



2609 North River Road, Port Allen, Louisiana 70767

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

American Radiation Services, Inc.

Laboratory Analysis Report

ARS1-12-01669

Prepared for:

LA Department of Environmental Quality

Randy Creighton, Sandy Wackett

Office of Environmental Compliance

P.O. Box 4312

Baton Rouge, LA 70821-4312

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

deqlabinfo@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: ARS1-12-01669
Client Sample ID: 040-081512-09-A
Sample Collection Date: 08/15/12
Sample Matrix: Aqueous

Request or PO Number: N/A
ARS Sample ID: ARS1-12-01669-001
Date Received: 08/15/12
Report Date: 08/17/12

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	-4.831	269.420	19.900	U	pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A
K-40	124.400	29.943	27.200		pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A
SC-46	0.288	1.390	2.350	U	pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A
CO-60	-0.004	1.486	2.560	U	pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A
CS-137	1.206	1.522	2.510	U	pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A
TL-208	4.819	2.765	2.610		pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A
PB-210	-18.060	42.053	53.200	U	pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A
BI-212	3.517	11.084	19.400	U	pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A
BI-214	15.590	5.604	5.430		pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A
PB-214	15.517	3.668	5.720		pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A
RA-226	63.569	34.522	48.400		pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A
RA-228	18.705	5.383	8.410		pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A
TH-228	12.776	2.817	3.780		pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A
U-235	6.213	8.700	14.400	U	pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A
U-238	-7.312	35.349	46.300	U	pCi/L	ARS-006/EPA 901.1	08/16/12 15:40	JDT	N/A

NOTES:

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QC Results per Analytical Batch

Analytical Batch	ARS1-B12-01982
SDG	ARS1-12-01669
Analysis	Gamma Spec (Aqueous)
Analysis Test Method	ARS-006/EPA 901.1
Analysis Code	GAM-A-015
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	08/16/12 15:25	Analysis Technician	JDT	
Analysis Batch Sample ID	QC Type	Analyte	Results	CSU (2s)	Expected Value	LCS Rec (%)	MDC
ARS1-B12-01982-01	LCS	AM-241	45500	3500	43730	104	660
ARS1-B12-01982-01	LCS	CO-60	67600	2600	68162	99	580
ARS1-B12-01982-01	LCS	CS-137	52900	2300	51811	102	320

Duplicate RER/DER/RPD				Analysis Date	08/16/12 15:43	Analysis Technician	JDT
Analyte	Result LCS	CSU LCS (2s)	Results LCSD	CSU LCSD (2s)	RER	DER	RPD
AM-241	45500	3467	43500	3269	0.29	0.81	4.5
CO-60	67600	2648	68800	2573	0.23	0.63	1.8
CS-137	52900	2269	53500	2192	0.13	0.37	1.1

Method Blank			Analysis Date	08/16/12 15:55	Analysis Technician	JDT
Analysis Batch Sample ID	QC Type	Analyte	Results	CSU (2s)	MDC	Qual
ARS1-B12-01982-03	MBL	AM-241	-0.1	2.1	2.9	U
ARS1-B12-01982-03	MBL	CO-60	0.4	1.4	2.3	U
ARS1-B12-01982-03	MBL	CS-137	-0.2	1.2	2.1	U

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 <u>Bi-214</u> |
| 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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