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FOURTH QUARTER 1991
AND 1991 SUMMARY

H-AREA ACID/CAUSTIC BASIN GROUNDWATER MONITORING REPORT (U)

KEY WORDS

HAC wells
hazardous waste
iron
manganese
tritium

PUBLICATION DATE: MARCH 1992

Authorized Derivative Classifier:

MASTER C. F. Chapman

WESTINGHOUSE SAVANNAH RIVER COMPANY
SAVANNAH RIVER SITE
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Abstract

During fourth quarter 1991, samples from the HAC monitoring wells at the H-Area Acid/Caustic Basin were analyzed for indicator parameters, turbidity, major ions, volatile organic compounds, radionuclides, and other constituents. Monitoring results that exceeded the U.S. Environmental Protection Agency primary drinking water standards (PDWS) and the Savannah River Site (SRS) flagging criteria and turbidity standards during the quarter, with summary results for the year, are the focus of this report.

During fourth quarter 1991, tritium activities exceeded the PDWS in wells HAC 1, 2, 3, and 4. Iron and manganese exceeded Flag 2 criteria in well HAC 3, and specific conductance exceeded the Flag 2 criterion in well HAC 2. No priority pollutant (EPA, 1990) exceeded the PDWS or Flag 2 criteria in wells HAC 2 and 4. None of the HAC wells exceeded the SRS turbidity standard.

Tritium activities were of similar magnitude in downgradient and upgradient wells. Iron, manganese, and specific conductance were elevated in at least one of the downgradient wells but not in the upgradient wells.

During 1991, elevated tritium activities were found in all four HAC wells every quarter. Elevated total radium occurred in well HAC 2 during third quarter.

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Executive Summary

The monitoring wells at the H-Area Acid/Caustic Basin are sampled quarterly as part of the Savannah River Site (SRS) Groundwater Monitoring Program to comply with South Carolina Hazardous Waste Management Regulations.

During fourth quarter 1991, samples from four monitoring wells at the H-Area Acid/Caustic Basin were analyzed for turbidity, pH, specific conductance, major ions, total organic halogens, total organic carbon, total dissolved solids, radionuclides, pesticides, herbicides, and other constituents. Monitoring results that exceeded the U.S. Environmental Protection Agency primary drinking water standards (PDWS) and the SRS flagging criteria and turbidity standards are discussed in this report.

Wells HAC 2 and 3 did not yield four well volumes prior to sampling; thus, the samples collected from these wells may not be representative groundwater samples. Wells HAC 1, 2, 3, and 4 contained tritium activities that exceeded the PDWS, with values ranging up to $5.5\text{E}+01$ pCi/mL in well HAC 1. Historic records indicate no disposal of radionuclides at this unit (Heffner and Exploration Resources, 1991), so the presence of this constituent is not likely due to basin activities. Iron exceeded the Flag 2 criterion in well HAC 3, with a value of $429\text{ }\mu\text{g/L}$. Manganese exceeded the Flag 2 criterion in well HAC 3, with a value of $86\text{ }\mu\text{g/L}$. Specific conductance exceeded the Flag 2 criterion in well HAC 2 at $580\text{ }\mu\text{S/cm}$.

No priority pollutants (EPA, 1990) in excess of the PDWS or Flag 2 criteria were detected in wells HAC 2 and 4.

Tritium activities in downgradient well HAC 3 and sidegradient-to-upgradient well HAC 1 appeared similar to tritium levels in upgradient well HAC 4. Iron and manganese were elevated in downgradient well HAC 3. Specific conductance was elevated in downgradient well HAC 2.

Wells HAC 1, 3, and 4 had turbidity values less than 5 NTU, and well HAC 2 did not exceed the 50 NTU turbidity standard.

Water-table elevations at the H-Area Acid/Caustic Basin indicate that groundwater flow direction is toward site northwest; this flow has been consistent for at least 12 quarters. The horizontal gradient at the H-Area Acid/Caustic Basin is very small, complicating the determination of groundwater flow direction. The revised Groundwater Quality Assessment Plan (WSRC, 1991) for the unit indicates that the monitoring well network at the H-Area Acid/Caustic Basin is sufficient to detect any effects on the groundwater due to the basin.

Introduction

The H-Area Acid/Caustic Basin is southwest of the H-Area Canyon Building near the H-Area Tank Farm at the Savannah River Site (SRS). The basin, constructed in the early 1950s, is an unlined earthen pit that received dilute sulfuric acid and sodium hydroxide solutions and other wastes from several areas within SRS. The basin provided an area for the mixing and neutralization of the dilute solutions before their discharge into nearby streams. Disposal of acid/caustic solutions to the H-Area Acid/Caustic Basin was discontinued in 1982; however, the basin received steam condensate from a hose box and drainage from a chemical pad until 1985 (Heffner and Exploration Resources, 1991).

Under the terms of a consent decree executed May 26, 1988, by the U.S. District Court (District of South Carolina, Aiken Division), the basin became subject to requirements of Subtitle C of the Resource Conservation and Recovery Act (RCRA), the South Carolina Hazardous Waste Management Regulations (SCHWMR), and associated regulations. In the summer of 1988, a network of monitoring wells was proposed for the basin to ensure compliance with SCHWMR; in August 1988, four monitoring wells were installed at the H-Area Acid/Caustic Basin.

The monitoring wells at the H-Area Acid/Caustic Basin are sampled quarterly as part of the SRS Groundwater Monitoring Program to comply with SCHWMR. The revised Groundwater Quality Assessment Plan (WSRC, 1991), which has been submitted to the South Carolina Department of Health and Environmental Control (SCDHEC), indicates that the monitoring well network at the H-Area Acid/Caustic Basin is sufficient to detect any effects on the groundwater due to the basin.

Discussion

Groundwater Monitoring Data

The standard practice at SRS is to purge four well volumes from each well and ensure that the field parameters have stabilized before sample collection. If a well that goes dry during purging recovers sufficiently for sampling within 24 hours, the procedure is considered a single sampling event. During fourth quarter 1991, wells HAC 2 and 3 at the H-Area Acid/Caustic Basin did not yield four well volumes prior to sampling; thus, the samples collected from these wells may not be representative groundwater samples. Six and nine gallons of water were evacuated from wells HAC 2 and 3, respectively.

Samples from four monitoring wells at the H-Area Acid/Caustic Basin were analyzed for turbidity, pH, specific conductance, major ions, total organic halogens, total organic carbon, total dissolved solids, radionuclides, pesticides, herbicides, and other constituents. During this quarter, samples from wells HAC 2 and 4 were analyzed for priority pollutants (EPA, 1990). These analyses were performed to satisfy an SCDHEC Notice of Deficiency on the F-, H-, K-, and P-Area Acid/Caustic Basins Groundwater Quality Assessment Plan to ensure that there are no hazardous organics in the groundwater.

This report describes monitoring results that exceeded the U.S. Environmental Protection Agency (EPA) primary drinking water standards (PDWS) (Appendix A), the SRS flagging criteria (Appendix B), and the SRS turbidity standards. The Environmental Monitoring Section of the Environmental Protection Department at SRS recently revised the flagging criteria for identifying constituents in high concentrations in groundwater. In general, the criteria are as follows:

- Flag 2 criteria are based on the PDWS; if the constituents do not have a PDWS, Flag 2 criteria are based on the secondary drinking water standards (SDWS) or 10 times the method detection limits as described in Appendix B. Constituent levels that equal or exceed Flag 2 criteria are described as *elevated*.
- Flag 1 criteria are based on half the PDWS; if the constituents do not have a PDWS, Flag 1 criteria are based on half the SDWS or 5 times the method detection limits as described in Appendix B. Flag 1 levels for a constituent may reflect analytical error; however, this level may indicate the initial detection of a contaminant. Thus, constituents exceeding Flag 1 criteria are included in this report and are described as *slightly elevated*.
- Flag 0 criteria are based on constituent levels below Flag 1.

Illustrations of the monitored waste management unit at SRS (Figure 1), the individual monitoring wells (Figure 2), and the flow directions of the groundwater beneath the basin (Figure 3) are in Appendix C; and monitoring results tables are in Appendix D. Samples that exceeded holding times also are shown in Appendix D.

Analytical Results Exceeding Standards

Results for analytes that exceeded their respective PDWS (see Appendix A) during 1991 are summarized in Table 1 (Appendix D), and results for all of the analytes are presented in Table 3 (Appendix D). Wells HAC 1, 2, 3, and 4 all contained tritium activities that exceeded the PDWS, with values ranging up to $5.5E+01$ pCi/mL in well HAC 1.

Constituents that exceeded other Flag 1 and 2 criteria (see Appendix B) during fourth quarter 1991 are summarized in Table 2 (Appendix D). Iron exceeded the Flag 2 criterion in well HAC 3, with a value of $429 \mu\text{g/L}$. Manganese exceeded the Flag 2 criteria in HAC 3, with a value of $86 \mu\text{g/L}$. Specific conductance exceeded the Flag 2 criterion in well HAC 2 at $580 \mu\text{S/cm}$.

No priority pollutants (EPA, 1990) above the PDWS or Flag 2 criteria appeared in wells HAC 2 and 4.

Turbidity Results Exceeding Standards

Turbidity results, in nephelometric turbidity units (NTU), are reported for well samples exceeding 5 and 50 NTU. During fourth quarter 1991, wells HAC 1, 3, and 4 had turbidity values less than 5 NTU. Well HAC 2 did not exceed the 50 NTU turbidity standard (Table 3, Appendix D).

The detection value of 5 NTU, established by EPA (1986) as a general standard, is considered unrealistic for monitoring wells at SRS. Gass (1989) has documented turbidity measurements ranging up to 5,000 NTU from properly designed wells screened in poorly productive formations, such as those often screened in the water table. During the 1989 RCRA Compliance Evaluation Inspection, officials from EPA Region IV indicated that the SRS turbidity standard of 50 NTU is conservative. These officials also agreed that water-table wells in this area often correspond to nonaquifer formations, rendering development of these wells more difficult due to the low yield and high proportion of mobile fines typical of these formations (Bergren and Bennett, 1989).

Water Elevations, Flow Directions, and Flow Rates

Water-table elevations and the groundwater flow direction beneath the H-Area Acid/Caustic Basin are shown in Figure 3 (Appendix C). Water-table elevations indicate that groundwater flow direction is toward the northwest (using SRS grid coordinates); this flow has been consistent for at least 12 quarters. The horizontal gradient at the H-Area Acid/Caustic Basin is very slight, complicating the determination of a unique flow direction.

The groundwater flow rate in the water table (Aquifer Zone IIB₂) beneath the H-Area Acid/Caustic Basin is estimated using the following equation:

$$\text{Flow (ft/day)} = \frac{\text{Hydraulic Conductivity (ft/day)}}{\text{Porosity (unitless)}} \times \frac{dh \text{ (ft)}}{dl \text{ (ft)}}$$

A hydraulic conductivity constant of 10 ft/day (Geraghty & Miller, 1990) is used as a conservative estimate (i.e., the actual hydraulic conductivity should be somewhat less than 10 ft/day). The effective porosity value is estimated at 20% (Killian et al., 1987), dh is the difference in head, and dl is the length of the flow path. Flow rate estimates vary depending on the vertical gradient between wells, the size of the area under consideration, and the number of data points. The following calculation is useful only as an indication of the order of magnitude for flow rates in this area.

The flow rate estimate for groundwater beneath the H-Area Acid/Caustic Basin is as follows:

$$\frac{10}{0.20} \times \frac{0.4}{68.07} = 0.29 \text{ ft/day}$$

$$0.29 \text{ ft/day} \times 365 = 106 \text{ ft/year}$$

Results of Upgradient vs. Downgradient Wells

Well HAC 4 is upgradient, well HAC 1 is sidegradient to upgradient, well HAC 3 is downgradient, and well HAC 2 is downgradient. Tritium activities in downgradient well HAC 3 and sidegradient-to-upgradient well HAC 1 appeared similar to tritium levels in upgradient well HAC 4. Iron and manganese were elevated in downgradient well HAC 3. Specific conductance was elevated in downgradient well HAC 2.

Conclusions

Tritium exceeded the PDWS during the fourth quarter of 1991 in the HAC wells at the H-Area Acid/Caustic Basin. Iron, manganese, and specific conductance exceeded Flag 2 criteria during fourth quarter 1991. No well samples exceeded the 50 NTU turbidity standard.

Wells HAC 1, 2, 3, and 4 all contained tritium activities that exceeded the PDWS, with values ranging up to $5.5E+01$ pCi/mL in well HAC 1. Elevated levels of tritium in the HAC wells have been reported previously.

Because historical records for this waste management unit indicate no radionuclides were disposed of here (Heffner and Exploration Resources, 1991), the elevated levels of tritium in the HAC wells are not considered a result of seepage from the basin. Releases of tritium in F and H areas, including the high-level waste tank farm adjacent to the H-Area Acid/Caustic Basin, are a possible source of the tritium in the HAC wells.

No priority pollutants (EPA, 1990) appeared above the PDWS or Flag 2 criteria in wells HAC 2 and 4.

Tritium activities in downgradient well HAC 3 and sidegradient-to-upgradient well HAC 1 appeared similar to tritium levels in upgradient well HAC 4. Iron and manganese were elevated in downgradient well HAC 3. Specific conductance was elevated in downgradient well HAC 2. 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.

Summary 1991

Tritium persisted as a contaminant at the H-Area Acid/Caustic Basin throughout the year. Wells HAC 1, 2, 3, and 4 all exhibited levels of tritium above the PDWS for all four quarters. Total radium exceeded the PDWS during third quarter in well HAC 2 but not elsewhere or during any other quarter of 1991.

The history of the H-Area Acid/Caustic Basin indicates that no radionuclides have been disposed of at the basin (Heffner and Exploration Resources, 1991). This, coupled with the fact that well HAC 1 is sidegradient to upgradient and well HAC 4 is upgradient, suggests that the tritium at the H-Area Acid/Caustic Basin is not due to basin activities. The source of the radium is unknown; however, radium is a naturally occurring substance.

Errata

Errors in the computer program used to mark analyses that exceed holding times caused a number of analyses to be incorrectly flagged as exceeding holding time in the third quarter 1991 report.

The nitrate as nitrogen analysis for well HAC 3 was the only analysis performed by General Engineering Laboratory on samples from the HAC well series during third quarter 1991 that exceeded holding time.

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Appendix A – Primary Drinking Water Standards

Primary Drinking Water Standards

Analyte	Unit	PDWS	Source
Antimony-125	pCi/L	300	Final PDWS (EPA, 1977)
Arsenic	µg/L	50	Final PDWS (EPA, 1990)
Barium	µg/L	2,000	Final PDWS (EPA, 1991c)
Barium-140	pCi/L	90	Final PDWS (EPA, 1977)
Benzene	µg/L	5	Final PDWS (EPA, 1990)
Beryllium-7	pCi/L	6,000	Final PDWS (EPA, 1977)
Bromodichloromethane	µg/L	100	Final PDWS (EPA, 1991c)
Bromoform	µg/L	100	Final PDWS (EPA, 1991c)
Cadmium	µg/L	10	Final PDWS (EPA, 1990)
Carbon tetrachloride	µg/L	5	Final PDWS (EPA, 1990)
Carbon-14	pCi/L	2,000	Final PDWS (EPA, 1977)
Cerium-141	pCi/L	300	Final PDWS (EPA, 1977)
Cesium-137	pCi/L	200	Final PDWS (EPA, 1977)
Chlordane	µg/L	2	Final PDWS (EPA, 1991a)
Chloroethene (Vinyl chloride)	µg/L	2	Final PDWS (EPA, 1990)
Chloroform	µg/L	100	Final PDWS (EPA, 1991c)
Chromium	µg/L	100	Final PDWS (EPA, 1991a)
Chromium-51	pCi/L	6,000	Final PDWS (EPA, 1977)
Cobalt-58	pCi/L	9,000	Final PDWS (EPA, 1977)
Cobalt-60	pCi/L	100	Final PDWS (EPA, 1977)
Copper	µg/L	1,300	Final PDWS (EPA, 1991b)
Dibromochloromethane	µg/L	100	Final PDWS (EPA, 1991c)
Dibromochloropropane	µg/L	0.2	Final PDWS (EPA, 1991a)
1,4-Dichlorobenzene	µg/L	75	Final PDWS (EPA, 1990)
1,2-Dichloroethane	µg/L	5	Final PDWS (EPA, 1990)
cis 1,2-Dichloroethene	µg/L	70	Final PDWS (EPA, 1991a)
1,1-Dichloroethylene	µg/L	7	Final PDWS (EPA, 1990)
trans-1,2-Dichloroethylene	µg/L	100	Final PDWS (EPA, 1991a)
2,4-Dichlorophenoxyacetic acid	µg/L	100	Final PDWS (EPA, 1990)
1,2-Dichloropropane	µg/L	5	Final PDWS (EPA, 1991a)
Endrin	µg/L	0.2	Final PDWS (EPA, 1990)
Ethylbenzene	µg/L	700	Final PDWS (EPA, 1991a)
Europium-154	pCi/L	200	Final PDWS (EPA, 1977)
Europium-155	pCi/L	600	Final PDWS (EPA, 1977)
Fluoride	µg/L	4,000	Final PDWS (EPA, 1991c)
Gross alpha	pCi/L	15	Final PDWS (EPA, 1990)
Heptachlor	µg/L	0.4	Final PDWS (EPA, 1991a)
Heptachlor epoxide	µg/L	0.2	Final PDWS (EPA, 1991a)
Iodine-129	pCi/L	1	Final PDWS (EPA, 1977)
Iodine-131	pCi/L	3	Final PDWS (EPA, 1977)
Iron-55	pCi/L	2,000	Final PDWS (EPA, 1977)
Iron-59	pCi/L	200	Final PDWS (EPA, 1977)
Lanthanum-140	pCi/L	60	Final PDWS (EPA, 1977)
Lead	µg/L	15	Final PDWS (EPA, 1991b)
Lindane	µg/L	4	Final PDWS (EPA, 1990)
Manganese-54	pCi/L	300	Final PDWS (EPA, 1977)
Mercury	µg/L	2	Final PDWS (EPA, 1991a)
Methoxychlor	µg/L	100	Final PDWS (EPA, 1990)
Nickel-59	pCi/L	300	Final PDWS (EPA, 1977)
Nickel-63	pCi/L	50	Final PDWS (EPA, 1977)
Niobium-95	pCi/L	300	Final PDWS (EPA, 1977)
Nitrate as nitrogen	µg/L	10,000	Final PDWS (EPA, 1991a)
Nitrite as nitrogen	µg/L	1,000	Final PDWS (EPA, 1991a)
PCB 1016	µg/L	0.5	Final PDWS (EPA, 1991a)
PCB 1221	µg/L	0.5	Final PDWS (EPA, 1991a)

<u>Analyte</u>	<u>Unit</u>	<u>PDWS</u>	<u>Source</u>
PCB 1232	µg/L	0.5	Final PDWS (EPA, 1991a)
PCB 1242	µg/L	0.5	Final PDWS (EPA, 1991a)
PCB 1248	µg/L	0.5	Final PDWS (EPA, 1991a)
PCB 1254	µg/L	0.5	Final PDWS (EPA, 1991a)
PCB 1260	µg/L	0.5	Final PDWS (EPA, 1991a)
PCB 1262	µg/L	0.5	Final PDWS (EPA, 1991a)
Pentachlorophenol	µg/L	1	Final PDWS (EPA, 1991c)
Ruthenium-103	pCi/L	200	Final PDWS (EPA, 1977)
Ruthenium-106	pCi/L	30	Final PDWS (EPA, 1977)
Selenium	µg/L	50	Final PDWS (EPA, 1991a)
Silver	µg/L	50	Final PDWS (EPA, 1990)
Strontium-89	pCi/L	20	Final PDWS (EPA, 1977)
Strontium-90	pCi/L	8	Final PDWS (EPA, 1990)
Styrene	µg/L	100	Final PDWS (EPA, 1991a)
Technetium-99	pCi/L	900	Final PDWS (EPA, 1977)
Tetrachloroethylene	µg/L	5	Final PDWS (EPA, 1991a)
Tin-113	pCi/L	300	Final PDWS (EPA, 1977)
Toluene	µg/L	1,000	Final PDWS (EPA, 1991a)
Total radium	pCi/L	5	Final PDWS (EPA, 1990)
Toxaphene	µg/L	3	Final PDWS (EPA, 1991a)
2,4,5-TP (Silvex)	µg/L	10	Final PDWS (EPA, 1990)
1,1,1-Trichloroethane	µg/L	200	Final PDWS (EPA, 1990)
Trichloroethylene	µg/L	5	Final PDWS (EPA, 1990)
Tritium	pCi/mL	20	Final PDWS (EPA, 1990)
Xylenes	µg/L	10,000	Final PDWS (EPA, 1991a)
Zinc-65	pCi/L	300	Final PDWS (EPA, 1977)
Zirconium-95	pCi/L	200	Final PDWS (EPA, 1977)
Zirconium/Niobium-95	pCi/L	200	Final PDWS (EPA, 1977) ^a

^a When radionuclide analyses are combined, the lower PDWS of the two isotopes is used.

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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 criterion for a constituent equals 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 for that constituent. If a constituent does not have a drinking water standard, the Flag 2 criterion equals 10 times the method detection limit calculated as the 90th percentile detection limit obtained recently by one of the primary analytical laboratories.
- Flag 1 criterion for a constituent equals 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 for that constituent. If a constituent does not have an EPA drinking water standard, the Flag 1 criterion equals 5 times the method detection limit calculated as the 90th percentile detection limit obtained recently by one of the primary analytical laboratories.
- Analytical results for a constituent below Flag 1 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	3.17	6.34	Proposed DWS (EPA, 1991d)
Americium-243	pCi/L	3.19	6.37	Proposed DWS (EPA, 1991d)
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, 1990a)
Antimony-125	pCi/L	150	300	Final DWS (EPA, 1977)
Aramite	µg/L	50	100	EPA Method 8270
Arsenic	µg/L	25	50	Final DWS (EPA, 1990b)

Analyte	Unit	Flag 1	Flag 2	Source
Azobenzene	µg/L	50	100	EPA Method 625
Barium	µg/L	1,000	2,000	Final DWS (EPA, 1991c)
Barium-140	pCi/L	45	90	Final DWS (EPA, 1977)
Benzene	µg/L	2.5	5	Final DWS (EPA, 1990b)
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, 1990a)
Benzo[b]fluoranthene	µg/L	0.1	0.2	Proposed DWS (EPA, 1990a)
Benzo[k]fluoranthene	µg/L	0.1	0.2	Proposed DWS (EPA, 1990a)
Benzoic acid	µg/L	250	500	EPA Method 8270
Benzo[g,h,i]perylene	µg/L	50	100	EPA Method 8270
Benzo[a]pyrene	µg/L	0.1	0.2	Proposed DWS (EPA, 1990a)
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, 1990a)
Beryllium-7	pCi/L	3,000	6,000	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 (EPA, 1991c)
Bromoform	µg/L	50	100	Final DWS (EPA, 1991c)
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, 1990a)
Butylbenzyl phthalate		No flag	No flag	Set by EPD/EMS
Cadmium	µg/L	5	10	Final DWS (EPA, 1990b)
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 (EPA, 1990b)
Carbon 12-labeled 2,3,7,8-TCDD	µg/L	0.00225	0.0045	EPA Method 8280
Carbon 12-labeled 2,3,7,8-TCDF	µg/L	0.002	0.004	EPA Method 8280
Carbon-14	pCi/L	1,000	2,000	Final DWS (EPA, 1977)
Carbonate		No flag	No flag	Set by EPD/EMS
Cerium-141	pCi/L	150	300	Final DWS (EPA, 1977)
Cerium-144	pCi/L	131	261	Proposed DWS (EPA, 1991d)
Cesium-134	pCi/L	40.7	81.3	Set by EPD/EMS ^a
Cesium-137	pCi/L	100	200	Final DWS (EPA, 1977)
Chlordane	µg/L	1	2	Final DWS (EPA, 1991a)
Chloride	µg/L	125,000	250,000	Secondary DWS (EPA, 1991a)
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 (EPA, 1990b)
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 (EPA, 1991c)
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
2-Chlorophenol	µg/L	50	100	EPA Method 8270

Analyte	Unit	Flag 1	Flag 2	Source
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 (EPA, 1991a)
Chromium-51	pCi/L	3,000	6,000	Final DWS (EPA, 1977)
Chrysene	µg/L	0.1	0.2	Proposed DWS (EPA, 1990a)
Cobalt	µg/L	20	40	EPA Method 6010
Cobalt-58	pCi/L	4,500	9,000	Final DWS (EPA, 1977)
Cobalt-60	pCi/L	50	100	Final DWS (EPA, 1977)
Color		No flag	No flag	Set by EPD/EMS
Copper	µg/L	650	1,300	Final DWS (EPA, 1991b)
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	66.5	133	Proposed DWS (EPA, 1991d)
Curium-243	pCi/L	4.15	8.3	Proposed DWS (EPA, 1991d)
Curium-244	pCi/L	4.92	9.84	Proposed DWS (EPA, 1991d)
Curium-246	pCi/L	3.14	6.27	Proposed DWS (EPA, 1991d)
Cyanide	µg/L	100	200	Proposed DWS (EPA, 1990a)
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, 1990a)
Dibenzofuran	µg/L	50	100	EPA Method 8270
Dibromochloromethane	µg/L	50	100	Final DWS (EPA, 1991c)
Dibromochloropropane	µg/L	0.1	0.2	Final DWS (EPA, 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	50	100	EPA Method 8270
1,3-Dichlorobenzene	µg/L	50	100	EPA Method 8270
1,4-Dichlorobenzene	µg/L	37.5	75	Final DWS (EPA, 1990b)
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 (EPA, 1990b)
cis-1,2-Dichloroethene	µg/L	35	70	Final DWS (EPA, 1991a)
1,1-Dichloroethylene	µg/L	3.5	7	Final DWS (EPA, 1990b)
1,2-Dichloroethylene	µg/L	25	50	EPA Method 8240
trans-1,2-Dichloroethylene	µg/L	50	100	Final DWS (EPA, 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	50	100	Final DWS (EPA, 1990b)
1,2-Dichloropropane	µg/L	2.5	5	Final DWS (EPA, 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
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

Analyte	Unit	Flag 1	Flag 2	Source
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-Dirnethyl 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 (EPA, 1990b)
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 (EPA, 1991a)
Europium-154	pCi/L	100	200	Final DWS (EPA, 1977)
Europium-155	pCi/L	300	600	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 (EPA, 1991c)
Gross alpha	pCi/L	7.5	15	Final DWS (EPA, 1990b)
Heptachlor	µg/L	0.2	0.4	Final DWS (EPA, 1991a)
Heptachlor epoxide	µg/L	0.1	0.2	Final DWS (EPA, 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, 1990a)
Hexachlorobutadiene	µg/L	50	100	EPA Method 8270
Hexachlorocyclopentadiene	µg/L	25	50	Proposed DWS (EPA, 1990a)
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
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

<u>Analyte</u>	<u>Unit</u>	<u>Flag 1</u>	<u>Flag 2</u>	<u>Source</u>
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	0.5	1	Final DWS (EPA, 1977)
Iodine-131	pCi/L	1.5	3	Final DWS (EPA, 1977)
Iodomethane (Methyl iodide)	µg/L	75	150	EPA Method 8240
Iron	µg/L	150	300	Secondary DWS (EPA, 1991a)
Iron-55	pCi/L	1,000	2,000	Final DWS (EPA, 1977)
Iron-59	pCi/L	100	200	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	30	60	Final DWS (EPA, 1977)
Lead	µg/L	7.5	15	Final DWS (EPA, 1991b)
Lindane	µg/L	2	4	Final DWS (EPA, 1990b)
Lithium	µg/L	25	50	EPA Method 6010
Magnesium		No flag	No flag	Set by EPD/EMS
Manganese	µg/L	25	50	Secondary DWS (EPA, 1991a)
Manganese-54	pCi/L	150	300	Final DWS (EPA, 1977)
Mercury	µg/L	1	2	Final DWS (EPA, 1991a)
Methacrylonitrile	µg/L	250	500	EPA Method 8240
Methapyrilene	µg/L	50	100	EPA Method 8270
Methoxychlor	µg/L	50	100	Final DWS (EPA, 1990b)
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	3.53	7.06	Proposed DWS (EPA, 1991d)
Nickel	µg/L	50	100	Proposed DWS (EPA, 1990a)
Nickel-59	pCi/L	150	300	Final DWS (EPA, 1977)
Nickel-63	pCi/L	25	50	Final DWS (EPA, 1977)
Niobium-95	pCi/L	150	300	Final DWS (EPA, 1977)
Nitrate as nitrogen	µg/L	5,000	10,000	Final DWS (EPA, 1991a)
Nitrite as nitrogen	µg/L	500	1,000	Final DWS (EPA, 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
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

<u>Analyte</u>	<u>Unit</u>	<u>Flag 1</u>	<u>Flag 2</u>	<u>Source</u>
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	25	50	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 (EPA, 1991a)
PCB 1221	µg/L	0.25	0.5	Final DWS (EPA, 1991a)
PCB 1232	µg/L	0.25	0.5	Final DWS (EPA, 1991a)
PCB 1242	µg/L	0.25	0.5	Final DWS (EPA, 1991a)
PCB 1248	µg/L	0.25	0.5	Final DWS (EPA, 1991a)
PCB 1254	µg/L	0.25	0.5	Final DWS (EPA, 1991a)
PCB 1260	µg/L	0.25	0.5	Final DWS (EPA, 1991a)
PCB 1262	µg/L	0.25	0.5	Final DWS (EPA, 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 (EPA, 1991c)
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 420.2
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	3.51	7.02	Proposed DWS (EPA, 1991d)
Plutonium-239	pCi/L	31.1	62.1	Proposed DWS (EPA, 1991d)
Plutonium-239/240	pCi/L	31.1	62.1	Proposed DWS (EPA, 1991d) ^a
Plutonium-240	pCi/L	31.1	62.2	Proposed DWS (EPA, 1991d)
Plutonium-241		No flag	No flag	Set by EPD/EMS
Plutonium-242	pCi/L	32.7	65.4	Proposed DWS (EPA, 1991d)
Potassium		No flag	No flag	Set by EPD/EMS
Potassium-40	pCi/L	150	300	Proposed DWS (EPA, 1986)
Pronamid	µg/L	50	100	EPA Method 8270
Propionitrile	µg/L	1,000	2,000	EPA Method 8240
Pyrene	µg/L	50	100	EPA Method 8270
Pyridine	µg/L	50	100	EPA Method 8270
Radium-226	pCi/L	7.85	15.7	Proposed DWS (EPA, 1991d)
Radium-228	pCi/L	3.93	7.85	Proposed DWS (EPA, 1991d)
Radon-222	pCi/L	150	300	Proposed DWS (EPA, 1991d)
Ruthenium-103	pCi/L	100	200	Final DWS (EPA, 1977)
Ruthenium-106	pCi/L	15	30	Final DWS (EPA, 1977)

<u>Analyte</u>	<u>Unit</u>	<u>Flag 1</u>	<u>Flag 2</u>	<u>Source</u>
Safrole	µg/L	50	100	EPA Method 8270
Selenium	µg/L	25	50	Final DWS (EPA, 1991a)
Silica		No flag	No flag	Set by EPD/EMS
Silver	µg/L	25	50	Final DWS (EPA, 1990b)
Sodium		No flag	No flag	Set by EPD/EMS
Sodium-22	pCi/L	233	466	Proposed DWS (EPA, 1991d)
Specific conductance	µS/cm	250	500	Set by EPD/EMS
Strontium-89	pCi/L	10	20	Final DWS (EPA, 1977)
Strontium-90	pCi/L	4	8	Final DWS (EPA, 1990b)
Styrene	µg/L	50	100	Final DWS (EPA, 1991a)
Sulfate	µg/L	200,000	400,000	Proposed DWS (EPA, 1990a)
Sulfide	µg/L	5,000	10,000	EPA Method 9030
Sulfotepp	µg/L	50	100	EPA Method 8270
Surfactants		No flag	No flag	Set by EPD/EMS
Technetium-99	pCi/L	450	900	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 (EPA, 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, 1990a)
Thionazin	µg/L	50	100	EPA Method 8270
Thorium-228	pCi/L	62.5	125	Proposed DWS (EPA, 1991d)
Thorium-230	pCi/L	39.6	79.2	Proposed DWS (EPA, 1991d)
Thorium-232	pCi/L	44	88	Proposed DWS (EPA, 1991d)
Thorium-234	pCi/L	200	401	Proposed DWS (EPA, 1991d)
Tin	µg/L	10	20	EPA Method 282.2
Tin-113	pCi/L	150	300	Final DWS (EPA, 1977)
Toluene	µg/L	500	1,000	Final DWS (EPA, 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	2.5	5	Final DWS (EPA, 1990b)
Total silica	µg/L	500	1,000	EPA Method 6010
Toxaphene	µg/L	1.5	3	Final DWS (EPA, 1991a)
2,4,5-TP (Silvex)	µg/L	5	10	Final DWS (EPA, 1990b)
Tributyl phosphate	µg/L	50	100	EPA Method 8270
1,2,4-Trichlorobenzene	µg/L	4.5	9	Proposed DWS (EPA, 1990a)
1,1,1-Trichloroethane	µg/L	100	200	Final DWS (EPA, 1990b)
1,1,2-Trichloroethane	µg/L	2.5	5	Proposed DWS (EPA, 1990a)
Trichloroethylene	µg/L	2.5	5	Final DWS (EPA, 1990b)
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

<u>Analyte</u>	<u>Unit</u>	<u>Flag 1</u>	<u>Flag 2</u>	<u>Source</u>
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	10	20	Final DWS (EPA, 1990b)
Turbidity		No flag	No flag	Set by EPD/EMS
Uranium	µg/L	10	20	Proposed DWS (EPA, 1991d)
Uranium alpha activity	pCi/L	15	30	Proposed DWS (EPA, 1991d)
Uranium-234	pCi/L	6.95	13.9	Proposed DWS (EPA, 1991d)
Uranium-235	pCi/L	7.25	14.5	Proposed DWS (EPA, 1991d)
Uranium-238	pCi/L	7.3	14.6	Proposed DWS (EPA, 1991d)
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 (EPA, 1991a)
Zinc	µg/L	2,500	5,000	Secondary DWS (EPA, 1991a)
Zinc-65	pCi/L	150	300	Final DWS (EPA, 1977)
Zirconium-95	pCi/L	100	200	Final DWS (EPA, 1977)
Zirconium/Niobium-95	pCi/L	100	200	Final DWS (EPA, 1977) ^a

^a When radionuclide analyses are combined, the lower DWS of the two isotopes is used for flagging.

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Appendix C – Figures

Figure 1. Location of the H-Area Acid/Caustic Basin at the Savannah River Site

Figure 2. Location of Groundwater Monitoring Wells at the H-Area Acid/Caustic Basin

Figure 3. Potentiometric Surface Map of the Water Table at the H-Area Acid/Caustic Basin

Appendix D – Groundwater Monitoring Results Tables

Key to Reading the Tables

Abbreviations which may appear in the tabular data:

B = analyte detected in associated blank as well as in sample
D = drinking water standard
E = exponential notation (e.g., $1.1\text{E}-09 \mu\text{Ci/mL} = 1.1 \times 10^{-9} \mu\text{Ci/mL} = 0.0000000011 \mu\text{Ci/mL}$)
EM = EPD/EMS Laboratory
GE = General Engineering
H = holding time
1,2,3,4,6,7,8-HPCDD = 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
J = estimated value
Lindane = gamma-benzene hexachloride
MA = M-Area Laboratory
msl = mean sea level
NTU = turbidity units
pH = pH units
pCi/L = picocuries per liter
pCi/mL = picocuries per milliliter
PVC = polyvinyl chloride
TOC = top of casing
Sp. = specific
 $\mu\text{g/L}$ = 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.

EPA method 150.1 for pH analyses requires "immediate" analysis. During fourth quarter, this was generally interpreted as allowing no more than 24 hours between sample collection in the field and analysis in the laboratory. Due to time involved in shipping, most laboratory pH analyses are performed out of holding time.

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

Table 1. Constituents Exceeding the Primary Drinking Water Standards for 1991

<u>Well</u>	<u>Constituent</u>	<u>Unit</u>	<u>Quarter 1</u>	<u>Quarter 2</u>	<u>Quarter 3</u>	<u>Quarter 4</u>
HAC 1	Tritium ^a	pCi/mL	8.2E+01 ± 1.2E+00	5.8E+01 ± 1.1E+00	4.9E+01 ± 1.0E+00	5.5E+01 ± 1.3E+00
	Tritium ^a	pCi/mL	8.1E+01 ± 1.2E+00	NA ^b	NA	NA
	Tritium ^c	pCi/mL	8.1E+01 ± 1.2E+00 ^c	NA	NA	NA
HAC 2	Total radium	pCi/L	— ^d	—	7.2E+00 ± 4.4E+00	—
	Tritium	pCi/mL	5.2E+01 ± 1.1E+00	5.1E+01 ± 1.0E+00	4.4E+01 ± 1.0E+00	4.7E+01 ± 1.2E+00
HAC 3	Tritium	pCi/mL	5.1E+01 ± 1.1E+00	5.2E+01 ± 9.0E-01	5.2E+01 ± 1.0E+00	3.3E+01 ± 1.1E+00
HAC 4	Tritium	pCi/mL	4.1E+01 ± 1.0E+00	3.6E+01 ± 9.0E-01	3.0E+01 ± 8.0E-01	3.0E+01 ± 1.1E+00

^a Duplicate samples.

^b Not analyzed this quarter.

^c This value is presented with the tritium results in the First Quarter 1991 H-Area Acid/Caustic Basin Groundwater Monitoring Report. The EPD/EMS Savannah River Site's Groundwater Monitoring Program, First Quarter 1991, report does not include this value.

^d Not above standard this quarter.

Table 2. Constituents Exceeding Other Flagging Criteria

<u>Well</u>	<u>Constituent</u>	<u>Unit</u>	<u>Result</u>	<u>Flag</u>
HAC 1	Iron	µg/L	195	1
HAC 2	Iron	µg/L	162	1
	Specific conductance	µS/cm	580	2
	Sulfate	µg/L	275,000	1
HAC 3	Iron	µg/L	429	2
	Manganese	µg/L	86	2
HAC 4	Aluminum	µg/L	152	1
	Lead	µg/L	7.6	1
	Manganese	µg/L	45	1

Table 3. Groundwater Monitoring Results for Individual Wells**WELL HAC 1**

<u>SRS Coord.</u>	<u>Lat./Longitude</u>	<u>Screen Zone Elevation</u>	<u>Top of Casing</u>	<u>Casing</u>	<u>Formation</u>
N72171.0 E61415.2	33.285599 °N 81.645272 °W	278.8-258.8 ft msl	298.4 ft msl	4" PVC	Water Table

MEASUREMENTS CONDUCTED IN THE FIELD

Sample date: 12/02/91
 Depth to water: 27.95 ft (8.52 m) below TOC
 Water elevation: 270.45 ft (82.43 m) msl
 Sp. conductance: 177 μ S/cm
 Water evacuated before sampling: 39 gal

Time: 15:35
 pH: 5.0
 Alkalinity: 0 mg/L
 Water temperature: 23.4°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	GE
		Specific conductance	115	μ S/cm	0	GE
		Turbidity	0.64	NTU	0	GE
		Turbidity	0.63	NTU	0	GE
		Arsenic	<2.0	μ g/L	0	GE
		Barium	3.1	μ g/L	0	GE
		Cadmium	<2.0	μ g/L	0	GE
		Calcium	196	μ g/L	0	GE
		Chloride	5,850	μ g/L	0	GE
		Chloride	5,800	μ g/L	0	GE
		Chromium	<4.0	μ g/L	0	GE
		2,4-Dichlorophenoxyacetic acid	<0.30	μ g/L	0	GE
•		Endrin	<0.0060	μ g/L	0	GE
		Fluoride	<100	μ g/L	0	GE
		Iron	195	μ g/L	1	GE
		Lead	6.3	μ g/L	0	GE
•		Lindane	<0.0050	μ g/L	0	GE
		Magnesium	150	μ g/L	0	GE
		Manganese	7.4	μ g/L	0	GE
		Mercury	<0.20	μ g/L	0	GE
•		Methoxychlor	<0.50	μ g/L	0	GE
		Nitrate as nitrogen	1,920	μ g/L	0	GE
		Phenols	<5.0	μ g/L	0	GE
		Potassium	<500	μ g/L	0	GE
		Selenium	<2.0	μ g/L	0	GE
		Silica	6,300	μ g/L	0	GE
		Silver	<2.0	μ g/L	0	GE
		Sodium	23,800	μ g/L	0	GE
		Sulfate	31,200	μ g/L	0	GE
		Sulfate	30,400	μ g/L	0	GE
		Total dissolved solids	62,000	μ g/L	0	GE
		Total dissolved solids	61,000	μ g/L	0	GE
		Total organic carbon	<1,000	μ g/L	0	GE
		Total organic halogens	15	μ g/L	0	GE
		Total phosphates (as P)	<50	μ g/L	0	GE

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

WELL HAC 1 collected on 12/02/91, laboratory analyses (cont.)

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
•		Toxaphene	<0.24	µg/L	0	GE
		2,4,5-TP (Silvex)	<0.090	µg/L	0	GE
		Gross alpha	2.3E+00 ± 1.1E+00	pCi/L	0	GE
		Nonvolatile beta	6.3E+00 ± 1.8E+00	pCi/L	0	GE
		Total radium	<1.0E+00	pCi/L	0	GE
■		Tritium	5.5E+01 ± 1.3E+00	pCi/mL	2	GE

WELL HAC 2

<u>SRS Coord.</u>	<u>Lat/Longitude</u>	<u>Screen Zone Elevation</u>	<u>Top of Casing</u>	<u>Casing</u>	<u>Formation</u>
N72220.2 E61366.9	33.285629 °N 81.645495 °W	278.8-258.8 ft msl	298.1 ft msl	4" PVC	Water Table

MEASUREMENTS CONDUCTED IN THE FIELD

Sample date: 12/02/91
 Depth to water: 28.26 ft (8.61 m) below TOC
 Water elevation: 269.84 ft (82.25 m) msl
 Sp. conductance: 537 µS/cm
 Water evacuated before sampling: 6 gal
 The well went dry during purging.

Time: 15:10
 pH: 5.2
 Alkalinity: 2 mg/L
 Water temperature: 22.5°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	6.1	pH	0	GE
		Specific conductance	580	µS/cm	2	GE
		Turbidity	18	NTU	0	GE
		Acenaphthene	<10	µg/L	0	GE
		Acenaphthylene	<10	µg/L	0	GE
		Aldrin	<10	µg/L	0	GE
		Aluminum	26	µg/L	0	GE
		Anthracene	<10	µg/L	0	GE
		Antimony	<2.0	µg/L	0	GE
		Arsenic	<2.0	µg/L	0	GE
		Barium	7.8	µg/L	0	GE
		Benzene	<1.0	µg/L	0	GE
		alpha-Benzene hexachloride	<10	µg/L	0	GE
		beta-Benzene hexachloride	<10	µg/L	0	GE
		delta-Benzene hexachloride	<10	µg/L	0	GE
		Benzidine	<10	µg/L	0	GE
		Benzo[a]anthracene	<10	µg/L	0	GE
		Benzo[a]pyrene	<10	µg/L	0	GE
		Benzo[b]fluoranthene	<10	µg/L	0	GE
		Benzo[g,h,i]perylene	<10	µg/L	0	GE
		Benzo[k]fluoranthene	<10	µg/L	0	GE
		Beryllium	<3.0	µg/L	0	GE
		Bis(2-chloroethoxy) methane	<10	µg/L	0	GE
		Bis(2-chloroethyl) ether	<10	µg/L	0	GE

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

WELL HAC 2 collected on 12/02/91, laboratory analyses (cont.)

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
		Bis(2-chloroisopropyl) ether	< 10	µg/L	0	GE
		Bis(2-ethylhexyl) phthalate	< 10	µg/L	0	GE
		Bromide	< 1,000	µg/L	0	GE
		Bromodichloromethane	< 1.0	µg/L	0	GE
		Bromoform	< 1.0	µg/L	0	GE
		Bromomethane (Methyl bromide)	< 1.0	µg/L	0	GE
		4-Bromophenyl phenyl ether	< 10	µg/L	0	GE
		Butylbenzyl phthalate	< 10	µg/L	0	GE
		Cadmium	< 2.0	µg/L	0	GE
		Calcium	269	µg/L	0	GE
		Carbon tetrachloride	< 1.0	µg/L	0	GE
		Chlordane	< 10	µg/L	0	GE
		Chloride	6,700	µg/L	0	GE
•		para-Chloro-meta-cresol	< 10	µg/L	0	GE
		Chlorobenzene	< 1.0	µg/L	0	GE
		Chloroethane	< 1.0	µg/L	0	GE
		Chloroethene (Vinyl chloride)	< 1.0	µg/L	0	GE
		2-Chloroethyl vinyl ether	< 1.0	µg/L	0	GE
		Chloroform	< 1.0	µg/L	0	GE
		Chloromethane (Methyl chloride)	< 1.0	µg/L	0	GE
		2-Chloronaphthalene	< 10	µg/L	0	GE
•		2-Chlorophenol	< 10	µg/L	0	GE
		4-Chlorophenyl phenyl ether	< 10	µg/L	0	GE
		Chromium	< 4.0	µg/L	0	GE
		Chrysene	< 10	µg/L	0	GE
		Cobalt	< 4.0	µg/L	0	GE
		Copper	< 4.0	µg/L	0	GE
		Cyanide	< 5.0	µg/L	0	GE
		p,p'-DDD	< 10	µg/L	0	GE
		p,p'-DDE	< 10	µg/L	0	GE
		p,p'-DDT	< 10	µg/L	0	GE
		Di-n-butyl phthalate	< 10	µg/L	0	GE
		Di-n-octyl phthalate	< 10	µg/L	0	GE
		Dibenz[a,h]anthracene	< 10	µg/L	0	GE
		Dibromochloromethane	< 1.0	µg/L	0	GE
		3,3'-Dichlorobenzidine	< 10	µg/L	0	GE
		1,1-Dichloroethane	< 1.0	µg/L	0	GE
		1,2-Dichloroethane	< 1.0	µg/L	0	GE
		1,1-Dichloroethylene	< 1.0	µg/L	0	GE
		trans-1,2-Dichloroethylene	< 1.0	µg/L	0	GE
		Dichloromethane (Methylene chloride)	3.5	µg/L	0	GE
•		2,4-Dichlorophenol	< 10	µg/L	0	GE
		2,4-Dichlorophenoxyacetic acid	< 0.30	µg/L	0	GE
		1,2-Dichloropropane	< 1.0	µg/L	0	GE
		trans-1,3-Dichloropropene	< 1.0	µg/L	0	GE
		cis-1,3-Dichloropropene	< 1.0	µg/L	0	GE
		Dieldrin	< 10	µg/L	0	GE
		Diethyl phthalate	< 10	µg/L	0	GE
•		2,4-Dimethyl phenol	< 10	µg/L	0	GE
		Dimethyl phthalate	< 10	µg/L	0	GE
•		2,4-Dinitrophenol	< 45	µg/L	0	GE
		2,4-Dinitrotoluene	< 10	µg/L	0	GE
		2,6-Dinitrotoluene	< 10	µg/L	0	GE

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

WELL HAC 2 collected on 12/02/91, laboratory analyses (cont.)

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
		1,2-Diphenylhydrazine	< 10	μg/L	0	GE
		Endosulfan I	< 10	μg/L	0	GE
		Endosulfan II	< 10	μg/L	0	GE
		Endosulfan sulfate	< 10	μg/L	0	GE
		Endrin	< 10	μg/L	0	GE
		Endrin aldehyde	< 10	μg/L	0	GE
		Ethylbenzene	< 1.0	μg/L	0	GE
		Fluoranthene	< 10	μg/L	0	GE
		Fluorene	< 10	μg/L	0	GE
		Fluoride	< 100	μg/L	0	GE
		Heptachlor	< 10	μg/L	0	GE
		Heptachlor epoxide	< 10	μg/L	0	GE
		Hexachlorobenzene	< 10	μg/L	0	GE
		Hexachlorobutadiene	< 10	μg/L	0	GE
		Hexachlorocyclopentadiene	< 10	μg/L	0	GE
		Hexachloroethane	< 10	μg/L	0	GE
		Indeno[1,2,3-c,d]pyrene	< 10	μg/L	0	GE
		Iron	162	μg/L	1	GE
		Isophorone	< 10	μg/L	0	GE
		Lead	< 3.0	μg/L	0	GE
		Lindane	< 10	μg/L	0	GE
		Magnesium	350	μg/L	0	GE
		Manganese	15	μg/L	0	GE
		Mercury	0.58	μg/L	0	GE
		Methoxychlor	< 0.50	μg/L	0	GE
•		2-Methyl-4,6-dinitrophenol	< 10	μg/L	0	GE
		N-Nitrosodi-propylamine	< 10	μg/L	0	GE
		N-Nitrosodimethylamine	< 10	μg/L	0	GE
		N-Nitrosodiphenylamine	< 10	μg/L	0	GE
		Naphthalene	< 10	μg/L	0	GE
		Nickel	< 4.0	μg/L	0	GE
		Nitrate as nitrogen	480	μg/L	0	GE
		Nitrobenzene	< 10	μg/L	0	GE
•		2-Nitrophenol	< 10	μg/L	0	GE
•		4-Nitrophenol	< 10	μg/L	0	GE
		PCB 1016	< 150	μg/L	0	GE
		PCB 1221	< 150	μg/L	0	GE
		PCB 1232	< 150	μg/L	0	GE
		PCB 1242	< 150	μg/L	0	GE
		PCB 1248	< 150	μg/L	0	GE
		PCB 1254	< 150	μg/L	0	GE
		PCB 1260	< 150	μg/L	0	GE
•		Pentachlorophenol	< 10	μg/L	0	GE
		Phenanthrene	< 10	μg/L	0	GE
•		Phenol	< 10	μg/L	0	GE
		Phenols	< 5.0	μg/L	0	GE
		Potassium	< 500	μg/L	0	GE
		Pyrene	< 10	μg/L	0	GE
		Selenium	< 2.0	μg/L	0	GE
		Silica	7,610	μg/L	0	GE
		Silver	< 2.0	μg/L	0	GE
		Sodium	90,500	μg/L	0	GE
		Sulfate	275,000	μg/L	1	GE

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

WELL HAC 2 collected on 12/02/91, laboratory analyses (cont.)

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
		1,1,2,2-Tetrachloroethane	< 1.0	µg/L	0	GE
		Tetrachloroethylene	< 1.0	µg/L	0	GE
		Thallium	< 2.0	µg/L	0	GE
		Toluene	< 1.0	µg/L	0	GE
		Total dissolved solids	308,000	µg/L	0	GE
		Total organic carbon	< 1,000	µg/L	0	GE
		Total organic carbon	< 1,000	µg/L	0	GE
		Total organic halogens	< 5.0	µg/L	0	GE
		Total phosphates (as P)	< 50	µg/L	0	GE
		Total phosphates (as P)	< 50	µg/L	0	GE
		Toxaphene	< 10	µg/L	0	GE
		2,4,5-TP (Silvex)	< 0.090	µg/L	0	GE
		1,2,4-Trichlorobenzene	< 10	µg/L	0	GE
		1,1,1-Trichloroethane	< 1.0	µg/L	0	GE
		1,1,2-Trichloroethane	< 1.0	µg/L	0	GE
		Trichloroethylene	< 1.0	µg/L	0	GE
		Trichlorofluoromethane	< 1.0	µg/L	0	GE
•		2,4,6-Trichlorophenol	< 10	µg/L	0	GE
		Zinc	6.0	µg/L	0	GE
		Gross alpha	5.5E+00 ± 1.9E+00	pCi/L	0	GE
		Nonvolatile beta	< 2.0E+00	pCi/L	0	GE
		Total radium	2.0E+00 ± 1.5E+00	pCi/L	0	GE
■		Tritium	4.7E+01 ± 1.2E+00	pCi/mL	2	GE

WELL HAC 3

<u>SRS Coord.</u>	<u>Lat/Longitude</u>	<u>Screen Zone Elevation</u>	<u>Top of Casing</u>	<u>Casing</u>	<u>Formation</u>
N72183.4	33.285461 °N	275.0-255.0 ft msl	298.0 ft msl	4" PVC	Water Table
E61313.6	81.645564 °W				

MEASUREMENTS CONDUCTED IN THE FIELD

Sample date: 12/02/91
 Depth to water: 27.92 ft (8.51 m) below TOC
 Water elevation: 270.08 ft (82.32 m) msl
 Sp. conductance: 181 µS/cm
 Water evacuated before sampling: 9 gal
 The well went dry during purging.

Time: 12:35
 pH: 4.9
 Alkalinity: 0 mg/L
 Water temperature: 23.3°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	5.0	pH	0	GE
		Specific conductance	170	µS/cm	0	GE
		Turbidity	3.6	NTU	0	GE
		Arsenic	< 2.0	µg/L	0	GE
		Barium	14	µg/L	0	GE
		Cadmium	< 2.0	µg/L	0	GE
		Calcium	515	µg/L	0	GE

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

WELL HAC 3 collected on 12/02/91, laboratory analyses (cont.)

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
		Chloride	10,000	µg/L	0	GE
		Chromium	<4.0	µg/L	0	GE
		2,4-Dichlorophenoxyacetic acid	<0.30	µg/L	0	GE
•		Endrin	<0.0060	µg/L	0	GE
		Fluoride	<100	µg/L	0	GE
		Iron	429	µg/L	2	GE
		Lead	6.8	µg/L	0	GE
•		Lindane	<0.0050	µg/L	0	GE
		Magnesium	458	µg/L	0	GE
		Manganese	86	µg/L	2	GE
		Mercury	0.38	µg/L	0	GE
•		Methoxychlor	<0.50	µg/L	0	GE
		Nitrate as nitrogen	1,570	µg/L	0	GE
		Phenols	<5.0	µg/L	0	GE
		Potassium	<500	µg/L	0	GE
		Selenium	<2.0	µg/L	0	GE
		Silica	6,450	µg/L	0	GE
		Silver	<2.0	µg/L	0	GE
		Sodium	35,400	µg/L	0	GE
		Sulfate	72,000	µg/L	0	GE
		Sulfate	69,400	µg/L	0	GE
		Total dissolved solids	93,000	µg/L	0	GE
		Total organic carbon	<1,000	µg/L	0	GE
		Total organic halogens	7.7	µg/L	0	GE
		Total phosphates (as P)	<50	µg/L	0	GE
•		Toxaphene	<0.24	µg/L	0	GE
		2,4,5-TP (Silvex)	<0.090	µg/L	0	GE
		Gross alpha	<2.0E+00	pCi/L	0	GE
		Nonvolatile beta	2.6E+00 ± 1.9E+00	pCi/L	0	GE
		Total radium	1.3E+00 ± 1.1E+00	pCi/L	0	GE
■		Tritium	3.3E+01 ± 1.1E+00	pCi/mL	2	GE

WELL HAC 4

<u>SRS Coord.</u>	<u>Lat/Longitude</u>	<u>Screen Zone Elevation</u>	<u>Top of Casing</u>	<u>Casing</u>	<u>Formation</u>
N72120.3	33.285416 °N	274.1-254.1 ft msl	296.9 ft msl	4" PVC	Water Table
E61372.0	81.645287 °W				

MEASUREMENTS CONDUCTED IN THE FIELD

Sample date: 12/02/91
 Depth to water: 26.34 ft (8.03 m) below TOC
 Water elevation: 270.56 ft (82.47 m) msl
 Sp. conductance: 45 µS/cm
 Water evacuated before sampling: 43 gal

Time: 12:10
 pH: 4.6
 Alkalinity: 0 mg/L
 Water temperature: 22.8°C

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

LABORATORY ANALYSES for WELL HAC 4

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
•		pH	6.7	pH	0	GE
•		pH	6.7	pH	0	GE
•		pH	6.9	pH	0	GE
•		pH	6.9	pH	0	GE
		Specific conductance	40	µS/cm	0	GE
		Specific conductance	40	µS/cm	0	GE
		Specific conductance	40	µS/cm	0	GE
		Specific conductance	40	µS/cm	0	GE
		Turbidity	0.34	NTU	0	GE
		Acenaphthene	< 10	µg/L	0	GE
		Acenaphthylene	< 10	µg/L	0	GE
		Aldrin	< 10	µg/L	0	GE
		Aluminum	152	µg/L	1	GE
		Anthracene	< 10	µg/L	0	GE
		Antimony	< 2.0	µg/L	0	GE
		Arsenic	< 2.0	µg/L	0	GE
		Barium	12	µg/L	0	GE
		Benzene	< 1.0	µg/L	0	GE
		alpha-Benzene hexachloride	< 10	µg/L	0	GE
		beta-Benzene hexachloride	< 10	µg/L	0	GE
		delta-Benzene hexachloride	< 10	µg/L	0	GE
		Benzidine	< 10	µg/L	0	GE
		Benzo[a]anthracene	< 10	µg/L	0	GE
		Benzo[a]pyrene	< 10	µg/L	0	GE
		Benzo[b]fluoranthene	< 10	µg/L	0	GE
		Benzo[g,h,i]perylene	< 10	µg/L	0	GE
		Benzo[k]fluoranthene	< 10	µg/L	0	GE
		Beryllium	< 3.0	µg/L	0	GE
		Bis(2-chloroethoxy) methane	< 10	µg/L	0	GE
		Bis(2-chloroethyl) ether	< 10	µg/L	0	GE
		Bis(2-chloroisopropyl) ether	< 10	µg/L	0	GE
		Bis(2-ethylhexyl) phthalate	< 10	µg/L	0	GE
		Bromide	< 1,000	µg/L	0	GE
		Bromodichloromethane	< 1.0	µg/L	0	GE
		Bromoform	< 1.0	µg/L	0	GE
		Bromomethane (Methyl bromide)	< 1.0	µg/L	0	GE
		4-Bromophenyl phenyl ether	< 10	µg/L	0	GE
		Butylbenzyl phthalate	< 10	µg/L	0	GE
		Cadmium	< 2.0	µg/L	0	GE
		Calcium	91	µg/L	0	GE
		Carbon tetrachloride	< 1.0	µg/L	0	GE
		Chlordane	< 10	µg/L	0	GE
		Chloride	4,360	µg/L	0	GE
•		para-Chloro-meta-cresol	< 10	µg/L	0	GE
		Chlorobenzene	< 1.0	µg/L	0	GE
		Chloroethane	< 1.0	µg/L	0	GE
		Chloroethene (Vinyl chloride)	< 1.0	µg/L	0	GE
		2-Chloroethyl vinyl ether	< 1.0	µg/L	0	GE
		Chloroform	< 1.0	µg/L	0	GE
		Chloromethane (Methyl chloride)	< 1.0	µg/L	0	GE
		2-Chloronaphthalene	< 10	µg/L	0	GE
•		2-Chlorophenol	< 10	µg/L	0	GE
		4-Chlorophenyl phenyl ether	< 10	µg/L	0	GE

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WELL HAC 4 collected on 12/02/91, laboratory analyses (cont.)

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
		Chromium	<4.0	µg/L	0	GE
		Chrysene	<10	µg/L	0	GE
		Cobalt	<4.0	µg/L	0	GE
		Copper	10	µg/L	0	GE
		Cyanide	<5.0	µg/L	0	GE
		p,p'-DDD	<10	µg/L	0	GE
		p,p'-DDE	<10	µg/L	0	GE
		p,p'-DDT	<10	µg/L	0	GE
		Di-n-butyl phthalate	<10	µg/L	0	GE
		Di-n-octyl phthalate	<10	µg/L	0	GE
		Dibenz[a,h]anthracene	<10	µg/L	0	GE
		Dibromochloromethane	<1.0	µg/L	0	GE
		3,3'-Dichlorobenzidine	<10	µg/L	0	GE
		1,1-Dichloroethane	<1.0	µg/L	0	GE
		1,2-Dichloroethane	<1.0	µg/L	0	GE
		1,1-Dichloroethylene	<1.0	µg/L	0	GE
		trans-1,2-Dichloroethylene	<1.0	µg/L	0	GE
		Dichloromethane (Methylene chloride)	3.5	µg/L	0	GE
•		2,4-Dichlorophenol	<10	µg/L	0	GE
		2,4-Dichlorophenoxyacetic acid	<0.30	µg/L	0	GE
		1,2-Dichloropropane	<1.0	µg/L	0	GE
		trans-1,3-Dichloropropene	<1.0	µg/L	0	GE
		cis-1,3-Dichloropropene	<1.0	µg/L	0	GE
		Dieldrin	<10	µg/L	0	GE
		Diethyl phthalate	<10	µg/L	0	GE
•		2,4-Dimethyl phenol	<10	µg/L	0	GE
		Dimethyl phthalate	<10	µg/L	0	GE
•		2,4-Dinitrophenol	<45	µg/L	0	GE
		2,4-Dinitrotoluene	<10	µg/L	0	GE
		2,6-Dinitrotoluene	<10	µg/L	0	GE
		1,2-Diphenylhydrazine	<10	µg/L	0	GE
		Endosulfan I	<10	µg/L	0	GE
		Endosulfan II	<10	µg/L	0	GE
		Endosulfan sulfate	<10	µg/L	0	GE
		Endrin	<10	µg/L	0	GE
		Endrin aldehyde	<10	µg/L	0	GE
		Ethylbenzene	<1.0	µg/L	0	GE
		Fluoranthene	<10	µg/L	0	GE
		Fluorene	<10	µg/L	0	GE
		Fluoride	<100	µg/L	0	GE
		Heptachlor	<10	µg/L	0	GE
		Heptachlor epoxide	<10	µg/L	0	GE
		Hexachlorobenzene	<10	µg/L	0	GE
		Hexachlorobutadiene	<10	µg/L	0	GE
		Hexachlorocyclopentadiene	<10	µg/L	0	GE
		Hexachloroethane	<10	µg/L	0	GE
		Indeno[1,2,3-c,d]pyrene	<10	µg/L	0	GE
		Iron	27	µg/L	0	GE
		Isophorone	<10	µg/L	0	GE
		Lead	7.6	µg/L	1	GE
		Lindane	<10	µg/L	0	GE
		Magnesium	290	µg/L	0	GE
		Manganese	45	µg/L	1	GE

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WELL HAC 4 collected on 12/02/91, 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	0.47	µg/L	0	GE
		Methoxychlor	<0.50	µg/L	0	GE
•		2-Methyl-4,6-dinitrophenol	<10	µg/L	0	GE
		N-Nitrosodi-propylamine	<10	µg/L	0	GE
		N-Nitrosodimethylamine	<10	µg/L	0	GE
		N-Nitrosodiphenylamine	<10	µg/L	0	GE
		Naphthalene	<10	µg/L	0	GE
		Nickel	<4.0	µg/L	0	GE
		Nitrate as nitrogen	2,080	µg/L	0	GE
		Nitrobenzene	<10	µg/L	0	GE
•		2-Nitrophenol	<10	µg/L	0	GE
•		4-Nitrophenol	<10	µg/L	0	GE
		PCB 1016	<150	µg/L	0	GE
		PCB 1221	<150	µg/L	0	GE
		PCB 1232	<150	µg/L	0	GE
		PCB 1242	<150	µg/L	0	GE
		PCB 1248	<150	µg/L	0	GE
		PCB 1254	<150	µg/L	0	GE
		PCB 1260	<150	µg/L	0	GE
•		Pentachlorophenol	<10	µg/L	0	GE
		Phenanthrene	<10	µg/L	0	GE
•		Phenol	<10	µg/L	0	GE
		Phenols	<5.0	µg/L	0	GE
		Potassium	<500	µg/L	0	GE
		Pyrene	<10	µg/L	0	GE
		Selenium	<2.0	µg/L	0	GE
		Silica	5,940	µg/L	0	GE
		Silver	<2.0	µg/L	0	GE
		Sodium	5,100	µg/L	0	GE
		Sulfate	4,280	µg/L	0	GE
		1,1,2,2-Tetrachloroethane	<1.0	µg/L	0	GE
		Tetrachloroethylene	<1.0	µg/L	0	GE
		Thallium	<2.0	µg/L	0	GE
		Toluene	<1.0	µg/L	0	GE
		Total dissolved solids	11,000	µg/L	0	GE
		Total organic carbon	<1,000	µg/L	0	GE
		Total organic carbon	<1,000	µg/L	0	GE
		Total organic carbon	<1,000	µg/L	0	GE
		Total organic carbon	<1,000	µg/L	0	GE
		Total organic halogens	6.2	µg/L	0	GE
		Total organic halogens	11	µg/L	0	GE
		Total organic halogens	12	µg/L	0	GE
		Total organic halogens	14	µg/L	0	GE
		Total phosphates (as P)	<50	µg/L	0	GE
		Toxaphene	<10	µg/L	0	GE
		2,4,5-TP (Silvex)	<0.090	µg/L	0	GE
		1,2,4-Trichlorobenzene	<10	µg/L	0	GE
		1,1,1-Trichloroethane	<1.0	µg/L	0	GE
		1,1,2-Trichloroethane	<1.0	µg/L	0	GE
		Trichloroethylene	<1.0	µg/L	0	GE
		Trichlorofluoromethane	<1.0	µg/L	0	GE
•		2,4,6-Trichlorophenol	<10	µg/L	0	GE
		Zinc	8.0	µg/L	0	GE

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WELL HAC 4 collected on 12/02/91, laboratory analyses (cont.)

<u>H</u>	<u>D</u>	<u>Analyte</u>	<u>Result</u>	<u>Unit</u>	<u>Flag</u>	<u>Lab</u>
		Gross alpha	4.4E+00 ± 1.6E+00	pCi/L	0	GE
		Nonvolatile beta	<2.0E+00	pCi/L	0	GE
		Total radium	<1.0E+00	pCi/L	0	GE
	■	Tritium	3.0E+01 ± 1.1E+00	pCi/mL	2	GE

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

END

**DATE
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