



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

## American Radiation Services, Inc.

### Laboratory Analysis Report

**ARS1-09-00457**

*Prepared for:*

### Nuclear Regulatory Commission (NRC)

James Noggle  
USNRC Region 1  
475 Allendale Road  
King of Prussia, PA 19406  
James.NoggleQnrc.gov

Phone: 610.337.5063

  
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 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# 30658

NELAP Cert# E87558



2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group: ARS1-09-00457

Request or PO Number: N/A

Client Sample ID: MW-66-21-(007)

ARS Sample ID: ARS1-09-00457-001

Sample Collection Date: 01/27/09 13:52

Date Received: 2/4/2009

Sample Matrix: Aqueous

Report Date: 03/04/09 12:15

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC		Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
MN-54	-0.045	2.393	4.040	2.020	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA	N/A
FE-59	-3.042	5.183	7.040	3.520	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA	N/A
CO-58	-1.046	11.223	3.830	1.915	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA	N/A
CO-60	0.298	2.512	4.360	2.180	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA	N/A
ZN-65	-0.613	186.060	8.600	4.300	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA	N/A
NB-95	0.966	1.873	3.270	1.635	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA	N/A
ZR-95	-0.849	27.529	6.960	3.480	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA	N/A
I-131	-2.350	71.071	3.820	1.910	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA	N/A
CS-134	0.557	2.583	4.360	2.180	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA	N/A
CS-137	9.189	3.879	4.300	2.150		pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA	N/A
BA-140	4491	9.371	15.600	7.800	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA	N/A
LA-140	2.201	3.008	4.980	2.490	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA	N/A
SR-90	0.564	0.123	0.325	0.151		pCi/L	ARS-032/Eichrom SRW-01	2/24/09 17:20	BS	108.00%
H-3	573.582	113.263	147.387	72.520		pCi/L	ARS-054/EPA 906.0	2/27/09 17:08	BS	N/A
NI-63	0.2022	4.3956	7.4931	3.6857	U	pCi/L	ARS-022	3/3/09 7:11	BS	N/A

NOTES:

*Lindsay Rammel*  
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 client.

LELAP Certificate # 30658

NELAP Certificate # E87558



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

ARS Sampk Delivery Group: ARS1-09-00457  
 Client Sample ID: MW-66-36-(007)  
 Sample Collection Date: 01/27/09 13:07  
 Sample Matrix: Aqueous

Request or PO Number: N/A  
 ARS Sample ID: ARS1-09-00457-002  
 Date Received: 2/4/2009  
 Report Date: 03/04/09 12:15

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Recovery	Mem
MN-54	0.419	2.512	4.250	2.125	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	ILA		N/A
FE-59	0.276	4.553	7.750	3.875	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA		N/A
CO-58	-1.715	2.608	4.320	2.160	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA		N/A
CO-60	1.792	2.525	4.190	2.095	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA		N/A
ZN-65	-0.109	5.763	9.790	4.895	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA		N/A
NB-95	1.862	2.578	4.270	2.135	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	ILA		N/A
ZR-95	-0.598	3.954	6.680	3.340	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA		N/A
I-131	-2.649	6.229	3.980	1.990	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA		N/A
CS-134	-0.983	2.746	4.600	2.300	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA		N/A
CS-137	-0.103	2.618		2.215	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA		N/A
BA-140	-0.467	16.991	4.30	8.750	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA		N/A
LA-140	-2.344	12.804	4.598	2.435	U	pCi/L	ARS-006/EPA 901.1	2/12/09 18:17	JLA		N/A
SR-90	9.627	0.772	0.288	0.133		pCi/L	ARS-032/Eichrom SRW-01	2/24/09 17:20	BS	108.0%	
P-3	3765.124	410.782	146.878	72.270		pCi/L	ARS-054/EPA 906.0	2/27/09 21:16	BS		N/A
NI-63	2.9524	4.798	8.0066	3.9382	U	pCi/L	ARS-022	3/3/09 11:26	BS		N/A

NOTES

*Lindsay Rouse*  
 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 client.

LELAP Certificate# 30658

NELAP Certificate # E87558



2609 North River Road, Port Allen, Louisiana 70767

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

## QC Results Report

Sample Delivery Group: ARS1-09-00457

Date Received: 2/4/2009

### Laboratory Control Sample Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1σ)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Percent Recovery (%)	LCS Acceptance Range
N/A	LCS	Ni-63	203.828	47.405	8.283	204.509		pCi/L	ARS-022	3/2/09 18:34	BS	100	75%-125%

### Blank Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1σ)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date/Time	Analysis Technician
NIA	MBL	Ni-63	-0.869	4.708	8.055	NA	U	pCi/L	ARS-022	3/3/09 2:58	BS

### RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1σ)	Result 2	CSU 2 (1σ)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER Acceptance Range
N/A	LCS	Ni-63	203.828	47.405	210.004	48.834		pCi/L	ARS-022	3/2/09 22:47	BS	0.06	< 1

### DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1σ)	Result 2	CSU 2 (1σ)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER Acceptance Range
N/A	LCS	Ni-63	203.828	47.405	210.004	48.834		pCi/L	ARS-022	3/2/09 22:47	BS	0.18	< 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 the client.

LELAP Certificate# 01949

NELAP Certificate # E87558



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

## QC Results Report

Sample Delivery Group: ARS1-09-00457

Date Received: 2/4/2009

### Laboratory Control Sample Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1 s)	MDC	Expected Value	Qual	Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Percent Recovery (%)	Acceptance Range
ARS1-B09-00590	LCS	H3	1215.833	164.027	146.397	1257.658		pCi/L	ARS-054/EPA 906.0	2/27/09 0:37	BS	97	75% - 125%

### Blank Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1 s)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date/Time	Analysis Technician
ARS1-B09-00590	MBL	H3	133.046	88.682	145.165	NA	U	pCi/L	ARS-054/EPA 906.0	2/27/09 8:52	BS

### RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1 s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	R:R Acceptance Range
ARS1-B09-00590	LCSD	H3	1215.833	164.027	1308.130	172.358		pCi/L	ARS-054/EPA 906.0	2/27/09 4:45	BS	0.27	< 1

### DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1 s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	Acceptance Range
ARS1-B09-00590	LCSD	H3	1215.833	164.027	1308.130	172.358		pCi/L	ARS-054/EPA 906.0	2/27/09 4:45	BS	0.78	< 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



2609 North River Road, Port Allen, Louisiana 70767

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

## QC Results Report

Sample Delivery Group: ARS1-09-00457

Date Received: 02/04/09

### Laboratory Control Sample Evaluation

Analysis Batch	Analyte	Analysis Results	CSU 1 (1σ)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Percent Recovery (%)	ICS Acceptance Range
ARS1-B09-00577	LCS	Sr-90	18.94	1.5	0.347		pCi/L	ARS-032/EPA 905.0	2/24/09 17:20	BS	91	75%-125%

### Blank Evaluation

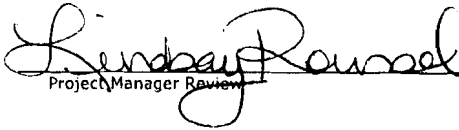
Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1σ)	MDC	Expected Value	Qual	Units	Analysis Test Method	Analysis Date/Time	Analysis Technician
ARS1-B09-00577	MBL	51-90	-0.103	0.09	0.336	NA	U	pCi/L	ARS-032/EPA 905.0	2/24/09 17:20	BS

### RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1σ)	Result 2	CSU 2 (1σ)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER Acceptance Range
ARS1-B09-00577	LCSD	Sr-90	18.94	1.5	20.01	1.6		pCi/L	ARS-032/EPA 905.0	2/24/09 17:20	BS	0.35	< 1

### DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1σ)	Result 2	CSU 2 (1σ)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER Acceptance Range
ARS1-B09-00577	LCSD	9-90	18.94	1.5	20.0	1.6		pCi/L	ARS-032/EPA 905.0	2/24/09 17:20	BS	0.99	< 3

  
Project Manager Review

Notes: American Radiation Services, Inc. assumes no liability for the use or interpretation or 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 Certificate # 30658

NELAP Certificate # E87558



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

## QC Results Report

Sample Delivery Group: ARS1-09-00457  
 Date Received: 02/04/09

### Laboratory Control Sample Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1 s)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date	Analysis Technician	Percent Recovery (%)	LCS Acceptance Range
ARS1-609-00546	LCS	CO-60	25461.00	509.44	197.20	25394.58		pCi/g	EPA 901.1	02/12/09	JLA	100	75%-125%
ARS1-B09-00546	LCS	CS-137	15342.00	363.55	140.40	15365.62		pCi/g	EPA 901.1	02/12/09	JLA	100	75%-125%
ARS1-B09-00546	LCS	AM-241	34336.00	1246.80	278.20	34896.70		pCi/g	EPA 901.1	02/12/09	JLA	98	75%-125%

### Blank Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (1 s)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date	Analysis Technician
ARS1-B09-00546	MBL	CO-60	-0.003	0.010	0.005	NA	U	pCi	EPA 901.1	02/12/09	JLA
ARS1-B09-00546	MBL	CS-137	-0.001	0.003	0.005	NA	U	pCi	EPA 901.1	02/12/09	JLA
ARS1-B09-00546	MBL	AM-241	0.002	0.002	0.006	NA	U	pCi	EPA 901.1	02/12/09	JLA

### RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1 s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date	Analysis Technician	RER	RER Acceptance Range
ARS1-B09-00546	LCSD	CO-60	25461.00	509.44	25140.00	495.44		pCi/g	EPA 901.1	02/12/09	JLA	0.32	< 1
ARS1-B09-00546	LCSD	CS-137	15342.00	363.55	15473.00	346.37		pCi/g	EPA 901.1	02/12/09	JLA	0.18	< 1
ARS1-B09-00546	LCSD	AM-241	34336.00	1246.80	34015.00	1245.90		pCi/g	EPA 901.1	02/12/09	JLA	0.13	< 1

### DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (1 s)	Result 2	CSU 2 (1s)	Qual	Analysis Units	Analysis Test Method	Analysis Date	Analysis Technician	DER	DER Acceptance Range
ARS1-B09-00546	LCSD	CO-60	25461.00	509.44	25140.00	495.44		pCi/g	EPA 901.1	02/12/09	JLA	0.90	< 3
ARS1-B09-00546	LCSD	CS-137	15342.00	363.55	15473.00	346.37		pCi/g	EPA 901.1	02/12/09	JLA	0.52	< 3
ARS1-B09-00546	LCSD	AM-241	34336.00	1246.80	34015.00	1245.90		pCi/g	EPA 901.1	02/12/09	JLA	0.36	< 3

*Lindsey Rounel*  
 Quality Assurance 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 client

LELAP Certificate # 30658

NELAP Certificate # E87558



## 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.

### 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, (9186). (Updated through 1995).
- 4.0) EPA 600/4/79-020; Methods for Chemical Analysis of Water and Waste. March 1983.
- 6.0) HASL 300
- 6.0) **ARS-040**; An LCSD 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 ( <b>non-detect</b> ).   |
| 2.0)  | MDC           | (Minimum Detectable Concentration) minimum <b>concentration</b> of the <b>analyte</b> that ARS can detect utilizing the specific analysis |
| 3.0)  | <b>MBL</b>    | Method Blank  |
| 4.0)  | DO            | Duplicate Original  |
| 5.0)  | DUP           | Method Duplicate  |
| 6.0)  | <b>MS/MSD</b> | Matrix Spike/Matrix Spike Duplicate   |
| 7.0)  | <b>S</b>      | Spike   |
| 8.0)  | RS            | Reference Spike   |
| 9.0)  | <b>*SC</b>    | Subcontracted out to another qualified laboratory   |
| 10.0) | NR            | Not Referenced  |
| 11.0) | NIA           | Not Applicable  |
| 12.0) |               | Reported as a <b>calculated</b> value   |
| 13.0) | <b>**</b>     | False Positive due to interference from <u>Bi-214</u>   |
| 14.0) | U             | Activity is below the MDC   |
| 15.0) | LCS/LCSD      | Laboratory Control Standard/Laboratory Control Standard Duplicate   |

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 ARS International.



RC FORM 303

U.S. NUCLEAR REGULATORY COMMISSION

LABORATORY USE ONLY

2004)

**REQUEST FOR ANALYSIS AND CHAIN OF CUSTODY**

LABORATORY: \_\_\_\_\_

SAMPLE LOCATION (LICENSEE)  
INDIAN POINT ENERGY CENTER

CONTROL NUMBER

LICENSEE NUMBER DOCKET NO.

SAMPLE SUBMITTED

# TOTAL	TYPE	VOLUME	WEIGHT
1	GROUND WATER	2000 ML	- 2 Kg

DATE SAMPLES SUBMITTED

PRIORITY  
 ROUTINE  
 URGENT

SAMPLE COLLECTION INTERVAL			
	MONTH	DAY	YEAR
START			
STOP			

SPECTOR RESPONSIBLE: Jim Noggle (USNRC) TELEPHONE NUMBER: (610) 337-5063

ANALYSIS TO BE PERFORMED	LIST DESIRED LLD (Optional)	OTHER TYPE OF ANALYSIS (Specify)	LIST DESIRED LLD (Optional)
<input type="checkbox"/> GROSS ALPHA (GA)		<input type="checkbox"/> STRONTIUM-90 (Sr90)	
<input type="checkbox"/> GROSS BETA (GB)		<input checked="" type="checkbox"/> NICKEL-63 (Ni63)	
<input type="checkbox"/> GAMMA SPEC (GS)		<input type="checkbox"/>	
<input type="checkbox"/> TRITIUM (H3)		<input type="checkbox"/>	
<input type="checkbox"/> CARBON-14 (C14)		<input type="checkbox"/>	
<input type="checkbox"/> IODINE-125 (I125)		<input type="checkbox"/>	

RELENGISHED BY	RECEIVED BY	DATE	TIME	REASON FOR CHANGE OF CUSTODY
<i>[Signature]</i>	<i>[Signature]</i>	01/27/09	1710	Verify correct samples
<i>[Signature]</i>	<i>[Signature]</i>	1/27/09	1710	Relinquished (observed & verified samples)
<i>[Signature]</i>	SECURED STORAGE	01/27/09	1710	Secured Storage.
<i>[Signature]</i>	SHIPMENT 09-019	1/30/09	1500	SHIP TO LAB
<i>[Signature]</i>	<i>[Signature]</i>	2-4-09	0830	

FEE RECOVERABLE  NO  YES

TAC NUMBER \_\_\_\_\_

REMARKS:

NOTE: SAMPLES WILL BE DISCARDED AFTER ANALYSIS UNLESS REASON ARE NOTED IN REMARKS ABOVE.

