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F- AND H-AREA SEWAGE
SLUDGE APPLICATION SITES
GROUNDWATER MONITORING REPORT (U)

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Abstract

During second quarter 1992, the four wells at the F-Area Sewage Sludge Application Site (FSS wells) and the three wells at the H-Area Sewage Sludge Application Site (HSS wells) were sampled and analyzed for constituents required quarterly by South Carolina Department of Health and Environmental Control Construction Permit 12,076. None of these analytes exceeded the U.S. Environmental Protection Agency Primary Drinking Water Standards (PDWS) or the Savannah River Site (SRS) Flag 2 criteria at either sewage sludge site.

The F-Area Sewage Sludge Application Site wells also were analyzed for a number of other constituents not required by the permit. Of these constituents, tritium exceeded the PDWS in wells FSS 2D and 3D. Lead exceeded the PDWS in well FSS 3D.

Iron exceeded the Flag 2 criterion in well FSS 4D, and manganese exceeded the SRS Flag 2 criterion in wells FSS 2D and 3D.

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Executive Summary

Eleven sewage sludge application sites at the Savannah River Site (SRS) were originally the subject of a research program, begun in 1980, using domestic sewage sludge to reclaim borrow pits and to enhance forest productivity at SRS. Currently, the F- and H-Area Sewage Sludge Application Sites are the only remaining active sludge application sites.

The monitoring wells at the F- and H-Area Sewage Sludge Application Sites are sampled quarterly as part of the SRS Groundwater Monitoring Program and to comply with Construction Permit 12,076, issued by the South Carolina Department of Health and Environmental Control (SCDHEC).

During second quarter 1992, samples from the four monitoring wells at the F-Area site (FSS series) and the three monitoring wells at the H-Area site (HSS series) were analyzed for constituents required quarterly by the SCDHEC construction permit. In addition, the FSS wells received analyses for the annual parameters required by the construction permit and for other constituents required by the SRS Groundwater Monitoring Program. This report describes monitoring results that exceeded the U.S. Environmental Protection Agency Primary Drinking Water Standards (PDWS) or the SRS flagging criteria.

Wells FSS 1D, 2D, 3D, 4D, and HSS 1D and 3D did not yield four well volumes prior to sampling; thus, the samples collected from these wells may not be representative groundwater samples.

Tritium exceeded the PDWS in well FSS 2D at $8.2\text{E}+01$ pCi/mL and in well FSS 3D at $5.3\text{E}+01$ pCi/mL. Lead exceeded the PDWS in well FSS 3D at $19\text{ }\mu\text{g/L}$. Iron exceeded the Flag 2 criterion in well FSS 4D at $826\text{ }\mu\text{g/L}$. Manganese exceeded the Flag 2 criterion in well FSS 2D at $69\text{ }\mu\text{g/L}$ and in well FSS 3D at $76\text{ }\mu\text{g/L}$. None of the constituents analyzed in the HSS wells exceeded the PDWS or the SRS Flag 2 criteria.

Alkalinity ranged up to 48 mg/L in the FSS well series and up to 2 mg/L in the HSS well series.

Water-table elevations at the F-Area Sewage Sludge Application Site indicate that the groundwater flow direction is toward the southwest (SRS grid coordinates), discharging into Fourmile Branch. Well FSS 1D is upgradient, and well FSS 3D is downgradient. Elevated levels of tritium, lead, and manganese were found in downgradient well FSS 3D; upgradient well FSS 1D did not contain any constituents that exceeded standards.

Water-table elevations at the H-Area Sewage Sludge Application Site indicate that the groundwater flow direction is generally toward the southwest (SRS grid coordinates). Well HSS 3D is upgradient, and wells HSS 1D and HSS 2D are downgradient. None of the constituents analyzed for were elevated in the downgradient HSS wells.

Introduction

The 11 sewage sludge application sites at the Savannah River Site (SRS) were originally the subject of a research program, begun in 1980, using domestic sewage sludge to reclaim borrow pits and to enhance forest productivity at SRS. Sludge was applied to the sites, and hardwoods and pines were then planted to quantify the wood biomass that could be produced using the sludge as a fertilizer and soil conditioner.

Currently, of the 11 original sewage sludge sites, only F- and H-Area Sewage Sludge Application Sites remain active. These sites may receive sludge from SRS sanitary wastewater treatment plants in accordance with Construction Permit 12,076, issued by the South Carolina Department of Health and Environmental Control (SCDHEC) in April 1986.

The F-Area Sewage Sludge Application Site covers approximately 8 acres south of Road E in the southeastern portion of F Area (see Figures 1 and 2 in Appendix C). Sludge was disposed of at this location from 1980 until third quarter 1990. The H-Area Sewage Sludge Application Site includes approximately 13 acres south of Road E in the southeastern portion of H Area (see Figures 1 and 3 in Appendix C). Sewage sludge has been disposed of intermittently at this site since November 1990.

In 1988, SRS determined that new wells were required at the F- and H-Area sites to assess the effects on groundwater of sewage sludge application to these sites. SRS installed four new wells at the F-Area site and three new wells at the H-Area site after receiving approval by SCDHEC. These wells, designated FSS 1D, 2D, 3D, and 4D and HSS 1D, 2D, and 3D, were first sampled during fourth quarter 1988. All wells monitor the water table and are constructed of 4-in. polyvinyl chloride pipe. This report presents data from these wells for second quarter 1992 as required by Special Condition 4 of Construction Permit 12,076.

Discussion

Groundwater Monitoring Data

The standard practice at SRS is to purge a minimum of four well volumes from each well and ensure that the field parameters have stabilized before sample collection. A well that goes dry before completion of purging is allowed to recover and sampling is attempted again within 24 hours without additional purging. If successful, this sampling constitutes a single sampling event. During second quarter 1992, wells FSS 1D, 2D, 3D, 4D, and HSS 1D and 3D did not yield four well volumes prior to sampling. The samples collected from these wells may not, therefore, be representative groundwater samples. Most of these wells consistently have failed to purge four well volumes since their installation.

Samples from the four monitoring wells at the F-Area site and the three monitoring wells at the H-Area site are analyzed quarterly for the following parameters as required by SCDHEC Construction Permit 12,076:

- Specific conductance and pH (laboratory measurements)
- Water quality indicators: chloride, nitrate and nitrite (as nitrogen), sodium, and total dissolved solids

Annually, these wells are also analyzed for cadmium, calcium, copper, iron, lead, magnesium, manganese, nickel, potassium, and total phosphates (as phosphorus) as required by the construction permit. The wells may also receive additional analyses as part of the SRS Groundwater Monitoring Program.

During second quarter 1992, the FSS wells also received the following analyses:

- Toxic metals: arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, and silver
- Additional water quality indicators: calcium, fluoride, iron, magnesium, manganese, phenols, potassium, silica, sulfate, total organic carbon, total organic halogens, and total phosphates (as phosphorus)
- Gas chromatograph/mass spectrometer volatile organics analyses
- Pesticides and herbicides: 2,4-dichlorophenoxyacetic acid, endrin, lindane, methoxychlor, silvex, and toxaphene
- Radionuclides: gross alpha, nonvolatile beta, radium-226, and tritium

This report discusses monitoring results that exceeded the U.S. Environmental Protection Agency Primary Drinking Water Standards (PDWS) (see Appendix A) or the SRS flagging criteria (see Appendix B) during second quarter 1992.

Appendix C provides the locations of the monitored sites at SRS (Figure 1); the individual FSS and HSS monitoring wells (Figures 2 and 3, respectively); the flow directions of the groundwater beneath the sites (Figures 4 and 5); and the tritium activities in the FSS wells compared to the tritium activities in Old Burial Ground wells (Figure 6). Monitoring results tables as well as analyses that exceeded the holding times and PDWS are in Appendix D.

Analytical Results Exceeding Standards

Table 1 (Appendix D) summarizes constituents that exceeded the PDWS during second quarter 1992 for the F-Area Sewage Sludge Application Site. Table 2 (Appendix D) summarizes constituents in excess of the PDWS for the H-Area Sewage Sludge Application Site for the quarter. Tritium exceeded the PDWS in well FSS 2D at $8.2\text{E}+01$ pCi/mL and in well FSS 3D at $5.3\text{E}+01$ pCi/mL. Lead exceeded the PDWS in well FSS 3D at $19\text{ }\mu\text{g/L}$. No constituents exceeded the PDWS in the HSS wells during second quarter 1992.

Tables 3 and 4 (Appendix D) summarize constituents exceeding half the PDWS or other Flag 1 or 2 criteria during second quarter 1992 for the F-Area Sewage Sludge Application Site and H-Area Sewage Sludge Application Site, respectively. Iron exceeded the Flag 2 criterion in well FSS 4D at $826\text{ }\mu\text{g/L}$. Manganese exceeded the Flag 2 criterion in well FSS 2D at $69\text{ }\mu\text{g/L}$ and in well FSS 3D at $76\text{ }\mu\text{g/L}$. No constituents exceeded the Flag 2 criteria in HSS wells.

Second quarter 1992 results for all constituents for the FSS and HSS wells are presented in Tables 5 and 6, respectively (Appendix D).

Presently, SRS sets no flagging criteria for alkalinity; in the FSS wells, alkalinity ranged up to 48 mg/L in well FSS 2D. In the HSS wells, alkalinity ranged up to 2 mg/L in well HSS 1D.

Water Elevations and Groundwater Flow Directions

Water-table elevations at the F-Area Sewage Sludge Application Site indicate that the groundwater flow direction is toward the southwest (SRS grid coordinates), discharging into Fourmile Branch. Well FSS 1D is upgradient, and well FSS 3D is downgradient. Down-gradient well FSS 3D contained tritium and lead levels that exceeded the PDWS and manganese concentrations that exceeded the Flag 2 criterion; upgradient well FSS 1D did not contain any constituents that exceeded standards.

Water-table elevations at the H-Area Sewage Sludge Application Site indicate that the groundwater flow direction is generally toward the southwest (SRS grid coordinates), although the nearly linear orientation of the wells makes this determination difficult (Figure 5, Appendix C). Well HSS 3D is the designated upgradient well, and wells HSS 1D and HSS 2D are downgradient. None of the HSS wells contained constituents that exceeded standards.

Conclusions

- During second quarter 1992, tritium and lead exceeded the PDWS, and iron and manganese exceeded the SRS Flag 2 criteria in the FSS well series.
- Elevated levels of tritium, lead, and manganese were found in downgradient well FSS 3D; upgradient well FSS 1D did not contain any constituents that exceeded standards. Generally, elevated levels of constituents found in downgradient wells but not in upgradient wells at a waste management unit are considered products of the waste management unit.
- No constituents were elevated in the HSS well series.
- The historic records for the F- and H-Area Sewage Sludge Application Sites indicate that no radionuclides were disposed of in the immediate area. The source of the tritium in the FSS wells is believed to be the Old Burial Ground (see Figure 6, Appendix C); the source of the other elevated constituents in these wells is unknown.
- The wells that pumped dry during purging, FSS 1D, 2D, 3D, 4D, and HSS 1D and 3D, may have yielded unrepresentative groundwater samples.

Errata

The results of analyses performed using EPA Method 900.1 have been incorrectly referred to in the past as total radium results and have been inappropriately evaluated against the drinking water standard for combined radium-226 and radium-228. EPA Method 900.1 should be considered a gross radium alpha screening procedure; it may be used to screen drinking water for the necessity of performing a specific radium-226 analysis, but it gives no indication of the presence or quantity of radium-228 in the sample. This analysis is now referred to as total alpha-emitting radium.

First Quarter 1992:

- Chlordane analysis was requested as part of the Base/Neutral/Acid suite of analyses as described in the Environmental Protection Department/Environmental Monitoring Section contract with the analytical laboratory. However, the Roy F. Weston laboratory, who conducted the analyses for first through third quarters 1992, does not include chlordane in their Base/Neutral/Acid suite of analyses. Chlordane analysis will be conducted by General Engineering Laboratories for fourth quarter 1992.

Appendix A – Primary Drinking Water Standards

Primary Drinking Water Standards

Analyte	Unit	Level	Status	Reference
Americium-241	pCi/L	6.34E + 00	Proposed	EPA, 1991
Americium-243	pCi/L	6.37E + 00	Proposed	EPA, 1991
Antimony	µg/L	5 ^a	Proposed	EPA, 1990
Antimony-125	pCi/L	3E + 02	Final	EPA, 1977
Arsenic	µg/L	50	Final	CFR, 1991
Barium	µg/L	2,000	Final	CFR, 1991
Barium-140	pCi/L	9E + 01	Final	EPA, 1977
Benzene	µg/L	5	Final	CFR, 1991
Benzo[a]anthracene	µg/L	0.1	Proposed	EPA, 1990
Benzo[b]fluoranthene	µg/L	0.2	Proposed	EPA, 1990
Benzo[k]fluoranthene	µg/L	0.2	Proposed	EPA, 1990
Benzo[a]pyrene	µg/L	0.2	Proposed	EPA, 1990
Beryllium	µg/L	1	Proposed	EPA, 1990
Beryllium-7	pCi/L	6E + 03	Final	EPA, 1977
Bromodichloromethane	µg/L	100	Final	CFR, 1991
Bromoform	µg/L	100	Final	CFR, 1991
2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	µg/L	7	Proposed	EPA, 1990
Cadmium	µg/L	5	Final	CFR, 1991
Carbon-14	pCi/L	2E + 03	Final	EPA, 1977
Carbon tetrachloride	µg/L	5	Final	CFR, 1991
Cerium-141	pCi/L	3E + 02	Final	EPA, 1977
Cerium-144	pCi/L	2.61E + 02	Proposed	EPA, 1991
Cesium-134	pCi/L	8.13E + 02 ^b	Proposed	EPA, 1991
Cesium-137	pCi/L	2E + 02	Final	EPA, 1977
Chlordane	µg/L	2	Final	CFR, 1991
Chloroethene (Vinyl chloride)	µg/L	2	Final	CFR, 1991
Chloroform	µg/L	100	Final	CFR, 1991
Chromium	µg/L	100	Final	CFR, 1991
Chromium-51	pCi/L	6E + 03	Final	EPA, 1977
Chrysene	µg/L	0.2	Proposed	EPA, 1990
Cobalt-57	pCi/L	1E + 03	Final	EPA, 1977
Cobalt-58	pCi/L	9E + 03	Final	EPA, 1977
Cobalt-60	pCi/L	1E + 02	Final	EPA, 1977
Copper	µg/L	1,300	Final	CFR, 1991
Curium-242	pCi/L	1.33E + 02	Proposed	EPA, 1991
Curium-243	pCi/L	8.3E + 00	Proposed	EPA, 1991
Curium-244	pCi/L	9.84E + 00	Proposed	EPA, 1991
Curium-246	pCi/L	6.27E + 00	Proposed	EPA, 1991
Cyanide	µg/L	200	Proposed	EPA, 1990
Dibenz[a,h]anthracene	µg/L	0.3	Proposed	EPA, 1990
Dibromochloromethane	µg/L	100	Final	CFR, 1991
Dibromochloropropane	µg/L	0.2	Final	CFR, 1991
1,2-Dichlorobenzene	µg/L	600	Final	CFR, 1991
1,4-Dichlorobenzene	µg/L	75	Final	CFR, 1991
1,2-Dichloroethane	µg/L	5	Final	CFR, 1991
1,1-Dichloroethylene	µg/L	7	Final	CFR, 1991
cis-1,2-Dichloroethylene	µg/L	70	Final	CFR, 1991
trans-1,2-Dichloroethylene	µg/L	100	Final	CFR, 1991
Dichloromethane (Methylene chloride)	µg/L	5	Proposed	EPA, 1990
2,4-Dichlorophenoxyacetic acid	µg/L	70	Final	CFR, 1991
1,2-Dichloropropane	µg/L	5	Final	CFR, 1991
Endrin	µg/L	0.2	Final	CFR, 1991
Ethylbenzene	µg/L	700	Final	CFR, 1991
Europium-154	pCi/L	2E + 02	Final	EPA, 1977

Analyte	Unit	Level	Status	Reference
Europium-155	pCi/L	6E + 02	Final	EPA, 1977
Fluoride	µg/L	4,000	Final	CFR, 1991
Gross alpha ^c	pCi/L	1.5E + 01	Final	CFR, 1991
Heptachlor	µg/L	0.4	Final	CFR, 1991
Heptachlor epoxide	µg/L	0.2	Final	CFR, 1991
Hexachlorobenzene	µg/L	1	Proposed	EPA, 1990
Hexachlorocyclopentadiene	µg/L	50	Proposed	EPA, 1990
Iodine-129	pCi/L	1E + 00	Final	EPA, 1977
Iodine-131	pCi/L	3E + 00	Final	EPA, 1977
Iron-55	pCi/L	2E + 03	Final	EPA, 1977
Iron-59	pCi/L	2E + 02	Final	EPA, 1977
Lanthanum-140	pCi/L	6E + 01	Final	EPA, 1977
Lead	µg/L	15	Final	CFR, 1991
Lindane	µg/L	0.2	Final	CFR, 1991
Manganese-54	pCi/L	3E + 02	Final	EPA, 1977
Mercury	µg/L	2	Final	CFR, 1991
Methoxychlor	µg/L	40	Final	CFR, 1991
Neptunium-237	pCi/L	7.06E + 00	Proposed	EPA, 1991
Nickel	µg/L	100	Proposed	EPA, 1990
Nickel-59	pCi/L	3E + 02	Final	EPA, 1977
Nickel-63	pCi/L	5E + 01	Final	EPA, 1977
Niobium-95	pCi/L	3E + 02	Final	EPA, 1977
Nitrate as nitrogen	µg/L	10,000	Final	CFR, 1991
Nitrite as nitrogen	µg/L	1,000	Final	CFR, 1991
Nonvolatile beta	pCi/L	5E + 01	Proposed	EPA, 1986
PCBs ^d	µg/L	0.5	Final	CFR, 1991
Pentachlorophenol	µg/L	1	Final	CFR, 1991
Plutonium-238	pCi/L	7.02E + 00	Proposed	EPA, 1991
Plutonium-239	pCi/L	6.21E + 01	Proposed	EPA, 1991
Plutonium-239/240 ^e	pCi/L	6.21E + 01	Proposed	EPA, 1991
Plutonium-240	pCi/L	6.22E + 01	Proposed	EPA, 1991
Plutonium-241	pCi/L	6.26E + 01	Proposed	EPA, 1991
Plutonium-242	pCi/L	6.54E + 01	Proposed	EPA, 1991
Potassium-40	pCi/L	3E + 02	Proposed	EPA, 1986
Radium-226	pCi/L	1.57E + 01	Proposed	EPA, 1991
Radium, 228	pCi/L	7.85E + 00	Proposed	EPA, 1991
Radon - 2	pCi/L	3E + 02	Proposed	EPA, 1991
Ruthenium-103	pCi/L	2E + 02	Final	EPA, 1977
Ruthenium-106	pCi/L	3E + 01	Final	EPA, 1977
Selenium	µg/L	50	Final	CFR, 1991
Silver	µg/L	50	Final	CFR, 1991
Sodium-22	pCi/L	4.66E + 02	Proposed	EPA, 1991
Strontium-89	pCi/L	2E + 01 ^f	Final	EPA, 1977
Strontium-89/90 ^g	pCi/L	8E + 00	Final	CFR, 1991
Strontium-90	pCi/L	8E + 00	Final	CFR, 1991
Styrene	µg/L	100	Final	CFR, 1991
Sulfate	µg/L	400,000 ^a	Proposed	EPA, 1990
Technetium-99	pCi/L	9E + 02	Final	EPA, 1977
Tetrachloroethylene	µg/L	5	Final	CFR, 1991
Thallium	µg/L	1	Proposed	EPA, 1990
Thorium-228	pCi/L	1.25E + 02	Proposed	EPA, 1991
Thorium-230	pCi/L	7.92E + 01	Proposed	EPA, 1991
Thorium-232	pCi/L	8.8E + 01	Proposed	EPA, 1991
Thorium-234	pCi/L	4.01E + 02	Proposed	EPA, 1991
Tin-113	pCi/L	3E + 02	Final	EPA, 1977
Toluene	µg/L	1,000	Final	CFR, 1991

<u>Analyte</u>	<u>Unit</u>	<u>Level</u>	<u>Status</u>	<u>Reference</u>
Total radium	pCi/L	5E + 00	Final	CFR, 1991
Total trihalomethanes	µg/L	100	Final	CFR, 1991
Toxaphene	µg/L	3	Final	CFR, 1991
2,4,5-TP (Silvex)	µg/L	50	Final	CFR, 1991
1,2,4-Trichlorobenzene	µg/L	9	Proposed	EPA, 1990
1,1,1-Trichloroethane	µg/L	200	Final	CFR, 1991
1,1,2-Trichloroethane	µg/L	5	Proposed	EPA, 1990
Trichloroethylene	µg/L	5	Final	CFR, 1991
Tritium	pCi/mL	2E + 01	Final	CFR, 1991
Uranium	µg/L	20	Proposed	EPA, 1991
Uranium alpha activity	pCi/L	3E + 01	Proposed	EPA, 1991
Uranium-233/234 ^a	pCi/L	1.38E + 01	Proposed	EPA, 1991
Uranium-234	pCi/L	1.39E + 01	Proposed	EPA, 1991
Uranium-235	pCi/L	1.45E + 01	Proposed	EPA, 1991
Uranium-238	pCi/L	1.46E + 01	Proposed	EPA, 1991
Xylenes	µg/L	10,000	Final	CFR, 1991
Zinc-65	pCi/L	3E + 02	Final	EPA, 1977
Zirconium-95	pCi/L	2E + 02	Final	EPA, 1977
Zirconium/Niobium-95 ^e	pCi/L	2E + 02	Final	EPA, 1977

Note: Drinking water standards set by EPA (1977) correspond to the level at which each radionuclide contributes 4 mrem/yr of dose to an individual consuming 2 L of contaminated liquid a day. See EPA (1977) for details.

^a This value is the lower of two proposed levels.

^b EPD/EMS uses the proposed standard because it is a lower value; the final PDWS in 1977 may have been in error.

^c The standard given is for gross alpha including radium-226 but excluding radon and uranium.

^d Analyses were conducted in 1992 for the following: PCB 1016, PCB 1221, PCB 1232, PCB 1242, PCB 1248, PCB 1254, and PCB 1260.

^e For double radionuclide analyses where each separate radionuclide has its own standard, the more stringent standard is used.

^f This value is the lower of two levels given for strontium-89.

References

CFR (Code of Federal Regulations), 1991. *National Primary Drinking Water Regulations*, 40 CFR, Part 141, pp. 578-715. Washington, DC.

EPA (U.S. Environmental Protection Agency), 1977. *National Interim Primary Drinking Water Regulations*, EPA-570/9-76-003. Washington, DC.

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EPA (U.S. Environmental Protection Agency), 1990. *National Primary and Secondary Drinking Water Regulations; Synthetic Organic Chemicals and Inorganic Chemicals; Proposed Rule*, *Federal Register*, July 25, 1990, pp. 30369-30448. Washington, DC.

EPA (U.S. Environmental Protection Agency), 1991. *National Primary Drinking Water Regulations; Radionuclides; Proposed Rule*, *Federal Register*, July 18, 1991, pp. 33052-33127. Washington, DC.

Appendix B – Flagging Criteria

Flagging Criteria

Beginning in 1991, the Environmental Monitoring Section of the Environmental Protection Department (EPD/EMS) modified its guidelines for flagging constituents in the Groundwater Monitoring Program. These flagging criteria are as follows:

- Flag 2 criteria for constituents equal the U.S. Environmental Protection Agency (EPA) Primary Drinking Water Standard, the EPA proposed Primary Drinking Water Standard, or the EPA Secondary Drinking Water Standard. If a constituent does not have a drinking water standard, the Flag 2 criterion equals 10 times the method detection limit (MDL) calculated as the 90th percentile detection limit obtained recently by one of the primary analytical laboratories.
- Flag 1 criteria for constituents equal one-half of the EPA Primary Drinking Water Standard, one-half the EPA proposed Primary Drinking Water Standard, or one-half the EPA Secondary Drinking Water Standard. If a constituent does not have an EPA drinking water standard, the Flag 1 criterion equals 5 times the MDL calculated as the 90th percentile detection limit obtained recently by one of the primary analytical laboratories.
- Analytical results for constituents below Flag 1 or below sample detection limits are classified as Flag 0.

The following parameters are not assigned flagging criteria: alkalinity, calcium, carbonate, color, corrosivity, magnesium, odor, potassium, Eh, silica, sodium, total dissolved solids, total phosphorus, total phosphates (as P), and turbidity. In addition, common laboratory contaminants and cleaners including phthalates, methylene chloride, ketones, and toluene are not assigned flagging criteria.

<u>Analyte</u>	<u>Unit</u>	<u>Flag 1</u>	<u>Flag 2</u>	<u>Source</u>
Acenaphthene	µg/L	50	100	EPA Method 8270
Acenaphthylene	µg/L	50	100	EPA Method 8270
Acetone	µg/L	50	100	EPA Method 8240
Acetonitrile (Methyl cyanide)	µg/L	500	1,000	EPA Method 8240
Acetophenone	µg/L	50	100	EPA Method 8270
2-Acetylaminofluorene	µg/L	50	100	EPA Method 8270
Acrolein	µg/L	100	200	EPA Method 8240
Acrylonitrile	µg/L	100	200	EPA Method 8240
Aldrin	µg/L	2.5	5	EPA Method 8080
Alkalinity (as CaCO ₃)		No flag	No flag	Set by EPD/EMS
Allyl chloride	µg/L	250	500	EPA Method 8240
Aluminum	µg/L	100	200	EPA Method 6010
Americium-241	pCi/L	3.17E+00	6.34E+00	Proposed DWS (EPA, 1991)
Americium-243	pCi/L	3.19E+00	6.37E+00	Proposed DWS (EPA, 1991)
4-Aminobiphenyl	µg/L	50	100	EPA Method 8270
Ammonia	µg/L	500	1,000	APHA Method 417B
Ammonia nitrogen	µg/L	50	100	EPA Method 350.1
Aniline	µg/L	50	100	EPA Method 8270
Anthracene	µg/L	50	100	EPA Method 8270
Antimony	µg/L	2.5	5	Proposed DWS (EPA, 1990)
Antimony-125	pCi/L	1.5E+02	3E+02	Final DWS (EPA, 1977)

Analyte	Unit	Flag 1	Flag 2	Source
Aramite	µg/L	50	100	EPA Method 8270
Arsenic	µg/L	25	50	Final DWS (CFR, 1991a)
Azobenzene	µg/L	50	100	EPA Method 625
Barium	µg/L	1,000	2,000	Final DWS (CFR, 1991a)
Barium-140	pCi/L	4.5E+01	9E+01	Final DWS (EPA, 1977)
Benzene	µg/L	2.5	5	Final DWS (CFR, 1991a)
alpha-Benzene hexachloride	µg/L	2.5	5	EPA Method 8080
beta-Benzene hexachloride	µg/L	2.5	5	EPA Method 8080
delta-Benzene hexachloride	µg/L	2.5	5	EPA Method 8080
Benzidine	µg/L	250	500	EPA Method 8270
Benzo[a]anthracene	µg/L	0.05	0.1	Proposed DWS (EPA, 1990)
Benzo[b]fluoranthene	µg/L	0.1	0.2	Proposed DWS (EPA, 1990)
Benzo[k]fluoranthene	µg/L	0.1	0.2	Proposed DWS (EPA, 1990)
Benzo[g,h,i]perylene	µg/L	50	100	EPA Method 8270
Benzo[a]pyrene	µg/L	0.1	0.2	Proposed DWS (EPA, 1990)
Benzoic acid	µg/L	250	500	EPA Method 8270
1,4-Benzoquinone	µg/L	50	100	EPA Method 8270
Benzyl alcohol	µg/L	100	200	EPA Method 8270
Beryllium	µg/L	0.5	1	Proposed DWS (EPA, 1990)
Beryllium-7	pCi/L	3E+03	6E+03	Final DWS (EPA, 1977)
Bis(2-chloroethoxy) methane	µg/L	50	100	EPA Method 8270
Bis(2-chloroethyl) ether	µg/L	50	100	EPA Method 8270
Bis(2-chloroisopropyl) ether	µg/L	50	100	EPA Method 8270
Bis(chloromethyl) ether	µg/L	50	100	EPA Method 8270
Bis(chloromethyl-ethyl) ether	µg/L	50	100	EPA Method 8270
Bis(2-ethylhexyl) phthalate		No flag	No flag	Set by EPD/EMS
Bromide	µg/L	5,000	10,000	EPA Method 300.0
Bromodichloromethane	µg/L	50	100	Final DWS (CFR, 1991a)
Bromoform	µg/L	50	100	Final DWS (CFR, 1991a)
Bromomethane (Methyl bromide)	µg/L	5	10	EPA Method 8240
4-Bromophenyl phenyl ether	µg/L	50	100	EPA Method 8270
2-sec-Butyl-4,6-dinitrophenol	µg/L	3.5	7	Proposed DWS (EPA, 1990)
Butylbenzyl phthalate		No flag	No flag	Set by EPD/EMS
Cadmium	µg/L	2.5	5	Final DWS (CFR, 1991a)
Calcium		No flag	No flag	Set by EPD/EMS
Carbon disulfide	µg/L	5	10	EPA Method 8240
Carbon tetrachloride	µg/L	2.5	5	Final DWS (CFR, 1991a)
Carbon-14	pCi/L	1E+03	2E+03	Final DWS (EPA, 1977)
Carbonate	µg/L	500	1,000	EPA Method 310.1
Cerium-141	pCi/L	1.5E+02	3E+02	Final DWS (EPA, 1977)
Cerium-144	pCi/L	1.31E+02	2.61E+02	Proposed DWS (EPA, 1991)
Cesium-134	pCi/L	4.07E+01	8.13E+01	Proposed DWS (EPA, 1991)
Cesium-137	pCi/L	1E+02	2E+02	Final DWS (EPA, 1977)
Chlordane	µg/L	1	2	Final DWS (CFR, 1991a)
Chloride	µg/L	125,000	250,000	Secondary DWS (CFR, 1991b)
4-Chloroaniline	µg/L	50	100	EPA Method 8270
Chlorobenzene	µg/L	5	10	EPA Method 8240
Chlorobenzilate	µg/L	50	100	EPA Method 8270
Chloroethane	µg/L	5	10	EPA Method 8240
Chloroethene (Vinyl chloride)	µg/L	1	2	Final DWS (CFR, 1991a)
Chloroethyl vinyl ether	µg/L	5	10	EPA Method 8240
2-Chloroethyl vinyl ether	µg/L	5	10	EPA Method 8240
Chloroform	µg/L	50	100	Final DWS (CFR, 1991a)
para-Chloro-meta-cresol	µg/L	50	100	EPA Method 8270
Chloromethane (Methyl chloride)	µg/L	5	10	EPA Method 8240
2-Chloronaphthalene	µg/L	50	100	EPA Method 8240

Analyte	Unit	Flag 1	Flag 2	Source
2-Chlorophenol	µg/L	50	100	EPA Method 8270
4-Chlorophenyl phenyl ether	µg/L	50	100	EPA Method 8270
Chloroprene	µg/L	1,000	2,000	EPA Method 8240
Chromium	µg/L	50	100	Final DWS (CFR, 1991a)
Chromium-51	pCi/L	3E + 03	6E + 03	Final DWS (EPA, 1977)
Chrysene	µg/L	0.1	0.2	Proposed DWS (EPA, 1990)
Cobalt	µg/L	20	40	EPA Method 6010
Cobalt-57	pCi/L	5E + 02	1E + 03	Final DWS (EPA, 1977)
Cobalt-58	pCi/L	4.5E + 03	9E + 03	Final DWS (EPA, 1977)
Cobalt-60	pCi/L	5E + 01	1E + 02	Final DWS (EPA, 1977)
Color		No flag	No flag	Set by EPD/EMS
Copper	µg/L	650	1,300	Final DWS (CFR, 1991a)
Corrosivity		No flag	No flag	Set by EPD/EMS
m-Cresol (3-Methylphenol)	µg/L	50	100	EPA Method 8270
o-Cresol (2-Methylphenol)	µg/L	50	100	EPA Method 8270
p-Cresol (4-Methylphenol)	µg/L	50	100	EPA Method 8270
Curium-242	pCi/L	6.65E + 01	1.33E + 02	Proposed DWS (EPA, 1991)
Curium-243	pCi/L	4.15E + 00	8.3E + 00	Proposed DWS (EPA, 1991)
Curium-244	pCi/L	4.92E + 00	9.84E + 00	Proposed DWS (EPA, 1991)
Curium-246	pCi/L	3.14E + 00	6.27E + 00	Proposed DWS (EPA, 1991)
Cyanide	µg/L	100	200	Proposed DWS (EPA, 1990)
p,p'-DDD	µg/L	2.5	5	EPA Method 8080
p,p'-DDE	µg/L	2.5	5	EPA Method 8080
p,p'-DDT	µg/L	2.5	5	EPA Method 8080
Di-n-butyl phthalate		No flag	No flag	Set by EPD/EMS
Di-n-octyl phthalate		No flag	No flag	Set by EPD/EMS
Diallate	µg/L	50	100	EPA Method 8270
Dibenz[a,h]anthracene	µg/L	0.15	0.3	Proposed DWS (EPA, 1990)
Dibenzofuran	µg/L	50	100	EPA Method 8270
Dibromochloromethane	µg/L	50	100	Final DWS (CFR, 1991a)
Dibromochloropropane	µg/L	0.1	0.2	Final DWS (CFR, 1991a)
1,2-Dibromo-3-chloropropane	µg/L	250	500	EPA Method 8240
1,2-Dibromoethane	µg/L	100	200	EPA Method 8240
Dibromomethane (Methylene bromide)	µg/L	5	10	EPA Method 8240
1,2-Dichlorobenzene	µg/L	300	600	Final DWS (CFR, 1991a)
1,3-Dichlorobenzene	µg/L	50	100	EPA Method 8270
1,4-Dichlorobenzene	µg/L	37.5	75	Final DWS (CFR, 1991a)
3,3'-Dichlorobenzidine	µg/L	50	100	EPA Method 8270
trans-1,4-Dichloro-2-butene	µg/L	150	300	EPA Method 8240
Dichlorodifluoromethane	µg/L	5	10	EPA Method 8240
1,1-Dichloroethane	µg/L	5	10	EPA Method 8240
1,2-Dichloroethane	µg/L	2.5	5	Final DWS (CFR, 1991a)
cis-1,2-Dichloroethene	µg/L	35	70	Final DWS (CFR, 1991a)
1,1-Dichloroethylene	µg/L	3.5	7	Final DWS (CFR, 1991a)
1,2-Dichloroethylene	µg/L	25	50	EPA Method 8240
trans-1,2-Dichloroethylene	µg/L	50	100	Final DWS (CFR, 1991a)
Dichloromethane (Methylene chloride)		No flag	No flag	Set by EPD/EMS
2,4-Dichlorophenol	µg/L	50	100	EPA Method 8270
2,6-Dichlorophenol	µg/L	50	100	EPA Method 8270
2,4-Dichlorophenoxyacetic acid	µg/L	35	70	Final DWS (CFR, 1991a)
1,2-Dichloropropane	µg/L	2.5	5	Final DWS (CFR, 1991a)
cis-1,3-Dichloropropene	µg/L	5	10	EPA Method 8240
trans-1,3-Dichloropropene	µg/L	5	10	EPA Method 8240
Dieldrin	µg/L	2.5	5	EPA Method 8080

Analyte	Unit	Flag 1	Flag 2	Source
Diethyl phthalate		No flag	No flag	Set by EPD/EMS
Dimethoate	µg/L	50	100	EPA Method 8270
p-Dimethylaminoazobenzene	µg/L	50	100	EPA Method 8270
p-(Dimethylamino)ethylbenzene	µg/L	50	100	EPA Method 8270
7,12-Dimethylbenz[a]anthracene	µg/L	50	100	EPA Method 8270
3,3'-Dimethylbenzidine	µg/L	50	100	EPA Method 8270
a,a-Dimethylphenethylamine	µg/L	50	100	EPA Method 8270
2,4-Dimethyl phenol	µg/L	50	100	EPA Method 8270
Dimethyl phthalate		No flag	No flag	Set by EPD/EMS
1,3-Dinitrobenzene	µg/L	50	100	EPA Method 8270
4,6-Dinitro-ortho-cresol	µg/L	250	500	EPA Method 8270
2,4-Dinitrophenol	µg/L	250	500	EPA Method 8270
2,4-Dinitrotoluene	µg/L	50	100	EPA Method 8270
2,6-Dinitrotoluene	µg/L	50	100	EPA Method 8270
1,4-Dioxane	µg/L	50	100	EPA Method 8270
Diphenylamine	µg/L	50	100	EPA Method 8270
1,2-Diphenylhydrazine	µg/L	50	100	EPA Method 8270
Dissolved organic carbon	µg/L	5,000	10,000	EPA Method 9060
Disulfoton	µg/L	50	100	EPA Method 8270
Eh		No flag	No flag	Set by EPD/EMS
alpha-Endosulfan	µg/L	50	100	EPA Method 8270
beta-Endosulfan	µg/L	50	100	EPA Method 8270
Endosulfan I	µg/L	2.5	5	EPA Method 8080
Endosulfan II	µg/L	2.5	5	EPA Method 8080
Endosulfan sulfate	µg/L	2.5	5	EPA Method 8080
Endrin	µg/L	0.1	0.2	Final DWS (CFR, 1991a)
Endrin aldehyde	µg/L	2.5	5	EPA Method 8080
Endrin ketone		No flag	No flag	Set by EPD/EMS
Ethyl methacrylate	µg/L	50	100	EPA Method 8270
Ethyl methanesulfonate	µg/L	50	100	EPA Method 8270
Ethylbenzene	µg/L	350	700	Final DWS (CFR, 1991a)
Europium-154	pCi/L	1E+02	2E+02	Final DWS (EPA, 1977)
Europium-155	pCi/L	3E+02	6E+02	Final DWS (EPA, 1977)
Famphur	µg/L	50	100	EPA Method 8270
Fluoranthene	µg/L	50	100	EPA Method 8270
Fluorene	µg/L	50	100	EPA Method 8270
Fluoride	µg/L	2,000	4,000	Final DWS (CFR, 1991a)
Gross alpha	pCi/L	7.5E+00	1.5E+01	Final DWS (CFR, 1991a)
Heptachlor	µg/L	0.2	0.4	Final DWS (CFR, 1991a)
Heptachlor epoxide	µg/L	0.1	0.2	Final DWS (CFR, 1991a)
Heptachlorodibenzo-p-dioxin isomers	µg/L	0.00325	0.0065	EPA Method 8280
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	µg/L	0.00325	0.0065	EPA Method 8280
Heptachlorodibenzo-p-furan isomers	µg/L	0.00225	0.0045	EPA Method 8280
1,2,3,4,6,7,8-Heptachlorodibenzo-p-furan	µg/L	0.00225	0.0045	EPA Method 8280
Hexachlorobenzene	µg/L	0.5	1	Proposed DWS (EPA, 1990)
Hexachlorobutadiene	µg/L	50	100	EPA Method 8270
Hexachlorocyclopentadiene	µg/L	25	50	Proposed DWS (EPA, 1990)
Hexachlorodibenzo-p-dioxin isomers	µg/L	0.00225	0.0045	EPA Method 8280
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	µg/L	0.00225	0.0045	EPA Method 8280
Hexachlorodibenzo-p-furan isomers	µg/L	0.002	0.004	EPA Method 8280

Analyte	Unit	Flag 1	Flag 2	Source
1,2,3,4,7,8-Hexachlorodibenzo- p-furan	µg/L	0.002	0.004	EPA Method 8280
Hexachloroethane	µg/L	50	100	EPA Method 8270
Hexachlorophene	µg/L	250	500	EPA Method 8270
Hexachloropropene	µg/L	50	100	EPA Method 8270
2-Hexanone	µg/L	100	200	EPA Method 8240
Indeno[1,2,3-c,d]pyrene	µg/L	50	100	EPA Method 8270
Iodine	µg/L	500	1,000	EPA Method 415
Iodine-129	pCi/L	5E-01	1E+00	Final DWS (EPA, 1977)
Iodine-131	pCi/L	1.5E+00	3E+00	Final DWS (EPA, 1977)
Iodomethane (Methyl iodide)	µg/L	75	150	EPA Method 8240
Iron	µg/L	150	300	Secondary DWS (CFR, 1991b)
Iron-55	pCi/L	1E+03	2E+03	Final DWS (EPA, 1977)
Iron-59	pCi/L	1E+02	2E+02	Final DWS (EPA, 1977)
Isobutyl alcohol	µg/L	500	1,000	EPA Method 8240
Isodrin	µg/L	50	100	EPA Method 8270
Isophorone	µg/L	50	100	EPA Method 8270
Isosafrole	µg/L	50	100	EPA Method 8270
Kepone	µg/L	50	100	EPA Method 8270
Lanthanum-140	pCi/L	3E+01	6E+01	Final DWS (EPA, 1977)
Lead	µg/L	7.5	15	Final DWS (CFR, 1991a)
Lindane	µg/L	0.1	0.2	Final DWS (CFR, 1991a)
Lithium	µg/L	25	50	EPA Method 6010
Magnesium		No flag	No flag	Set by EPD/EMS
Manganese	µg/L	25	50	Secondary DWS (CFR, 1991b)
Manganese-54	pCi/L	1.5E+02	3E+02	Final DWS (EPA, 1977)
Mercury	µg/L	1	2	Final DWS (CFR, 1991a)
Methacrylonitrile	µg/L	250	500	EPA Method 8240
Methapyrilene	µg/L	50	100	EPA Method 8270
Methoxychlor	µg/L	20	40	Final DWS (CFR, 1991a)
3-Methylcholanthrene	µg/L	50	100	EPA Method 8270
2-Methyl-4,6-dinitrophenol	µg/L	250	500	EPA Method 8270
Methyl ethyl ketone		No flag	No flag	Set by EPD/EMS
Methyl isobutyl ketone		No flag	No flag	Set by EPD/EMS
Methyl methacrylate	µg/L	50	100	EPA Method 8270
Methyl methanesulfonate	µg/L	50	100	EPA Method 8270
2-Methylnaphthalene	µg/L	50	100	EPA Method 8270
Molybdenum	µg/L	250	500	EPA Method 6010
Naphthalene	µg/L	50	100	EPA Method 8270
1,4-Naphthoquinone	µg/L	50	100	EPA Method 8270
1-Naphthylamine	µg/L	50	100	EPA Method 8270
2-Naphthylamine	µg/L	50	100	EPA Method 8270
Neptunium-237	pCi/L	3.53E+00	7.06E+00	Proposed DWS (EPA, 1991)
Nickel	µg/L	50	100	Proposed DWS (EPA, 1990)
Nickel-59	pCi/L	1.5E+02	3E+02	Final DWS (EPA, 1977)
Nickel-63	pCi/L	2.5E+01	5E+01	Final DWS (EPA, 1977)
Niobium-95	pCi/L	1.5E+02	3E+02	Final DWS (EPA, 1977)
Nitrate as nitrogen	µg/L	5,000	10,000	Final DWS (CFR, 1991a)
Nitrite as nitrogen	µg/L	500	1,000	Final DWS (CFR, 1991a)
2-Nitroaniline	µg/L	50	100	EPA Method 8270
3-Nitroaniline	µg/L	50	100	EPA Method 8270
4-Nitroaniline	µg/L	50	100	EPA Method 8270
Nitrobenzene	µg/L	50	100	EPA Method 8270
Nitrogen by Kjeldahl method	µg/L	500	1,000	EPA Method 351.2
2-Nitrophenol	µg/L	50	100	EPA Method 8270
4-Nitrophenol	µg/L	50	100	EPA Method 8270

Analyte	Unit	Flag 1	Flag 2	Source
4-Nitroquinoline-1-oxide	µg/L	50	100	EPA Method 8270
N-Nitrosodi-n-butylamine	µg/L	50	100	EPA Method 8270
N-Nitrosodiethylamine	µg/L	50	100	EPA Method 8270
N-Nitrosodimethylamine	µg/L	50	100	EPA Method 8270
N-Nitrosodiphenylamine	µg/L	50	100	EPA Method 8270
N-Nitrosodi-propylamine	µg/L	50	100	EPA Method 8270
N-Nitrosomethylethylamine	µg/L	50	100	EPA Method 8270
N-Nitrosomorpholine	µg/L	50	100	EPA Method 8270
N-Nitrosopiperidine	µg/L	50	100	EPA Method 8270
N-Nitrosopyrrolidine	µg/L	50	100	EPA Method 8270
5-Nitro-o-toluidine	µg/L	50	100	EPA Method 8270
Nonvolatile beta	pCi/L	2.5E+01	5E+01	Proposed DWS (EPA, 1986)
Octachlorodibenzo-p-dioxin isomers	µg/L	0.005	0.01	EPA Method 8280
Octachlorodibenzo-p-furan isomers	µg/L	0.005	0.01	EPA Method 8280
Odor		No flag	No flag	Set by EPD/EMS
Oil & Grease	µg/L	5,000	10,000	EPA Method 413.1
Parathion	µg/L	2.5	5	EPA Method 8080
Parathion methyl	µg/L	2.5	5	EPA Method 8080
PCB 1016	µg/L	0.25	0.5	Final DWS (CFR, 1991a)
PCB 1221	µg/L	0.25	0.5	Final DWS (CFR, 1991a)
PCB 1232	µg/L	0.25	0.5	Final DWS (CFR, 1991a)
PCB 1242	µg/L	0.25	0.5	Final DWS (CFR, 1991a)
PCB 1248	µg/L	0.25	0.5	Final DWS (CFR, 1991a)
PCB 1254	µg/L	0.25	0.5	Final DWS (CFR, 1991a)
PCB 1260	µg/L	0.25	0.5	Final DWS (CFR, 1991a)
PCB 1262	µg/L	0.25	0.5	Final DWS (CFR, 1991a)
Pentachlorobenzene	µg/L	50	100	EPA Method 8270
Pentachlorodibenzo-p-dioxin isomers	µg/L	0.00275	0.0055	EPA Method 8280
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	µg/L	0.00275	0.0055	EPA Method 8280
Pentachlorodibenzo-p-furan isomers	µg/L	0.00275	0.0055	EPA Method 8280
1,2,3,7,8-Pentachlorodibenzo-p-furan	µg/L	0.00275	0.0055	EPA Method 8280
Pentachloroethane	µg/L	50	100	EPA Method 8270
Pentachloronitrobenzene	µg/L	50	100	EPA Method 8270
Pentachlorophenol	µg/L	0.5	1	Final DWS (CFR, 1991a)
pH	pH	8	10	Set by EPD/EMS
pH	pH	4	3	Set by EPD/EMS
Phenacetin	µg/L	50	100	EPA Method 8270
Phenanthrene	µg/L	50	100	EPA Method 8270
Phenol	µg/L	50	100	EPA Method 8270
Phenols	µg/L	25	50	EPA Method 420.1
p-Phenylenediamine	µg/L	50	100	EPA Method 8270
Phorate	µg/L	2.5	5	EPA Method 8080
2-Picoline	µg/L	50	100	EPA Method 8270
Plutonium-238	pCi/L	3.51E+00	7.02E+00	Proposed DWS (EPA, 1991)
Plutonium-239	pCi/L	3.11E+01	6.21E+01	Proposed DWS (EPA, 1991)
Plutonium-239/240 ^a	pCi/L	3.11E+01	6.21E+01	Proposed DWS (EPA, 1991)
Plutonium-240	pCi/L	3.11E+01	6.22E+01	Proposed DWS (EPA, 1991)
Plutonium-241	pCi/L	3.13E+01	6.26E+01	Proposed DWS (EPA, 1991)
Plutonium-242	pCi/L	3.27E+01	6.54E+01	Proposed DWS (EPA, 1991)
Potassium		No flag	No flag	Set by EPD/EMS
Potassium-40	pCi/L	1.5E+02	3E+02	Proposed DWS (EPA, 1986)
Pronamid	µg/L	50	100	EPA Method 8270
Propionitrile	µg/L	1,000	2,000	EPA Method 8240

Analyte	Unit	Flag 1	Flag 2	Source
Pyrene	µg/L	50	100	EPA Method 8270
Pyridine	µg/L	50	100	EPA Method 8270
Radium-226	pCi/L	7.85E+00	1.57E+01	Proposed DWS (EPA, 1991)
Radium-228	pCi/L	3.93E+00	7.85E+00	Proposed DWS (EPA, 1991)
Radon-222	pCi/L	1.5E+02	3E+02	Proposed DWS (EPA, 1991)
Ruthenium-103	pCi/L	1E+02	2E+02	Final DWS (EPA, 1977)
Ruthenium-106	pCi/L	1.5E+01	3E+01	Final DWS (EPA, 1977)
Safrole	µg/L	50	100	EPA Method 8270
Selenium	µg/L	25	50	Final DWS (CFR, 1991a)
Silica		No flag	No flag	Set by EPD/EMS
Silver	µg/L	25	50	Final DWS (CFR, 1991a)
Sodium		No flag	No flag	Set by EPD/EMS
Sodium-22	pCi/L	2.33E+02	4.66E+02	Proposed DWS (EPA, 1991)
Specific conductance	µS/cm	250	500	Set by EPD/EMS
Strontium-89	pCi/L	1E+01	2E+01	Final DWS (EPA, 1977)
Strontium-89/90 ^a	pCi/L	4E+00	8E+00	Final DWS (CFR, 1991a)
Strontium-90	pCi/L	4E+00	8E+00	Final DWS (CFR, 1991a)
Styrene	µg/L	50	100	Final DWS (CFR, 1991a)
Sulfate	µg/L	200,000	400,000	Proposed DWS (EPA, 1990)
Sulfide	µg/L	5,000	10,000	EPA Method 9030
Sulfotep	µg/L	50	100	EPA Method 8270
Surfactants		No flag	No flag	Set by EPD/EMS
2,3,7,8-TCDD	µg/L	0.00225	0.0045	EPA Method 8280
2,3,7,8-TCDF	µg/L	0.002	0.004	EPA Method 8280
Technetium-99	pCi/L	4.5E+02	9E+02	Final DWS (EPA, 1977)
1,2,4,5-Tetrachlorobenzene	µg/L	50	100	EPA Method 8270
Tetrachlorodibenzo-p-dioxin isomers	µg/L	0.00225	0.0045	EPA Method 8280
Tetrachlorodibenzo-p-furan isomers	µg/L	0.002	0.004	EPA Method 8280
1,1,1,2-Tetrachloroethane	µg/L	5	10	EPA Method 8240
1,1,2,2-Tetrachloroethane	µg/L	5	10	EPA Method 8240
Tetrachloroethylene	µg/L	2.5	5	Final DWS (CFR, 1991a)
2,3,4,6-Tetrachlorophenol	µg/L	50	100	EPA Method 8270
Tetraethyl dithiopyrophosphate	µg/L	50	100	EPA Method 8270
Thallium	µg/L	0.5	1	Proposed DWS (EPA, 1990)
Thionazin	µg/L	50	100	EPA Method 8270
Thorium-228	pCi/L	6.25E+01	1.25E+02	Proposed DWS (EPA, 1991)
Thorium-230	pCi/L	3.96E+01	7.92E+01	Proposed DWS (EPA, 1991)
Thorium-232	pCi/L	4.4E+01	8.8E+01	Proposed DWS (EPA, 1991)
Thorium-234	pCi/L	2E+02	4.01E+02	Proposed DWS (EPA, 1991)
Tin	µg/L	10	20	EPA Method 282.2
Tin-113	pCi/L	1.5E+02	3E+02	Final DWS (EPA, 1977)
Toluene	µg/L	500	1,000	Final DWS (CFR, 1991a)
o-Toluidine	µg/L	50	100	EPA Method 8270
Total carbon	µg/L	5,000	10,000	EPA Method 9060
Total dissolved solids		No flag	No flag	Set by EPD/EMS
Total hydrocarbons	µg/L	5,000	10,000	EPA Method 418.1
Total inorganic carbon	µg/L	5,000	10,000	EPA Method 9060
Total organic carbon	µg/L	5,000	10,000	EPA Method 9060
Total organic halogens	µg/L	25	50	EPA Method 9020
Total organic nitrogen	µg/L	500	1,000	EPA Method 420
Total petroleum hydrocarbons	µg/L	5,000	10,000	EPA Method 418.1
Total phosphates (as P)		No flag	No flag	Set by EPD/EMS
Total phosphorus		No flag	No flag	Set by EPD/EMS
Total radium	pCi/L	2.5E+00	5E+00	Final DWS (CFR, 1991a)

<u>Analyte</u>	<u>Unit</u>	<u>Flag 1</u>	<u>Flag 2</u>	<u>Source</u>
Total silica	µg/L	500	1,000	EPA Method 6010
Total trihalomethanes	µg/L	50	100	Final DWS (CFR, 1991a)
Toxaphene	µg/L	1.5	3	Final DWS (CFR, 1991a)
2,4,5-TP (Silvex)	µg/L	25	50	Final DWS (CFR, 1991a)
Tributyl phosphate	µg/L	50	100	EPA Method 8270
1,2,4-Trichlorobenzene	µg/L	4.5	9	Proposed DWS (EPA, 1990)
1,1,1-Trichloroethane	µg/L	100	200	Final DWS (CFR, 1991a)
1,1,2-Trichloroethane	µg/L	2.5	5	Proposed DWS (EPA, 1990)
Trichloroethylene	µg/L	2.5	5	Final DWS (CFR, 1991a)
Trichlorofluoromethane	µg/L	5	10	EPA Method 8240
2,4,5-Trichlorophenol	µg/L	50	100	EPA Method 8270
2,4,6-Trichlorophenol	µg/L	50	100	EPA Method 8270
2,4,5-Trichlorophenoxyacetic acid	µg/L	2.5	5	EPA Method 8150
1,2,3-Trichloropropane	µg/L	5	10	EPA Method 8240
O,O,O-Triethyl phosphorothioate	µg/L	50	100	EPA Method 8270
1,3,5-Trinitrobenzene	µg/L	50	100	EPA Method 8270
Tritium	pCi/mL	1E + 01	2E + 01	Final DWS (CFR, 1991a)
Turbidity		No flag	No flag	Set by EPD/EMS
Uranium	µg/L	10	20	Proposed DWS (EPA, 1991)
Uranium alpha activity	pCi/L	1.5E + 01	3E + 01	Proposed DWS (EPA, 1991)
Uranium-233/234 ^a	pCi/L	6.9E-00	1.38E + 01	Proposed DWS (EPA, 1991)
Uranium-234	pCi/L	6.95E + 00	1.39E + 01	Proposed DWS (EPA, 1991)
Uranium-235	pCi/L	7.25E + 00	1.45E + 01	Proposed DWS (EPA, 1991)
Uranium-238	pCi/L	7.3E + 00	1.46E + 01	Proposed DWS (EPA, 1991)
Vanadium	µg/L	50	100	EPA Method 6010
Vinyl acetate	µg/L	5	10	EPA Method 8240
Xylenes	µg/L	5,000	10,000	Final DWS (CFR, 1991a)
Zinc	µg/L	2,500	5,000	Secondary DWS (CFR, 1991b)
Zinc-65	pCi/L	1.5E + 02	3E + 02	Final DWS (EPA, 1977)
Zirconium-95	pCi/L	1E + 02	2E + 02	Final DWS (EPA, 1977)
Zirconium/Niobium-95 ^a	pCi/L	1E + 02	2E + 02	Final DWS (EPA, 1977)

^a For double radionuclide analyses where each separate radionuclide has its own standard, the more stringent standard is used.

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Appendix C – Figures

Figure 1. Location of the F- and H-Area Sewage Sludge Application Sites at the Savannah River Site

Figure 2. Location of Groundwater Monitoring Wells at the F-Area Sewage Sludge Application Site

Figure 3. Location of Groundwater Monitoring Wells at the H-Area Sewage Sludge Application Site

Figure 4. Potentiometric Surface Map of the F-Area Sewage Sludge Application Site

Figure 5. Potentiometric Surface Map of the H-Area Sewage Sludge Application Site

Appendix D – Groundwater Monitoring Results Tables

Key to Reading the Tables

The following abbreviations may appear in the tabular data:

BA = Barringer Laboratories, Inc.
CN = Clemson Technical Center, Inc.
D = drinking water standard
E = exponential notation (e.g., $1.1E-09 = 1.1 \times 10^{-9} = 0.0000000011$)
EM = EPD/EMS Laboratory
GE = General Engineering Laboratories
GP = Environmental Physics, Inc.
H = holding time
1,2,3,4,6,7,8-HPCCDD = 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin
1,2,3,4,6,7,8-HPCDF = 1,2,3,4,6,7,8-heptachlorodibenzo-p-furan
1,2,3,4,7,8-HXCDD = 1,2,3,4,7,8-hexachlorodibenzo-p-dioxin
1,2,3,4,7,8-HXCDF = 1,2,3,4,7,8-heptachlorodibenzo-p-furan
Lindane = gamma-benzene hexachloride
MA = M-Area Laboratory
msl = mean sea level
MSL = million structures/liter
NTU = turbidity unit
pH = pH unit
pCi/L = picocuries per liter
pCi/mL = picocuries per milliliter
Sp. = specific
PVC = polyvinyl chloride
TCDD = tetrachlorodibenzo-p-dioxin
TCDF = tetrachlorodibenzo-p-furan
TE = Teledyne Isotopes, Inc.
TM = TMA/Eberline
TOC = top of casing
WA = Roy F. Weston, Inc.
 $\mu\text{g/L}$ = micrograms per liter
 $\mu\text{S/cm}$ = microsiemens per centimeter

Holding Times

Standard analytical methods include a limit, called holding time, on the maximum elapsed time between sample collection and extraction or analysis by the laboratory. In the data tables, a large dot (●) in the H (holding time) column indicates that holding time was exceeded. Analyses performed beyond holding time may not yield valid results.

South Carolina Department of Health and Environmental Control (SCDHEC) allows only 15 minutes to elapse between sampling and analysis for pH. Thus, laboratory pH analyses always exceed holding time.

Laboratory-initiated procedures for reducing the number of other analyses performed out of holding time include subcontracting analyses when difficulties with equipment, personnel, or work load would prevent timely analyses. Beginning fourth quarter 1991, SRS reduced the compensation to laboratories for analyses performed out of holding time.

Table 1. Constituents Exceeding the Primary Drinking Water Standards at the F-Area Sewage Sludge Application Site

<u>Well</u>	<u>Constituent</u>	<u>Unit</u>	<u>1Q92</u>	<u>2Q92</u>
FSS 2D	Tritium	pCi/mL	5.7E+01	8.2E+01
FSS 3D	Lead	µg/L	26	19
	Tritium	pCi/mL	4.0E+01	5.3E+01

Table 2. Constituents Exceeding the Primary Drinking Water Standards at the H-Area Sewage Sludge Application Site

<u>Well</u>	<u>Constituent</u>	<u>Unit</u>	<u>1Q92</u>	<u>2Q92</u>
HSS 3D	Lead	µg/L	39	NA ^a

^a NA = not analyzed.

Table 3. Constituents Exceeding Half the Primary Drinking Water Standards or Other Flag 1 or Flag 2 Criteria at the F-Area Sewage Sludge Application Site

<u>Well</u>	<u>Constituent</u>	<u>Unit</u>	<u>2Q92</u>	<u>Flag</u>
FSS 2D	Manganese	µg/L	69	2
FSS 3D	Manganese	µg/L	76	2
FSS 4D	Iron	µg/L	826	2

Table 4. Constituents Exceeding Half the Primary Drinking Water Standards or Other Flag 1 or Flag 2 Criteria at the H-Area Sewage Sludge Application Site

<u>Well</u>	<u>Constituent</u>	<u>Unit</u>	<u>2Q92</u>	<u>Flag</u>
N ^a	None	N	N	N

^a N = not applicable.

Table 5. Groundwater Monitoring Results for Individual Wells at the F-Area Sewage Sludge Application Site

WELL FSS 1D

<u>SRS Coord.</u>	<u>Lat/Longitude</u>	<u>Screen Zone Elevation</u>	<u>Top of Casing</u>	<u>Casing</u>	<u>Formation</u>
N75257.6 E53897.6	33.280161 °N 81.671063 °W	229.9-209.9 ft msl	266.0 ft msl	4" PVC	Water table

FIELD MEASUREMENTS

Sample date: 06/16/92
 Depth to water: 42.10 ft (12.83 m) below TOC
 Water elevation: 223.90 ft (68.25 m) msl
 Sp. conductance: 91 μ S/cm
 Water evacuated before sampling: 6 gal
 The well went dry during purging.

Time: 15:10
 pH: 5.6
 Alkalinity: 31 mg/L
 Water temperature: 21.6°C

LABORATORY ANALYSES

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
•		pH	7.6	pH	0	WA
•		pH	7.6	pH	0	WA
•		Specific conductance	100	μ S/cm	0	WA
•		Specific conductance	100	μ S/cm	0	WA
		Arsenic	<2.0	μ g/L	0	WA
		Barium	11	μ g/L	0	WA
		Benzene	<5.0	μ g/L	0	WA
		Bromodichloromethane	<5.0	μ g/L	0	WA
		Bromoform	<5.0	μ g/L	0	WA
		Bromomethane (Methyl bromide)	<10	μ g/L	0	WA
		Cadmium	1.2	μ g/L	0	WA
		Calcium	19,600	μ g/L	0	WA
		Carbon tetrachloride	<5.0	μ g/L	0	WA
		Chloride	2,460	μ g/L	0	WA
		Chlorobenzene	<5.0	μ g/L	0	WA
		Chloroethane	<10	μ g/L	0	WA
		Chloroethene (Vinyl chloride)	<10	μ g/L	0	WA
		2-Chloroethyl vinyl ether	<10	μ g/L	0	WA
		Chloroform	<5.0	μ g/L	0	WA
		Chloromethane (Methyl chloride)	<10	μ g/L	0	WA
		Chromium	<1.1	μ g/L	0	WA
		Copper	64	μ g/L	0	WA
		Dibromochloromethane	<5.0	μ g/L	0	WA
		1,1-Dichloroethane	<5.0	μ g/L	0	WA
		1,2-Dichloroethane	<5.0	μ g/L	0	WA
		trans-1,2-Dichloroethene	<5.0	μ g/L	0	WA
		1,1-Dichloroethylene	<5.0	μ g/L	0	WA
		Dichloromethane (Methylene chloride)	1.2	μ g/L	0	WA
		2,4-Dichlorophenoxyacetic acid	<1.1	μ g/L	0	WA
		1,2-Dichloropropane	<5.0	μ g/L	0	WA
		cis-1,3-Dichloropropene	<5.0	μ g/L	0	WA
		trans-1,3-Dichloropropene	<5.0	μ g/L	0	WA
		Endrin	<0.11	μ g/L	0	WA
		Ethylbenzene	<5.0	μ g/L	0	WA
		Fluoride	<100	μ g/L	0	WA

• = exceeded holding time. ■ = exceeded primary drinking water standard.

WELL FSS 1D collected on 06/16/92, laboratory analyses (cont.)

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
		Iron	33	µg/L	0	WA
		Lead	2.6	µg/L	0	WA
		Lindane	<0.057	µg/L	0	WA
		Magnesium	433	µg/L	0	WA
		Manganese	12	µg/L	0	WA
		Mercury	<0.20	µg/L	0	WA
		Methoxychlor	<0.57	µg/L	0	WA
		Nickel	<3.1	µg/L	0	WA
		Nitrate as nitrogen	291	µg/L	0	WA
•		Nitrite as nitrogen	<10	µg/L	0	WA
		Phenols	<5.0	µg/L	0	WA
		Phenols	<5.0	µg/L	0	WA
		Potassium	518	µg/L	0	WA
		Selenium	<2.0	µg/L	0	WA
		Silica	6,880	µg/L	0	WA
		Silver	<0.70	µg/L	0	WA
		Sodium	3,090	µg/L	0	WA
		Sulfate	1,980	µg/L	0	WA
		1,1,2,2-Tetrachloroethane	<5.0	µg/L	0	WA
		Tetrachloroethylene	<5.0	µg/L	0	WA
		Toluene	<5.0	µg/L	0	WA
		Total dissolved solids	57,000	µg/L	0	WA
		Total organic carbon	<500	µg/L	0	WA
		Total organic halogens	<20	µg/L	0	WA
		Total organic halogens	<20	µg/L	0	WA
		Total phosphates (as P)	122	µg/L	0	WA
		Toxaphene	<1.1	µg/L	0	WA
		2,4,5-TP (Silvex)	<0.55	µg/L	0	WA
		1,1,1-Trichloroethane	<5.0	µg/L	0	WA
		1,1,2-Trichloroethane	<5.0	µg/L	0	WA
		Trichloroethylene	<5.0	µg/L	0	WA
		Trichlorofluoromethane	<5.0	µg/L	0	WA
		Gross alpha	<3.0E+00	pCi/L	0	CN
		Nonvolatile beta	<5.0E+00	pCi/L	0	CN
		Radium-226	<1.0E+00	pCi/L	0	CN
		Tritium	9.4E+00 ± 7.8E-01	pCi/mL	0	CN

• = exceeded holding time. ■ = exceeded primary drinking water standard.

WELL FSS 2D

<u>SRS Coord.</u>	<u>Lat/Longitude</u>	<u>Screen Zone Elevation</u>	<u>Top of Casing</u>	<u>Casing</u>	<u>Formation</u>
N75103.5 E53918.9	33.279855 °N 81.670708 °W	224.4-204.4 ft msl	261.6 ft msl	4" PVC	Water table

FIELD MEASUREMENTS

Sample date: 06/16/92	Time: 14:40
Depth to water: 38.27 ft (11.66 m) below TOC	pH: 6.0
Water elevation: 223.33 ft (68.07 m) msl	Alkalinity: 48 mg/L
Sp. conductance: 164 µS/cm	Water temperature: 20.9°C
Water evacuated before sampling: 12 gal	
The well went dry during purging.	

LABORATORY ANALYSES

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
•		pH	6.9	pH	0	WA
•		Specific conductance	134	µS/cm	0	WA
		Arsenic	<2.0	µg/L	0	WA
		Barium	49	µg/L	0	WA
		Benzene	<5.0	µg/L	0	WA
		Bromodichloromethane	<5.0	µg/L	0	WA
		Bromoform	<5.0	µg/L	0	WA
		Bromomethane (Methyl bromide)	<10	µg/L	0	WA
		Cadmium	1.2	µg/L	0	WA
		Calcium	19,800	µg/L	0	WA
		Carbon tetrachloride	<5.0	µg/L	0	WA
		Chloride	5,170	µg/L	0	WA
		Chlorobenzene	<5.0	µg/L	0	WA
		Chloroethane	<10	µg/L	0	WA
		Chloroethene (Vinyl chloride)	<10	µg/L	0	WA
		2-Chloroethyl vinyl ether	<10	µg/L	0	WA
		Chloroform	<5.0	µg/L	0	WA
		Chloromethane (Methyl chloride)	<10	µg/L	0	WA
		Chromium	<1.1	µg/L	0	WA
		Copper	<1.1	µg/L	0	WA
		Dibromochloromethane	<5.0	µg/L	0	WA
		1,1-Dichloroethane	<5.0	µg/L	0	WA
		1,2-Dichloroethane	<5.0	µg/L	0	WA
		trans-1,2-Dichloroethene	<5.0	µg/L	0	WA
		1,1-Dichloroethylene	<5.0	µg/L	0	WA
		Dichloromethane (Methylene chloride)	<5.0	µg/L	0	WA
		2,4-Dichlorophenoxyacetic acid	<1.1	µg/L	0	WA
		1,2-Dichloropropane	<5.0	µg/L	0	WA
		cis-1,3-Dichloropropene	<5.0	µg/L	0	WA
		trans-1,3-Dichloropropene	<5.0	µg/L	0	WA
		Endrin	<0.11	µg/L	0	WA
		Endrin	<0.22	µg/L	0	WA
		Ethylbenzene	<5.0	µg/L	0	WA
		Fluoride	<100	µg/L	0	WA
		Iron	15	µg/L	0	WA
		Lead	<2.0	µg/L	0	WA
		Lindane	<0.054	µg/L	0	WA
		Lindane	<0.11	µg/L	0	WA
		Magnesium	1,010	µg/L	0	WA

• = exceeded holding time. ■ = exceeded primary drinking water standard.

WELL FSS 2D collected on 06/16/92, laboratory analyses (cont.)

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
		Manganese	69	µg/L	2	WA
		Mercury	<0.20	µg/L	0	WA
		Methoxychlor	<0.54	µg/L	0	WA
		Methoxychlor	<1.1	µg/L	0	WA
		Methoxychlor	<1.1	µg/L	0	WA
		Nickel	<3.1	µg/L	0	WA
		Nitrate as nitrogen	712	µg/L	0	WA
•		Nitrite as nitrogen	12	µg/L	0	WA
		Phenols	<5.0	µg/L	0	WA
		Potassium	1,270	µg/L	0	WA
		Selenium	<2.0	µg/L	0	WA
		Silica	5,140	µg/L	0	WA
		Silver	3.4	µg/L	0	WA
		Sodium	6,390	µg/L	0	WA
		Sulfate	14,500	µg/L	0	WA
		1,1,2,2-Tetrachloroethane	<5.0	µg/L	0	WA
		Tetrachloroethylene	<5.0	µg/L	0	WA
		Toluene	<5.0	µg/L	0	WA
		Total dissolved solids	80,000	µg/L	0	WA
		Total organic carbon	<500	µg/L	0	WA
		Total organic halogens	13	µg/L	0	WA
		Total phosphates (as P)	125	µg/L	0	WA
		Toxaphene	<1.1	µg/L	0	WA
		Toxaphene	<2.2	µg/L	0	WA
		Toxaphene	<2.2	µg/L	0	WA
		2,4,5-TP (Silvex)	<0.55	µg/L	0	WA
		1,1,1-Trichloroethane	<5.0	µg/L	0	WA
		1,1,2-Trichloroethane	<5.0	µg/L	0	WA
		Trichloroethylene	<5.0	µg/L	0	WA
		Trichlorofluoromethane	<5.0	µg/L	0	WA
		Gross alpha	<3.0E+00	pCi/L	0	CN
		Nonvolatile beta	<5.0E+00	pCi/L	0	CN
		Radium-226	<1.0E+00	pCi/L	0	CN
■		Tritium	8.2E+01 ± 2.0E+00	pCi/mL	2	CN

• = exceeded holding time. ■ = exceeded primary drinking water standard.

WELL FSS 3D

<u>SRS Coord.</u>	<u>Lat/Longitude</u>	<u>Screen Zone Elevation</u>	<u>Top of Casing</u>	<u>Casing</u>	<u>Formation</u>
N74960.5 E53548.0	33.278933 °N 81.671406 °W	225.8-205.8 ft msl	258.2 ft msl	4" PVC	Water table

FIELD MEASUREMENTS

Sample date: 06/16/92	Time: 14:15
Depth to water: 37.07 ft (11.30 m) below TOC	pH: 4.7
Water elevation: 221.13 ft (67.40 m) msl	Alkalinity: 1 mg/L
Sp. conductance: 61 µS/cm	Water temperature: 21.3°C
Water evacuated before sampling: 6 gal	
The well went dry during purging.	

LABORATORY ANALYSES

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
•		pH	5.8	pH	0	WA
•		Specific conductance	52	µS/cm	0	WA
		Arsenic	< 2.0	µg/L	0	WA
		Barium	20	µg/L	0	WA
		Benzene	< 5.0	µg/L	0	WA
		Bromodichloromethane	< 5.0	µg/L	0	WA
		Bromoform	< 5.0	µg/L	0	WA
		Bromomethane (Methyl bromide)	< 10	µg/L	0	WA
		Cadmium	0.78	µg/L	0	WA
		Calcium	1,480	µg/L	0	WA
		Carbon tetrachloride	< 5.0	µg/L	0	WA
		Chloride	3,940	µg/L	0	WA
		Chlorobenzene	< 5.0	µg/L	0	WA
		Chloroethane	< 10	µg/L	0	WA
		Chloroethene (Vinyl chloride)	< 10	µg/L	0	WA
		2-Chloroethyl vinyl ether	< 10	µg/L	0	WA
		Chloroform	< 5.0	µg/L	0	WA
		Chloromethane (Methyl chloride)	< 10	µg/L	0	WA
		Chromium	< 1.1	µg/L	0	WA
		Copper	20	µg/L	0	WA
		Dibromochloromethane	< 5.0	µg/L	0	WA
		1,1-Dichloroethane	< 5.0	µg/L	0	WA
		1,2-Dichloroethane	< 5.0	µg/L	0	WA
		trans-1,2-Dichloroethene	< 5.0	µg/L	0	WA
		1,1-Dichloroethylene	< 5.0	µg/L	0	WA
		Dichloromethane (Methylene chloride)	< 5.0	µg/L	0	WA
		2,4-Dichlorophenoxyacetic acid	< 1.1	µg/L	0	WA
		2,4-Dichlorophenoxyacetic acid	< 2.3	µg/L	0	WA
		1,2-Dichloropropane	< 5.0	µg/L	0	WA
		cis-1,3-Dichloropropene	< 5.0	µg/L	0	WA
		trans-1,3-Dichloropropene	< 5.0	µg/L	0	WA
		Endrin	< 0.12	µg/L	0	WA
		Ethylbenzene	< 5.0	µg/L	0	WA
		Fluoride	< 100	µg/L	0	WA
		Iron	64	µg/L	0	WA
■		Lead	19	µg/L	2	WA
		Lindane	< 0.059	µg/L	0	WA
		Magnesium	1,130	µg/L	0	WA
		Manganese	76	µg/L	2	WA

• = exceeded holding time. ■ = exceeded primary drinking water standard.

WELL FSS 3D collected on 06/16/92, laboratory analyses (cont.)

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
		Mercury	<0.20	µg/L	0	WA
		Methoxychlor	<0.59	µg/L	0	WA
		Nickel	<3.1	µg/L	0	WA
		Nitrate as nitrogen	931	µg/L	0	WA
•		Nitrite as nitrogen	<10	µg/L	0	WA
		Phenols	<5.0	µg/L	0	WA
		Potassium	1,000	µg/L	0	WA
		Selenium	<2.0	µg/L	0	WA
		Silica	7,600	µg/L	0	WA
		Silver	1.9	µg/L	0	WA
		Sodium	6,890	µg/L	0	WA
		Sulfate	10,500	µg/L	0	WA
		1,1,2,2-Tetrachloroethane	<5.0	µg/L	0	WA
		Tetrachloroethylene	<5.0	µg/L	0	WA
		Toluene	<5.0	µg/L	0	WA
		Total dissolved solids	38,000	µg/L	0	WA
		Total dissolved solids	39,000	µg/L	0	WA
		Total organic carbon	<500	µg/L	0	WA
		Total organic halogens	21	µg/L	0	WA
		Total phosphates (as P)	223	µg/L	0	WA
		Toxaphene	<1.2	µg/L	0	WA
		2,4,5-TP (Silvex)	<0.57	µg/L	0	WA
		2,4,5-TP (Silvex)	<1.1	µg/L	0	WA
		1,1,1-Trichloroethane	<5.0	µg/L	0	WA
		1,1,2-Trichloroethane	<5.0	µg/L	0	WA
		Trichloroethylene	<5.0	µg/L	0	WA
		Trichlorofluoromethane	<5.0	µg/L	0	WA
		Gross alpha	<3.0E+00	pCi/L	0	CN
		Nonvolatile beta	<5.0E+00	pCi/L	0	CN
		Radium-226	<1.0E+00	pCi/L	0	CN
■		Tritium	5.3E+01 ± 1.6E+00	pCi/mL	2	CN

WELL FSS 4D

<u>SRS Coord.</u>	<u>Lat/Longitude</u>	<u>Screen Zone Elevation</u>	<u>Top of Casing</u>	<u>Casing</u>	<u>Formation</u>
N75537.8	33.279114 °N	222.6-202.6 ft msl	291.8 ft msl	4" PVC	Water table
E52876.1	81.674297 °W				

FIELD MEASUREMENTS

Sample date: 06/16/92
 Depth to water: 71.76 ft (21.87 m) below TOC
 Water elevation: 220.04 ft (67.07 m) msl
 Sp. conductance: 50 µS/cm
 Water evacuated before sampling: 12 gal
 The well went dry during purging.

Time: 15:35
 pH: 4.3
 Alkalinity: 0 mg/L
 Water temperature: 20.7°C

LABORATORY ANALYSES

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
•		pH	5.3	pH	0	WA
•		Specific conductance	41	µS/cm	0	WA
		Arsenic	<2.0	µg/L	0	WA

• = exceeded holding time. ■ = exceeded primary drinking water standard.

WELL FSS 4D collected on 06/16/92, laboratory analyses (cont.)

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
		Barium	8.7	µg/L	0	WA
		Benzene	< 5.0	µg/L	0	WA
		Bromodichloromethane	< 5.0	µg/L	0	WA
		Bromoform	< 5.0	µg/L	0	WA
		Bromomethane (Methyl bromide)	< 10	µg/L	0	WA
		Cadmium	1.1	µg/L	0	WA
		Calcium	1,770	µg/L	0	WA
		Carbon tetrachloride	< 5.0	µg/L	0	WA
		Chloride	4,410	µg/L	0	WA
		Chlorobenzene	< 5.0	µg/L	0	WA
		Chloroethane	< 10	µg/L	0	WA
		Chloroethene (Vinyl chloride)	< 10	µg/L	0	WA
		2-Chloroethyl vinyl ether	< 10	µg/L	0	WA
		Chloroform	< 5.0	µg/L	0	WA
		Chloromethane (Methyl chloride)	< 10	µg/L	0	WA
		Chromium	< 1.1	µg/L	0	WA
		Copper	27	µg/L	0	WA
		Dibromochloromethane	< 5.0	µg/L	0	WA
		1,1-Dichloroethane	< 5.0	µg/L	0	WA
		1,2-Dichloroethane	< 5.0	µg/L	0	WA
		trans-1,2-Dichloroethene	< 5.0	µg/L	0	WA
		1,1-Dichloroethylene	< 5.0	µg/L	0	WA
		Dichloromethane (Methylene chloride)	3.4	µg/L	0	WA
		2,4-Dichlorophenoxyacetic acid	< 1.1	µg/L	0	WA
		1,2-Dichloropropane	< 5.0	µg/L	0	WA
		cis-1,3-Dichloropropene	< 5.0	µg/L	0	WA
		trans-1,3-Dichloropropene	< 5.0	µg/L	0	WA
		Endrin	< 0.11	µg/L	0	WA
		Ethylbenzene	< 5.0	µg/L	0	WA
		Fluoride	< 100	µg/L	0	WA
		Iron	826	µg/L	2	WA
		Lead	< 2.0	µg/L	0	WA
		Lindane	< 0.056	µg/L	0	WA
		Magnesium	1,760	µg/L	0	WA
		Manganese	13	µg/L	0	WA
		Mercury	< 0.20	µg/L	0	WA
		Methoxychlor	< 0.56	µg/L	0	WA
		Nickel	< 3.1	µg/L	0	WA
		Nitrate as nitrogen	421	µg/L	0	WA
•		Nitrite as nitrogen	45	µg/L	0	WA
		Phenols	< 5.0	µg/L	0	WA
		Potassium	546	µg/L	0	WA
		Selenium	< 2.0	µg/L	0	WA
		Silica	9,260	µg/L	0	WA
		Silver	< 0.70	µg/L	0	WA
		Sodium	4,790	µg/L	0	WA
		Sulfate	501	µg/L	0	WA
		1,1,2,2-Tetrachloroethane	< 5.0	µg/L	0	WA
		Tetrachloroethylene	< 5.0	µg/L	0	WA
		Toluene	< 5.0	µg/L	0	WA
		Total dissolved solids	36,000	µg/L	0	WA
		Total dissolved solids	36,000	µg/L	0	WA
		Total organic carbon	< 500	µg/L	0	WA
		Total organic halogens	< 10	µg/L	0	WA
		Total phosphates (as P)	47	µg/L	0	WA
		Toxaphene	< 1.1	µg/L	0	WA

• = exceeded holding time. ■ = exceeded primary drinking water standard.

WELL FSS 4D collected on 06/16/92, laboratory analyses (cont.)

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
		2,4,5-TP (Silvex)	<0.56	µg/L	0	WA
		1,1,1-Trichloroethane	<5.0	µg/L	0	WA
		1,1,2-Trichloroethane	<5.0	µg/L	0	WA
		Trichloroethylene	<5.0	µg/L	0	WA
		Trichlorofluoromethane	<5.0	µg/L	0	WA
		Gross alpha	<3.0E+00	pCi/L	0	CN
		Nonvolatile beta	<5.0E+00	pCi/L	0	CN
		Radium-226	<1.0E+00	pCi/L	0	CN
		Tritium	6.6E+00 ± 6.9E-01	pCi/mL	0	CN

● = exceeded holding time. ■ = exceeded primary drinking water standard.

Table 6. Groundwater Monitoring Results for Individual Wells at the H-Area Sewage Sludge Application Site

WELL HSS 1D

<u>SRS Coord.</u>	<u>Lat/Longitude</u>	<u>Screen Zone Elevation</u>	<u>Top of Casing</u>	<u>Casing</u>	<u>Formation</u>
N67610.3 E64675.6	33.280828 °N 81.627829 °W	256.5-236.5 ft msl	310.1 ft msl	4" PVC	Water table

FIELD MEASUREMENTS

Sample date: 06/02/92
 Depth to water: 41.14 ft (12.54 m) below TOC
 Water elevation: 268.96 ft (81.98 m) msl
 Sp. conductance: 28 μ S/cm
 Water evacuated before sampling: 20 gal
 The well went dry during purging.

Time: 15:50
 pH: 5.3
 Alkalinity: 2 mg/L
 Water temperature: 19.9°C

LABORATORY ANALYSES

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
•		pH	6.0	pH	0	WA
•		pH	6.0	pH	0	WA
•		Specific conductance	25	μ S/cm	0	WA
•		Specific conductance	25	μ S/cm	0	WA
		Chloride	2,640	μ g/L	0	WA
		Nitrate as nitrogen	1,250	μ g/L	0	WA
		Nitrite as nitrogen	17	μ g/L	0	WA
		Nitrite as nitrogen	17	μ g/L	0	WA
		Sodium	1,700	μ g/L	0	WA
		Total dissolved solids	33,000	μ g/L	0	WA

WELL HSS 2D

<u>SRS Coord.</u>	<u>Lat/Longitude</u>	<u>Screen Zone Elevation</u>	<u>Top of Casing</u>	<u>Casing</u>	<u>Formation</u>
N67355.9 E64785.9	33.280445 °N 81.627045 °W	254.5-234.5 ft msl	304.4 ft msl	4" PVC	Water table

FIELD MEASUREMENTS

Sample date: 06/02/92
 Depth to water: 36.42 ft (11.10 m) below TOC
 Water elevation: 267.98 ft (81.68 m) msl
 Sp. conductance: 26 μ S/cm
 Water evacuated before sampling: 88 gal

Time: 14:45
 pH: 4.9
 Alkalinity: 1 mg/L
 Water temperature: 19.1°C

LABORATORY ANALYSES

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
•		pH	5.6	pH	0	WA
•		Specific conductance	26	μ S/cm	0	WA
		Chloride	2,780	μ g/L	0	WA
		Nitrate as nitrogen	1,190	μ g/L	0	WA
		Nitrite as nitrogen	10	μ g/L	0	WA
		Sodium	1,940	μ g/L	0	WA
		Total dissolved solids	42,000	μ g/L	0	WA

• = exceeded holding time. ■ = exceeded primary drinking water standard.

WELL HSS 3D

<u>SRS Coord.</u>	<u>Lat/Longitude</u>	<u>Screen Zone Elevation</u>	<u>Top of Casing</u>	<u>Casing</u>	<u>Formation</u>
N68257.5	33.282315 °N	282.6-262.6 ft msl	309.8 ft msl	4" PVC	Water table
E64709.5	81.628996 °W				

FIELD MEASUREMENTS

Sample date: 06/02/92	Time: 16:10
Depth to water: 28.31 ft (8.63 m) below TOC	pH: 4.3
Water elevation: 281.49 ft (85.80 m) msl	Alkalinity: 0 mg/L
Sp. conductance: 28 μ S/cm	Water temperature: 21.3°C
Water evacuated before sampling: 24 gal	
The well went dry during purging.	

LABORATORY ANALYSES

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
•		pH	5.1	pH	0	WA
•		Specific conductance	24	μ S/cm	0	WA
		Chloride	3,890	μ g/L	0	WA
		Nitrate as nitrogen	1,120	μ g/L	0	WA
		Nitrite as nitrogen	17	μ g/L	0	WA
		Sodium	2,710	μ g/L	0	WA
		Total dissolved solids	21,000	μ g/L	0	WA

• = exceeded holding time. ■ = exceeded primary drinking water standard.

END

DATE
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2/17/93