



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

American Radiation Services, Inc.

Laboratory Analysis Report

ARS1-10-02678

Prepared for:

Nuclear Regulatory Commission (NRC)

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Region III/DNMS/MCID Branch
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Lisle, IL 60532
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Fax: 630-515-1259

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

NELAP Cert# E87558



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

ARS Sample Delivery Group: ARS1-10-02678
Client Sample ID: BD-10-2-01
Sample Collection Date: 12-13-10
Sample Matrix: Aqueous

Request or PO Number: N/A
ARS Sample ID: ARS1-10-02678-001
Date Received: 12-15-10
Report Date: 01-05-11

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
H-3	266.703	115.579	183.244	90.228		pCi/L	ARS-054/EPA 906.0	12-29-10 17:13	BJS	N/A

NOTES:

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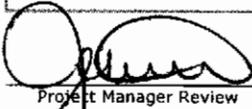
1 (800) 401-4277 FAX (225) 381-2996

ARS Sample Delivery Group: ARS1-10-02678
Client Sample ID: BD-10-2-02
Sample Collection Date: 12-13-10
Sample Matrix: Aqueous

Request or PO Number: N/A
ARS Sample ID: ARS1-10-02678-002
Date Received: 12-15-10
Report Date: 01-05-11

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
H-3	49.432	108.620	183.400	30.305	U	pCi/L	ARS-054/EPA 906.0	12-29-10 21:21	BJS	N/A

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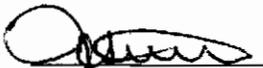
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ARS Sample Delivery Group: ARS1-10-02678
Client Sample ID: BD-10-2-03
Sample Collection Date: 12-13-10
Sample Matrix: Aqueous

Request or PO Number: N/A
ARS Sample ID: ARS1-10-02678-003
Date Received: 12-15-10
Report Date: 01-05-11

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
H-3	137.758	110.500	182.538	89.880	U	pCi/L	ARS-054/EPA 906.0	12-30-10 01:29	BJS	N/A

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ARS Sample Delivery Group: ARS1-10-02678
 Client Sample ID: BD-10-2-04
 Sample Collection Date: 12-13-10
 Sample Matrix: Aqueous

Request or PO Number: N/A
 ARS Sample ID: ARS1-10-02678-004
 Date Received: 12-15-10
 Report Date: 01-05-11

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
H-3	113.427	110.027	182.972	90.094	U	pCi/L	ARS-054/EPA 906.0	12-30-10 05:37	BJS	N/A

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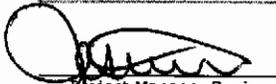
1 (800) 401-4277 FAX (225) 381-2996

ARS Sample Delivery Group: ARS1-10-02678
Client Sample ID: BD-10-2-05
Sample Collection Date: 12-13-10
Sample Matrix: Aqueous

Request or PO Number: N/A
ARS Sample ID: ARS1-10-02678-005
Date Received: 12-15-10
Report Date: 01-05-11

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
H-3	129.301	111.392	184.512	90.852	U	pCi/L	ARS-054/EPA 906.0	12-30-10 09:45	BJS	N/A

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ARS Sample Delivery Group: ARS1-10-02678
Client Sample ID: BD-10-2-06
Sample Collection Date: 12-13-10
Sample Matrix: Aqueous

Request or PO Number: N/A
ARS Sample ID: ARS1-10-02678-006
Date Received: 12-15-10
Report Date: 01-05-11

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
H-3	66.923	109.343	183.924	90.563	U	pCi/L	ARS-054/EPA 906.0	12-30-10 13:54	BJS	N/A

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ARS Sample Delivery Group: ARS1-10-02678
Client Sample ID: BD-10-2-07
Sample Collection Date: 12-13-10
Sample Matrix: Aqueous

Request or PO Number: N/A
ARS Sample ID: ARS1-10-02678-007
Date Received: 12-15-10
Report Date: 01-05-11

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
H-3	203.284	113.525	183.956	90.578		pCi/L	ARS-054/EPA 906.0	12-30-10 18:03	BJS	N/A

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ARS Sample Delivery Group: ARS1-10-02678
Client Sample ID: BD-10-2-08
Sample Collection Date: 12-13-10
Sample Matrix: Aqueous

Request or PO Number: N/A
ARS Sample ID: ARS1-10-02678-008
Date Received: 12-15-10
Report Date: 01-05-11

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
H-3	1094.743	168.599	182.960	90.088		pCi/L	ARS-054/EPA 906.0	12-30-10 22:13	BJ5	N/A

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ARS Sample Delivery Group: ARS1-10-02678
Client Sample ID: BD-10-2-09
Sample Collection Date: 12-13-10
Sample Matrix: Aqueous

Request or PO Number: N/A
ARS Sample ID: ARS1-10-02678-009
Date Received: 12-15-10
Report Date: 01-05-11

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	DLC	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
H-3	1826.638	232.301	184.162	90.680		pCi/L	ARS-054/EPA 906.0	12-31-10 02:23	BJS	N/A

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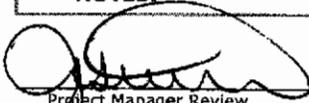
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ARS Sample Delivery Group: ARS1-10-02678
Client Sample ID: BD-10-2-10
Sample Collection Date: 12-13-10
Sample Matrix: Aqueous

Request or PO Number: N/A
ARS Sample ID: ARS1-10-02678-010
Date Received: 12-15-10
Report Date: 01-05-11

Analysis Description	Analysis Results	Analysis Error +/- 2 s	MDC	DLC	Quel	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Tracer/Chem Recovery
H-3	463.201	124.837	182.826	89.898		pCi/L	ARS-054/EPA 906.0	12-31-10 06:33	BJS	N/A

NOTES:



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QC Results Report

Sample Delivery Group: ARS1-10-02678
 Date Received: 12-15-2010

Laboratory Control Sample Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (2s)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Percent Recovery (%)	LCS Acceptance Range
ARS1-B10-05762	LCS	H3	2610.533	305.465	182.574	2496.479		pCi/L	ARS-054/EPA 906.0	12-29-10 12:41	BJS	105	75%-125%

Blank Evaluation

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (2s)	MDC	Expected Value	Qual	Report Units	Analysis Test Method	Analysis Date/Time	Analysis Technician
ARS1-B10-05762	MBL	H3	124.533	109.314	181.192	NA	U	pCi/L	ARS-054/EPA 906.0	12-29-10 12:41	BJS

RER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (2s)	Result 2	CSU 2 (2s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	RER	RER Acceptance Range
ARS1-B10-05762	LCSD	H3	2610.533	305.465	2608.230	305.450		pCi/L	ARS-054/EPA 906.0	12-29-10 12:41	BJS	0.00	< 1

DER Duplicate Evaluation

Analysis Batch	QC Type	Analysis Description	Result 1	CSU 1 (2s)	Result 2	CSU 2 (2s)	Qual	Analysis Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	DER	DER Acceptance Range
ARS1-B10-05762	LCSD	H3	2610.533	305.465	2608.230	305.450		pCi/L	ARS-054/EPA 906.0	12-29-10 12:41	BJS	0.01	< 3

Matrix Spike

Analysis Batch	QC Type	Analyte	Analysis Results	CSU 1 (2s)	Unspiked Activity	Spike Con.	Qual	Report Units	Analysis Test Method	Analysis Date/Time	Analysis Technician	Percent Recovery (%)	M5 Acceptance Range
ARS1-B10-05762	MS	H3	7342.233	778.582	266.703	7413.40		pCi/L	ARS-054/EPA 906.0	12-29-10 12:41	BJS	95	60%-140%

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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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NRC FORM 303
(1-2007)

U.S. NUCLEAR REGULATORY COMMISSION

LABORATORY USE ONLY

**REQUEST FOR ANALYSIS AND
CHAIN OF CUSTODY**

LABORATORY -- ORISE OTHER ARS
(Specify)

CONTROL NUMBER

BD-10-2

SAMPLE LOCATION (LICENSEE)

Braidwood Station

INSPECTION NO.

05000456/2010005

LICENSE NO.

DOCKET NO.

050-00456

SAMPLE SUBMITTED

# TOTAL	TYPE	VOLUME	WEIGHT	DATE SAMPLES SUBMITTED	PRIORITY
7	H2O	500 ml/ea	n/a	12/14/10	<input checked="" type="checkbox"/> ROUTINE <input type="checkbox"/> URGENT
3	H2O	250 ml/ea	n/a		

SAMPLE COLLECTION INTERVAL

	MONTH	DAY	YEAR	TIME
START	12	13	10	0922
STOP	12	13	10	1605

INSPECTOR RESPONSIBLE

Gene Bonano

TELEPHONE NUMBER

630-829-9826

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"/>	
<input type="checkbox"/> GROSS BETA (GB)		<input type="checkbox"/>	
<input type="checkbox"/> GAMMA SPEC (GS)		<input type="checkbox"/>	
<input checked="" type="checkbox"/> TRITIUM (H3)	200 pCi/L	<input type="checkbox"/>	
<input type="checkbox"/> CARBON-14 (C14)		<input type="checkbox"/>	
<input type="checkbox"/> IODINE-125 (I125)		<input type="checkbox"/>	

RELINQUISHED BY	RECEIVED BY	DATE	TIME	REASON FOR CHANGE OF CUSTODY
Gene Bonano	FEDEX	12/14/10	1700	Samples shipped to LAB (ARS)
	<i>[Signature]</i>	12-15-10	10:28	

FEE RECOVERABLE

YES NO

TAC NUMBER

(If Assigned)

REMARKS

Do not process/analyze samples until directed/authorized by Richard Conatser (Tel.: 301-415-4039), NRR, HQ NRC...

Hold samples until notified by NRC...

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

