Buckman1-11-5682	AQ	03/14/11 12:00 PM	03/14/11 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	82442	1	1000.00				20	11		N	N/A				
002	Buckman06-11-5683	AQ	03/14/11 12:00 PM	03/14/11 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	82443	1	1000.00				20	12		N	N/A				
003	Buckman08-11-5684	AQ	03/14/11 12:00 PM	03/14/11 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	82444	1	1000.00				20	12		N	N/A				

SDG Report - Analysis Assignments

Temp SDG	ARS1-11-00547	Sample Count	3
Client	Los Alamos National Laboratory	Analysis Count	2-6

Samples Count Totals per Analysis

Analysis Code	Analysis Description	Samples Count
LSC-A-021	Low Level Tritium Screen in (Aqueous)	3
LSC-A-022	Low Level Tritium by Enrichment Process in (Aqueous [AQ])	3

Analyses Assigned Per Fraction

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

DQO Report for SDG
ARS1-11-00547

Analysis Code	Group	Isotope	Activity Units	Aliquot Units	ProcedureNo	RDL	LCS_LL	LCS_UL	MS_LL	MS_UL	RadY_LL	RadY_UL	GravY_LL	GravY_LL	RER	RPD	DiltionReq	RoughPrepReq	BlankCorrectionMDA	BlankCorrectionAll	CountTimeReq	AliquotRequired
LSC-A-021	STD	H-3		TU	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		TU	ARS-054	0.00E+00	75	125	60	140	30	110	40	110	1.00	25	FALSE	FALSE	FALSE	FALSE		

ARS FILE TRACKING SHEET

SDG: ARS1-11-00547

Task	Date / Time	Initials
Date & Time Samples Received	03-17-11/10:09	CWB
ICOC Initiated / Storage Location: LL3H	03-17-11/11:39	CWB
Technical Checks Performed	See Batch	—
Report Written / EDD Generated: 6-24-11/1357 (Date/Time) SDL (Initials)	6-24-11/1355	SDL
Quality Assurance Checks Performed on Report	6-24-11 1420	JYM
Management Check Performed on Report		
Preliminary Report Sent	na	—
Report E-mailed	6-24-11/1448	SDL
Report Faxed	na	—
Report Reviewed	7-28-11/1517	MB
Report Mailed	NA	
Invoice Completed Invoice #: 110132	6-30-11/1212	D
Report Imaged	7-28-11/1528	MB

SPECIAL REQUIREMENTS

Requirement	Yes	No
3 Hour Rush		✓
24 Hour Rush		✓
48 Hour Rush		✓
Special Invoicing *see notes* Mgmt. Approval:		✓

NOTES:

ARS-062
04/23/2010

COMPANY NAME: Los Alamos National Lab **SDG:** ARS1-1100547

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 3

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

External and Internal Surveys

Exposure Rate Meter:	M3 242861	Serial No.:	M44-2 PR264266	Calibration Due Date:	4-19-11
Count Rate Meter:	M2 154859	Serial No.:	M44-9 PR184559	Calibration Due Date:	4-6-11

Background Exposure Rate (µR/hr)	28	Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd)	12	µR/hr
Background Count Rate (cpm)	60	Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd)	20	cpm
		Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd)	20	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
Buckman1-11-5682					1000 mL	11	20
1061-5683					1000 mL	12	20
1081-5684					1000 mL	12	20

Surveyors Name: [signature] Date/Time Surveyed: 3-17-11 / 10:58

S:\Procedures_Controlled\Controlled Forms\ARS-062 Sample Receipt Inspection Form

Page 1 of 1

ARS INTERNATIONAL

2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Request Number: 11-473

REVISED

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: 11-473

Original COC

Thursday, November 11, 2010

REQUEST NUMBER: 11-473

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806

These Samples are on:
LANL Request Number:11-473
Per Agreement Number:63641-001-10
Project Cost Code: WEPR1158W100

Please analyse the enclosed samples according to the schedule indicated:

SHIP DATE: 11/11/2010
TURNAROUND/REPORT DUE: 12/11/2010
TURNAROUND REQ'D: 30 Days

RAD SCREENING: Yes, Below Background
LAB REQUEST COMMENTS:

LANL ER SMO CONTACT:
Signature:

PRIORITY	METHOD CODE	CNTNR	SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	SPECIAL INSTRUCTIONS
	Generic:Low_Level_Tritium	1	Buckman1-11-1944	WG	11/10/2010	
		1	Buckman06-11-1970	WG	11/10/2010	
		1	Buckman08-11-2042	WG	11/10/2010	

Final Page of REQUEST NUMBER 11-473

Thursday, November 11, 2010

LAB CHAIN OF CUSTODY DOCUMENT NUMBER: 11-473C

REQUEST NUMBER: 11-473

LOS ALAMOS
NATIONAL LABORATORY

ATTN: Danny Coleman
American Radiation Services - Primary
1726 Wooddale Court
Baton Rouge, LA 70806
LAB REQUEST COMMENTS:

TURNAROUND/REPORT DUE: 12/11/2010
TURNAROUND REQ'D: 30

SAMPLE ID	CTNR	CTNR DESC	ORDER	PRESERV	MATRIX
Buckman1-11-1944	1	POLY	WSP-LL-H-3	None	WG
Buckman06-11-1970	1	POLY	WSP-LL-H-3	None	WG
Buckman08-11-2042	1	POLY	WSP-LL-H-3	None	WG

Relinquished By:	Date	Time	Received By:	Date	Time
[illegible]	11/11/10	3:00	[illegible]	11-16-10	11:08
Printed Name / Signature			Printed Name / Signature		
Printed Name / Signature			Printed Name / Signature		
Printed Name / Signature			Printed Name / Signature		

Received for DISPOSAL By: **Date** **Time** **Remarks:**

Printed Name Signature

2609 North River Road • Port Allen, Louisiana 70767
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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory Request: 11-473

Case Narrative

ARS INTERNATIONAL

2609 North River Road • Port Allen, Louisiana 70767
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March 14, 2011

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

Request Number: **11-473**
LANL Sample ID: Buckman1-11-1944; Buckman06-11-1970; Buckman08-11-2042.

Dear Mr. Greene;

On November 16, 2010, ARS International received three (3) water samples to be analyzed for Low Level Tritium.

The samples underwent enrichment and were counted using the appropriate counting equipment and QA/QC for this type of analysis. Results of the analysis and QA/QC are attached in the data package.

The client and QA/QC samples were counted with a count time sufficient to meet quality control parameters for counting equipment and were within acceptance criteria and statistical sound detection limits.

If you have any questions please do not hesitate to call at 225.381.2991 or email LANL@amrad.com.

Sincerely,

Eugene Mulligan

Laboratory Management
ARS International

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

COVER PAGE

PROJECT SAMPLE IDENTIFICATION
CROSS-REFERENCE
TO ARS SAMPLE LABORATORY IDs

Subcontract (LANL Agreement Number) 63641-001-10

Request Number	LANL PROJECT SAMPLE ID NUMBER	American Radiation Services SAMPLE ID NUMBER(S)
11-473	Buckman1-11-1944	ARS1-10-02491-001
11-473	Buckman06-11-1970	ARS1-10-02491-002
11-473	Buckman08-11-2042	ARS1-10-02491-003

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

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

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	Title	Date
Dwyane Mulligan	Laboratory Management, ARS International	3-14-11

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-10-02491	**Request or PO Number:**	11-473
Client Sample ID:	Buckman1-11-1944	**ARS Sample ID:**	ARS1-10-02491-001
Sample Collection Date:	11/10/10	**Date Received:**	11/16/10
Sample Matrix:	Aqueous	**Report Date:**	08/18/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.050	0.230	0.790	0.380	U	TU	ARS-040	03/04/11 00:00	JR	NA

NOTES: Project Cost Code WEPR 1158W100

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 NELAP Certificate # E87558

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-10-02491	**Request or PO Number:**	11-473
Client Sample ID:	Buckman06-11-1970	**ARS Sample ID:**	ARS1-10-02491-002
Sample Collection Date:	11/10/10	**Date Received:**	11/16/10
Sample Matrix:	Aqueous	**Report Date:**	08/18/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.030	0.230	0.760	0.370	U	TU	ARS-040	03/04/11 00:00	JR	NA

NOTES: Project Cost Code WEPR 1158W100

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 NELAP Certificate # E87558

ARS INTERNATIONAL

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ARS Sample Delivery Group:	ARS1-10-02491	**Request or PO Number:**	11-473
Client Sample ID:	Buckman08-11-2042	**ARS Sample ID:**	ARS1-10-02491-003
Sample Collection Date:	11/10/10	**Date Received:**	11/16/10
Sample Matrix:	Aqueous	**Report Date:**	08/18/11

Analysis Description	Analysis Results	Analysis Error +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.580	0.250	0.750	0.360	U	TU	ARS-040	03/04/11 00:00	JR	NA

NOTES: Project Cost Code WEPR 1158W100

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 NELAP Certificate # E87558

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QC Results Report

Sample Delivery Group: ARS1-10-02491
Date Received: 11/16/2010

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-B10-05618	LCS	H3	8.130	1.260	0.770	8.340		TU	ARS-040	3/2/11 19:27	JR	97	75%-125%

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-B10-05618	MBL	H3	-0.610	0.210	0.680	NA	U	TU	ARS-040	3/3/11 7:52	JR

Sample RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER AcceptanceRange
ARS1-B10-05618	LCSD	H3	8.130	1.260	9.020	1.410		TU	ARS-040	3/3/11 1:40	JR	0.33	< 1

Sample DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER AcceptanceRange
ARS1-B10-05618	LCSD	H3	8.130	1.260	9.020	1.410		TU	ARS-040	3/3/11 1:40	JR	0.94	< 3

Project Manager Review

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

LELAP Certificate# 01949 NELAP Certificate # E87558

Expected Value Calculations LANL

ARS Batch Number: ARS1-B10 - 05618

LCS	**CALCULATED EXPECTED VALUE**	=	26.863	TU 8.340			
			Range	21.490	-	32.235	
LCSD	**CALCULATED EXPECTED VALUE**	=	26.822	8.327			
			Range	21.458	-	32.186	

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting Samples

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	10-02492; 2491; 2509; 2510; 2511
ARS Batch ID Number	ARS1-B10-05618

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8.978E-01
b	-9.611E-01
c	

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	ACF (def. = 1)	1
Syserror	0.15	Reporting Units	TU
Coverage Factor	1	UCF	7.151
		Aliquot must be entered in liters!!	

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f'	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
ARS1-B10-05618-01	503.97	2.00	11.67	2.06	9.61	0.02	40.36	4.86	1.55	552.66	0.3125	0.00500	L	2/25/2009	3/2/2011	360	360	0.90311	8.13	0.33	0.33	1.26	0.77	0.37	TU
ARS1-B10-05618-02	504.74	2.00	12.50	2.06	10.44	0.02	37.33	4.96	1.55	559.26	0.3137	0.00500	L	2/25/2009	3/3/2011	360	360	0.90299	9.02	0.36	0.36	1.40	0.83	0.40	TU
ARS1-B10-05618-03	505.04	2.00	11.49	2.06	9.43	0.02	41.19	1.27	1.55	552.74	0.3125	0.00500	L	3/13/2011	3/3/2011	360	360	1.00137	-0.61	0.19	0.19	0.21	0.68	0.33	TU
ARS1-B10-05618-04	492.05	2.02	11.78	2.08	9.70	0.02	39.09	1.67	1.55	555.57	0.3130	0.00502	L	11/9/2010	3/3/2011	360	360	0.9843	0.28	0.22	0.22	0.22	0.72	0.35	TU
ARS1-B10-05618-05	500.17	2.01	9.69	2.07	7.62	0.02	50.08	39.77	1.55	566.39	0.3149	0.00503	L	11/10/2010	3/3/2011	360	360	0.98444	68.44	0.61	0.61	10.28	0.56	0.27	TU
ARS1-B10-05618-07	499.25	2.01	11.20	2.07	9.13	0.02	42.02	1.65	1.55	555.37	0.3130	0.00501	L	11/9/2010	3/4/2011	360	360	0.98417	0.22	0.20	0.20	0.21	0.67	0.33	TU
ARS1-B10-05618-08	496.29	2.00	10.23	2.06	8.17	0.02	46.49	1.57	1.55	552.08	0.3124	0.00389	L	11/10/2010	3/4/2011	360	360	0.9843	0.05	0.23	0.23	0.23	0.79	0.38	TU
ARS1-B10-05618-09	497.25	2.02	12.37	2.08	10.29	0.02	37.31	1.56	1.55	546.49	0.3115	0.00502	L	11/10/2010	3/4/2011	360	360	0.9843	0.03	0.23	0.23	0.23	0.76	0.37	TU
ARS1-B10-05618-10	493.65	2.00	12.04	2.06	9.98	0.02	38.16	1.79	1.55	548.40	0.3118	0.00500	L	11/10/2010	3/4/2011	360	360	0.9843	0.58	0.23	0.23	0.25	0.75	0.36	TU
ARS1-B10-05618-11	500.41	2.00	12.09	2.06	10.03	0.02	38.47	1.95	1.70	587.47	0.3205	0.00501	L	11/17/2010	3/8/2011	360	360	0.98471	0.57	0.23	0.23	0.25	0.75	0.37	TU
ARS1-B10-05618-12	492.12	1.99	12.67	2.05	10.62	0.02	35.84	1.86	1.70	576.12	0.3173	0.00502	L	11/17/2010	3/9/2011	360	360	0.98458	0.40	0.25	0.25	0.25	0.81	0.40	TU
ARS1-B10-05618-13	486.78	2.02	12.58	2.08	10.50	0.02	35.85	12.91	1.70	597.10	0.3232	0.00502	L	11/16/2010	3/9/2011	360	360	0.98444	27.37	0.49	0.49	4.14	0.80	0.39	TU
ARS1-B10-05618-15	496.95	2.00	11.59	2.06	9.53	0.02	40.14	2.46	1.70	587.77	0.3205	0.00501	L	11/11/2010	3/9/2011	360	360	0.98376	1.68	0.24	0.24	0.35	0.72	0.35	TU
ARS1-B10-05618-16	492.30	2.01	11.87	2.07	9.80	0.02	38.73	1.69	1.70	579.51	0.3182	0.00502	L	11/11/2010	3/9/2011	360	360	0.98376	-0.02	0.22	0.22	0.22	0.75	0.37	TU
ARS1-B10-05618-17	495.86	2.01	13.27	2.07	11.20	0.02	34.30	1.74	1.70	594.71	0.3225	0.00501	L	11/11/2010	3/10/2011	360	360	0.98362	0.10	0.25	0.25	0.25	0.84	0.41	TU
ARS1-B10-05618-18	500.10	2.00	11.54	2.06	9.48	0.02	40.59	4.73	1.70	582.89	0.3192	0.00501	L	11/11/2010	3/10/2011	360	360	0.98362	6.64	0.29	0.29	1.04	0.72	0.35	TU
ARS1-B10-05618-19	495.16	2.01	12.34	2.07	10.27	0.02	37.23	1.66	1.70	590.76	0.3214	0.00500	L	11/16/2010	3/10/2011	360	360	0.9843	-0.09	0.23	0.23	0.23	0.78	0.38	TU
ARS1-B10-05618-20	503.55	2.00	13.26	2.06	11.20	0.02	34.81	1.76	1.70	592.76	0.3219	0.00500	L	11/16/2010	3/10/2011	360	360	0.9843	0.15	0.25	0.25	0.25	0.83	0.41	TU
ARS1-B10-05618-21	502.44	2.00	11.78	2.06	9.72	0.02	39.81	1.64	1.70	581.40	0.3188	0.00501	L	11/12/2010	3/11/2011	360	360	0.98362	-0.13	0.22	0.22	0.22	0.73	0.36	TU
ARS1-B10-05618-22	498.54	2.00	11.73	2.06	9.67	0.02	39.71	1.81	1.70	582.46	0.3191	0.00502	L	11/12/2010	3/11/2011	360	360	0.98362	0.25	0.22	0.22	0.22	0.73	0.36	TU
ARS1-B10-05618-23	492.59	2.00	12.09	2.06	10.03	0.02	37.89	1.67	1.70	590.19	0.3212	0.00504	L	11/12/2010	3/11/2011	360	360	0.98362	-0.07	0.22	0.22	0.22	0.76	0.37	TU

ARS Tritium Enrichment Calculations

Procedures	ARS-040 , ARS-060
ARS File ID Number	10-02492; 2491; 2509; 2510; 2511
ARS Batch ID Number	ARS1-B10-05618

Enrichment Factor Curve coeff. - Power y = a * x^b	
a	8.978E-01
b	-9.611E-01
c	

Bkg Quench Curve coeff. - Polynomial y = ax^3+bx^2+cx+d	
a	-2.319E-06
b	2.724E-03
c	-1.060E+00
d	1.383E+02

lambda	1.3863E-04	**ACF (def. = 1)**	1
Syserror	0.15	**Reporting Units**	**pCi**
Coverage Factor	1	**UCF**	2.22

Sample ID	Initial Mass sample (g) V_i	Mass Na2O2 added (g) mi	Final mass electrolyzed sample w/ NaOH (g) V_f	Mass equivalent NaOH (g) m_f	Final Mass Electrolyzed sample (g pure H2O) V_f	Volume factor X	Enrichment Factor Y	Average Sample CPM R_s	Bkg CPM R_b	QIP tSIE	Detector Eff (decimal) Eff	Aliquot Aliquot	Enter aliq. in final Rep. Units Units	Activity reference date T_o	Start Date of Count T_c	Total Sample Count Duration (min) t cnt (min)	Total Bkg Count Duration (min) t cnt (min)	Decay Correction to To DF	Sample Activity Conc. AC_i	Standard Counting Uncertainty CU	Counting Uncertainty 1s CU	Combined Standard Uncertainty 1s CSU	Minimum Detectable Conc. MDC	Decision Level Conc. DLC	Reporting Units Units
ARS1-B10-05618-01	503.97	2.00	11.67	2.06	9.61	0.02	40.36	4.86	1.55	552.66	0.3125	0.00500	L	2/25/2009	3/2/2011	360	360	0.90311	26.19	1.06	1.06	4.07	2.47	1.21	pCi/L
ARS1-B10-05618-02	504.74	2.00	12.50	2.06	10.44	0.02	37.33	4.96	1.55	559.26	0.3137	0.00500	L	2/25/2009	3/3/2011	360	360	0.90299	29.06	1.15	1.15	4.51	2.66	1.30	pCi/L
ARS1-B10-05618-03	505.04	2.00	11.49	2.06	9.43	0.02	41.19	1.27	1.55	552.74	0.3125	0.00500	L	3/13/2011	3/3/2011	360	360	1.00137	-1.95	0.62	0.62	0.68	2.19	1.07	pCi/L
ARS1-B10-05618-04	492.05	2.02	11.78	2.08	9.70	0.02	39.09	1.67	1.55	555.57	0.3130	0.00502	L	11/9/2010	3/3/2011	360	360	0.9843	0.90	0.70	0.70	0.72	2.33	1.14	pCi/L
ARS1-B10-05618-05	500.17	2.01	9.69	2.07	7.62	0.02	50.08	39.77	1.55	566.39	0.3149	0.00503	L	11/10/2010	3/3/2011	360	360	0.98444	220.47	1.95	1.95	33.13	1.80	0.88	pCi/L
ARS1-B10-05618-07	499.25	2.01	11.20	2.07	9.13	0.02	42.02	1.65	1.55	555.37	0.3130	0.00501	L	11/9/2010	3/4/2011	360	360	0.98417	0.70	0.65	0.65	0.66	2.17	1.06	pCi/L
ARS1-B10-05618-08	496.29	2.00	10.23	2.06	8.17	0.02	46.49	1.57	1.55	552.08	0.3124	0.00389	L	11/10/2010	3/4/2011	360	360	0.9843	0.17	0.75	0.75	0.75	2.53	1.24	pCi/L
ARS1-B10-05618-09	497.25	2.02	12.37	2.08	10.29	0.02	37.31	1.56	1.55	546.49	0.3115	0.00502	L	11/10/2010	3/4/2011	360	360	0.9843	0.09	0.73	0.73	0.73	2.45	1.20	pCi/L
ARS1-B10-05618-10	493.65	2.00	12.04	2.06	9.98	0.02	38.16	1.79	1.55	548.40	0.3118	0.00500	L	11/10/2010	3/4/2011	360	360	0.9843	1.85	0.74	0.74	0.79	2.41	1.17	pCi/L
ARS1-B10-05618-11	500.41	2.00	12.09	2.06	10.03	0.02	38.47	1.95	1.70	587.47	0.3205	0.00501	L	11/17/2010	3/8/2011	360	360	0.98471	1.85	0.75	0.75	0.80	2.42	1.18	pCi/L
ARS1-B10-05618-12	492.12	1.99	12.67	2.05	10.62	0.02	35.84	1.86	1.70	576.12	0.3173	0.00502	L	11/17/2010	3/9/2011	360	360	0.98458	1.28	0.80	0.80	0.82	2.62	1.28	pCi/L
ARS1-B10-05618-13	486.78	2.02	12.58	2.08	10.50	0.02	35.85	12.91	1.70	597.10	0.3232	0.00502	L	11/16/2010	3/9/2011	360	360	0.98444	88.18	1.58	1.58	13.32	2.57	1.26	pCi/L
ARS1-B10-05618-15	496.95	2.00	11.59	2.06	9.53	0.02	40.14	2.46	1.70	587.77	0.3205	0.00501	L	11/11/2010	3/9/2011	360	360	0.98376	5.40	0.76	0.76	1.11	2.32	1.14	pCi/L
ARS1-B10-05618-16	492.30	2.01	11.87	2.07	9.80	0.02	38.73	1.69	1.70	579.51	0.3182	0.00502	L	11/11/2010	3/9/2011	360	360	0.98376	-0.07	0.72	0.72	0.72	2.42	1.18	pCi/L
ARS1-B10-05618-17	495.86	2.01	13.27	2.07	11.20	0.02	34.30	1.74	1.70	594.71	0.3225	0.00501	L	11/11/2010	3/10/2011	360	360	0.98362	0.33	0.81	0.81	0.81	2.70	1.32	pCi/L
ARS1-B10-05618-18	500.10	2.00	11.54	2.06	9.48	0.02	40.59	4.73	1.70	582.89	0.3192	0.00501	L	11/11/2010	3/10/2011	360	360	0.98362	21.38	0.94	0.94	3.34	2.31	1.13	pCi/L
ARS1-B10-05618-19	495.16	2.01	12.34	2.07	10.27	0.02	37.23	1.66	1.70	590.76	0.3214	0.00500	L	11/16/2010	3/10/2011	360	360	0.9843	-0.31	0.74	0.74	0.74	2.50	1.22	pCi/L
ARS1-B10-05618-20	503.55	2.00	13.26	2.06	11.20	0.02	34.81	1.76	1.70	592.76	0.3219	0.00500	L	11/16/2010	3/10/2011	360	360	0.9843	0.49	0.80	0.80	0.80	2.67	1.31	pCi/L
ARS1-B10-05618-21	502.44	2.00	11.78	2.06	9.72	0.02	39.81	1.64	1.70	581.40	0.3188	0.00501	L	11/12/2010	3/11/2011	360	360	0.98362	-0.43	0.69	0.69	0.70	2.36	1.15	pCi/L
ARS1-B10-05618-22	498.54	2.00	11.73	2.06	9.67	0.02	39.71	1.81	1.70	582.46	0.3191	0.00502	L	11/12/2010	3/11/2011	360	360	0.98362	0.79	0.71	0.71	0.72	2.36	1.15	pCi/L
ARS1-B10-05618-23	492.59	2.00	12.09	2.06	10.03	0.02	37.89	1.67	1.70	590.19	0.3212	0.00504	L	11/12/2010	3/11/2011	360	360	0.98362	-0.22	0.72	0.72	0.72	2.44	1.19	pCi/L

QC Evaluation

EPA Method: ARS-040
Batch ID: ARS1-B10-05618
SDG's: ARS1-10-2492; 2491; 2509; 2510; 2511

LCS	26.1900	**CSU (2s)**	7.9700
LCSD	29.0600	**CSU-D (2s)**	8.8300

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

at 1 sigma

DER $\frac{2.87}{5.947474}$ = 0.482558 **< 3**

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

%RPD $\frac{2.87}{27.625}$ *100 = 10.38914 **< 25%**

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

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

at 2 sigma

RER = $\frac{2.87}{16.8000}$ 0.170833333 **<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	-1.95	1.34	2.19	
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 = -1.95
CSU = 1.34
Is ACT<1.65*CSU? YES

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-05618**

Method **ARS-054** **Analysis** **LSC-A-022** **Matrix** **AQ**

Description **Low Level Tritium by Enrichment**

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-05618-01	LCS	B-11110								
ARS1-B10-05618-02	LCSD	B-11111								
ARS1-B10-05618-03	MBL									
ARS1-B10-05618-04	TRG				**ARS1-10-02492**	002	1	CAMO-11-1269	STD	12/07/10
ARS1-B10-05618-05	TRG				**ARS1-10-02492**	003	1	CAMO-11-1271	STD	12/07/10
ARS1-B10-05618-07	TRG				**ARS1-10-02492**	005	1	CAMO-11-1302	STD	12/07/10
ARS1-B10-05618-08	TRG				**ARS1-10-02491**	001	1	Buckman1-11-1944	STD	12/13/10
ARS1-B10-05618-09	TRG				**ARS1-10-02491**	002	1	Buckman06-11-1970	STD	12/13/10
ARS1-B10-05618-10	TRG				**ARS1-10-02491**	003	1	Buckman08-11-2042	STD	12/13/10
ARS1-B10-05618-11	TRG				**ARS1-10-02509**	001	1	CASA-11-1365	STD	12/14/10
ARS1-B10-05618-12	TRG				**ARS1-10-02509**	002	1	CASA-11-1367	STD	12/14/10
ARS1-B10-05618-13	TRG				**ARS1-10-02510**	001	1	CASA-11-1360	STD	12/14/10
ARS1-B10-05618-15	TRG				**ARS1-10-02510**	003	1	CASA-11-1371	STD	12/14/10
ARS1-B10-05618-16	TRG				**ARS1-10-02510**	004	1	CASA-11-1373	STD	12/14/10
ARS1-B10-05618-17	TRG				**ARS1-10-02510**	005	1	CASA-11-1374	STD	12/14/10
ARS1-B10-05618-18	TRG				**ARS1-10-02510**	006	1	CASA-11-1376	STD	12/14/10
ARS1-B10-05618-19	TRG				**ARS1-10-02510**	007	1	CASA-11-1379	STD	12/14/10
ARS1-B10-05618-20	TRG				**ARS1-10-02510**	008	1	CASA-11-1380	STD	12/14/10
ARS1-B10-05618-21	TRG				**ARS1-10-02511**	001	1	CAMO-11-1262	STD	12/14/10
ARS1-B10-05618-22	TRG				**ARS1-10-02511**	002	1	CAMO-11-1265	STD	12/14/10
ARS1-B10-05618-23	TRG				**ARS1-10-02511**	003	1	CAMO-11-1285	STD	12/14/10

82203 10-02492-002-1 **XRAD**

82204 10-02492-003-1 **XRAD**

82205 10-02492-005-1 **XRAD**

82206 10-02491-001-1 **XRAD**

82207 10-02491-002-1 **XRAD**

82208 10-02491-003-1 **XRAD**

82209 10-02509-001-1 **XRAD**

82210 10-02509-002-1 **XRAD**

82211 10-02510-001-1 **XRAD**

82212 10-02510-003-1 **XRAD**

82213 10-02510-004-1 **XRAD**

82214 10-02510-005-1 **XRAD**

82215 10-02510-006-1 **XRAD**

82216 10-02510-007-1 **XRAD**

82217 10-02510-008-1 **XRAD**

82218 10-02511-001-1 **XRAD**

82219 10-02511-002-1 **XRAD**

82220 10-02511-003-1 **XRAD**

LCS Report
Analytical Batch: ARS1-B10-05618

BlindID	ABatch	ABatchSampleID	BlindGroup	StdID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-11110	ARS1-B10-05618	ARS1-B10-05618-01	B-H3	S-0206	H-3	5	2.721946554	17.18	22.22	5.04	TBYRD	12/6/2010			
B-11111	ARS1-B10-05618	ARS1-B10-05618-02	B-H3	S-0206	H-3	5	2.721946554	17.22	22.26	5.04	TBYRD	12/6/2010			

ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
8011	ARS1-B10-05618	ARS1-B10-05618-01		5	g					JRABER	03/13/2011 17:01:16
8012	ARS1-B10-05618	ARS1-B10-05618-02		5	g					JRABER	03/13/2011 17:01:16
8013	ARS1-B10-05618	ARS1-B10-05618-03		5	g					JRABER	03/13/2011 17:01:16
8014	ARS1-B10-05618	ARS1-B10-05618-04	CAMO-11-1269	5.02	g	82203				JRABER	03/13/2011 17:01:16
8015	ARS1-B10-05618	ARS1-B10-05618-05	CAMO-11-1271	5.03	g	82204				JRABER	03/13/2011 17:01:17
8016	ARS1-B10-05618	ARS1-B10-05618-07	CAMO-11-1302	5.01	g	82205				JRABER	03/13/2011 17:01:17
8017	ARS1-B10-05618	ARS1-B10-05618-08	Buckman1-11-1944	3.89	g	82206				JRABER	03/13/2011 17:01:17
8018	ARS1-B10-05618	ARS1-B10-05618-09	Buckman06-11-1970	5.02	g	82207				JRABER	03/13/2011 17:01:18
8019	ARS1-B10-05618	ARS1-B10-05618-10	Buckman08-11-2042	5	g	82208				JRABER	03/13/2011 17:01:18
8020	ARS1-B10-05618	ARS1-B10-05618-11	CASA-11-1365	5.01	g	82209				JRABER	03/13/2011 17:01:18
8021	ARS1-B10-05618	ARS1-B10-05618-12	CASA-11-1367	5.02	g	82210				JRABER	03/13/2011 17:01:18
8022	ARS1-B10-05618	ARS1-B10-05618-13	CASA-11-1360	5.02	g	82211				JRABER	03/13/2011 17:01:19
8023	ARS1-B10-05618	ARS1-B10-05618-15	CASA-11-1371	5.01	g	82212				JRABER	03/13/2011 17:01:19
8024	ARS1-B10-05618	ARS1-B10-05618-16	CASA-11-1373	5.02	g	82213				JRABER	03/13/2011 17:01:20
8025	ARS1-B10-05618	ARS1-B10-05618-17	CASA-11-1374	5.01	g	82214				JRABER	03/13/2011 17:01:20
8026	ARS1-B10-05618	ARS1-B10-05618-18	CASA-11-1376	5.01	g	82215				JRABER	03/13/2011 17:01:20
8027	ARS1-B10-05618	ARS1-B10-05618-19	CASA-11-1379	5	g	82216				JRABER	03/13/2011 17:01:21
8028	ARS1-B10-05618	ARS1-B10-05618-20	CASA-11-1380	5	g	82217				JRABER	03/13/2011 17:01:21
8029	ARS1-B10-05618	ARS1-B10-05618-21	CAMO-11-1262	5.01	g	82218				JRABER	03/13/2011 17:01:21
8030	ARS1-B10-05618	ARS1-B10-05618-22	CAMO-11-1265	5.02	g	82219				JRABER	03/13/2011 17:01:21
8031	ARS1-B10-05618	ARS1-B10-05618-23	CAMO-11-1285	5.04	g	82220				JRABER	03/13/2011 17:01:22

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\20110302_1306
Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110302_1306\20110302_1306.results
RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110302_1306\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20110302_1306\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: LL 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
Count Time (min): 360.00
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	0.0	18.6	0.50
B	0.0	2000.0	0.00
C	0.0	2000.0	0.00

Count Corrections-

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

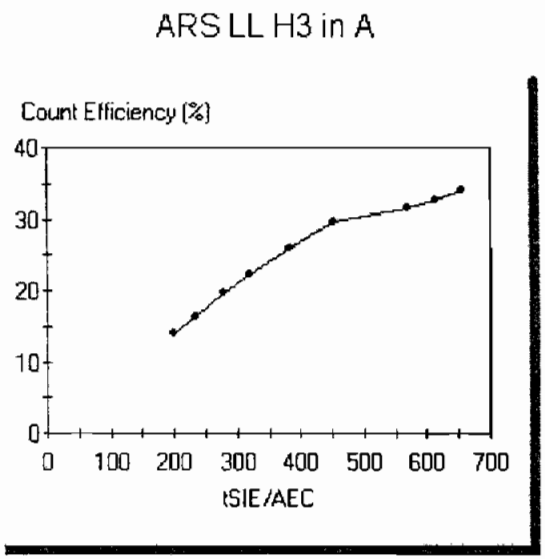
Half Life-

Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 11/19/2010
Date Modified:
ARS LL H3 in A

tSIE/AEC	Count Efficiency (%)
655.11	34.08
613.27	32.77
569.42	31.54
454.14	29.55
383.12	26.06
318.52	22.25
280.21	19.79
235.97	16.48
199.12	13.98

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff	Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	360.00	1.700	5.32	583.51		31.94	3/8/2011	11:42:40 AM	
2	2	B10-05618-11	360.00	1.948	6.08	587.47		32.05	3/8/2011	5:54:51 PM	
2	3	B10-05618-12	360.00	1.862	5.87	576.12		31.73	3/9/2011	12:12:51 AM	
2	4	B10-05618-13	360.00	12.914	39.96	597.10		32.32	3/9/2011	6:30:49 AM	
2	5	B10-05618-15	360.00	2.459	7.67	587.77		32.05	3/9/2011	12:46:04 PM	
2	6	B10-05618-16	360.00	1.692	5.32	579.51		31.82	3/9/2011	6:58:27 PM	
2	7	B10-05618-17	360.00	1.741	5.40	594.71		32.25	3/10/2011	1:10:48 AM	
2	8	B10-05618-18	360.00	4.733	14.83	582.89		31.92	3/10/2011	7:23:05 AM	
2	9	B10-05618-19	360.00	1.659	5.16	590.76		32.14	3/10/2011	1:35:26 PM	
2	10	B10-05618-20	360.00	1.763	5.47	592.76		32.19	3/10/2011	7:47:41 PM	
2	11	B10-05618-21	360.00	1.642	5.15	581.40		31.88	3/11/2011	1:59:56 AM	
2	12	B10-05618-22	360.00	1.810	5.67	582.46		31.91	3/11/2011	8:12:07 AM	
Missing vial 13.											
2	14	~~Sample #14~~ B10-05618-23	360.00	1.666	5.19	590.19		32.12	3/11/2011	2:24:30 PM	

JDR 3-13-2011

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
2	1	BACKGROUND	360.00	1.549	5.06	515.36	30.61	3/2/2011	1:15:11 PM	
2	2	B10-05618-01	360.00	4.861	15.55	552.66	31.25	3/2/2011	7:27:35 PM	
2	3	B10-05618-02	360.00	4.962	15.82	559.26	31.37	3/3/2011	1:40:11 AM	
2	4	B10-05618-03	360.00	1.270	4.06	552.74	31.25	3/3/2011	7:52:42 AM	
2	5	B10-05618-04	360.00	1.672	5.34	555.57	31.30	3/3/2011	2:04:51 PM	
2	6	B10-05618-05	360.00	39.768	126.29	566.39	31.49	3/3/2011	8:16:54 PM	
2	7	B10-05618-07	360.00	1.650	5.27	555.37	31.30	3/4/2011	2:29:11 AM	
2	8	B10-05618-08	360.00	1.573	5.04	552.08	31.24	3/4/2011	8:41:15 AM	
2	9	B10-05618-09	360.00	1.555	4.99	546.49	31.15	3/4/2011	2:53:14 PM	
2	10	B10-05618-10	360.00	1.791	5.74	548.40	31.18	3/4/2011	9:05:24 PM	

Tritium Enrichment Data

Procedures: **ARS-040**

Date: 1/25/2011

ARS File ID Numbers: ARS1-10-02492; 02491; 02509; 02510; 02511

ARS Batch ID: ARS1-B10-05618

		Vf'								Aliquot					
	A Batch ID:	Gross Sample Recovered	Enrichment factor	Cryo-Distil Flask #	Tare Wt Cryo-distil flask	Gross Wt flask + Sample	Recovered Water	Tare Weight of LSC Vial	Vial + Sample	Net Sample	*Wt of Vial, Sample& Dead Water Filler if used*	*Net Dead Water Added*	Tare Wt b/f Cocktail	Gross Wt Vial + Sample + Cocktail	Net Wt of Cocktail Added
1	ARS1-B10-05618-01	11.67	43.19	N/A,N/A	101.30	107.24	5.94	6.61	11.61	5.00	0.00	0.00	11.61	26.60	14.99
2	ARS1-B10-05618-02	12.50	40.38	N/A,N/A	96.37	102.71	6.34	6.62	11.62	5.00	0.00	0.00	11.62	26.62	15.00
3	ARS1-B10-05618-03	11.49	43.95	N/A,N/A	116.24	122.64	6.40	6.47	11.47	5.00	0.00	0.00	11.47	26.46	14.99
4	ARS1-B10-05618-04	11.78	41.77	N/A,7	116.63	124.89	8.26	6.61	11.63	5.02	0.00	0.00	11.63	26.61	14.98
5	ARS1-B10-05618-05	9.69	51.62	N/A,N/A	100.72	106.88	6.16	6.48	11.51	5.03	0.00	0.00	11.51	26.55	15.04
6		0.00	–				0.00			0.00		0.00			0.00
7	ARS1-B10-05618-07	11.20	44.58	E,N/A	90.54	96.91	6.37	6.51	11.52	5.01	0.00	0.00	11.52	26.51	14.99
8	ARS1-B10-05618-08	10.23	48.51	N/A,11	100.68	104.61	3.93	6.47	10.36	3.89	11.47	1.11	11.47	26.51	15.04
9	ARS1-B10-05618-09	12.37	40.20	N/A,N/A	109.65	118.40	8.75	6.56	11.58	5.02	0.00	0.00	11.58	26.57	14.99
10	ARS1-B10-05618-10	12.04	41.00	N/A,N/A	107.46	115.83	8.37	6.60	11.60	5.00	0.00	0.00	11.60	26.61	15.01
11	ARS1-B10-05618-11	12.09	41.39	G,N/A	99.68	108.19	8.51	6.59	11.60	5.01	0.00	0.00	11.60	26.59	14.99
12	ARS1-B10-05618-12	12.67	38.84	N/A,7	116.64	125.45	8.81	6.48	11.50	5.02	0.00	0.00	11.50	26.49	14.99
13	ARS1-B10-05618-13	12.58	38.69	N/A,N/A	101.71	110.60	8.89	6.64	11.66	5.02	0.00	0.00	11.66	26.66	15.00
14		0.00	–				0.00			0.00		0.00			0.00
15	ARS1-B10-05618-15	11.59	42.88	N/A,N/A	92.13	99.84	7.71	6.84	11.85	5.01	0.00	0.00	11.85	26.86	15.01
16	ARS1-B10-05618-16	11.87	41.47	N/A,11	116.24	121.48	5.24	6.62	11.64	5.02	0.00	0.00	11.64	26.64	15.00
17	ARS1-B10-05618-17	13.27	37.37	N/A,N/A	91.48	101.14	9.66	6.67	11.68	5.01	0.00	0.00	11.68	26.67	14.99
18	ARS1-B10-05618-18	11.54	43.34	N/A,N/A	107.43	115.29	7.86	6.58	11.59	5.01	0.00	0.00	11.59	26.58	14.99
19	ARS1-B10-05618-19	12.34	40.13	N/A,N/A	121.80	130.53	8.73	6.52	11.52	5.00	0.00	0.00	11.52	26.51	14.99
20	ARS1-B10-05618-20	13.26	37.98	N/A,7	96.40	105.87	9.47	6.52	11.52	5.00	0.00	0.00	11.52	26.51	14.99
21	ARS1-B10-05618-21	11.78	42.65	G,N/A	99.83	108.11	8.28	6.50	11.51	5.01	0.00	0.00	11.51	26.51	15.00
22	ARS1-B10-05618-22	11.73	42.50	N/A,N/A	92.18	100.07	7.89	6.58	11.60	5.02	0.00	0.00	11.60	26.59	14.99
23	ARS1-B10-05618-23	12.09	40.74	N/A,11	116.23	121.43	5.20	6.50	11.54	5.04	0.00	0.00	11.54	26.53	14.99
24		0.00	–				0.00			0.00		0.00			0.00
25		0.00	–				0.00			0.00		0.00			0.00
26		0.00	–				0.00			0.00		0.00			0.00
27		0.00	–				0.00			0.00		0.00			0.00
28		0.00	–				0.00			0.00		0.00			0.00
29		0.00	–				0.00			0.00		0.00			0.00

Chemist Signature: Jonny D. Rahm

ARS, International
Port Allen Lab

Tritium Enrichment Data

Procedures: **ARS-040**

Date: 1/25/2011

ARS File ID Numbers: ARS1-10-02492; 02491; 02509; 02510; 02511

ARS Batch ID: ARS1-B10-05618

	A Batch ID:	Enrichment Cell No.	Tare Wt of Electrolysis Cell & Electrodes	Tare Wt Reservoir	mi Wt Na_2O_2	Gross Weight of Sample Reservoir	Vi Gross Sample Added	Electrolysis Start Date & Time	Start AMP	Start Bath C°	Electolysis End Date & Time	End Bath C°	End Wt of Cell + Resv. + Sample
1	ARS1-B10-05618-01	1	331.10	199.96	2.00	703.93	503.97	1-14-11 1427	5.00	2.0	2-10-11 0815	2.0	542.73
2	ARS1-B10-05618-02	2	336.73	189.29	2.00	694.03	504.74	1-14-11 1429	5.00	2.0	2-10-11 0824	2.0	538.52
3	ARS1-B10-05618-03	3	334.75	193.00	2.00	698.04	505.04	1-14-11 1439	5.00	2.0	2-10-11 0934	2.0	539.24
4	ARS1-B10-05618-04	77	335.44	200.65	2.02	692.70	492.05	1-15-11 1019	5.00	2.0	2-11-11 1007	2.0	547.87
5	ARS1-B10-05618-05	59	337.02	195.13	2.01	695.30	500.17	1-15-11 1026	5.00	2.0	2-11-11 0815	2.0	541.84
6							0.00						
7	ARS1-B10-05618-07	12	331.50	194.44	2.01	693.69	499.25	1-15-11 1033	5.00	2.0	2-12-11 1358	2.0	537.14
8	ARS1-B10-05618-08	68	334.86	194.80	2.00	691.09	496.29	1-15-11 1039	5.00	2.0	2-13-11 0815	2.0	539.89
9	ARS1-B10-05618-09	51	334.59	200.61	2.02	697.86	497.25	1-15-11 1101	5.00	2.0	2-13-11 0821	2.0	547.57
10	ARS1-B10-05618-10	95	334.30	195.64	2.00	689.29	493.65	1-15-11 1106	5.00	2.0	2-14-11 0901	2.0	541.98
11	ARS1-B10-05618-11	26	335.14	193.93	2.00	694.34	500.41	1-15-11 1113	5.00	2.0	2-15-11 0815	2.0	541.16
12	ARS1-B10-05618-12	28	332.11	195.01	1.99	687.13	492.12	1-15-11 1131	5.00	2.0	2-17-11 1143	2.0	539.79
13	ARS1-B10-05618-13	42	330.48	192.00	2.02	678.78	486.78	1-15-11 1136	5.00	2.0	2-17-11 1057	2.0	535.06
14							0.00						
15	ARS1-B10-05618-15	35	339.81	193.87	2.00	690.82	496.95	1-15-11 1649	5.00	2.0	2-19-11 1107	2.0	545.27
16	ARS1-B10-05618-16	61	335.70	207.28	2.01	699.58	492.30	2-1-11 1316	5.00	2.0	2-18-11 0819	2.0	554.85
17	ARS1-B10-05618-17	93	337.22	187.78	2.01	683.64	495.86	2-1-11 1328	5.00	2.0	2-19-11 1642	2.0	538.27
18	ARS1-B10-05618-18	6	331.11	198.44	2.00	698.54	500.10	2-1-11 1337	5.00	2.0	2-18-11 0815	2.0	541.09
19	ARS1-B10-05618-19	49	334.82	190.18	2.01	685.34	495.16	2-1-11 1405	5.00	2.0	2-19-11 1357	2.0	537.34
20	ARS1-B10-05618-20	76	333.96	186.75	2.00	690.30	503.55	2-1-11 1420	5.00	2.0	2-20-11 0815	2.0	533.97
21	ARS1-B10-05618-21	7	334.55	190.36	2.00	692.80	502.44	2-1-11 1430	5.00	2.0	2-20-11 1152	2.0	536.69
22	ARS1-B10-05618-22	50	332.03	201.04	2.00	699.58	498.54	2-1-11 1502	5.00	2.0	2-21-11 1324	2.0	544.80
23	ARS1-B10-05618-23	21	333.69	199.08	2.00	691.67	492.59	2-1-11 1523	5.00	2.0	2-20-11 1424	2.0	544.86
24							0.00						
25							0.00						
26							0.00						
27							0.00						
28							0.00						
29							0.00						

Chemist Signature: Jimmy D. Ralin

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
2-28-11	0940	S-0251-V4	C-14 Std verif	1118	[illegible]
↓	↓	S-0251-V5	↓	↓	[illegible]
3-1-11	1100 ~~1130~~ JR 3-1-11	Background ~~S-8~~ JR 3-1-11	C-14 Std. verif.	1101	[illegible]
↓	↓	S-0250-V1	↓	↓	[illegible]
↓	↓	S-0250-V2	↓	↓	[illegible]
↓	↓	S-0250-V3	↓	↓	[illegible]
↓	↓	S-0250-V4	↓	↓	[illegible]
↓	↓	S-0250-V5	↓	↓	[illegible]
↓	↓	S-0251-V1	↓	↓	[illegible]
↓	↓	S-0251-V2	↓	↓	[illegible]
↓	↓	S-0251-V3	↓	↓	[illegible]
↓	↓	S-0251-V4	↓	↓	[illegible]
↓	↓	S-0251-V5	↓	↓	[illegible]
3-2-2011	1118	SNC 51	QA	QA	JDR
↓	↓	Background	B10-05618	1306	JDR
↓	↓	B10-05618-01	↓	↓	JDR
↓	↓	B10-05618-02	↓	↓	JDR
↓	↓	B10-05618-03	↓	↓	JDR
↓	↓	B10-05618-04	↓	↓	JDR
↓	↓	B10-05618-05	↓	↓	JDR

Reviewed By: [illegible] Date: 3-9-11
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
3-2-2011	1118	B10-05618-07	B10-05618	1306	JDR
↓	↓	B10-05618-08	↓	↓	JDR
↓	↓	B10-05618-09	↓	↓	JDR
↓	↓	B10-05618-10	↓	↓	JDR
3-6-11	1510	SNC 51	QA	QA	JDR
↓	↓	Background	B11-00901	1703	JDR
↓	↓	B11-00901-04	↓	↓	JDR
↓	↓	B11-00901-05	↓	↓	JDR
↓	↓	B11-00901-06	↓	↓	JDR
↓	↓	B11-00901-07	↓	↓	JDR
↓	↓	B11-00901-08	↓	↓	JDR
↓	↓	B11-00901-09	↓	↓	JDR
↓	↓	B11-00901-10	↓	↓	JDR
↓	↓	B11-00901-11	↓	↓	JDR
↓	↓	B11-00901-12	↓	↓	JDR
↓	↓	B11-00901-13	↓	↓	JDR
↓	↓	B11-00901-14	↓	↓	JDR
↓	↓	B11-00901-15	↓	↓	JDR
↓	↓	B11-00901-16	↓	↓	JDR
↓	↓	B11-00901-17	↓	↓	JDR

Reviewed By: LSW Initials Date: 3-7-11

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
3-6-11	1510	B11-00901-18	B11-00901	1703	JDR
↓	↓	B11-00901-19	↓	↓	JDR
↓	↓	B11-00901-20	↓	↓	JDR
3-7-11 LSW ↓	↓	B11-00901-21	↓	↓	JDR
3-8-11	1133	B10-05618-11	B10-05618	1133	JDR
↓	↓	B10-05618-12	↓	↓	JDR
↓	↓	B10-05618-13	↓	↓	JDR
↓	↓	B10-05618-15	↓	↓	JDR
↓	↓	B10-05618-16	↓	↓	JDR
↓	↓	B10-05618-17	↓	↓	JDR
↓	↓	B10-05618-18	↓	↓	JDR
↓	↓	B10-05618-19	↓	↓	JDR
↓	↓	B10-05618-20	↓	↓	JDR
↓	↓	B10-05618-21	↓	↓	JDR
↓	↓	B10-05618-22	↓	↓	JDR
↓	↓	B10-05618-23	↓	↓	JDR
	N/A				
		JDR	3-13-2011		
				Data unavailable - LSW 3-14-11	

Reviewed By: LSW Date: 3-14-11
Initials

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American Radiation Services Analytical Reports

for

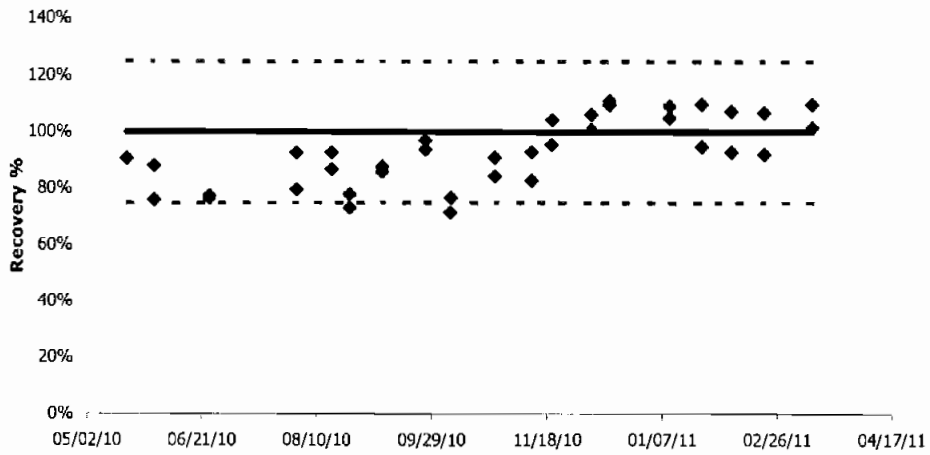
Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Control Charts

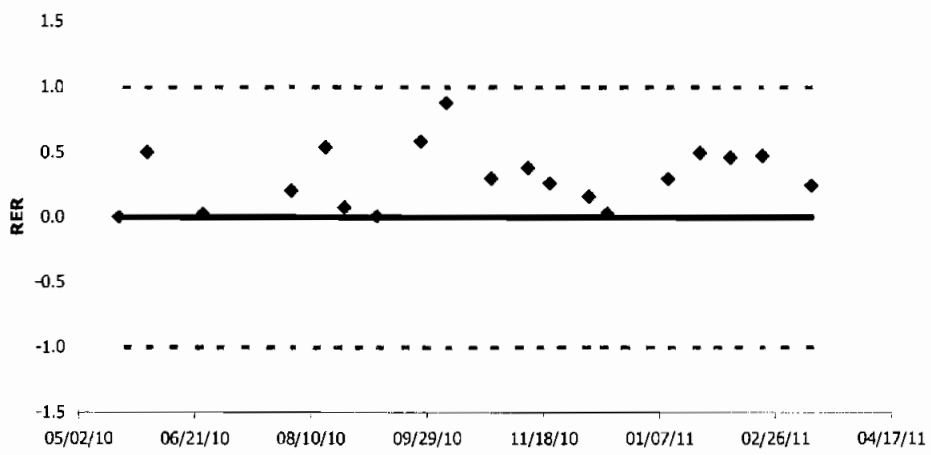
QC Chart

LLH-3 LCS



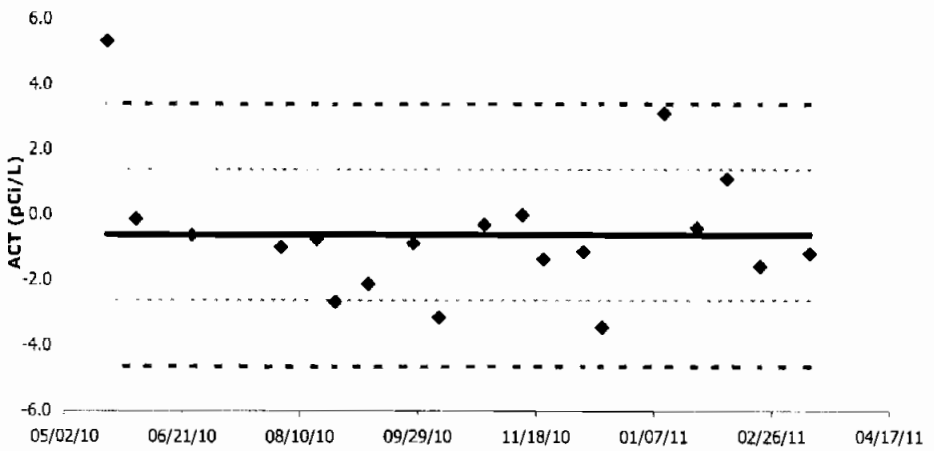
Average	STDEV	n	UCL	LCL
0.9323	0.1172	20	1.2500	0.7500

LLH-3 RER



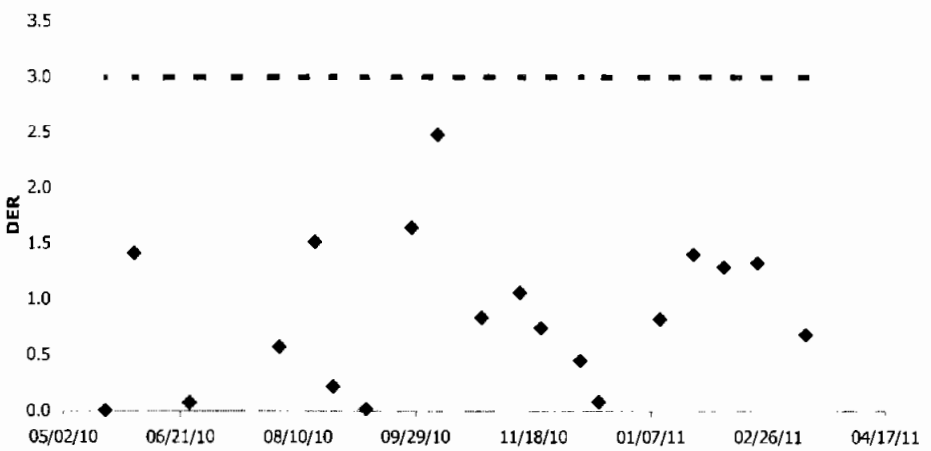
		n	UCL	LCL
		20	1.0000	-1.0000

LLH-3 Blank



Average	STDEV	n	UCL	LCL
-0.6165	2.0081	20	3.3998	-4.6328

LLH-3 DER



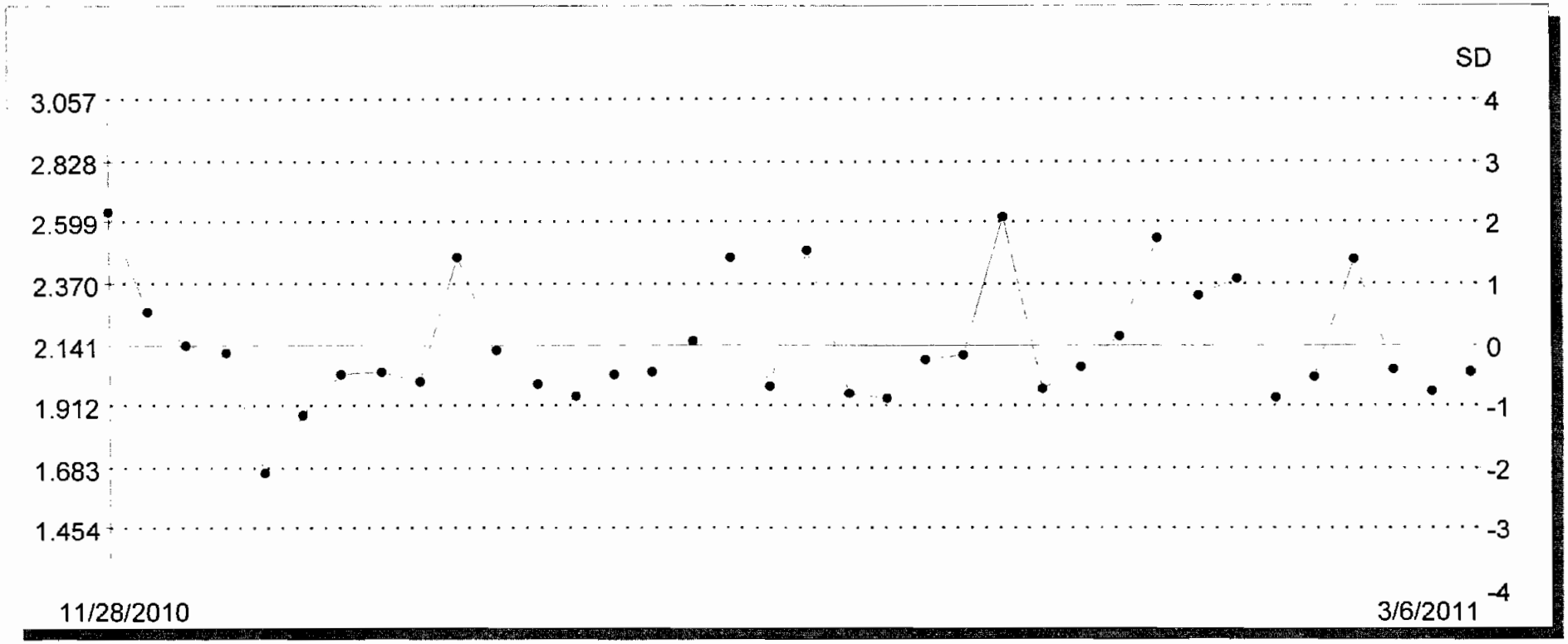
		n	UCL	
		20	3.0000	

3H Background
Total # pts : 5212
Valid # pts : 36
Mean : 2.14
SD : 0.23

Date	Value	Valid Pt
Nov 28, 2010	2.63	X
Nov 28, 2010	2.26	X
Nov 28, 2010	2.14	X
Nov 28, 2010	2.11	X
Nov 28, 2010	1.66	X
Nov 28, 2010	1.88	X
Nov 28, 2010	2.03	X
Nov 30, 2010	2.04	X
Dec 02, 2010	2.00	X
Dec 08, 2010	2.46	X
Dec 13, 2010	2.12	X
Dec 15, 2010	1.99	X
Dec 22, 2010	1.95	X
Dec 29, 2010	2.03	X
Dec 30, 2010	2.04	X
Jan 03, 2011	2.15	X
Jan 05, 2011	2.47	X
Jan 10, 2011	1.99	X
Jan 11, 2011	2.49	X
Jan 14, 2011	1.96	X
Jan 19, 2011	1.94	X
Jan 21, 2011	2.09	X
Jan 27, 2011	2.10	X
Jan 29, 2011	2.62	X
Feb 01, 2011	1.97	X
Feb 07, 2011	2.06	X
Feb 09, 2011	2.17	X
Feb 10, 2011	2.54	X
Feb 13, 2011	2.33	X
Feb 18, 2011	2.39	X
Feb 22, 2011	1.94	X
Feb 24, 2011	2.02	X
Feb 25, 2011	2.46	X
Feb 28, 2011	2.05	X
Mar 02, 2011	1.96	X
Mar 06, 2011	2.04	X

3H Background

Total # pts	: 5212
Valid # pts	: 36
Mean	: 2.14
SD	: 0.23

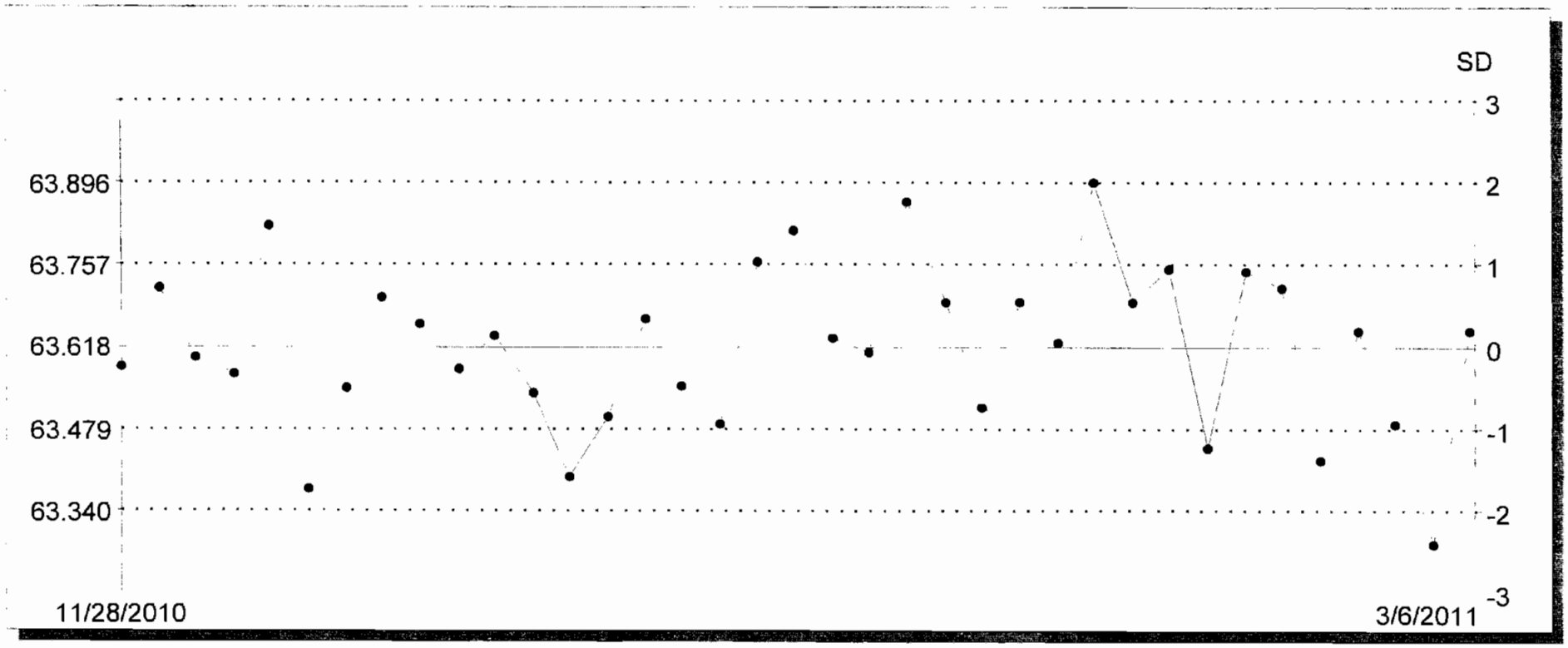


3H Efficiency
Total # pts : 5283
Valid # pts : 37
Mean : 63.62
SD : 0.14

Date	Value	Valid Pt
Nov 28, 2010	63.58	X
Nov 28, 2010	63.72	X
Nov 28, 2010	63.60	X
Nov 28, 2010	63.57	X
Nov 28, 2010	63.82	X
Nov 28, 2010	63.38	X
Nov 28, 2010	63.55	X
Nov 30, 2010	63.70	X
Nov 30, 2010	63.66	X
Dec 02, 2010	63.58	X
Dec 08, 2010	63.64	X
Dec 13, 2010	63.54	X
Dec 15, 2010	63.39	X
Dec 22, 2010	63.50	X
Dec 29, 2010	63.66	X
Dec 30, 2010	63.55	X
Jan 03, 2011	63.49	X
Jan 05, 2011	63.76	X
Jan 10, 2011	63.82	X
Jan 11, 2011	63.63	X
Jan 14, 2011	63.61	X
Jan 19, 2011	63.87	X
Jan 21, 2011	63.69	X
Jan 27, 2011	63.52	X
Jan 29, 2011	63.69	X
Feb 01, 2011	63.62	X
Feb 07, 2011	63.90	X
Feb 09, 2011	63.69	X
Feb 10, 2011	63.75	X
Feb 13, 2011	63.45	X
Feb 18, 2011	63.75	X
Feb 22, 2011	63.72	X
Feb 24, 2011	63.43	X
Feb 25, 2011	63.65	X
Feb 28, 2011	63.49	X
Mar 02, 2011	63.28	X
Mar 06, 2011	63.64	X

3H Efficiency

Total # pts	: 5283
Valid # pts	: 37
Mean	: 63.62
SD	: 0.14



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American Radiation Services Analytical Reports

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Tritium- Screening by Low Level Liquid Scintillation Counting

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Tritium-Screening by Low Level Liquid Scintillation Counting

Samples

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

ARS File ID Numbers: ARS1-10-02492; 2509; 2510; 2511
ARS Batch ID: ARS1-B10-05617

	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	B10-05617-04	120	1.490	1.181	30.72	5.01	90.437	pCi/L	172.3216	NO
2	B10-05617-05	120	1.996	1.181	30.91	5.00	237.539	pCi/L	171.6049	~~YES, analyze by LSC-A-001~~. NO JB 12-13-10
3	B10-05617-06	120	2.554	1.181	31.29	5.05	391.400	pCi/L	167.8424	YES, analyze by LSC-A-001.
4	B10-05617-07	120	1.371	1.181	31.08	5.00	55.074	pCi/L	170.6663	NO
5	B10-05617-08	120	1.404	1.181	30.74	5.04	64.836	pCi/L	171.1844	NO
6	B10-05617-09	120	1.407	1.181	30.72	5.03	65.882	pCi/L	171.6364	NO
7	B10-05617-10	120	1.365	1.181	31.26	5.03	52.712	pCi/L	168.6715	NO
8	B10-05617-11	120	1.256	1.181	30.91	5.01	21.816	pCi/L	171.2624	NO
9	B10-05617-12	120	1.472	1.181	30.93	5.02	84.422	pCi/L	170.8107	NO
10	B10-05617-13	120	1.823	1.181	30.98	5.00	186.694	pCi/L	171.2172	~~YES, analyze by LSC-A-001~~. NO JB 12-13-10
11	B10-05617-14	120	3.169	1.181	30.83	5.04	576.314	pCi/L	170.6847	YES, analyze by LSC-A-001.
12	B10-05617-15	120	1.593	1.181	30.96	5.05	118.700	pCi/L	169.6314	NO
13	B10-05617-16	120	1.407	1.181	30.96	5.00	65.763	pCi/L	171.3278	NO
14	B10-05617-17	120	1.577	1.181	30.95	5.00	115.269	pCi/L	171.3831	NO
15	B10-05617-18	120	1.547	1.181	30.99	5.01	106.186	pCi/L	170.8203	NO
16	B10-05617-19	120	1.451	1.181	30.85	5.00	78.847	pCi/L	171.9387	NO
17	B10-05617-20	120	1.649	1.181	30.98	5.01	135.823	pCi/L	170.8754	NO
18	B10-05617-21	120	1.452	1.181	31	5.00	78.756	pCi/L	171.1067	NO
19	B10-05617-22	120	1.501	1.181	30.88	5.02	92.986	pCi/L	171.0873	NO
20	B10-05617-23	120	1.586	1.181	30.97	5.03	117.110	pCi/L	170.2509	NO
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

ARS INTERNATIONAL

Analysis Batch ID **ARS1-B10-05617**

Method **ARS-054** **Analysis** **LSC-A-021** **Matrix** **AQ**

Description **Low Level Tritium Screen**

ABatch Sample ID	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline
ARS1-B10-05617-01	LCS									
ARS1-B10-05617-02	LCSD									
ARS1-B10-05617-03	MBL									
ARS1-B10-05617-04	TRG				**ARS1-10-02492**	002	1	CAMO-11-1269	STD	12/07/10
ARS1-B10-05617-05	TRG				**ARS1-10-02492**	003	1	CAMO-11-1271	STD	12/07/10
ARS1-B10-05617-06	TRG				**ARS1-10-02492**	004	1	CAMO-11-1273	STD	12/07/10
ARS1-B10-05617-07	TRG				**ARS1-10-02492**	005	1	CAMO-11-1302	STD	12/07/10
ARS1-B10-05617-08	TRG				**ARS1-10-02491**	001	1	Buckman1-11-1944	STD	12/13/10
ARS1-B10-05617-09	TRG				**ARS1-10-02491**	002	1	Buckman06-11-1970	STD	12/13/10
ARS1-B10-05617-10	TRG				**ARS1-10-02491**	003	1	Buckman08-11-2042	STD	12/13/10
ARS1-B10-05617-11	TRG				**ARS1-10-02509**	001	1	CASA-11-1365	STD	12/14/10
ARS1-B10-05617-12	TRG				**ARS1-10-02509**	002	1	CASA-11-1367	STD	12/14/10
ARS1-B10-05617-13	TRG				**ARS1-10-02510**	001	1	CASA-11-1360	STD	12/14/10
ARS1-B10-05617-14	TRG				**ARS1-10-02510**	002	1	CASA-11-1363	STD	12/14/10
ARS1-B10-05617-15	TRG				**ARS1-10-02510**	003	1	CASA-11-1371	STD	12/14/10
ARS1-B10-05617-16	TRG				**ARS1-10-02510**	004	1	CASA-11-1373	STD	12/14/10
ARS1-B10-05617-17	TRG				**ARS1-10-02510**	005	1	CASA-11-1374	STD	12/14/10
ARS1-B10-05617-18	TRG				**ARS1-10-02510**	006	1	CASA-11-1376	STD	12/14/10
ARS1-B10-05617-19	TRG				**ARS1-10-02510**	007	1	CASA-11-1379	STD	12/14/10
ARS1-B10-05617-20	TRG				**ARS1-10-02510**	008	1	CASA-11-1380	STD	12/14/10
ARS1-B10-05617-21	TRG				**ARS1-10-02511**	001	1	CAMO-11-1262	STD	12/14/10
ARS1-B10-05617-22	TRG				**ARS1-10-02511**	002	1	CAMO-11-1265	STD	12/14/10
ARS1-B10-05617-23	TRG				**ARS1-10-02511**	003	1	CAMO-11-1285	STD	12/14/10

76448 10-02492-002-1 **XRAD**
76449 10-02492-003-1 **XRAD**
76450 10-02492-004-1 **XRAD**
76451 10-02492-005-1 **XRAD**
76452 10-02491-001-1 **XRAD**
76453 10-02491-002-1 **XRAD**
76454 10-02491-003-1 **XRAD**
76455 10-02509-001-1 **XRAD**
76456 10-02509-002-1 **XRAD**
76457 10-02510-001-1 **XRAD**
76458 10-02510-002-1 **XRAD**
76459 10-02510-003-1 **XRAD**
76460 10-02510-004-1 **XRAD**
76461 10-02510-005-1 **XRAD**
76462 10-02510-006-1 **XRAD**
76463 10-02510-007-1 **XRAD**
76464 10-02510-008-1 **XRAD**
76465 10-02511-001-1 **XRAD**
76466 10-02511-002-1 **XRAD**
76467 10-02511-003-1 **XRAD**

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ARS-054

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
7145	ARS1-B10-05617	ARS1-B10-05617-01		1	g					JRABER	12/07/2010 14:45:34
7146	ARS1-B10-05617	ARS1-B10-05617-02		1	g					JRABER	12/07/2010 14:45:34
7147	ARS1-B10-05617	ARS1-B10-05617-03		1	g					JRABER	12/07/2010 14:45:34
7148	ARS1-B10-05617	ARS1-B10-05617-04	CAMO-11-1269	5.01	g	76448				JRABER	12/07/2010 14:45:34
7149	ARS1-B10-05617	ARS1-B10-05617-05	CAMO-11-1271	5	g	76449				JRABER	12/07/2010 14:45:34
7150	ARS1-B10-05617	ARS1-B10-05617-06	CAMO-11-1273	5.05	g	76450				JRABER	12/07/2010 14:45:34
7151	ARS1-B10-05617	ARS1-B10-05617-07	CAMO-11-1302	5	g	76451				JRABER	12/07/2010 14:45:34
7152	ARS1-B10-05617	ARS1-B10-05617-08	Buckman1-11-1944	5.04	g	76452				JRABER	12/07/2010 14:45:34
7153	ARS1-B10-05617	ARS1-B10-05617-09	Buckman06-11-1970	5.03	g	76453				JRABER	12/07/2010 14:45:35
7154	ARS1-B10-05617	ARS1-B10-05617-10	Buckman08-11-2042	5.03	g	76454				JRABER	12/07/2010 14:45:35
7155	ARS1-B10-05617	ARS1-B10-05617-11	CASA-11-1365	5.01	g	76455				JRABER	12/07/2010 14:45:35
7156	ARS1-B10-05617	ARS1-B10-05617-12	CASA-11-1367	5.02	g	76456				JRABER	12/07/2010 14:45:35
7157	ARS1-B10-05617	ARS1-B10-05617-13	CASA-11-1360	5	g	76457				JRABER	12/07/2010 14:45:35
7158	ARS1-B10-05617	ARS1-B10-05617-14	CASA-11-1363	5.04	g	76458				JRABER	12/07/2010 14:45:35
7159	ARS1-B10-05617	ARS1-B10-05617-15	CASA-11-1371	5.05	g	76459				JRABER	12/07/2010 14:45:35
7160	ARS1-B10-05617	ARS1-B10-05617-16	CASA-11-1373	5	g	76460				JRABER	12/07/2010 14:45:36
7161	ARS1-B10-05617	ARS1-B10-05617-17	CASA-11-1374	5	g	76461				JRABER	12/07/2010 14:45:36
7162	ARS1-B10-05617	ARS1-B10-05617-18	CASA-11-1376	5.01	g	76462				JRABER	12/07/2010 14:45:36
7163	ARS1-B10-05617	ARS1-B10-05617-19	CASA-11-1379	5	g	76463				JRABER	12/07/2010 14:45:36
7164	ARS1-B10-05617	ARS1-B10-05617-20	CASA-11-1380	5.01	g	76464				JRABER	12/07/2010 14:45:36
7165	ARS1-B10-05617	ARS1-B10-05617-21	CAMO-11-1262	5	g	76465				JRABER	12/07/2010 14:45:36
7166	ARS1-B10-05617	ARS1-B10-05617-22	CAMO-11-1265	5.02	g	76466				JRABER	12/07/2010 14:45:36
7167	ARS1-B10-05617	ARS1-B10-05617-23	CAMO-11-1285	5.03	g	76467				JRABER	12/07/2010 14:45:37

Low Low Level H-3 Testing

Assay Definition-

Assay Description:
Low Low Level Tritium

Assay Type: DPM (Single)
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\ARS\Low Low Level Tritium\20101208_1858
Raw Results Path: C:\Packard\Tricarb\Results\ARS\Low Low Level Tritium\20101208_1858\20101208_1858.results
RTF File Name: C:\Packard\Tricarb\Results\ARS\Low Low Level Tritium\20101208_1858\Report1.rtf
Comma-Delimited File Name: C:\Packard\Tricarb\Results\ARS\Low Low Level Tritium\20101208_1858\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Low Low Level Tritium.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
Count Time (min): 120.00
Count Mode: Low Level
Assay Count Cycles: 1 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

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

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

Count Corrections-

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

Half Life-

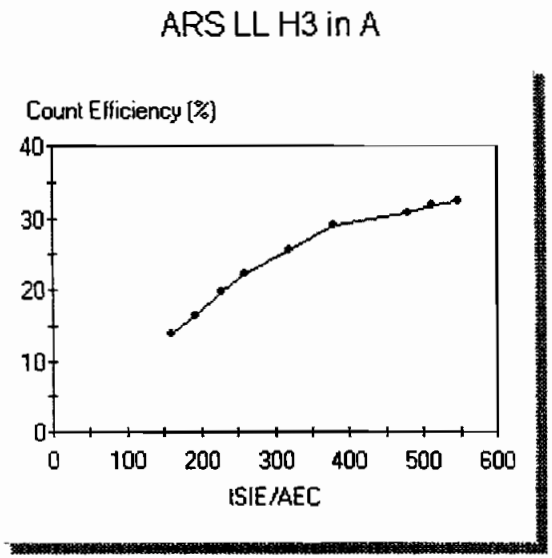
Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time

Low Low Level H-3 Testing

A
B
C

Cycle 1 Results
Quench Curve Block Data



Date Acquired: 11/30/2010
Date Modified:
ARS LL H3 in A

tSIE/AEC	Count Efficiency (%)
548.77	32.48
512.15	31.92
480.70	30.66
380.48	28.98
321.20	25.72
261.54	22.30
228.13	19.65
193.83	16.47
159.53	13.75

Low Low Level H-3 Testing

P#	S#	SMPL_ID	Count Time	CPMA	DPM1	tSIE	Eff Nucl In A	DATE	TIME	MESSAGES
41	1	BACKGROUND	120.00	1.181	3.807	489.61	31.02	12/8/2010	7:08:03 PM	
41	2	B10-05617-04	120.00	1.490	4.850	482.20	30.72	12/8/2010	9:18:35 PM	
41	3	B10-05617-05	120.00	1.996	6.456	486.94	30.91	12/8/2010	11:29:03 PM	
41	4	B10-05617-06	120.00	2.554	8.162	496.49	31.29	12/9/2010	1:41:15 AM	
41	5	B10-05617-07	120.00	1.371	4.411	491.05	31.08	12/9/2010	3:53:24 AM	
41	6	B10-05617-08	120.00	1.404	4.568	482.73	30.74	12/9/2010	6:03:54 AM	
41	7	B10-05617-09	120.00	1.407	4.579	482.15	30.72	12/9/2010	8:14:22 AM	
41	8	B10-05617-10	120.00	1.365	4.367	495.56	31.26	12/9/2010	10:24:50 AM	
41	9	B10-05617-11	120.00	1.256	4.065	486.87	30.91	12/9/2010	12:35:19 PM	
41	10	B10-05617-12	120.00	1.472	4.759	487.48	30.93	12/9/2010	2:45:50 PM	
41	11	B10-05617-13	120.00	1.823	5.885	488.76	30.98	12/9/2010	4:56:21 PM	
41	12	B10-05617-14	120.00	3.169	10.277	484.93	30.83	12/9/2010	7:06:54 PM	
41	13	B10-05617-15	120.00	1.593	5.145	488.24	30.96	12/9/2010	9:19:07 PM	
41	14	B10-05617-16	120.00	1.407	4.546	488.17	30.96	12/9/2010	11:29:39 PM	
41	15	B10-05617-17	120.00	1.577	5.096	487.86	30.95	12/10/2010	1:40:09 AM	
41	16	B10-05617-18	120.00	1.547	4.993	488.86	30.99	12/10/2010	3:50:40 AM	
41	17	B10-05617-19	120.00	1.451	4.701	485.54	30.85	12/10/2010	6:01:11 AM	
41	18	B10-05617-20	120.00	1.649	5.322	488.64	30.98	12/10/2010	8:11:43 AM	
41	19	B10-05617-21	120.00	1.452	4.684	489.24	31.00	12/10/2010	10:22:14 AM	
41	20	B10-05617-22	120.00	1.501	4.862	486.08	30.88	12/10/2010	12:32:46 PM	
41	21	B10-05617-23	120.00	1.586	5.122	488.33	30.97	12/10/2010	2:43:18 PM	

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
12-3-10	1437	B10-05533-06	B10-05533	0949	[illegible]
↓	↓	B10-05533-07	↓	↓	[illegible]
↓	↓	B10-05533-08	↓	↓	[illegible]
↓	↓	B10-05533-09	↓	↓	[illegible] LSW 12-06-10
12-7-2010	1457	SNC 117	QA	QA	JDR
↓	↓	Background	B10-05617	1858	JDR
↓	↓	B10-05617-04	↓	↓	JDR
↓	↓	B10-05617-05	↓	↓	JDR
↓	↓	B10-05617-06	↓	↓	JDR
↓	↓	B10-05617-07	↓	↓	JDR
↓	↓	B10-05617-08	↓	↓	JDR
↓	↓	B10-05617-09	↓	↓	JDR
↓	↓	B10-05617-10	↓	↓	JDR
↓	↓	B10-05617-11	↓	↓	JDR
↓	↓	B10-05617-12	↓	↓	JDR
↓	↓	B10-05617-13	↓	↓	JDR
↓	↓	B10-05617-14	↓	↓	JDR
↓	↓	B10-05617-15	↓	↓	JDR
↓	↓	B10-05617-16	↓	↓	JDR
↓	↓	B10-05617-17	↓	↓	JDR

Reviewed By: LSW Date: 12-15-10
Initials

Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
12-7-10	1457	B10-05617-18	B10-05617	1858	JDR
↓	↓	B10-05617-19	↓	↓	JDR
↓	↓	B10-05617-20	↓	↓	JDR
↓	↓	B10-05617-21	↓	↓	JDR
↓	↓	B10-05617-22	↓	↓	JDR
↓	↓	B10-05617-23	↓	↓	JDR
12-9-10	1259	Background	B10-05546	1645	JDR
↓	↓	B10-05546-01	↓	↓	JDR
↓	↓	B10-05546-02	↓	↓	JDR
↓	↓	B10-05546-03	↓	↓	JDR
↓	↓	B10-05546-04	↓	↓	JDR
↓	↓	B10-05546-05	↓	↓	JDR
↓	↓	B10-05546-06	↓	↓	JDR
↓	↓	B10-05546-07	↓	↓	JDR
↓	↓	B10-05546-08	↓	↓	JDR
↓	↓	B10-05546-09	↓	↓	JDR
↓	↓	B10-05546-10	↓	↓	JDR
↓	↓	B10-05546-11	↓	↓	JDR
↓	↓	B10-05546-12	↓	↓	JDR
↓	↓	B10-05546-13	↓	↓	JDR

LSW 12-10-10

Reviewed By: LSW Date: 12-15-10
Initials

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

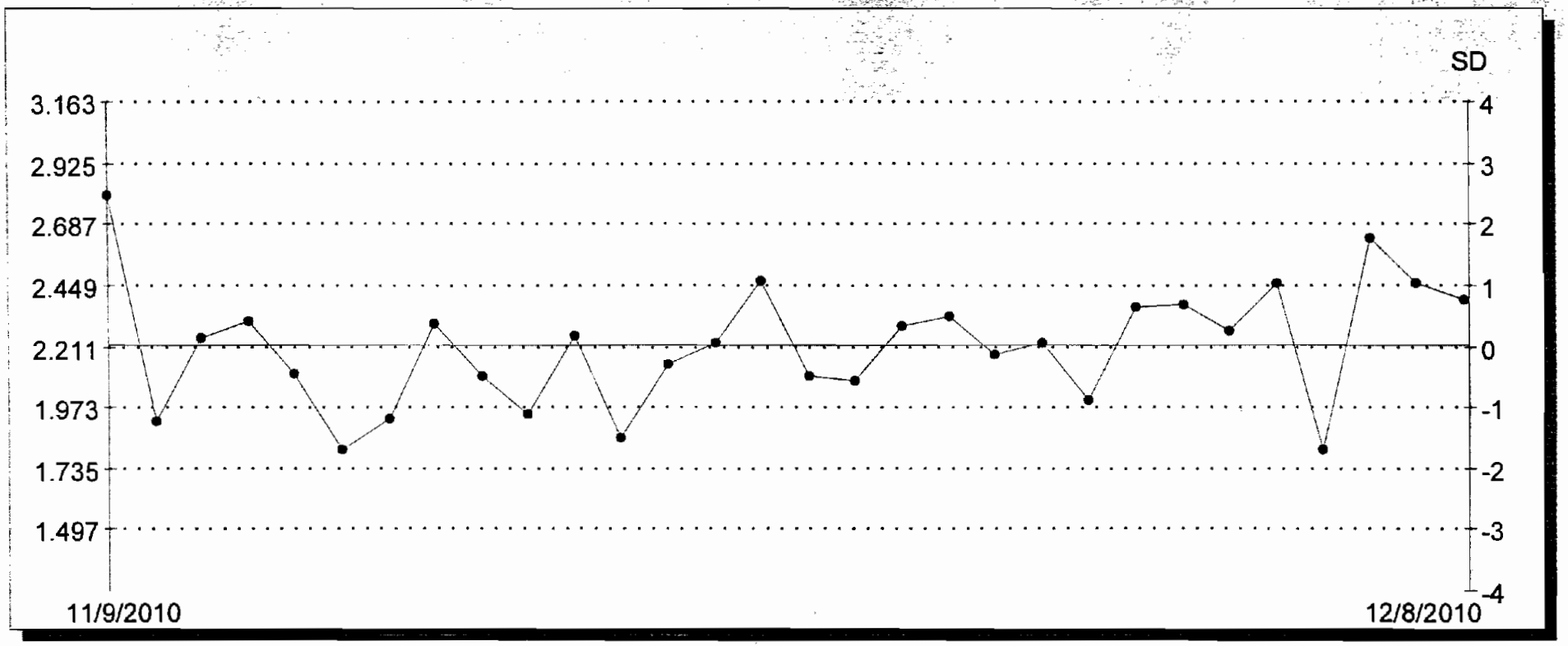
Control Charts

3H Background
Total # pts : 1507
Valid # pts : 30
Mean : 2.21
SD : 0.24

Date	Value	Valid Pt
Nov 09, 2010	2.80	X
Nov 10, 2010	1.92	X
Nov 11, 2010	2.24	X
Nov 15, 2010	2.31	X
Nov 16, 2010	2.10	X
Nov 17, 2010	1.80	X
Nov 17, 2010	1.93	X
Nov 17, 2010	2.30	X
Nov 17, 2010	2.09	X
Nov 17, 2010	1.94	X
Nov 22, 2010	2.25	X
Nov 25, 2010	1.85	X
Nov 28, 2010	2.14	X
Nov 28, 2010	2.23	X
Nov 28, 2010	2.47	X
Nov 28, 2010	2.09	X
Nov 28, 2010	2.08	X
Nov 28, 2010	2.29	X
Nov 29, 2010	2.33	X
Nov 29, 2010	2.18	X
Nov 29, 2010	2.22	X
Nov 29, 2010	2.01	X
Nov 29, 2010	2.36	X
Nov 29, 2010	2.38	X
Nov 30, 2010	2.28	X
Nov 30, 2010	2.45	X
Nov 30, 2010	1.81	X
Dec 02, 2010	2.63	X
Dec 05, 2010	2.46	X
Dec 08, 2010	2.39	X

3H Background

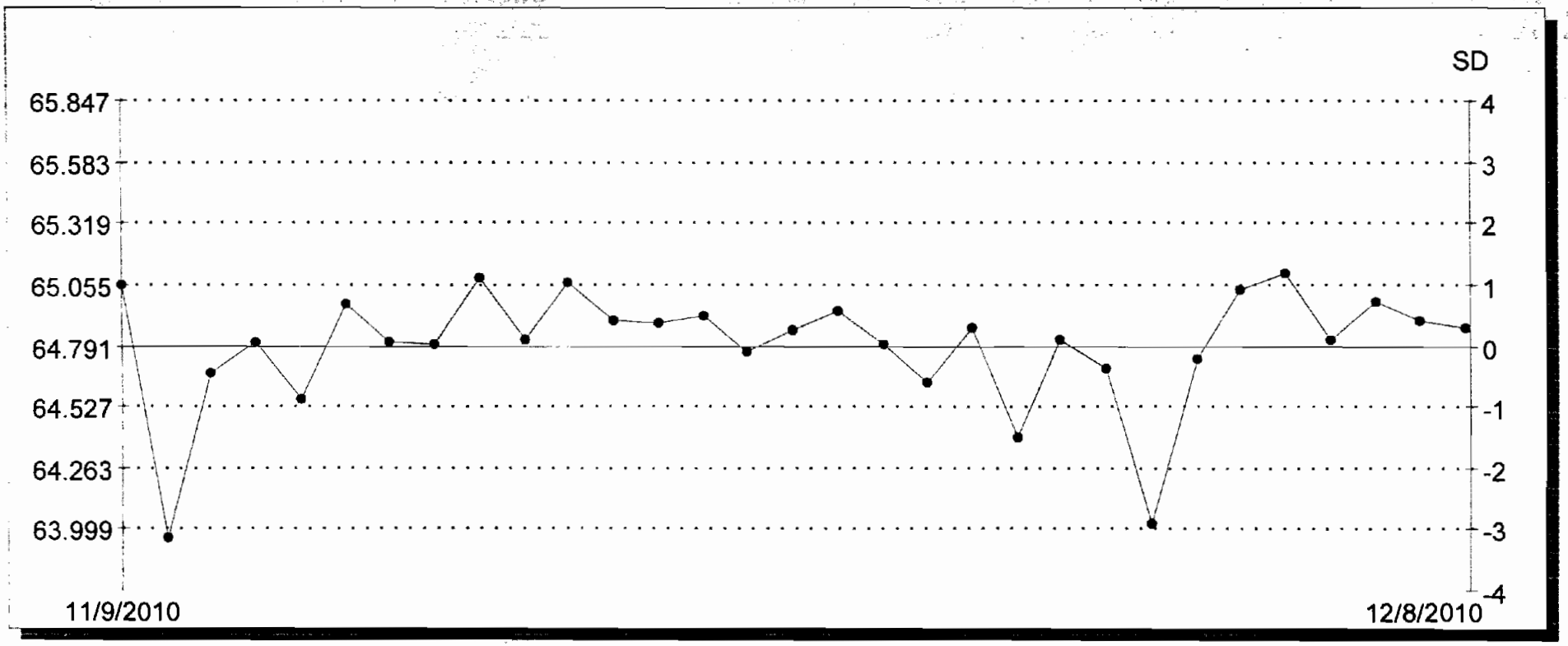
Total # pts	: 1507
Valid # pts	: 30
Mean	: 2.21
SD	: 0.24



3H Efficiency
Total # pts : 1545
Valid # pts : 31
Mean : 64.79
SD : 0.26

Date	Value	Valid Pt
Nov 09, 2010	65.05	X
Nov 10, 2010	63.96	X
Nov 11, 2010	64.67	X
Nov 15, 2010	64.81	X
Nov 16, 2010	64.56	X
Nov 17, 2010	64.97	X
Nov 17, 2010	64.81	X
Nov 17, 2010	64.79	X
Nov 17, 2010	65.08	X
Nov 17, 2010	64.82	X
Nov 22, 2010	65.07	X
Nov 25, 2010	64.90	X
Nov 28, 2010	64.89	X
Nov 28, 2010	64.92	X
Nov 28, 2010	64.77	X
Nov 28, 2010	64.86	X
Nov 28, 2010	64.94	X
Nov 28, 2010	64.80	X
Nov 29, 2010	64.63	X
Nov 29, 2010	64.87	X
Nov 29, 2010	64.40	X
Nov 29, 2010	64.82	X
Nov 29, 2010	64.69	X
Nov 29, 2010	64.02	X
Nov 30, 2010	64.73	X
Nov 30, 2010	65.03	X
Nov 30, 2010	65.11	X
Nov 30, 2010	64.82	X
Dec 02, 2010	64.99	X
Dec 05, 2010	64.90	X
Dec 08, 2010	64.87	X

3H Efficiency
Total # pts : 1545
Valid # pts : 31
Mean : 64.79
SD : 0.26



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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: 5/13/2010 0:00 *date counted*
STANDARD REFERENCE #: S-0206

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

Radionuclide: H-3 Dilution Reference Date: 2/25/2009 8:30

Dilution Activity	3.01	pCi per gram ===> dpm/g	6.68
Verif. Date Decay Corrected	2.81	pCi per gram ===> dpm/g	6.24

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-0206-V1B	11.98	1	LSC	0.3328	1.62	5.040	6.18	2.78
S-0206-V2B	11.42	1	LSC	0.3186	1.62	5.010	6.13	2.76
S-0206-V3B	12.01	1	LSC	0.3360	1.62	4.990	6.19	2.79
S-0206-V4B	11.75	1	LSC	0.3275	1.62	5.010	6.17	2.78
S-0206-V5B	11.45	1	LSC	0.3196	1.62	5.020	6.13	2.76

	Average	6.16	2.77
	Two Sigma Uncertainty	0.06	0.02
10% Max *PASS*	Standard Deviation percent of known concentration	0.45%	0.45%
	Target Activity	6.24	2.81
5% Max *PASS*	% Diff	-1.27%	-1.27%

Verification Expiration Date: May 13, 2011

Prepared & Counted By: Jeremy Raber Date: 5/13/2010 0:00

Verified & Approved By: Eugene Mulligan Date: 5/14/2010

QC Approval: Amy Engel Date: 5/14/2010

S-0206		
H-3	Verified	*5/14/10*
SL	**Expires**	**5/14/11**
Manufactuer	**NIST**	
Sol Matrix	H2O	
Ref No	NIST 4361C	
Tech	M. Thibodeaux	
Parent ID	S-0152	

RADIOACTIVE STANDARDS -- BATON ROUGE LABORATORY

STD ID: S-0206

ARS INTERNATIONAL

Add/Edit *Secondary Stds*

Planning	
Planning Comments	Create a Low Level H3 LCS solution.
Target dpm/g (on dil. date)	6.66
Target Final volume mL	500
Appx mass g of Parent Sol'n	49.8188436
Appx vol ml of Parent Sol'n	49.91868096
Expected Addition for Analysis g	5

Standards Preparation / Dilution	
Secondary Solution #	S-0206
Dilution Date (New Ref Date)	02/25/2009 08:30
Ampoule, Empty (g)	
Ampoule /Solution Gross (g)	
Net Wt Removed (g)	
Transfer Container, empty (g)	103.64
Container Plus Solution (g)	153.45
Net Wt Transferred (g)	49.81
DPM Xferred on 02/25/2009 08:30	3329.408875
Diluent/matrix	Dead H2O
Diluent Density Cont, empty (g)	
Test Mass of 5 ml of Diluent (g)	
Diluent Density Test - (g/mL)	
Dilution Empty Container Mass (g)	198.75
Dilution Full Cont g (if measured)	697.31
Dilution Final Volume ml (if measured)	500
Final Dilution Density (g/mL)	0.99712
Final Dilution Measured Mass g	498.56
Comments	Use as H3LL LCS creation. Dilution performed as stated above by M Thibodeaux on 2/25/09. -BJS 2/25/09
Final Dilution dpm/g	6.678050535
Final Dil New Ref Date/Time	02/25/2009 08:30

Parent Standard Data

Parent Solution Reference #	NIST 4361C		
Parent Solution #	S-0152		
Parent Principal Radionuclide	H-3	Half Life (Days)	4499.8000000
Parent Reference Date	09/03/1998 11:00		
Parent Certified Act	120.54	Cert Act/Vol Units	dpm g
Parent Cert Act Uncert 1 Sigma	0.0076		
Parent Sp. Gravity G/Ml	0.998		
Parent Supplier	NIST		
Parent Date Recvd	12/04/06		
Parent Received By	LU		
Parent Cert Exp Data			
Parent Matrix	H2O		
Certified dpm/g At Ref Date	120.54		
Certified dpm/g on 02/25/2009 08:30	66.84217777		
Parent Comments	Liquid in a 500-ml borosilicate-glass media bottle with teflon-lined screw cap. Approximately 500 grams		
Parent Tech	M. Thibodeaux		
Is_Primary	FALSE		
Is_LCS	TRUE		
Is_Tracer	FALSE		
Is_Calib	FALSE		

Standards Activity as of: 03/02/11 08:49

Active	Std ID	Isotope	PSCLT	Verification Date	Exp Date	Status	Ref Date	Ref ACT (dpm)	ACT at Date Above (dpm/g)	Halflife (days)	Parent ID	Expended Date	Comments
A	S-0195	Ra-226	PC			Not Ver	06/24/08	7.7832E+02	777.4105	5.840E+05			Primary Ra-226 standard for calibration.
A	S-0196	Ra-226	SLC			Not Ver	07/03/08	2.3567E+02	235.3992	5.840E+05	S-0195		Calibration standard for Ra-226
A	S-0197	Ra-228	SL	11/11/10	11/11/11	OK	07/10/08	4.4972E+01	32.7047	2.100E+03	S-0127		LCS for Ra-228
A	S-0198	Ra-226	SL	09/24/09	09/24/10	EXP	07/07/08	1.4986E+03	1486.9276	5.840E+05	S-0193		[illegible]
A	S-0199	Ni-63	SL	04/14/10	04/14/11	OK	08/25/08	4.5399E+01	44.6162	3.660E+04	S-0178		Ni-63 LCS dilution with 7.5 mL of 2 mg/mL Ni carrier added to the soln
A	S-0200	Sr-89	PC			Not Ver	09/17/08	1.9942E+04	0.0916	5.053E-01			Primary Sr-89 calibration standard
A	S-0206	H-3	SL	05/14/10	05/14/11	OK	02/25/09	6.6781E+00	5.9632	4.500E+03	S-0152		Use as H3LL LCS creation. Dilution performed as stated above by M [illegible]ab
A	S-0210	Ba-133	PT			Not Ver	05/15/09	7.6431E+02	678.9627	3.840E+03			Primary Ba-133 tracer
A	S-0211	Ba-133	ST			Not Ver	05/18/09	4.5236E+02	402.0655	3.840E+03	S-0210		Intermediate level tracer solution. Dilution performed as stated above
A	S-0212	Ba-133	SLT	05/21/09	05/21/10	EXP	05/18/09	9.9546E+00	8.8477	3.840E+03	S-0211		[illegible]
A	S-0213	Ba-133	SLT	05/25/09	05/25/10	EXP	05/23/09	6.6543E+01	59.1979	3.840E+03	S-0211		
A	S-0215	C-14	P			Not Ver	09/03/90	5.4020E+04	53885.5647	2.082E+06			C-14 for Calibration use only (5 ml Ampoule)
A	S-0216	AM-241	P			Not Ver	05/16/07	1.0640E+02	105.7545	1.579E+05			Parent Am-241 Working Soln (1g in 5 ml NIST borosilicate-glass ampoule
A	S-0218	C-14	SC	08/05/09	08/05/10	EXP	07/22/09	2.0419E+05	294132.2897	2.082E+06	S-0215		[illegible]
A	S-0220	Am-241	P			Not Ver	08/19/09	2.6725E+01	26.6594	1.579E+05			No certificate for this standard on file in the QA office. NTIs is no
A	S-0221	Am-241	SL	08/05/10	08/05/11	OK	08/19/09	2.6725E+01	26.6594	1.579E+05	S-0220		[illegible]
A	S-0222	PU-242	PT	09/28/09	09/28/10	EXP	09/23/09	2.6314E+01	26.3142	1.365E+08			
A	S-0223	PU-242	SLT	10/06/10	10/06/11	OK	09/25/09	7.6699E+00	7.6699	1.365E+08	S-0222		[illegible]
A	S-0224	Ra-226	SL	11/11/10	11/11/11	OK	11/04/09	6.4243E+01	64.2063	5.840E+05	S-0198		Ra-226 LCS stock solution. Dilution performed as stated above by B Ste
A	S-0225	Sr-89	PC			Not Ver	10/01/09	1.0276E+05	85.4692	5.053E+01			Primary Sr-89 standard. 5 ml liquid in flame sealed vial.
A	S-0226	PU-239	SC	11/19/09	11/19/10	EXP	11/16/09	1.9777E+03	1977.6583	8.807E+06	S-0186		Pu-239 calibration standard. Dilution performed as stated above by B S
A	S-0227	U-238	PC			Not Ver	05/17/07	1.7557E+02	175.5667	1.632E+12			Primary U-238 calibration standard. 5ml liquid in flame sealed vial.
A	S-0228	U-238	SC	11/19/09	11/19/10	EXP	11/17/09	2.6904E+02	269.0445	1.632E+12	S-0227		Uranium standard for use in creating Alpha Spec check sources. Dilutio
A	S-0229	Sr-89	SC	11/18/09	07/28/10	EXP	11/18/09	1.7112E+04	27.4954	5.053E+01	S-0225		[illegible]
A	S-0230	U-238	PL			Not Ver	11/23/09	1.8617E+02	186.1684	1.632E+12			Primary U-238, 235, 234 standard. 5ml liquid in flame sealed vial.
A	S-0231	Th-230	SL	10/18/10	10/18/11	OK	02/19/10	1.2559E+01	12.5584	2.753E+07	S-0172		[illegible]
A	S-0232	Th-229	PT			Not Ver	01/28/05	1.1940E+02	119.3314	2.681E+06			
A	S-0233	Th-229	SLT	02/22/10	02/22/11	EXP	01/28/05	1.1940E+02	119.3314	2.681E+06	S-0232		[illegible]
A	S-0234	Sr-90	PL			Not Ver	03/04/10	4.5500E+02	444.1340	1.041E+04			Previously logged as T11c. Sr-90 standard to be used for creating LCS
A	S-0235	Sr-90	SL			Not Ver	03/12/10	4.4497E+01	43.4570	1.041E+04	S-0234		[illegible]
A	S-0236	Sr-90	SL	03/17/10	03/17/11	OK	03/17/10	4.8169E+01	47.0591	1.041E+04	S-0160		Sr-90 LCS standard. Dilution performed as stated above by B Steffens
A	S-0237	H-3	SL	03/22/10	03/22/11	OK	03/22/10	3.5037E+03	3322.3454	4.500E+03	S-0031		[illegible]
A	S-0240	Sr-90	SL	04/13/10	04/13/11	OK	04/13/10	4.8132E+01	47.1081	1.041E+04	S-0160		Painesville Sr-90 LCS standard. Dilution performed as stated above by
A	S-0241	U-232	ST	06/11/10	06/11/11	OK	06/09/10	9.1520E+00	9.0852	2.516E+04	S-0161		[illegible]
A	S-0242	Pu-239	PL			Not Ver	11/23/09	6.5202E+03	6519.9187	8.807E+06			Primary Pu-239 standard. 5ml liquid in flame sealed vial.
A	S-0243	Sr-90	PL	07/01/10	07/01/11	OK	07/01/09	1.3200E+00	1.2675	1.041E+04			[illegible]
A	S-0244	Th-230	PL	07/01/10	07/01/11	OK	07/01/09	6.5900E-01	0.6590	2.753E+07			Mapep air filter used as QC for LDEQ GB air filter particulate samples
A	S-0245	Fe-55	SC	08/18/10	08/18/11	OK	08/13/10	2.6617E+00	2.3109	9.860E+02	S-0183		[illegible]
A	S-0246	Th-229	ST	10/18/10	10/18/11	OK	09/20/10	1.1204E+01	11.2039	2.681E+06	S-0233		Th-229 tracer standard. Dilution performed as stated above by B Steffe
A	S-0247	H-3	SL	10/13/10	10/13/11	OK	10/11/10	5.6100E+00	5.4887	4.500E+03	S-0237		[illegible]
A	S-0248	Pu-242	PT			Not Ver	01/01/10	2.6770E+01	26.7699	1.365E+08			Primary Pu-242 standard in flame-sealed 5 ml borosilicate-glass ampoul
A	S-0249	C-14	PC			Not Ver	02/03/11	7.5243E+03	7514.2331	2.082E+06			Primary C-14 calibration standard.
A	S-0250	C-14	S	03/07/11	03/07/12	OK	02/17/11	4.7591E+00	4.7590	2.090E+06	S-0153		C-14 LCS standard. Dilution performed as stated above by B Steffens.
A	S-0251	C-14	SC	03/07/11	03/07/12	OK	02/21/11	1.1123E+04	11122.8495	2.082E+06	S-0249		[illegible]
I	S-0001	Am-241	S	04/30/08	04/30/09	EXP	03/16/06	5.1937E+01	51.5251	1.579E+05	S-0069	10/12/09	S-0001 Working level Am241 solution - Information entered from dilutio

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American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Folder Duplicate

Report Compilation Checklist

ARS SDG: 10-02491 **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~~	

Susan Weese 3-14-11
Report Generator Signature Date

[illegible] 3-14-11
Management Review Signature Date

ARS-059
07/03/2009

ARS INTERNATIONAL

LSC
Technical Review Checklist

ARS SDG ARS1-10-02491

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:**	ARS1-B10-05618	**Batch B:**	N/A	**Batch C:**	N/A
Test Method(s):		LSC-A-022		N/A		N/A

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Jimmy D. Rahm 3-2-2011
Chemist Signature Date

Sue Jones 3-2-11
Verifier Review Signature Date

B. ANALYSIS REVIEW

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

[signature] 3-14-11
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

N/A SDR 3-13-11

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

Jimmy D. Rahm 3-13-11
Analyst Signature Date

N/A
Technicial Reviewer Signature Date

Batch A: ARS1-B10-05618

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): _____

Project Manager Signature	Date	QA Officer Signature	Date
Susan Leex	3-14-11	[illegible]	3-14-11

GENERAL COMMENTS

LSC
Technical Review Checklist

ARS SDG ARS1-10-02491

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:**	ARS1-B10-05617	**Batch B:**	N/A	**Batch C:** N/A
Test Method(s):		LSC-A-021		N/A	N/A

A. RADIOCHEMICAL PREPARATION REVIEW

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

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

Jimmy D. Rahn 12-7-2010 — **Chemist Signature** **Date**

Jamal Brown 12-7-10 — **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

VPM — **QA Officer Signature** 3-14-4 — **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~~ JDR 12-12-10 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

N/A JDR 12-12-10

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

Jimmy D. Rahn 12-12-10 — **Analyst Signature** **Date**

N/A — **Technicial Reviewer Signature** **Date**

Batch A: ARS1-B10-05617

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): _____

Susan Reese 3-14-11
Project Manager Signature Date

VHM 3-14-11
QA Officer Signature Date

GENERAL COMMENTS

SDG Report - Samples and Containers

SDG Specific Data

SDG	ARS1-10-02491	TAT Days	30	Project Type	Environmental
Sample Count	Rpt Level 4	Date Received	11/16/2010	COC Number	11-473C
Client	Los Alamos National Laboratory	Client Deadline	12/16/2010	PO Number	63641-001-10
Client Code	114	Internal Deadline	12/15/2010	Job Number	WEPR1158W100
Profile Number	PN-00094	Lab Deadline	12/13/2010	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	Buckman1-11-1944	AQ	11/10/10 12:00 PM	11/10/10 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	75204	1	1000.00				30	13		N	N/A				
002	Buckman06-11-1970	AQ	11/10/10 12:00 PM	11/10/10 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	75205	1	1000.00				35	12		N	N/A				
003	Buckman08-11-2042	AQ	11/10/10 12:00 PM	11/10/10 12:00 PM	H	90	5	LL3H							
➔	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol
	75206	1	1000.00				30	13		N	N/A				

SDG Report - Analysis Assignments

Temp SDG	ARS1-10-02491	Sample Count	[illegible]
Client	Los Alamos National Laboratory	Analysis Count	2-6

Samples Count Totals per Analysis

Analysis Code	Analysis Description	Samples Count
LSC-A-021	Low Level Tritium Screen in (Aqueous)	3
LSC-A-022	Low Level Tritium by Enrichment Process in (Aqueous [AQ])	3

Analyses Assigned Per Fraction

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

DQO Report for SDG
ARS1-10-02491

Analysis Code	Group	Isotope	Activity Units	Aliquot Units	ProcedureNo	RDL	LCS_LL	LCS_UL	MS_LL	MS_UL	RadY_LL	RadY_UL	GravY_LL	GravY_LL	RER	RPD	DiltionReq	RoughPrepReq	BlankCorrectionMDA	BlankCorrectionAll	CountTimeReq	AliquotRequired
LSC-A-021	STC	H-3		TU	ARS-054	0.00E+00	75	125	60	140	30	110	40	110	1.00	25	FALSE	FALSE	FALSE	FALSE		
LSC-A-022	STC	Enriched H-3		TU	ARS-054	0.00E+00	75	125	60	140	30	110	40	110	1.00	25	FALSE	FALSE	FALSE	FALSE		

ARS FILE TRACKING SHEET

SDG: ARS1-10-02491

Task	Date / Time	Initials
Date & Time Samples Received	11-16-10/11:08	CWB
ICOC Initiated / Storage Location: LL3H	11-16-10/11:52	CWB
Technical Checks Performed	See Batch	—
Report Written / EDD Generated: 3-14-11 / 1120 | SDL (Date/Time, Initials)	3-14-11/1120	SDL
Quality Assurance Checks Performed on Report	3-14-11 1528	VM
Management Check Performed on Report		
Preliminary Report Sent		
Report E-mailed		
Report Faxed		
Report Reviewed		
Report Mailed		
Invoice Completed Invoice #:_____		
Report Imaged		

SPECIAL REQUIREMENTS

Requirement	Yes	No
3 Hour Rush		✓
24 Hour Rush		✓
48 Hour Rush		✓
Special Invoicing *see notes* Mgmt. Approval:_____		✓

NOTES:

ARS-062
04/23/2010

COMPANY NAME: Los Alamos National Lab. **SDG:** ARS1-10-02491

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 3

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

External and Internal Surveys

Exposure Rate Meter:	M3 242361	Serial No.:	M44-2 PR264266	Calibration Due Date:	4-19-11
Count Rate Meter:	M2 154859	Serial No.:	M44-9 PR184559	Calibration Due Date:	4/6-11

Background Exposure Rate (µR/hr)	22	Max. Exposure Rate on Shipping Containers Externals (Plus Bkgd)	20	µR/hr
Background Count Rate (cpm)	50	Max. Removable Count Rate on Shipping Containers Externals (Plus Bkgd)	60	cpm
		Max. Removable Count Rate on Shipping Containers Internals (Plus Bkgd)	60	cpm

Sample Label/Comments/Notes	pH Orig (pH ≤ 2 is Acceptable)	pH Final	Mark if Preserve	Acid Lot #	Weight(g) / Volume(mL)	µR/hr (Acceptance Limits <500 µR/hr)	cpm (Acceptance Limits <100 cpm/cm²)
Buckman-11-1944					1000	13	30
Buckman-11-1970					1000	12	35
Buckman-11-2042					1000	13	30

Surveyors' Name: [signature] Date/Time Surveyed: 11-10-10 / 11:20

S:\Procedures_Controlled\Controlled Forms\ARS-062 Sample Receipt Inspection Form

DISCREPANT SAMPLE RECEIPT REPORT

For Sample Receiving Use

SDG: _____ **Receipt Date/Time:** _____/_____ **Matrix:** _____

Client Name: LANL

Problem Description:

The following; Buckman 06-11-1970, Buckman 08-11-2042, and Buckman 1-11-1944 are present but missing COC

For Project Manager Use

Client Notified (Y | N): _____ **Date/Time Client Notified:** 11·12·10 / 11:04

Client/PM Resolution:

emailed Keith & Joylene
They mailed us a COC for these
3 samples (Req # 11-473)

Client Notified that TAT Starts from Resolution of DSRR (Y | N): _____

Date/Time DSRR Resolved: 11·16·10 / 10:35 **PM Initials:** SDL

For Sample Receiving Use

Action Taken:

Receive the COC and checked in samples as normal.

Signature: [signature] **Date/Time:** 11/6/10 / 11:08
Sample Custodian

ARS-062-002 r1 S:\Procedures_Controlled/Control Forms