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To: R. E. Edwards

From: C. J. Bannochie

**Results of Preliminary Hg Speciation Testing on 4Q14 Tank 50, 1Q15 Tank 50, and SRNL 14-Day TCLP Leachate**

Approved by:

C. L. Crawford, Technical Reviewer per E7, 2.60

Date

W. R. Willmarth, SRNL Mercury Task Lead

Date

## INTRODUCTION

The Savannah River National Laboratory (SRNL) was tasked with preparing and shipping samples for Hg speciation by Eurofins Frontier Global Sciences, Inc. in Seattle, WA on behalf of the Savannah River Remediation (SRR) Mercury Task Team. The first shipment of samples was designated to include existing 4Q14 Tank 50 WAC material archived in the SRNL Shielded Cells; 1Q15 Tank 50 material pulled on February 25, 2015; and leachate from the 14-day SRNL conducted Toxicity Characteristic Leaching Procedure (TCLP) performed on a sample of saltstone prepared from the official 1Q15 Tank 50 WAC sample.

Eurofins supplied deionized water, 250 mL PETG bottles, 125 mL amber glass bottles, and preservative (1.2 mL concentrated HCl). Tank 50 samples were prepared in triplicate plus a blank, while duplicate samples of the leachate plus a blank were prepared. Each sample was analyzed for five Hg species: total Hg, elemental Hg [Hg(0)], ionic Hg [Hg(I) and Hg(II)], methyl Hg [CH<sub>3</sub>Hg-X, where X is a counter anion], and dimethyl Hg [(CH<sub>3</sub>)<sub>2</sub>Hg]. The analytes were determined from samples in three separate bottles: 1) methyl Hg, 2) dimethyl Hg and elemental Hg, and 3) total Hg and ionic Hg. Initially it was communicated that Eurofins would determine Hg(0) from bottle 3), but it was reported from bottle 2) for each set of samples. In total, 33 samples were prepared on March 4, 2015 and shipped by next-day air to Eurofins where they were received on March 6, 2015. Details of the sample preparation activities are recorded in the SRNL E-Notebook system.<sup>i</sup> SRNL deionized water was employed as the blank for the Tank 50 samples, and uncontacted extraction fluid was submitted as the blank for the leachate.

<sup>i</sup> Bannochie, C. J., "Eurofins Sample Preparation for Hg Speciation (Part 1)", Experiment L2320-00016- 40, SRNL E-Notebook (Production), Savannah River National Laboratory, Aiken, SC 29808 (February 2015).

Table 1 provides the Eurofins reported data corrected for dilutions performed by SRNL. All blanks, not shown in the table, were reported as either Non Detect (ND) or with values at least three orders of magnitude smaller than the samples. The last column of Table 1 provides the percent of total Hg that the four measured species (elemental, ionic, methyl, and dimethyl) represent. Clearly, Tank 50 contains species of Hg that are not yet accounted for by the speciation conducted. This is not unexpected, but SRNL and Eurofins agreed that these would be the appropriate initial species to examine, fully recognizing that additional speciation work may be necessary to close the Hg species balance. SRNL will work with Eurofins to determine which additional species they can analyze in SRS samples, such as particulate Hg, ethyl Hg and/or phenyl Hg, and make recommendations for future work accordingly.

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**Table 1. Concentrations of various Hg species in Tank 50 and a 14-day SRNL TCLP extractant expressed as Hg in mg/L (ppm) [%RSD].**

<b>Sample (No. of Replicates)</b>	<b>Total Hg</b>	<b>Elemental Hg [Hg(0)]</b>	<b>Ionic Hg [Hg(I) &amp; Hg(II)]</b>	<b>Methyl Hg</b>	<b>Dimethyl Hg</b>	<b>Species Fraction of Total Hg</b>
4Q14 Tank 50 (3)	78.7 [2.1]	0.571 [11]	1.19 [0.39]	37.6 [25]	ND	50%
1Q15 Tank 50 (3)	126 [10]	0.912 [18]	5.04 [12]	53.5 [39]	0.00219 [12]	47%
14-Day SRNL TCLP Extractant (2)	0.151 [7.2]	0.000734 [1.6]	0.00541 [16]	0.121 [16]	0.000139 [28]	84%

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