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Characterization Results for the January 2017 H-Tank Farm 2H Evaporator Overhead Sample

T. T. Truong

J. C. Nicholson

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REVIEWS AND APPROVALS

AUTHORS:

_____
T. T. Truong, Advanced Characterization and Processing Date

_____
J. C. Nicholson, Nonproliferation Enabling Technologies Date

TECHNICAL REVIEW:

_____
J. H. Christian, Advanced Characterization and Processing, Reviewed per E7 2.60 Date

APPROVAL:

_____
B. J. Wiedenman, Manager Date
Advanced Characterization & Processing

_____
D. E. Dooley, Director, Environmental & Chemical Process Technology Research Programs Date

_____
P. W. Norris, Manager Date
Evaporator & ETP Engineering

EXECUTIVE SUMMARY

This report contains the radioanalytical results of the 2H evaporator overhead sample received at SRNL on January 19, 2017. 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 2H evaporator overhead stream to SRNL on January 19, 2017. SRNL analyzed the sample for ^{137}Cs, ^{90}Sr, and ^{129}I to verify compliance with the ETP WWCT WAC (rev. 6).[1]

2.0 Experimental Procedure

The 2H overheads sample was submitted to SRNL in a 250 mL poly bottle. The volume of the sample was approximately 175 mL. For this report, the entire sample 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. 175 mL of deionized 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. 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

Results of the analyses are provided in Table 3-1, along with the applicable ETP WAC limits.[1] These results are based on single measurements performed by AD. A blank sample of deionized water was run for quality assurance and all concentrations were found to be less than the minimum detectable concentrations and are therefore reported as values preceded by "<" symbols. Where applicable, one-sigma uncertainties are reported in brackets beside discrete results.

As shown in Table 3-1, 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	January 2017 2H Evaporator Overhead Sample Concentration (dpm/mL)	Blank Sample Concentration (dpm/mL)	ETP WAC Acceptance Limits (dpm/mL)[1]
^{137}Cs	6.97E+01 [7.25%]	<9.66E00	3.28E+02
^{90}Sr	<5.35E+01	<6.27E+01	1.76E+02
^{129}I	<6.66E−01	<7.58E−01	1.00E+00

The analytical results listed in Table 3-1 are in good agreement with previous results for 2H samples collected in 2009, 2011, 2014, and 2016 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.

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

Analyte	2009 (dpm/mL)[3]	2011 (dpm/mL)[4]	2014 (dpm/mL)[5]	2016 (dpm/mL)[6]	ETP WAC Acceptance Limits (dpm/mL)[1]
^{137}Cs	3.51E+01	1.76E+01	5.80E+01	7.04E+01	3.28E+02
^{90}Sr	<2.98E+01	<1.63E+01	<8.17E+00	<1.00E+01	1.76E+02
^{129}I	<6.73E−01	<5.77E−01	<8.02E−02	5.83E−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.[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 are contained in an electronic laboratory notebook (ELN L6004-00260-02).[7]

4.0 Conclusions

The January 2017 2H 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 2009, 2011, 2014, and 2016 2H evaporator 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., "Task Technical and Quality Assurance Plan for 2014 Evaporator Overhead Sample Analysis," SRNL-RP-2014-00797, Rev. 0, September 2014.

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

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

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

[6] Nicholson, J. C., "Characterization Results for the March 2016 H-Tank Farm 2H Evaporator Overhead Samples," SRNL-STI-2016-00253, Rev. 1, September 2016.

[7] Electronic Laboratory Notebook "2017 2H Evaporator Overhead Samples," L6004-00260-02.

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