



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

## American Radiation Services, Inc.

### Laboratory Analysis Report

**ARS1-12-01623**

*Prepared for:*

### LA Department of Environmental Quality

Randy Creighton, Sandy Wackett

Judith Schuerman

Office of Environmental Compliance

P.O. Box 4312

Baton Rouge, LA 70821-4312

randy.creighton@la.gov; sandy.wackett@la.gov

deqlabinfo@la.gov; judith.schuerman@la.gov

Phone: 225-219-3678

Fax: 225-219-3708

  
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

ProjectManagers@amrad.com

Phone: 225.381.2991

Fax: 225.381.2996

LELAP Cert# 01949



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**ARS Sample Delivery Group:** ARS1-12-01623  
**Client Sample ID:** 5098912.5  
**Sample Collection Date:** 08/09/12  
**Sample Matrix:** Soil/Solid/Sludge

**Request or PO Number:** N/A  
**ARS Sample ID:** ARS1-12-01623-001  
**Date Received:** 08/09/12  
**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	-0.005	0.191	2.170	U	pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A
K-40	0.994	1.620	3.150	U	pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A
SC-46	-0.050	0.250	0.256	U	pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A
CO-60	-0.058	0.151	0.265	U	pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A
CS-137	-0.016	0.477	0.226	U	pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A
TL-208	0.182	0.135	0.215	U	pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A
PB-210	1.627	1.992	3.450	U	pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A
BI-212	0.038	1.055	1.930	U	pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A
BI-214	0.873	0.386	0.562		pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A
PB-214	1.107	1.049	0.434		pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A
RA-226	-0.076	2.186	3.800	U	pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A
RA-228	0.356	0.488	0.852	U	pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A
TH-228	0.605	0.267	0.320		pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A
U-235	-0.217	2.860	1.030	U	pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A
U-238	0.388	2.151	3.930	U	pCi/g	ARS-007/EPA 901.1M	08/09/12 16:37	JDT	N/A

**NOTES:**

Project Manager Review

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## QC Results per Analytical Batch

Analytical Batch	ARS1-B12-01902
SDG	ARS1-12-01623
Analysis	Gamma Spec (Solid)
Analysis Test Method	ARS-007/EPA 901.1M
Analysis Code	GAM-A-020
Report Units	pCi/g

### 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 09:46	Analysis Technician	JDT	
Analysis Batch Sample ID	QC Type	Analyte	Results	CSU (2s)	Expected Value	LCS Rec (%)	MDC
ARS1-B12-01902-01	LCS	AM-241	39200	2900	40000	98	750
ARS1-B12-01902-01	LCS	CO-60	66000	4500	67189	98	620
ARS1-B12-01902-01	LCS	CS-137	56600	3900	57270	99	370

Duplicate RER/DER/RPD				Analysis Date	08/09/12 09:57	Analysis Technician	JDT
Analyte	Result LCS	CSU LCS (2s)	Results LCSD	CSU LCSD (2s)	RER	DER	RPD
AM-241	39200	2885	40800	3151	0.26	0.73	4.0
CO-60	66000	4470	67400	2657	0.19	0.52	2.1
CS-137	56600	3894	59300	2535	0.42	1.13	4.7

Method Blank			Analysis Date	08/09/12 09:48	Analysis Technician	JDT
Analysis Batch Sample ID	QC Type	Analyte	Results	CSU (2s)	MDC	Qual
ARS1-B12-01902-03	MBL	AM-241	-5	15	25	U
ARS1-B12-01902-03	MBL	CO-60	-2	27	22	U
ARS1-B12-01902-03	MBL	CS-137	1.2	10.0	18	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<sup>®</sup>** 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, 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 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)  | <b>ND</b>       | Not detected above the detection limit (non-detect).  |
| 2.0)  | <b>MDC</b>      | (Minimum Detectable Concentration) minimum concentration of the analyte that ARS can detect utilizing the specific analysis |
| 3.0)  | <b>MBL</b>      | Method Blank  |
| 4.0)  | <b>DO</b>       | Duplicate Original  |
| 5.0)  | <b>DUP</b>      | Method Duplicate  |
| 6.0)  | <b>MS/MSD</b>   | Matrix Spike/Matrix Spike Duplicate   |
| 7.0)  | <b>S</b>        | Spike   |
| 8.0)  | <b>RS</b>       | Reference Spike   |
| 9.0)  | <b>*SC</b>      | Subcontracted out to another qualified laboratory   |
| 10.0) | <b>NR</b>       | Not Referenced  |
| 11.0) | <b>N/A</b>      | Not Applicable  |
| 12.0) | <b>**</b>       | False Positive due to interference from <u>Bi-214</u>   |
| 13.0) | <b>U</b>        | Activity is below the MDC   |
| 14.0) | <b>LCS/LCSD</b> | Laboratory Control Standard/Laboratory Control Standard Duplicate   |
| 15.0) | <b>DLC</b>      | Decision Level Concentration (ANSI N42.23) or critical level  |

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