2609 North River Road, Port Allen, Louisiana 70767

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

American Radiation Services, Inc.

Laboratory Analysis Report

ARS1-12-01622

Prepared for:

LA Department of Environmental Quality

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Project Manager Review | **Management 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

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Phone: 225.381.2991
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LELAP Cert# 01949

ARS INTERNATIONAL

2609 North River Road, Port Allen, Louisiana 70767

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

ARS Sample Delivery Group:	ARS1-12-01622	**Request or PO Number:**	N/A
Client Sample ID:	5098912.1	**ARS Sample ID:**	ARS1-12-01622-001
Sample Collection Date:	08/09/12	**Date Received:**	08/09/12
Sample Matrix:	Aqueous	**Report Date:**	08/10/12

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
BE-7	3.886	13.871	23.300	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:10	JDT	N/A
K-40	-1.697	29.635	49.200	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:10	JDT	N/A
SC-46	0.524	2.219	3.750	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:10	JDT	N/A
CO-60	-1.341	2.631	4.690	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:10	JDT	N/A
CS-137	-0.583	2.429	4.160	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:10	JDT	N/A
TL-208	-2.440	6.376	3.920	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:10	JDT	N/A
PB-210	44.697	49.877	73.600	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:10	JDT	N/A
BI-212	8.925	18.820	31.900	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:10	JDT	N/A
BI-214	9.460	6.243	8.760		pCi/L	ARS-006/EPA 901.1	08/09/12 16:10	JDT	N/A
PB-214	11.742	5.475	9.010		pCi/L	ARS-006/EPA 901.1	08/09/12 16:10	JDT	N/A
RA-226	6.512	45.938	85.300	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:10	JDT	N/A
RA-228	1.778	8.571	15.200	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:10	JDT	N/A
U-235	-8.695	13.255	23.300	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:10	JDT	N/A
U-238	47.701	57.826	85.500	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:10	JDT	N/A

NOTES:

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ARS Sample Delivery Group:	ARS1-12-01622	**Request or PO Number:**	N/A
Client Sample ID:	5098912.2	**ARS Sample ID:**	ARS1-12-01622-002
Sample Collection Date:	08/09/12	**Date Received:**	08/09/12
Sample Matrix:	Aqueous	**Report Date:**	08/10/12

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
BE-7	-14.754	65.697	32.700	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:13	JDT	N/A
K-40	41.756	32.505	40.300		pCi/L	ARS-006/EPA 901.1	08/09/12 16:13	JDT	N/A
SC-46	0.523	2.233	3.780	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:13	JDT	N/A
CO-60	-0.929	69.752	3.580	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:13	JDT	N/A
CS-137	-0.913	2.598	4.350	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:13	JDT	N/A
TL-208	2.994	2.883	3.690	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:13	JDT	N/A
PB-210	-13.117	63.112	84.900	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:13	JDT	N/A
BI-212	-17.034	192.500	33.000	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:13	JDT	N/A
BI-214	27.598	11.059	8.100		pCi/L	ARS-006/EPA 901.1	08/09/12 16:13	JDT	N/A
PB-214	17.871	6.991	8.980		pCi/L	ARS-006/EPA 901.1	08/09/12 16:13	JDT	N/A
RA-226	19.067	47.791	85.400	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:13	JDT	N/A
RA-228	-0.164	8.441	15.100	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:13	JDT	N/A
U-235	8.670	13.734	22.700	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:13	JDT	N/A
U-238	-21.786	49.388	67.400	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:13	JDT	N/A

NOTES:

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ARS Sample Delivery Group:	ARS1-12-01622	**Request or PO Number:**	N/A
Client Sample ID:	5098912.3	**ARS Sample ID:**	ARS1-12-01622-003
Sample Collection Date:	08/09/12	**Date Received:**	08/09/12
Sample Matrix:	Aqueous	**Report Date:**	08/10/12

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
BE-7	5.356	17.003	28.400	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:17	JDT	N/A
K-40	5.642	39.022	63.000	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:17	JDT	N/A
SC-46	-0.020	3.003	3.410	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:17	JDT	N/A
CO-60	1.306	2.068	3.450	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:17	JDT	N/A
CS-137	-0.015	1.724	2.950	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:17	JDT	N/A
TL-208	-1.297	3.013	4.030	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:17	JDT	N/A
PB-210	-101.330	69.643	97.100	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:17	JDT	N/A
BI-212	-11.412	16.714	30.300	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:17	JDT	N/A
BI-214	12.708	5.890	8.710		pCi/L	ARS-006/EPA 901.1	08/09/12 16:17	JDT	N/A
PB-214	9.035	5.212	8.970		pCi/L	ARS-006/EPA 901.1	08/09/12 16:17	JDT	N/A
RA-226	-518.560	40.252	82.100	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:17	JDT	N/A
RA-228	4.788	7.659	13.600	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:17	JDT	N/A
U-235	-2.509	12.475	17.900	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:17	JDT	N/A
U-238	-42.223	36.696	75.200	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:17	JDT	N/A

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ARS Sample Delivery Group:	ARS1-12-01622	**Request or PO Number:**	N/A
Client Sample ID:	5098912.4	**ARS Sample ID:**	ARS1-12-01622-004
Sample Collection Date:	08/09/12	**Date Received:**	08/09/12
Sample Matrix:	Aqueous	**Report Date:**	08/10/12

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
BE-7	-3.357	16.044	27.500	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:34	JDT	N/A
K-40	23.996	36.221	43.500	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:34	JDT	N/A
SC-46	0.124	1.978	3.370	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:34	JDT	N/A
CO-60	-1.974	24.191	4.430	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:34	JDT	N/A
CS-137	0.402	2.093	3.530	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:34	JDT	N/A
TL-208	0.192	2.733	3.600	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:34	JDT	N/A
PB-210	14.987	52.899	75.600	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:34	JDT	N/A
BI-212	-0.765	19.030	28.300	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:34	JDT	N/A
BI-214	18.783	9.444	8.240		pCi/L	ARS-006/EPA 901.1	08/09/12 16:34	JDT	N/A
PB-214	10.153	4.730	7.740		pCi/L	ARS-006/EPA 901.1	08/09/12 16:34	JDT	N/A
RA-226	18.646	48.812	67.000	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:34	JDT	N/A
RA-228	0.910	7.363	13.200	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:34	JDT	N/A
U-235	3.281	9.982	17.100	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:34	JDT	N/A
U-238	36.324	45.944	63.600	U	pCi/L	ARS-006/EPA 901.1	08/09/12 16:34	JDT	N/A

NOTES:

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QC Results per Analytical Batch

Analytical Batch	ARS1-B12-01905
SDG	ARS1-12-01622
Analysis	Gamma Spec (Aqueous)
Analysis Test Method	ARS-006/EPA 901.1
Analysis Code	GAM-A-015
Report Units	pCi/L

Acceptable QC Performance Ranges

QC Sample Type	Performance Items and Ranges		
Laboratory Control Sample	Recovery (%):	> 75	< 125
Matrix Spike	Recovery (%):	> 60	< 140
Duplicate	Replicate Error Ratio (RER):		< 1
	Duplicate Error Ratio (DER):		< 3
	Relative Percent Difference (RPD %):		≤ 25

Laboratory Control Sample

Analysis Date: 08/09/12 16:02 — Analysis Technician: JDT

Analysis Batch Sample ID	QC Type	Analyte	Results	CSU (2s)	Expected Value	LCS Rec (%)	MDC
ARS1-B12-01905-01	LCS	AM-241	39800	2900	42703	93	440
ARS1-B12-01905-01	LCS	CO-60	72800	3500	73568	99	480
ARS1-B12-01905-01	LCS	CS-137	64100	4200	63865	100	250

Duplicate RER/DER/RPD

Analysis Date: 08/09/12 16:15 — Analysis Technician: JDT

Analyte	Result LCS	CSU LCS (2s)	Results LCSD	CSU LCSD (2s)	RER	DER	RPD
AM-241	39800	2939	43900	3611	0.63	1.75	9.8
CO-60	72800	3472	73700	2817	0.14	0.39	1.2
CS-137	64100	4244	64100	2693	0.00	0.00	0.0

Method Blank

Analysis Date: 08/09/12 16:08 — Analysis Technician: JDT

Analysis Batch Sample ID	QC Type	Analyte	Results	CSU (2s)	MDC	Qual
ARS1-B12-01905-03	MBL	AM-241	0.0	1.6	2.6	U
ARS1-B12-01905-03	MBL	CO-60	0.0	1.1	1.8	U
ARS1-B12-01905-03	MBL	CS-137	0.43	0.77	1.3	U

Joanie Haigler

Joanie Haigler

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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.

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, 18th, 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 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 (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
12.0)	**	False Positive due to interference from Bi-214
13.0)	**U**	Activity is below the MDC
14.0)	**LCS/LCSD**	Laboratory Control Standard/Laboratory Control Standard Duplicate
15.0)	**DLC**	Decision Level Concentration (ANSI N42.23) or critical level

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LELAP Cert# 01949 ***NELAP Cert# E87558***

STATE OF LOUISIANA

DEPARTMENT OF ENVIRONMENTAL QUALITY

CHAIN OF CUSTODY

LABORATORY SERVICES

System Code

Name: DEQ ID# AI 182981

Address: 602 N. 5th St. 8-10-12 JAH From J.

Location: Baton Rouge LA 70802

Parish: EBR Team Leader: Karen Price

Permit Number/Inspector's Log Number:

Additional Team Members: Bryan Riche'

List any Field Data Sheets that accompany the sample

Office Org # Project Code

Additional Comments: Rush

Sample #/Sampler I.D.	Location ID/Outfall/ (Canister S.N.)	Date	Time	Sample Medium/Type	Methodology	Preservatives	Grab or Comp	# Containers	# Aliquots	Requested Analysis									Destination* AL, BL,RL, WL	Remarks (Priority, etc.)
5098912.1	NW	8/9/12	11:42A	Water	Ra226/228	ice														
5098912.2	NE	8/9/12	11:47A	Water	↓	↓														
5098912.3	SE	8/9/12	11:52A	Water	↓	↓														
5098912.4	SW	8/9/12	11:56A	Water	↓	↓														
*5098912.5	W side	8/9/12	11:59A	Soil	↓	↓														

Split Samples Accepted? N/A

If yes, Accepted By:

Name:

Signature:

Sample #(s):

*5098912.5 Logged in under AAS1-12-01622 8-9-12 JAH

Sample Number	Aliquot	Grab	Team	Witness Name/Signature	Title

CHAIN OF CUSTODY

Relinquished by:	Date	Time	Received By:
[signature]	8/9/2012	14:41	[signature] 8/9/12 14:42

Recommended Sample Disposition:

Final Sample Disposition:

Date:

*AL=Air Lab, BL=Bioassay Lab, RL-Radiation Lab, WL=Water Lab