Offsite

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: AUG 16 2011
Refer To: EP2011-0277

RECEIVED
AUG 2011

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: Los Alamos National Laboratory Sitewide Monitoring Program Drinking Water Results for the City of Santa Fe Buckman Water Supply Wells

Dear Mr. Snyder:

This report, prepared by Los Alamos National Laboratory (the Laboratory), provides the analytical results from the March 14, 2011, sampling of the City of Santa Fe's Buckman Wells Nos. 1, 6, and 8 for low-level tritium analysis. All results were below the U.S. Environmental Protection Agency (EPA) drinking water standard.

Routine monitoring of select Buckman water supply wells is conducted in accordance with the April 22, 2010, sampling and analysis plan cooperatively developed between the Laboratory and City of Santa Fe staff. Under this plan, the Laboratory will sample Buckman Wells Nos. 1, 6, and 8 quarterly: twice per year for full-suite analysis (radiologicals [including tritium], general inorganics [including perchlorate], metals [including chromium], and organics); and twice per year for low-level tritium.

The attached CD contains the following items: (1) American Radiation Services (ARSL) data report; and (2) an Excel file of all analytical results (Tables 1 and 2) with a glossary of laboratory qualification codes, secondary validation codes, and secondary validation reason codes. The analytical results are as follows.

Tritium: Samples from Buckman Wells Nos. 1, 6, and 8 were submitted to ARSL for low-level tritium analysis. Historically, all low-level tritium samples were submitted to the University of Miami Tritium Laboratory (UMTL) for analysis. Beginning in early 2010, however, the Laboratory's contract with UMTL expired and a new contract was awarded to ARSL. Accordingly, results from ARSL may not be directly comparable with those from UMTL because of differences in each laboratory's minimum detectable activity (MDA) and counting uncertainty. The analytical results are discussed below and presented in Table 1.0.

34686

Low-level tritium results from ARSL are reported to the Laboratory in units of concentration called tritium units (TU). The Laboratory converts all ARSL low-level tritium results from TU to pCi/L; 1 TU is equivalent to approximately 3.22 pCi/L. Conversions are made to standardize units with the federal drink water standard of 20,000 pCi/L.

- Tritium results from the sampling of Buckman Wells Nos. 1, 6, and 8 on March 14, 2011, were as follows:

➢ Buckman Well No. 1:	2.97 pCi/L
➢ Buckman Well No. 6:	3.58 pCi/L
➢ Buckman Well No. 8:	–2.49 pCi/L

It should be noted that nondetect levels of radionuclides may be accurately reported as negative values. Before the sample is analyzed, a blank or background sample is inserted and the "background count" is measured. The "background count" is then subtracted from the total sample count, which may result in a negative value if the counts for the sample were sufficiently low. An accurate measurement of a sample requires that this background count be subtracted out.

Field Parameters: Results from the measurement of field parameters—conductivity, temperature, turbidity, dissolved oxygen, redox potential, and pH—are presented in Table 2.0. All results are compliant with the EPA Secondary Drinking Water Regulations.

In summary, all results presented in this report are below EPA drinking water standards.

If you have any questions, please contact Steve Paris at (505) 606-0915 (smparis@lanl.gov) or Woody Woodworth (505) 665-5820 (lance.woodworth@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/CD/SP/BB:sm

Attachments: CD with the following items:
(1) ARSL data report
(2) Excel file of Tables 1.0–2.0 and a glossary of laboratory qualification codes, secondary validation codes, and secondary validation reason codes (LA-UR-11-4467)

Cy: (w/att.)
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
Alex Puglisi, City of Santa Fe, 801 West San Mateo, Santa Fe, NM 87505
John Keiling, 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
Neil Weber, San Ildefonso Pueblo
Bob Beers, ENV-RCRA, MS K490
RPF, MS M707 (electronic copy)
Public Reading Room (hard copy)

Cy: (Letter and CD and/or DVD only)
Laurie King, EPA Region 6, Dallas, TX
Steve Yanicak, NMED-DOE-OB, MS M894
Hai Shen, DOE-LASO, MS A316
Gene Turner, DOE-LASO, MS A316
Steve Paris, EP-CAP, MS M992
Suzanne Coyne, IRM-DCS, MS M992
William Alexander, EP-BPS, MS M992

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)
James C. Cantwell, ADESHQ, MS K491 (date-stamped letter emailed)
Mike Saladen, ENV-RCRA, MS K490 (date-stamped letter emailed)
Danny Katzman, EP-ET, MS M992 (date-stamped letter emailed)
Craig Douglass, EP-CAP, MS M992 (date-stamped letter emailed)
Michael J. Graham, ADEP, MS M991 (date-stamped letter emailed)

Table 1.0
Buckman Wells Nos. 1, 6, and 8
Low-Level Tritium

Location Name	Start Date	Analyte	Analyte Desc	Anyl Meth Code	Fld Prep Code		Std Result	Unit	Std Uncertainty (1s)	Std MDA	Lab Qual Code	Concat Flag Code	Lab Code	Sample ID
Buckman 1	3/14/2011	H-3	Tritium	Generic:Low_Level_Tritium	UF		2.969	pCi/L	0.83	2.171			ARSL	Buckman1-11-5682
Buckman 6	3/14/2011	H-3	Tritium	Generic:Low_Level_Tritium	UF		3.576	pCi/L	0.99	2.618			ARSL	Buckman06-11-5683
Buckman 8	3/14/2011	H-3	Tritium	Generic:Low_Level_Tritium	UF	<	-2.491*	pCi/L	0.80	2.586	U	U	ARSL	Buckman08-11-5684

Notes: UF = Unfiltered; U = The analyte was analyzed for but not detected. *Nondetect levels of radionuclides may be accurately reported as negative values. Before the sample is analyzed, a blank or background sample is inserted, and the “background count” is measured. The “background count” is then subtracted from the total sample count, which may result in a negative value if the counts for the sample were sufficiently low. An accurate measurement of a sample requires that this background count be subtracted out.

Table 2.0
Buckman Wells Nos. 1, 6, and 8
Field Parameters

Location Name	Start Date	Analyte	Analyte Desc	Fld Prep Code	Result	Units	Lab Code	Sample Id
Buckman 1	3/14/2011	DO	Dissolved Oxygen	UF	6.98	mg/L	FLD	Buckman1-11-5682
Buckman 1	3/14/2011	ORP	Oxidation Reduction Potential	UF	189.7	mV	FLD	Buckman1-11-5682
Buckman 1	3/14/2011	SPEC_CONDC	Specific Conductance	UF	441	uS/cm	FLD	Buckman1-11-5682
Buckman 1	3/14/2011	TEMP	Temperature	UF	21.17	deg C	FLD	Buckman1-11-5682
Buckman 1	3/14/2011	TURB	Turbidity	UF	NA	NTU	FLD	Buckman1-11-5682
Buckman 1	3/14/2011	pH	pH	UF	8.2	SU	FLD	Buckman1-11-5682
Buckman 6	3/14/2011	DO	Dissolved Oxygen	UF	7.2	mg/L	FLD	Buckman06-11-5683
Buckman 6	3/14/2011	ORP	Oxidation Reduction Potential	UF	216.8	mV	FLD	Buckman06-11-5683
Buckman 6	3/14/2011	SPEC_CONDC	Specific Conductance	UF	596	uS/cm	FLD	Buckman06-11-5683
Buckman 6	3/14/2011	TEMP	Temperature	UF	22.93	deg C	FLD	Buckman06-11-5683
Buckman 6	3/14/2011	TURB	Turbidity	UF	2.2	NTU	FLD	Buckman06-11-5683
Buckman 6	3/14/2011	pH	pH	UF	6.92	SU	FLD	Buckman06-11-5683
Buckman 8	3/14/2011	DO	Dissolved Oxygen	UF	6.07	mg/L	FLD	Buckman08-11-5684
Buckman 8	3/14/2011	ORP	Oxidation Reduction Potential	UF	198	mV	FLD	Buckman08-11-5684
Buckman 8	3/14/2011	SPEC_CONDC	Specific Conductance	UF	581	uS/cm	FLD	Buckman08-11-5684
Buckman 8	3/14/2011	TEMP	Temperature	UF	25.8	deg C	FLD	Buckman08-11-5684
Buckman 8	3/14/2011	TURB	Turbidity	UF	1.2	NTU	FLD	Buckman08-11-5684
Buckman 8	3/14/2011	pH	pH	UF	7.44	SU	FLD	Buckman08-11-5684

Table 5b.Transcriptomics Validation Status Codes

Total Rows: 1,000 Showing: 1 to 1,000	
1	VALIDATED_CANONICAL
2	VALIDATED_NON_CANONICAL
3	VALIDATED_UNMAPPED
4	VALIDATED_AMBIGUOUS
5	VALIDATED_NOT_ANALYZED
6	The validation was not done, without an analysis. Results are not available for this variable.
7	The validation was not done, without an analysis. Results are not available for this variable(missing). Any reported RNA value has been caused in the
8	No data qualifier flag has been applied in this section.Issue
9	Sample Quality Control Failure(QC Failure) PRC Statistics Unobtained (G)
10	VALIDATED_DEGRADED
11	VALIDATED_LOW_QC
12	VALIDATED_LOW_
13	VALIDATED_LOW_
14	VALIDATED_LOW_
15	The sample is a control and thus has or copied in these times the 1 sigma RNA (propagated uncertainty).
16	VALIDATED_ZERO
17	VALIDATED_ZERO
18	VALIDATED_ZERO
19	VALIDATED_UNMAPPED
20	VALIDATED_UNMAPPED
21	CFX qC Classic RNA TPS Table 6 calculate non-detects.Therefore not detected (G)
22	VALIDATED_LOW_
23	VALIDATED_LOW_
24	VALIDATED_LOW_
25	VALIDATED_ZERO
26	VALIDATED_ZERO
27	VALIDATED_ZERO
28	VALIDATED_ZERO
29	VALIDATED_ZERO
30	Chemical Sciences and Technology validation assignment is qualifier to the sample.Issue: The Biology validation expert should ha
31	VALIDATED_UNMAPPED
32	The qualifier flag has been applied in this section.
33	The sample was a control, from the laboratory control sample for the sample.Issue: Not RNA.
34	The sample was a control, from the laboratory control sample for the sample.Issue: Not RNA.
35	The reagent used should be regarded as not detected because the plate was determined to be contaminated in the gentex experiment.
36	The reagent used should regarded as not detected because the the gentex experiment plate was not qualified
37	The sample was a control, therefore it (missing) value may not be accepted for use.
38	VALIDATED_ZERO
39	VALIDATED_ZERO
40	VALIDATED_ZERO
41	VALIDATED_ZERO
42	VALIDATED_ZERO
43	VALIDATED_ZERO
44	VALIDATED_ZERO
45	VALIDATED_ZERO

FT-IR This spectroscopic method uses non-ionizing infrared photons to map the molecular fingerprint of a sample, allowing for the identification of specific functional groups and chemical bonds without destroying the material.

FT-IR Fourier Transform Infrared Spectroscopy

FT-IR The Fourier-transform infrared spectroscopy method is used to identify the chemical structure of the polymer matrix and detect the presence of specific functional groups or additives.

FT-IR Fourier Transform Infrared Spectroscopy

FT-IR The Fourier-transform infrared spectroscopy method is used to identify the chemical structure of the polymer matrix and detect the presence of specific functional groups or additives.

FT-IR Fourier Transform Infrared Spectroscopy

FT-IR Fourier Transform Infrared Spectroscopy

FT-IR Fourier Transform Infrared Spectroscopy

Table S5-6.

Valid Flag
A
DNA
GUP
IUP
J
J-
J+
JN-
JN+
JPM
LIMIT
MS
MSD
N
NJ
NQ
NUP
P
PM
R
RPM
RUP
U
UA
UJ
VUP

Table 55-5 Laboratory Qualification Codes

Lab Qual	Club Qual	Desc
*		* (Inorganic) - The result for this analyte in the Laboratory Replicate analysis was outside acceptance criter
**		** (Organic) and (Inorganic) - The result for this analyte in the Laboratory Control Sample analysis was outside acceptance crite
		* (Inorganic) - The result for this analyte in the Laboratory Replicate analysis was outside acceptance criteria. (E) (Organic) - The result for this anlayte exceeded the up
		range of the instrument initial calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the serial dilution analysis was outside acceptance criteria. (E)
*E		(Inorganic) (GFAA) - The result for this analyte failed one or more CLP acceptance criteria as explained in the case narrative.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than I
B		Instrument Detection Limit but less than the Contract Required Detection Limit.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than I
		Instrument Detection Limit but less than the Contract Required Detection Limit. * (Inorganic) - The result for this analyte in the Laboratory Replicate analysis was outside
B*		acceptance criteria.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than I
		Instrument Detection Limit but less than the Contract Required Detection Limit. * (Inorganic) - The result for this analyte in the Laboratory Replicate analysis was outside
		acceptance criteria. (E) (Organic) - The result for this anlayte exceeded the upper range of the instrument initial calibration curve. (E) (Inorganic) (ICP-AES) - The result for this
		analyte in the serial dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) - The result for this analyte failed one or more CLP acceptance criteria as
B*E		explained in the case narrative.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than I
		Instrument Detection Limit but less than the Contract Required Detection Limit. (E) (Organic) - The result for this anlayte exceeded the upper range of the instrument initial
		calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the serial dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) - The result for
BE		analyte failed one or more CLP acceptance criteria as explained in the case narrative.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than I
		Instrument Detection Limit but less than the Contract Required Detection Limit. (E) (Organic) - The result for this anlayte exceeded the upper range of the instrument initial
		calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the serial dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) - The result for
		analyte failed one or more CLP acceptance criteria as explained in the case narrative. * (Inorganic) - The result for this analyte in the Laboratory Replicate analysis was outside
BE*		acceptance criteria.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than I
		Instrument Detection Limit but less than the Contract Required Detection Limit. (E) (Organic) - The result for this anlayte exceeded the upper range of the instrument initial
		calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the serial dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) - The result for
		analyte failed one or more CLP acceptance criteria as explained in the case narrative. (N) (Organic) - The reported analyte is a tentitively identified compound (TIC). (N)
BEN		(Inorganic) - The result for this anlayte in the matrix spike sample was outside acceptance criteria.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than I
		Instrument Detection Limit but less than the Contract Required Detection Limit. (E) (Organic) - The result for this anlayte exceeded the upper range of the instrument initial
		calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the serial dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) - The result for
		analyte failed one or more CLP acceptance criteria as explained in the case narrative. (N) (Organic) - The reported analyte is a tentitively identified compound (TIC). (N)
		(Inorganic) - The result for this anlayte in the matrix spike sample was outside acceptance criteria. * (Inorganic) - The result for this analyte in the Laboratory Replicate analysis
BEN*		was outside acceptance criteria.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than I
		Instrument Detection Limit but less than the Contract Required Detection Limit. (J) (Organic/General Inorganics) - The result for this analyte was greater than the Method
BJ		Detection Limit (MDL) but less than the Practical Quantitaion Limit (PQL).
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (J) (Organic) - The reported analyte is a tentitively identified compos
BJN		(TIC). (N) (Organic) - The reported analyte is a tentitively identified compound (TIC).
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than the
		Instrument Detection Limit but less than the Contract Required Detection Limit. (J) (Organic/General Inorganics) - The result for this analyte was greater than the Method
		Detection Limit (MDL) but less than the Practical Quantitaion Limit (PQL). (P) (Pesticides/PCBs) - The quantitative results for this analyte between the primary and secondary
		GC columns were greater than 25% difference. (P) (SW-846 EPA Method 8310 High Pressure Liquid Chromotography, HPLC results) - The quantitative results for this anal
BJP		between the primary and secondary HPLC columns or primary and secondary HPLC detectors were greater than 40% difference.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than I
		Instrument Detection Limit but less than the Contract Required Detection Limit. (J) (Organic/General Inorganics) - The result for this analyte was greater than the Method
		Detection Limit (MDL) but less than the Practical Quantitaion Limit (PQL). (P) (Pesticides/PCBs) - The quantitative results for this analyte between the primary and secondary
		GC columns were greater than 25% difference. (P) (SW-846 EPA Method 8310 High Pressure Liquid Chromotography, HPLC results) - The quantitative results for this anal
		between the primary and secondary HPLC columns or primary and secondary HPLC detectors were greater than 40% difference. (X) (Organic/Inorganic) - The result for this
BJPX		analyte should be regarded as not detected.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than I
		Instrument Detection Limit but less than the Contract Required Detection Limit. (N) (Organic) - The reported analyte is a tentitively identified compound (TIC). (N) (Inorganic) -
BN		The result for this anlayte in the matrix spike sample was outside acceptance criteria.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than I
		Instrument Detection Limit but less than the Contract Required Detection Limit. (N) (Organic) - The reported analyte is a tentitively identified compound (TIC). (N) (Inorganic) -
		The result for this anlayte in the matrix spike sample was outside acceptance criteria. * (Inorganic) - The result for this analyte in the Laboratory Replicate analysis was outside
BN*		acceptance criteria.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than I
		Instrument Detection Limit but less than the Contract Required Detection Limit. (N) (Organic) - The reported analyte is a tentitively identified compound (TIC). (N) (Inorganic) -
		The result for this anlayte in the matrix spike sample was outside acceptance criteria. (E) (Organic) - The result for this anlayte exceeded the upper range of the instrument
		initial calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the serial dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) - The result
BNE		for this analyte failed one or more CLP acceptance criteria as explained in the case narrative.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than the
		Instrument Detection Limit but less than the Contract Required Detection Limit. (P) (Pesticides/PCBs) - The quantitative results for this analyte between the primary and
		secondary GC columns were greater than 25% difference. (P) (SW-846 EPA Method 8310 High Pressure Liquid Chromotography, HPLC results) - The quantitative results for
BP		this analyte between the primary and secondary HPLC columns or primary and secondary HPLC detectors were greater than 40% difference.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than I
		Instrument Detection Limit but less than the Contract Required Detection Limit. (P) (Pesticides/PCBs) - The quantitative results for this analyte between the primary and
		secondary GC columns were greater than 25% difference. (P) (SW-846 EPA Method 8310 High Pressure Liquid Chromotography, HPLC results) - The quantitative results for
		this analyte between the primary and secondary HPLC columns or primary and secondary HPLC detectors were greater than 40% difference. (X) (Organic/Inorganic) - The
BPX		result for this analyte should be regarded as not detected.
		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (B) (Inorganic) - The result for this analyte was greater than I
		Instrument Detection Limit but less than the Contract Required Detection Limit. (W) (Inorganic GFAA CLP) - The result for this analyte in the post-digestion spike sample was
BW		outside acceptance criteria.
BX		(B) (Organic) - This analyte was detected in the associated Laboratory Method Blank and the sample. (X) Diode array didn't confi
D		(D) (Organic) - The result for this analyte was reported from a dilutio
		(D) (Organic) - The result for this analyte was reported from a dilution. (J) (Organic/General Inorganics) - The result for this analyte was greater than the Method Detection Li
DJ		(MDL) but less than the Practical Quantitaion Limit (PQL).
DNA		did not analyze due to broken equipment
		(D) (Organic) - The result for this analyte was reported from a dilution. (P) (Pesticides/PCBs) - The quantitative results for this analyte between the primary and secondary GC
		columns were greater than 25% difference. (P) (SW-846 EPA Method 8310 High Pressure Liquid Chromotography, HPLC results) - The quantitative results for this analyte
DP		between the primary and secondary HPLC columns or primary and secondary HPLC detectors were greater than 40% difference.
		(D) (Organic) - The result for this analyte was reported from a dilution. (P) (Pesticides/PCBs) - The quantitative results for this analyte between the primary and secondary
		columns were greater than 25% difference. (P) (SW-846 EPA Method 8310 High Pressure Liquid Chromotography, HPLC results) - The quantitative results for this analyte
		between the primary and secondary HPLC columns or primary and secondary HPLC detectors were greater than 40% difference. (X) (Organic/Inorganic) - The result for this
DPX		analyte should be regarded as not detected.
		(E) (Organic) - The result for this anlayte exceeded the upper range of the instrument initial calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the se
		dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) - The result for this analyte failed one or more CLP acceptance criteria as explained in the case
E		narrative.
		(E) (Organic) - The result for this anlayte exceeded the upper range of the instrument initial calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the se
		dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) - The result for this analyte failed one or more CLP acceptance criteria as explained in the case
E*		narrative. * (Inorganic) - The result for this analyte in the Laboratory Replicate analysis was outside acceptance criteria.
		(E) (Organic) - The result for this anlayte exceeded the upper range of the instrument initial calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the serial
		dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) - The result for this analyte failed one or more CLP acceptance criteria as explained in the case
EJ		narrative. (J) (Organic/General Inorganics) - The result for this analyte was greater than the Method Detection Limit (MDL) but less than the Practical Quantitaion Limit (PQL).
		(E) (Organic) - The result for this anlayte exceeded the upper range of the instrument initial calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the se
		dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) - The result for this analyte failed one or more CLP acceptance criteria as explained in the case
		narrative. (J) (Organic/General Inorganics) - The result for this analyte was greater than the Method Detection Limit (MDL) but less than the Practical Quantitaion Limit (PQL
EJ*		(Inorganic) - The result for this analyte in the Laboratory Replicate analysis was outside acceptance criteria.
		(E) (Organic) - The result for this anlayte exceeded the upper range of the instrument initial calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the se
		dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) - The result for this analyte failed one or more CLP acceptance criteria as explained in the case
		narrative. (J) (Organic/General Inorganics) - The result for this analyte was greater than the Method Detection Limit (MDL) but less than the Practical Quantitaion Limit (PQL)
		(N) (Organic) - The reported analyte is a tentitively identified compound (TIC). (N) (Inorganic) - The result for this anlayte in the matrix spike sample was outside acceptance
EJN		criteria.
		(E) (Organic) - The result for this anlayte exceeded the upper range of the instrument initial calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the se
		dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) - The result for this analyte failed one or more CLP acceptance criteria as explained in the case
		narrative. (N) (Organic) - The reported analyte is a tentitively identified compound (TIC). (N) (Inorganic) - The result for this anlayte in the matrix spike sample was outside
EN		acceptance criteria.
		(E) (Organic) - The result for this anlayte exceeded the upper range of the instrument initial calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the serial
		dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) - The result for this analyte failed one or more CLP acceptance criteria as explained in the case
		narrative. (N) (Organic) - The reported analyte is a tentitively identified compound (TIC). (N) (Inorganic) - The result for this anlayte in the matrix spike sample was outside
EN*		acceptance criteria. * (Inorganic) - The result for this analyte in the Laboratory Replicate analysis was outside acceptance criteria.
H		(H) (Organic/Inorganic) - The required extraction or analysis holding time for this result was exceeds
		(H) (Organic/Inorganic) - The required extraction or analysis holding time for this result was exceeded. * (Organic) and (Inorganic) - The result for this analyte in the Labora
		Control Sample analysis was outside acceptance criteria.
H*		(H) (Organic/Inorganic) - The required extraction or analysis holding time for this result was exceeded. (J) (Organic/General Inorganics) - The result for this analyte was gre
HJ		than the Method Detection Limit (MDL) but less than the Practical Quantitaion Limit (PQL).
		(H) (Organic/Inorganic) - The required extraction or analysis holding time for this result was exceeded. (J) (Organic/General Inorganics) - The result for this analyte was gre
		than the Method Detection Limit (MDL) but less than the Practical Quantitaion Limit (PQL). * (Inorganic) - The result for this analyte in the Laboratory Replicate analysis was
HJ*		outside acceptance criteria.
		(I) (DIOXIN) The lab is reporting an interference for the associated congener. The reported concentration is an Estimated Maximum Possible Concentration (EMPC) due to
I		reported interference.
		(d15N) - The d15N of nitrate is a signature of the nitrate present in a sample. Therefore, nitrate has to be present to have a signature. A d15N value can not be given to a bla
		since the blank does not have nitrate. This is different than most analytical methods where you would run a blank and use the designator: "non detect" or detected, but below
INS		detection limit.
J		(J) (Organic/General Inorganics) - The result for this analyte was greater than the Method Detection Limit (MDL) but less than the Practical Quantitaion Limit (PQL).
		(J) (Organic/General Inorganics) - The result for this analyte was greater than the Method Detection Limit (MDL) but less than the Practical Quantitaion Limit (PQL)
J*		(Inorganic) - The result for this analyte in the Laboratory Replicate analysis was outside acceptance criteria.
		(J) (Organic/General Inorganics) - The result for this analyte was greater than the Method Detection Limit (MDL) but less than the Practical Quantitaion Limit (PQL).
		(Organic) - The reported analyte is a tentitively identified compound (TIC). (N) (Inorganic) - The result for this anlayte in the matrix spike sample was outside acceptance
JN		criteria.
		(J) (Organic/Inorganic/General Inorganics) - The result for this analyte was greater than the Method Detection Limit (MDL) but less than the Practical Quantitaion Limit (PC
		(N) (Organic) - The reported analyte is a tentitively identified compound (TIC). (N) (Inorganic) - The result for this anlayte in the matrix spike sample was outside acceptance
JN*		criteria. * (Inorganic) - The result for this analyte in the Laboratory Replicate analysis was outside acceptance criteria.
		(J) (Organic/General Inorganics) - The result for this analyte was greater than the Method Detection Limit (MDL) but less than the Practical Quantitaion Limit (PQL).
		(Pesticides/PCBs) - The quantitative results for this analyte between the primary and secondary GC columns were greater than 25% difference. (P) (SW-846 EPA Method
JP		8310 High Pressure Liquid Chromotography, HPLC results) - The quantitative results for this analyte between the primary and secondary HPLC columns or primary and
		secondary HPLC detectors were greater than 40% difference.
		(J) (Organic/General Inorganics) - The result for this analyte was greater than the Method Detection Limit (MDL) but less than the Practical Quantitaion Limit (PQL). (P)
		(Pesticides/PCBs) - The quantitative results for this analyte between the primary and secondary GC columns were greater than 25% difference. (P) (SW-846 EPA Method
		8310 High Pressure Liquid Chromotography, HPLC results) - The quantitative results for this analyte between the primary and secondary HPLC columns or primary and
JPX		secondary HPLC detectors were greater than 40% difference. (X) (Organic/Inorganic) - The result for this analyte should be regarded as not detected.
		(J) (Organic/General Inorganics) - The result for this analyte was greater than the Method Detection Limit (MDL) but less than the Practical Quantitaion Limit (PQL).
JX		(Organic/Inorganic) - The result for this analyte should be regarded as not detected.
L		(L) (Inorganic) - The result for this analyte in the serial dilution sample indicates physical and chemical interferences are preser
LT		(LT) (Rad) - The result for this analyte is affected by spectral interferenc
		(N) (Organic) - The reported analyte is a tentitively identified compound (TIC). (N) (Inorganic) - The result for this anlayte in the matrix spike sample was outside acceptai
N		criteria.
		(N) (Organic) - The reported analyte is a tentitively identified compound (TIC). (N) (Inorganic) - The result for this anlayte in the matrix spike sample was outside acceptai
N*		criteria. * (Inorganic) - The result for this analyte in the Laboratory Replicate analysis was outside acceptance criteria.
		(P) (Pesticides/PCBs) - The quantitative results for this analyte between the primary and secondary GC columns were greater than 25% difference. (P) (SW-846 EPA Meth
		8310 High Pressure Liquid Chromotography, HPLC results) - The quantitative results for this analyte between the primary and secondary HPLC columns or primary and
P		secondary HPLC detectors were greater than 40% difference.
		(P) (Pesticides/PCBs) - The quantitative results for this analyte between the primary and secondary GC columns were greater than 25% difference. (P) (SW-846 EPA Meth
		8310 High Pressure Liquid Chromotography, HPLC results) - The quantitative results for this analyte between the primary and secondary HPLC columns or primary and
		secondary HPLC detectors were greater than 40% difference. (J) (Organic/General Inorganics) - The result for this analyte was greater than the Method Detection Limit (MDL)
PJ		but less than the Practical Quantitaion Limit (PQL).
		(P) (Pesticides/PCBs) - The quantitative results for this analyte between the primary and secondary GC columns were greater than 25% difference. (P) (SW-846 EPA Method
		8310 High Pressure Liquid Chromotography, HPLC results) - The quantitative results for this analyte between the primary and secondary HPLC columns or primary and
PX		secondary HPLC detectors were greater than 40% difference. (X) (Organic/Inorganic) - The result for this analyte should be regarded as not detected.
Q		(Q) The result for this analyte was reported at an elevated reporting lim
R		(Inorganic) -The data are not useable. Organic -The data are unusable (compound may or may not be present.) Resampling and reanalysis is necessary for verification.
SI		(SI) (Rad) - Gamma spectroscopy result should be regarded as an uncertain identification due to spectral interferenc
SQ		(SQ) (Rad) - Gamma spectroscopy result should be regarded as an uncertain identification due to spectral interferenc
TI		(TI) (Rad) - Gamma spectroscopy result should be regarded as an uncertain identification due to spectral interferenc
U		(U) (Organic/Inorganic) - The result for this analyte was not detected at the specified reporting lim
		(U) (Organic/Inorganic) - The result for this analyte was not detected at the specified reporting limit. * (Inorganic) - The result for this analyte in the Laboratory Replicate anal
U*		was outside acceptance criteria.
		(U) (Organic/Inorganic) - The result for this analyte was not detected at the specified reporting limit. (E) (Organic) - The result for this anlayte exceeded the upper range of
		instrument initial calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the serial dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) -
UE		The result for this analyte failed one or more CLP acceptance criteria as explained in the case narrative.
		(U) (Organic/Inorganic) - The result for this analyte was not detected at the specified reporting limit. (E) (Inorganic) (ICP-AES) - The result for this analyte in the serial dilu
		analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) - The result for this analyte failed one or more CLP acceptance criteria as explained in the case narrative. *
UE*		(Inorganic) - The result for this analyte in the Laboratory Replicate analysis was outside acceptance criteria.
		(U) (Organic/Inorganic) - The result for this analyte was not detected at the specified reporting limit. (E) (Organic) - The result for this anlayte exceeded the upper range of
		instrument initial calibration curve. (E) (Inorganic) (ICP-AES) - The result for this analyte in the serial dilution analysis was outside acceptance criteria. (E) (Inorganic) (GFAA) -
		The result for this analyte failed one or more CLP acceptance criteria as explained in the case narrative. (N) (Organic) - The reported analyte is a tentitively identified compound
UEN		(TIC). (N) (Inorganic) - The result for this anlayte in the matrix spike sample was outside acceptance criteria.
		(U) (Organic/Inorganic) - The result for this analyte was not detected at the specified reporting limit. (H) (Organic/Inorganic) - The required extraction or analysis holding time
UH		this result was exceeded.
		(U) (Organic/Inorganic) - The result for this analyte was not detected at the specified reporting limit. (H) (Organic/Inorganic) - The required extraction or analysis holding time
UH*		this result was exceeded. * (Inorganic) - The result for this analyte in the Laboratory Replicate analysis was outside acceptance criteria.
UI		(UI) (Rad) - Gamma spectroscopy result should be regarded as an uncertain identificatio
UJ		(UJ) (Organic) Legacy CST lab code should not be used
		UL (all suites) Not detected legacy - This lab qual code is applied by WQ personnel for CST data and other legacy data that was reported as not detected using the less th
UL		symbol without the laboratory assigning a U lab code.
		(U) (Organic/Inorganic) - The result for this analyte was not detected at the specified reporting limit. (N) (Organic) - The reported analyte is a tentitively identified compos
UN		(TIC). (N) (Inorganic) - The result for this anlayte in the matrix spike sample was outside acceptance criteria.
		(U) (Organic/Inorganic) - The result for this analyte was not detected at the specified reporting limit. (N) (Organic) - The reported analyte is a tentitively identified compos
		(TIC). (N) (Inorganic) - The result for this anlayte in the matrix spike sample was outside acceptance criteria. * (Inorganic) - The result for this analyte in the Laboratory
UN*		Replicate analysis was outside acceptance criteria.
UUI		(UUI) (Rad) - Gamma spectroscopy result should be regarded as an uncertain identification and the lab assigned these gamma spectroscopy results as not detected.
		(U) (Organic/Inorganic) - The result for this analyte was not detected at the specified reporting limit. (W) (Inorganic GFAA CLP) - The result for this analyte in the post-digest
UW		spike sample was outside acceptance criteria.
UY2		(UY2) (Rad) - Result should be regarded as an uncertain identification due to spectral interferenc
W		(W) (Inorganic GFAA CLP) - The result for this analyte in the post-digestion spike sample was outside acceptance criteri
X		(X) (Organic/Inorganic) - The result for this analyte should be regarded as not detecte
		(X) (Organic/Inorganic) - The result for this analyte should be regarded as not detected. (B) (Organic) - This analyte was detected in the associated Laboratory Method Blank
XB		and the sample. (B) (Inorganic) - The result for this analyte was greater than the Instrument Detection Limit but less than the Contract Required Detection Limit.

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

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: 11-1637

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

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: 11-1637

Case Narrative

ARS INTERNATIONAL

2609 North River Road • Port Allen, Louisiana 70767
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

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

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:	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:**	06/24/11

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	0.930	0.260	0.680	0.330		TU	ARS-040	06/21/11 23:51	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

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:**	06/24/11

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	1.120	0.310	0.820	0.390		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.*

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:	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:**	06/24/11

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	-0.780	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
2609 North River Road, Port Allen, Louisiana 70767
1 (800) 401-4277 FAX (225) 381-2996

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	7.110	1.120	0.710	8.128		TU	ARS-040	6/21/11 14:19	JR	87	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	-0.620	0.200	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	7.110	1.120	8.380	1.310		TU	ARS-040	6/21/11 17:29	JR	0.52	< 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	7.110	1.120	8.380	1.310		TU	ARS-040	6/21/11 17:29	JR	1.47	< 3

Susan Leese
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	

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

Samples

QC Evaluation

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

LCS	22.8900	**CSU (2s)**	7.0400
LCSD	27.0100	**CSU-D (2s)**	8.2800

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

DER 4.12 / 5.4341513 = 0.758168 **< 3**

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

%RPD 4.12 / 24.95 *100 = 16.51303 **< 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 = 4.12 / 15.3200 0.268929504 **<1**

Blank Information

	Act	CSU(2s)	MDA	Act>MDA
AM-241				
U-234				
U-235				
U-238				
Pu-238				
Pu-239/240				
Th-228				
Th-230				
Th-232				
H3	-2	1.25	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 = -2
CSU = 1.25
Is ACT<1.65*CSU? YES

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	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	6	1.41	485.51	0.3009	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	7.11	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	6	1.41	492.59	0.3022	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	8.38	0.37	0.37	1.31	0.78	0.38	TU
B11-01170-03	506.24	2.00	12.35	2.06	10.29	0.02	37.96	1	1.41	513.56	0.3058	0.00800	L	6/21/2011	6/21/2011	180	180	0.99999	-0.62	0.17	0.17	0.20	0.64	0.31	TU
B11-01170-04	506.02	2.02	11.63	2.08	9.55	0.02	40.77	2	1.41	406.43	0.2720	0.00804	L	3/14/2011	6/21/2011	180	180	0.98636	0.93	0.22	0.22	0.26	0.68	0.33	TU
B11-01170-05	503.20	2.01	13.71	2.07	11.64	0.02	33.52	2	1.41	410.46	0.2740	0.00807	L	3/14/2011	6/22/2011	180	180	0.98622	1.12	0.26	0.26	0.31	0.82	0.39	TU
B11-01170-06	505.38	2.00	13.63	2.06	11.57	0.02	33.86	1	1.41	411.21	0.2744	0.00803	L	3/14/2011	6/22/2011	180	180	0.98622	-0.78	0.22	0.22	0.25	0.81	0.39	TU
B11-01170-07	504.43	2.03	11.13	2.09	9.04	0.02	42.85	1	1.41	402.05	0.2699	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	-0.63	0.18	0.18	0.20	0.66	0.32	TU
B11-01170-08	516.63	1.99	12.43	2.05	10.38	0.02	38.38	3	1.41	403.70	0.2707	0.00757	L	3/11/2011	6/22/2011	180	180	0.98581	2.86	0.28	0.28	0.51	0.77	0.37	TU
B11-01170-09	511.23	2.00	12.16	2.06	10.10	0.02	39.01	4	1.41	410.77	0.2742	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	4.29	0.29	0.29	0.70	0.71	0.34	TU
B11-01170-10	509.67	2.01	11.75	2.07	9.68	0.02	40.52	1	1.41	412.42	0.2750	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	-0.66	0.18	0.18	0.21	0.68	0.33	TU
B11-01170-11	511.88	1.99	11.49	2.05	9.44	0.02	41.68	1	1.41	410.95	0.2743	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	-0.64	0.18	0.18	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	1.41	307.62	0.2155	0.00820	L	3/11/2011	6/23/2011	180	180	0.98568	-0.74	0.21	0.21	0.23	0.76	0.37	TU
B11-01170-13	508.51	2.00	11.07	2.06	9.01	0.02	43.31	2	1.41	422.58	0.2800	0.00800	L	3/10/2011	6/23/2011	180	180	0.98554	0.86	0.20	0.20	0.24	0.62	0.30	TU
B11-01170-14	507.87	2.02	11.43	2.08	9.35	0.02	41.75	1	1.41	415.81	0.2766	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-0.63	0.18	0.18	0.20	0.66	0.32	TU
B11-01170-17	498.51	2.00	10.47	2.06	8.41	0.02	45.40	1	1.41	414.25	0.2759	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-0.58	0.16	0.16	0.19	0.61	0.29	TU
B11-01170-18	501.98	2.00	11.43	2.06	9.37	0.02	41.20	1	1.41	422.34	0.2799	0.00800	L	3/18/2011	6/23/2011	180	180	0.98663	-0.63	0.18	0.18	0.20	0.66	0.32	TU
B11-01170-19	503.31	2.01	11.35	2.07	9.28	0.02	41.69	1	1.41	418.98	0.2782	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	-0.63	0.18	0.18	0.20	0.65	0.31	TU
B11-01170-20	504.40	1.99	11.82	2.05	9.77	0.02	39.76	1	1.41	414.60	0.2761	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	-0.67	0.19	0.19	0.21	0.69	0.33	TU
B11-01170-21	508.41	2.01	10.35	2.07	8.28	0.02	46.97	1	1.41	411.26	0.2744	0.00800	L	3/17/2011	6/23/2011	180	180	0.9865	-0.57	0.16	0.16	0.18	0.59	0.28	TU
B11-01170-22	502.58	2.00	10.51	2.06	8.45	0.02	45.55	1	1.41	412.08	0.2748	0.00800	L	3/18/2011	6/24/2011	180	180	0.9865	-0.58	0.16	0.16	0.19	0.60	0.29	TU
B11-01170-23	487.79	1.99	10.56	2.05	8.51	0.02	43.96	1	1.41	411.69	0.2746	0.00800	L	3/17/2011	6/24/2011	180	180	0.98636	-0.61	0.17	0.17	0.19	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	6	1.41	485.51	0.3009	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	22.89	1.06	1.06	3.59	2.28	1.10	pCi/L
B11-01170-02	504.65	2.00	13.03	2.06	10.97	0.02	35.59	6	1.41	492.59	0.3022	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	27.01	1.19	1.19	4.22	2.52	1.21	pCi/L
B11-01170-03	506.24	2.00	12.35	2.06	10.29	0.02	37.96	1	1.41	513.56	0.3058	0.00800	L	6/21/2011	6/21/2011	180	180	0.99999	-2.00	0.56	0.56	0.64	2.07	1.00	pCi/L
B11-01170-04	506.02	2.02	11.63	2.08	9.55	0.02	40.77	2	1.41	406.43	0.2720	0.00804	L	3/14/2011	6/21/2011	180	180	0.98636	3.01	0.71	0.71	0.84	2.19	1.06	pCi/L
B11-01170-05	503.20	2.01	13.71	2.07	11.64	0.02	33.52	2	1.41	410.46	0.2740	0.00807	L	3/14/2011	6/22/2011	180	180	0.98622	3.62	0.85	0.85	1.01	2.63	1.27	pCi/L
B11-01170-06	505.38	2.00	13.63	2.06	11.57	0.02	33.86	1	1.41	411.21	0.2744	0.00803	L	3/14/2011	6/22/2011	180	180	0.98622	-2.53	0.71	0.71	0.80	2.62	1.26	pCi/L
B11-01170-07	504.43	2.03	11.13	2.09	9.04	0.02	42.85	1	1.41	402.05	0.2699	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	-2.04	0.57	0.57	0.65	2.11	1.02	pCi/L
B11-01170-08	516.63	1.99	12.43	2.05	10.38	0.02	38.38	3	1.41	403.70	0.2707	0.00757	L	3/11/2011	6/22/2011	180	180	0.98581	9.22	0.91	0.91	1.66	2.48	1.20	pCi/L
B11-01170-09	511.23	2.00	12.16	2.06	10.10	0.02	39.01	4	1.41	410.77	0.2742	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	13.81	0.93	0.93	2.27	2.28	1.10	pCi/L
B11-01170-10	509.67	2.01	11.75	2.07	9.68	0.02	40.52	1	1.41	412.42	0.2750	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	-2.12	0.59	0.59	0.67	2.19	1.06	pCi/L
B11-01170-11	511.88	1.99	11.49	2.05	9.44	0.02	41.68	1	1.41	410.95	0.2743	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	-2.06	0.58	0.58	0.66	2.14	1.03	pCi/L
B11-01170-12	504.59	1.99	10.63	2.05	8.58	0.02	45.06	1	1.41	307.62	0.2155	0.00820	L	3/11/2011	6/23/2011	180	180	0.98568	-2.37	0.66	0.66	0.75	2.45	1.18	pCi/L
B11-01170-13	508.51	2.00	11.07	2.06	9.01	0.02	43.31	2	1.41	422.58	0.2800	0.00800	L	3/10/2011	6/23/2011	180	180	0.98554	2.77	0.65	0.65	0.77	2.01	0.97	pCi/L
B11-01170-14	507.87	2.02	11.43	2.08	9.35	0.02	41.75	1	1.41	415.81	0.2766	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-2.04	0.57	0.57	0.65	2.11	1.02	pCi/L
B11-01170-17	498.51	2.00	10.47	2.06	8.41	0.02	45.40	1	1.41	414.25	0.2759	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-1.88	0.53	0.53	0.60	1.95	0.94	pCi/L
B11-01170-18	501.98	2.00	11.43	2.06	9.37	0.02	41.20	1	1.41	422.34	0.2799	0.00800	L	3/18/2011	6/23/2011	180	180	0.98663	-2.04	0.57	0.57	0.65	2.11	1.02	pCi/L
B11-01170-19	503.31	2.01	11.35	2.07	9.28	0.02	41.69	1	1.41	418.98	0.2782	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	-2.03	0.57	0.57	0.65	2.10	1.01	pCi/L
B11-01170-20	504.40	1.99	11.82	2.05	9.77	0.02	39.76	1	1.41	414.60	0.2761	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	-2.15	0.60	0.60	0.68	2.22	1.07	pCi/L
B11-01170-21	508.41	2.01	10.35	2.07	8.28	0.02	46.97	1	1.41	411.26	0.2744	0.00800	L	3/17/2011	6/23/2011	180	180	0.9865	-1.83	0.51	0.51	0.58	1.89	0.91	pCi/L
B11-01170-22	502.58	2.00	10.51	2.06	8.45	0.02	45.55	1	1.41	412.08	0.2748	0.00800	L	3/18/2011	6/24/2011	180	180	0.9865	-1.88	0.53	0.53	0.60	1.95	0.94	pCi/L
B11-01170-23	487.79	1.99	10.56	2.05	8.51	0.02	43.96	1	1.41	411.69	0.2746	0.00800	L	3/17/2011	6/24/2011	180	180	0.98636	-1.95	0.55	0.55	0.62	2.02	0.97	pCi/L

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	1.96	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
B11-01170-01	504.33	2.00	11.92	2.06	9.86	0.02	39.40	6	1.41	485.51	0.3009	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	22.89	1.06	2.08	7.04	2.28	1.10	pCi/L
B11-01170-02	504.65	2.00	13.03	2.06	10.97	0.02	35.59	6	1.41	492.59	0.3022	0.00800	L	2/25/2009	6/21/2011	180	180	0.88933	27.01	1.19	2.34	8.28	2.52	1.21	pCi/L
B11-01170-03	506.24	2.00	12.35	2.06	10.29	0.02	37.96	1	1.41	513.56	0.3058	0.00800	L	6/21/2011	6/21/2011	180	180	0.99999	-2.00	0.56	1.10	1.25	2.07	1.00	pCi/L
B11-01170-04	506.02	2.02	11.63	2.08	9.55	0.02	40.77	2	1.41	406.43	0.2720	0.00804	L	3/14/2011	6/21/2011	180	180	0.98636	3.01	0.71	1.38	1.64	2.19	1.06	pCi/L
B11-01170-05	503.20	2.01	13.71	2.07	11.64	0.02	33.52	2	1.41	410.46	0.2740	0.00807	L	3/14/2011	6/22/2011	180	180	0.98622	3.62	0.85	1.66	1.97	2.63	1.27	pCi/L
B11-01170-06	505.38	2.00	13.63	2.06	11.57	0.02	33.86	1	1.41	411.21	0.2744	0.00803	L	3/14/2011	6/22/2011	180	180	0.98622	-2.53	0.71	1.39	1.58	2.62	1.26	pCi/L
B11-01170-07	504.43	2.03	11.13	2.09	9.04	0.02	42.85	1	1.41	402.05	0.2699	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	-2.04	0.57	1.12	1.27	2.11	1.02	pCi/L
B11-01170-08	516.63	1.99	12.43	2.05	10.38	0.02	38.38	3	1.41	403.70	0.2707	0.00757	L	3/11/2011	6/22/2011	180	180	0.98581	9.22	0.91	1.78	3.24	2.48	1.20	pCi/L
B11-01170-09	511.23	2.00	12.16	2.06	10.10	0.02	39.01	4	1.41	410.77	0.2742	0.00800	L	3/11/2011	6/22/2011	180	180	0.98581	13.81	0.93	1.81	4.45	2.28	1.10	pCi/L
B11-01170-10	509.67	2.01	11.75	2.07	9.68	0.02	40.52	1	1.41	412.42	0.2750	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	-2.12	0.59	1.16	1.32	2.19	1.06	pCi/L
B11-01170-11	511.88	1.99	11.49	2.05	9.44	0.02	41.68	1	1.41	410.95	0.2743	0.00800	L	3/9/2011	6/22/2011	180	180	0.98554	-2.06	0.58	1.13	1.29	2.14	1.03	pCi/L
B11-01170-12	504.59	1.99	10.63	2.05	8.58	0.02	45.06	1	1.41	307.62	0.2155	0.00820	L	3/11/2011	6/23/2011	180	180	0.98568	-2.37	0.66	1.30	1.48	2.45	1.18	pCi/L
B11-01170-13	508.51	2.00	11.07	2.06	9.01	0.02	43.31	2	1.41	422.58	0.2800	0.00800	L	3/10/2011	6/23/2011	180	180	0.98554	2.77	0.65	1.27	1.51	2.01	0.97	pCi/L
B11-01170-14	507.87	2.02	11.43	2.08	9.35	0.02	41.75	1	1.41	415.81	0.2766	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-2.04	0.57	1.12	1.27	2.11	1.02	pCi/L
B11-01170-17	498.51	2.00	10.47	2.06	8.41	0.02	45.40	1	1.41	414.25	0.2759	0.00800	L	3/9/2011	6/23/2011	180	180	0.9854	-1.88	0.53	1.04	1.17	1.95	0.94	pCi/L
B11-01170-18	501.98	2.00	11.43	2.06	9.37	0.02	41.20	1	1.41	422.34	0.2799	0.00800	L	3/18/2011	6/23/2011	180	180	0.98663	-2.04	0.57	1.12	1.27	2.11	1.02	pCi/L
B11-01170-19	503.31	2.01	11.35	2.07	9.28	0.02	41.69	1	1.41	418.98	0.2782	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	-2.03	0.57	1.12	1.27	2.10	1.01	pCi/L
B11-01170-20	504.40	1.99	11.82	2.05	9.77	0.02	39.76	1	1.41	414.60	0.2761	0.00800	L	3/16/2011	6/23/2011	180	180	0.98636	-2.15	0.60	1.18	1.34	2.22	1.07	pCi/L
B11-01170-21	508.41	2.01	10.35	2.07	8.28	0.02	46.97	1	1.41	411.26	0.2744	0.00800	L	3/17/2011	6/23/2011	180	180	0.9865	-1.83	0.51	1.00	1.14	1.89	0.91	pCi/L
B11-01170-22	502.58	2.00	10.51	2.06	8.45	0.02	45.55	1	1.41	412.08	0.2748	0.00800	L	3/18/2011	6/24/2011	180	180	0.9865	-1.88	0.53	1.03	1.17	1.95	0.94	pCi/L
B11-01170-23	487.79	1.99	10.56	2.05	8.51	0.02	43.96	1	1.41	411.69	0.2746	0.00800	L	3/17/2011	6/24/2011	180	180	0.98636	-1.95	0.55	1.07	1.22	2.02	0.97	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

American Radiation Services, Inc.
Baton Rouge Laboratory

Analysis Batch Report

Printed: 4/1/2011 11:35 AM

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

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
JTR ARS1-B11-01170-15 and ARS1-B11-01170-16 deleted from current batch b/c samples failed screening criteria twice.

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

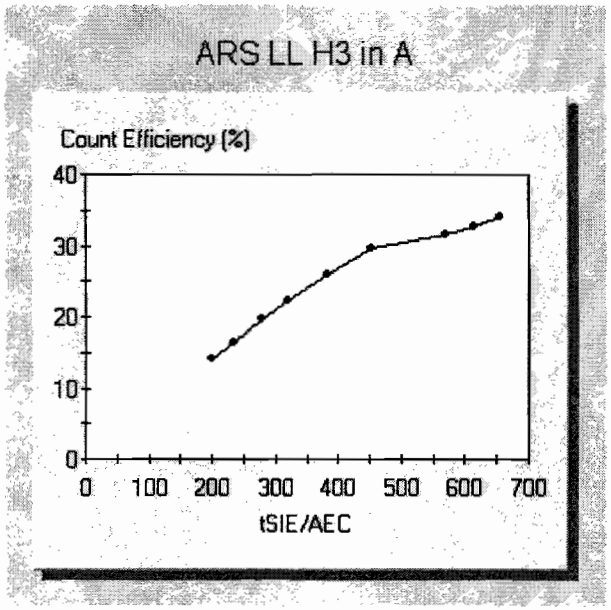
Half Life-

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	48.42	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

Chemist Signature: Jimmy D. Ralen

ARS, International
Port Allen Lab

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						

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

Chemist Signature: Jimmy D. Rahn

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	↓		
↓	↓	6-23-11 ~~B11-02218-10~~ B11-02218-10	↓		
↓	↓	B11-02218-11	↓		
↓	↓	B11-02218-12	↓		
↓	↓	6-23-11 ~~B11-02218-13~~ B11-02218-13	↓		
↓	↓	B11-02218-14	↓		
↓	↓	B11-02218-15	↓		
↓	↓	B11-02218-16	↓		

JDR 6-24-2011 NO DATA

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 solution
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 trace 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 (1g in 5 mL NIST borosilicate-glass ampoule
A	S-0218	C-14	SC	08/05/09	08/05/10	EXP	07/22/09	2.9419E+05	294121.4213	2.082E+06	S-0215		C-14 Calibration Standard used to validate the C-14 standard in house
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 spiked. Activity determined by averaging 7 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 trace 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 St
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 Th230 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		Primary T339 Th-229 tracer standard. Dilution performed by a non-union
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 matrices
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		Stock 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

ARS INTERNATIONAL

2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

American Radiation Services Analytical Reports

for

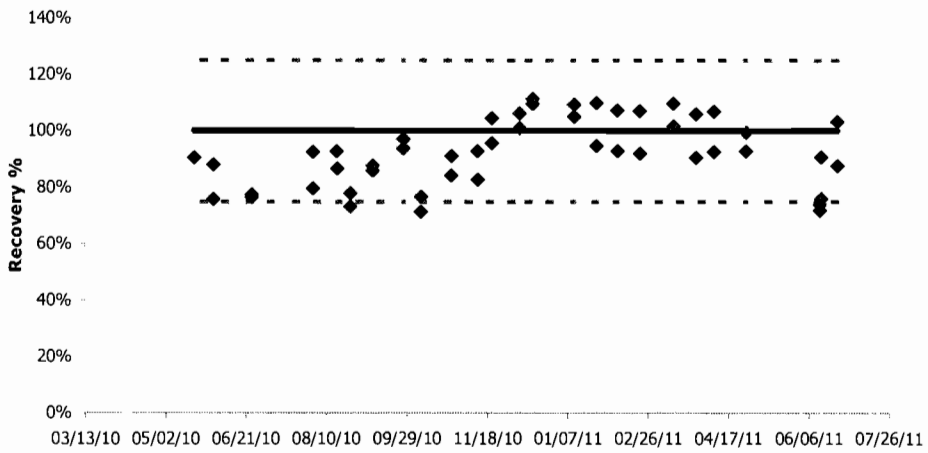
Los Alamos National Laboratory

Low Level Tritium by Low Level Liquid Scintillation Counting

Control Charts

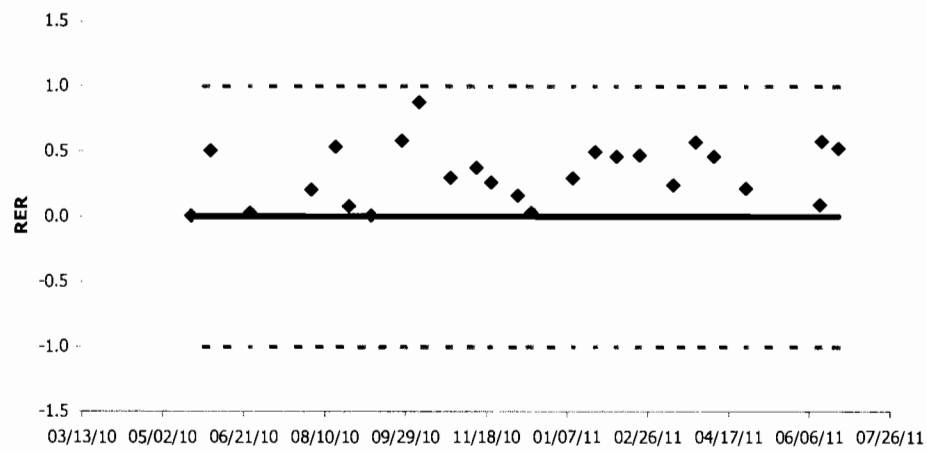
QC Chart

LLH-3 LCS



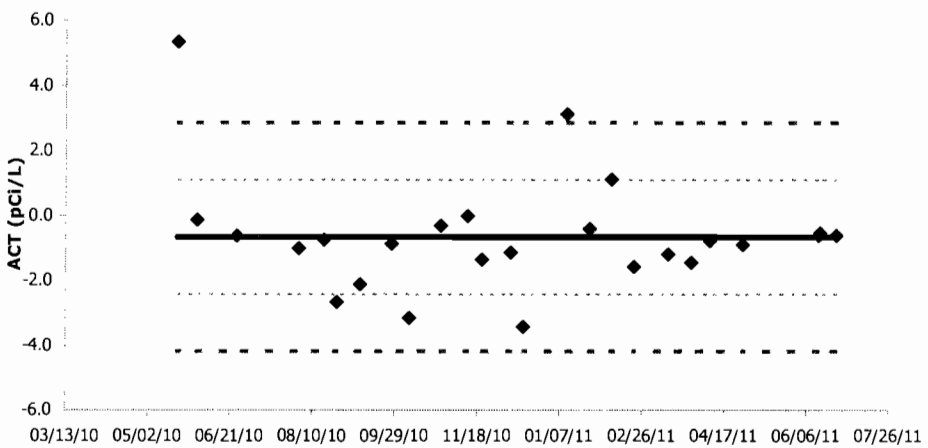
Average	STDEV	n	UCL	LCL
0.9270	0.1172	26	1.2500	0.7500

LLH-3 RER



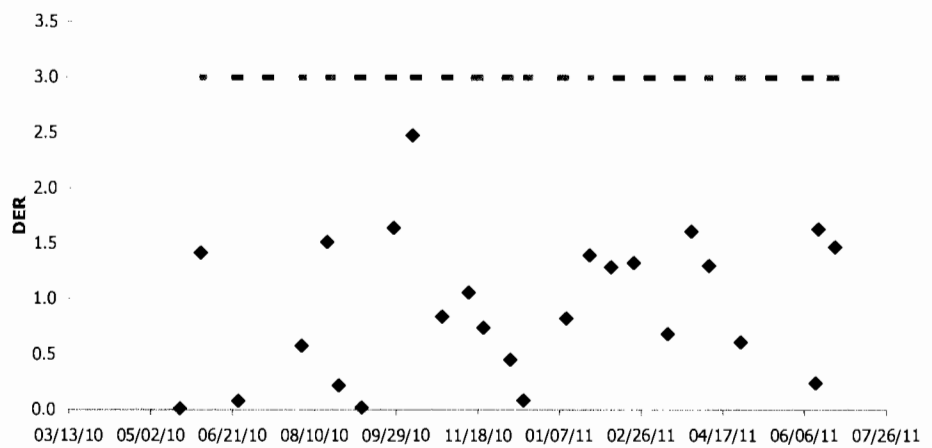
		n	UCL	LCL
		26	1.0000	-1.0000

LLH-3 Blank



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

LLH-3 DER



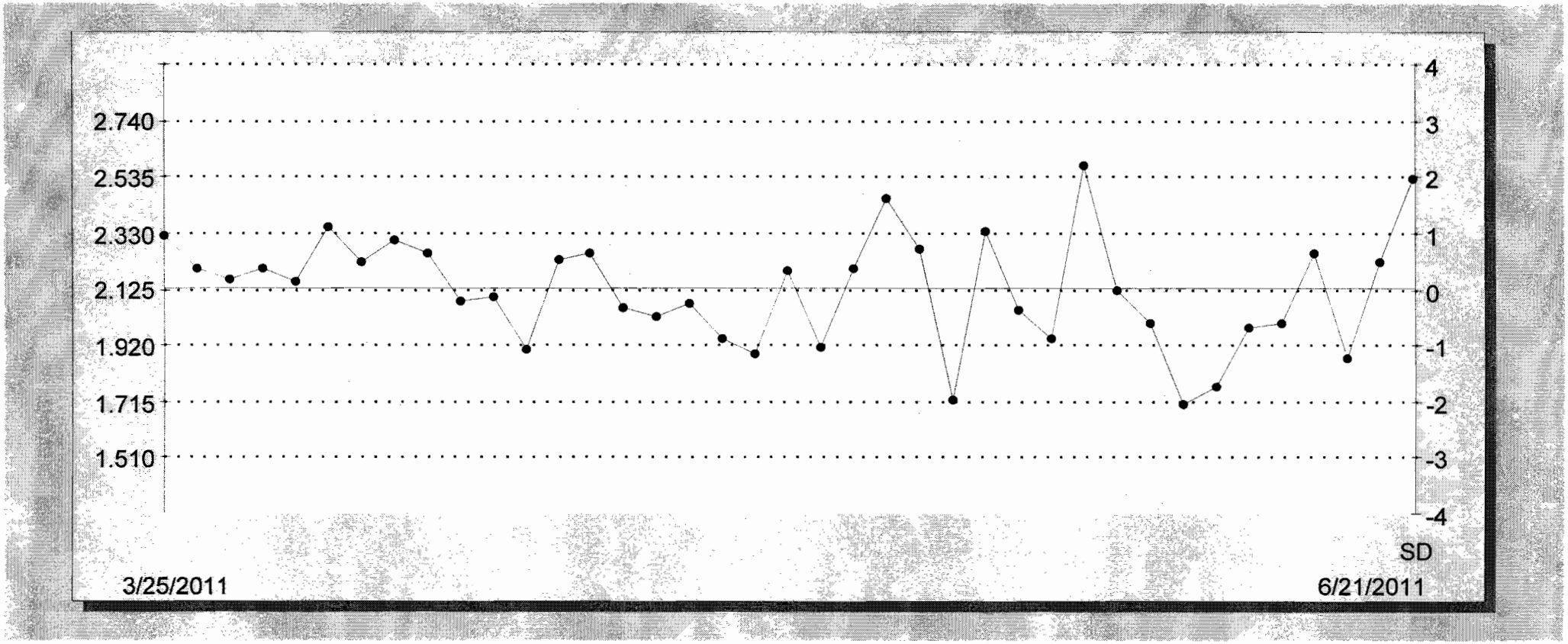
		n	UCL
		26	3.0000

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

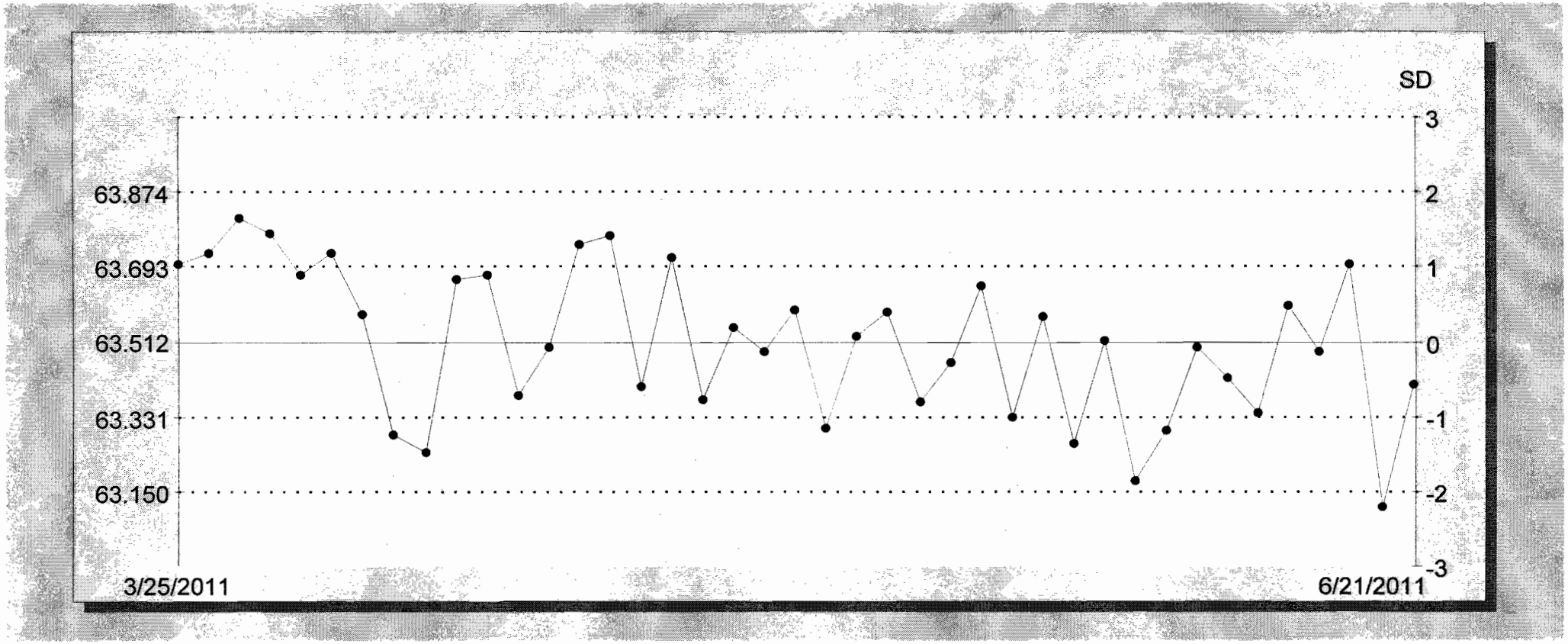


3H Efficiency
Total # pts : 5330
Valid # pts : 41
Mean : 63.51
SD : 0.18

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



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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium- Screening by Low Level Liquid Scintillation Counting

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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

Samples

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

ARS File ID Numbers: ARS1-11-00547; 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!

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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Tritium-Screening by Low Level Liquid Scintillation Counting

Laboratory Records

Analysis Batch Report

ARS INTERNATIONAL

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				[redacted]					
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

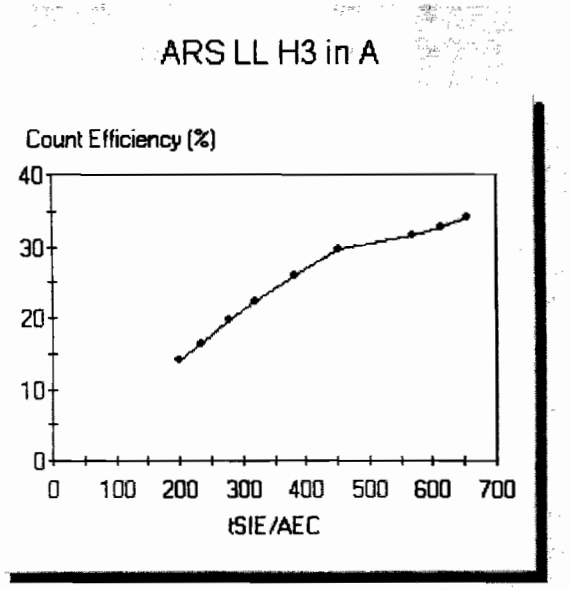
Half Life-

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
~~↓~~	~~↓~~	~~SKIPPED B11-01169-09 JDR ↓ 3-30-2011~~		~~↓~~	~~JDR~~
↓	↓	B11-01169-10	↓	↓	JDR

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

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

RIPPED

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

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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

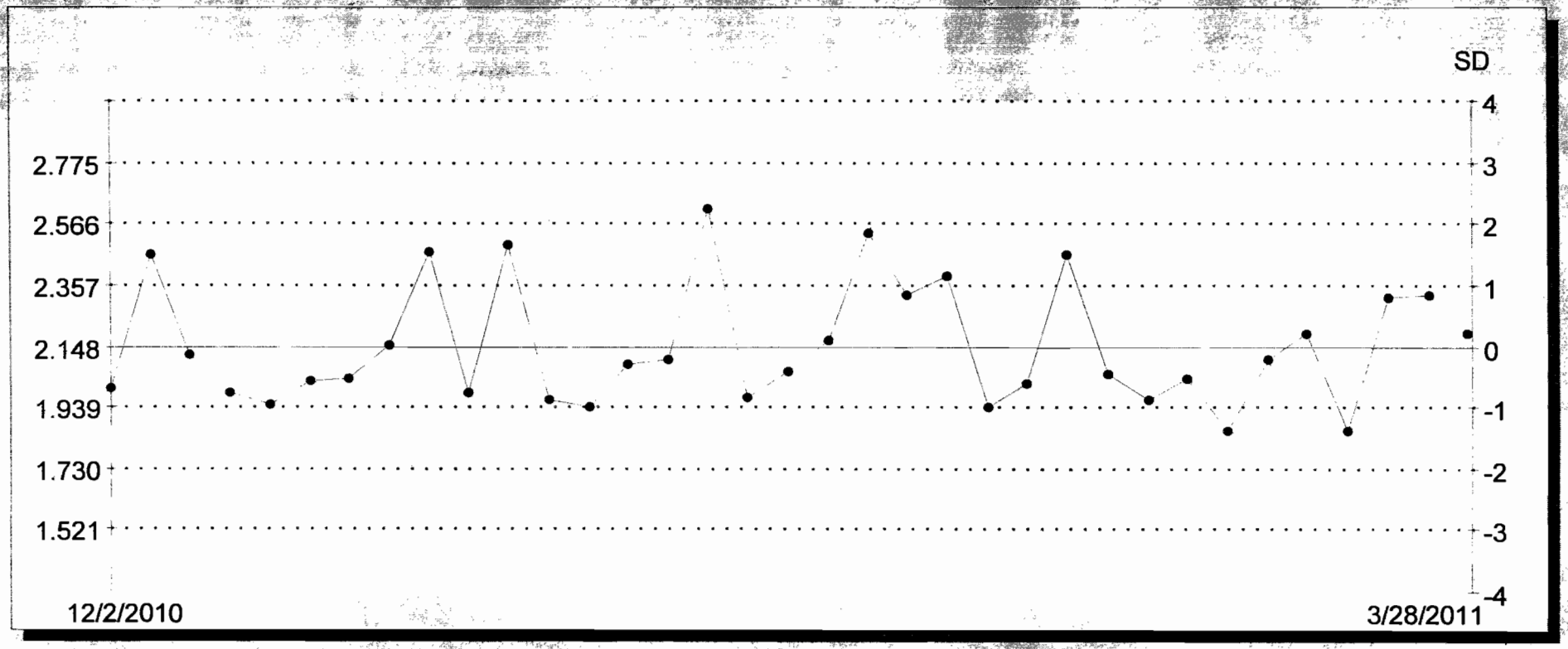
Tritium-Screening by Low Level Liquid Scintillation Counting

Control Charts

3H 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

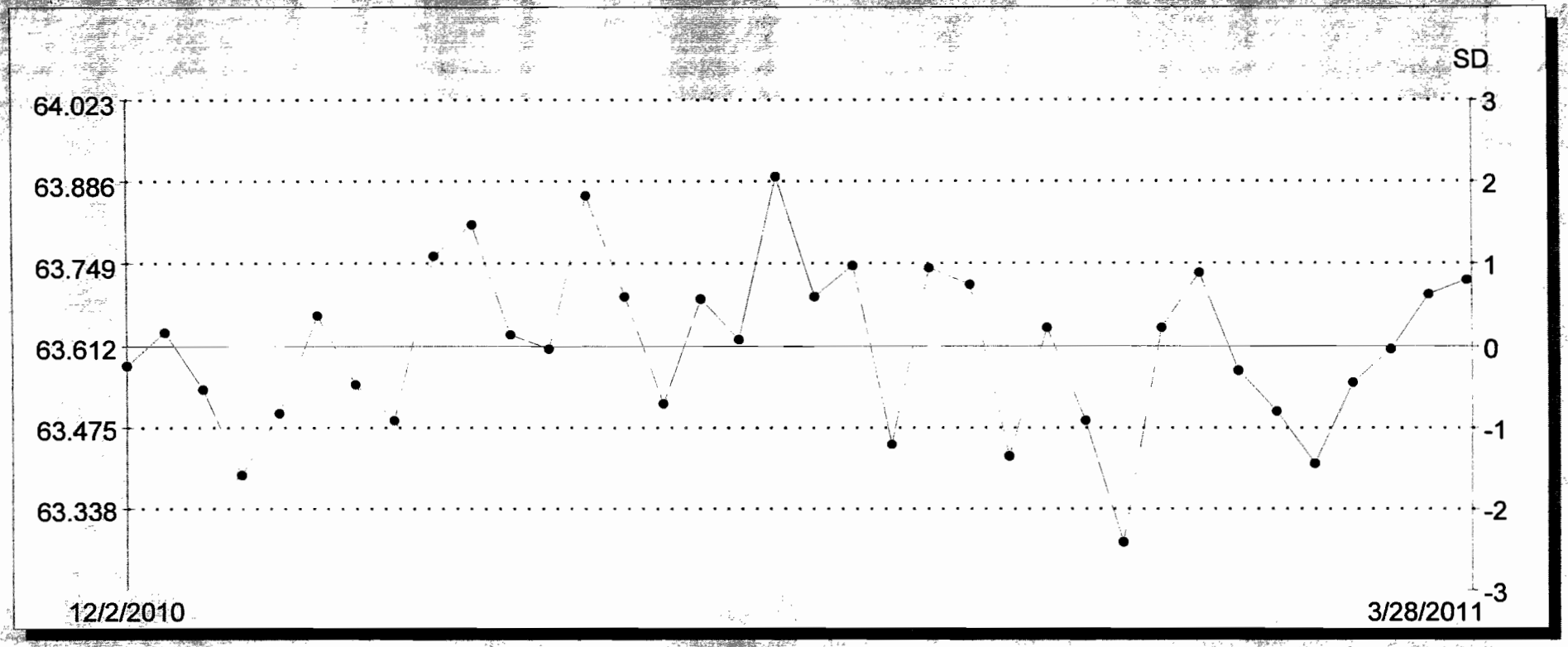


3H Efficiency
Total # pts : 5291
Valid # pts : 36
Mean : 63.61
SD : 0.14

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



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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Low Level Liquid Scintillation Counting

Calibration Information

ARS INTERNATIONAL

QUALITY CONTROL PROGRAM

AMERICAN RADIATION SERVICES
RADIOACTIVE REFERENCE SOLUTIONS

ANNUAL ACTIVITY VERIFICATION

VERIFICATION DATE 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	

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	Certl 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			

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

American Radiation Services Analytical Reports

for

Los Alamos National Laboratory

Folder Duplicate

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): _____

Jenny D. Rabu 6-21-2011 — Chemist Signature — Date

Tamara 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 — QA Officer Signature — 6-24-11 — 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 6-24-2011

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

Jenny D. Rabu 6-24-2011 — Analyst Signature — Date

N/A — Technicial Reviewer Signature — Date

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 Lee 6-24-11
Project Manager Signature Date

YM 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): _____

Jerry D. Rabun 3-28-11 — Chemist Signature / Date

Jamal Nour 3-28-11 — 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

VJM 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 JDR 3-31-11

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

Jerry D. Rabun 3-31-11 — Analyst Signature / Date

N/A — Technicial Reviewer Signature / 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 Heise 6-24-11
Project Manager Signature Date

VJM 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

American Radiation Services
Baton Rouge Laboratory

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 | SDL (Date/Time, Initials)	6-24-11/1355	SDL
Quality Assurance Checks Performed on Report	6-24-11 1420	YM
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:** ARS-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 PR284559	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

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)
Buckman1-11-5682					1000 mL	11	20
10611-5683					1000 mL	12	20
10511-5684					1000 mL	12	20

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