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Characterization Results for the 2013 HTF 3H Evaporator Overhead Samples

A. L. Washington, II

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REVIEWS AND APPROVALS

AUTHORS:

A. L. Washington, II, Advanced Characterization and Processing Date

TECHNICAL REVIEW:

S.H. Reboul, Advanced Characterization and Processing Date

APPROVAL:

F. M. Pennebaker, Manager Date
Advanced Characterization and Processing

S.L. Marra, Manager Date
Environmental & Chemical Process Technology Research Programs

D. J. Martin, Manager Date
Tank Farm/ETP Process Engineering Lead

EXECUTIVE SUMMARY

This report tabulates the radiochemical analysis of the 3H evaporator overhead sample 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

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 annual samples from the 3H evaporator overhead stream on August 22, 2013 for radiochemical characterization to verify compliance with the Effluent Treatment Project (ETP) Waste Acceptance Criteria (WAC)¹ (rev. 6).

2.0 Experimental Procedure

The 3H annual evaporator overhead samples arrived at the Savannah River National laboratory on August 22, 2013. Of these four received samples, there were two samples in glass bottles and two in poly bottles. For this report, a 250 mL sample aliquot was taken from the poly bottles and transferred to a 500 mL sample bottle more suitable for transmittal to the Analytical Development Section (ADS). Since these samples were relatively low in activity, no dilution was required prior to submittal for analysis. A blank is normally not used in the radiochemical portion of this analysis and therefore not addressed in this report. Baseline levels of the experiments were confirmed from instrument calibrations.

Three different analytical methods were used by ADS to determine the concentrations of ¹³⁷Cs, ⁹⁰Sr, and ¹²⁹I in the sample. Gamma spectrometry was used to determine the ¹³⁷Cs concentration. Radiochemical separation followed by liquid scintillation counting was utilized to determine the ⁹⁰Sr concentration. Radiochemical separation followed by low energy gamma photon spectroscopy was utilized to determine the ¹²⁹I concentration.

3.0 Results and Discussion

The results of the analyses provided in the table below are for a single determination by Analytical Development (AD). For the ¹²⁹I and ⁹⁰Sr, 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 ¹³⁷Cs, ¹²⁹I, and ⁹⁰Sr in the annual samples. The samples were submitted from the 3H evaporator overhead, 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	3H Evap Overheads (dpm/mL)	WWCT Feed Acceptance Limits (dpm/mL)
¹³⁷ Cs	2.65E+02	3.28E+02
⁹⁰ Sr	<2.43E+00	1.76E+02
¹²⁹ I	<3.33E-02	1.00E+00

The values listed in Table 3-1 are in good concurrence with previous data. In the 2011 sampling report, the concentrations of these radionuclides were 2.26E+02, <1.64E+01, and <6.06E-01 in units of dpm/mL for ^{137}Cs , ^{90}Sr , and ^{129}I , respectively.² The ^{137}Cs concentration has increased about 15% from the 2011 sampling to the current sample. Additionally, both the ^{90}Sr and ^{129}I concentrations were below the detection limit in both the 2011 and 2013 samples.

3.1 Quality Assurance

This report was developed in accordance with the protocols identified in Task Technical and Quality Assurance Plan SRNL-RP-2013-0058.³

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).⁴

4.0 Conclusions

The 3H 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 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., "Task Technical and Quality Assurance Plan for 2013 Evaporator Overhead Sample Analysis," SRNL-RP-2013-00528, Revision 0, August 2013.

⁴ Electronic Laboratory Notebook "3H Evaporator Overhead Analysis for 2013," E5690-00077-01.

Distribution:

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