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## DISCLAIMER

# Groundwater Monitoring Plan

# for the

# Z-Area Saltstone Disposal Facility
# Revision 3
# WRSC-TR-2005-00257

**December 2005**

**Certified by**

**Introduction**

Groundwater monitoring has been conducted at the Z-Area Saltstone Disposal Facility since 1987. At that time, groundwater monitoring was not required by the industrial landfill regulations, but a modest monitoring program was required by the operating permit. At the time of the 1996 permit renewal, it was determined that a more robust monitoring program was needed. The draft permit required new monitoring wells within 25 feet of each active disposal cell. As an alternative, SRS proposed a program based on direct push sampling. This program called for biennial direct push sampling within 25 feet of each waste-containing cell with additional samples being taken in areas where excessive cracking had been observed. The direct push proposal was accepted by The South Carolina Department of Health and Environmental Control (SCDHEC), and was incorporated by reference into the Z-Area Saltstone Industrial Solid Waste Permit, #025500-1603.

The Industrial Solid Waste Landfill Regulations were revised in 1998 and now include specific requirements for groundwater monitoring. SRS's plan for complying with those regulations is discussed below. The plan calls for a return to traditional monitoring with permanent wells. It also proposes a more technically sound monitoring list based on the actual composition of saltstone.

**Point of Compliance**

The point of compliance (POC) for an ISWLF is required by regulation to be no more than 500 feet from the hydraulically downgradient limit of the ISWLF. After consultation with SCDHEC, it has been agreed that the "hydraulically downgradient limit" of the Z-Area Saltstone Disposal Facility is approximated by the northeast wall of vault 4. In response to SCDHEC's request, the POC is specified to be a vertical surface approximately 100 feet downgradient (northeast) of that wall (figure 1). It is recognized that the point of compliance will shift when future vaults are constructed northeast of vault 4.

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**Groundwater Protection Standards**

Groundwater protection standards (Table 1) are proposed for all constituents listed in *Sampling and Analysis Plan for Z Area Saltstone Disposal Facility Restart, Revision 4***.** The GWPS consists of the Primary Drinking Water Standard (PDWS) or proposed PDWS if available. Where no PDWS is available, the Secondary Drinking Water Standard (SDWS) will be used. If there is no PDWS or SDWS for a constituent, the GWPS will be set at background or the practical quantitation limit if there is no background value. The list includes all constituents that might potentially be present in future waste streams *regardless of concentration.* Most of these constituents, if present at all, are present in very low concentrations and could not cause a significant impact to groundwater.

Table 1. Groundwater Protection Standards

| | | | |
|---|---|---|---|
| Aluminum | 200 | ppb | SDWS |
| Arsenic | 50 | ppb | PDWS |
| Antimony | 6 | ppb | PDWS |
| Barium | 2000 | ppb | PDWS |
| Beryllium | 4 | ppb | PDWS |
| 1, 1 Biphenyl | | | Background |
| Boron | | | Background |
| 1-Butanol | | | Background |
| Cadmium | 5 | ppb | PDWS |
| Chloride | 250 | ppm | SDWS |
| Chromium | 100 | ppb | PDWS |
| Cobalt | | | Background |
| Copper | 1300 | ppb | PDWS |
| Fluoride | 4000 | ppb | PDWS |

| | | | |
|---|---|---|---|
| Iron | 300 | ppb | SDWS |
| Isobutanol | | | Background |
| Lead | 15 | ppb | PDWS |
| Lithium | | | Background |
| Manganese | 50 | ppb | SDWS |
| Mercury | 2 | ppb | PDWS |
| Mercury (methyl) | | | Background |
| Molybdenum | | | Background |
| Nickel | 100 | ppb | PDWS |
| Nitrate/nitrite (as Nitrogen) | 10,000 | ppb | PDWS |
| Phenol | | | Background |
| Selenium | 50 | ppb | PDWS |
| Silver | 100 | ppb | SDWS |
| Strontium | | | Background |
| Sulfate | 250 | ppm | SDWS |
| Tetrachloroethylene | 5 | ppb | PDWS |
| Thallium | 2 | ppb | PDWS |
| Trichloroethylene | 5 | ppb | PDWS |
| Uranium | 20 | ppb | Proposed PDWS |
| Zinc | 500 | ppb | SDWS |
| Benzene | 5 | ppb | PDWS |
| Toluene | 1000 | ppb | PDWS |
| Total Radium | 5 | pCi/L | PDWS |
| Gross Alpha | 15 | pCi/L | PDWS |
| Gross beta | 4 | mrem/yr | PDWS |

Only constituents that are present in high concentrations relative to health based limits are relevant for groundwater monitoring. For that reason, a list of proposed Detection Monitoring Constituents (Table 2) was derived based on actual grout sampling results (Appendix 1) First the sampling results for nonradiological constituents were compared to risk-based standards multiplied by a dilution attenuation factor (DAF) of 2.5. The DAF was derived using site specific inputs except that a soil infiltration rate was used rather than that for the virtually impermeable vault top.

The only constituents present in the grout at 2.5 times the health based limit were fluoride, nitrate, molybdenum and selenium. For three constituents, fluoride, selenium and molybdenum, soil screening levels (SSL) were calculated using standard EPA methods (Appendix 2). For these calculations, the DAF of 2.5 was substituted for the less conservative recommended default value of 20. For fluoride the calculated SSL is 820 ppm. The maximum result for the grout was 492 ppm, so fluoride was eliminated as a monitoring constituent. For molybdenum the calculated SSL is 9.2 ppm. The maximum result for the grout was 0.486 ppm, so molybdenum was eliminated as a monitoring constituent. For selenium the calculated SSL is 0.65 ppm. The maximum result for the grout was 0.163 ppm, so selenium was also eliminated as a monitoring constituent.

Radium was eliminated from the semi-annual monitoring list based on process knowledge. The inventory of both SRS tank farms is only 2.66 curies for Ra 226 and 2.83 curies for Ra 228, and only a portion of this radium is destined to reach Z-Area. In the recently performed special analysis for Vault 4, it was determined that disposal limits of 4.8E+**16** Ci for Ra 226 and > 1E+**20** Ci for Ra 228 would be protective**.** So Vault 4 alone could safely hold at least 16 orders of magnitude more Ra 226 and 20 orders of magnitude more Ra 228 than is likely to be disposed of in all of the vaults combined. There is no plausible mechanism by which a vault release could result in measurable radium contamination of the aquifer. However, naturally occurring radium levels are of some interest, so Ra-226 and Ra 228 will be monitored on a biennial schedule.

The constituents proposed for semiannual detection monitoring at Z- Area are listed in Table 2. This short list is appropriate for detection monitoring since it has long been recognized that elevated levels of nitrate

(which is very mobile and very abundant in saltstone) will be a reliable early indicator of a vault release. If a release is detected, the ensuing groundwater assessment will include groundwater sampling and analysis for the entire GWPS list (table 1).

Table 2. Detection Monitoring Constituents and their Groundwater Protection Standards

| | | | |
|---|---|---|---|
| Nitrate (nitrate/nitrite) | 10,000 | ppb | PDWS |
| Gross Alpha | 15 | pCi/L | PDWS |
| Gross beta | 4 | mrem/yr | PDWS |
| I-129 | 1 | pCi/L | PDWS* |
| Tritium | 20,000 | pCi/L | PDWS |

*from "Radioactivity in Drinking Water", EPA 570/9-81-002, January 1981.

**Special Considerations for Beta-emitters**

Since the gross beta GWPS is defined in terms of dose (mrem/yr) rather than activity, the allowable activity varies from one nuclide to another (table 3). Iodine-129 must be routinely monitored because of its low drinking water standard (1 pCi/L). But it is only necessary to run specific analyses for other beta emitters if a gross beta result indicates the possibility of an exceedance of a standard or the need for a detailed assessment. In order to avoid unnecessary analytical and sampling costs, the following sampling scheme is proposed for beta-emitters.

Iodine 129 and gross nonvolatile beta will be monitored semiannually. If the gross beta result exceeds 8 pCi/L at a given well, the well will be resampled within 30 days and a Sr-90 analysis will be run. If Sr-90 is detected, it will be added to the monitoring list in table 2. If the gross beta result exceeds 30 pCi/L (the standard for Ru-106) at a given well, then that well and background well ZBG-1 will be resampled within 30 days and analyses for gross beta and for all constituents in table 3 will be run. Any nuclides detected above background will be added to the monitoring list in table 2. If the followup sampling confirms results above 30 pCi/L for gross beta, a plan for assessing the lateral and vertical extent of the plume will be developed and submitted to SCDHEC within 60 days.

**Special Considerations for Volatile Constituents**

The analytical results in Appendix 1 show that the current grout mix contains no volatile organic compounds (voc's) other than benzene and toluene. Both are present in the grout at levels below their PDWS. Since they could not become more concentrated in the groundwater than they are in the grout, these constituents will not be included in semiannual monitoring at this time. The monitoring list will be revised if future grout mixes require it. However, given the mobility of some voc's, the use of a DAF of 2.5 (as was used for metals above) may not be appropriate for assessing the possibility of an impact. So for those voc's with octanol partition coefficients (Kow's) of less than three, a DAF of 1 will be used. This means that any voc with a Kow less than or equal to 3 (like benzene or toluene) will be added to the semiannual monitoring list if its concentration in the grout is ever found to exceed its PDWS (or other health based limit).

There is always some possibility that volatiles could escape detection during grout sampling and /or exhibit greater mobility than predicted by published Kow values. For those reasons, samples from all wells will be analyzed for a suite of volatile organic compounds biennially (every two years).

**Background Groundwater Quality**

The regulation requires that background groundwater quality be established in the upgradient well. This is important when it is believed that background concentrations for any constituent might exceed the PDWS or other health based concentration. When this is the case, the GWPS can be set at the background concentration rather than the more restrictive health-based limit. At Z Area, the upgradient wells have been sampled for over ten years, and a large amount of background data is available for all of the Detection

Monitoring Constituents. The data clearly show that health based limits for those constituents are not exceeded in the background wells.

It may become necessary to add some volatile and semivolatile compounds to the sampling list as the waste stream changes to include waste from tank 48. The new saltstone mix will have to be characterized before disposal, and the analytical results of that waste characterization will be used to determine what changes are necessary for groundwater monitoring. If changes in the waste stream require the addition of new monitoring constituents, background data for those constituents will be evaluated at that time. For some newly proposed constituents, there may be insufficient data to establish background levels. As soon as such constituents are added to the monitoring list, SRS will collect the four independent samples needed to establish an initial background concentration.

**Proposed Groundwater Monitoring System**

The existing and proposed Z Area monitoring wells are shown in figure 1 and listed in table 4. All of these are watertable wells. Wells ZBG-3 through 5 and ZBG-9 through 11 are proposed as point of compliance wells**.** All wells are constructed using specifications in *Procedure Manual WSRC-3Q5 Hydrogeologic Data Collection.* The current point of compliance is based on the locations of existing vaults. If new vaults are built downgradient, the point of compliance will shift to a point 100 feet downgradient of the new vaults. At that time, the POC wells will be abandoned and replaced by wells appropriately positioned to monitor the new POC.

In addition to the POC wells, three new wells are proposed to monitor the watertable immediately downgradient of Vault 1 (figure1). These wells are proposed at the request of SCDHEC because of the large distance between Vault 1 and the point of compliance wells (approximately 850 feet). Vault 1 is of special interest because it has been in operation longer than any other vault and has experienced some cracking. Because of these unique characteristics, wells are desirable near this vault. However, all future wells will be installed between the furthest downgradient vault and the POC. The only exception will be in the case of any new vault being built more than 800 feet upgradient from the nearest well. Additional wells may be located immediately downgradient of such a vault. Wells located between vaults may have to be abandoned if they are impediments to new construction or landfill operations.

**Sampling and Analysis**

Samples from all wells will be analyzed semiannually for all Detection Monitoring Constituents in table 2. Samples from all wells will be analyzed for Ra -226 and Ra-228 and a full suite of volatile organic compounds biennially. Laboratory analysis will be conducted in accordance with *Procedure Manual WSRC-3Q5 Hydrogeologic Data Collection*. Well sampling will be conducted either by dedicated pump, as described in *WSRC-3Q5,* or by Hydrasleeve sampler, which has been shown to produce less turbid samples in the poorly producing wells common to Z Area.

**Data Evaluation and Reporting**.

Data from the downgradient wells will be compared to the appropriate GWPS (table 2). Where the GWPS is set at background, monitoring results will be evaluated as follows. Results from downgradient wells will be compared to upgradient results for the same sampling event. If the downgradient results exceed the upgradient results, then the historical upgradient data available up to that point will be used to establish an upper tolerance limit or other appropriate statistical limit (per Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities Addendum to Interim Final Guidance, EPA, 1992). If the downgradient result exceeds this limit, it will then be compared to duplicates and other quality assurance samples in an effort to rule out sampler or laboratory error. If no errors are detected, the result will be considered an exceedance of the GWPS.

The monitoring results and the process by which they are evaluated will be discussed in an annual report submitted to SCDHEC in January. In addition to the annual reports, data-only reports will be submitted in July that present data from first quarter sampling. If a GWPS is exceeded, this will be reported to

SCDHEC promptly, and the well will be resampled within 30 days. If the exceedance is confirmed, all wells will be sampled for the complete GWPS list (Table 1), and an assessment monitoring plan will be submitted.

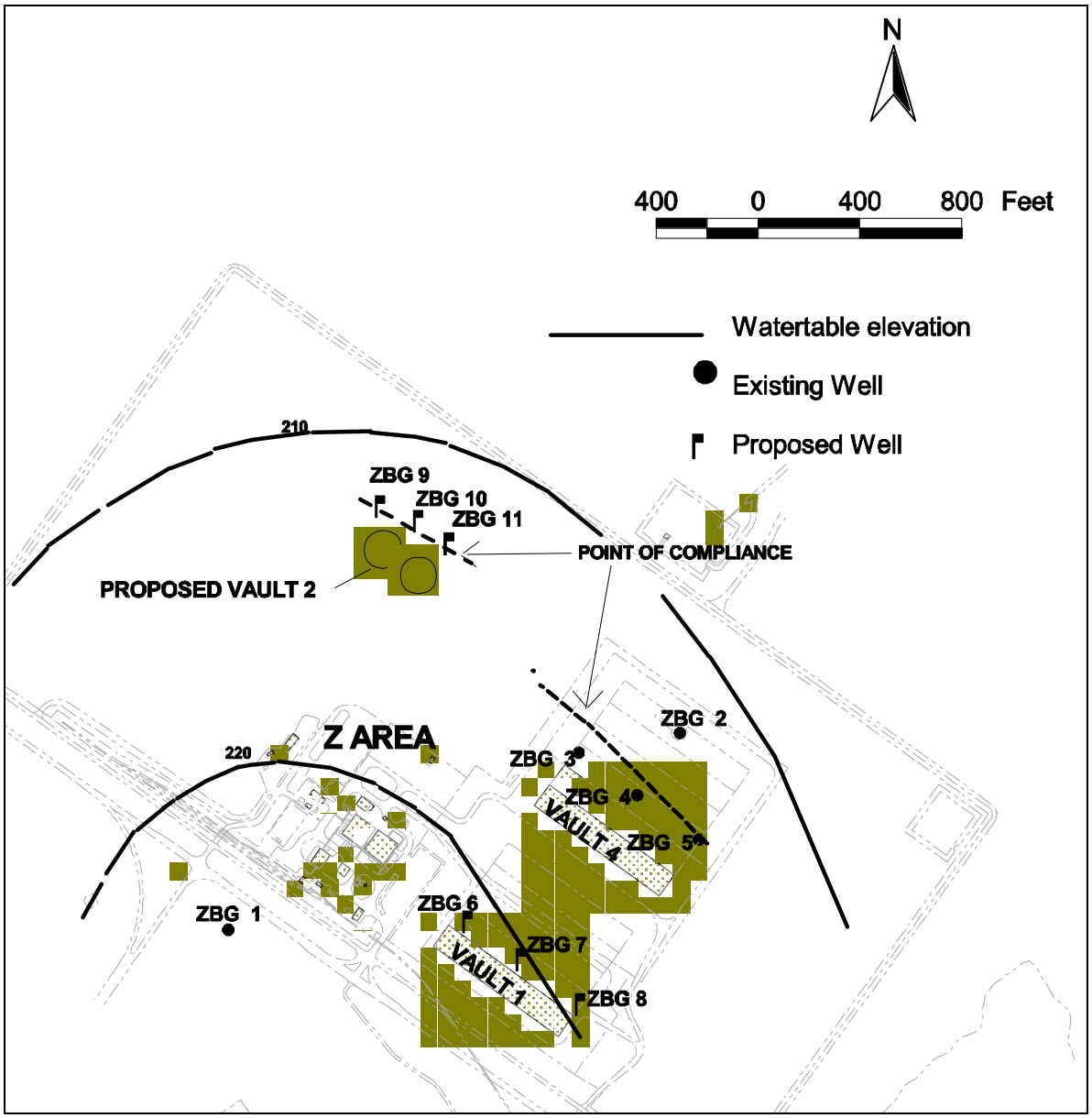


Figure 1. Locations of the point of compliance and existing and proposed monitoring wells.

Table 3. Maximum Concentration Limits for beta-emitting radionuclides in saltstone (from "Radioactivity in Drinking Water," EPA 570/9-81-002).

| | | |
|---|---|---|
| I-129 | 1 | pCi/L |
| Sr-90 | 8 | pCi/L |
| Ru-106 | 30 | pCi/L |
| Ni-63 | 50 | pCi/L |
| Pu-241 | 62.6 | pCi/L (proposed) |
| Co-60 | 100 | pCi/L |
| Cs-137 | 200 | pCi/L |
| Ni-59 | 300 | pCi/L |
| Sb-125 | 300 | pCi/L |
| Nb-94 | 707 | pCi/L (proposed) |
| Tc-99 | 900 | pCi/L |
| C-14 | 2000 | pCi/L |

Table 4. Monitoring well details

| Well | Easting | Northing | Screen Top (ft MSL) | Screen Bottom (ft MSL) | Total_Depth | Diameter | Material | Completion Date |
|---|---|---|---|---|---|---|---|---|
| ZBG 1 | 440150.1 | 3684778 | 240.1 | 220 | 71.1 | 4 | PVC | 17-Apr-87 |
| ZBG 2 | 440689.6 | 3685014 | 230.9 | 210.9 | 67.1 | 4 | PVC | 23-Apr-87 |
| ZBG 3 | 440568.5 | 3684990 | 214 | 204 | 74.5 | 2 | PVC | 18-Sep-02 |
| ZBG 4 | 440638.9 | 3684939 | 215.44 | 205.44 | 71 | 2 | PVC | 18-Sep-02 |
| ZBG 5 | 440712.8 | 3684886 | 213.77 | 203.77 | 71 | 2 | PVC | 18-Sep-02 |
| ZBG 6 | 440430 | 3684778 | 219 | 204 | 100 | 4 | PVC | PROPOSED |
| ZBG 7 | 440496 | 3684740 | 219 | 204 | 100 | 4 | PVC | PROPOSED |
| ZBG 8 | 440569 | 3684682 | 219 | 204 | 100 | 4 | PVC | PROPOSED |
| ZBG 9 | 440328 | 3685276 | 214 | 199 | 75 | 4 | PVC | PROPOSED |
| ZBG 10 | 440374 | 3685259 | 214 | 199 | 75 | 4 | PVC | PROPOSED |
| ZBG 11 | 440411 | 3685230 | 214 | 199 | 75 | 4 | PVC | PROPOSED |

# APPENDIX 1

# TCLP RESULTS

(from WSRC-TR-2004-00051)

D H E C
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

Type Data: Industrial Inorganic TCLP/R.61-58.5
Company Name: Westinghouse Savannah River Company
Subject/Project: Low-Curie Salt

Date: 01/30/04

| | Results in Milligrams per Liter | | | | |
|---|---|---|---|---|---|
| | Waste Stream 1 | | | - | |
| Facility Sample ID # | 9/29/2003 | 9/29/2003 | 9/29/2003 | - | - |
| Laboratory Sample ID # | 41-TR1 | 41-TR2 | 41-TR3 | - | - |
| Laboratory Name | 0310002-17 | 0310002-18 | 0310002-19 | - | - |
| SC Laboratory Certification # | BWXS-NELS | BWXS-NELS | BWXS-NELS | - | - |
| Subcontracted Laboratory Certification # | Pending | Pending | Pending | - | - |
| Subcontracted Laboratory Name | --- | --- | --- | - | - |
| Laboratory Receipt Information (Chain of Custody Must be Attached) | --- | --- | --- | - | - |
| | Attached | Attached | Attached | - | - |
| **Inorganic TCLP Chemicals** | 1 | 1 | 1 | - | - |

| Analytical Parameter | Analytical Method | Quantitation Limit (mg/l) | MCL (mg/l) | 10 x MCL (mg/l) | 30 x MCL (mg/l) | - | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | 6010B | 0.28 | 0.006 | 0.06 | 0.18 | - | <0.028 | <0.028 | <0.028 | - | - |
| Arsenic | 6010B | 0.12 | 0.01 | 0.10 | 0.3 | - | <0.012 | 0.021(B) | 0.016(B) | - | - |
| Barium | 6010B | 0.012 | 2 | 20.00 | 60 | - | 0.122 | 0.110 | 0.152 | - | - |
| Beryllium | 6010B | 1.70E-03 | 0.004 | 0.04 | 0.12 | - | <1.7E-4 | 1.1E-03 | <1.7E-4 | - | - |
| Cadmium | 6010B | 0.016 | 0.005 | 0.05 | 0.15 | - | <1.6E-3 | 2.78E-3(B) | 2.11E-3(B) | - | - |
| Chloride | 9056 | 250 | 250 | 2500.00 | 7500 | - | <250 | <250 | <250 | - | - |
| Chromium | 6010B | 0.032 | 0.1 | 1.00 | 3 | - | 0.0268(B) | 0.0276(B) | 0.0274(B) | - | - |
| Copper | 6010B | 0.059 | 1.3 | 13.00 | 39 | - | <5.9E-3 | <5.9E-3 | <5.9E-3 | - | - |
| Cyanide (as free cyanide) | 9010B / 9040[3] | - | 0.2 | 2.00 | 6 | - | - | - | - | - | - |
| Fluoride | 9056 | 250 | 4 | 40.00 | 120 | - | 488 | 467 | 492 | - | - |
| Iron | 6010B | 0.051 | 0.3 | 3.00 | 9 | - | 0.044(B) | 0.071 | 0.098 | - | - |
| Lead | 6010B | 0.28 | 0.015 | 0.15 | 0.45 | - | <0.028 | <0.028 | <0.028 | - | - |
| Manganese | 6010B | 0.012 | 0.05 | 0.50 | 1.5 | - | 3.8E-3(B) | 2.9E-3(B) | 0.0127 | - | - |
| Mercury | 7470A | 1.40E-03 | 0.002 | 0.02 | 0.06 | - | <1.4E-4 | 1.8E-4(B) | 8.1E-4(B) | - | - |
| Nitrate (as Nitrogen) | 9056 | 56 | 10 | 100.00 | 300 | - | 1.163E+03 | 1.209E+03 | 1.213E+03 | - | - |
| Nitrite (as Nitrogen) | 9056 | 76 | 10 | 100.00 | 300 | - | <76 | <76 | <76 | - | - |
| Nitrate/Nitrite (Total) | 9056 | 132 | 10 | 100.00 | 300 | - | 1.163E+03 | 1.209E+03 | 1.213E+03 | - | - |
| Selenium | 6010B | 0.28 | 0.05 | 0.50 | 1.5 | - | 0.156(B) | 0.150(B) | 0.163(B) | - | - |
| Silver | 6010B | 0.054 | 0.1 | 1.00 | 3 | - | <5.4E-3 | <5.4E-3 | <5.4E-3 | - | - |
| Sulfate | 9056 | 250 | 250 | 2500.00 | 7500 | - | 507 | 531 | 448 | - | - |
| Thallium | 7841 | - | 0.002 | 0.02 | 0.06 | - | - | - | - | - | - |
| Aluminum[7] | 6010B | 0.3 | 36 | 3.6E+02 | 1080 | - | 0.30(B) | 0.16(B) | 0.75(B) | - | - |
| Boron[7] | 6010B | 0.18 | 3.3 | 3.3E+01 | 99 | - | 0.517 | 0.483 | 0.37 | - | - |
| Cobalt[7] | 6010B | 0.026 | 2.2 | 2.2E+01 | 66 | - | <2.6E-3 | <2.6E-3 | <2.6E-3 | - | - |
| Lithium[7] | 6010B | 0.11 | 0.73 | 7.30 | 21.9 | - | 0.763 | 0.766 | 0.710 | - | - |
| Molybdenum[7] | 6010B | 0.23 | 0.18 | 1.80 | 5.4 | - | 0.486 | 0.484 | 0.442 | - | - |
| Nickel[7] | 6010B | 0.069 | 0.73 | 7.30 | 21.9 | - | <6.9E-3 | <6.9E-3 | <6.9E-3 | - | - |
| Strontium, stable[7] | 6010B | 0.013 | 22 | 2.2E+02 | 660 | - | 0.957 | 0.912 | 1.02 | - | - |
| Uranium[7] | Radionuclides[8] | 1.0E-06 | 7.3 | 73.00 | 219 | - | 3.5E-07 | 7.2E-09 | 8.2E-07 | - | - |

Footnotes: See Page 2


Type Data: Industrial RCRA - TCLP Semi-Volatiles
Company Name: Westinghouse Savannah River Company
Subject/Project: Low-Curie Salt

Date: 01/30/04

| | Results in Milligrams per Liter | | | | |
|---|---|---|---|---|---|
| | Waste Stream 1 | | | - | |
| Facility Sample ID # | 9/29/2003 | 9/29/2003 | 9/29/2003 | - | - |
| | 41-TM1 | 41-TM2 | 41-TM3 | - | - |
| Laboratory Sample ID # | 0310002-07A | 0310002-08A | 0310002-09A | - | - |
| Laboratory Name | BWXS-NELS | BWXS-NELS | BWXS-NELS | - | - |
| SC Laboratory Certification # | Pending | Pending | Pending | - | - |
| Subcontracted Laboratory Certification # | --- | --- | --- | - | - |
| Subcontracted Laboratory Name | --- | --- | --- | - | - |
| Laboratory Receipt Information (Chain of Custody Must be Attached) | Attached | Attached | Attached | - | - |
| **Semi-Volatile Organic Compounds** | Subcontract [1] | - | - | Subcontract [1] | - |

| Analytical Analaytes | Preparation Method | Analytical Method | Detection Limit (mg/l) | Quantitation Limit (mg/l) | MCL (mg/l) | 10 x MCL (mg/l) | 30 x MCL (mg/l) | - | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,4-Dichlorobenzene | 3550 | SW8270C | - | - | - | - | - | - | - | - | - | - | - |
| o-Cresol (2-Methtlphenol) | 3550 | SW8270C | - | - | - | - | - | - | - | - | - | - | - |
| m- and p-Cresol (3- & 4-Methylphenol) | 3550 | SW8270C | - | - | - | - | - | - | - | - | - | - | - |
| Hexachloroethane | 3550 | SW8270C | - | - | - | - | - | - | - | - | - | - | - |
| Nitrobenzene | 3550 | SW8270C | - | - | - | - | - | - | - | - | - | - | - |
| Hexochloro- 1,3-butadiene | 3550 | SW8270C | - | - | - | - | - | - | - | - | - | - | - |
| 2,4,6-Trichlorophenol | 3550 | SW8270C | - | - | - | - | - | - | - | - | - | - | - |
| 2,4,5-Trichlorophenol, etc. | 3550 | SW8270C | - | - | - | - | - | - | - | - | - | - | - |
| 2,4-Dinitrotoluene | 3550 | SW8270C | - | - | - | - | - | - | - | - | - | - | - |
| Hexachlorobenzene | 3550 | SW8270C | - | - | - | - | - | - | - | - | - | - | - |
| Pentachlorophenol | 3550 | SW8270C | - | - | - | - | - | - | - | - | - | - | - |
| Pyridine | 3550 | SW8270C | - | - | - | - | - | - | - | - | - | - | - |
| Phenol[2] | 3550 | SW8270C | 0.05 | 1.0 | 22000 | 220000 | 6.6E+05 | - | <1.0 | <1.0 | <1.0 | - | - |
| **Quality Assurance (for above samples)** | | | | | | | | | - | | | | |
| TCLP Extraction Batch # | | | | | | | | | 683-05 | 683-05 | 683-05 | - | - |
| Semivolatile Extraction Batch # | | | | | | | | | 648-66 | 648-66 | 648-66 | - | - |
| Analysis Batch Number | | | | | | | | | 102603.B | 102603.B | 102603.B | - | - |
| Surrogates. % Recovery | | | | | | | | | A | A | A | - | - |
| Nitrobenzene, d5 | | | | | | | | | - | - | - | - | - |
| 2-Fluorobiphenol | | | | | | | | | - | - | - | - | - |
| Terphenyl, d14 | | | | | | | | | - | - | - | - | - |
| Phenol, d6 | | | | | | | | | 34 | 31 | 34 | - | - |
| 2-Fluorophenol | | | | | | | | | - | - | - | - | - |
| 2,4,6-Tribromophenol | | | | | | | | | - | - | - | - | - |

1. Subcontracted Laboratory used for this Analyte.

2. PRG is given instead of the MCL. No MCL has been specified for this analyte.


Type Data: Industrial RCRA - TCLP Volatiles
Company Name: Westinghouse Savannah River Company
Subject/Project: Low-Curie Salt

Date: 01/30/04

| | | | | | | | | | Results in Milligrams per Liter | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Waste Stream 1 | | | - | |
| Facility Sample ID # | | | | | | | | | 9/29/2003 | 9/29/2003 | 9/29/2003 | - | - |
| | | | | | | | | | 41-TV1 | 41-TV2 | 41-TV3 | - | - |
| Laboratory Sample ID # | | | | | | | | | 0310002-02AT3 | 0310002-03AT3 | 0310002-04AT3 | - | - |
| Laboratory Name | | | | | | | | | BWXS-NELS | BWXS-NELS | BWXS-NELS | - | - |
| SC Laboratory Certification # | | | | | | | | | Pending | Pending | Pending | - | - |
| Subcontracted Laboratory Certification # | | | | | | | | | --- | --- | --- | - | - |
| Subcontracted Laboratory Name | | | | | | | | | --- | --- | --- | - | - |
| Laboratory Receipt Information (Chain of Custody Must be Attached) | | | | | | | | | --- | --- | --- | - | - |
| **TCLP Volatile Organic Compounds** | | | | | | | | | Subcontract [1] | - | - | Subcontract [1] | - |
| Analytical Parameter | Preparation Method | Analytical Method | Detection Limit (mg/l) | Quantitation Limit (mg/l) | MCL (mg/l) | 10 x MCL (mg/l) | 30 x MCL (mg/l) | - | - | | | | |
| Benzene | 5030B | SW8260B | 0.001 | 0.01 | 0.005 | 0.05 | 0.15 | - | <0.010 | 2.9E-3(J) | <0.010 | - | - |
| Carbon Tetrachloride | 5030B | SW8260B | - | - | - | - | - | - | - | - | - | - | - |
| Tetrachloroethylene | 5030B | SW8260B | - | - | - | - | - | - | - | - | - | - | - |
| Trichloroethylene | 5030B | SW8260B | - | - | - | - | - | - | - | - | - | - | - |
| Vinyl Chloride | 5030B | SW8260B | - | - | - | - | - | - | - | - | - | - | - |
| 1.1-Dichloroethylene | 5030B | SW8260B | - | - | - | - | - | - | - | - | - | - | - |
| 1,2-Dichloroethane | 5030B | SW8260B | - | - | - | - | - | - | - | - | - | - | - |
| Chloroform | 5030B | SW8260B | - | - | - | - | - | - | - | - | - | - | - |
| MEK (2-Butanone) | 5030B | SW8260B | - | - | - | - | - | - | - | - | - | - | - |
| Chlorobenzene | 5030B | SW8260B | - | - | - | - | - | - | - | - | - | - | - |
| Toluene | 5030B | SW8260B | 0.002 | 0.01 | 1 | 10 | 30 | - | 1.2E-3(J) | <0.010 | <0.010 | - | - |
| 1-Butanol[2] | 5030B | SW8260B | 0.100 | 0.1 | 3600 | 36000 | 1.1E+05 | - | <0.1 | <0.1 | <0.1 | - | - |
| **Quality Assurance (for above samples)** | | | | | | | | | - | | - | | |
| TCLP ZHE Extraction Batch # | | | | | | | | | 683-05 | 683-05 | 683-05 | - | - |
| Volatile Analysis Batch # | | | | | | | | | 100803.B | 100803.B | 100803.B | - | - |
| Surrogates, % Recovery | | | | | | | | | A | NA(toluene) | A | - | - |
| 1,2- Dichlorethane, d4 | | | | | | | | | - | - | - | - | - |
| Toluene, d8 | | | | | | | | | 104 | 68 | 103 | - | - |
| 4-Bromofluorobenzene | | | | | | | | | 96 | 106 | 98 | - | - |
| Other | | | | | | | | | - | - | - | - | - |

1. Subcontracted Laboratory Used for these Parameters(Analytes)

2. PRG is given instead of the MCL. No MCL has been specified for this analyte.

(J) indicates values that were above the method detection limits but below the quantitation limits.

# APPENDIX 2
Soil Screening Level inputs and results for:

Fluoride
Molybdenum
Selenium

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# Soil Screening Guidance for Chemicals

## Equation Values for Soil to Ground Water

| Partitioning Equation Parameter | Value |
|---|---|
| Dilution factor (unitless) | 2.5 |
| Fraction organic carbon in soil (unitless) | 0.0004 |
| Water-filled soil porosity ($L_{water}/L_{soil}$) | 0.3 |
| Dry soil bulk density (kg/L) | 1.5 |
| Soil particle density (kg/L) | 2.65 |

## Soil Screening Levels for Soil to Ground Water (mg/kg)

| Analyte | Cas Number | Ground Water Concentration* (mg/L) | Ground Water Concentration Source | Soil Screening Level |
|---|---|---|---|---|
| Fluorine (Soluble Fluoride) | 7782414 | 5.5E+00 | HBL | 8.2E+02 |

*Ground Water Concentration=Ground Water Concentration Source × Dilution Factor

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| Soil particle density (kg/L) | 2.65 |

## Soil Screening Levels for Soil to Ground Water (mg/kg)

| Analyte | Cas Number | Ground Water Concentration* (mg/L) | Ground Water Concentration Source | Soil Screening Level |
|---|---|---|---|---|
| Molybdenum | 7439987 | 4.6E-01 | HBL | 9.2E+00 |

*Ground Water Concentration=Ground Water Concentration Source × Dilution Factor

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# Soil Screening Guidance for Chemicals

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| Water-filled soil porosity ($L_{water}/L_{soil}$) | 0.3 |
| Dry soil bulk density (kg/L) | 1.5 |
| Soil particle density (kg/L) | 2.65 |

## Soil Screening Levels for Soil to Ground Water (mg/kg)

| Analyte | Cas Number | Ground Water Concentration* (mg/L) | Ground Water Concentration Source | Soil Screening Level |
|---|---|---|---|---|
| Selenium | 7782492 | 1.3E-01 | MCLG | 6.5E-01 |

*Ground Water Concentration=Ground Water Concentration Source × Dilution Factor

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