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Results for the May 19, 2010 Inadvertent Transfer to the Saltstone Disposal Facility: Slurry Sample Analytical Results

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EXECUTIVE SUMMARY

This report details the chemical analysis results for the characterization of the May 19, 2010 inadvertent transfer from the Saltstone Production Facility (SPF) to the Saltstone Disposal Facility (SDF) [1].

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ABBREVIATIONS

AA	Atomic Absorption
ICP-ES	Inductively coupled plasma – (atomic) emission spectroscopy
MRL	Method Reporting Limit
RCRA	Resource Conservation and Recovery Act
SDF	Saltstone Disposal Facility
SFT	Salt Feed Tank
SPF	Saltstone Production Facility
SRNL	Savannah River National Laboratory
SRS	Savannah River Site
WSE	Waste Solidification Engineering

1.0 Introduction

On May 19, 2010, the Saltstone Processing Facility (SPF) inadvertently transferred approximately 1800 gallons of untreated low-level salt solution from the salt feed tank (SFT) to Cell F of Vault 4. The transfer was identified and during safe configuration shutdown, approximately 70 gallons of SFT material was left in the Saltstone hopper. After the shutdown, the material in the hopper was undisturbed, while the SFT has received approximately 1400 gallons of drain water from the Vault 4 bleed system [1]. The drain water path from Vault 4 to the SFT does not include the hopper (Figure 1); therefore it was determined that the material remaining in the hopper was the most representative sample of the salt solution transferred to the vault.

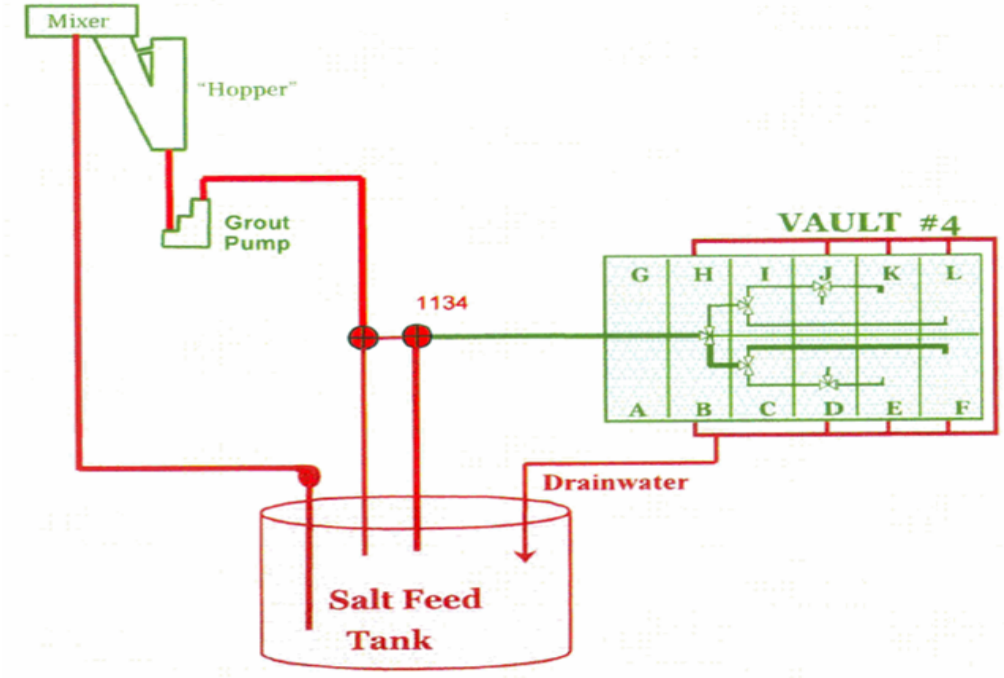

Figure 1-1. Flow diagram from the SFT to Vault 4.

To complete item #5 of Reference 1, Savannah River National Laboratory (SRNL) was asked to analyze the liquid sample retrieved from the hopper for pH, and metals identified by the Resource Conservation and Recovery Act (RCRA) [2]. SRNL prepared a report to complete item #5 and determine the hazardous nature of the transfer [3]. Waste Solidification Engineering then instructed SRNL to provide a more detailed analysis of the slurried sample to assist in the determination of the portion of Tank 50 waste in the hopper sample.

2.0 Experimental Procedure

Excess slurry sample prepared and digested for analysis in Reference 3 was submitted for Inductively Coupled Plasma – (atomic) Emission Spectroscopy (ICP-ES) and atomic absorption (AA) analysis.

3.0 Results

Table 1 contains the results for the slurry sample from the inadvertent transfer to the SDF. The table provides the analyte of interest, the method used for measuring that analyte, and the average concentration of the analyte based on triplicate samples. Several of the contaminants were either not detected in the slurry samples or detected at values below the method reporting limit (MRL). For those analytes, the result is preceded by a "<" which indicates the result is an upper limit based on the sensitivity of the method used to analyze the individual analyte. The density of the sample measured in Reference 3, 1.0354 g/mL, was used to report the results in milligrams per liter.

Table 1. Concentration of the Analytes Measured in the Hopper Slurry Sample.

Analyte	Method	Hopper Sample (μg/g)	Hopper Sample (mg/L)
Silver (Ag)	ICP-ES	7.44E-01	7.70E-01
Aluminum (Al)	ICP-ES	1.81E+03	1.87E+03
Arsenic (As)	AA	1.11E+00	1.15E+00
Boron (B)	ICP-ES	<4.42E+00	<4.58E+00
Barium (Ba)	ICP-ES	8.63E+00	8.94E+00
Beryllium (Be)	ICP-ES	<7.00E-02	<7.25E-02
Calcium (Ca)	ICP-ES	2.34E+03	2.42E+03
Cadmium (Cd)	ICP-ES	3.50E-01	3.62E-01
Cerium (Ce)	ICP-ES	7.91E+00	8.19E+00
Cobalt (Co)	ICP-ES	1.34E+00	1.39E+00
Chromium (Cr)	ICP-ES	4.63E+01	4.79E+01
Copper (Cu)	ICP-ES	2.98E+00	3.09E+00
Iron (Fe)	ICP-ES	1.56E+03	1.62E+03
Gadolinium (Gd)	ICP-ES	1.60E+01	1.66E+01
Mercury (Hg)	AA	8.46E+02	8.76E+02
Potassium (K)	ICP-ES	5.16E+02	5.34E+02
Lanthanum (La)	ICP-ES	1.00E+00	<1.04E+00
Lithium (Li)	ICP-ES	5.02E+00	5.20E+00
Magnesium (Mg)	ICP-ES	2.73E+02	2.83E+02
Manganese (Mn)	ICP-ES	9.30E+02	9.63E+02
Molybdenum (Mo)	ICP-ES	4.62E+00	4.78E+00
Sodium (Na)	ICP-ES	9.99E+03	1.03E+04
Nickel (Ni)	ICP-ES	6.54E+01	6.77E+01
Phosphorus (P)	ICP-ES	3.10E+02	3.21E+02
Lead (Pb)	ICP-ES	2.94E+00	3.04E+00
Sulfur (S)	ICP-ES	6.16E+02	6.38E+02
Antimony (Sb)	ICP-ES	<2.08E+00	<2.15E+00
Selenium (Se)	AA	6.70E-01	7.00E-01
Silicon (Si)	ICP-ES	3.06E+02	3.17E+02
Tin (Sn)	ICP-ES	<1.72E+00	<1.78E+00
Strontium (Sr)	ICP-ES	1.86E+01	1.93E+01
Titanium (Ti)	ICP-ES	6.80E+01	7.04E+01
Uranium (U)	ICP-ES	<8.89E+01	<9.20E+01
Vanadium (V)	ICP-ES	2.11E+00	2.18E+00
Zinc (Zn)	ICP-ES	2.39E+01	2.47E+01
Zirconium (Zr)	ICP-ES	3.11E+00	3.22E+00

4.0 References

1. Webb, V.R., "Salt Feed Solution Sent to Vault 4 Cell F," 2010-CTS-006436, May 20, 2010.

2. Staub, A.V. "Analysis of Grout Hopper Liquid Sample," HLW-SSF-TTR-2010-0002, May 2010.

3. Cozzi, A.D. and Reigel, M.M., "Saltstone Processing Facility Transfer Sample", SRNL-RP-2010-00360, Revision 0, July 2010.