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Revision 0

SALTSTONE 2QCY09 TCLP RESULTS

M.M. Reigel

November 2009

Environmental and Chemical Process Technology
Savannah River National Laboratory
Aiken, SC 29808

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EXECUTIVE SUMMARY

A Saltstone waste form was prepared in the Savannah River National Laboratory from a Tank 50H sample and Z-Area premix material for the second quarter of calendar year 2009 (2QCY09). After the prescribed 28 day cure, samples of the saltstone were collected, and the waste form was shown to meet the South Carolina Hazardous Waste Management Regulations (SCHWMR) R.61-79.261.24 and R.61-79.268.48(a) requirements for a nonhazardous waste form with respect to RCRA metals and underlying hazardous constituents. These analyses met all quality assurance specifications of USEPA SW-846.

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B&WTSG-RACL	B & W Technical Services Group-Radioisotope and Analytical Chemistry Laboratory
CVAA	Cold Vapor Atomic Absorption
DL	Detection Limit
DSS-HT	Decontaminated Salt Solution Hold Tank
ESS-WP	Environmental Services Section – Waste Programs
ETP	Effluent Treatment Project
ICP-MS	Inductively Coupled Plasma – Mass Spectrometer
ISWLF	Industrial Solid Waste Landfill
LCS	Laboratory Control Sample
MCL	Maximum Contaminant Level
MCU	Modular Caustic Side Solvent Extraction Unit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
QL	Quantitation Limit
RCRA	Resource Conservation and Recovery Act
RL	Reporting Limit
RPD	Relative Percent Differences
SCDHEC	South Carolina Department of Health and Environmental Control
SCHWMR	South Carolina Hazardous Waste Management Regulations
SDF	Saltstone Disposal Facility
SDG	Sample Delivery Group
SPF	Saltstone Production Facility
SRNL	Savannah River National Laboratory
TCLP	Toxic Characteristic Leaching Procedure
UHC	Underlying Hazardous Constituent
UTS	Universal Treatment Standards

1.0 Introduction

The Saltstone Production Facility (SPF) receives waste from Tank 50H for treatment. In the second quarter of the 2009 calendar year (2QCY09), Tank 50 accepted transfers of approximately 32 kgal from the Effluent Treatment Project (ETP) waste, approximately 4 kgal from Tank 710—the H-Canyon General Purpose Evaporator, approximately 156 kgal from the Modular Caustic Side Solvent Extraction Unit (MCU) Decontaminated Salt Solution Hold Tank (DSS-HT), and approximately 484 kgal from Tank 23.

The Saltstone Grout Sampling plan provides the South Carolina Department of Health and Environmental Control (SCDHEC) with the chemical and physical characterization strategy for the salt solution which is to be disposed of in the Z-Area Solid Waste Landfill (ISWLF).[1] During operation, samples were collected from Tank 50H and grout samples prepared to determine the non-hazardous nature of the grout to meet the requirements of the South Carolina Hazardous Waste Management Regulations (SCHWMR) R.61-79.261.24(b) and R.61-79.268.48(a).

SRNL was asked to prepare saltstone from a sample of Tank 50H obtained May 20, 2009 during 2QCY09 to determine the non-hazardous nature of the grout. The samples were cured and shipped to Babcock & Wilcox Technical Services Group-Radioisotope and Analytical Chemistry Laboratory (B&WTSG-RACL) to perform the Toxic Characteristic Leaching Procedure (TCLP)[2] and subsequent extract analysis on saltstone samples for the analytes required for the quarterly analysis saltstone sample. In addition to the eight toxic metals—arsenic, barium, cadmium, chromium, mercury, lead, selenium and silver—analytes included the underlying hazardous constituents (UHC) antimony, beryllium, nickel, and thallium which could not be eliminated from analysis by process knowledge.[3] B&WTSG-RACL provided subsamples to GEL Laboratories, LLC for analysis for the UHCs benzene, phenols and total and amenable cyanide.

2.0 Experimental

This section is a summary of the approach taken to prepare and characterize the saltstone samples. The saltstone sample preparation was performed at SRNL. Saltstone sample characterization was performed at both B&WTSG-RACL facility in Lynchburg, Virginia and the GEL laboratory facility in Charleston, South Carolina. Figure 1 is a flowchart of the steps taken to prepare and characterize the saltstone samples.

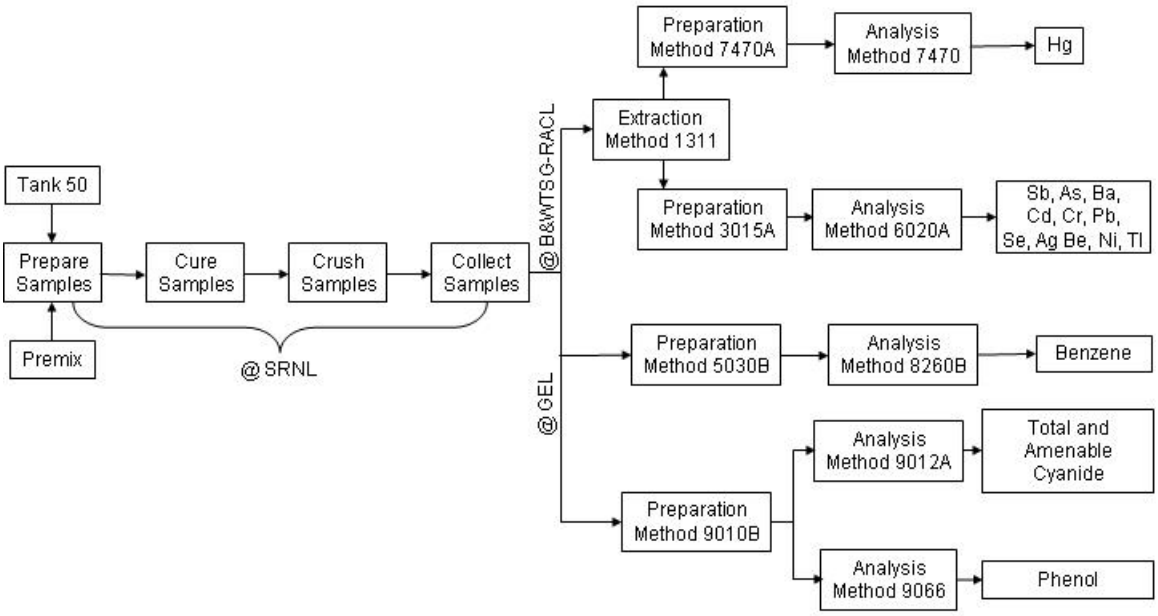

Figure 1. Flowchart of saltstone sample preparation and analysis.

2.1 Saltstone Preparation

Saltstone preparation was performed at SRNL. The weight percent solids data used for the TCLP sample was taken from the quarterly Waste Acceptance Criteria (WAC) analyses performed on Tank 50.[4] Table 1 lists the concentration of TCLP metals of interest in the salt solution from the WAC analysis for the sample. Complete analysis of the salt solution used is in Reference 4. Table 2 contains the parameters used to prepare the TCLP sample.

Saltstone samples for TCLP were prepared with the Tank 50H blended salt solution and a premix of cement, slag, and fly ash. Figure 1 shows the formulation used to prepare these samples. The salt solution, admixtures and premix materials were combined in a blender and mixed at low speed for one minute, inspected for incorporation of the premix, and then mixed at high speed for an additional two minutes. After the saltstone slurry was mixed, it was cast into a polyethylene zip top bag. The bag was laid flat and the air was expelled prior to sealing. The sample was cured flat in a polypropylene bag to facilitate the size reduction step needed to conform to the particle size requirements of the TCLP method.

After curing for not less than 28 days[*]—34 days for the 2Q09 sample, the saltstone was removed from the container and a portion of the saltstone was crushed to particles less than 0.9 centimeters (3/8 inch) as prescribed by Section 7.13 of the TCLP method.[2] The crushed saltstone was packaged into containers provided by Environmental Services Section – Waste Programs (ESS-WP). After the saltstone has been crushed, sieved and packaged, the sample is deemed "collected."[5] ESS-WP retrieved the samples from SRNL and transported them to B&WTSG-RACL for extraction and analysis. B&WTSG-RACL repackaged a portion of the sample and shipped the sample to GEL Laboratories to perform totals analysis for the UHCs benzene, phenol and total and amenable cyanide.

[*] Samples are considered ready for analysis after 28 days. Samples are not crushed until shipment has been scheduled.

Table 1. Sample Results of TCLP Metals from Tank 50 WAC Analysis.

-	Sample Results (mg/L)[4]	Regulatory Limits (mg/L)
-	2Q09	Toxicity[a]
As	< 0.234	5
Ba	0.465	100
Cd	< 0.508	1
Cr	41.8	5
Pb	0.473	5
Hg	14.0	0.2
Se	< 0.470	1
Ag	< 1.04	5
--	--	UHC[b]
Sb	< 5.29	1.15
Be	< 0.0398	1.22
Ni	14.4	11
Tl	< 0.0724	0.20
-	-	(mg/kg)
benzene	< 0.025	10
phenol	< 0.10	5.2
cyanide (total)	NM	1.2
cyanide (amenable)	NM	0.86

NM – Not Measured
[a] SCHWMR R.61-79.261.24(b) "Characteristic of Toxicity."
[b] SCHWMR R.61-79.268.48 "Universal Treatment Standards."

Table 2. Customer Recommended Values for Preparation of TCLP Sample

Parameter	2Q09
Water-to-Premix ratio	0.60
(Daratard 17) gal/Ton premix	0.08
(Dow Corning Q2-1383A) gal/Ton premix	0.22

Saltstone Mix Data Sheet

MIX # 0112		Date: 7/15/2009	
Material	**%**	**WT%**	**Grams**
Waste Solution: Tank 50 5/21/09 2Q09 **Wt% Solids #** 22.99 **Grams Water** 238.73		43.61	310.00
Admixture: Q2 1383-A		0.16	0.63
Admixture: Daratard 17		0.07	0.27
Admixture:			
Premix		56.27	400.00
Cement (% of Premix)	10	5.63	40.00
Slag (% of Premix)	45	25.32	180.00
Fly Ash (% of Premix)	45	25.32	180.00
Total	100	100.10	710.90
Water to Premix Ratio	0.60		

Calculations:

For 2Q TCLP sample

wt % solids from cells analysis

Use CBO fly ash

From customer: 0.60 w/p, 0.22 gpm Q2, 0.08 gpm Daratard 17, 35 T/hr dry feed

Q2 is actual Q2 amount . In plant diluted 1:4 in water.

Figure 2. Data sheet for the Saltstone mix used to prepare the 2Q09 TCLP sample.

2.2 Saltstone Testing

Saltstone testing was performed by B&WTSG-RACL and GEL Laboratories, LLC. Activities associated with the 2QCY09 saltstone samples were:

At B&WTSG-RACL,

- performing the TCLP extraction,
- digesting the TCLP leachate, and
- analyzing the digested leachate.

At GEL

- performing extractions on solid subsamples shipped from B&WTSG-RACL and
- analyzing extracts.

2.2.1 B&WTSG-RACL

The samples arrived at B&WTSG-RACL, Lynchburg, Virginia on August 20, 2009 for analysis. Shipping container temperatures were documented to be within specifications. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage.

The Metals method 6020A analysis was performed on an X-7 Series Inductively Coupled Plasma – Mass Spectrometer (ICP-MS). The instrument measures ions produced by a radio-frequency inductively coupled plasma. Analyte species originating in a liquid are nebulized and the resulting aerosol transported by argon gas into the plasma torch. The ions produced by high temperatures are entrained in the plasma gas and introduced, by means of an interface, into a mass spectrometer. The ions produced in the plasma are sorted according to their mass-to-charge ratios and quantified with a channel electron multiplier. Mass interferences must be assessed and valid corrections applied or the data flagged to indicate problems.

The Metals method 7470A analysis was performed on a Leman PC 200 II instrument which consists of a cold vapor atomic absorption spectrometer (CVAA) set to detect mercury at a wavelength of 253.7 nm. The mercury is reduced to the elemental state and aerated from solution in a closed system. The mercury vapor passes through a cell positioned in the light path of an atomic absorption spectrophotometer. Absorbance (peak height) is measured as a function of mercury concentration.

A portion of the leachate from the second quarter sample was used as the quality control sample (matrix spike) for the ICP-MS and CVAA.

2.2.2 GEL Laboratories, LLC

The subsamples arrived at GEL Laboratories, LLC, Charleston, South Carolina on August 28, 2009 for analysis. Shipping container temperatures were documented to be within specifications. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage.

The method 8260B analysis was performed with an HP6890/HP5973 gas chromatograph/mass spectrometer using a J&W1DB-624 column.

The methods 9012A and 9066 were performed using a Lachat QuickChem FIA+ 8000 Series.

3.0 Results & Discussion

3.1 Sample Results

Results were summarized in Table 3 from the data package for these analyses.[6] Data is presented in these results as reported by the vendors.

3.1.1 B&WTSG-RACL

Analytes detected but at concentrations too low to determine quantitatively have been flagged with the "B" qualifier. Analytes that were not detected have been flagged with the "U" qualifier. In addition to the results, Detection Limits (DLs) have been given. The DL is the minimum concentration of an analyte that can be identified, measured, and reported with 99% confidence that the concentration is above zero. The DL values given in the table are the results from this study adjusted for sample dilution. The Quantitation Limit (QL) is the lowest level at which an analyte may be accurately and reproducibly achieved.

Results in Table 3, when compared with the DLs and QLs, can be organized into three groups:

- Beryllium was not detected in the leachate.
- Antimony, chromium, lead, nickel, silver and thallium were detected below the QLs.
- Arsenic, barium, cadmium, mercury, and selenium were detected in the leachates at concentrations above the QLs.

Table 3. TCLP Leachates RCRA Metal Concentrations, DLs, and QLs

-	Methods	Sample Limits (µg/L)	Sample Limits (µg/L)	Sample Results (µg/L)
SRS ID	-	-	-	**2Q09**
B&W ID	-	**DL**	**QL**	**0908015-01A**
Sb	3015, 6020A	0.133	11.111	[B]8.1
As	3015, 6020A	0.100	5.556	17.4
Ba	3015, 6020A	0.439	55.556	246
Cd	3015, 6020A	0.111	5.556	[N]25.4
Cr	3015, 6020A	0.306	11.1	[B]10.8
Pb	3015, 6020A	0.483	5.556	[B]5.5
Hg	7470A	0.068	0.200	2.55
Se	3015, 6020A	0.244	27.778	93.7
Ag	3015, 6020A	0.061	5.556	[B, N]0.133
Be	3015, 6020A	0.156	5.56	[U, N]0.156
Ni	3015, 6020A	1.6	5.556	[B, N]5.3
Tl	3015, 6020A	0.206	5.556	[B]3.1

- Indicates a location in the table for which an entry would not be appropriate.
[U] Final concentration of the analyte was found to be below the DL.
[B] Analyte is present at a concentration above the DL but less than the QL
[N] Associated Matrix Spike is outside percent recovery quality control criteria.

3.1.1.1 Comparison of Results to Regulatory Limits

Results from the TCLP leachate analyses from Table 3 are replicated in Table 4—with units changed from µg/L to mg/L—along with the regulatory limits that may be applied to the Saltstone waste form. Table 4 includes the SCHWMR R.61-79.261.24(b) limits above which a waste is to be considered

characteristically hazardous for toxicity and the SCHWMR R.61-79.268.48 Universal Treatment Standards (UTS) for hazardous constituents. In addition, Maximum Contaminant Levels (MCL's) from the State Primary Drinking Water Regulations* also have been included in Table 4. By comparing the sample results and the regulatory limits in Table 4, the following conclusions can be made:

- The saltstone waste form was not characteristically hazardous for toxicity.
- The leachate metals concentrations were below the Nonwastewater Standard for all of the metals.
- Barium, beryllium, chromium, lead, and silver were below the MCL's.
- Arsenic, antimony, cadmium, mercury, selenium, and thallium exceeded the MCL.
- Nickel does not have a MCL.

The MCL is the limit for a constituent in drinking water. The MCL is used to determine the class of landfill required. At 10x MCL, a Class 3 landfill is required. The SDF vaults are permitted as a Class 3 landfill. None of the analyses were greater than 10x the MCL.

Table 4. Saltstone TCLP Results and Corresponding Regulatory Limits.

-	Sample Results (mg/L)	Regulatory Limits		
SRS ID	**2Q09**	**Toxicity[a]**	**UTS[b]**	**MCL[c]**
B&W ID	**0905003-01A**	**(mg/L)**	**Nonwastewater Standard (mg/L TCLP)**	**(mg/L)**
Sb	[B]8.10E-03	-	1.15	0.006
As	1.74E-02	5	5	0.010
Ba	0.246	100	21	2
Cd	[N]2.54E-02	1	0.11	0.005
Cr	[B]1.08E-02	5	0.6	0.1
Pb	[B]5.50E-03	5	0.75	0.015[d]
Hg	2.55E-03	0.2	0.025	2E-03
Se	9.37E-02	1	5.7	0.05
Ag	[B, N]1.33E-04	5	0.14	0.1[e]
Be	[U, N]1.56E-04	-	1.22	4E-03
Ni	[B, N]5.30E-03	-	11	-
Tl	[B]3.10E-03	-	0.20	2E-03

- Indicates a location in the table for which an entry would not be appropriate.
[U] Final concentration of the analyte was found to be below the DL.
[B] Analyte is present at a concentration above the DL but less than the QL.
[N] Associated Matrix Spike is outside percent recovery quality control criteria.
[a] R.61-79.261.24(b) "Characteristic of Toxicity."
[b] R.61-79.268.48 "Universal Treatment Standards."
[c] SCDHEC State Primary Drinking Water Regulation Maximum Contaminant Levels.
[d] Lead action level from SCDHEC 61-58.11.B.
[e] Secondary drinking water parameter.

* Regulations 61-58 through 61-58.15 are promulgated pursuant to S.C. Code Sections 44-55-10 et seq. and are collectively known as the State Primary Drinking Water Regulations.

3.1.1.2 Quality Assurance

The following subsections include summaries of results from blanks, laboratory control samples, matrix spikes, and matrix spike duplicates. The data package also includes data for calibration verifications, interference checks, and serial dilutions.

3.1.1.3 Blanks

Blank concentrations are given in Table 5. In the TCLP Blank, arsenic, lead, nickel, and thallium levels were above the QL. Antimony, barium, cadmium, chromium, selenium, and silver were present at levels above their DLs, but below their QLs. Beryllium and mercury were found to be below the DL.

Table 5. TCLP Blank.

Analyte	TCLP Blank (μg/L)
Sb	[B] 0.761
As	6.7
Ba	[B] 7.8
Cd	[B, N] 3.4
Cr	[B] 5.1
Pb	22.4*
Hg	[U] 0.068
Se	[B] 7.2
Ag	[B,N] 0.944*
Be	[U, N] 0.156
Ni	[N] 117*
Tl	5.9*

[B] Analyte is present at a concentration above the DL but less than the QL.
[U] Final concentration of the analyte was found to be below the DL.
[N] Associated Matrix Spike is outside percent recovery quality control criteria.
*The TCLP blank shows a larger concentration than in the leachate; all other blanks associated with the analysis are within the expected range.

3.1.1.4 Laboratory Control Samples

Results from the Laboratory Control Sample (LCS) are given in Table 6. The LCS post spike recoveries met USEPA SW-846 acceptance limits for all elements; however, antimony is outside of the acceptance limit. Laboratory Control Samples are clean aqueous solutions analyzed to assure integrity of the analytical technique exclusive of matrix effects.

Table 6. RCRA Metal Laboratory Control Sample

Analyte	Laboratory Control (µg /L)		Recovery (%)
-	True	Measured	(80 – 120)
Sb	515.0	628.9	122
As	787.0	793.9	101
Ba	1660.0	1665.6	100
Cd	253.0	256.6	101
Cr	239.0	243.2	102
Pb	1140.0	1139.4	100
Hg	15.3	16.4	106.9
Se	1750.0	1634.4	93
Ag	362.0	365.3	101
Be	317.0	307.8	97
Ni	850.0	835.0	98
Tl	815.0	793.3	97

3.1.1.5 Matrix Spikes

Results from analysis of the matrix spike (MS) and matrix spike duplicates (MSD) are given in Table 7. The initial concentrations in the first column are reproduced from Table 3. These results show that:

- The percent recoveries (%R) obtained from the MS analyses met the recommended quality control acceptance criteria for percent recoveries (75 – 125%) for all applicable analytes except for Ag, Be, Cd, and Ni.
- The percent recoveries (%R) obtained from the MSD analyses met the recommended quality control acceptance criteria for percent recoveries (75 – 125%) for all applicable analytes except for Ag and Cd.
- The RPD(s) between the MS and MSD met the acceptance limits (0 – 20%).

Table 7. TCLP Leachates RCRA Metal Matrix Spike and Duplicate Results

Analyte	Initial Concentrations (µg /L)		Spiked Sample (µg /L)		Recovery (%)		RPD (%)
-	B&W ID 0905003-01A	Spike Added	Spike	Spike Duplicate	Spike	Spike Duplicate	-
Sb	[B]8.1	555.56	562.2	596.1	100	106	6
As	17.4	2222.22	1954	2021	87	90	3
Ba	246	2222.22	2082	2210	83	88	6
Cd	[N]25.4	55.56	49.9	49.1	44	43	2
Cr	[B]10.8	222.22	188.5	200.3	80	85	6
Pb	[B]5.5	555.56	516.4	545.4	92	97	5
Hg	2.55	5.00	7.440	7.180	97.8	92.6	-
Se	93.7	2222.22	1897	1959	81	84	3
Ag	[B, N]0.133	55.56	38.2	40.2	68	72	5
Be	[U, N]0.156	55.56	40.7	42.9	73	77	5
Ni	[B, N]5.3	555.56	408.1	427.3	72	76	5
Tl	[B]3.1	2222.22	1984	2104	89	95	6

[U] Final concentration of the analyte was found to be below the DL.
[B] Analyte is present at a concentration above the DL but less than the QL.
[N] Associated Matrix Spike is outside percent recovery quality control criteria.

3.1.1.6 Calibration Information

- All initial calibration requirements have been met for this sample delivery group (SDG).
- All Contract Required Detection Limit standard(s) met the referenced advisory control limits.
- All interference check samples associated with this SDG met the established acceptance criteria.
- All continuing calibration blanks bracketing this batch met the established acceptance criteria.
- All continuing calibration verifications bracketing this SDG met the acceptance criteria.

3.1.2 GEL Laboratories, LLC

GEL reports general chemistry analyses on the organics in the sample. If the concentrations of phenol and cyanide are not detected or below the detection limit (<MDL) the result is reported as “ND”. However, when benzene or other organics are not detected, they are reported at the limit of quantitation—the reporting limit. Analytes detected but at concentrations too low to determine quantitatively have been flagged with the “J” qualifier. Analytes that were not detected have been flagged with the “U” qualifier. In addition to the results, Detection Limits (DLs) and Reporting Limits (RLs) have been given. The DL is the minimum concentration of an analyte that can be identified, measured, and reported with 99% confidence that the concentration is above zero. The DL values given in Table 8 are the results from this study adjusted for sample dilution. The RL is the lowest level at which an analyte may be accurately and reproducibly quantitated.

Table 8. Totals Concentrations, DLs, and RLs.

-	Methods	Sample Limits (µg/kg)	Sample Limits (µg/kg)	Sample Results (µg/kg)
SRS ID	-	-	-	**2Q09**
GEL ID	-	**DL**	**RL**	**236193001**
benzene	5030, 8260B	29.4	98.0	[U]ND
phenol	9010B, 9066	74.1	231	[U]ND
cyanide (total)	9010B, 9012A	66.4	244	4120
cyanide (amenable)	9012A	66.4	244	505

- Indicates a location in the table for which an entry would not be appropriate.
[U] Final concentration of the analyte was found to be below the DL.

3.1.2.1 Comparison of Results to Regulatory Limits

Results from the analyses from Table 8 are replicated in Table 9—with units changed from µg/kg to mg/kg—along with the regulatory limits that may be applied to the Saltstone waste form. Table 9 includes the SCHWMR R.61-79.268.48 Universal Treatment Standards (UTS) for hazardous constituents. By comparing the sample results and the regulatory limits in Table 9, it can be concluded that for all of the analytes, the concentrations were below the Nonwastewater Standard with the exception of total and amenable cyanide.

Table 9. Saltstone Totals Results and Corresponding Regulatory Limits.

-	Sample Results (mg/kg)	Regulatory Limits (mg/kg)
SRS ID	**2Q09**	**UTS[b]**
GEL ID	**236193001**	
benzene	[U]ND	10
phenol	[U]ND	6.2
cyanide (total)	4.120	590
cyanide (amenable)	0.505	30

- Indicates a location in the table for which an entry would not be appropriate.
[U] Final concentration of the analyte was found to be below the DL.
[b] R.61-79.268.48 “Universal Treatment Standards”.

3.1.2.2 Quality Assurance

The following subsections include summaries of results from blanks, laboratory control samples, matrix spikes, and matrix spike duplicates. The data package for this task also includes data for calibration verifications, interference checks, and serial dilutions.

3.1.2.3 Blanks

Blank concentrations are given in Table 10. Target and non target analytes were detected in the Method Blank below the reporting limit. Amenable to chlorination cyanide is determined by subtracting the results determined in the chlorinated cyanide test from those determined in the total cyanide test. The Method Blanks analyzed with this Sample Delivery Group (SDG) met the acceptance criteria.

Table 10. Method Blank.

Analyte	Method Blank (µg/kg)
benzene	^{U}ND
phenol	^{U}ND
cyanide (total)	^{U}ND
cyanide (amenable)	--

- Indicates a location in the table for which an entry would not be appropriate.
ND – Not Detectable

3.1.2.4 Laboratory Control Samples

Results from the Laboratory Control Sample (LCS) are given in Table 11. All LCS recoveries met the vendor laboratory acceptance limits.* Laboratory Control Samples are clean aqueous solutions analyzed to assure integrity of the analytical technique exclusive of matrix effects.

Table 11. Laboratory Control Sample.

Analyte	Laboratory Control (µg /kg)			Recovery (%)	
-	True	Measured		-	
benzene	50.0	47.9		95.7	
phenol	2500	2650	2530	106	101
cyanide (total)	174000	146000		83.9	
cyanide (amenable)	--	--		--	

3.1.2.5 Matrix Spikes

Total cyanide is the only method where a matrix spike would be applicable. The result from analysis of the matrix spike (MS) is given in Table 12. These results show that the percent recoveries (%R) obtained from the MS analyses met the recommended quality control acceptance criteria for percent recoveries.

Table 12. Matrix Spike Results.

Analyte	Initial Concentrations (µg /kg)		Spiked Sample (µg /kg)	Recovery (%)
-	GEL ID 236193001	Spike Added		
cyanide (total)	103	5750	4870	82.8
	103	5750	5430	92.6

3.1.2.6 Calibration Information

- All initial calibration requirements have been met for this sample delivery group (SDG).
- All Contract Required Detection Limit standard(s) met the referenced advisory control limits.
- All interference check samples associated with this SDG met the established acceptance criteria.
- All continuing calibration blanks bracketing this batch met the established acceptance criteria.
- All continuing calibration verifications bracketing this SDG met the acceptance criteria.

* USEPA SW-846 methods use a range of 70-130% for default limits until the laboratory establishes their own limits based on the recoveries they normally achieve for spiked compounds.

4.0 Conclusions

Preparation of the 2QCY09 saltstone samples and the subsequent TCLP analyses showed that:

- The saltstone waste form disposed of in the Saltstone Disposal Facility in 2QCY09 was not characteristically hazardous for toxicity.
- The concentrations of the eight RCRA metals and UHCs identified as possible in the saltstone waste form were present at levels below the UTS.
- Analyses met all quality assurance specifications of USEPA SW-846.

The saltstone waste form placed in the Saltstone Disposal Facility in 2QCY09 met the SCHWMR R.61-79.261.24(b) RCRA metals requirements for a nonhazardous waste form. The TCLP leachate concentrations were less than 5x the MCLs in SCDHEC Regulations R.61-107.16, Subpart A, 16.5.

The saltstone waste form placed in the Saltstone Disposal Facility in 2QCY09 met the R.61-79.268.48(a) non wastewater treatment standards.

Analyses met all USEPA SW-846 quality assurance requirements except for the matrix spike recoveries for Ag, Be, Cd, and Ni. Quality assurance requirements include limits on holding times, laboratory control sample recoveries, matrix spike recoveries, serial dilution results when applicable, calibration verification, and interference checks.

5.0 References

1. Liner, K.R., "Saltstone Grout Sampling (U)," ESH-EPG-2004-00318.

2. "Toxicity Characteristic Leaching Procedure," EPA SW-846, Procedure 1311.

3. Britt, T.E., "Assessment of Regulated Organics under 40 CFR Part 268, Section 48, Universal Treatment Standards, Relative to SRS Tank Farm Waste," LWO-LWE-2007-00052.

4. DiPrete, C.C., Bibler, N.E., and Reigel, M.M., "Tables Containing Results for the Second Quarter 2009 Tank 50 WAC Slurry Sample: Chemical and Radionuclide Contaminant Results," SRNL-TR-2009-00343.

5. Liner, K.R., 11/28/2007, Private Communication.

6. Reigel, M.M., "Data Package from Vendor for 2QCY09 TCLP Analysis," SRNL-L3100-2009-00260.