

American Radiation Baton Rouge LA		Chain of Custody/Analysis Request										COC/Lab Request #: 2015-1205 Page 1 of 1											
Client Contact:		Lab Agreement #:			Site Name: Los Alamos National Laboratory																		
		Project Number:																		Rad Screening Info:			
		Analysis Turnaround Time:																		WSP-LL-H-3		Lab Reporting Limit Type:	
		24 Hour - <input type="checkbox"/> Other - <input type="checkbox"/>																				Sample Quantitation	
		7 Days - <input type="checkbox"/>																				Limit	
		14 Days - <input type="checkbox"/>																					
		21 Days - <input type="checkbox"/>																					
		28 Days - <input checked="" type="checkbox"/>																					
Field Sample ID	Sample Date	Sample Time	Sample Matrix																				
CAMO-15-95776	May 7 2015	15:09	W	1																			
CAMO-15-95787	May 7 2015	11:38	W	1																			
CAMO-15-95788	May 8 2015	11:45	W	1																			
CAMO-15-95789	May 11 2015	14:25	W	1																			
CAMO-15-95790	May 12 2015	11:22	W	1																			
CAMO-15-95760	May 12 2015	11:22	W	1																			
CAMO-15-95792	May 12 2015	13:12	W	1																			
CAMO-15-95759	May 12 2015	15:12	W	1																			
Special Instructions:																							
Relinquished by:		Print Name:		Date/Time:		Received by:		Print Name:		Date/Time:													
Relinquished by:		Print Name:		Date/Time:		Received by:		Print Name:		Date/Time:													
Relinquished by:		Print Name:		Date/Time:		Received by:		Print Name:		Date/Time:													

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 9200

EVENT NAME: Mortandad/Sandia (Chromium, MDA C and General Surveillance) MY2015 Q3 Watershed Sampling

SAMPLE ID: CAMO-15-95759

WORK ORDER:

	<u>AS PLANNED</u>	<u>AS COLLECTED</u>		<u>AS PLANNED</u>	<u>AS COLLECTED</u>
Date Collected (MM/DD/YYYY):	05/12/2015	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1512		MEDIA:	UA	↓
PRS ID:	NA		SAMPLE TECH CODE:	UA	GSR
LOCATION ID:	R-62		FIELD PREP:	UF	OK
LOCATION TYPE:	NA		FIELD QC TYPE:	FD	↓
TOP DEPTH:	NA		SAMPLE USAGE:	QC	↓
BOTTOM DEPTH:	NA	↓	EXCAVATED:		YES / NO / <del>NA</del>

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	1 LITER POLY	1	HNO3	Y	NA
↓	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2	HCL	↓	↓
	WSP-8270C-SVOA	1 LITER AMBER GLASS	2	ICE		
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-GrossA/B	1 LITER POLY	1	HNO3		
	WSP-LL-H-3	1 LITER POLY	1	NONE		
	WSP-RAD	1 GAL POLY	1	HNO3		
↓	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4	↓	↓

SAMPLE COMMENTS: NA

LOCATION COMMENTS: NA

## FIELD PARAMETERS:

Dissolved Oxygen	NA	mg/L	Flow (in gpm)	NA	GPM	Oxidation-Reduction Potential	NA	mV
pH	↓	SU	Specific Conductance	↓	uS/cm	Temperature	↓	deg C
Turbidity	↓	NTU						

COLLECTED BY (PRINT): A.V.gil

**SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY****EVENT ID:** 9200**EVENT NAME:** Mortandad/Sandia (Chromium, MDA C and General Surveillance) MY2015 Q3 Watershed Sampling**SAMPLE ID:** CAMO-15-95759**WORK ORDER:**

<b>RELINQUISHED BY</b> (Printed Name) Jonathan Romero (Signature) <i>Jonathan Romero</i>	<b>Date/Time</b> 5/12/15 1615	<b>RECEIVED BY</b> (Printed Name) J. Sherwood (Signature) <i>J. Sherwood</i>	<b>Date/Time</b> 5/12/15 1615
<b>RELINQUISHED BY</b> (Printed Name) (Signature)	<b>Date/Time</b>	<b>RECEIVED BY</b> (Printed Name) (Signature)	<b>Date/Time</b>

Report Date: 04/30/2015

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 9200

EVENT NAME: Mortandad/Sandia (Chromium, MDA C and General Surveillance) MY2015 Q3 Watershed Sampling

SAMPLE ID: CAMO-15-95760

WORK ORDER:

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	05/12/2015	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1122		MEDIA:	UA	↓
PRS ID:	NA		SAMPLE TECH CODE:	UA	45P
LOCATION ID:	R-60		FIELD PREP:	UF	OK
LOCATION TYPE:	NA		FIELD QC TYPE:	FD	↓
TOP DEPTH:	↓		SAMPLE USAGE:	QC	↓
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	1 LITER POLY	1	HNO3	Y	NA
↓	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2	HCL	↓	↓
	WSP-8270C-SVOA	1 LITER AMBER GLASS	2	ICE		
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-LL-H-3	1 LITER POLY	1	NONE		
↓	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4	↓	↓

SAMPLE COMMENTS: NA

LOCATION COMMENTS: NA

FIELD PARAMETERS: NA

Dissolved Oxygen	↓	mg/L	Flow (in gpm)	NA	GPM	Oxidation-Reduction Potential	NA	mV
pH	↓	SU	Specific Conductance	↓	uS/cm	Temperature	↓	deg C
Turbidity	↓	NTU						

COLLECTED BY (PRINT): A. Vigil

RELINQUISHED BY (Printed Name) A. Vigil (Signature) A. Vigil	Date/Time 5/12/15 1615	RECEIVED BY (Printed Name) S. Sherwood (Signature) S. Sherwood	Date/Time 5/12/15 1615
--	------------------------------	--	------------------------------

Date/Time

Date/Time

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 9200

EVENT NAME: Mortandad/Sandia (Chromium, MDA C and General Surveillance) MY2015 Q3 Watershed Sampling

SAMPLE ID: CAMO-15-95776

WORK ORDER: NA

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	05/07/2015	ok	FIELD MATRIX:	WG	ok
TIME COLLECTED (HH:MM):	1509		MEDIA:	UA	
PRS ID:	ok		SAMPLE TECH CODE:	UA	GSP
LOCATION ID:	R-14 S1		FIELD PREP:	UF	ok
LOCATION TYPE:	MON		FIELD QC TYPE:	REG	
TOP DEPTH:	ok		SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2	HCL	Y	NA
	WSP-8270C-SVOA	1 LITER AMBER GLASS	2	ICE		
	WSP-LL-H-3	1 LITER POLY	1	NONE		

## SAMPLE COMMENTS:

NA

## LOCATION COMMENTS:

sampled 40' within diesel generator

## FIELD PARAMETERS:

Dissolved Oxygen	5.59	mg/L	Flow (in gpm)	6.98	GPM	Oxidation-Reduction Potential	85.2	mV
pH	8.13	SU	Specific Conductance	130	uS/cm	Temperature	23.72	deg C
Turbidity	0.6	NTU						

## COLLECTED BY (PRINT):

D. Teram. 110

RELINQUISHED BY (Printed Name) (Signature)	Date/Time 5/7/15 1545	RECEIVED BY (Printed Name) (Signature)	Date/Time 5/7/15 1545
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 04/30/2015

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 9200

EVENT NAME: Mortandad/Sandia (Chromium, MDA C and General Surveillance) MY2015 Q3 Watershed Sampling

SAMPLE ID: CAMO-15-95787

WORK ORDER: NA

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	05/07/2015	ok	FIELD MATRIX:	WG	ok
TIME COLLECTED (HH:MM):	1139		MEDIA:	UA	J
PRS ID:	ok		SAMPLE TECH CODE:	UA	GSP
LOCATION ID:	R-46		FIELD PREP:	UF	ok
LOCATION TYPE:	MON		FIELD QC TYPE:	REG	
TOP DEPTH:	ok		SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	1 LITER POLY	1	HNO3	Y	NA
	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2	HCL		
	WSP-8270C-SVOA	1 LITER AMBER GLASS	2	ICE		
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-LL-H-3	1 LITER POLY	1	NONE		
	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4		

## SAMPLE COMMENTS:

NA

## LOCATION COMMENTS:

sampled within 30' of running diesel generator and 40'-50' of fork lift

## FIELD PARAMETERS:

Dissolved Oxygen	6.59	mg/L	Flow (in gpm)	4.84	GPM	Oxidation-Reduction Potential	175.4	mV
pH	7.92	SU	Specific Conductance	122	uS/cm	Temperature	21.80	deg C
Turbidity	0.8	NTU						

COLLECTED BY (PRINT):

D. Jarama 1/10

RELINQUISHED BY (Printed Name) (Signature)	Date/Time 5/7/15 1545	RECEIVED BY (Printed Name) (Signature)	Date/Time 5/7/15 1545
--	-----------------------------	--	-----------------------------

**SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY****EVENT ID:** 9200**EVENT NAME:** Mortandad/Sandia (Chromium, MDA C and General Surveillance) MY2015 Q3 Watershed Sampling**SAMPLE ID:** CAMO-15-95787**WORK ORDER:** NA

<b>RELINQUISHED BY</b> (Printed Name) (Signature)		<b>RECEIVED BY</b> (Printed Name) (Signature)	
---	--	---	--

Report Date: 04/30/2015

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 9200

EVENT NAME: Mortandad/Sandia (Chromium, MDA C and General Surveillance) MY2015 Q3 Watershed Sampling

SAMPLE ID: CAMO-15-95788

WORK ORDER: NA

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	05/08/2015	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1145		MEDIA:	UA	OK
PRS ID:	NA		SAMPLE TECH CODE:	UA	GSP
LOCATION ID:	R-50 S1		FIELD PREP:	UF	OK
LOCATION TYPE:	MON		FIELD QC TYPE:	REG	
TOP DEPTH:	NA		SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	1 LITER POLY	1	HNO3	Y	NA
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-LL-H-3	1 LITER POLY	1	NONE		
	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COMMENTS: None

LOCATION COMMENTS: Sampled 40' From running diesel generator

## FIELD PARAMETERS:

Dissolved Oxygen	5.53	mg/L	Flow (in gpm)	2.27	GPM	Oxidation-Reduction Potential	238.4	mV
pH	7.98	SU	Specific Conductance	195	uS/cm	Temperature	20.18	deg C
Turbidity	0.55	NTU						

COLLECTED BY (PRINT): A. Stocker

RELINQUISHED BY (Printed Name) Austin Tosh (Signature) Austin Tosh	Date/Time 5-8-15 1240	RECEIVED BY (Printed Name) S. Sherwood (Signature) S. Sherwood	Date/Time 5/8/15 1240
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 04/30/2015



## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 9200

EVENT NAME: Mortandad/Sandia (Chromium, MDA C and General Surveillance) MY2015 Q3 Watershed Sampling

SAMPLE ID: CAMO-15-95789

WORK ORDER: NA

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	05/11/2015	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1425		MEDIA:	UA	↓
PRS ID:	NA		SAMPLE TECH CODE:	UA	GSP
LOCATION ID:	R-50 S2		FIELD PREP:	UF	OK
LOCATION TYPE:	MON		FIELD QC TYPE:	REG	↓
TOP DEPTH:	NA		SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	NA	↓	EXCAVATED:		YES / NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	1 LITER POLY	1	HNO3	Y	NA
↓	WSP-CN(T)	250 ML POLY	1	NAOH	↓	↓
↓	WSP-LL-H-3	1 LITER POLY	1	NONE	↓	↓
↓	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4	↓	↓

SAMPLE COMMENTS: None

LOCATION COMMENTS: Sampled w/in 50' of running diesel generator

## FIELD PARAMETERS:

Dissolved Oxygen	8.18	mg/L	Flow (in gpm)	1.27	GPM	Oxidation-Reduction Potential	121.3	mV
pH	7.97	SU	Specific Conductance	137	uS/cm	Temperature	21.41	deg C
Turbidity	1.51	NTU						

COLLECTED BY (PRINT): U. Shaw

RELINQUISHED BY (Printed Name) Jesse Berryhill (Signature) <i>[Signature]</i>	Date/Time 5/11/15 1540	RECEIVED BY (Printed Name) Sherwood (Signature) <i>[Signature]</i>	Date/Time 5/11/15 1540
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 04/30/2015

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 9200

EVENT NAME: Mortandad/Sandia (Chromium, MDA C and General Surveillance) MY2015 Q3 Watershed Sampling

SAMPLE ID: CAMO-15-95790

WORK ORDER: NA

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	05/12/2015	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1122		MEDIA:	UA	↓
PRS ID:	NA		SAMPLE TECH CODE:	UA	GSP
LOCATION ID:	R-60		FIELD PREP:	UF	OK
LOCATION TYPE:	MON		FIELD QC TYPE:	REG	↓
TOP DEPTH:	NA		SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	NA		EXCAVATED:		YES / NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	1 LITER POLY	1	HNO3	Y	NA
	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2	HCL		
	WSP-8270C-SVOA	1 LITER AMBER GLASS	2	ICE		
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-LL-H-3	1 LITER POLY	1	NONE		
	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COMMENTS: None

LOCATION COMMENTS: sampled w/in 50' of running diesel generator

## FIELD PARAMETERS:

Dissolved Oxygen	5.23	mg/L	Flow (in gpm)	2.7	GPM	Oxidation-Reduction Potential	24.5	mV
pH	8.29	SU	Specific Conductance	130	uS/cm	Temperature	22.47	deg C
Turbidity	3.29	NTU						

COLLECTED BY (PRINT): A.V. Vigil

RELINQUISHED BY (Printed Name) ANDREW VIGIL (Signature) <i>Andrew Vigil</i>	Date/Time 5/12/15 1615	RECEIVED BY (Printed Name) S. Sherwood (Signature) <i>S. Sherwood</i>	Date/Time 5/12/15 1615
---	------------------------------	---	------------------------------

Date/Time

Date/Time

## SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 9200

EVENT NAME: Mortandad/Sandia (Chromium, MDA C and General Surveillance) MY2015 Q3 Watershed Sampling

SAMPLE ID: CAMO-15-95792

WORK ORDER: NA

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	05/12/2015	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1312		MEDIA:	UA	↓
PRS ID:	NA		SAMPLE TECH CODE:	UA	LSP
LOCATION ID:	R-62		FIELD PREP:	UF	OK
LOCATION TYPE:	MON		FIELD QC TYPE:	REG	↓
TOP DEPTH:	NA		SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	NA	↓	EXCAVATED:		YES / NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	MSGP-Hg	1 LITER POLY	1	HNO3	Y	NA
	WSP-8260B-VOA	40 ML SEPTUM AMBER GLASS	2	HCL		
	WSP-8270C-SVOA	1 LITER AMBER GLASS	2	ICE		
	WSP-CN(T)	250 ML POLY	1	NAOH		
	WSP-GrossA/B	1 LITER POLY	1	HNO3		
	WSP-LL-H-3	1 LITER POLY	1	NONE		
	WSP-RAD	1 GAL POLY	1	HNO3		
↓	WSP-TKN+TOC	500 ML AMBER GLASS	1	H2SO4	↓	↓

SAMPLE COMMENTS:

NA

LOCATION COMMENTS:

5/12/15 NA

FIELD PARAMETERS:

Dissolved Oxygen	6.56	mg/L	Flow (in gpm)	1.8	GPM	Oxidation-Reduction Potential	66.2	mV
pH	8.39	SU	Specific Conductance	194	uS/cm	Temperature	19.12	deg C
Turbidity	0.92	NTU						

COLLECTED BY (PRINT):

A. Vigil

**SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY****EVENT ID:** 9200**EVENT NAME:** Mortandad/Sandia (Chromium, MDA C and General Surveillance) MY2015 Q3 Watershed Sampling**SAMPLE ID:** CAMO-15-95792**WORK ORDER:** NA

<b>RELINQUISHED BY</b> (Printed Name) Jonathan Romero (Signature) <i>Jonathan Romero</i>	<b>Date/Time</b> 5/12/15 1615	<b>RECEIVED BY</b> (Printed Name) S. Sheppard (Signature) <i>S. Sheppard</i>	<b>Date/Time</b> 5/12/15 1615
<b>RELINQUISHED BY</b> (Printed Name) (Signature)	<b>Date/Time</b>	<b>RECEIVED BY</b> (Printed Name) (Signature)	<b>Date/Time</b>

Report Date: 04/30/2015

## DATA VALIDATION REPORT

Chain Of Custody No. 2015-1205

### 1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
ARS1-15-01395	Generic:Low_Level_Tritium	2				
ARS1-15-01395	Generic:Low_Level_Tritium	1				
ARS1-15-01395	Generic:Low_Level_Tritium	1				
ARS1-15-01395	Generic:Low_Level_Tritium	2	2			

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
ARS1-15-01395	Generic:Low_Level_Tritium	ARS1-B15-	ARS1-B15-	6	2				1					1	1						

### 2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
Generic:Low_Level_Tritium	RAD	CAMO-15-95759	ARS1-B15-02081-13	FD	1	0	0	0
Generic:Low_Level_Tritium	RAD	CAMO-15-95760	ARS1-B15-02081-11	FD	1	0	0	0
Generic:Low_Level_Tritium	RAD	CAMO-15-95776	ARS1-B15-02081-06	REG	1	0	0	0
Generic:Low_Level_Tritium	RAD	CAMO-15-95787	ARS1-B15-02081-07	REG	1	0	0	0
Generic:Low_Level_Tritium	RAD	CAMO-15-95788	ARS1-B15-02081-08	REG	1	0	0	0
Generic:Low_Level_Tritium	RAD	CAMO-15-95789	ARS1-B15-02081-09	REG	1	0	0	0
Generic:Low_Level_Tritium	RAD	CAMO-15-95790	ARS1-B15-02081-10	REG	1	0	0	0
Generic:Low_Level_Tritium	RAD	CAMO-15-95792	ARS1-B15-02081-12	REG	1	0	0	0
Generic:Low_Level_Tritium	RAD	LCS	ARS1-B15-02081-01	LCS	0	0	1	0
Generic:Low_Level_Tritium	RAD	LCSD	ARS1-B15-02081-02	LCSD	0	0	1	0
Generic:Low_Level_Tritium	RAD	MB	ARS1-B15-02081-03	MB	1	0	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

## DATA VALIDATION REPORT

No.

5. Any contaminants in blanks?

No.

6. Any surrogate recoveries outside the control limits?

No.

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

No.

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

No.

9. Any Field Duplicate RPDs outside the desired limits?

No.

10. Any Lab Duplicate RPDs outside the desired limits?

No.

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

## DATA VALIDATION REPORT

### 13. Display Flagged Data.

Location ID	COC Number	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	Paramter Name	Lab Qualifier	Validation Qualifier	Validation Reason Codes	Detect Flag	Lab Result	Lab Units	Report Result	Report Units	Report MDA	Report Uncertainty	Lab Matrix	Sample Date	Percent	Analysis Lot ID	Validation Status Code	Use Flag
R-60	2015-1205	CAMO-15-95760	FD	INIT	RAD	Generic_Low_Level_Tritium		U	U	R5	N	0.8430	pCi/L	0.8430	pCi/L	2.0530	0.6330	W	05/12/2015		ARS1-B15-02081	VAL	Y
R-14 S1	2015-1205	CAMO-15-95776	REG	INIT	RAD	Generic_Low_Level_Tritium		U	U	R5	N	1.3610	pCi/L	1.3610	pCi/L	2.1360	0.6870	W	05/07/2015		ARS1-B15-02081	VAL	Y
R-46	2015-1205	CAMO-15-95787	REG	INIT	RAD	Generic_Low_Level_Tritium		U	U	R5	N	-0.3300	pCi/L	-0.3300	pCi/L	2.0820	0.6050	W	05/07/2015		ARS1-B15-02081	VAL	Y
R-50 S2	2015-1205	CAMO-15-95789	REG	INIT	RAD	Generic_Low_Level_Tritium		U	U	R5	N	1.2340	pCi/L	1.2340	pCi/L	2.2810	0.7200	W	05/11/2015		ARS1-B15-02081	VAL	Y
R-60	2015-1205	CAMO-15-95790	REG	INIT	RAD	Generic_Low_Level_Tritium		U	U	R5	N	0.9540	pCi/L	0.9540	pCi/L	2.2910	0.7070	W	05/12/2015		ARS1-B15-02081	VAL	Y

**Reason Code**

### Description

NQ

The analytical laboratory did not qualify the analyte as not detected and/or any other standard qualifire. The analyte is detected in the sample.

R5

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

## 14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAMO-15-95759	R-62	FD	Generic:Low_Level_Tritium	0	1
CAMO-15-95760	R-60	FD	Generic:Low_Level_Tritium	0	1
CAMO-15-95776	R-14 S1	REG	Generic:Low_Level_Tritium	0	1
CAMO-15-95787	R-46	REG	Generic:Low_Level_Tritium	0	1
CAMO-15-95788	R-50 S1	REG	Generic:Low_Level_Tritium	0	1
CAMO-15-95789	R-50 S2	REG	Generic:Low_Level_Tritium	0	1
CAMO-15-95790	R-60	REG	Generic:Low_Level_Tritium	0	1
CAMO-15-95792	R-62	REG	Generic:Low_Level_Tritium	0	1



2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

# **American Radiation Services Analytical Reports**

for

## **Los Alamos National Laboratory**

### **Request Number: 2015-1205**





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: 2015-1205**

# **Original COC**

[illegible]



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: 2015-1205**

# **Case Narrative**



2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

June 19, 2015

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

Request Number: **2015-1205**

LANL Sample ID: CAMO-15-95776; CAMO-15-95787; CAMO-15-95788; CAMO-15-95789;  
CAMO-15-95790; CAMO-15-95760; CAMO-15-95792; CAMO-15-95759.

Dear Mr. Greene;

On May 15, 2015, ARS International received eight (8) water samples to be analyzed for Low Level Tritium.

Samples 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](mailto:LANL@amrad.com).

Sincerely,

A handwritten signature in black ink, appearing to read 'James D. Fu', is written over a horizontal line.

Laboratory Management  
ARS International



2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

## COVER PAGE

**PROJECT SAMPLE IDENTIFICATION  
CROSS-REFERENCE  
TO ARS SAMPLE LABORATORY IDs  
Subcontract (LANL Agreement Number) 250953**

<b>Request Number</b>	<b>LANL PROJECT SAMPLE ID NUMBER</b>	<b>American Radiation Services SAMPLE ID NUMBER(S)</b>
2015-1205	CAMO-15-95776	ARS1-15-01395-001
2015-1205	CAMO-15-95787	ARS1-15-01395-002
2015-1205	CAMO-15-95788	ARS1-15-01395-003
2015-1205	CAMO-15-95789	ARS1-15-01395-004
2015-1205	CAMO-15-95790	ARS1-15-01395-005
2015-1205	CAMO-15-95760	ARS1-15-01395-006
2015-1205	CAMO-15-95792	ARS1-15-01395-007
2015-1205	CAMO-15-95759	ARS1-15-01395-008

### **SAMPLE RECEIPT**

The sample was received in good condition and was screened for radioactive contamination as per procedure ARS-062 "Sample Receiving". Samples were checked in with a 40-day turnaround, per latest contract modification.

### **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."*



2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

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

A handwritten signature in black ink, appearing to read 'James D. Fur', is written over a horizontal line.

Signature

Laboratory Management, ARS International

Title

06-19-15

Date

2609 North River Road, Port Allen, Louisiana 70767

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



## ARS International, LLC

### Laboratory Analysis Report

**ARS1-15-01395**

*Prepared for:*

### Los Alamos National Laboratory

Keith Greene

P.O. Box 1663

MS M992

Los Alamos, NM 87545

kgreene@lanl.gov

Phone: 505-665-9966

Fax: 505-665-9972

**Project Manager Review**

**Management Review**

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

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

**Project Manager**

**ProjectManagers@amrad.com**

Phone: 225.381.2991

Fax: 225.381.2996



**LELAP Cert# 01949**

## Notes:

### Comments:

- 1.0) Soil and Sludge analysis are reported on a wet basis or an as received basis unless otherwise indicated.
- 2.0) Data in this report are within the limits of uncertainty specified in the reference method unless otherwise specified.
- 3.0) Modified analysis procedures are procedures that are modified to meet the certain specifications. An example may be the use of a water method to analyze a solid matrix due to the lack of an officially recognized procedure for the analysis of the solid matrix. Modified analyses are indicated by the subsequent addition of "m" to the procedure number (i.e. 900.0M).
- 4.0) Derived Air Concentrations and Effluent Release Concentrations are obtained from 10 CFR 20 Appendix B.
- 5.0) **Total activity** is actually total gamma activity and is determined utilizing the prominent gamma emitters from the naturally occurring radioactive decay chains and other prominent radioactive nuclides. Total activity may be lower than the actual total activity due to the extent of secular equilibrium achieved in the various decay chains at the time of analysis. The total activity is not representative of nuclides that emit solely alpha or beta particles.
- 6.0) Ra-228 is determined via secular equilibrium with its daughter, Actinium 228 (Gamma Spectroscopy only).
- 7.0) U-238 is determined via secular equilibrium with its daughter, Thorium 234 (Gamma Spectroscopy only).
- 8.0) All gamma spectroscopy was performed utilizing high purity germanium detectors (HPGe).
- 9.0) ARS makes every attempt to match sample density to calibrated density; however, in some cases, it is not practical or possible to do so and data results may be affected (Gamma Spectroscopy only).
- 10.0) Gamma spectroscopy results are calculated values based on the **ORTEC®** GammaVision ENV32 Analysis Engine.
- 11.0) ACLASS DOD and ISO 17025 certification applies only to the following analytes and methods: Gross Alpha and Gross Beta (EPA 900, SM7110B&C, SW846 9310); Radium 226 (EPA 903, EPA 903.1, SM 7500 Ra-B, SW846 9315); Radium 228 (EPA 904, SM 7500 Ra-B SW846 9320); Iodine-131 (EPA 901.1); Uranium by ICPMS (EPA 200.8); Strontium 89/90 (EPA 905, Eichrom SRW01, HASL 300 Sr-03-RC); Tritium (EPA 906, EPA 906M); Gamma Emitters (EPA 901.1, SM7120B, HASL 300 Ga-01-R); Americium-241, Curium 242/244, Plutonium 239/240 and 241, Thorium 228/230/232, Uranium 234/233 and 238 (Eichrom ACW03 VBS); Lead 210 (HASL 300 Pb-01-RC, Eichrom OTW01); Polonium 210 (HASL 300 Po-01-RC, HASL 300 Po-02-RC); Technetium-99 (Eichrom TCW02, Eichrom TCS01M).

### Method References:

- 1.0) **EPA 600/4-80-032**; Prescribed Procedures for the Measurements of Radioactivity in Drinking Water, August 1980.
- 2.0) Standard Methods for Examination of Water and Waste Water, 18<sup>th</sup>, 1992.
- 3.0) **EPA SW-846**; Test Methods for Evaluating Solid Waste, Third Edition, (9/86). (Updated through 1995).
- 4.0) **EPA 600/4-79-020**; Methods for Chemical Analysis of Water and Waste, March 1983.
- 5.0) **HASL 300**
- 6.0) **ARS-040**; An LCS/D is not reported with this process. The criteria for the LCS/LCSD analysis for reproducibility have not been established for Low Level Tritium analysis. A prepared standard for Low Level Tritium has not been developed. As a result, the standard we use is based on the dilution of a verified conventional tritium standard. The volume required for Low Level Tritium analysis, in addition to the lack of an available Low Level Tritium standard, introduce variability into the LCS/LCSD analysis that does not represent the actual sample analysis. The preferred measure for reproducibility is to run a duplicate analysis of a sample.

### Definitions:

- 1.0) **ND** Not detected above the detection limit (non-detect).
- 2.0) **MDC** (Minimum Detectable Concentration) minimum concentration of the analyte that ARS can detect utilizing the specific analysis
- 3.0) **MBL** Method Blank
- 4.0) **DO** Duplicate Original
- 5.0) **DUP** Method Duplicate
- 6.0) **MS/MSD** Matrix Spike/Matrix Spike Duplicate
- 7.0) **S** Spike
- 8.0) **RS** Reference Spike
- 9.0) **\*SC** Subcontracted out to another qualified laboratory
- 10.0) **NR** Not Referenced
- 11.0) **N/A** Not Applicable
- 13.0) **U** Activity is below the MDC
- 14.0) **LCS/LCSD** Laboratory Control Standard/Laboratory Control Standard Duplicate
- 15.0) **DL** Decision Level Concentration (ANSI N42.23) or critical level

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

LELAP Cert# 01949

NELAP Cert# E87558

ARS-059-010  
Revision: 3  
Revision Date: 100314





2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

# **American Radiation Services Analytical Reports**

**for**

**Los Alamos National Laboratory**

## **Low Level Tritium by Low Level Liquid Scintillation Counting**



2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group: ARS1-15-01395  
Client Sample ID: CAMO-15-95776  
Sample Collection Date: 05/07/15  
Sample Matrix: Aqueous

Request or PO Number: 2015-1205  
ARS Sample ID: ARS1-15-01395-001  
Date Received: 05/15/15  
Report Date: 06/11/15

Analysis Description	Analysis Results	CSU +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	1.361	0.687	2.136	1.031	U	pCi/L	ARS-040	06/09/15 21:59	VTV	NA

**NOTES:**

Project Manager Review

**Notes:** ARS International, LLC assumes no liability for the use or interpretation of any analytical results provided other than the cost of the analysis itself.  
Reproduction of this report in less than full requires the written consent of ARS International, LLC.  
The results in this report pertain only to the samples tested and are intended solely for the use of the client.

LELAP Certificate# 01949



2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group: ARS1-15-01395  
Client Sample ID: CAMO-15-95787  
Sample Collection Date: 05/07/15  
Sample Matrix: Aqueous

Request or PO Number: 2015-1205  
ARS Sample ID: ARS1-15-01395-002  
Date Received: 05/15/15  
Report Date: 06/11/15

Analysis Description	Analysis Results	CSU +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	-0.330	0.605	2.082	1.004	U	pCi/L	ARS-040	06/10/15 02:09	VTV	NA

**NOTES:**

Project Manager Review

**Notes:** ARS International, LLC assumes no liability for the use or interpretation of any analytical results provided other than the cost of the analysis itself.  
Reproduction of this report in less than full requires the written consent of ARS International, LLC.  
The results in this report pertain only to the samples tested and are intended solely for the use of the client.

LELAP Certificate# 01949



INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group: ARS1-15-01395  
Client Sample ID: CAMO-15-95788  
Sample Collection Date: 05/08/15  
Sample Matrix: Aqueous

Request or PO Number: 2015-1205  
ARS Sample ID: ARS1-15-01395-003  
Date Received: 05/15/15  
Report Date: 06/11/15

Analysis Description	Analysis Results	CSU +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	25.581	3.986	2.231	1.076		pCi/L	ARS-040	06/10/15 06:20	VTV	NA

**NOTES:**

Project Manager Review

**Notes:** ARS International, LLC assumes no liability for the use or interpretation of any analytical results provided other than the cost of the analysis itself.  
Reproduction of this report in less than full requires the written consent of ARS International, LLC.  
The results in this report pertain only to the samples tested and are intended solely for the use of the client.

LELAP Certificate# 01949



2609 North River Road, Port Allen, Louisiana 70767

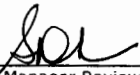
1 (800) 401-4277 FAX (225) 381-2996

ARS Sample Delivery Group: ARS1-15-01395  
Client Sample ID: CAMO-15-95789  
Sample Collection Date: 05/11/15  
Sample Matrix: Aqueous

Request or PO Number: 2015-1205  
ARS Sample ID: ARS1-15-01395-004  
Date Received: 05/15/15  
Report Date: 06/11/15

Analysis Description	Analysis Results	CSU +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	1.234	0.720	2.281	1.101	U	pCi/L	ARS-040	06/10/15 10:31	VTV	NA

**NOTES:**

  
Project Manager Review

**Notes:** ARS International, LLC assumes no liability for the use or interpretation of any analytical results provided other than the cost of the analysis itself.  
Reproduction of this report in less than full requires the written consent of ARS International, LLC.  
The results in this report pertain only to the samples tested and are intended solely for the use of the client.

LELAP Certificate# 01949



INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767


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

ARS Sample Delivery Group: ARS1-15-01395  
Client Sample ID: CAMO-15-95790  
Sample Collection Date: 05/12/15  
Sample Matrix: Aqueous

Request or PO Number: 2015-1205  
ARS Sample ID: ARS1-15-01395-005  
Date Received: 05/15/15  
Report Date: 06/11/15

Analysis Description	Analysis Results	CSU +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.954	0.707	2.291	1.105	U	pCi/L	ARS-040	06/10/15 14:42	VTV	NA

**NOTES:**

  
Project Manager Review

**Notes:** ARS International, LLC assumes no liability for the use or interpretation of any analytical results provided other than the cost of the analysis itself. Reproduction of this report in less than full requires the written consent of ARS International, LLC. The results in this report pertain only to the samples tested and are intended solely for the use of the client.

LELAP Certificate# 01949



INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group: ARS1-15-01395  
Client Sample ID: CAMO-15-95760  
Sample Collection Date: 05/12/15  
Sample Matrix: Aqueous

Request or PO Number: 2015-1205  
ARS Sample ID: ARS1-15-01395-006  
Date Received: 05/15/15  
Report Date: 06/11/15

Analysis Description	Analysis Results	CSU +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	0.843	0.633	2.053	0.991	U	pCi/L	ARS-040	06/10/15 18:53	VTV	NA

NOTES:

  
Project Manager Review

**Notes:** ARS International, LLC assumes no liability for the use or interpretation of any analytical results provided other than the cost of the analysis itself. Reproduction of this report in less than full requires the written consent of ARS International, LLC. The results in this report pertain only to the samples tested and are intended solely for the use of the client.

LELAP Certificate# 01949



2609 North River Road, Port Allen, Louisiana 70767

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

**ARS Sample Delivery Group:** ARS1-15-01395  
**Client Sample ID:** CAMO-15-95792  
**Sample Collection Date:** 05/12/15  
**Sample Matrix:** Aqueous

**Request or PO Number:** 2015-1205  
**ARS Sample ID:** ARS1-15-01395-007  
**Date Received:** 05/15/15  
**Report Date:** 06/11/15

Analysis Description	Analysis Results	CSU +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	15.812	2.564	2.335	1.127		pCi/L	ARS-040	06/10/15 23:04	VTV	NA

**NOTES:**

Project Manager Review

**Notes:** ARS International, LLC assumes no liability for the use or interpretation of any analytical results provided other than the cost of the analysis itself.  
Reproduction of this report in less than full requires the written consent of ARS International, LLC.  
The results in this report pertain only to the samples tested and are intended solely for the use of the client.

LELAP Certificate# 01949





2609 North River Road, Port Allen, Louisiana 70767


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

ARS Sample Delivery Group: ARS1-15-01395  
Client Sample ID: CAMO-15-95759  
Sample Collection Date: 05/12/15  
Sample Matrix: Aqueous

Request or PO Number: 2015-1205  
ARS Sample ID: ARS1-15-01395-008  
Date Received: 05/15/15  
Report Date: 06/11/15

Analysis Description	Analysis Results	CSU +/- 1 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
Enriched H-3	14.744	2.395	2.211	1.067		pCi/L	ARS-040	06/11/15 03:14	VTV	NA

**NOTES:**

  
Project Manager Review

**Notes:** ARS International, LLC assumes no liability for the use or interpretation of any analytical results provided other than the cost of the analysis itself.  
Reproduction of this report in less than full requires the written consent of ARS International, LLC.  
The results in this report pertain only to the samples tested and are intended solely for the use of the client.

LELAP Certificate# 01949



2609 North River Road, Port Allen, Louisiana 70767

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

## QC Results Report

Sample Delivery Group: ARS1-15-01182;1394;1395

### 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-B15-02081	LCSD	H3	26.328	4.115	2.436	27.154		pCi/L	ARS-040	6/9/15 3:14	VTV	97	80%-120%

### Blank Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1s)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date/Time	Analysis Technician
ARS1-B15-02081	MBL	H3	0.274	0.595	2.002	NA	U	pCi/L	ARS-040	6/9/15 3:14	VTV

### 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 Acceptance Range
ARS1-B15-02081	LCSD	H3	26.328	4.115	25.552	3.995		pCi/L	ARS-040	6/9/15 3:14	VTV	0.10	< 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 Acceptance Range
ARS1-B15-02081	LCSD	H3	26.328	4.115	25.552	3.995		pCi/L	ARS-040	6/9/15 3:14	VTV	0.27	< 3

Project Manager Review

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

LELAP Certificate # 01949

NELAP Certificate # E87558

**QC Evaluation**  
EPA Method: ARS-040  
Batch ID: ARS1-B15-02081  
SDG's: ARS1-15-01182; 1394; 1395

LCS	<u>25.5520</u>	CSU (2s)	<u>7.8310</u>
LCSD	<u>26.3280</u>	CSU-D (2s)	<u>8.0660</u>

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

$$DER = \frac{0.776}{5.621052} = 0.138052 < 3$$

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

$$\%RPD = \frac{0.776}{25.94} * 100 = 2.991519 < 25\%$$

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

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

$$RER = \frac{0.776}{15.8970} = 0.048814242 < 1$$

**Blank Information**

	Act	CSU(2s)	MDA	Act>MDA
AM-241				
U-234				
U-235				
U-238				
Pu-238				
Pu-239/240				
Th-228				
Th-230				
Th-232				
H3	0.274	1.166	2.002	
Ra-226				
Ra-228				
Total U				
Pb-210				
Po-209				
Sr-90				
TC-99				
NI-63				

\*MDA should be below RDL  
\*Blank activity must be below MDA  
\*Blank activity must be < 1.65\*CSU (DOE only)

ACT = 0.274

CSU = 1.166

Is ACT<1.65\*CSU? **YES**



2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

**American Radiation Services  
Analytical Reports**

**for**

**Los Alamos National Laboratory**

**Low Level Tritium  
by  
Low Level Liquid  
Scintillation Counting**

**Laboratory  
Records**

# Analysis Batch Report

Analysis Batch ID ARS1-B15-02081												
ABatch Sample ID	Method			ARS-040			Analysis			LSC-A-022		
	Description			Low Level Tritium by Electrolytic Enrichment			FR			Client ID		
	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	Run	FR	Run	Client ID	Isotope Group	Lab Deadline	AQ
ARS1-B15-02081-01	LCS	B-18938										
ARS1-B15-02081-02	LCSD	B-19104										
ARS1-B15-02081-03	MBL											
ARS1-B15-02081-04	TRG				ARS1-15-01182	001	2	2	CAMO-15-94138	STD	05/26/15	
ARS1-B15-02081-05	TRG				ARS1-15-01394	001	1	1	CAWA-15-95850	STD	06/16/15	
ARS1-B15-02081-06	TRG				ARS1-15-01395	001	1	1	CAMO-15-95776	STD	06/16/15	
ARS1-B15-02081-07	TRG				ARS1-15-01395	002	1	1	CAMO-15-95787	STD	06/16/15	
ARS1-B15-02081-08	TRG				ARS1-15-01395	003	1	1	CAMO-15-95788	STD	06/16/15	
ARS1-B15-02081-09	TRG				ARS1-15-01395	004	1	1	CAMO-15-95789	STD	06/16/15	
ARS1-B15-02081-10	TRG				ARS1-15-01395	005	1	1	CAMO-15-95790	STD	06/16/15	
ARS1-B15-02081-11	TRG				ARS1-15-01395	006	1	1	CAMO-15-95760	STD	06/16/15	
ARS1-B15-02081-12	TRG				ARS1-15-01395	007	1	1	CAMO-15-95792	STD	06/16/15	
ARS1-B15-02081-13	TRG				ARS1-15-01395	008	1	1	CAMO-15-95759	STD	06/16/15	

LCS Report  
Analytical Batch: ARS1-B15-02081

BlindID	ABatch	ABatchSampleID	BlindGroup	SidID	Isotope	ExpectedAddition	ExpectedValue	EmptyWt	GrossWt	NetWt	UserID	ModDate	ExpectedValue_CT	MidPointCountDate	KnownValue
B-18938	ARS1-B15-02081	ARS1-B15-02081-01	B-H3	S-0301	H-3	5	2.714735601	13.2769	18.2924	5.0155	AMRADYTELLIS	4/27/2015	2.697228878	6/8/2015	13.52795144
B-19104	ARS1-B15-02081	ARS1-B15-02081-02	B-H3	S-0301	H-3	5	2.704717893	13.2575	18.2919	5.0344	AMRADYTELLIS	5/21/2015	2.69681343	6/9/2015	13.57683753

5.988 dpm/g

ARS Batch Number: ARS1-B15 -

Enter these Values for LCS	Current ACT	5.9880	Standards Report
	NetWt	5.0155	LCS Report
	Aliquot	0.5001	Procedural Data Report

Enter these Values for LCSD	Current ACT	5.9880	Standards Report
	NetWt	5.0344	LCS Report
	Aliquot	0.5001	Procedural Data Report

### Expected Value Calculations

ARS Batch Number:

LCS	CALCULATED EXPECTED VALUE	=	27.0523	
			Range	20.2892 - 33.8153
LCSD	CALCULATED EXPECTED VALUE	=	27.1542	
			Range	20.3657 - 33.9428

ARS-040 Calculation Results			
ARS1-B15-02081			
ACF	1		
UCF	2.22		
Sys Error	0.15		

AnalysisCode	ABatchSampleID	Initial_Mass_sample_g	Mass_Na2O2_added_g	Final_mass_electrolyzed_sample_NaOH_g	Mass_equivalent_NaOH_g	Final_Mass_Electrolyzed_sample_g	VolumeFactor_X	Enrichment_Factor_Y
LSC-A-022	ARS1-B15-02081-01	500.080	2.060	16.680	2.114	14.566	0.029	26.861
LSC-A-022	ARS1-B15-02081-02	500.080	2.020	16.780	2.073	14.707	0.029	26.614
LSC-A-022	ARS1-B15-02081-03	500.250	2.060	12.790	2.114	10.676	0.021	36.220
LSC-A-022	ARS1-B15-02081-04	469.060	2.020	15.800	2.073	13.727	0.029	26.740
LSC-A-022	ARS1-B15-02081-05	500.760	2.060	16.120	2.114	14.006	0.028	27.929
LSC-A-022	ARS1-B15-02081-06	500.560	2.010	15.600	2.062	13.538	0.027	28.847
LSC-A-022	ARS1-B15-02081-07	500.620	2.030	14.990	2.083	12.907	0.026	30.203
LSC-A-022	ARS1-B15-02081-08	500.320	2.040	15.900	2.093	13.807	0.028	28.293
LSC-A-022	ARS1-B15-02081-09	500.460	2.040	16.600	2.093	14.507	0.029	26.987
LSC-A-022	ARS1-B15-02081-10	500.160	2.050	16.530	2.103	14.427	0.029	27.116
LSC-A-022	ARS1-B15-02081-11	500.170	2.020	14.840	2.073	12.767	0.026	30.495
LSC-A-022	ARS1-B15-02081-12	500.530	2.050	16.720	2.103	14.617	0.029	26.796
LSC-A-022	ARS1-B15-02081-13	500.290	2.030	16.000	2.083	13.917	0.028	28.076



# ARS-040 Calculation Results

ARS1-B15-02081

ACF 1

UCF 2.22

Sys Error 0.15

AnalysisCode	ABatchSampleID	Average_Sample_CPM	Bkg_CPM	LSIE	Detector_Eff_decimal	Aliquot	Aliquots	Activity reference date	Start Date of Count	Sample_Count	Duration_min
LSC-A-022	ARS1-B15-02081-01	4.530	1.068	395.680	0.232	0.01005	L	1/6/2015	6/8/2015		240.000
LSC-A-022	ARS1-B15-02081-02	4.545	1.068	383.880	0.237	0.01007	L	1/6/2015	6/9/2015		240.000
LSC-A-022	ARS1-B15-02081-03	1.112	1.068	391.000	0.230	0.00870	L	6/5/2015	6/9/2015		240.000
LSC-A-022	ARS1-B15-02081-04	1.247	1.068	393.330	0.231	0.01002	L	4/20/2015	6/9/2015		240.000
LSC-A-022	ARS1-B15-02081-05	1.240	1.068	402.580	0.234	0.01003	L	5/13/2015	6/9/2015		240.000
LSC-A-022	ARS1-B15-02081-06	1.273	1.068	408.220	0.236	0.01001	L	5/7/2015	6/9/2015		240.000
LSC-A-022	ARS1-B15-02081-07	1.017	1.068	392.750	0.231	0.01005	L	5/7/2015	6/10/2015		240.000
LSC-A-022	ARS1-B15-02081-08	4.757	1.068	392.380	0.230	0.01002	L	5/8/2015	6/10/2015		240.000
LSC-A-022	ARS1-B15-02081-09	1.242	1.068	406.650	0.236	0.01004	L	5/11/2015	6/10/2015		240.000
LSC-A-022	ARS1-B15-02081-10	1.202	1.068	401.310	0.234	0.01003	L	5/12/2015	6/10/2015		240.000
LSC-A-022	ARS1-B15-02081-11	1.200	1.068	395.620	0.232	0.01004	L	5/12/2015	6/10/2015		240.000
LSC-A-022	ARS1-B15-02081-12	3.246	1.068	397.990	0.232	0.01001	L	5/12/2015	6/10/2015		240.000
LSC-A-022	ARS1-B15-02081-13	3.213	1.068	400.110	0.233	0.01006	L	5/12/2015	6/11/2015		240.000

ARS-040 Calculation Results

ARS1-B15-02081

ACF	1
UCF	2.22
Sys Error	0.15

AnalysisCode	ABatchSampleID	Total_Bkg_Count	Count_Duration_min	DF	Sample_Activity_Conc	Standard_Counting_Uncertainty	CU_1	CSU_1	CU_1_96	CSU_1_96	MDC	DLC	ActivityReportUnits
LSC-A-022	ARS1-B15-02081-01		240.000	0.97656	25.552	1.127	1.127	3.995	2.209	7.831	2.374	1.145	pCi
LSC-A-022	ARS1-B15-02081-02		240.000	0.97656	26.328	1.158	1.158	4.115	2.270	8.066	2.436	1.175	pCi
LSC-A-022	ARS1-B15-02081-03		240.000	0.99938	0.274	0.593	0.593	0.595	1.163	1.166	2.002	0.966	pCi
LSC-A-022	ARS1-B15-02081-04		240.000	0.99233	1.315	0.721	0.721	0.748	1.414	1.466	2.362	1.140	pCi
LSC-A-022	ARS1-B15-02081-05		240.000	0.99585	1.187	0.677	0.677	0.700	1.326	1.371	2.220	1.071	pCi
LSC-A-022	ARS1-B15-02081-06		240.000	0.99493	1.361	0.656	0.656	0.687	1.286	1.346	2.136	1.031	pCi
LSC-A-022	ARS1-B15-02081-07		240.000	0.99478	-0.330	0.603	0.603	0.605	1.182	1.186	2.082	1.004	pCi
LSC-A-022	ARS1-B15-02081-08		240.000	0.99493	25.581	1.080	1.080	3.986	2.117	7.813	2.231	1.076	pCi
LSC-A-022	ARS1-B15-02081-09		240.000	0.99539	1.234	0.696	0.696	0.720	1.364	1.411	2.281	1.101	pCi
LSC-A-022	ARS1-B15-02081-10		240.000	0.99554	0.954	0.693	0.693	0.707	1.358	1.386	2.291	1.105	pCi
LSC-A-022	ARS1-B15-02081-11		240.000	0.99554	0.843	0.621	0.621	0.633	1.216	1.241	2.053	0.991	pCi
LSC-A-022	ARS1-B15-02081-12		240.000	0.99539	15.812	0.973	0.973	2.564	1.908	5.025	2.335	1.127	pCi
LSC-A-022	ARS1-B15-02081-13		240.000	0.99539	14.744	0.918	0.918	2.395	1.799	4.693	2.211	1.067	pCi

ARS-040 Calculation Results			
ARS1-B15-02081			
ACF	1		
UCF	2.22		
Sys Error	0.15		

AnalysisCode	ABatchSampleID	AliquotReportUnits	UserID	ModDate
LSC-A-022	ARS1-B15-02081-01	L	AMRAD\WVU	6/11/2015
LSC-A-022	ARS1-B15-02081-02	L	AMRAD\WVU	6/11/2015
LSC-A-022	ARS1-B15-02081-03	L	AMRAD\WVU	6/11/2015
LSC-A-022	ARS1-B15-02081-04	L	AMRAD\WVU	6/11/2015
LSC-A-022	ARS1-B15-02081-05	L	AMRAD\WVU	6/11/2015
LSC-A-022	ARS1-B15-02081-06	L	AMRAD\WVU	6/11/2015
LSC-A-022	ARS1-B15-02081-07	L	AMRAD\WVU	6/11/2015
LSC-A-022	ARS1-B15-02081-08	L	AMRAD\WVU	6/11/2015
LSC-A-022	ARS1-B15-02081-09	L	AMRAD\WVU	6/11/2015
LSC-A-022	ARS1-B15-02081-10	L	AMRAD\WVU	6/11/2015
LSC-A-022	ARS1-B15-02081-11	L	AMRAD\WVU	6/11/2015
LSC-A-022	ARS1-B15-02081-12	L	AMRAD\WVU	6/11/2015
LSC-A-022	ARS1-B15-02081-13	L	AMRAD\WVU	6/11/2015

Protocol# 2 - Low Level H3.1sa

User: H3 Low Level

## 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\20150608\_1844

Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20150608\_1844\20150608\_1844.results

RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20150608\_1844\LLH3.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20150608\_1844\LLH3 Results.csv

Assay File Name: C:\Packard\Tricarb\Assays\Low Level H3.1sa

## Count Conditions-

Nuclide: Low Level H3

Quench Indicator: tSIE/AEC

External Std Terminator (sec): 0.5 2s%

Pre-Count Delay (min): 0.00

## Quench Set:

Low Energy: ARS LL H3 10mL

Count Time (min): 240.00

Count Mode: Low Level

Assay Count Cycles: 1

#Vials/Sample: 1

Repeat Sample Count: 1

Calculate % Reference: Off

Background Subtract: Off

Low CPM Threshold: Off

2 Sigma % Terminator: On - Any Region

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

## Count Corrections-

Static Controller: On

Colored Samples: Off

Coincidence Time (nsec): 18

Half Life-

Luminescence Correction: Off

Heterogeneity Monitor: Off

Delay Before Burst (nsec): 75

Half Life Correction: Off

Regions Half Life

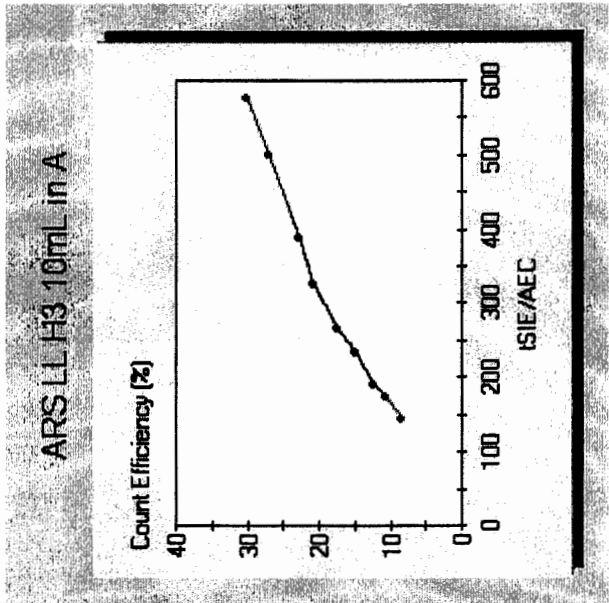
Units

Reference Date

Reference Time

A  
B  
C

Cycle 1 Results  
Quench Curve Block Data



Date Acquired: 08/23/2014

Date Modified:

ARS LL H3 10mL in A

tSIE/AEC	Count Efficiency (%)
579.14	30.08
502.50	27.05
390.30	22.96
328.76	20.79
269.84	17.56
235.00	14.99
193.53	12.42
175.30	10.70
145.76	8.35

Protocol# 2 - Low Level H3.lsa

User: H3 Low Level

P#	S#	SMPL_ID	CPMA	DPM1	tsIE	Eff	Nucl	In A	Count	Time	DATE	TIME	MESSAGES
2	1	BACKGROUND	1.068	4.67	388.09			22.88	240.00		6/8/2015	6:53:11 PM	
2	2	B15-02081-01	4.530	19.57	395.68			23.15	240.00		6/8/2015	11:04:03 PM	
2	3	B15-02081-02	4.545	20.00	383.88			22.73	240.00		6/9/2015	3:14:59 AM	
2	4	B15-02081-03	1.112	4.84	391.00			22.98	240.00		6/9/2015	7:25:52 AM	
2	5	B15-02081-04	1.247	5.40	393.33			23.07	240.00		6/9/2015	11:36:46 AM	
2	6	B15-02081-05	1.240	5.30	402.58			23.40	240.00		6/9/2015	3:47:42 PM	
2	7	B15-02081-06	1.273	5.39	408.22			23.61	240.00		6/9/2015	7:58:43 PM	
2	8	B15-02081-07	1.017	4.41	392.75			23.05	240.00		6/10/2015	12:09:28 AM	
2	9	B15-02081-08	4.757	20.66	392.38			23.03	240.00		6/10/2015	4:20:23 AM	
2	10	B15-02081-09	1.242	5.27	406.65			23.55	240.00		6/10/2015	8:31:23 AM	
2	11	B15-02081-10	1.202	5.15	401.31			23.36	240.00		6/10/2015	12:42:06 PM	
2	12	B15-02081-11	1.200	5.18	395.62			23.15	240.00		6/10/2015	4:52:48 PM	
2	13	B15-02081-12	3.246	13.97	397.99			23.24	240.00		6/10/2015	9:03:36 PM	
2	14	B15-02081-13	3.213	13.78	400.11			23.31	240.00		6/11/2015	1:14:20 AM	

ABatch	AnalysisCode	ABatchSampleID	ClientID	S01_1_EnrichCellNo	S01_2_TareCell	S01_3_TareResv
ARS1-B15-02081	LSC-A-022	ARS1-B15-02081-01		0	319.56	196.89
ARS1-B15-02081	LSC-A-022	ARS1-B15-02081-02		0	320.25	197.95
ARS1-B15-02081	LSC-A-022	ARS1-B15-02081-03		0	329.6	229.67
ARS1-B15-02081	LSC-A-022	ARS1-B15-02081-04	CAMO-15-94138	0	317.34	208.14
ARS1-B15-02081	LSC-A-022	ARS1-B15-02081-05	CAWA-15-95850	0	317.2	199.62
ARS1-B15-02081	LSC-A-022	ARS1-B15-02081-06	CAMO-15-95776	0	325.45	211.47
ARS1-B15-02081	LSC-A-022	ARS1-B15-02081-07	CAMO-15-95787	0	322.53	213.38
ARS1-B15-02081	LSC-A-022	ARS1-B15-02081-08	CAMO-15-95788	0	312.22	196.18
ARS1-B15-02081	LSC-A-022	ARS1-B15-02081-09	CAMO-15-95789	0	313.83	232.26
ARS1-B15-02081	LSC-A-022	ARS1-B15-02081-10	CAMO-15-95790	0	321.2	204.6
ARS1-B15-02081	LSC-A-022	ARS1-B15-02081-11	CAMO-15-95760	0	328.94	198.54
ARS1-B15-02081	LSC-A-022	ARS1-B15-02081-12	CAMO-15-95792	0	331.13	227.23
ARS1-B15-02081	LSC-A-022	ARS1-B15-02081-13	CAMO-15-95759	0	320.94	192.51

S02_GrossWtResv	S03_1_WtNa2O2	C_GrossSampleAdded	S04_1_ElectroID	S04_2_StartAmp	S04_3_StartBathC	S05_1_ElectroID
696.97	2.06	500.08	5/21/2015	5	2	6/5/2015
698.03	2.02	500.08	5/21/2015	5	2	6/5/2015
729.92	2.06	500.25	5/21/2015	5	2	6/2/2015
677.2	2.02	469.06	5/21/2015	5	2	6/5/2015
700.38	2.06	500.76	5/21/2015	5	2	6/5/2015
712.03	2.01	500.56	5/21/2015	5	2	6/8/2015
714	2.03	500.62	5/22/2015	5	2	6/2/2015
696.5	2.04	500.32	5/21/2015	5	2	6/4/2015
732.72	2.04	500.46	5/21/2015	5	2	6/4/2015
704.76	2.05	500.16	5/21/2015	5	2	6/4/2015
698.71	2.02	500.17	5/21/2015	5	2	6/5/2015
727.76	2.05	500.53	5/21/2015	5	2	6/4/2015
692.8	2.03	500.29	5/21/2015	5	2	6/5/2015



S05_2_EndBathC	S05_3_EndCellWt	C_GrossSmplRec	C_EnrichmentF	S06_TareWt	S07_GrossWt	C_RecoveredWa	S08_TearWtLSCVial
2	533.13	16.68	29.98081535	124.75	136.98	12.23	6.62
2	534.98	16.78	29.80214541	119.02	131.44	12.42	6.6
2	572.06	12.79	39.11258796	123.27	132	8.73	6.64
2	541.28	15.8	29.68734177	108.35	120.04	11.69	6.59
2	532.94	16.12	31.06451613	123.24	135.49	12.25	6.66
2	552.52	15.6	32.08717949	99.64	111.66	12.02	6.59
2	550.9	14.99	33.39693129	124.59	134.98	10.39	6.64
2	524.3	15.9	31.46666667	108.35	120.16	11.81	6.58
2	562.69	16.6	30.14819277	119	131.9	12.9	6.61
2	542.33	16.53	30.25771325	108.66	121.02	12.36	6.65
2	542.32	14.84	33.7041779	100.46	111.56	11.1	6.57
2	575.08	16.72	29.93600478	96.95	109.06	12.11	6.59
2	529.45	16	31.268125	124.73	137.36	12.63	6.57

S09_VialPlusSmpl	C_NetSample	S10_1_WtVislSmplDrWatFill	C_NetDeadWaterAdded	C_TareWtBFCocktail	S10_2_GrossWtVSC
16.67	10.05	0	0	16.67	26.7
16.67	10.07	0	0	16.67	26.71
15.34	8.7	16.65	1.31	16.65	26.66
16.61	10.02	0	0	16.61	26.65
16.69	10.03	0	0	16.69	26.74
16.6	10.01	0	0	16.6	26.64
16.69	10.05	0	0	16.69	26.74
16.6	10.02	0	0	16.6	26.61
16.65	10.04	0	0	16.65	26.69
16.68	10.03	0	0	16.68	26.71
16.61	10.04	0	0	16.61	26.64
16.6	10.01	0	0	16.6	26.64
16.63	10.06	0	0	16.63	26.64

C_NetWtCocktailAdded	UserID	ModDate
10.03	AMRAD\VVU	6/5/2015
10.04	AMRAD\VVU	6/5/2015
10.01	AMRAD\VVU	6/5/2015
10.04	AMRAD\VVU	6/5/2015
10.05	AMRAD\VVU	6/8/2015
10.04	AMRAD\VVU	6/8/2015
10.05	AMRAD\VVU	6/8/2015
10.01	AMRAD\VVU	6/8/2015
10.04	AMRAD\VVU	6/8/2015
10.03	AMRAD\VVU	6/8/2015
10.03	AMRAD\VVU	6/8/2015
10.04	AMRAD\VVU	6/8/2015
10.01	AMRAD\VVU	6/9/2015

# Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
6-2-15	14:39	B15-02017-04	B15-02017	1630	VV
↓	↓	↓ OS	↓	↓	VV
↓	↓	↓ 06	↓	↓	VV
↓	↓	↓ 07	↓	↓	VV
6-8-15	16:56	SNC 16	QA	QA	VV
↓	↓	Background	B15-02081	1844	VV
↓	↓	B15-02081-01	↓	↓	VV
↓	↓	↓ 02	↓	↓	VV
↓	↓	↓ 03	↓	↓	VV
↓	↓	↓ 04	↓	↓	VV
↓	↓	↓ 05	↓	↓	VV
↓	↓	↓ 06	↓	↓	VV
↓	↓	↓ 07	↓	↓	VV
↓	↓	↓ 08	↓	↓	VV
↓	↓	↓ 09	↓	↓	VV
↓	↓	↓ 10	↓	↓	VV
↓	↓	↓ 11	↓	↓	VV
↓	↓	↓ 12	↓	↓	VV
↓	↓	↓ 13	↓	↓	VV
6-9-15	14:11	SNC 16	QA	QA	VV

WIP 6-3-15



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**

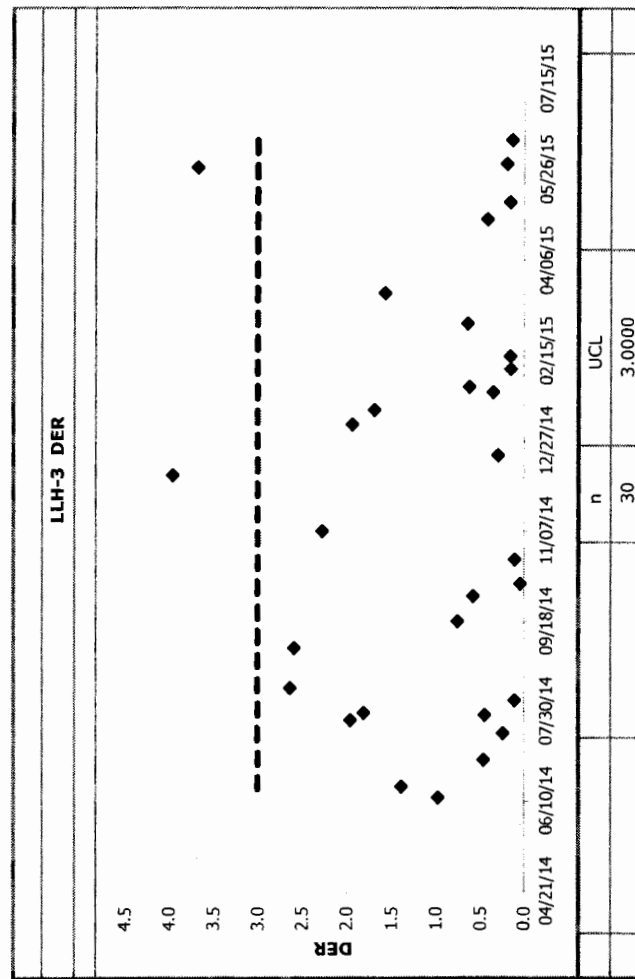
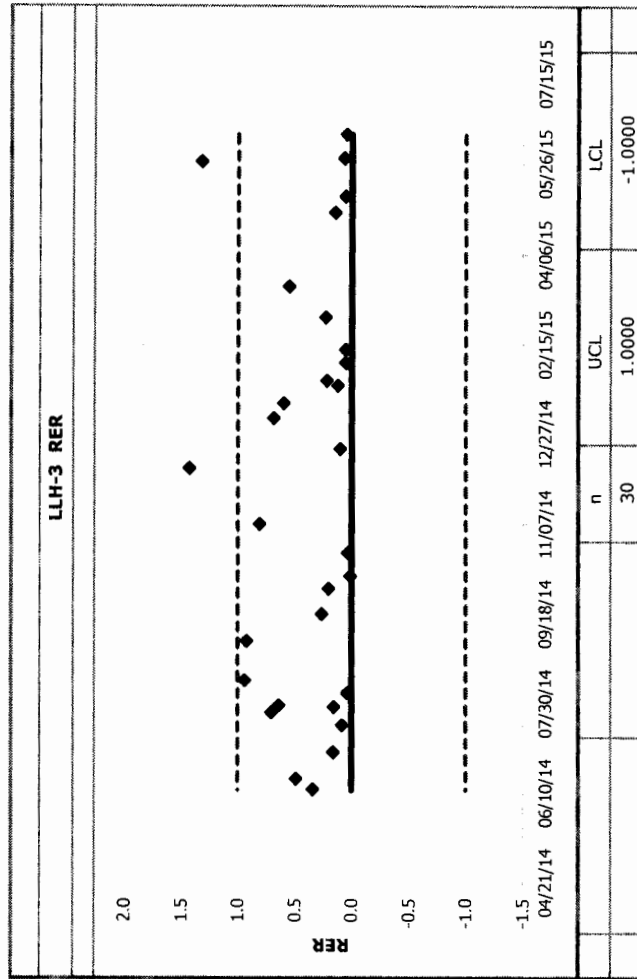
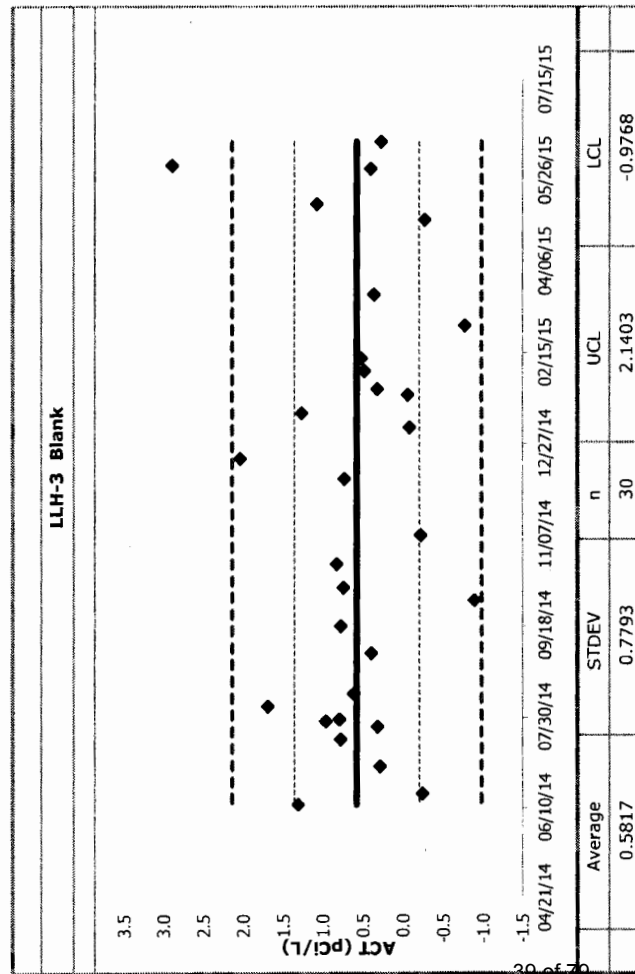
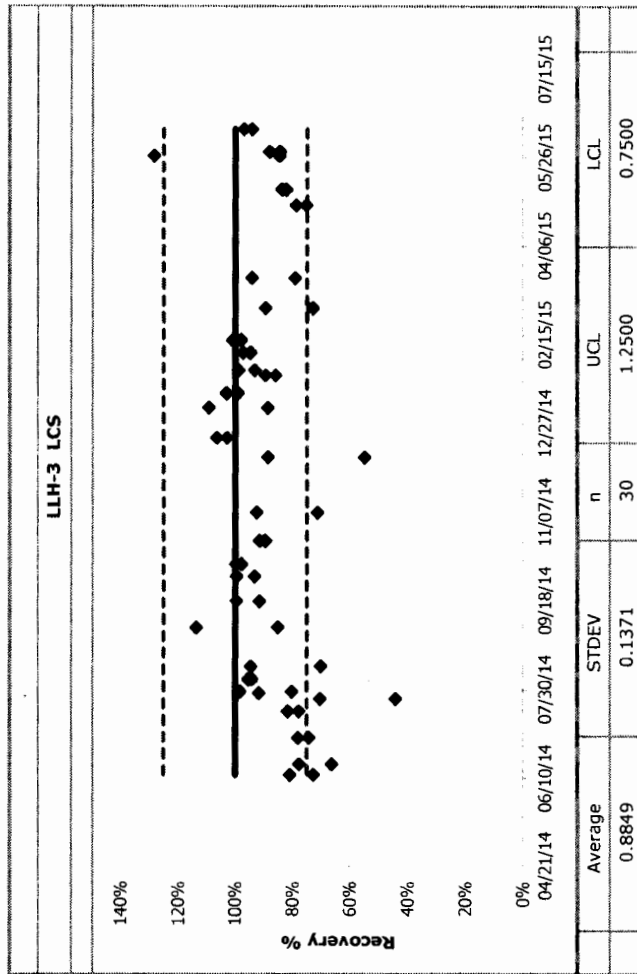
**Low Level Tritium**

**by**

**Low Level Liquid  
Scintillation Counting**

# **Control Charts**

# QC Chart

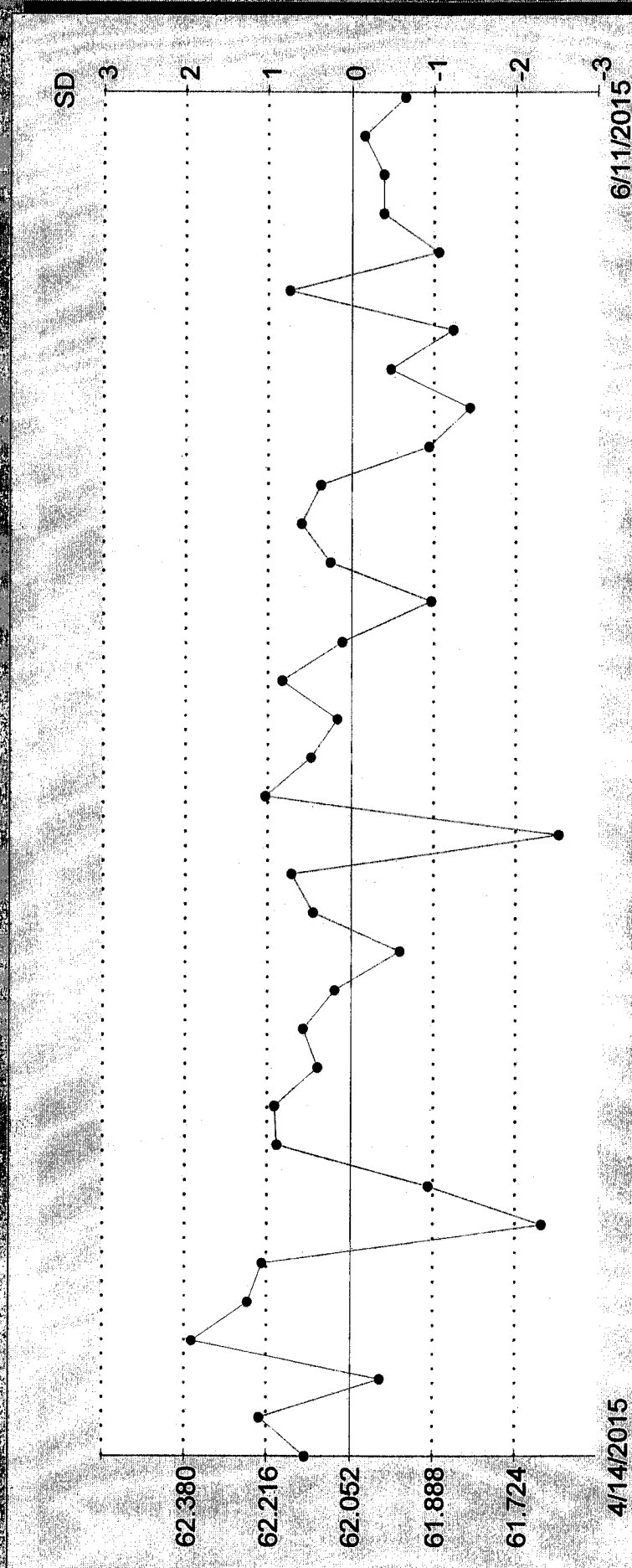


3H Efficiency

Total # pts : 6082  
Valid # pts : 36  
Mean : 62.05  
SD : 0.16

Date	Value	Valid Pt
Apr 14, 2015	62.14	X
Apr 17, 2015	62.23	X
Apr 18, 2015	61.99	X
Apr 20, 2015	62.37	X
Apr 23, 2015	62.26	X
Apr 25, 2015	62.23	X
Apr 27, 2015	61.67	X
Apr 30, 2015	61.90	X
May 03, 2015	62.20	X
May 05, 2015	62.20	X
May 08, 2015	62.11	X
May 13, 2015	62.15	X
May 15, 2015	62.08	X
May 19, 2015	61.95	X
May 22, 2015	62.13	X
May 25, 2015	62.17	X
May 25, 2015	61.64	X
May 25, 2015	62.22	X
May 25, 2015	62.13	X
May 25, 2015	62.08	X
May 25, 2015	62.19	X
May 25, 2015	62.07	X
May 25, 2015	61.89	X
May 25, 2015	62.09	X
May 26, 2015	62.15	X
May 26, 2015	62.11	X
May 26, 2015	61.89	X
May 26, 2015	61.81	X
May 26, 2015	61.97	X
May 26, 2015	61.85	X
May 27, 2015	62.18	X
May 30, 2015	61.88	X
Jun 01, 2015	61.99	X
Jun 02, 2015	61.99	X
Jun 08, 2015	62.03	X
Jun 11, 2015	61.94	X

3H Efficiency  
 Total # pts : 6082  
 Valid # pts : 36  
 Mean : 62.05  
 SD : 0.16



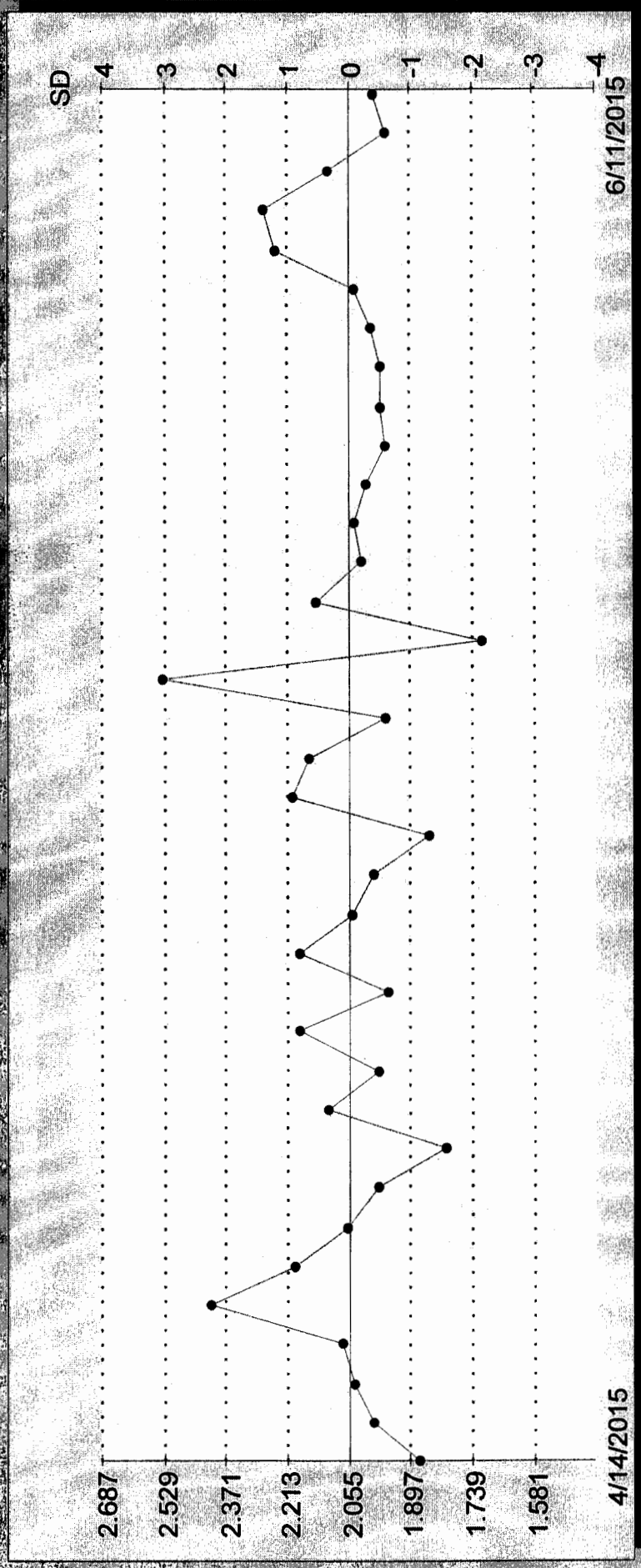


## 3H Background

Total # pts : 6007  
Valid # pts : 36  
Mean : 2.06  
SD : 0.16

Date	Value	Valid Pt
Apr 14, 2015	1.87	X
Apr 17, 2015	1.99	X
Apr 18, 2015	2.04	X
Apr 20, 2015	2.08	X
Apr 23, 2015	2.41	X
Apr 25, 2015	2.20	X
Apr 27, 2015	2.06	X
Apr 30, 2015	1.98	X
May 03, 2015	1.80	X
May 05, 2015	2.11	X
May 08, 2015	1.98	X
May 13, 2015	2.18	X
May 15, 2015	1.96	X
May 19, 2015	2.18	X
May 22, 2015	2.05	X
May 25, 2015	1.99	X
May 25, 2015	1.85	X
May 25, 2015	2.20	X
May 25, 2015	2.16	X
May 25, 2015	1.96	X
May 25, 2015	2.54	X
May 25, 2015	1.71	X
May 25, 2015	2.14	X
May 25, 2015	2.03	X
May 26, 2015	2.04	X
May 26, 2015	2.01	X
May 26, 2015	1.96	X
May 26, 2015	1.97	X
May 26, 2015	1.98	X
May 26, 2015	2.00	X
May 27, 2015	2.04	X
May 30, 2015	2.24	X
Jun 01, 2015	2.28	X
Jun 02, 2015	2.11	X
Jun 08, 2015	1.96	X
Jun 09, 2015	1.99	X

3H Background  
Total # pts : 6007  
Valid # pts : 36  
Mean : 2.06  
SD : 0.16





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**

ARS File ID Numbers: ARS1-15-01394, 1395  
ARS Batch ID: ARS1-B15-02024

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-B15-02024-04	120	1.264	1.084	22.4	10.00	36.197	pCi/L	113.6237	NO
2 ARS1-B15-02024-05	120	0.988	1.084	22.72	10.00	-19.033	pCi/L	112.0234	NO
3 ARS1-B15-02024-06	120	0.909	1.084	23.06	10.00	-34.184	pCi/L	110.3717	NO
4 ARS1-B15-02024-07	120	1.116	1.084	22.84	10.00	6.311	pCi/L	111.4348	NO
5 ARS1-B15-02024-08	120	1.199	1.084	22.86	10.00	22.660	pCi/L	111.3374	NO
6 ARS1-B15-02024-09	120	1.172	1.084	22.98	10.00	17.250	pCi/L	110.756	NO
7 ARS1-B15-02024-10	120	1.129	1.084	22.83	10.00	8.879	pCi/L	111.4837	NO
8 ARS1-B15-02024-11	120	1.278	1.084	22.75	10.00	38.412	pCi/L	111.8757	NO
9 ARS1-B15-02024-12	120	1.188	1.084	22.53	10.00	20.793	pCi/L	112.9681	NO
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

Analysis Batch ID    ARS1-B15-02024											
	Method			ARS-054	Analysis			LSC-A-021	Matrix	AQ	
	Description				Low Level Tritium Screening						
	Type	Blind Iso1	Blind Iso2	Blind Iso3	SDG	FR	Run	Client ID	Isotope Group	Lab Deadline	
ABatch Sample ID											
ARS1-B15-02024-01	LCS										
ARS1-B15-02024-02	LCSD										
ARS1-B15-02024-03	MBL										
ARS1-B15-02024-04	TRG										
ARS1-B15-02024-05	TRG					001	1	CAWA-15-95850	STD	06/16/15	
ARS1-B15-02024-06	TRG					001	1	CAMO-15-95776	STD	06/16/15	
ARS1-B15-02024-07	TRG					002	1	CAMO-15-95787	STD	06/16/15	
ARS1-B15-02024-08	TRG					003	1	CAMO-15-95788	STD	06/16/15	
ARS1-B15-02024-09	TRG					004	1	CAMO-15-95789	STD	06/16/15	
ARS1-B15-02024-10	TRG					005	1	CAMO-15-95790	STD	06/16/15	
ARS1-B15-02024-11	TRG					006	1	CAMO-15-95760	STD	06/16/15	
ARS1-B15-02024-12	TRG					007	1	CAMO-15-95792	STD	06/16/15	
						008	1	CAMO-15-95759	STD	06/16/15	

ID_31001_054	ABatch	ABatchSampleID	ClientID	Aliquot1	AliquotUnits1	IC_ID1	Aliquot2	AliquotUnits2	IC_ID2	UserID	ModDate
15003	ARS1-B15-02024	ARS1-B15-02024-01		1 L						AMRAD\VVU	05/18/2015 15:03:42
15004	ARS1-B15-02024	ARS1-B15-02024-02		1 L						AMRAD\VVU	05/18/2015 15:03:42
15005	ARS1-B15-02024	ARS1-B15-02024-03		1 L						AMRAD\VVU	05/18/2015 15:03:42
15006	ARS1-B15-02024	ARS1-B15-02024-04	CAWA-15-95850	10 L		204351				AMRAD\VVU	05/18/2015 15:03:42
15007	ARS1-B15-02024	ARS1-B15-02024-05	CAMO-15-95776	10 L		204353				AMRAD\VVU	05/18/2015 15:03:42
15008	ARS1-B15-02024	ARS1-B15-02024-06	CAMO-15-95787	10 L		204354				AMRAD\VVU	05/18/2015 15:03:42
15009	ARS1-B15-02024	ARS1-B15-02024-07	CAMO-15-95788	10 L		204355				AMRAD\VVU	05/18/2015 15:03:42
15010	ARS1-B15-02024	ARS1-B15-02024-08	CAMO-15-95789	10 L		204356				AMRAD\VVU	05/18/2015 15:03:42
15011	ARS1-B15-02024	ARS1-B15-02024-09	CAMO-15-95790	10 L		204357				AMRAD\VVU	05/18/2015 15:03:43
15012	ARS1-B15-02024	ARS1-B15-02024-10	CAMO-15-95760	10 L		204359				AMRAD\VVU	05/18/2015 15:03:43
15013	ARS1-B15-02024	ARS1-B15-02024-11	CAMO-15-95792	10 L		204362				AMRAD\VVU	05/18/2015 15:03:43
15014	ARS1-B15-02024	ARS1-B15-02024-12	CAMO-15-95759	10 L		204363				AMRAD\VVU	05/18/2015 15:03:43



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\20150519\_1137

Raw Results Path: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20150519\_1137\20150519\_1137.results

RTF File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20150519\_1137\LLH3.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\H3 Low Level\Low Level H3\20150519\_1137\LLH3 Results.csv

Assay File Name: C:\Packard\Tricarb\Assays\Low Level H3.lsa

Count Conditions-

Nuclide: Low Level H3

Quench Indicator: tSIE/AEC

External Std Terminator (sec): 0.5 2s%

Pre-Count Delay (min): 0.00

Quench Set:

Low Energy: ARS LL H3 10mL

Count Time (min): 120.00

Count Mode: Low Level

Assay Count Cycles: 1

#Vials/Sample: 1

Repeat Sample Count: 1

Calculate % Reference: Off

Background Subtract: Off

Low CPM Threshold: Off

2 Sigma % Terminator: On - Any Region

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

Count Corrections-

Static Controller: On

Colored Samples: Off

Coincidence Time (nsec): 18

Half Life-

Half Life Correction: Off

Regions Half Life

Units

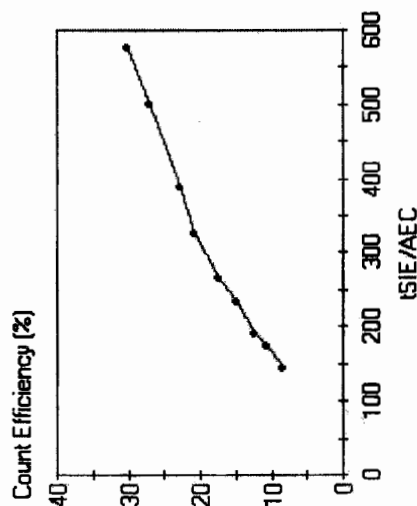
Reference Date

Reference Time

A  
B  
C

Cycle 1 Results  
Quench Curve Block Data

ARS LL H3 10mL in A



Date Acquired: 08/23/2014

Date Modified:

ARS LL H3 10mL in A

tSIE/AEC	Count Efficiency (%)
579.14	30.08
502.50	27.05
390.30	22.96
328.76	20.79
269.84	17.56
235.00	14.99
193.53	12.42
175.30	10.70
145.76	8.35

P#	S#	SMPL_ID	CPMA	DPM1	tsIE	Eff Nucl	In A	Count	Time	DATE	TIME	MESSAGES
2	1	BACKGROUND	1.084	4.82	376.82		22.48	120.00		5/19/2015	11:45:57 AM	
2	2	B15-02024-04	1.264	5.64	374.53		22.40	120.00		5/19/2015	1:55:59 PM	
2	3	B15-02024-05	0.988	4.35	383.59		22.72	120.00		5/19/2015	4:05:53 PM	
2	4	B15-02024-06	0.909	3.94	393.09		23.06	120.00		5/19/2015	6:15:45 PM	
2	5	B15-02024-07	1.116	4.88	387.00		22.84	120.00		5/19/2015	8:25:38 PM	
2	6	B15-02024-08	1.199	5.25	387.58		22.86	120.00		5/19/2015	10:35:31 PM	
2	7	B15-02024-09	1.172	5.10	391.07		22.98	120.00		5/20/2015	12:45:22 AM	
2	8	B15-02024-10	1.129	4.94	386.73		22.83	120.00		5/20/2015	2:55:14 AM	
2	9	B15-02024-11	1.278	5.62	384.33		22.75	120.00		5/20/2015	5:05:08 AM	
2	10	B15-02024-12	1.188	5.27	378.15		22.53	120.00		5/20/2015	7:15:00 AM	

### Low Level Tritium pH Checks

[illegible]

# Beta Liquid Scintillation Counter Log Book

Date	Time	ARS Sample I.D. Number	Batch Number	Liquid Scintillation File Number	Technician Initials
<sup>15</sup> 5-15-15	16:30	B15-01556-16	B15-01556	1810	JB
↓	↓	↓ -17	↓	↓	JB
↓	↓	↓ -18	↓	↓	JB
↓	↓	↓ -19	↓	↓	JB
↓	↓	↓ -20	↓	↓	JB
↓	↓	↓ -21	↓	↓	JB
5-18-15	10:19	SNE 16	QA	QA	VV
↓	↓	Background	B15-02024	1137	VV
↓	↓	B15-02024-01	↓	↓	VV
↓	↓	05	↓	↓	VV
↓	↓	06	↓	↓	VV
↓	↓	07	↓	↓	VV
↓	↓	08	↓	↓	VV
↓	↓	09	↓	↓	VV
↓	↓	10	↓	↓	VV
↓	↓	11	↓	↓	VV
↓	↓	12	↓	↓	VV
VV 5-20-15					



2609 North River Road • Port Allen, Louisiana 70767

1 (800) 401-4277 • Fax (225) 381-2996

# **American Radiation Services Analytical Reports**

for

**Los Alamos National Laboratory**

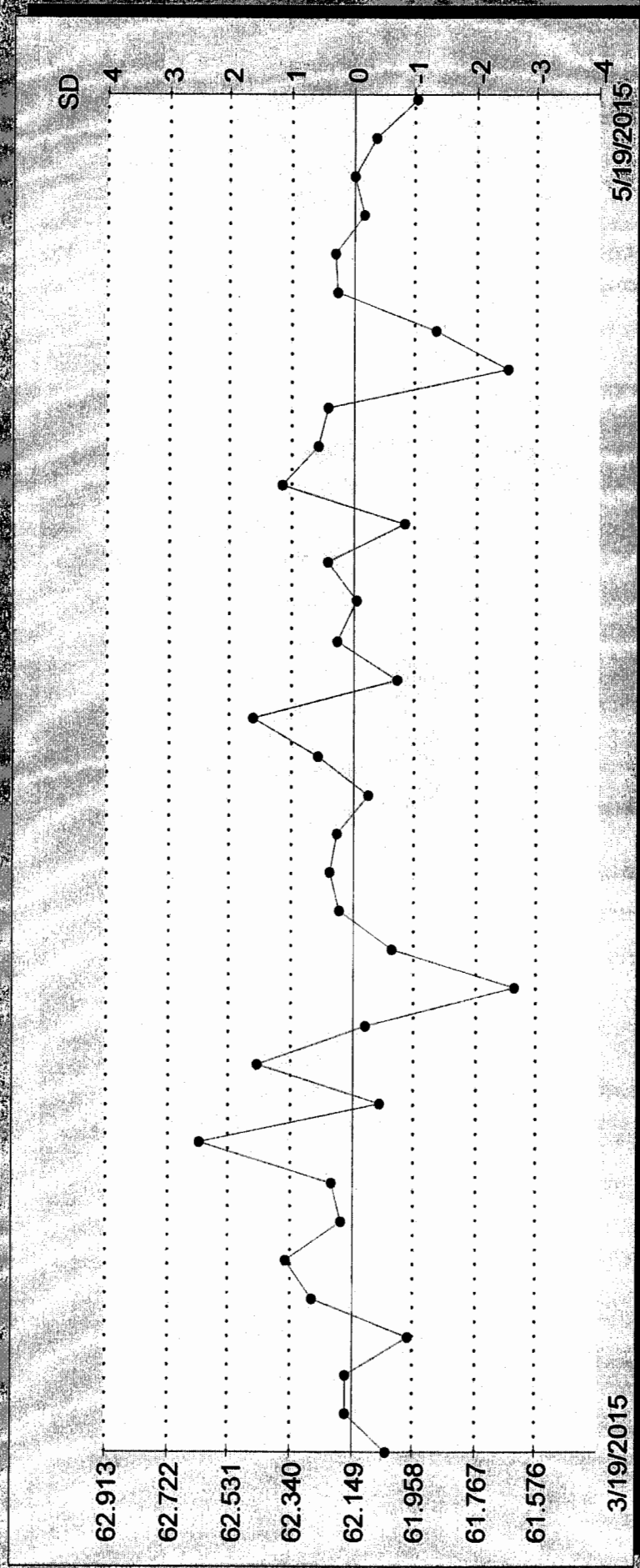
## **Tritium-Screening by Low Level Liquid Scintillation Counting Control Charts**

## 3H Efficiency

Total # pts : 6060  
Valid # pts : 36  
Mean : 62.15  
SD : 0.19

Date	Value	Valid Pt
Mar 19, 2015	62.04	X
Mar 19, 2015	62.17	X
Mar 19, 2015	62.17	X
Mar 19, 2015	61.97	X
Mar 19, 2015	62.27	X
Mar 19, 2015	62.35	X
Mar 19, 2015	62.19	X
Mar 19, 2015	62.21	X
Mar 19, 2015	62.62	X
Mar 20, 2015	62.07	X
Mar 20, 2015	62.44	X
Mar 20, 2015	62.11	X
Mar 20, 2015	61.64	X
Mar 20, 2015	62.03	X
Mar 20, 2015	62.19	X
Mar 20, 2015	62.22	X
Mar 20, 2015	62.20	X
Mar 24, 2015	62.10	X
Mar 30, 2015	62.26	X
Mar 31, 2015	62.46	X
Apr 02, 2015	62.02	X
Apr 10, 2015	62.20	X
Apr 14, 2015	62.14	X
Apr 17, 2015	62.23	X
Apr 18, 2015	61.99	X
Apr 20, 2015	62.37	X
Apr 23, 2015	62.26	X
Apr 25, 2015	62.23	X
Apr 27, 2015	61.67	X
Apr 30, 2015	61.90	X
May 03, 2015	62.20	X
May 05, 2015	62.20	X
May 08, 2015	62.11	X
May 13, 2015	62.15	X
May 15, 2015	62.08	X
May 19, 2015	61.95	X

3H Efficiency  
Total # pts : 6060  
Valid # pts : 36  
Mean : 62.15  
SD : 0.19



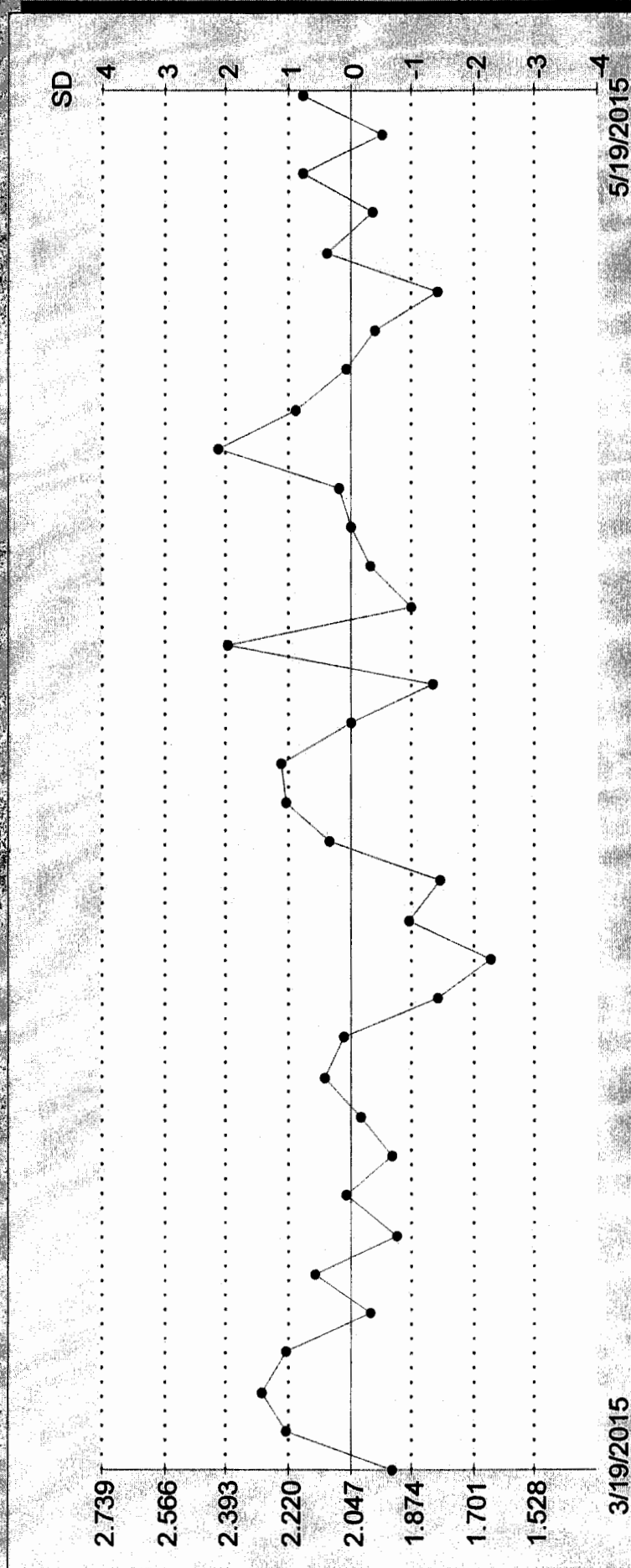


3H Background

Total # pts : 5985  
Valid # pts : 36  
Mean : 2.05  
SD : 0.17

Date	Value	Valid Pt
Mar 19, 2015	1.93	X
Mar 19, 2015	2.23	X
Mar 19, 2015	2.29	X
Mar 19, 2015	2.22	X
Mar 19, 2015	1.99	X
Mar 19, 2015	2.14	X
Mar 19, 2015	1.91	X
Mar 19, 2015	2.06	X
Mar 19, 2015	1.93	X
Mar 20, 2015	2.02	X
Mar 20, 2015	2.12	X
Mar 20, 2015	2.06	X
Mar 20, 2015	1.80	X
Mar 20, 2015	1.65	X
Mar 20, 2015	1.88	X
Mar 20, 2015	1.80	X
Mar 20, 2015	2.10	X
Mar 24, 2015	2.22	X
Mar 30, 2015	2.24	X
Mar 31, 2015	2.04	X
Apr 02, 2015	1.81	X
Apr 10, 2015	2.39	X
Apr 14, 2015	1.87	X
Apr 17, 2015	1.99	X
Apr 18, 2015	2.04	X
Apr 20, 2015	2.08	X
Apr 23, 2015	2.41	X
Apr 25, 2015	2.20	X
Apr 27, 2015	2.06	X
Apr 30, 2015	1.98	X
May 03, 2015	1.80	X
May 05, 2015	2.11	X
May 08, 2015	1.98	X
May 13, 2015	2.18	X
May 15, 2015	1.96	X
May 19, 2015	2.18	X

3H Background  
Total # pts : 5985  
Valid # pts : 36  
Mean : 2.05  
SD : 0.17





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**



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

VERIFICATION DATE 1/8/2015 1:21 date counted  
 STANDARD REFERENCE # S-0301

Principal Radionuclide

H-3

ENTER --&gt;

Half Life, Years

1.232E+01

OR --&gt;

Half Life, Days

4.4998E+03  
4.4998E+03Radionuclide H-3Dilution Reference Date 1/6/2015 16:20Dilution Activity 2.76 pCi per gram ==> dpm/g 6.13Verif. Date Decay Corrected 2.76 pCi per gram ==> dpm/g 6.13**Minimum of 3 Required**

Trial ID	Sample Count	Count Time (min)	Detector	Efficiency	Bkg (cpm)	Net Weight	Decay Corrected Activity Result (dpm/g)	Decay Corrected Activity Result (pCi/g)
S-0301-V1	21.35	1	LSC	0.3430	10.24	5.035	6.43	2.90
S-0301-V2	20.93	1	LSC	0.3429	10.24	4.999	6.24	2.81
S-0301-V3	21.17	1	LSC	0.3440	10.24	4.985	6.37	2.87
S-0301-V4	21.36	1	LSC	0.3461	10.24	5.005	6.42	2.89
S-0301-V5	21.34	1	LSC	0.3447	10.24	4.987	6.46	2.91

		Average	6.38	2.88
		Two Sigma Uncertainty	0.17	0.08
10% Max	PASS	Standard Deviation percent of known concentration	1.43%	1.43%
		Target Activity	6.13	2.76
5% Max	PASS	% Diff	4.15%	4.15%

Verification Expiration Date: January 8, 2016

Prepared &amp; Counted By

Date: 1/8/2015 1:21

Verified &amp; Approved By

Date: 1-8-15

QC Approval

Date: 1-8-15

### H-3 Standard Verification

Verifier's Name: Brian Steffens

Date: 1/7/2015

Pipettor ID: FJ40469

Pipettor ID: Auto-pipettor

Pipettor ID: na

Standard ID: S-0301

Standard ID: N/A

Standards brought up to ~5g with distilled dead water.

Standards made in glass vials.

Weight of Standard		
15mL of Ultima Gold added to standard	S-0301-V1	5.035 g
	S-0301-V2	4.999 g
	S-0301-V3	4.985 g
	S-0301-V4	5.005 g
	S-0301-V5	4.987 g

Balance ID: H1331122173560P

Assay Definition-

Assay Description:  
 H3 Normal Lvl

Assay Type: DPM (Single)

Report Name: Report1

Output Data Path: C:\Packard\Tricarb\Results\ARS\H3 Normal Lvl\20150107\_1305

Raw Results Path: C:\Packard\Tricarb\Results\ARS\H3 Normal Lvl\20150107\_1305\20150107\_1305.results

RTF File Name: C:\Packard\Tricarb\Results\ARS\H3 Normal Lvl\20150107\_1305\H3 Results.rtf

Comma-Delimited File Name: C:\Packard\Tricarb\Results\ARS\H3 Normal Lvl\20150107\_1305\H3 Results.csv

Assay File Name: C:\Packard\TriCarb\Assays\H3 Normal Lvl.lsa

Count Conditions-

Nuclide: Standard H3

Quench Indicator: tSIE/AEC

External Std Terminator (sec): 0.5 2s%

Pre-Count Delay (min): 0.00

Quench Set:

Low Energy: PE UG STD H3

Count Time (min): 120.00

Count Mode: Normal

Assay Count Cycles: 1

#Vials/Sample: 1

Repeat Sample Count: 1

Calculate % Reference: Off

Background Subtract: Off

Low CPM Threshold: Off

2 Sigma % Terminator: On - Any Region

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

Count Corrections-

Static Controller: On

Colored Samples: Off

Coincidence Time (nsec): 18

Half Life

Luminescence Correction: n/a

Heterogeneity Monitor: n/a

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

P#	S#	SMPL_ID	CPMA	DPM1	tsIE	Eff Nucl	In A	Count	Time	DATE	TIME	MESSAGES
23	1	BACKGROUND	10.24	29.90	375.72		34.25	120.00		1/7/2015	1:06:41 PM	
23	2	S-0301-V1	21.35	62.24	376.49		34.30	120.00		1/7/2015	3:08:33 PM	
23	3	S-0301-V2	20.93	61.04	376.42		34.29	120.00		1/7/2015	5:10:53 PM	
23	4	S-0301-V3	21.17	61.56	377.88		34.40	120.00		1/7/2015	7:12:56 PM	
23	5	S-0301-V4	21.36	61.71	381.04		34.61	120.00		1/7/2015	9:14:58 PM	
23	6	S-0301-V5	21.34	61.91	379.00		34.47	120.00		1/7/2015	11:17:02 PM	

ARS INTERNATIONAL		Add/Edit Secondary Stds	Parent Standard Data	
Planning		Parent Solution Reference #	NIST SRM 4927F	
Planning Comments	Create an H3 LCS standard.	Parent Solution #	S-0237	
Target dpm/g (on dil. date)	6	Parent Principal Radionuclide	H-3	Half Life (Days) 4499.8000000
Target Final volume mL	2000	Parent Reference Date	03/22/2010 10:10	
Appx mass g of Parent Sol'n	4.485521955	Parent Certified Act	3503.682716	Certi Act/Vol Units dpm g
Appx vol mL of Parent Sol'n	4.493610454	Parent Cert Act Uncert 1 Sigma	0.0036	
Expected Addition for Analysis g	5	Parent Sp. Gravity G/mL	0.9982	
Standards Preparation / Dilution		Parent Supplier	NIST SRM 4927F	
Secondary Solution #	S-0301	Parent Date Recvd	01/02/00	
Dilution Date (New Ref Date)	01/06/2015 16:20	Parent Received By	Unknown	
Ampoule, Empty (g)		Parent Cert Exp Date		
Ampoule /Solution Gross (g)		Parent Matrix	H2O	
Net Wt Removed (g)		Certified dpm/g At Ref Date	3503.682716	
Transfer Container, empty (g)	13.232	Certified dpm/g on 01/06/2015 16:20	2675.273941	
Container Plus Solution (g)	17.803	Parent Comments	Intermediate level H-3 standard for creating LCS solutions and matrix spikes. Dilution performed as stated above by B Steffens. -BJS 1/22/15	
Net Wt Transferred (g)	4.571			
DPM Xferred on 01/06/2015 16:20	12228.67719			
Diluent/matrix	DI H2O	Parent Tech	Unknown	
Diluent Density Cont, empty (g)		Is_Primary	FALSE	
Test Mass of 5 mL of Diluent (g)		Is_LCS	TRUE	
Diluent Density Test - (g/mL)		Is_Tracer	FALSE	
Dilution Empty Container Mass (g)	407.34	Is_Calib	FALSE	
Dilution Full Cont g (If measured)	2402.02			
Dilution Final Volume mL (If measured)	2000			
Final Dilution Density (g/mL)	0.99734			
Final Dilution Measured Mass g	1994.68			
Comments	H3 LCS standard. Dilution performed as stated above by B Steffens. -BJS 1/6/15			
Final Dilution dpm/g	6.130646111			
Final Dil New Ref Date/Time	01/06/2015 16:20			



### H-3 Standard Verification

**Verifier's Name:** Brian Steffens

**Date:** 1/7/2015

Pipettor ID: FJ40469

Pipettor ID: Auto-pipettor

Pipettor ID: na

**Standard ID:** S-0301

**Standard ID:** N/A

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

**Weight of Standard**

15mL of Ultima  
Gold added to  
standard

S-0301-V1	5.035	g
S-0301-V2	4.999	g
S-0301-V3	4.985	g
S-0301-V4	5.805	g
S-0301-V5	4.987	g

**Balance ID:** H1331122173560P

ARS INTERNATIONAL		Add/Edit Secondary Stds	Parent Standard Data	
Planning		Parent Solution Reference #	NIST SRM 4927F	
Planning Comments		Parent Solution #	S-0237	
Target dpm/g (on dil. date)	6	Parent Principal Radionuclide	H-3	Half Life (Days) 4499.6000000
Target Final volume mL	2000	Parent Reference Date	03/22/2010 10:10	
Appx mass g of Parent Sol'n	4.484732071	Parent Certified Act	3503.682716	Certi Act/Vol Units dpm 9
Appx vol ml of Parent Sol'n	4.492819145	Parent Cert Act Uncert 1 Sigma	0.0036	
Expected Addition for Analysis g		Parent Sp. Gravity G/ml	0.9982	
Standards Preparation / Dilution		Parent Supplier	NIST SRM 4927F	
Secondary Solution #	S-0301	Parent Date Recvd	01/02/09	
Dilution Date (New Ref Date)		Parent Received By	Unknown	
Ampoule, Empty (g)		Parent Cert Exp Date		
Ampoule /Solution Gross (g)		Parent Matrix	H2O	
Net Wt Removed (g)		Certified dpm/g At Ref Date	3503.682716	
Transfer Container, empty (g)	13.232	Certified dpm/g on 01/05/2015 12:53	2675.745131	
Container Plus Solution (g)	17.803	Parent Comments	Intermediate level H-3 standard for creating LCS solutions and matrix spikes. Dilution performed as stated above by B. Steffens. BJS 3/22/10	
Net Wt Transferred (g)				
DPM Xferred on 01/05/2015 12:53				
Diluent/matrix				
Diluent Density Cont, empty (g)		Parent Tech	Unknown	
Test Mass of 5 ml of Diluent (g)		Is_Primary	FALSE	
Diluent Density Test - (g/mL)		Is_LCS	TRUE	
Dilution Empty Container Mass (g)	407.34	Is_Tracer	FALSE	
Dilution Full Cont g (if measured)	2402.02	Is_Calib	FALSE	
Dilution Final Volume ml (if measured)				
Final Dilution Density (g/mL)				
Final Dilution Measured Mass g				
Comments				
Final Dilution dpm/g				
Final Dil New Ref Date/Time	01/05/2015 12:53			



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: 15-01395

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 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	

SD  
Report Generator Signature

6-19-15  
Date

James D. Lee  
Management Review Signature

6-19-15  
Date



# LSC Technical Review Checklist

ARS SDG ARS1-15-01395

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: B15-02024 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?	<input checked="" type="checkbox"/> Yes No N/A	<input checked="" type="checkbox"/> Yes No N/A
2) 100% of Manual Calculations Verified?	Yes No <input checked="" type="checkbox"/> N/A	Yes No <input checked="" type="checkbox"/> N/A
3) Blank Composition/Configuration Matches Calibration?	<input checked="" type="checkbox"/> Yes No <input checked="" type="checkbox"/> N/A	Yes No <input checked="" type="checkbox"/> N/A
4) Deviations from procedure are documented and verified?	Yes No <input checked="" type="checkbox"/> N/A	Yes No <input checked="" type="checkbox"/> N/A
5) Appropriate Cocktail Selected?	<input checked="" type="checkbox"/> Yes No N/A	<input checked="" type="checkbox"/> Yes No N/A
6) Sample Prep Anomaly? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (See Tech Notes) NCR # (If initiated): _____		
<div>Chemist Signature: <u>Nam Van</u> Date: <u>5-18-15</u> Verifier Review Signature: <u>David Kyp</u> Date: <u>5-18-15</u></div>		

## B. ANALYSIS REVIEW

	Analyst Review	QA Officer Review
1) Calibrations Valid and Current?	<input checked="" type="checkbox"/> Yes No N/A	<input checked="" type="checkbox"/> Yes No N/A
2) Backgrounds Valid and Current?	<input checked="" type="checkbox"/> Yes No N/A	<input checked="" type="checkbox"/> Yes No N/A
3) Source Checks Completed and Acceptable?	<input checked="" type="checkbox"/> Yes No N/A	<input checked="" type="checkbox"/> Yes No N/A
QA Officer Signature: <u>James D. Lee</u> Date: <u>6-19-15</u>		
	Analyst Review	Technical Review
4) Background Checks Complete and Acceptable?	<input checked="" type="checkbox"/> Yes No N/A	Yes No N/A
5) 100% of Manually Entered Parameters Verified Accurate?	<input checked="" type="checkbox"/> Yes No N/A	Yes No N/A
6) Appropriate QC samples initiated at required frequency?	<input checked="" type="checkbox"/> 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?	<input checked="" type="checkbox"/> Yes No N/A	Yes No N/A
b) Spectra show no Evidence of Interferences?	<input checked="" type="checkbox"/> Yes No N/A	Yes No N/A
c) Sample Quench for All Samples within Range of Quench Curve?	<input checked="" type="checkbox"/> Yes No N/A	Yes No N/A
7) Analysis Anomaly? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (See Comments) NCR # (If initiated): _____		
<div>Analyst Signature: <u>Nam Van</u> Date: <u>5-20-15</u> Technical Reviewer Signature: <u>NA</u> Date: _____</div>		



**LSC**  
**Technical Review Checklist**

Batch A: B15-02024

**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	<i>NA</i> Yes No N/A
4) LCS/LCD Criteria Met?	Yes No N/A	<i>NA</i> 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? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (See Tech Notes)    NCR # (If initiated): _____		
<div style="display: flex; justify-content: space-between;"><div style="width: 45%; text-align: center;"><i>NA</i> _____ Project Manager Signature                      Date</div><div style="width: 45%; text-align: center;"><i>NA</i> _____ QA Officer Signature                                      Date</div></div>		

**GENERAL COMMENTS**



# LSC Technical Review Checklist

ARS SDG ARS1-15-01395Sample Matrix: AQ Aliquot (Circle One): Dry As Received ☒ Filtered Other: \_\_\_\_\_Required QC Samples (Mark all that apply): Blank ☒ LOS ☒ LGSD ☒ Sample Dup MS MSDARS A. Batch ID(s): Batch A: B15-02081 Batch B: N/A Batch C: N/ATest Method(s): LSC-A-022 N/A N/A

## A. RADIOCHEMICAL PREPARATION REVIEW

	Chemist Review	Verifier Review
1) 100% of Manual Transcriptions Verified?	Yes <input checked="" type="checkbox"/> No N/A	Yes <input checked="" type="checkbox"/> No N/A
2) 100% of Manual Calculations Verified?	Yes No N/A <input checked="" type="checkbox"/>	Yes No N/A <input checked="" type="checkbox"/>
3) Blank Composition/Configuration Matches Calibration?	Yes <input checked="" type="checkbox"/> No N/A	Yes <input checked="" type="checkbox"/> No N/A
4) Deviations from procedure are documented and verified?	Yes No N/A <input checked="" type="checkbox"/>	Yes No N/A <input checked="" type="checkbox"/>
5) Appropriate Cocktail Selected?	Yes <input checked="" type="checkbox"/> No N/A	Yes <input checked="" type="checkbox"/> No N/A
6) Sample Prep Anomaly? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (See Tech Notes) NCR # (If initiated): _____		
<div>Chemist Signature: <u>Nam Vu</u> Date: <u>6-8-15</u></div> <div>Verifier Review Signature: <u>Michael Kent</u> Date: <u>6-8-15</u></div>		

## B. ANALYSIS REVIEW

	Analyst Review	QA Officer Review
1) Calibrations Valid and Current?	Yes <input checked="" type="checkbox"/> No N/A	Yes <input checked="" type="checkbox"/> No N/A
2) Backgrounds Valid and Current?	Yes <input checked="" type="checkbox"/> No N/A	Yes <input checked="" type="checkbox"/> No N/A
3) Source Checks Completed and Acceptable?	Yes <input checked="" type="checkbox"/> No N/A	Yes <input checked="" type="checkbox"/> No N/A
QA Officer Signature: <u>James D. Lu</u> Date: <u>6-19-15</u>		
	Analyst Review	Technical Review
4) Background Checks Complete and Acceptable?	Yes <input checked="" type="checkbox"/> No N/A	Yes <input checked="" type="checkbox"/> No N/A
5) 100% of Manually Entered Parameters Verified Accurate?	Yes <input checked="" type="checkbox"/> No N/A	Yes <input checked="" type="checkbox"/> No N/A
6) Appropriate QC samples initiated at required frequency?	Yes <input checked="" type="checkbox"/> No N/A	Yes <input checked="" type="checkbox"/> 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 <input checked="" type="checkbox"/> No N/A	Yes <input checked="" type="checkbox"/> No N/A
b) Spectra show no Evidence of Interferences?	Yes <input checked="" type="checkbox"/> No N/A	Yes <input checked="" type="checkbox"/> No N/A
c) Sample Quench for All Samples within Range of Quench Curve?	Yes <input checked="" type="checkbox"/> No N/A	Yes <input checked="" type="checkbox"/> No N/A
7) Analysis Anomaly? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (See Comments) NCR # (If initiated): _____		
<div>Analyst Signature: <u>Nam Vu</u> Date: <u>6-11-15</u></div> <div>Technical Reviewer Signature: <u>[Signature]</u> Date: <u>6-11-15</u></div>		





**DQO Report for SDG**  
ARS1-15-01395

Analysis Code	Group	PrepType	Isotope	Activity Units	Aliquot Units	ProcedureNo	RDL	LCS_LL	LCS_UL	MS_LL	MS_UL	RadY_LL	RadY_UL	GravY_LL	GravY_UL	RER	RPD	DilutionReq	BlankCorrectionMDA	BlankCorrectionAll	CountTimeReq	AliquotRequired
LSC-A-021	STD	WRAD	H-3	pCi	L	ARS-054	0.00E+00	75	125	60	140	30	110	40	110	1.00	25	FALSE	FALSE	FALSE	FALSE	
LSC-A-022	STD	WRAD	Enriched H-3	pCi	L	ARS-040	0.00E+00	75	125	60	140	30	110	40	110	1.00	25	FALSE	FALSE	FALSE	FALSE	

# SDG Report - Samples and Containers

SDG Specific Data					
SDG	ARS1-15-01395	TAT Days	28	Project Type	Environmental
Sample Count	8	Date Received	5/15/2015	COC Number	2015-1205
Client	Los Alamos National Laboratory	Client Deadline	6/12/2015	PO Number	
Client Code	114	Internal Deadline	6/11/2015	Job Number	
Profile Number	PN-00094	Lab Deadline	6/9/2015	Job Location	Los Alamos National Laboratory
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 →	CAMO-15-95776	AQ	05/07/15 03:09 PM	05/07/15 03:09 PM	H	90	5	O3								
	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol	
	204206	1	1000.00				80	24		N	N/A					
002 →	CAMO-15-95787	AQ	05/07/15 11:38 AM	05/07/15 11:38 AM	H	90	5	O3								
	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol	
	204207	1	1000.00				80	24		N	N/A					
003 →	CAMO-15-95788	AQ	05/08/15 11:45 AM	05/08/15 11:45 AM	H	90	5	O3								
	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol	
	204208	1	1000.00				80	24		N	N/A					
004 →	CAMO-15-95789	AQ	05/11/15 02:25 PM	05/11/15 02:25 PM	H	90	5	O3								
	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol	
	204209	1	1000.00				80	24		N	N/A					
005 →	CAMO-15-95790	AQ	05/12/15 11:22 AM	05/12/15 11:22 AM	H	90	5	O3								
	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol	
	204210	1	1000.00				80	24		N	N/A					
006 →	CAMO-15-95760	AQ	05/12/15 11:22 AM	05/12/15 11:22 AM	H	90	5	O3								
	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol	
	204211	1	1000.00				80	24		N	N/A					
007 →	CAMO-15-95792	AQ	05/12/15 01:12 PM	05/12/15 01:12 PM	H	90	5	O3								
	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol	
	204212	1	1000.00				80	24		N	N/A					
008 →	CAMO-15-95759	AQ	05/12/15 03:12 PM	05/12/15 03:12 PM	H	90	5	O3								
	IC_ID	Cnt	Volume_mL	Wt_g	pH_Orig	pH_Final	CPM	uR_Hr	Storage	VOA	Head Sp	AF Units	AF Rate	AF Mins	AF Total Vol	
	204213	1	1000.00				80	24		N	N/A					

### SDG Report - Analysis Assignments

Temp SDG	ARS1-15-01395	Sample Count	8
Client	Los Alamos National Laboratory	Analysis Count	2-16

Samples Count Totals per Analysis		
Analysis Code	Analysis Description	Samples Count
LSC-A-021	Low Level Tritium Screen in (Aqueous)	8
LSC-A-022	Low Level Tritium by Enrichment Process in (Aqueous [AQ])	8

Analyses Assigned Per Fraction		
Fraction	Analysis Code	X = Assigned
001	LSC-A-021	X
001	LSC-A-022	X
002	LSC-A-021	X
002	LSC-A-022	X
003	LSC-A-021	X
003	LSC-A-022	X
004	LSC-A-021	X
004	LSC-A-022	X
005	LSC-A-021	X
005	LSC-A-022	X
006	LSC-A-021	X
006	LSC-A-022	X
007	LSC-A-021	X
007	LSC-A-022	X
008	LSC-A-021	X
008	LSC-A-022	X

# ARS FILE TRACKING SHEET

SDG: ARS1-15-01395

Task	Date / Time	Initials
Date & Time Samples Received	05-15-15 09:45	PD
ICOC Initiated/Storage Location: <u>03</u>	05-15-15 13:11	PD
Technical Checks Performed		See Mathu
Report Written (EDD) Generated <u>6-11-15/1106</u> <u>SDA</u>	<u>6-19-15/952</u>	SDA
Quality Assurance Checks Performed on Report	<u>6-19-15/1010</u>	<u>SDA</u>
Management Checks Performed on Report		
Preliminary Report Scan		
Report E-mailed/Faxed		
Invoice Completed Invoice #: _____		
Requires Report Mailed Yes / <del>No</del>		
Requires Original COC mailed Yes / <del>No</del>		
Report Reviewed and Imaged		

EDD  
Loaded  
SDA  
6-11-15

## SPECIAL REQUIREMENTS

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

### NOTES

ADEP

COMPANY NAME: LANL

SDG: ARSI-15-01395

## External and Internal Surveys

## 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  
 Radioactive ☐ Yes ☒ No

Marked Radioactive

# Samples Rcv

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

pH  $\leq 2$  is Acceptable

### Acceptance Limits

$$<500 \mu R/hr \quad <100 \text{ cpm/cm}^2$$
[illegible]

Surveyors' Name:

Date/Time Surveyed: 5-15-15 / 0945

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

Page 1 of 1

American Radiation

Baton Rouge LA

# Chain of Custody/Analysis Request

AdP

COC/Lab Request #:

2015-1205

Page 1 of 1

Client Contact:

Lab Agreement #:

Site Name: Los Alamos National Laboratory

Project Number:

Analysis Turnaround Time:

24 Hour - ☐ Other - ☐

7 Days - ☐

14 Days - ☐

21 Days - ☐

28 Days - ☒

Rad Screening Info:

Lab Reporting Limit Type:

Sample Quantitation Limit

Field Sample ID

Sample Date Sample Time Sample Matrix

WSP-LL-H-3

CAMO-15-95776

May 7 2015 15:09 W 1

CAMO-15-95787

May 7 2015 11:38 W 1

CAMO-15-95788

May 8 2015 11:45 W 1

CAMO-15-95789

May 11 2015 14:25 W 1

CAMO-15-95790

May 12 2015 11:22 W 1

CAMO-15-95760

May 12 2015 11:22 W 1

CAMO-15-95792

May 12 2015 13:12 W 1

CAMO-15-95759

May 12 2015 15:12 W 1

Special Instructions:

Relinquished by:

Print Name:

Date/Time:

Received by:

Print Name:

Date/Time:

Relinquished by:

Print Name:

Date/Time:

Received by:

Print Name:

Date/Time:

Relinquished by:

Print Name:

Date/Time:

Received by:

Print Name:

Date/Time: