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Summary Report for the Analysis of the Sludge Batch 7b (Macrobatch 9) DWPF Pour Stream Glass Sample for Canister S04023

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November 2020

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EXECUTIVE SUMMARY

In order to comply with the Defense Waste Processing Facility (DWPF) Waste Form Compliance Plan for Sludge Batch 7b, Savannah River National Laboratory (SRNL) personnel characterized the Defense Waste Processing Facility (DWPF) pour stream (PS) glass sample collected while filling canister S04023. This report summarizes the results of the compositional analysis for reportable oxides and radionuclides and the normalized Product Consistency Test (PCT) results. The PCT responses indicate that the DWPF produced glass that is significantly more durable than the Environmental Assessment glass. Results and further details are documented in SRNL-STI-2013-00462, Revision 1 "Analysis of the DWPF Sludge Batch 7b (Macrobatch 9) Pour Stream Glass Sample."

Revision 1 of this report includes the following updates:

- Table 2: published percent relative standard deviation (%RSD) for the lithium normalized release (NL Li) in the Environmental Assessment (EA) glass
- Table 3: %RSD for Zr-93

Table 1. Measured Reportable Oxides[a]

Oxide	Measured (wt%)	%RSD
Al_2O_3	7.58	2.4
B_2O_3	4.72	2.0
Fe_2O_3	8.67	1.8
Li_2O	4.83	3.1
MnO	1.66	1.7
Na_2O	14.42	2.6
NiO	1.38	2.9
SiO_2	49.42	2.8
U_3O_8	2.56	2.8

Table 2. Normalized PCT Results (g/L)

Glass ID	NL B	NL Li	NL Na	NL Si	NL U
ARM	0.4	0.5	0.5	0.3	---
St. Dev.	0.006	0.003	0.004	0.001	---
%RSD	1.5	0.6	0.9	0.6	---
EA - Measured	16.6	9.4	13.2	4.0	---
St. Dev.	0.1	0.06	0.09	0.02	---
%RSD	0.7	0.7	0.7	0.4	---
EA - Published[b]	16.7	9.6	13.3	3.9	---
St. Dev.	1.2	0.7	0.9	0.4	---
%RSD	7	8	7	10	---
SB7b PS	0.8	0.9	1.0	0.5	0.4
St. Dev.	0.007	0.005	0.007	0.003	0.004
%RSD	1.0	0.6	0.7	0.6	0.9

[a] Greater than 0.5 wt% on an elemental basis.

[b] C.M. Jantzen, J.B. Pickett, K.G. Brown, T.B. Edwards, and D.C. Beam, "Process/Product Models for the Defense Waste Processing Facility (DWPF): Part I. Predicting Glass Durability from Composition Using a Thermodynamic Hydration Energy Reaction Model (THERMO)," Westinghouse Savannah River Company, Aiken, SC, WSRC-TR-93-672, Rev. 1, 1995.

Table 3. Reportable Radionuclides

Radionuclide	Concentration (Ci/kg)	%RSD
Sr-90	4.6E+00	4.8
Zr-93	1.6E-04	98.6
Tc-99	7.1E-06	5.5
Cs-137	7.9E-01	3.3
Th-232	4.8E-07	0.7
U-233	<3.8E-05	3.4
U-234	<2.4E-05	3.4
U-235	2.4E-07	5.5
U-236	4.0E-07	15.1
U-238	6.8E-06	1.8
Np-237	9.2E-06	6.3
Pu-238	5.4E-02	4.2
Pu-239	4.8E-03	2.3
Pu-240	1.5E-03	4.0
Pu-241	1.8E-02	4.0
Pu-242	<1.5E-05	3.4
Am-241	1.5E-02	3.3