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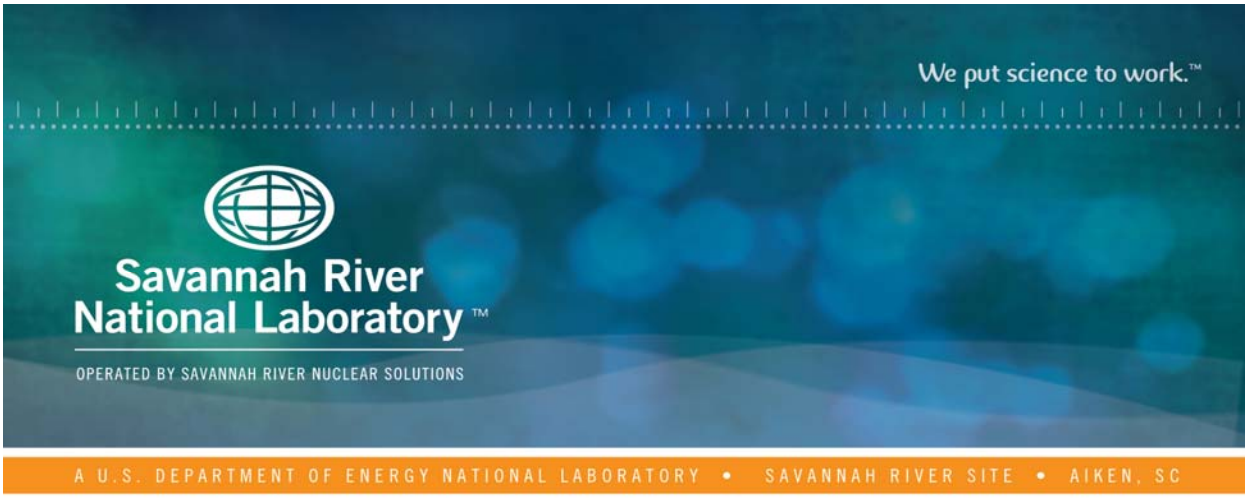

Saltstone First Quarter Calendar Year 2018 (1QCY18) Toxicity Characteristic Leaching Procedure (TCLP) Results

K. A. Hill

June 2018

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EXECUTIVE SUMMARY

The aqueous waste from Tank 50 (salt solution) is sampled quarterly for transfers to the Saltstone Production Facility (SPF). Salt solution is treated at SPF and disposed of in the Saltstone Disposal Facility (SDF). A SDF waste form (saltstone) was prepared in the Savannah River National Laboratory (SRNL) from the Tank 50 Waste Acceptance Criteria (WAC) sample[1] and Z-Area premix material for the first quarter of calendar year 2018 (1QCY18).[2,3] Results from this memorandum support Task 2: 'Grout Leaching Analyses' of the Task Technical Request (TTR).[2] After a 28 day cure, a sample of the SDF waste form was collected and shipped to a certified laboratory for analysis using the Toxicity Characteristic Leaching Procedure (TCLP).[4] The 1QCY18 saltstone sample met the South Carolina (SC) Code of Regulations for Hazardous Waste Management Regulations (HWMR) 61-79.261.24 and 61-79-268.48 requirements for a non-hazardous waste form with respect to Resource Conservation and Recovery Act (RCRA) metals and Underlying Hazardous Constituents (UHCs), and also met the Saltstone WAC.[5,6,13]

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D&S-FE	DWPF & Saltstone Facility Engineering
EC&ACP	Environmental Compliance & Area Completion Projects
EPA	Environmental Protection Agency
ES	Environmental Stewardship
ETF	Effluent Treatment Facility
LOD	Limit of Detection
LOQ	Limit of Quantitation
MRL	Minimum Reporting Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NRC	Nuclear Regulatory Commission
RCRA	Resource Conservation and Recovery Act
RL	Reporting Limit
SDF	Saltstone Disposal Facility
SPF	Saltstone Production Facility
SRNL	Savannah River National Laboratory
SRR	Savannah River Remediation
SWRI	Southwest Research Institute
TCLP	Toxicity Characteristic Leaching Procedure
TTQAP	Task Technical and Quality Assurance Plan
TTR	Technical Task Request
UHC	Underlying Hazardous Constituents
WAC	Waste Acceptance Criteria

1.0 Introduction

The SPF receives waste from Tank 50 for treatment. The following dates were selected starting from the last quarterly sampling date to the current quarterly sampling date. Tank 50 accepted the following transfers from July 17, 2017 to February 6, 2018:[7]

- ~7.9 kgal from 211-H
- ~11.5 kgal from Effluent Treatment Facility (ETF)
- ~2.0 kgal from Other

On February 6, 2018, a salt solution sample was taken from Tank 50[1] and used to prepare a SDF waste form sample, referred to as a saltstone sample[8]. Once the 1QCY18 saltstone sample cured for 28 days, it was crushed, sieved, packaged, and deemed "collected".[9] The sample was then shipped to Southwest Research Institute (SWRI) to analyze for toxicity per the TCLP method.[4,5] This saltstone sample determines whether the non-hazardous nature of the grout meets the requirements of the SC Code of Regulations 61-79.261.24[6] for RCRA metals and 61-79.268.48[5] for inorganic/organic UHCs (for informational purposes only[3]).

2.0 Experimental

Saltstone preparation was performed at SRNL. DWPF & Saltstone Facility Engineering (D&S-FE) provided SRNL with the saltstone grout recipe as well as the premix components.[8] The saltstone sample was prepared using the mixing method outlined in SRNL Environmental Stewardship (ES) work instructions.[10] The sample was left to cure for at least 28 days. After curing, the sample was crushed and sieved using the method outlines in ES work instructions.[11] Material that passed through the 3/8-inch sieve was subsequently screened through a No. 4 sieve. The material retained on the No. 4 sieve was packaged and shipped to Southwest Research Institute (SWRI) by Environmental Compliance & Area Completion Projects (EC&ACP).[3]

3.0 Results

Table 3-1 summarizes the analytical results provided by the vendor, SWRI.[12] The entire vendor report is documented and included as a reference.[12] For comparison, the previous quarter and four quarter average results are shown. The limits are from Table 6 of the WAC[13] and reflect the requirements in the applicable version of the document. Note that the vendor used a "modified" Method 1311 where sample mass was restricted due to the elevated activity of the sample. This methodology is consistent with the joint guidance from the Nuclear Regulatory Commission (NRC) and Environmental Protection Agency (EPA) for mixed radioactive and hazardous waste.[14]

Table 3-1. 1QCY18 Saltstone Sample TCLP Results

Analyte	Result[12]	Unit	Regulatory Limit Toxicity[6] (mg/L)	WAC Limit[13] (mg/L)	Results	
					Previous Quarter[15] (mg/L)	Previous Four Quarter Average[15-18] (mg/L)
Arsenic (As)	0.020[U]	mg/L	5.0	2.5	0.020[U]	0.0237*
Barium (Ba)	1.84	mg/L	100.0	50	0.510	0.514
Cadmium (Cd)	0.005[U]	mg/L	1.0	0.5	0.005[U]	0.005^
Chromium (Cr)	0.0727	mg/L	5.0	2.5	0.005[U]	0.005^
Lead (Pb)	0.0075[U]	mg/L	5.0	2.5	0.005[U]	0.00875[+]
Mercury (Hg)	0.0593[D]	mg/L	0.2	0.1	0.00507	0.0102
Selenium (Se)	0.0417[B]	mg/L	1.0	0.5	0.0250[U]	0.0252*
Silver (Ag)	0.010[U]	mg/L	5.0	2.5	0.010[U]	0.0088[+]
Antimony (Sb)	0.025 [U]	mg/L	-	-	0.020 [U]	0.025[+]
Beryllium (Be)	0.005[B]	mg/L	-	-	0.005[UD]	0.005^
Nickel (Ni)	0.0649	mg/L	-	-	0.005[U]	0.005*
Thallium (Tl)	0.005[UD]	mg/L	-	-	0.005[UD]	0.005^
					(mg/kg)	(mg/kg)
Benzene	0.00098[U]	mg/kg	-	-	0.0009[U]	0.0009[+]
Amenable Cyanide	0.211[U]	mg/kg	-	-	0.5[J]	2.52*
Total Cyanide	11.0	mg/kg	-	-	12.0	9.58
Total Phenol	1.37 [J]	mg/kg	-	-	1.86[J2]	1.18*

[U] Non-detected analyte
[D] Results reported from a dilution
[J1] Matrix spike (MS) and/or spike duplicate (MSD) duplicate criteria were not met
[J2] MS/MSD recoveries were less than 30%, but the post prepared spike was greater than or equal to 75%
[J3] Duplicate outlier
[J4] MSD recovery was less than 75%, but greater than or equal to 30% and the post spike was greater than or equal to 75%
[B] Analyte was detected at the instrument at or above Limits of Detection (LOD), but less than Limit of Quantitation (LOQ)
* Contains qualifier of "U" in at least one quarter
[+] Contains qualifier of "U" in all quarters with multiple Reporting Limits (RL) or Limits of Detection (LOD)
^ Contains qualifier of "U" in all quarters with same RL or LOD

4.0 Conclusions

Analyses of the SDF waste form prepared from the 1QCY18 Tank 50 salt solution sample and premix material resulted in the following:

- The RCRA metal TCLP leachate concentrations met the SC Code of Regulations 61-79.261.24 requirements for a nonhazardous waste form.[6]
- The measured concentrations of the TCLP RCRA metals and additional inorganic/organic UHCs met the SC Code of Regulations 61-79.268.48 nonwastewater standards.[5]
- The measured concentrations of the TCLP RCRA metals met the Saltstone WAC.[13]

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