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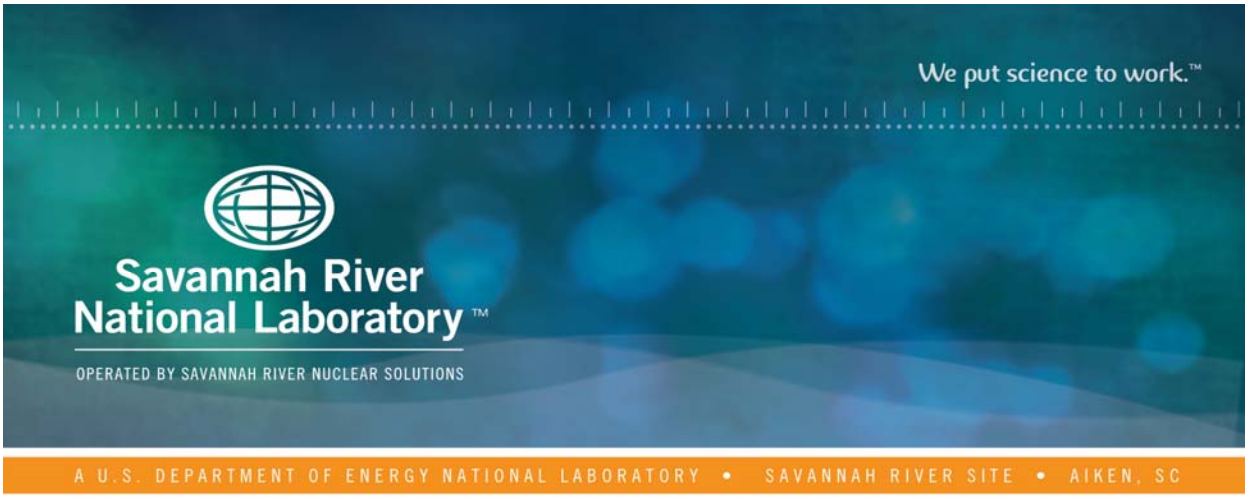

Characterization Results for the October 2015 H-Tank Farm 3H Evaporator Overhead Samples

J. C. Nicholson

January 28, 2016

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EXECUTIVE SUMMARY

This report contains the radioanalytical results of the 3H evaporator overhead sample received at SRNL on October 13, 2015. 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). All of 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 Tank

1.0 Introduction

The Tank Farm submitted the annual sample from the 3H evaporator overhead stream to SRNL on October 13, 2015. SRNL analyzed the sample for ^{137}Cs, ^{90}Sr, and ^{129}I, to verify compliance with the ETP WWCT WAC[1] (rev. 6).

2.0 Experimental Procedure

The 3H overheads sample was submitted to SRNL in a 250 mL poly bottle. The volume of the sample was approximately 200 mL. For this report, a 100 mL sample aliquot was taken from the poly bottle and transferred to a 200 mL sample bottle more suitable for transmittal to the Analytical Development (AD) laboratories. Since this sample was relatively low in activity, no dilution was required prior to submittal for analysis. One hundred milliliters of de-ionized water was additionally submitted as a blank, for routine quality assurance purposes (to monitor potential cross contamination).

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

Results of the analyses are provided in Table 3-1, along with the applicable ETP WAC limits.[1] Note that these results are based on single determinations performed by AD.

For the ^{90}Sr and ^{129}I results, the measured concentrations were less than the minimum detectable concentrations and therefore reported as values preceded by "<" symbols. In contrast, the ^{137}Cs concentration greater than the minimum detectable concentration and is reported as a discrete value (without being preceded by a "<" symbol). Uncertainties are reported in parentheses beside the result.

As shown in the table, all three radionuclide concentrations in the sample were found to be less than the corresponding ETP WAC limits.

Table 3-1. Results of Radiochemical Analysis

Analyte	October 2015 3H Evap Overheads Concentration (dpm/mL)	October 2015 3H Blank Sample Concentration (dpm/mL)	ETP WAC Acceptance Limits (dpm/mL)
^{137}Cs	1.52E+02 (5.00%)	<1.16E-01	3.28E+02
^{90}Sr	<3.47E+00	<2.71E-02	1.76E+02
^{129}I	<4.87E-02	<4.20E+00	1.00E+00

The analytical results listed in Table 3-1 are in relatively good agreement with previous results for 3H samples collected in August 2011, August 2013, and January 2015 shown in Table 3-2. All ^{90}Sr and ^{129}I concentration values measured across these four most recent sampling events were found to be below the minimum detectable concentrations and well below the ETP WAC acceptance limits. For the August 2011 sample, the ^{137}Cs concentration was found to be 2.26E+02 dpm/mL. [2] The ^{137}Cs concentration (2.65E+02 dpm/mL) increased about 15% from the August 2011 sampling to the August 2013 sampling.[3] For the January 2015 sample, the ^{137}Cs content (1.52E+02 dpm/mL) fell by nearly half from the 2013 results. However, the ^{137}Cs content of the October 2015 sample (1.52E+02 dpm/mL) is identical to that found for the January 2015 sample (1.52E+02 dpm/mL).[4] With the variability of ^{137}Cs concentrations determined over these past four sampling events, all of these concentrations were less than the ETP WAC acceptance limit.

Table 3-2. Results of Radiochemical Analysis

Analyte	August 2011 3H Evap Overheads Concentration (dpm/mL)	August 2013 3H Evap Overheads Concentration (dpm/mL)	January 2015 3H Evap Overheads Concentration (dpm/mL)	ETP WAC Acceptance Limits (dpm/mL)
^{137}Cs	2.26E+02	2.65E+02	1.52E+02	3.28E+02
^{90}Sr	<1.64E+01	<2.42E+00	<1.01E+01	1.76E+02
^{129}I	<6.06E-01	<3.33E-02	<2.94E-02	1.00E+00

Quality Assurance

This report was developed in accordance with the protocols identified in Task Technical and Quality Assurance Plan SRNL-RP-2014-00797.[5] 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). [6]

4.0 Conclusions

The October 2015 3H Evaporator Overhead sample was found to be in compliance with the ETP WAC, based on the required radiochemical analysis performed for ^{137}Cs, ^{90}Sr, and ^{129}I. Additionally, the concentrations of the aforementioned radionuclides are reasonably consistent with the concentrations previously reported for the August 2011, August 2013, and January 2015 3H Overhead samples.

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., "Characterization Results for the 2014 HTF 3H & 2H Evaporator Overhead Samples," SRNL-STI-2015-00198, May 8, 2015.

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

[6] Electronic Laboratory Notebook "2016 3H Evaporator Overhead Samples," L5796-00226-01.

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