

# **2014 Radiological Monitoring Results Associated with the Advanced Test Reactor Complex Cold Waste Pond**

Mike Lewis

February 2015



The INL is a U.S. Department of Energy National Laboratory  
operated by Battelle Energy Alliance

# **2014 Radiological Monitoring Results Associated with the Advanced Test Reactor Complex Cold Waste Pond**

**Mike Lewis**

**February 2015**

**Idaho National Laboratory**

**Idaho Falls, Idaho 83415**

**<http://www.inl.gov>**

**Prepared for the  
U.S. Department of Energy  
Office of Nuclear Energy  
Under DOE Idaho Operations Office  
Contract DE-AC07-05ID14517**

Enclosure  
February 24, 2015  
CCN 235006  
INL/EXT-15-34084

## **2014 Radiological Monitoring Results Associated with the Advanced Test Reactor Complex Cold Waste Pond**



## **ABSTRACT**

This report summarizes radiological monitoring performed of the Idaho National Laboratory Site's Advanced Test Reactor Complex Cold Waste wastewater prior to discharge into the Cold Waste Pond and of specific groundwater monitoring wells associated with the Industrial Wastewater Reuse Permit (#LA-000161-01, Modification B). All radiological monitoring is performed to fulfill Department of Energy requirements under the Atomic Energy Act.



## CONTENTS

ABSTRACT.....	iii
1 BACKGROUND.....	1
2 RADIOLOGICAL SAMPLE RESULTS.....	1
2.1 Reporting Period.....	1
2.2 Effluent Sample Results.....	1
2.3 Groundwater Sample Results.....	2
3 REFERENCES.....	4

## TABLES

Table 1. Advanced Test Reactor Complex Cold Waste Pond effluent gross alpha and gross beta radiological results for the period of November 2013 through October 2014.....	2
Table 2. Gross alpha, gross beta, and tritium results from samples collected in April and October 2014 from the Advanced Test Reactor Complex Cold Waste Pond Industrial Wastewater Reuse Permit monitoring wells.....	3





# **2014 Radiological Monitoring Results Associated with the Advanced Test Reactor Complex Cold Waste Pond**

## **1 BACKGROUND**

The radiological information presented in this report is provided based upon an agreement between the Idaho Department of Environmental Quality and the U.S. Department of Energy Idaho Operations Office. This report fulfills the terms of agreement documented in the current Industrial Wastewater Reuse Permit (IWRP) #LA-000161-01 for the Idaho National Laboratory Site's Advanced Test Reactor Complex (ATR Complex, formerly Reactor Technology Complex) Cold Waste Pond (CWP). The IWRP was issued on February 26, 2008 (Johnston 2008) and modified (Modification B) on August 20, 2008 (Eager 2008).

As stated in Section H ("Standard Reporting Requirements"), items 6 and 7 of the IWRP:

- The permittee agrees to provide to the Department the results of radiological monitoring of the effluent, prior to discharge into the percolation pond, with respect to the INL-ATR Complex Cold Waste Pond that is performed to fulfill Department of Energy requirements under the Atomic Energy Act. The permittee agrees to provide the results with the Annual Report.
- The permittee agrees to provide to the Department the results of ground water radiological monitoring with respect to the INL-ATR Complex Cold Waste Pond that is performed to fulfill Department of Energy requirements under the Atomic Energy Act. The permittee agrees to provide the results with the Annual Report.

## **2 RADIOLOGICAL SAMPLE RESULTS**

### **2.1 Reporting Period**

For the ATR Complex CWP, this IWRP reporting year runs from November 1, 2013–October 31, 2014. As stated in the "Facility Monitoring Table" of Section G of the IWRP, groundwater sampling shall be conducted in April and October each year. Therefore, the groundwater results presented will be from the April and October 2014 sampling events.

### **2.2 Effluent Sample Results**

Samples were collected to satisfy the release objectives of DOE Order 458.1 and is addressed within the Environmental Management System required by DOE Order 436.1.

Monthly composite samples were collected from TRA-764 (WW-016101) using a flow proportional composite sampler. The monthly composite samples were analyzed by gamma spectrometry, and for gross alpha and gross beta.

If the gross beta activity were to exceed 15 pCi/L, a contingency analysis for strontium-90 would be performed on the sample. For this reporting year, the gross beta level of 15 pCi/L was exceeded in the February, June, and August 2014. Strontium-90 was not detected in these samples.

Beginning with the June 2013 sampling event, contingency analyses for radium-226 and radium-228 were performed if the gross alpha activity in the sample exceeded 5 pCi/L. No contingency analyses for radium were required.

Additional iodine-129, strontium-89/90, and tritium analyses were performed on the sample collected in September 2014. The results for these radionuclides were reported as undetected by the laboratory.

All monthly gamma spectrometry results were reported as undetected with the exception of the April and June (field duplicate) potassium-40 samples with activity levels of 23 pCi/L and 31.9 pCi/L, respectively. The initial June sample result for potassium-40 was rejected by the laboratory because of high counting uncertainty. Potassium-40 is a naturally occurring isotope of potassium and has been detected occasionally in samples collected in previous years.

Table 1 shows the monthly gross alpha and gross beta results. Positive detections are considered measurements exceeding the instrument's minimum detection level and greater than two times the uncertainty.

Table 1. Advanced Test Reactor Complex Cold Waste Pond effluent gross alpha and gross beta radiological results for the period of November 2013 through October 2014.

Sample Month	Gross Alpha (pCi/L)	Gross Beta (pCi/L)
November 2013	ND <sup>a</sup>	4.75 ( $\pm$ 0.982) <sup>b</sup>
December 2013	ND	8.32 ( $\pm$ 1.18)
January 2014	ND	12.1 ( $\pm$ 1.08)
February 2014	ND	15.5 ( $\pm$ 1.18)
March 2014	ND	13.6 ( $\pm$ 0.972)
April 2014	ND	3.36 ( $\pm$ 0.91)
May 2014	1.89 ( $\pm$ 0.605)	2.55 ( $\pm$ 0.685)
June 2014	ND ND <sup>c</sup>	13.4 ( $\pm$ 1.28) 15.7 <sup>c</sup> ( $\pm$ 1.38)
July 2014	2.38 ( $\pm$ 0.664)	ND
August 2014	ND	15.3 ( $\pm$ 1.22)
September 2014	ND	ND
October 2014	ND	ND
a. ND – Not detected. b. One sigma uncertainty shown in parenthesis. c. Field duplicate sample result.		

## 2.3 Groundwater Sample Results

Samples were collected to satisfy the release objectives of DOE Order 458.1 and addressed within the Environmental Management System required by DOE Order 436.1.

Groundwater samples for radiological parameters were collected from aquifer wells Middle-1823, TRA-07, TRA-08, USGS-065, and USGS-076 in April and October 2014. A field duplicate sample was collected from USGS-076 on April 8, 2014. Samples were analyzed by gamma spectrometry, and for gross alpha, gross beta, tritium, and strontium-90.

Only gross alpha, gross beta, and tritium were positively detected in the April and/or October samples (Table 2). Positive detections are considered measurements exceeding the instrument's minimum detection level and greater than two times the uncertainty.

Table 2. Gross alpha, gross beta, and tritium results from samples collected in April and October 2014 from the Advanced Test Reactor Complex Cold Waste Pond Industrial Wastewater Reuse Permit monitoring wells.

Monitoring Wells:			
Monitoring Well	Sample Date	Parameter	Sample Result (pCi/L)
USGS-065	04/09/14	Gross Alpha	ND
		Gross Beta	5.73 (± 0.547) <sup>a</sup>
		Tritium	2,330 (± 277)
	10/07/14	Gross Alpha	ND <sup>b</sup>
		Gross Beta	8.17 (± 1.25)
		Tritium	2,450 (± 298)
TRA-07	04/09/14	Gross Alpha	ND
		Gross Beta	6.96 (± 0.578)
		Tritium	5,490 (± 581)
	10/16/14	Gross Alpha	2.82 (± 0.987)
		Gross Beta	8.06 (± 1.33)
		Tritium	6,580 (± 695)
TRA-08	04/07/14	Gross Alpha	ND
		Gross Beta	3.49 (± 0.554)
		Tritium	1,050 (± 160)
	10/06/14	Gross Alpha	ND
		Gross Beta	3.51 (± 0.923)
		Tritium	1,100 (± 182)
USGS-076	04/08/14	Gross Alpha	ND ND <sup>c</sup>
		Gross Beta	2.2 (± 0.53) ND <sup>c</sup>
		Tritium	471 (± 119) ND <sup>c</sup>
	10/07/14	Gross Alpha	ND
		Gross Beta	ND
		Tritium	ND
Middle-1823	04/08/14	Gross Alpha	ND
		Gross Beta	4.46 (± 0.531)
		Tritium	672 (± 136)
	10/06/14	Gross Alpha	ND
		Gross Beta	2.94 (± 0.797)
		Tritium	1,000 (± 177)
a. One sigma uncertainty shown in parentheses.			
b. ND – Not detected.			
c. Analytical result from field duplicate sample collected on April 8, 2014.			

### 3 REFERENCES

- 42 USC § 2011–2259, 1954, “Atomic Energy Act of 1954,” *United States Code*.
- DOE Order 436.1, 2011, “Departmental Sustainability,” U.S. Department of Energy, May 2, 2011.
- DOE Order 458.1, 2011, “Radiation Protection of the Public and the Environment,” U.S. Department of Energy, February 11, 2011.
- Eager, G., DEQ, to W. Hamel, DOE-ID, August 20, 2008, “Minor Modification B, Facility Name Change from Reactor Technology Complex (RTC) to Advanced Test Reactor Complex (ATR Complex), Cold Waste Pond, Wastewater Reuse Permit No. LA-000161-01,” CCN 214687.
- Johnston, J., DEQ, to W. Hamel, DOE-ID, February 26, 2008, “Reactor Technology Complex (RTC) Cold Waste Pond, Wastewater Reuse Permit No. LA-000161-01 (Industrial Wastewater),” CCN 212842.