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Characterization Results for the 2014 HTF 3H & 2H Evaporator Overhead Samples

A. L. Washington, II

May 8, 2015

SRNL-STI-2015-00198, Revision 0

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EXECUTIVE SUMMARY

This report tabulates the radiochemical analysis of the 3H and 2H evaporator overhead samples for ^{137}Cs, ^{90}Sr, and ^{129}I to meet the requirements in the Effluent Treatment Project (ETP) Waste Acceptance Criteria (WAC) (rev. 6). This report identifies the sample receipt date, preparation method, and analysis performed in the accumulation of the listed values. All data was found to be within the ETP WAC (rev. 6) specification for the Waste Water Collection Tanks (WWCT).

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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 submitted annual samples from the 2H and 3H evaporator overhead stream on November 7, 2014 and January 7, 2015, respectively. These samples require radiochemical characterization 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 was pulled and arrived at the Savannah River National laboratory (SRNL) on November 7, 2014. Similarly, the 3H annual evaporator overhead sample was pulled and arrived at SRNL on January 7, 2015. SRNL received one 250 mL poly bottle for analysis for each sample. Both samples were prepared identically for submission to Analytical Development (AD). For this report, a 200 mL sample aliquot was taken from the poly bottles and transferred to a 250 mL sample bottle more suitable for transmittal to the AD. Since these samples were 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.

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)	3H Evap Overheads (dpm/mL)	Blank	ETP WAC Acceptance Limits (dpm/mL)
^{137}Cs	5.80E+01	1.52E+02	<1.42E-01	3.28E+02
^{90}Sr	<8.17E+00	<1.01E+01	<1.09E+01	1.76E+02
^{129}I	<8.02E-02	<2.94E-02	<5.95E-02	1.00E+00

The values listed in Table 3-1 are in good concurrence with previous data from 2011 and 2013. The 2H evaporator was not sampled for the 2013 report and was not included. In the 2011 sampling report, the concentrations of these radionuclides were 1.76E+01, <1.63E+01, and <5.77E-01 in units of dpm/mL for ^{137}Cs, ^{90}Sr, and ^{129}I, respectively. [2] The ^{137}Cs concentration has increased ~2X from the 2011 sampling to the current 2H sample. Additionally, both the ^{90}Sr and ^{129}I concentrations were below the detection limit in both the 2011 and 2014 samples. Comparing the current 3H values to the 2013 report, the ^{137}Cs values for the 3H evaporator sample are lower by nearly half of what they were in 2013. Additionally, the ^{90}Sr and ^{129}I remain below the detection limit as they were in the 2013 document.[3]

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.[4]

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).[5]

4.0 Conclusions

The 2H and 3H Evaporator Overhead samples were 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 2011.

5.0 References

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

[2] Washington, A.L., "Report on the Analysis of WAC Samples from Evaporator Overheads for 2011," SRNL-STI-2011-00660, March 2012.

[3] Washington, A.L., "Characterization Results for the 2013 HTF 3H Evaporator Overhead Samples," SRNL-STI-2013-00525, December 4, 2013.

[4] Washington, A.L., "Task Technical and Quality Assurance Plan for 2014 Evaporator Overhead Sample Analysis," SRNL-RP-2014-00797, Revision 0, September 8, 2014.

[5] Electronic Laboratory Notebook "3H Evaporator Overhead Analysis for 2013," E5690-00077-05.

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