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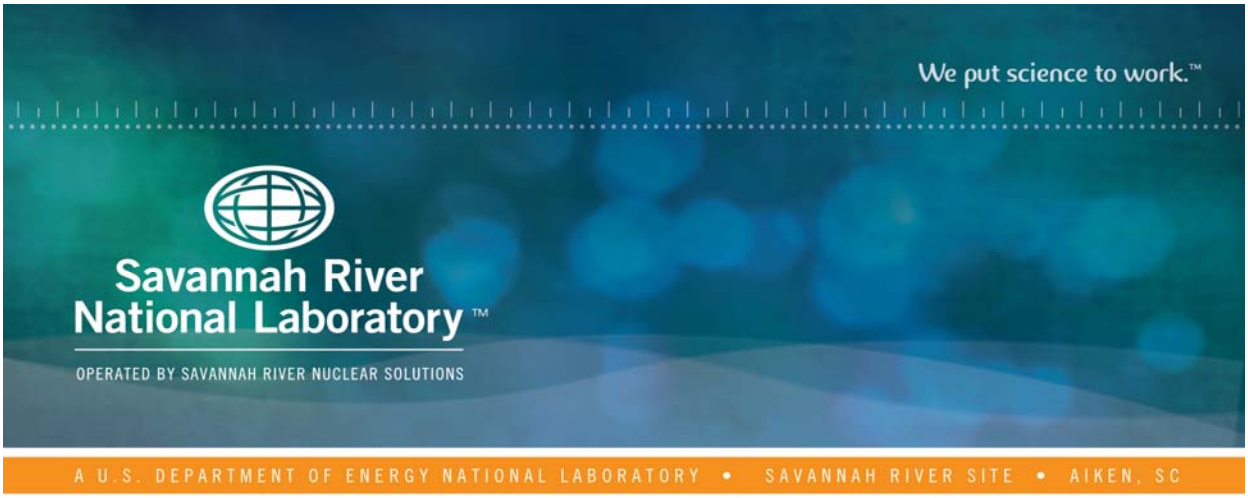

Characterization Results for the July 2018 H-Tank Farm 2H Evaporator Overhead Samples

A. L. Washington, II

March 2019

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EXECUTIVE SUMMARY

This report contains the radioanalytical results of the 2H evaporator overhead sample received at Savannah River National Laboratory (SRNL) on July 16, 2018. Specifically, concentrations of ^{137}Cs, ^{90}Sr, and ^{129}I are reported and compared to the corresponding Waste Acceptance Criteria (WAC) limits of the Effluent Treatment Project (ETP) Waste Water Collection Tank (WWCT) (rev. 6). The radionuclide concentrations in the sample were found to be in compliance with the ETP WAC limits.

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LIST OF ABBREVIATIONS

AD	Analytical Development
ELN	Electronic Laboratory Notebook
ETP	Effluent Treatment Project
SRNL	Savannah River National Laboratory
WAC	Waste Acceptance Criteria
WWCT	Waste Water Collection Tanks

1.0 Introduction

The Tank Farm has submitted the annual sample from the 2H evaporator overhead stream on July 16, 2018 for radiochemical characterization. Specifically, SRNL analyzed the sample for ^{137}Cs, ^{90}Sr, and, ^{129}I to verify compliance with the Effluent Treatment Project (ETP) Waste Acceptance Criteria (WAC)[1] (rev. 6).

2.0 Experimental Procedure

The 2H annual evaporator overhead sample arrived at the Savannah River National Laboratory on July 16, 2018. The sample consisted of one 250 mL glass bottle. For this report, a 150 mL sample aliquot was taken from the glass bottle and transferred to a 200 mL sample bottle more suitable for transmittal to the Analytical Development (AD) section. Since this sample was relatively low in activity, no dilution was required prior to submittal for analysis. De-ionized water was additionally submitted as a blank to verify the efficiency and accuracy of the instrumentation. Baseline levels of the experiments were confirmed internally from instrument calibrations.

Three different analytical methods were used by AD to determine the concentrations of ^{137}Cs, ^{90}Sr, and ^{129}I in the sample. Gamma spectrometry was used to determine the ^{137}Cs concentration. Radiochemical separation followed by liquid scintillation counting was utilized to determine the ^{90}Sr concentration. Radiochemical separation followed by low energy gamma photon spectroscopy was utilized to determine the ^{129}I concentration. These sample preparation and characterization techniques are in accordance with the "Task Technical and Quality Assurance Plan for 2014 Evaporator Overhead Sample Analysis".[2]

3.0 Results and Discussion

The results of the analyses provided in the table below are for a single determination by AD. For the ^{129}I and ^{90}Sr, the concentration fell below the lower limit of detection. In these cases, AD reported the lower limit of detection preceded by "<".

Table 3-1 provides the measured concentrations of ^{137}Cs, ^{129}I, and ^{90}Sr in the annual samples, along with the limits given in the current revision of the ETP WAC.[1] All radionuclide concentrations in the sample were found to be less than the corresponding ETP WAC limits.

Table 3-1. Results of Radiochemical Analysis

Analyte	2H Evap Overheads (dpm/mL) (one sigma % uncertainty)	Blank Sample Concentration (dpm/mL) (one sigma % uncertainty)	WWCT Feed Acceptance Limits (dpm/mL)
^{137}Cs	9.13E+01 (5.00%)	2.01E-01 (22.7%)	3.28E+02
^{129}I	<2.74E-02	<5.02E-02	1.00E+00
^{90}Sr	<4.99E+00	<1.70E+01	1.76E+02

The values listed in Table 3-1 are in good concurrence with previous data from 2011, 2013, 2014, 2016, and 2017 shown in Table 3-2. The ^{137}Cs concentration falls within the reported concentration range of previous samples and well below the ETP WAC limit. Similar to previous years, the ^{90}Sr and ^{129}I concentrations of the 2H evaporator overhead sample were below the detection limits and the ETP WAC acceptance limits.[3,4,5,6,7]

Table 3-2. Radiochemical Analysis on Previous 2H Evaporator Overhead Samples

Analyte	2009[3] (dpm/mL)	2011[4] (dpm/mL)	2014[5] (dpm/mL)	2016[6] (dpm/mL)	2017[7] (dpm/mL)	ETP WAC Acceptance Limits (dpm/mL)[1]
^{137}Cs	3.51E+01	1.76E+01	5.80E+01	7.04E+01	6.97E+01	3.28E+02
^{90}Sr	<2.98E+01	<1.63E+01	<8.17E+00	<1.00E+01	<5.35E+01	1.76E+02
^{129}I	<6.73E-01	<5.77E-01	<8.02E-02	5.83E-02	<6.66E-01	1.00E+00

3.1 Quality Assurance

This report was developed in accordance with the protocols identified in Task Technical and Quality Assurance Plan SRNL-RP-2014-00797.[2] Requirements for performing reviews of technical reports and the extent of review are established in manual E7 2.60. SRNL documents the extent and type of review using the SRNL Technical Report Design Checklist contained in WSRC-IM-2002-00011, Rev. 2. The data from this experiment is contained in an electronic laboratory notebook (ELN).[8]

4.0 Conclusions

The July 2018 2H Evaporator Overhead sample was found to be in compliance with the ETP WAC based on the limited radiochemical analysis performed for ^{137}Cs, ^{90}Sr, and ^{129}I. Additionally, the concentrations of the aforementioned radionuclides are in agreement with the previous analysis performed in 2009, 2011, 2014, 2016, and 2017.

5.0 References

[1] "F/H Effluent Treatment Facility Waste Acceptance Criteria," X-SD-H-00009, Revision 6, June 2012.

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[3] Washington, A. L., "Report on the Analysis of WAC Samples from Evaporator Overheads for 2009-revised," SRNL-STI-2010-00134, Rev. 1, December 2010.

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[5] Washington, A.L., "Characterization Results for the 2014 HTF 3H & 2H Evaporator Overhead Samples," SRNL-STI-2015-00198, May 2015.

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[7] Truong, T. T., "Characterization Results for the January 2017 H-Tank Farm 2H Evaporator Overhead Sample", SRNL-STI-2017-00166, Rev. 0, April 10, 2017.

[8] Electronic Laboratory Notebook "2018 2H Evaporator Overhead Samples," E5690-00077-16.

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