Quarterly Sampling of the Wetlands Along the Old F-Area Effluent Ditch: March 1994^(U)

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Executive Summary

In March 1994, well point water and near surface water samples (i.e. bucket samples) were collected to further characterize tritium and volatile organic compounds (VOC) in the wetlands along the old F-Area effluent ditch south of 643-E (old burial ground). Groundwater flow paths suggest that compounds detected in water table wells around 643-E would migrate towards the old F-Area effluent ditch and Fourmile Branch. Recent analytical results from near surface water sampling in the wetlands that comprise the old F-Area effluent ditch have shown that tritium and small quantities of VOCs are outcropping in the area. For this study, samples were collected at seven locations along the old F-Area effluent ditch. Well point samples were collected from all locations and near surface water samples were collected at four locations.

Results of the March 1994 sampling event further support findings that tritium and volatile organic compounds originating from 643-E are outcropping in the wetlands near the old F-Area effluent ditch.

Six different analytes were detected in the well points at least once at concentrations greater than the method detection limit. These analytes included 1,2-dichloroethylene, acetone, methyl ethyl ketone, tetrachloroethylene, trichloroethylene, and tritium. Of the six analytes, 1,2-dichloroethylene, tetrachloroethylene, trichloroethylene, and tritium were detected at levels above the Primary Drinking Water Standards (PDWS; EPA, 1991) or the Maximum Contaminant Levels (MCL; EPA, 1993a and b) list.

Four analytes, 1,2-dichloroethylene, trichloroethylene, tritium, and vinyl chloride, were detected in the buckets, at least once at concentrations greater than the method detection limit. Each analyte was detected at least once at concentrations above the PDWS or the MCL.

A secondary objective of this project was to compare VOC concentrations between the well points installed to depths of 6 to 8 ft and the near surface water sampling devices (buckets) installed to depths of 1 to 2 ft. Based on differences in tritium concentrations at each location, it was determined that the sampling devices intercepted different groundwater flow paths. This negated direct comparison of analytical results between devices. However, when VOC concentrations measured at each well point and bucket location were normalized, based on the percent differences observed in tritium concentrations at that location, resulting well point and bucket VOC concentrations were comparable in most cases. These results suggest that volatilization losses of VOCs from the buckets were negligible.

The information in this report was developed during the course of work under Contract No. DE-AC09-89SR18035 with the U. S. Department of Energy.

Introduction

The Radioactive Waste Burial Grounds are central waste storage sites used for disposing of onsite and offsite radioactive and nonradioactive wastes (Jaegge et al., 1985). The burial grounds are divided into three areas: Building 643-E (old burial ground), which received wastes from 1952 through 1972; Building 643-7E, which has been receiving wastes since 1969; and Building 643-28E which is a closure area within Building 643-7E and is termed the Mixed Waste Management Facility (MWMF) (Jaegge et al., 1985). The sampling zone along the old F-Area effluent ditch receives discharge from shallow groundwater flowing under the southwest corner of 643-E.

Detectable quantities of organic compounds have been measured in the groundwater beneath 643-E (Hoeffner et al., 1985; Hoeffner, 1984). Potential sources of the organic compounds in 643-E were identified as liquid scintillation wastes, spent solvents, decontamination reagents, and waste oils (Hoeffner et al., 1985) as well as decomposition of humic substances. Hoeffner et al. (1985) performed in-depth analysis of semi-volatile organics (using GC/MS) on ten wells in 643-E that consistently contained measurable amounts of total organic carbon. One other well included in the study was located in close proximity to 643-E near the site of previous decontamination operations. From these 11 wells, more than 50 organic compounds were detected. Detected aromatic volatile organic compounds included benzene, toluene, phenol, and naphthalene, among others. Hoeffner et al. (1985) indicated that the primary source of these four compounds was liquid scintillation wastes.

Many water table wells (BGO series, Group D) near 643-E are sampled quarterly as part of the SRS groundwater monitoring program. These wells are sampled for Resource Conservation and Recovery Act (RCRA), Appendix IX, analyses. Chlorinated VOCs are routinely detected in several water table wells, particularly in the southwest corner of 643-E. These compounds include 1,1-dichloroethane, 1,2-dichloroethene, 1,1-dichloroethylene, trans-1,2-dichloroethylene, tetrachloroethylene, trichloroethylene, and vinyl chloride (EMS, 1993). They either originate from or are biodegradation products of wastes buried in 643-E (i.e., organic degreasers). Tritium is also routinely detected in the wells and originates primarily from spent melt crucibles in 643-E.

Groundwater flow paths for Aquifer Zone IIB₂ (WSRC, 1991) suggest that compounds detected in the water table wells around 643-E would migrate towards the old F-Area effluent ditch and Fourmile Branch (FMB) (Figure 1). As the flow paths approach FMB, shallow groundwater outcrops into FMB and its wetlands including those along the old F-Area effluent ditch. Recent analytical results from near surface water sampling in the wetlands that comprise the old F-Area effluent ditch have shown that tritium and small quantities of volatile organic compounds (VOCs) are outcropping in the area. Detected organic compounds include toluene, total 1,2-dichloroethylene, vinyl chloride, and trichloroethylene (Dixon, 1993a and b). Based on the regional groundwater flow patterns for the water table aquifer in this area, it is believed that these constituents are migrating from beneath 643-E and outcropping into the wetlands. This hypothesis is further corroborated by tritium and conductivity results from the quarterly tritium survey (Dixon and Rogers, 1993a) conducted in the wetlands of FMB down gradient of the F- and H-Area seepage basins. Waste discharges influent into the F- and H-Area seepage basins, in which 643-E is located between, contained high levels of salt ions compared to waste stored in 643-E. Using a Spearman rank correlation, Dixon and Rogers (1993a) found a strong correlation between tritium activities and conductivity values at locations where wetland water was being influenced by the contaminant plumes migrating from the F- and H-Area seepage basins. However, conductivity values measured in the wetlands south of 643-E were at or near background, even at locations where tritium activities were in excess of 50,000 pCi/ml (Dixon and Rogers, 1993a); no correlation exists between tritium activities and conductivity values for this wetland. These results are consistent with previous studies (Haselow et al, 1990; Dixon and Rogers, 1993b) and suggest that tritium and VOC concentrations measured in the wetlands south of 643-E originate from wastes buried in 643-E.

The purpose of this study is to further characterize tritium and VOC outcrops in the wetlands south of 643-E along the old F-Area effluent ditch. This project differs from previous sampling events in that well points (less than 10 ft below the soil surface) are used to sample the shallow groundwater. In the past, a relatively simple near surface water sampling methodology has been employed to collect

samples from the wetlands. Using the near surface water sampling methodology, a small hole is excavated using a shovel at each sampling location. A five gallon plastic bucket with the sides cut out is then installed in the hole to a depth of about 1.5 ft. After installation, these buckets are covered with a plastic lid. Twenty-four hours later, after water has seeped into the buckets, the water samples are collected. This methodology, while simple, provides good analytical results for a wide range of parameters at a reasonable cost for many sampling locations. Using the well point sampling methodology, the shallow well points are installed to a depth of 6 to 8 ft and are completely sealed to

prevent VOCs from escaping. This should provide additional assurance that representative VOC samples are collected. As a secondary objective to characterizing VOC and tritium contamination in the wetlands, the two sampling methodologies will be compared to determine any differences. If it can be shown that the results from both methodologies are comparable, it may not be necessary to use the more expensive well point sampling methodology when VOCs are of interest on future projects of this type (i.e., either the near surface water or shallow well point samples may be used to evaluate outcropping VOC plumes).

Figure 1. Sampling Locations Along the Old F-Area Effluent Ditch. (All locations are prefixed by "FHB0").

Objectives

The objectives of this report are to:

- present the results of the March 1994 sampling event in the wetlands south of 643-E along the old F-Area effluent ditch
- compare, where possible, these results to related standards (Table 1)
- compare analytical results from well points and adjacent near surface water sampling (i.e. buckets) locations

Methods

The Environmental Sciences Section conducted the first round of well point volatile organic compounds (VOC) and tritium sampling in the wetlands at the old F-Area effluent ditch on March 5, 1994 and March 7, 1994. Analytical services for the referenced samples were obtained via task order under Contract AA01244N with Weston Analytics (WA). WA analyzed the samples for compounds on the Appendix IX Volatiles list. For split sample analyses, analytical services were arranged onsite through the Analytical Development Section (ADS) of the Savannah River Technology Center (SRTC). ADS analyzed the samples for compounds on the Target Compound List (volatile organics only) following Contract Laboratory Program (CLP) protocol. ADS performed a tentatively identified compounds (TIC) scan on each split sample. All samples were submitted to the Environmental Monitoring Section (EMS) for tritium analysis. A list of the constituents analyzed by each laboratory, along with the methods used and method detection limits, is given on Tables 2 and 3.

Sampling Locations

Samples were collected from seven locations in the wetlands along the old F-Area effluent ditch (Table 4 and Figure 1). Based on data from previous studies, locations exhibiting high tritium and volatile organic compound (VOC) concentrations were selected. Well point water samples were collected at all locations and bucket samples were collected at four locations. Bucket samples and well point samples share the same identification numbers, except the identification numbers for the bucket samples are suffixed with a "B". Background well point and bucket water samples were collected at two locations in wetlands along Upper Three Runs Creek.

A blind duplicate sample was collected at location FHB014 and submitted to WA and EMS as a quality assurance/quality control (QA/QC) sample. Split samples were collected at locations FHB013 and FHB018 and submitted

to ADS. One trip blank sample, QA2, was carried throughout all sampling activities. The trip blank consisted of two 40 ml vials of deionized water. The trip blank was carried to each sampling location, handled like the collected samples, and submitted to WA for analyses. A field blank, QA3, was collected at location FHB018. It consisted of two 40 ml vials filled with deionized water. At location FHB018, the caps were removed from the vials and the samples were exposed to the atmosphere during collection activities. The field blank was then submitted to WA for analyses.

Well Point Sample Collection

Well points were installed according to WSRC-3Q5 (Chapter 7) procedures at each sampling location in February 1994. The well points were constructed of a 2-inch diameter PVC TriLok material to depths ranging from approximately 6 to 8 ft below ground level. Each well point was screened over the bottom 2.5 ft with TriLok well screen (0.010 inch slot size). Figure 2 illustrates a schematic diagram of the well points. Boreholes were hand augured to depths ranging from approximately 6 to 8 ft or until unconsolidated material was reached. The well points were then inserted into the boreholes and driven to the final depth. After the well points were inserted into the boreholes, a plastic lid with a 2-inch diameter hole was slipped onto the casing to a depth of 6 to 8 inches below the soil surface. To create a surface seal, bentonite was placed on top of the lid and the bentonite was covered with soil from the surrounding area. No grout or filter pack material was used in the construction of the well points.

One-inch diameter, 12 VDC submersible pumps were installed in each well and connected to the well cap using stainless steel tubing and swagelok connections. Each well cap was fitted with connections to facilitate measuring water levels and making headspace measurements.

Well point samples were collected according to procedure ESSOP 2-115 (WSRC-L-14.1, 1993a). A brief description of the sampling procedure is described in this report; however, for a detailed discussion of the sampling procedure, ESSOP 2-115.

The day before sample collection began, a plastic cap was placed over the pump discharge tube and well vent to prevent the loss of VOCs to the atmosphere. Prior to sample collection, the VOC concentration in the headspace of the each well point was determined using a HNU photoionization detector (PID). The PID was an HNU model PI-101 equipped with a standard probe using a 10.2 eV lamp.

After making headspace measurements, water level measurements were taken to determine the volume of water contained within the well point. Once the volume of water in each well point was determined, pumping was started and the flowrate was determined. Attempts were made at each well point to purge two well volumes; however, seven out of nine well points pumped dried prior to purging two well volumes. In these cases, sample collection began when the well points recovered.

Conductivity and pH measurements were taken initially at the start of purging, and subsequently thereafter, for at least three sets of measurements until successive readings differed by less than ten percent. When three sets of successive measurements were within ten percent, stabilization requirements had been met and sample collection began. In cases where well points pumped dry, initial conductivity and pH measurements were taken and sample collection began when the well point recovered. All samples were obtained by collecting discharge directly from the pump. All containers were filled to the shoulder except VOC samples, which were completely filled such that no headspace remained. Total activity samples for shipping clearance were collected at each well point except at the background locations.

Near Surface Water Sample Collection

Near surface water samples (bucket samples) were collected according to procedure ESSOP 2-104 (WSRC-L-14.1, 1993d). A brief description of the sampling procedure is given described in this report; however, for a detailed discussion of the sampling procedure, ESSOP 2-104 should be reviewed.

Near surface water sampling locations were already established as part of a previous project. At each location, a hole was excavated (approximately 18 inches deep) using a decontaminated stainless steel shovel. A five-gallon plastic bucket screened on the sides and bottom was placed in the hole and covered with a lid. All buckets were bailed the day before sample collection began to ensure that a representative sample of the local shallow groundwater was being collected. Conductivity and pH measurements were taken at each bucket sampling location. All samples were collected by dipping the containers directly into the water in the bucket. VOC samples were completely filled such that no headspace remained. Other sample containers were filled to the shoulder.

Sample Processing

When the sample containers for a location were filled, they were stored in a cooler containing blue ice for transport to the processing area. At the processing area, the samples were stored at 4°C until they were packaged for shipment. Samples were packed and shipped according "Packaging Nonradioactive Water Samples for Offsite Shipment" and "Packaging Radioactive Water Samples for Offsite Shipment" (WSRC-3Q5, Ch.15) procedures. The particular procedure used was determined by the total activity results. Chain of custody procedures always followed the for all samples.

Data Validation

Weston Analytics (WA) and their subcontractors submitted hard copies and electronic data diskettes (EDD) containing the analytical data to ESS. The hard copies were considered the laboratory-validated data packages and consisted of a case narrative for each batch, the result of the analyses, and QA/QC information (i.e. spike recoveries). The EDDs consisted of one flat ASCII computer file for each laboratory batch. The data were formatted on the EDDs into the AN92 data format to provide the information in Appendix B. ADS and EMS submitted hard copies of the analytical data, which were manually entered into a spreadsheet and verified by ESS.

Each EDD file was uploaded onto an IBM mainframe computer at SRS. The files were then merged to create one file to accommodate data review and validation activities.

The names of the blind replicate samples were changed to the correct location number and marked as a replicate sample. Statistical Application Software (SAS) computer programs were run on each file to verify the data. The following data verification checks were made using the SAS programs:

- verifying the location names and sample dates
- identifying data entry errors (incorrect methods or units)
- verifying that samples were analyzed within hold times
- verifying that all result and analysis qualifiers were valid.

Any suspected data entry errors were documented and submitted to WA for verification or correction. Changes to the database were recorded in a logbook.

After all data entry errors were resolved, the data were downloaded into a spreadsheet, where they were screened to identify missing analyses and duplicate records. The

laboratory was notified of any data that were missing and responded by submitting an EDD for the analysis. Duplicate records were deleted from the database after the laboratory determined they had, in error, submitted the data twice.

The results from samples that were used as laboratory replicates were averaged when both analyses were above the detection limit. Data below the detection limit and data presented with result or analysis qualifiers were not averaged and are noted in the comprehensive data tables (Appendix A) by "NA". Data that were averaged are noted with an "A" in the "Averaged" column.

Other data validation checks included:

- verifying that all surrogates and spikes were within acceptable recovery ranges
- determining lab blanks with results above detection limits and verifying that these results were qualified accordingly.

Table 1. Primary Drinking Water Standard and Maximum Containment Levels Standards Used in Data Comparisons.

Analyte	Standard	Units	Source
1,1,1,2-Tetrachloroethane	NS ¹		
1,1,1-Trichloroethane	200	µg/L	EPA, 1993a
1,1,2,2-Tetrachloroethane	NS		
1,1,2-Trichloroethane	5	µg/L	EPA, 1993b
1,1-Dichloroethane	NS		
1,1-Dichloroethylene	7	µg/L	EPA, 1993a
1,2,3-Trichloropropane	NS		
1,2-Dibromo-3-chloropropane	0.2	µg/L	EPA, 1993a
1,2-Dibromoethane	NS		
1,2-Dichloroethane	5	µg/L	EPA, 1993a
1,2-Dichloroethylene (total)	70 ²	µg/L	EPA, 1993a
1,2-Dichloropropane	5	µg/L	EPA, 1993a
2-Hexanone	NS		
4-Methyl-2-pentanone	NS		
Acetone	NS		
Acetonitrile (Methyl cyanide)	NS		
Acrolein	NS		
Acrylonitrile	NS		
Allyl chloride	NS		
Benzene	5	µg/L	EPA, 1993a
Bromodichloromethane	NS		
Bromoform	NS		
Carbon disulfide	NS		
Carbon tetrachloride	5	µg/L	EPA, 1993a
Chlorobenzene	100	µg/L	EPA, 1993a
Chloroethane	NS		
Chloroform	100	µg/L	EPA, 1991a
Chloroprene	NS		
cis-1,2-Dichloroethylene	70	µg/L	EPA, 1993a
cis-1,3-Dichloropropene	NS		
Dibromochloromethane	NS		
Dichlorodifluoromethane	NS		
Ethyl methacrylate	NS		
Ethylbenzene	700	µg/L	EPA, 1993a
Isobutyl alcohol	NS		
Methacrylonitrile	NS		
Methyl bromide	NS		
Methyl chloride	NS		
Methyl ethyl ketone	NS		
Methyl iodide	NS		
Methyl methacrylate	NS		
Methylene bromide	NS		
Methylene chloride	5	µg/L	EPA, 1993b
Pentachloroethane	NS		
Propionitrile	NS		
Styrene	100	µg/L	EPA, 1993a
Tetrachloroethylene	5	µg/L	EPA, 1993a
Toluene	1000	µg/L	EPA, 1993a

Table 1. Primary Drinking Water Standard and Maximum Containment Levels Standards Used in Data Comparisons. (Contd)

Analyte	Standard	Units	Source
trans-1,2-Dichloroethylene	100	µg/L	EPA, 1993a
trans-1,3-Dichloropropene	NS		
trans-1,4-Dichloro-2-butene	NS		
Trichloroethylene	5	µg/L	EPA, 1991a
Trichlorofluoromethane	NS		
Trichlorofluoromethane	NS		
Tritium	20	pCi/ml	EPA, 1993a
Vinyl acetate	NS		
Vinyl chloride	2	µg/L	EPA, 1993a
Xylenes (total)	10000	µg/L	EPA, 1993a

¹No standard

²MCL listed is for cis-1,2-dichloroethylene.

Table 2. Methods and Method Detection Limits for Weston Analytics.

Analyte	Lab	Method	MDL ¹	Units
1,1,1,2-Tetrachloroethane	WA	EPA8240	10	µg/L
1,1,1-Trichloroethane	WA	EPA8240	5	µg/L
1,1,2,2-Tetrachloroethane	WA	EPA8240	5	µg/L
1,1,2-Trichloroethane	WA	EPA8240	5	µg/L
1,1-Dichloroethane	WA	EPA8240	5	µg/L
1,1-Dichloroethylene	WA	EPA8240	5	µg/L
1,2 Dibromo-3-chloropropane	WA	EPA8240	20	µg/L
1,2 Dibromoethane	WA	EPA8240	20	µg/L
1,2,3-Trichloropropane	WA	EPA8240	10	µg/L
1,2-Dichloroethane	WA	EPA8240	5	µg/L
1,2-Dichloroethylene (total)	WA	EPA8240	5	µg/L
1,2-Dichloropropane	WA	EPA8240	5	µg/L
2-Hexanone	WA	EPA8240	10	µg/L
4-Methyl-2-pentanone	WA	EPA8240	10	µg/L
Acetone	WA	EPA8240	10	µg/L
Acetonitrile (Methyl cyanide)	WA	EPA8240	100	µg/L
Acetonitrile (Methyl cyanide)	WA	EPA8240	20	µg/L
Acrolein	WA	EPA8240	500	µg/L
Acrolein	WA	EPA8240	10	µg/L
Acrylonitrile	WA	EPA8240	100	µg/L
Acrylonitrile	WA	EPA8240	10	µg/L
Allyl chloride	WA	EPA8240	100	µg/L
Benzene	WA	EPA8240	5	µg/L
Bromodichloromethane	WA	EPA8240	5	µg/L
Bromoform	WA	EPA8240	5	µg/L
Carbon disulfide	WA	EPA8240	5	µg/L
Carbon tetrachloride	WA	EPA8240	5	µg/L
Chlorobenzene	WA	EPA8240	5	µg/L
Chloroethane	WA	EPA8240	10	µg/L
Chloroform	WA	EPA8240	5	µg/L
Chloroprene	WA	EPA8240	10	µg/L
Chloroprene	WA	EPA8240	20	µg/L
cis-1,3-Dichloropropene	WA	EPA8240	5	µg/L
Dibromochloromethane	WA	EPA8240	5	µg/L
Dichlorodifluoromethane	WA	EPA8240	20	µg/L
Dichlorodifluoromethane	WA	EPA8240	10	µg/L
Ethyl methacrylate	WA	EPA8240	20	µg/L
Ethylbenzene	WA	EPA8240	5	µg/L
Isobutyl alcohol	WA	EPA8240	2000	µg/L
Isobutyl alcohol	WA	EPA8240	20	µg/L
Methacrylonitrile	WA	EPA8240	20	µg/L
Methyl bromide	WA	EPA8240	10	µg/L
Methyl chloride	WA	EPA8240	10	µg/L
Methyl ethyl ketone	WA	EPA8240	10	µg/L
Methyl iodide	WA	EPA8240	10	µg/L
Methyl methacrylate	WA	EPA8240	20	µg/L
Methylene bromide	WA	EPA8240	20	µg/L
Methylene bromide	WA	EPA8240	10	µg/L
Methylene chloride	WA	EPA8240	5	µg/L

Table 2. Methods and Method Detection Limits for Weston Analytics. (Contd)

Analyte	Lab	Method	MDL ¹	Units
Pentachloroethane	WA	EPA8240	20	µg/L
Propionitrile	WA	EPA8240	50	µg/L
Styrene	WA	EPA8240	5	µg/L
Tetrachloroethylene	WA	EPA8240	5	µg/L
Toluene	WA	EPA8240	5	µg/L
trans-1,3-Dichloropropene	WA	EPA8240	5	µg/L
trans-1,4-Dichloro-2-butene	WA	EPA8240	20	µg/L
trans-1,4-Dichloro-2-butene	WA	EPA8240	100	µg/L
Trichloroethylene	WA	EPA8240	5	µg/L
Trichlorofluoromethane	WA	EPA8240	10	µg/L
Trichlorofluoromethane	WA	EPA8240	5	µg/L
Vinyl acetate	WA	EPA8240	10	µg/L
Vinyl chloride	WA	EPA8240	10	µg/L
Xylenes (total)	WA	EPA8240	5	µg/L

¹Method Detection Limit

Table 3. Methods and Method Detection Limits for Analytical Development Section and Environmental Monitoring Section.

Analyte	Lab	Method	MDL ¹	Units
1,1,1-Trichloroethane	ADS	ADS2656	10	µg/L
1,1,2,2-Tetrachloroethane	ADS	ADS2656	10	µg/L
1,1,2-Trichloroethane	ADS	ADS2656	10	µg/L
1,1-Dichloroethane	ADS	ADS2656	10	µg/L
1,1-Dichloroethene	ADS	ADS2656	10	µg/L
1,2-Dichloroethane	ADS	ADS2656	10	µg/L
1,2-Dichloropropane	ADS	ADS2656	10	µg/L
2-Hexanone	ADS	ADS2656	10	µg/L
4-Methyl-2-pentanone	ADS	ADS2656	10	µg/L
Acetone	ADS	ADS2656	10	µg/L
Benzene	ADS	ADS2656	10	µg/L
Bromodichloromethane	ADS	ADS2656	10	µg/L
Bromoform	ADS	ADS2656	10	µg/L
Carbon disulfide	ADS	ADS2656	10	µg/L
Carbon tetrachloride	ADS	ADS2656	10	µg/L
Chlorobenzene	ADS	ADS2656	10	µg/L
Chloroethane	ADS	ADS2656	10	µg/L
Chloroform	ADS	ADS2656	10	µg/L
cis-1,2-Dichloroethene	ADS	ADS2656	10	µg/L
cis-1,3-Dichloropropene	ADS	ADS2656	10	µg/L
Dibromochloromethane	ADS	ADS2656	10	µg/L
Ethylbenzene	ADS	ADS2656	10	µg/L
Methyl bromide	ADS	ADS2656	10	µg/L
Methyl chloride	ADS	ADS2656	10	µg/L
Methylene chloride	ADS	ADS2656	10	µg/L
Methyl ethyl ketone	ADS	ADS2656	10	µg/L
Styrene	ADS	ADS2656	10	µg/L
Tetrachloroethene	ADS	ADS2656	10	µg/L
Toluene	ADS	ADS2656	10	µg/L
trans-1,2-dichloroethene	ADS	ADS2656	10	µg/L
trans-1,3-dichloropropene	ADS	ADS2656	10	µg/L
Trichloroethene	ADS	ADS2656	10	µg/L
Tritium	EMS	EMS2760	1	pCi/ml
Vinyl acetate	ADS	ADS2656	10	µg/L
Vinyl chloride	ADS	ADS2656	10	µg/L
Xylenes (total)	ADS	ADS2656	10	µg/L

¹Method Detection Limit

Table 4. Well Point and Bucket Water Sampling Locations.

Sampling Locations	SRS Coordinates		Elevation ¹ (msl)
	North	East	
FHB013	73514	53840	211.2
FHB013B ²	73514	53840	211.2
FHB014	73571	53729	212.0
FHB014B	73571	53729	212.0
FHB016	73718	54032	217.4
FHB017	73672	53990	217.5
FHB018	73567	54024	214.4
FHB018B	73567	54024	214.4
FHB019	73489	53897	211.6
FHB020	73431	54011	212.4
FHB020B	73431	54011	212.4
BGS002	93839	87018	177.7
BGS002B	93839	87018	177.7
BGS003	94252	81794	178.6
BGS003B	94252	81794	178.6

¹Ground elevation above mean sea level (msl)

²Location identification numbers ending with the suffix "B" designates surface water sampling locations.

Figure 2. Schematic Diagram of Well Points.

Discussion

Analytical services were provided by several laboratories. Weston Analytics (WA) was used as the reference laboratory for volatile organic compound (VOC) analyses and SRTC's Environmental Monitoring Section (EMS) was used as the reference laboratory for tritium analyses. SRTC's Analytical Development Section analyzed split samples. Samples analyzed by WA and EMS were considered the reference samples on which all analyses and interpretations were based. Samples analyzed by ADS were considered the quality assurance samples and were not used in the analyses and interpretations. This should prevent inter-lab variability of constituent concentrations from biasing the analyses and interpretation. "

Analytical results for the March 1994 sampling event in the wetlands along the old F-Area effluent ditch south of 643-E (old burial ground) are presented in Appendix A. Location identification numbers ending with the "B" suffix designate bucket water sampling locations, whereas, all other identification numbers, excluding quality assurance samples, are well point locations. The results are presented in a format similar to that used in the quarterly groundwater monitoring reports issued by EMS (EMS, 1993). For each sampling location, the sampling date, field measurements, including water level elevation (well points only), pH, conductivity, etc., and all laboratory analyses, are presented (excluding lab blanks and standards). Included in the laboratory analysis tables for each location and analyte is the lab that performed the analyses, result or analytical modifiers, the analytical results, and standards (PDWS and MCL). The legend at the beginning of Appendix A explains the abbreviations and modifiers used to present the data. For locations where split samples were collected (well points FHB013 and FHB018), results from each lab are presented for each analyte. Laboratory duplicates were averaged with their corresponding reference samples, except in cases where the duplicate or reference analysis was reported at or below detection limit or in cases where results were qualified with a result or analysis qualifier.

In addition to the split samples, other standard quality assurance/quality control (QA/QC) samples were collected. These included a blind replicate sample collected at FHB014 (FHB014 R), a field blank sample collected at FHB018 (QA3), a trip blank sample carried throughout sampling activities (QA2), and a volatile trip blank shipped with the nonradioactive samples (FVA001). All samples deemed nonradioactive, as defined by Department of Transportation (DOT) regulations, were shipped in the

same shipping container on March 9, 1994. By the same definition, samples considered to be limited quantities of excepted radioactive material were shipped in the same shipping container on March 9, 1994. To minimize volume for the radioactive shipment, a volatile trip blank was not shipped with these samples.

Field Measurements

Conductivity and pH were measured at each well point and bucket location and the results are presented in Appendix A. Conductivity and pH results for well point and bucket locations are measurements taken as the samples were collected. Conductivity and pH measurements taken during well purging are given in the field data sheets. The pH of the well point and bucket locations ranged from 4.1 to 5.9 and 4.1 to 6.0, respectively. The average pH of the well point and bucket locations was 5.02 and 4.77, respectively. The conductivity of the well point and bucket locations ranged from 25 to 74 $\mu\text{S}/\text{cm}$ and 28 to 136 $\mu\text{S}/\text{cm}$, respectively. The pH values measured for the well point and bucket locations are comparable to the pH measured at the background locations, while conductivity values suggest some locations are being influenced by elevated ion concentrations. Conductivity and pH measurements for well points and buckets are within the range commonly observed in the water table wells around 643-E.

At each well point, the concentration of VOCs in the headspace was measured using a calibrated photoionization detector (PID; HNU model PI-101, 10.2 eV lamp). PID measurements at some locations were observed in excess of 20 ppmv while GC/MS analysis of the well point water yielded VOC concentrations well below those necessary to give such readings. For comparison purposes, calculations were made based on Henry's law constants to determine headspace VOC concentrations (ppmv) expected given the concentration of each VOC in the water of a particular well point. These calculations were made for selected well points exhibiting high VOC concentrations in the well point water. Calculations were made for each VOC detected in the water for a particular well point and resulting air concentrations were summed to give a total VOC concentration in the headspace of the well point. Results of the calculations and the PID results are shown in Table 5 and a sample calculation is shown in Appendix C. This comparison shows that the PID measurements are in

excess of the expected headspace VOC concentration for each well point. Therefore, the PID measurements were determined to be suspect.

Table 5. Comparison of Total VOC Concentration Measured in the Headspace of Selected Well Points to the Calculated VOC Concentration.

Location	Measured VOC (ppmv)	Calculated VOC (ppmv)
FHB013	22	3.12
FHB014	22	0.84
FHB017	32	2.17
FHB018	24	11.36
FHB019	24	1.46

PID measurements could have been influenced by improper calibration, organics originating from well point construction material, organics venting to the well from the vadose zone, and/or natural organics from the surrounding wetland area. Each case was considered and only one was plausible. Natural organic compounds originating from decaying organic matter in the wetlands surrounding the sampling locations could have influenced the PID measurements. In any event, it is extremely unlikely that the measured headspace VOC concentrations result from any chlorinated VOCs measured in the water at the well point locations. For future sampling events, air samples will be collected from each well point and analyzed using GC/MS to determine headspace VOC concentrations.

Comparison of Well and Bucket Sampling Locations to Established Standards

Since most of the analytical data from the well point and bucket sampling locations in the wetlands along the old F-Area effluent ditch were reported as below the limit of detection (LOD) and virtually all of the background data was reported as LOD, interpretation and analysis of the data are based completely on observed trends rather than statistical analyses. The small sample size and numerous data reported below LOD make statistical analysis of the data impractical. In the future, as data are combined from different sampling events, statistical analysis may be possible.

Six different analytes were detected at concentrations above the LOD for the well points (including background locations). These analytes were reported without any type of result or analysis qualifiers and represented 11 percent

of the analyses performed for each well point. Table 6 lists the detected analytes and the number of well points at which each analyte was detected.

Table 6. Analytes Detected at Well Point Locations.

Analyte	Number of Well Points	Number of Detects
1,2-Dichloroethylene (total)	9	5
Acetone	9	3
Methyl ethyl ketone	9	1
Tetrachloroethylene	9	2
Trichloroethylene	9	4
Tritium	9	8

Acetone was detected at three well point locations, one of which was a background location. Acetone is a common laboratory contaminant that is routinely detected in samples and method blanks. In this case, one result was flagged by the lab due to method blank contamination. Conversations with the lab confirmed that no qualifiers should have been reported with the results. However, results at the other two locations remain highly suspect, particularly since one of the locations was a background location. Results from future sampling events should provide conclusive evidence as to whether the reported concentrations are the result of lab contamination, as suspected.

Figures 3, 4, and 5 show maps of the 1,2-dichloroethylene (total), trichloroethylene, and tritium plumes as measured in the well points at the old F-Area effluent ditch. For each figure, symbol size for the analyte presented is linearly proportional to the concentration measured. These figures should give the reader a feel for the general location where each of these analytes were measured as well as the concentration of each analyte. The highest 1,2-dichloroethylene (total) and tritium concentrations (368 μL and 49,000 pCi/ml, respectively) were measured at well point FHB018, whereas the highest trichloroethylene concentration (32.4 $\mu\text{g/L}$) was measured at well point FHB013.

A list of analytes, along with the corresponding well point locations where concentrations were at levels greater than those established by the PDWS (EPA, 1991) or the MCL (EPA, 1993a and b), is given in Table 7. Four analytes were found to be above these standards at one or more well point locations. They included 1,2-dichloroethylene (total), tetrachloroethylene, trichloroethylene, and tritium.

Four different analytes were detected at concentrations above the LOD for the bucket locations (including background locations). These analytes were reported without

result or analysis qualifiers and represented approximately seven percent of the analyses performed for each bucket location. Table 8 lists the detected analytes and the number of buckets at which each analyte was detected.

A list of analytes, along with the corresponding bucket sampling locations where concentrations were at levels greater than those established by the PDWS or the MCL, is given in Table 9. Four analytes were above these standards at one or more well point locations. They included 1,2-dichloroethylene (total), trichloroethylene, tritium, and vinyl chloride.

Comparison of Well and Bucket Sampling Locations

As mentioned earlier, a secondary objective of this project is to compare analytical results from the well and bucket sampling methodologies to determine differences. Most compounds detected in the wells were also detected in the buckets. However, trichloroethylene was detected at FHB013, but not at FHB013B and methyl ethyl ketone was detected at FHB018 but not at FHB018B. Vinyl chloride was detected at FHB018B but not at FHB018.

Local flow lines in areas of shallow groundwater discharge can be complex. Therefore, it would not be uncommon for sampling locations in close proximity to intercept different flow lines and yield water with different chemical characteristics, as indicated in Figure 6. For this project, well points and buckets were within a few feet of each other, but installed at different depths. Figure 6 shows a schematic diagram of the water table flow lines near 643-E.

This figure clearly shows that well points and buckets (or near surface samplers) installed at different depths can intercept different groundwater flow paths and plume concentration zones. Since plume concentrations can vary substantially across different flow lines, direct comparison of the results obtained from the two sampling devices would be inappropriate.

Volatilization losses of tritium should be negligible and if the sampling devices intercept the same flow lines, tritium results should be comparable. Percent differences between tritium concentrations measured in the well points and those measured in the buckets are shown in Table 10. Observed differences are substantial for those locations where significant concentrations were measured. These differences suggest that the well points and buckets intercept different flow lines. As a result, differences would be expected and were observed between VOC concentrations measured in the well points and those measured in the buckets. However, when VOC concentrations measured at each well point and bucket location were normalized based on the percent differences observed in tritium concentrations at that location, resulting well point and bucket VOC concentrations were comparable in most cases. This suggests that volatilization losses of organic compounds from the buckets were negligible. For direct comparison of results in the future, it will be necessary to install well points and buckets to about the same depth to ensure that the devices intercept the same groundwater flow paths.

1,2-Dichloroethylene Plume at Old F-Area Effluent Ditch

Figure 3. 1,2-Dichloroethylene (total) Plume at the Old F-Area Effluent Ditch.

Figure 4. Trichloroethylene Plume at the Old F-Area Effluent Ditch.

Figure 5. Tritium Plume at the Old F-Area Effluent Ditch.

Figure 6. Schematic Diagram of Flow Lines near 643-E with the Seepage Line Intercept Enlarged to Show How Well Points and near Surface Samplers (buckets) Intercept Different Flow Lines and Plume Concentration Zones.

Table 7. Analytes and Corresponding Well Point Locations Where March 1994 Concentrations Exceeded the Primary Drinking Water Standard or Maximum Containment Levels.

Analyte	Lab	Result	Standard	Units	Location
1,2-Dichloroethylene (total)	WA	368	70	µg/L	FHB018
Tetrachloroethylene	WA	6	5	µg/L	FHB017
Tetrachloroethylene	WA	5.33	5	µg/L	FHB019
Trichloroethylene	WA	32.4	5	µg/L	FHB013
Trichloroethylene	WA	14.6	5	µg/L	FHB017
Trichloroethylene	WA	5.06	5	µg/L	FHB018
Trichloroethylene	WA	13.4	5	µg/L	FHB019
Tritium	EMS	23300	20	pCi/ml	FHB013
Tritium	EMS	1190	20	pCi/ml	FHB014
Tritium	EMS	1330	20	pCi/ml	FHB016
Tritium	EMS	38600	20	pCi/ml	FHB017
Tritium	EMS	49900	20	pCi/ml	FHB018
Tritium	EMS	20000	20	pCi/ml	FHB019
Tritium	EMS	22	20	pCi/ml	FHB020

Table 8. Analytes Detected at Bucket Locations.

Analyte	Number of Buckets	Number of Detects
1,2-Dichloroethylene (total)	6	3
Trichloroethylene	6	1
Tritium	6	5
Vinyl chloride	6	1

Table 9. Analytes and Corresponding Bucket Sampling Locations Where March 1994 Concentrations Exceeded the Primary Drinking Water Standard or Maximum Containment Levels.

Analyte	Lab	Result	Standard	Units	Location
1,2-Dichloroethylene (total)	WA	102	70	µg/L	FHB018B
Trichloroethylene	WA	5.36	5	µg/L	FHB018B
Tritium	EMS	6360	20	pCi/ml	FHB013B
Tritium	EMS	911	20	pCi/ml	FHB014B
Tritium	EMS	32800	20	pCi/ml	FHB018B
Tritium	EMS	25	20	pCi/ml	FHB020B
Vinyl chloride	WA	23	2	µg/L	FHB018B

Table 10. Comparison of Tritium Results from Well and Bucket Locations.

Location	Analyte	Result	Percent Difference ¹	Units
BGS003	Tritium	2	0	pCi/ml
BGS003B	Tritium	2		pCi/ml
FHB013	Tritium	23300	72.7	pCi/ml
FHB013B	Tritium	6360		pCi/ml
FHB014	Tritium	1190	23.4	pCi/ml
FHB014B	Tritium	911		pCi/ml
FHB018	Tritium	49900	34.3	pCi/ml
FHB018B	Tritium	32800		pCi/ml
FHB020	Tritium	22	-13.6	pCi/ml
FHB020B	Tritium	25		pCi/ml

¹Differences observed in tritium concentrations suggest that the wells and buckets intercept different groundwater flow paths.

Summary

Results of the March 1994 sampling event suggest that tritium and volatile organic compounds originating from 643-E are outcropping in the wetlands near the old F-Area effluent ditch. Samples collected from well point and bucket sampling locations contained measurable quantities of organics and tritium. These findings are expected because organics are routinely detected in water table wells in the vicinity of 643-E and shallow groundwater flowing beneath the southwest corner of 643-E outcrops in the wetlands along the old F-Area effluent ditch.

Six different analytes were detected in the well points at least once at concentrations greater than the method detection limit. These analytes included 1,2-dichloroethylene, acetone, methyl ethyl ketone, tetrachloroethylene, trichloroethylene, and tritium. Of these six analytes, four, 1,2-dichloroethylene, tetrachloroethylene, trichloroethylene, and tritium, were detected at levels above the PDWS or the MCL.

Four analytes, 1,2-dichloroethylene, trichloroethylene, tritium, and vinyl chloride, were detected in the buckets, at least once, at concentrations greater than the method detection limit. Each analyte was detected at least once at concentrations above the limits established by the PDWS or MCL.

An attempt was made to compare analytical results between well point and bucket sampling locations. Differences in tritium concentrations at each location indicated that the sampling devices, which were installed at different depths, intercepted different groundwater flow paths. This negated direct comparison of analytical results. However, results suggest that volatilization losses of VOCs from the buckets were negligible. In the future, well points and buckets should be installed to about the same depth for adequate comparisons of the two sampling methodologies.

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Appendix A
March 1994 Analytical Results

ANALYTICAL RESULTS

Analytical results from the March 1994 sampling event in the wetlands along the old F-Area effluent ditch are presented in this section. The analytical data for each location (well point and bucket) are presented in tabular format with the background samples presented first followed by the well point samples, bucket samples, and QA/QC samples. Locations ending with the suffix "B" designate bucket sampling locations.

For each sampling location, the results of all field measurements are presented including depth to water (well points only), water level elevation (well points only), pH, and specific conductance. This information is followed by all laboratory analyses for each location. For each analyte in the laboratory analyses tables, the following information is presented: the lab that performed the analysis, any result and analysis qualifiers, the analytical results, any appropriate standard for comparison, and the units in which the results are presented.

The following is a list of abbreviations used in the tables:

Lab	Laboratory performing analysis
Mod	Result or analysis qualifier
Rep	Replication sample (denoted by "R")
Avg	Average code
	"A" - reference sample averaged with lab duplicates for that sample
	"NA" - reference sample not averaged with lab duplicates for that sample
WA	Weston Analytics
ADS	Analytical Development Section
EMS	Environmental Monitoring Section

Result and Analysis Qualifiers

Result Qualifiers	
CODE	DESCRIPTION
(BLANK)	Data not remarked. Number should be interpreted exactly as reported.
J	The analytical result is an estimated quantity.
R	Rejected because of performance requirements in the sample or associated quality control analyses were not met. The analyte may or may not be present.
U	Material analyzed for but not detected. Value reported is the sample quantification limit.

Analysis Qualifiers	
CODE	DESCRIPTION
Q	Sample held beyond normal holding time. If holding time is exceeded by less than 30 days, used with "J". If holding time is exceeded by more than 30 days, used with "R".
V	Indicates the analyte was detected in both the sample and associated method blank.

BGS002

Field Measurements:

Sample Date: 3/05/94

Depth to Water: 4.86 ft below TOC

Water Level Elevation: 176.73 ft msl

pH: 4.06

Specific Conductance: 26 µS/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	µg/L
1,1,1-Trichloroethane	WA			U	5	200	µg/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	µg/L
1,1,2-Trichloroethane	WA			U	5	5	µg/L
1,1-Dichloroethane	WA			U	5	NS	µg/L
1,2,3-Trichloropropane	WA			U	10	NS	µg/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	µg/L
1,2-Dibromoethane	WA			U	20	NS	µg/L
1,2-Dichloroethane	WA			U	5	5	µg/L
1,2-Dichloroethylene (total)	WA			U	5	70	µg/L
1,2-Dichloropropane	WA			U	5	5	µg/L
2-Hexanone	WA			U	10	NS	µg/L
4-Methyl-2-pentanone	WA			U	10	NS	µg/L
Acetone	WA			U	10	NS	µg/L
Acetonitrile (Methyl cyanide)	WA			U	100	NS	µg/L
Acrolein	WA			U	500	NS	µg/L
Acrylonitrile	WA			U	100	NS	µg/L
Allyl chloride	WA			U	100	NS	µg/L
Benzene	WA			U	5	5	µg/L
Bromodichloromethane	WA			U	5	NS	µg/L
Bromoform	WA			U	5	NS	µg/L
Carbon disulfide	WA			U	5	NS	µg/L
Carbon tetrachloride	WA			U	5	5	µg/L
Chlorobenzene	WA			U	5	100	µg/L
Chloroethane	WA			U	10	NS	µg/L
Chloroform	WA			U	5	100	µg/L
Chloroprene	WA			U	10	NS	µg/L
cis-1,3-Dichloropropene	WA			U	5	NS	µg/L
Dibromochloromethane	WA			U	5	NS	µg/L
Dichlorodifluoromethane	WA			U	20	NS	µg/L
Ethyl methacrylate	WA			U	20	NS	µg/L
Ethylbenzene	WA			U	5	700	µg/L
Isobutyl alcohol	WA			U	2000	NS	µg/L
Methacrylonitrile	WA			U	20	NS	µg/L
Methyl bromide	WA			U	10	NS	µg/L
Methyl chloride	WA			U	10	NS	µg/L
Methyl ethyl ketone	WA			U	10	NS	µg/L
Methyl iodide	WA			U	10	NS	µg/L
Methyl methacrylate	WA			U	20	NS	µg/L
Methylene bromide	WA			U	20	NS	µg/L

BGS002 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Methylene chloride	WA			U	5	5	µg/L
Pentachloroethane	WA			U	20	NS	µg/L
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA			U	5	5	µg/L
Toluene	WA			U	5	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	20	NS	µg/L
Trichloroethylene	WA			U	5	5	µg/L
Trichlorofluoromethane	WA			U	10	NS	µg/L
Tritium	EMS			U	1	20	pCi/ml
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

BGS002B

Field Measurements:

Sample Date: 3/05/94

Depth to Water: NA

Water Level Elevation: NA

pH: 4.28

Specific Conductance: 28 µS/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	µg/L
1,1,1-Trichloroethane	WA			U	5	200	µg/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	µg/L
1,1,2-Trichloroethane	WA			U	5	5	µg/L
1,1-Dichloroethane	WA			U	5	NS	µg/L
1,2,3-Trichloropropane	WA			U	10	NS	µg/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	µg/L
1,2-Dibromoethane	WA			U	20	NS	µg/L
1,2-Dichloroethane	WA			U	5	5	µg/L
1,2-Dichloroethylene (total)	WA			U	5	70	µg/L
1,2-Dichloropropane	WA			U	5	5	µg/L
2-Hexanone	WA			U	10	NS	µg/L
4-Methyl-2-pentanone	WA			U	10	NS	µg/L
Acetone	WA			U	10	NS	µg/L
Acetonitrile (Methyl cyanide)	WA			U	100	NS	µg/L
Acrolein	WA			U	500	NS	µg/L
Acrylonitrile	WA			U	100	NS	µg/L
Allyl chloride	WA			U	100	NS	µg/L
Benzene	WA			U	5	5	µg/L
Bromodichloromethane	WA			U	5	NS	µg/L
Bromoform	WA			U	5	NS	µg/L
Carbon disulfide	WA			U	5	NS	µg/L
Carbon tetrachloride	WA			U	5	5	µg/L
Chlorobenzene	WA			U	5	100	µg/L
Chloroethane	WA			U	10	NS	µg/L
Chloroform	WA			U	5	100	µg/L
Chloroprene	WA			U	10	NS	µg/L
cis-1,3-Dichloropropene	WA			U	5	NS	µg/L
Dibromochloromethane	WA			U	5	NS	µg/L
Dichlorodifluoromethane	WA			U	20	NS	µg/L
Ethyl methacrylate	WA			U	20	NS	µg/L
Ethylbenzene	WA			U	5	700	µg/L
Isobutyl alcohol	WA			U	2000	NS	µg/L
Methacrylonitrile	WA			U	20	NS	µg/L
Methyl bromide	WA			U	10	NS	µg/L
Methyl chloride	WA			U	10	NS	µg/L
Methyl ethyl ketone	WA			U	10	NS	µg/L
Methyl iodide	WA			U	10	NS	µg/L
Methyl methacrylate	WA			U	20	NS	µg/L
Methylene bromide	WA			U	20	NS	µg/L

Quarterly Sampling of the Wetlands Along the Old F-Area Effluent Ditch: March 1994

BGS002B Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Methylene chloride	WA			U	5	5	µg/L
Pentachloroethane	WA			U	20	NS	µg/L
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA			J	2.77	5	µg/L
Toluene	WA			U	5	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	20	NS	µg/L
Trichloroethylene	WA			U	5	5	µg/L
Trichlorofluoromethane	WA			U	10	NS	µg/L
Tritium	EMS			U	1	20	pCi/ml
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

BGS003

Field Measurements:

Sample Date: 3/07/94

Depth to Water: 6.44 ft below TOC

Water Level Elevation: 174.19 ft msl

pH: 5.10

Specific Conductance: 30 μ S/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	μ g/L
1,1,1-Trichloroethane	WA			U	5	200	μ g/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	μ g/L
1,1,2-Trichloroethane	WA			U	5	5	μ g/L
1,1-Dichloroethane	WA			U	5	NS	μ g/L
1,2,3-Trichloropropane	WA			U	10	NS	μ g/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	μ g/L
1,2-Dibromoethane	WA			U	20	NS	μ g/L
1,2-Dichloroethane	WA			U	5	5	μ g/L
1,2-Dichloroethylene (total)	WA			U	5	70	μ g/L
1,2-Dichloropropane	WA			U	5	5	μ g/L
2-Hexanone	WA			U	10	NS	μ g/L
4-Methyl-2-pentanone	WA			U	10	NS	μ g/L
Acetone	WA				80.6	NS	μ g/L
Acetonitrile (Methyl cyanide)	WA			U	100	NS	μ g/L
Acrolein	WA			U	500	NS	μ g/L
Acrylonitrile	WA			U	100	NS	μ g/L
Allyl chloride	WA			U	100	NS	μ g/L
Benzene	WA			U	5	5	μ g/L
Bromodichloromethane	WA			U	5	NS	μ g/L
Bromoform	WA			U	5	NS	μ g/L
Carbon disulfide	WA			U	5	NS	μ g/L
Carbon tetrachloride	WA			U	5	5	μ g/L
Chlorobenzene	WA			U	5	100	μ g/L
Chloroethane	WA			U	10	NS	μ g/L
Chloroform	WA			U	5	100	μ g/L
Chloroprene	WA			U	10	NS	μ g/L
cis-1,3-Dichloropropene	WA			U	5	NS	μ g/L
Dibromochloromethane	WA			U	5	NS	μ g/L
Dichlorodifluoromethane	WA			U	20	NS	μ g/L
Ethyl methacrylate	WA			U	20	NS	μ g/L
Ethylbenzene	WA			U	5	700	μ g/L
Isobutyl alcohol	WA			U	2000	NS	μ g/L
Methacrylonitrile	WA			U	20	NS	μ g/L
Methyl bromide	WA			U	10	NS	μ g/L
Methyl chloride	WA			U	10	NS	μ g/L
Methyl ethyl ketone	WA			U	10	NS	μ g/L
Methyl iodide	WA			U	10	NS	μ g/L
Methyl methacrylate	WA			U	20	NS	μ g/L
Methylene bromide	WA			U	20	NS	μ g/L

Quarterly Sampling of the Wetlands Along the Old F-Area Effluent Ditch: March 1994

BGS003 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Methylene chloride	WA			U	5	5	µg/L
Pentachloroethane	WA			U	20	NS	µg/L
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA			U	5	5	µg/L
Toluene	WA			U	5	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	20	NS	µg/L
Trichloroethylene	WA			U	5	5	µg/L
Trichlorofluoromethane	WA			U	10	NS	µg/L
Tritium	EMS				2	20	pCi/ml
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

BGS003B

Field Measurements:

Sample Date: 3/05/94

Depth to Water: NA

Water Level Elevation: NA

pH: 4.12

Specific Conductance: 34 μ S/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	μ g/L
1,1,1-Trichloroethane	WA			U	5	200	μ g/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	μ g/L
1,1,2-Trichloroethane	WA			U	5	5	μ g/L
1,1-Dichloroethane	WA			U	5	NS	μ g/L
1,2,3-Trichloropropane	WA			U	10	NS	μ g/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	μ g/L
1,2-Dibromoethane	WA			U	20	NS	μ g/L
1,2-Dichloroethane	WA			U	5	5	μ g/L
1,2-Dichloroethylene (total)	WA			U	5	70	μ g/L
1,2-Dichloropropane	WA			U	5	5	μ g/L
2-Hexanone	WA			U	10	NS	μ g/L
4-Methyl-2-pentanone	WA			U	10	NS	μ g/L
Acetone	WA			U	10	NS	μ g/L
Acetonitrile (Methyl cyanide)	WA			U	100	NS	μ g/L
Acrolein	WA			U	500	NS	μ g/L
Acrylonitrile	WA			U	100	NS	μ g/L
Allyl chloride	WA			U	100	NS	μ g/L
Benzene	WA			U	5	5	μ g/L
Bromodichloromethane	WA			U	5	NS	μ g/L
Bromoform	WA			U	5	NS	μ g/L
Carbon disulfide	WA			U	5	NS	μ g/L
Carbon tetrachloride	WA			U	5	5	μ g/L
Chlorobenzene	WA			U	5	100	μ g/L
Chloroethane	WA			U	10	NS	μ g/L
Chloroform	WA			U	5	100	μ g/L
Chloroprene	WA			U	10	NS	μ g/L
cis-1,3-Dichloropropene	WA			U	5	NS	μ g/L
Dibromochloromethane	WA			U	5	NS	μ g/L
Dichlorodifluoromethane	WA			U	20	NS	μ g/L
Ethyl methacrylate	WA			U	20	NS	μ g/L
Ethylbenzene	WA			U	5	700	μ g/L
Isobutyl alcohol	WA			U	2000	NS	μ g/L
Methacrylonitrile	WA			U	20	NS	μ g/L
Methyl bromide	WA			U	10	NS	μ g/L
Methyl chloride	WA			U	10	NS	μ g/L
Methyl ethyl ketone	WA			U	10	NS	μ g/L
Methyl iodide	WA			U	10	NS	μ g/L
Methyl methacrylate	WA			U	20	NS	μ g/L
Methylene bromide	WA			U	20	NS	μ g/L

Quarterly Sampling of the Wetlands Along the Old F-Area Effluent Ditch: March 1994

BGS003B Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Methylene chloride	WA			U	5	5	µg/L
Pentachloroethane	WA			U	20	NS	µg/L
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA			U	5	5	µg/L
Toluene	WA			U	5	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	20	NS	µg/L
Trichloroethylene	WA			U	5	5	µg/L
Trichlorofluoromethane	WA			U	10	NS	µg/L
Tritium	EMS				2	20	pCi/ml
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

FHB013

Field Measurements:

Sample Date: 3/05/94

Depth to Water: 2.66 ft below TOC

Water Level Elevation: 210.94 ft msl

pH: 5.86

Specific Conductance: 74 μ S/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	μ g/L
1,1,1,2-Tetrachloroethane	WA		NA	U	10	NS	μ g/L
1,1,1,2-Tetrachloroethane	WA		NA	U	10	NS	μ g/L
1,1,1-Trichloroethane	WA			U	5	200	μ g/L
1,1,1-Trichloroethane	WA		NA	U	5	200	μ g/L
1,1,1-Trichloroethane	WA		NA	U	5	200	μ g/L
1,1,1-Trichloroethane	ADS			J	0	200	μ g/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	μ g/L
1,1,2,2-Tetrachloroethane	WA		NA	U	5	NS	μ g/L
1,1,2,2-Tetrachloroethane	WA		NA	U	5	NS	μ g/L
1,1,2,2-Tetrachloroethane	ADS			U	10	NS	μ g/L
1,1,2-Trichloroethane	WA			U	5	5	μ g/L
1,1,2-Trichloroethane	WA		NA	U	5	5	μ g/L
1,1,2-Trichloroethane	WA		NA	U	5	5	μ g/L
1,1,2-Trichloroethane	ADS			U	10	5	μ g/L
1,1-Dichloroethane	WA			J	0.998	NS	μ g/L
1,1-Dichloroethane	WA		NA	J	1.19	NS	μ g/L
1,1-Dichloroethane	WA		NA	J	1.1	NS	μ g/L
1,1-Dichloroethane	ADS			J	1	NS	μ g/L
1,1-Dichloroethylene	WA			U	5	7	μ g/L
1,1-Dichloroethylene	ADS			J	1	7	μ g/L
1,2,3-Trichloropropane	WA			U	10	NS	μ g/L
1,2,3-Trichloropropane	WA		NA	U	10	NS	μ g/L
1,2,3-Trichloropropane	WA		NA	U	10	NS	μ g/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	μ g/L
1,2-Dibromo-3-chloropropane	WA		NA	U	20	0.2	μ g/L
1,2-Dibromo-3-chloropropane	WA		NA	U	20	0.2	μ g/L
1,2-Dibromoethane	WA			U	20	NS	μ g/L
1,2-Dibromoethane	WA		NA	U	20	NS	μ g/L
1,2-Dibromoethane	WA		NA	U	20	NS	μ g/L
1,2-Dichloroethane	WA			U	5	5	μ g/L
1,2-Dichloroethane	WA		NA	U	5	5	μ g/L
1,2-Dichloroethane	WA		NA	U	5	5	μ g/L
1,2-Dichloroethane	ADS			U	10	5	μ g/L
1,2-Dichloroethylene (total)	WA	2	A		45.2	70	μ g/L
1,2-Dichloropropane	WA			U	5	5	μ g/L
1,2-Dichloropropane	WA		NA	U	5	5	μ g/L
1,2-Dichloropropane	WA		NA	U	5	5	μ g/L
1,2-Dichloropropane	ADS			U	10	5	μ g/L

Quarterly Sampling of the Wetlands Along the Old F-Area Effluent Ditch: March 1994

FHB013 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
2-Hexanone	WA			U	10	NS	µg/L
2-Hexanone	WA		NA	U	10	NS	µg/L
2-Hexanone	WA		NA	U	10	NS	µg/L
2-Hexanone	ADS			U	10	NS	µg/L
4-Methyl-2-pentanone	WA			U	10	NS	µg/L
4-Methyl-2-pentanone	WA		NA	U	10	NS	µg/L
4-Methyl-2-pentanone	WA		NA	U	10	NS	µg/L
4-Methyl-2-Pentanone	ADS			U	10	NS	µg/L
Acetone	WA			V	19.5	NS	µg/L
Acetone	WA		NA	V	24.7	NS	µg/L
Acetone	WA		NA	V	22.2	NS	µg/L
Acetone	ADS				43	NS	µg/L
Acetonitrile (Methyl cyanide)	WA			U	20	NS	µg/L
Acetonitrile (Methyl cyanide)	WA		NA	U	20	NS	µg/L
Acetonitrile (Methyl cyanide)	WA		NA	U	20	NS	µg/L
Acrolein	WA			U	10	NS	µg/L
Acrolein	WA		NA	U	10	NS	µg/L
Acrolein	WA		NA	U	10	NS	µg/L
Acrylonitrile	WA			U	10	NS	µg/L
Acrylonitrile	WA		NA	U	10	NS	µg/L
Acrylonitrile	WA		NA	U	10	NS	µg/L
Allyl chloride	WA			U	100	NS	µg/L
Allyl chloride	WA		NA	U	100	NS	µg/L
Allyl chloride	WA		NA	U	100	NS	µg/L
Benzene	WA			U	5	5	µg/L
Benzene	ADS			J	0	5	µg/L
Bromodichloromethane	WA			U	5	NS	µg/L
Bromodichloromethane	WA		NA	U	5	NS	µg/L
Bromodichloromethane	WA		NA	U	5	NS	µg/L
Bromodichloromethane	ADS			U	10	NS	µg/L
Bromoform	WA			U	5	NS	µg/L
Bromoform	WA		NA	U	5	NS	µg/L
Bromoform	WA		NA	U	5	NS	µg/L
Bromoform	ADS			U	10	NS	µg/L
Carbon disulfide	WA			U	5	NS	µg/L
Carbon disulfide	WA		NA	U	5	NS	µg/L
Carbon disulfide	WA		NA	U	5	NS	µg/L
Carbon disulfide	ADS			J	0	NS	µg/L
Carbon tetrachloride	WA			U	5	5	µg/L
Carbon tetrachloride	WA		NA	U	5	5	µg/L
Carbon tetrachloride	WA		NA	U	5	5	µg/L
Carbon tetrachloride	ADS			J	0	5	µg/L
Chlorobenzene	WA			U	5	100	µg/L
Chlorobenzene	ADS			U	10	100	µg/L
Chloroethane	WA			U	10	NS	µg/L
Chloroethane	WA		NA	U	10	NS	µg/L
Chloroethane	WA		NA	U	10	NS	µg/L
Chloroethane	ADS			U	10	NS	µg/L

FHB013 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Chloroform	WA			J	1.62	100	µg/L
Chloroform	WA		NA	J	1.68	100	µg/L
Chloroform	WA		NA	J	1.65	100	µg/L
Chloroform	ADS			J	2	100	µg/L
Chloroprene	WA			U	20	NS	µg/L
Chloroprene	WA		NA	U	20	NS	µg/L
Chloroprene	WA		NA	U	20	NS	µg/L
cis-1,2-Dichloroethylene	ADS				55	70	µg/L
cis-1,3-Dichloropropene	WA			U	5	NS	µg/L
cis-1,3-Dichloropropene	WA		NA	U	5	NS	µg/L
cis-1,3-Dichloropropene	WA		NA	U	5	NS	µg/L
cis-1,3-Dichloropropene	ADS			U	10	NS	µg/L
Dibromochloromethane	WA			U	5	NS	µg/L
Dibromochloromethane	WA		NA	U	5	NS	µg/L
Dibromochloromethane	WA		NA	U	5	NS	µg/L
Dibromochloromethane	ADS			U	10	NS	µg/L
Dichlorodifluoromethane	WA			J	1.16	NS	µg/L
Dichlorodifluoromethane	WA		NA	U	10	NS	µg/L
Dichlorodifluoromethane	WA		NA	J	1.48	NS	µg/L
Ethylbenzene	WA			J	1.07	700	µg/L
Ethylbenzene	WA		NA	J	1.15	700	µg/L
Ethylbenzene	WA		NA	J	1.09	700	µg/L
Ethylbenzene	ADS			J	1	700	µg/L
Isobutyl alcohol	WA			U	20	NS	µg/L
Isobutyl alcohol	WA		NA	U	20	NS	µg/L
Isobutyl alcohol	WA		NA	U	20	NS	µg/L
Methacrylonitrile	WA			U	20	NS	µg/L
Methacrylonitrile	WA		NA	U	20	NS	µg/L
Methacrylonitrile	WA		NA	U	20	NS	µg/L
Methyl bromide	WA			U	10	NS	µg/L
Methyl bromide	WA		NA	U	10	NS	µg/L
Methyl bromide	WA		NA	U	10	NS	µg/L
Methyl bromide	ADS			U	10	NS	µg/L
Methyl chloride	WA			U	10	NS	µg/L
Methyl chloride	WA		NA	U	10	NS	µg/L
Methyl chloride	WA		NA	U	10	NS	µg/L
Methyl chloride	ADS			U	10	NS	µg/L
Methyl ethyl ketone	WA			U	10	NS	µg/L
Methyl ethyl ketone	WA		NA	U	10	NS	µg/L
Methyl ethyl ketone	WA		NA	U	10	NS	µg/L
Methyl ethyl ketone	ADS			U	10	NS	µg/L
Methyl iodide	WA			U	10	NS	µg/L
Methyl iodide	WA		NA	U	10	NS	µg/L
Methyl iodide	WA		NA	U	10	NS	µg/L
Methylene bromide	WA			U	10	NS	µg/L
Methylene bromide	WA		NA	U	10	NS	µg/L
Methylene bromide	WA		NA	U	10	NS	µg/L

Quarterly Sampling of the Wetlands Along the Old F-Area Effluent Ditch: March 1994

FHB013 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Methylene chloride	WA			U	5	5	µg/L
Methylene chloride	WA		NA	J	1.05	5	µg/L
Methylene chloride	WA		NA	J	1.01	5	µg/L
Methylene chloride	ADS			J	1	5	µg/L
Propionitrile	WA			U	50	NS	µg/L
Propionitrile	WA		NA	U	50	NS	µg/L
Propionitrile	WA		NA	U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Styrene	WA		NA	U	5	100	µg/L
Styrene	WA		NA	U	5	100	µg/L
Styrene	ADS			U	10	100	µg/L
Tetrachloroethylene	WA				4.56	5	µg/L
Tetrachloroethylene	WA		NA	J	4.38	5	µg/L
Tetrachloroethylene	WA		NA	J	4.1	5	µg/L
Tetrachloroethylene	ADS			J	6	5	µg/L
Toluene	WA			J	4.59	1000	µg/L
Toluene	ADS			J	4	1000	µg/L
trans-1,2-Dichloroethylene	ADS			J	0	100	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,3-Dichloropropene	WA		NA	U	5	NS	µg/L
trans-1,3-Dichloropropene	WA		NA	U	5	NS	µg/L
trans-1,3-Dichloropropene	ADS			U	10	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	100	NS	µg/L
trans-1,4-Dichloro-2-butene	WA		NA	U	100	NS	µg/L
trans-1,4-Dichloro-2-butene	WA		NA	U	100	NS	µg/L
Trichloroethylene	WA				32.4	5	µg/L
Trichloroethylene	ADS				36	5	µg/L
Trichlorofluoromethane	WA			U	5	NS	µg/L
Trichlorofluoromethane	WA		NA	U	5	NS	µg/L
Trichlorofluoromethane	WA		NA	U	5	NS	µg/L
Tritium	EMS				23300	20	pCi/ml
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl acetate	WA		NA	U	10	NS	µg/L
Vinyl acetate	WA		NA	U	10	NS	µg/L
Vinyl Acetate	ADS			U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Vinyl chloride	WA		NA	U	10	2	µg/L
Vinyl chloride	WA		NA	U	10	2	µg/L
Vinyl Chloride	ADS			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L
Xylenes (total)	WA		NA	U	5	10000	µg/L
Xylenes (total)	WA		NA	U	5	10000	µg/L
Xylenes (total)	ADS			U	10	10000	µg/L

FHB013B

Field Measurements:

Sample Date: 3/05/94

Depth to Water: NA

Water Level Elevation: NA

pH: 4.71

Specific Conductance: 35 μ S/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	μ g/L
1,1,1-Trichloroethane	WA			U	5	200	μ g/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	μ g/L
1,1,2-Trichloroethane	WA			U	5	5	μ g/L
1,1-Dichloroethane	WA			U	5	NS	μ g/L
1,1-Dichloroethylene	WA			U	5	7	μ g/L
1,2,3-Trichloropropane	WA			U	10	NS	μ g/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	μ g/L
1,2-Dibromoethane	WA			U	20	NS	μ g/L
1,2-Dichloroethane	WA			U	5	5	μ g/L
1,2-Dichloroethylene (total)	WA				12.7	70	μ g/L
1,2-Dichloropropane	WA			U	5	5	μ g/L
2-Hexanone	WA			U	10	NS	μ g/L
4-Methyl-2-pentanone	WA			U	10	NS	μ g/L
Acetone	WA			U	10	NS	μ g/L
Acetonitrile (Methyl cyanide)	WA			U	20	NS	μ g/L
Acrolein	WA			U	10	NS	μ g/L
Acrylonitrile	WA			U	10	NS	μ g/L
Allyl chloride	WA			U	100	NS	μ g/L
Benzene	WA			U	5	5	μ g/L
Bromodichloromethane	WA			U	5	NS	μ g/L
Bromoform	WA			U	5	NS	μ g/L
Carbon disulfide	WA			U	5	NS	μ g/L
Carbon tetrachloride	WA			U	5	5	μ g/L
Chlorobenzene	WA			U	5	100	μ g/L
Chloroethane	WA			U	10	NS	μ g/L
Chloroform	WA			U	5	100	μ g/L
Chloroprene	WA			U	20	NS	μ g/L
cis-1,3-Dichloropropene	WA			U	5	NS	μ g/L
Dibromochloromethane	WA			U	5	NS	μ g/L
Dichlorodifluoromethane	WA			U	10	NS	μ g/L
Ethylbenzene	WA			U	5	700	μ g/L
Isobutyl alcohol	WA			U	20	NS	μ g/L
Methacrylonitrile	WA			U	20	NS	μ g/L
Methyl bromide	WA			U	10	NS	μ g/L
Methyl chloride	WA			U	10	NS	μ g/L
Methyl ethyl ketone	WA			U	10	NS	μ g/L
Methyl iodide	WA			U	10	NS	μ g/L
Methylene bromide	WA			U	10	NS	μ g/L
Methylene chloride	WA			U	5	5	μ g/L

Quarterly Sampling of the Wetlands Along the Old F-Area Effluent Ditch: March 1994

FHB013B Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA			U	5	5	µg/L
Toluene	WA			J	1.06	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	100	NS	µg/L
Trichloroethylene	WA			J	2.22	5	µg/L
Trichlorofluoromethane	WA			U	5	NS	µg/L
Tritium	EMS				6360	20	pCi/ml
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

FHB014

Field Measurements:

Sample Date: 3/05/94

Depth to Water: 3.29 ft below TOC

Water Level Elevation: 211.20 ft msl

pH: 5.09

Specific Conductance: 36 μ S/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	μ g/L
1,1,1,2-Tetrachloroethane	WA			U	10	NS	μ g/L
1,1,1-Trichloroethane	WA			U	5	200	μ g/L
1,1,1-Trichloroethane	WA	R		U	5	200	μ g/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	μ g/L
1,1,2,2-Tetrachloroethane	WA	R		U	5	NS	μ g/L
1,1,2-Trichloroethane	WA			U	5	5	μ g/L
1,1,2-Trichloroethane	WA	R		U	5	5	μ g/L
1,1-Dichloroethane	WA			U	5	NS	μ g/L
1,1-Dichloroethane	WA	R		U	5	NS	μ g/L
1,2,3-Trichloropropane	WA			U	10	NS	μ g/L
1,2,3-Trichloropropane	WA	R		U	10	NS	μ g/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	μ g/L
1,2-Dibromo-3-chloropropane	WA	R		U	20	0.2	μ g/L
1,2-Dibromoethane	WA			U	20	NS	μ g/L
1,2-Dibromoethane	WA	R		U	20	NS	μ g/L
1,2-Dichloroethane	WA			U	5	5	μ g/L
1,2-Dichloroethane	WA	R		U	5	5	μ g/L
1,2-Dichloroethylene (total)	WA				28	70	μ g/L
1,2-Dichloroethylene (total)	WA	R			30.8	70	μ g/L
1,2-Dichloropropane	WA			U	5	5	μ g/L
1,2-Dichloropropane	WA	R		U	5	5	μ g/L
2-Hexanone	WA			U	10	NS	μ g/L
2-Hexanone	WA	R		U	10	NS	μ g/L
4-Methyl-2-pentanone	WA			U	10	NS	μ g/L
4-Methyl-2-pentanone	WA	R		U	10	NS	μ g/L
Acetone	WA			U	10	NS	μ g/L
Acetone	WA	R		U	10	NS	μ g/L
Acetonitrile (Methyl cyanide)	WA			U	100	NS	μ g/L
Acetonitrile (Methyl cyanide)	WA	R		U	100	NS	μ g/L
Acrolein	WA			U	500	NS	μ g/L
Acrolein	WA	R		U	500	NS	μ g/L
Acrylonitrile	WA			U	100	NS	μ g/L
Acrylonitrile	WA	R		U	100	NS	μ g/L
Allyl chloride	WA			U	100	NS	μ g/L
Allyl chloride	WA	R		U	100	NS	μ g/L
Benzene	WA			U	5	5	μ g/L
Benzene	WA	R		U	5	5	μ g/L
Bromodichloromethane	WA			U	5	NS	μ g/L
Bromodichloromethane	WA	R		U	5	NS	μ g/L

FHB014 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Bromoform	WA			U	5	NS	µg/L
Bromoform	WA	R		U	5	NS	µg/L
Carbon disulfide	WA			U	5	NS	µg/L
Carbon disulfide	WA	R		U	5	NS	µg/L
Carbon tetrachloride	WA			U	5	5	µg/L
Carbon tetrachloride	WA	R		U	5	5	µg/L
Chlorobenzene	WA			U	5	100	µg/L
Chlorobenzene	WA	R		U	5	100	µg/L
Chloroethane	WA			U	10	NS	µg/L
Chloroethane	WA	R		U	10	NS	µg/L
Chloroform	WA			U	5	100	µg/L
Chloroform	WA	R		U	5	100	µg/L
Chloroprene	WA			U	10	NS	µg/L
Chloroprene	WA	R		U	10	NS	µg/L
cis-1,3-Dichloropropene	WA			U	5	NS	µg/L
cis-1,3-Dichloropropene	WA	R		U	5	NS	µg/L
Dibromochloromethane	WA			U	5	NS	µg/L
Dibromochloromethane	WA	R		U	5	NS	µg/L
Dichlorodifluoromethane	WA			U	20	NS	µg/L
Dichlorodifluoromethane	WA	R		U	20	NS	µg/L
Ethyl methacrylate	WA			U	20	NS	µg/L
Ethyl methacrylate	WA	R		U	20	NS	µg/L
Ethylbenzene	WA			U	5	700	µg/L
Ethylbenzene	WA	R		U	5	700	µg/L
Isobutyl alcohol	WA			U	2000	NS	µg/L
Isobutyl alcohol	WA	R		U	2000	NS	µg/L
Methacrylonitrile	WA			U	20	NS	µg/L
Methacrylonitrile	WA	R		U	20	NS	µg/L
Methyl bromide	WA			U	10	NS	µg/L
Methyl bromide	WA	R		U	10	NS	µg/L
Methyl chloride	WA			U	10	NS	µg/L
Methyl chloride	WA	R		U	10	NS	µg/L
Methyl ethyl ketone	WA			U	10	NS	µg/L
Methyl ethyl ketone	WA	R		U	10	NS	µg/L
Methyl iodide	WA			U	10	NS	µg/L
Methyl iodide	WA	R		U	10	NS	µg/L
Methyl methacrylate	WA			U	20	NS	µg/L
Methyl methacrylate	WA	R		U	20	NS	µg/L
Methylene bromide	WA			U	20	NS	µg/L
Methylene bromide	WA	R		U	20	NS	µg/L
Methylene chloride	WA			U	5	5	µg/L
Methylene chloride	WA	R		U	5	5	µg/L
Pentachloroethane	WA			U	20	NS	µg/L
Pentachloroethane	WA	R		U	20	NS	µg/L
Propionitrile	WA			U	50	NS	µg/L
Propionitrile	WA	R		U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Styrene	WA	R		U	5	100	µg/L

FHB014 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Tetrachloroethylene	WA			U	5	5	µg/L
Tetrachloroethylene	WA	R		U	5	5	µg/L
Toluene	WA			U	5	1000	µg/L
Toluene	WA	R		U	5	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,3-Dichloropropene	WA	R		U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	20	NS	µg/L
trans-1,4-Dichloro-2-butene	WA	R		U	20	NS	µg/L
Trichloroethylene	WA			U	5	5	µg/L
Trichloroethylene	WA	R		U	5	5	µg/L
Trichlorofluoromethane	WA			U	10	NS	µg/L
Trichlorofluoromethane	WA	R		U	10	NS	µg/L
Tritium	EMS				1190	20	pCi/ml
Tritium	EMS	R			1190	20	pCi/ml
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl acetate	WA	R		U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Vinyl chloride	WA	R		U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L
Xylenes (total)	WA	R		U	5	10000	µg/L

FHB014B

Field Measurements:

Sample Date: 3/05/94

Depth to Water: NA

Water Level Elevation: NA

pH: 4.64

Specific Conductance: 35 μ S/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	μ g/L
1,1,1-Trichloroethane	WA			U	5	200	μ g/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	μ g/L
1,1,2-Trichloroethane	WA			U	5	5	μ g/L
1,1-Dichloroethane	WA			U	5	NS	μ g/L
1,2,3-Trichloropropane	WA			U	10	NS	μ g/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	μ g/L
1,2-Dibromoethane	WA			U	20	NS	μ g/L
1,2-Dichloroethane	WA			U	5	5	μ g/L
1,2-Dichloroethylene (total)	WA				20.4	70	μ g/L
1,2-Dichloropropane	WA			U	5	5	μ g/L
2-Hexanone	WA			U	10	NS	μ g/L
4-Methyl-2-pentanone	WA			U	10	NS	μ g/L
Acetone	WA			U	10	NS	μ g/L
Acetonitrile (Methyl cyanide)	WA			U	100	NS	μ g/L
Acrolein	WA			U	500	NS	μ g/L
Acrylonitrile	WA			U	100	NS	μ g/L
Allyl chloride	WA			U	100	NS	μ g/L
Benzene	WA			U	5	5	μ g/L
Bromodichloromethane	WA			U	5	NS	μ g/L
Bromoform	WA			U	5	NS	μ g/L
Carbon disulfide	WA			U	5	NS	μ g/L
Carbon tetrachloride	WA			U	5	5	μ g/L
Chlorobenzene	WA			U	5	100	μ g/L
Chloroethane	WA			U	10	NS	μ g/L
Chloroform	WA			U	5	100	μ g/L
Chloroprene	WA			U	10	NS	μ g/L
cis-1,3-Dichloropropene	WA			U	5	NS	μ g/L
Dibromochloromethane	WA			U	5	NS	μ g/L
Dichlorodifluoromethane	WA			U	20	NS	μ g/L
Ethyl methacrylate	WA			U	20	NS	μ g/L
Ethylbenzene	WA			U	5	700	μ g/L
Isobutyl alcohol	WA			U	2000	NS	μ g/L
Methacrylonitrile	WA			U	20	NS	μ g/L
Methyl bromide	WA			U	10	NS	μ g/L
Methyl chloride	WA			U	10	NS	μ g/L
Methyl ethyl ketone	WA			U	10	NS	μ g/L
Methyl iodide	WA			U	10	NS	μ g/L
Methyl methacrylate	WA			U	20	NS	μ g/L
Methylene bromide	WA			U	20	NS	μ g/L

FHB014B Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Methylene chloride	WA			U	5	5	µg/L
Pentachloroethane	WA			U	20	NS	µg/L
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA			U	5	5	µg/L
Toluene	WA			U	5	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	20	NS	µg/L
Trichloroethylene	WA			U	5	5	µg/L
Trichlorofluoromethane	WA			U	10	NS	µg/L
Tritium	EMS				911	20	pCi/ml
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

FHB016

Field Measurements:

Sample Date: 3/05/94

Depth to Water: 4.60 ft below TOC

Water Level Elevation: 216.32 ft msl

pH: 5.09

Specific Conductance: 59 μ S/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA		NA	U	10	NS	μ g/L
1,1,1,2-Tetrachloroethane	WA		NA	U	10	NS	μ g/L
1,1,1,2-Tetrachloroethane	WA			U	10	NS	μ g/L
1,1,1-Trichloroethane	WA		NA	U	5	200	μ g/L
1,1,1-Trichloroethane	WA		NA	U	5	200	μ g/L
1,1,1-Trichloroethane	WA			U	5	200	μ g/L
1,1,2,2-Tetrachloroethane	WA		NA	U	5	NS	μ g/L
1,1,2,2-Tetrachloroethane	WA		NA	U	5	NS	μ g/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	μ g/L
1,1,2-Trichloroethane	WA		NA	U	5	5	μ g/L
1,1,2-Trichloroethane	WA		NA	U	5	5	μ g/L
1,1,2-Trichloroethane	WA			U	5	5	μ g/L
1,1-Dichloroethane	WA		NA	U	5	NS	μ g/L
1,1-Dichloroethane	WA		NA	U	5	NS	μ g/L
1,1-Dichloroethane	WA			U	5	NS	μ g/L
1,2,3-Trichloropropane	WA		NA	U	10	NS	μ g/L
1,2,3-Trichloropropane	WA		NA	U	10	NS	μ g/L
1,2,3-Trichloropropane	WA			U	10	NS	μ g/L
1,2-Dibromo-3-chloropropane	WA		NA	U	20	0.2	μ g/L
1,2-Dibromo-3-chloropropane	WA		NA	U	20	0.2	μ g/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	μ g/L
1,2-Dibromoethane	WA		NA	U	20	NS	μ g/L
1,2-Dibromoethane	WA		NA	U	20	NS	μ g/L
1,2-Dibromoethane	WA			U	20	NS	μ g/L
1,2-Dichloroethane	WA		NA	U	5	5	μ g/L
1,2-Dichloroethane	WA		NA	U	5	5	μ g/L
1,2-Dichloroethane	WA			U	5	5	μ g/L
1,2-Dichloroethylene (total)	WA		NA	J	3.91	70	μ g/L
1,2-Dichloroethylene (total)	WA		NA	J	3.75	70	μ g/L
1,2-Dichloroethylene (total)	WA			J	3.77	70	μ g/L
1,2-Dichloropropane	WA		NA	U	5	5	μ g/L
1,2-Dichloropropane	WA		NA	U	5	5	μ g/L
1,2-Dichloropropane	WA			U	5	5	μ g/L
2-Hexanone	WA		NA	U	10	NS	μ g/L
2-Hexanone	WA		NA	U	10	NS	μ g/L
2-Hexanone	WA			U	10	NS	μ g/L
4-Methyl-2-pentanone	WA		NA	U	10	NS	μ g/L
4-Methyl-2-pentanone	WA		NA	U	10	NS	μ g/L
4-Methyl-2-pentanone	WA			U	10	NS	μ g/L
Acetone	WA		A		109.3	NS	μ g/L

FHB016 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Acetonitrile (Methyl cyanide)	WA		NA	U	100	NS	µg/L
Acetonitrile (Methyl cyanide)	WA		NA	U	100	NS	µg/L
Acetonitrile (Methyl cyanide)	WA			U	100	NS	µg/L
Acrolein	WA		NA	U	500	NS	µg/L
Acrolein	WA		NA	U	500	NS	µg/L
Acrolein	WA			U	500	NS	µg/L
Acrylonitrile	WA		NA	U	100	NS	µg/L
Acrylonitrile	WA		NA	U	100	NS	µg/L
Acrylonitrile	WA			U	100	NS	µg/L
Allyl chloride	WA		NA	U	100	NS	µg/L
Allyl chloride	WA		NA	U	100	NS	µg/L
Allyl chloride	WA			U	100	NS	µg/L
Benzene	WA			U	5	5	µg/L
Bromodichloromethane	WA		NA	U	5	NS	µg/L
Bromodichloromethane	WA		NA	U	5	NS	µg/L
Bromodichloromethane	WA			U	5	NS	µg/L
Bromoform	WA		NA	U	5	NS	µg/L
Bromoform	WA		NA	U	5	NS	µg/L
Bromoform	WA			U	5	NS	µg/L
Carbon disulfide	WA		NA	U	5	NS	µg/L
Carbon disulfide	WA		NA	U	5	NS	µg/L
Carbon disulfide	WA			U	5	NS	µg/L
Carbon tetrachloride	WA		NA	U	5	5	µg/L
Carbon tetrachloride	WA		NA	U	5	5	µg/L
Carbon tetrachloride	WA			U	5	5	µg/L
Chlorobenzene	WA			U	5	100	µg/L
Chloroethane	WA		NA	U	10	NS	µg/L
Chloroethane	WA		NA	U	10	NS	µg/L
Chloroethane	WA			U	10	NS	µg/L
Chloroform	WA		NA	U	5	100	µg/L
Chloroform	WA		NA	U	5	100	µg/L
Chloroform	WA			U	5	100	µg/L
Chloroprene	WA		NA	U	10	NS	µg/L
Chloroprene	WA		NA	U	10	NS	µg/L
Chloroprene	WA			U	10	NS	µg/L
cis-1,3-Dichloropropene	WA		NA	U	5	NS	µg/L
cis-1,3-Dichloropropene	WA		NA	U	5	NS	µg/L
cis-1,3-Dichloropropene	WA			U	5	NS	µg/L
Dibromochloromethane	WA		NA	U	5	NS	µg/L
Dibromochloromethane	WA		NA	U	5	NS	µg/L
Dibromochloromethane	WA			U	5	NS	µg/L
Dichlorodifluoromethane	WA		NA	U	20	NS	µg/L
Dichlorodifluoromethane	WA		NA	U	20	NS	µg/L
Dichlorodifluoromethane	WA			U	20	NS	µg/L
Ethyl methacrylate	WA		NA	U	20	NS	µg/L
Ethyl methacrylate	WA		NA	U	20	NS	µg/L
Ethyl methacrylate	WA			U	20	NS	µg/L

FHB016 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Ethylbenzene	WA		NA	U	5	700	µg/L
Ethylbenzene	WA		NA	U	5	700	µg/L
Ethylbenzene	WA			U	5	700	µg/L
Isobutyl alcohol	WA		NA	U	2000	NS	µg/L
Isobutyl alcohol	WA		NA	U	2000	NS	µg/L
Isobutyl alcohol	WA			U	2000	NS	µg/L
Methacrylonitrile	WA		NA	U	20	NS	µg/L
Methacrylonitrile	WA		NA	U	20	NS	µg/L
Methacrylonitrile	WA			U	20	NS	µg/L
Methyl bromide	WA		NA	U	10	NS	µg/L
Methyl bromide	WA		NA	U	10	NS	µg/L
Methyl bromide	WA			U	10	NS	µg/L
Methyl chloride	WA		NA	U	10	NS	µg/L
Methyl chloride	WA		NA	U	10	NS	µg/L
Methyl chloride	WA			U	10	NS	µg/L
Methyl ethyl ketone	WA		NA	U	10	NS	µg/L
Methyl ethyl ketone	WA		NA	U	10	NS	µg/L
Methyl ethyl ketone	WA			U	10	NS	µg/L
Methyl iodide	WA		NA	U	10	NS	µg/L
Methyl iodide	WA		NA	U	10	NS	µg/L
Methyl iodide	WA			U	10	NS	µg/L
Methyl methacrylate	WA		NA	U	20	NS	µg/L
Methyl methacrylate	WA		NA	U	20	NS	µg/L
Methyl methacrylate	WA			U	20	NS	µg/L
Methylene bromide	WA		NA	U	20	NS	µg/L
Methylene bromide	WA		NA	U	20	NS	µg/L
Methylene bromide	WA			U	20	NS	µg/L
Methylene chloride	WA		NA	U	5	5	µg/L
Methylene chloride	WA		NA	U	5	5	µg/L
Methylene chloride	WA			U	5	5	µg/L
Pentachloroethane	WA		NA	U	20	NS	µg/L
Pentachloroethane	WA		NA	U	20	NS	µg/L
Pentachloroethane	WA			U	20	NS	µg/L
Propionitrile	WA		NA	U	50	NS	µg/L
Propionitrile	WA		NA	U	50	NS	µg/L
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA		NA	U	5	100	µg/L
Styrene	WA		NA	U	5	100	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA		NA	U	5	5	µg/L
Tetrachloroethylene	WA		NA	U	5	5	µg/L
Tetrachloroethylene	WA			U	5	5	µg/L
Toluene	WA			U	5	1000	µg/L
trans-1,3-Dichloropropene	WA		NA	U	5	NS	µg/L
trans-1,3-Dichloropropene	WA		NA	U	5	NS	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L

FHB016 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
trans-1,4-Dichloro-2-butene	WA		NA	U	20	NS	µg/L
trans-1,4-Dichloro-2-butene	WA		NA	U	20	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	20	NS	µg/L
Trichloroethylene	WA			U	5	5	µg/L
Trichlorofluoromethane	WA		NA	U	10	NS	µg/L
Trichlorofluoromethane	WA		NA	U	10	NS	µg/L
Trichlorofluoromethane	WA			U	10	NS	µg/L
Tritium	EMS				1330	20	pCi/ml
Vinyl acetate	WA		NA	U	10	NS	µg/L
Vinyl acetate	WA		NA	U	10	NS	µg/L
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA		NA	U	10	2	µg/L
Vinyl chloride	WA		NA	U	10	2	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Xylenes (total)	WA		NA	U	5	10000	µg/L
Xylenes (total)	WA		NA	U	5	10000	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

FHB017

Field Measurements:

Sample Date: 3/05/94

Depth to Water: 3.43 ft below TOC

Water Level Elevation: 215.92 ft msl

pH: 5.53

Specific Conductance: 52 μ S/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	μ g/L
1,1,1-Trichloroethane	WA			U	5	200	μ g/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	μ g/L
1,1,2-Trichloroethane	WA			U	5	5	μ g/L
1,1-Dichloroethane	WA			U	5	NS	μ g/L
1,1-Dichloroethylene	WA			U	5	7	μ g/L
1,2,3-Trichloropropane	WA			U	10	NS	μ g/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	μ g/L
1,2-Dibromoethane	WA			U	20	NS	μ g/L
1,2-Dichloroethane	WA			U	5	5	μ g/L
1,2-Dichloroethylene (total)	WA				45.7	70	μ g/L
1,2-Dichloropropane	WA			U	5	5	μ g/L
2-Hexanone	WA			U	10	NS	μ g/L
4-Methyl-2-pentanone	WA			U	10	NS	μ g/L
Acetone	WA			JV	8.86	NS	μ g/L
Acetonitrile (Methyl cyanide)	WA			U	20	NS	μ g/L
Acrolein	WA			U	10	NS	μ g/L
Acrylonitrile	WA			U	10	NS	μ g/L
Allyl chloride	WA			U	100	NS	μ g/L
Benzene	WA			U	5	5	μ g/L
Bromodichloromethane	WA			U	5	NS	μ g/L
Bromoform	WA			U	5	NS	μ g/L
Carbon disulfide	WA			U	5	NS	μ g/L
Carbon tetrachloride	WA			U	5	5	μ g/L
Chlorobenzene	WA			U	5	100	μ g/L
Chloroethane	WA			U	10	NS	μ g/L
Chloroform	WA			J	1.95	100	μ g/L
Chloroprene	WA			U	20	NS	μ g/L
cis-1,3-Dichloropropene	WA			U	5	NS	μ g/L
Dibromochloromethane	WA			U	5	NS	μ g/L
Dichlorodifluoromethane	WA			U	10	NS	μ g/L
Ethylbenzene	WA			U	5	700	μ g/L
Isobutyl alcohol	WA			U	20	NS	μ g/L
Methacrylonitrile	WA			U	20	NS	μ g/L
Methyl bromide	WA			U	10	NS	μ g/L
Methyl chloride	WA			U	10	NS	μ g/L
Methyl ethyl ketone	WA			U	10	NS	μ g/L
Methyl iodide	WA			U	10	NS	μ g/L
Methylene bromide	WA			U	10	NS	μ g/L
Methylene chloride	WA			U	5	5	μ g/L

FHB017 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA				6	5	µg/L
Toluene	WA			U	5	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	100	NS	µg/L
Trichloroethylene	WA				14.6	5	µg/L
Trichlorofluoromethane	WA			U	5	NS	µg/L
Tritium	EMS				38600	20	pCi/ml
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

FHB018

Field Measurements:

Sample Date: 3/05/94

Depth to Water: 4.28 ft below TOC

Water Level Elevation: 213.33 ft msl

pH: 5.45

Specific Conductance: 61 μ S/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	μ g/L
1,1,1-Trichloroethane	WA			U	5	200	μ g/L
1,1,1-Trichloroethane	ADS			J	1	200	μ g/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	μ g/L
1,1,2,2-Tetrachloroethane	ADS			U	10	NS	μ g/L
1,1,2-Trichloroethane	WA			U	5	5	μ g/L
1,1,2-Trichloroethane	ADS			U	10	5	μ g/L
1,1-Dichloroethane	ADS			J	2	NS	μ g/L
1,1-Dichloroethylene	WA			U	5	7	μ g/L
1,1-Dichloroethylene	ADS			J	2	7	μ g/L
1,2,3-Trichloropropane	WA			U	10	NS	μ g/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	μ g/L
1,2-Dibromoethane	WA			U	20	NS	μ g/L
1,2-Dichloroethane	WA			U	5	5	μ g/L
1,2-Dichloroethane	ADS			U	10	5	μ g/L
1,2-Dichloroethylene (total)	WA				368	70	μ g/L
1,2-Dichloropropane	WA			U	5	5	μ g/L
1,2-Dichloropropane	ADS			J	1	5	μ g/L
2-Hexanone	WA			U	10	NS	μ g/L
2-Hexanone	ADS			U	10	NS	μ g/L
4-Methyl-2-pentanone	WA			U	10	NS	μ g/L
4-Methyl-2-Pentanone	ADS			U	10	NS	μ g/L
Acetone	WA			U	10	NS	μ g/L
Acetone	ADS			U	10	NS	μ g/L
Acetonitrile (Methyl cyanide)	WA			U	20	NS	μ g/L
Acrolein	WA			U	10	NS	μ g/L
Acrylonitrile	WA			U	10	NS	μ g/L
Allyl chloride	WA			U	100	NS	μ g/L
Benzene	WA			U	5	5	μ g/L
Benzene	ADS			J	1	5	μ g/L
Bromodichloromethane	WA			U	5	NS	μ g/L
Bromodichloromethane	ADS			U	10	NS	μ g/L
Bromoform	WA			U	5	NS	μ g/L
Bromoform	ADS			U	10	NS	μ g/L
Carbon disulfide	WA			U	5	NS	μ g/L
Carbon disulfide	ADS			J	0	NS	μ g/L
Carbon tetrachloride	WA			U	5	5	μ g/L
Carbon tetrachloride	ADS			U	10	5	μ g/L
Chlorobenzene	WA			U	5	100	μ g/L
Chlorobenzene	ADS			U	10	100	μ g/L

FHB018 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Chloroethane	WA			U	10	NS	µg/L
Chloroethane	ADS			U	10	NS	µg/L
Chloroform	WA			U	5	100	µg/L
Chloroform	ADS			J	1	100	µg/L
Chloroprene	WA			U	20	NS	µg/L
cis-1,2-Dichloroethylene	ADS				405	70	µg/L
cis-1,3-Dichloropropene	WA			U	5	NS	µg/L
cis-1,3-Dichloropropene	ADS			U	10	NS	µg/L
Dibromochloromethane	WA			U	5	NS	µg/L
Dibromochloromethane	ADS			U	10	NS	µg/L
Dichlorodifluoromethane	WA			J	6.95	NS	µg/L
Ethylbenzene	WA			U	5	700	µg/L
Ethylbenzene	ADS			U	10	700	µg/L
Isobutyl alcohol	WA			U	20	NS	µg/L
Methacrylonitrile	WA			U	20	NS	µg/L
Methyl bromide	WA			U	10	NS	µg/L
Methyl bromide	ADS			U	10	NS	µg/L
Methyl chloride	WA			U	10	NS	µg/L
Methyl chloride	ADS			U	10	NS	µg/L
Methyl ethyl ketone	WA				13.1	NS	µg/L
Methyl ethyl ketone	ADS			U	10	NS	µg/L
Methyl iodide	WA			U	10	NS	µg/L
Methylene bromide	WA			U	10	NS	µg/L
Methylene chloride	WA			J	1.33	5	µg/L
Methylene chloride	ADS			J	2	5	µg/L
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			J	1.32	100	µg/L
Styrene	ADS			U	10	100	µg/L
Tetrachloroethylene	WA			U	5	5	µg/L
Tetrachloroethylene	ADS			J	2	5	µg/L
Toluene	WA			U	5	1000	µg/L
Toluene	ADS			J	0	1000	µg/L
trans-1,2-Dichloroethylene	ADS			J	6	100	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,3-Dichloropropene	ADS			U	10	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	100	NS	µg/L
Trichloroethylene	WA				5.06	5	µg/L
Trichloroethylene	ADS			J	8	5	µg/L
Trichlorofluoromethane	WA			U	5	NS	µg/L
Tritium	EMS				49900	20	pCi/ml
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl Acetate	ADS			U	10	NS	µg/L
Vinyl chloride	WA			J	1.49	2	µg/L
Vinyl chloride	ADS			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L
Xylenes (total)	ADS			U	10	10000	µg/L

FHB018B

Field Measurements:

Sample Date: 3/05/94

Depth to Water: NA

Water Level Elevation: NA

pH: 6.00

Specific Conductance: 136 μ S/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	μ g/L
1,1,1-Trichloroethane	WA			U	5	200	μ g/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	μ g/L
1,1,2-Trichloroethane	WA			U	5	5	μ g/L
1,1-Dichloroethane	WA			U	5	NS	μ g/L
1,1-Dichloroethylene	WA			U	5	7	μ g/L
1,2,3-Trichloropropane	WA			U	10	NS	μ g/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	μ g/L
1,2-Dibromoethane	WA			U	20	NS	μ g/L
1,2-Dichloroethane	WA			U	5	5	μ g/L
1,2-Dichloroethylene (total)	WA				102	70	μ g/L
1,2-Dichloropropane	WA			U	5	5	μ g/L
2-Hexanone	WA			U	10	NS	μ g/L
4-Methyl-2-pentanone	WA			U	10	NS	μ g/L
Acetone	WA			U	10	NS	μ g/L
Acetonitrile (Methyl cyanide)	WA			U	20	NS	μ g/L
Acrolein	WA			U	10	NS	μ g/L
Acrylonitrile	WA			U	10	NS	μ g/L
Allyl chloride	WA			U	100	NS	μ g/L
Benzene	WA			U	5	5	μ g/L
Bromodichloromethane	WA			U	5	NS	μ g/L
Bromoform	WA			U	5	NS	μ g/L
Carbon disulfide	WA			U	5	NS	μ g/L
Carbon tetrachloride	WA			U	5	5	μ g/L
Chlorobenzene	WA			U	5	100	μ g/L
Chloroethane	WA			U	10	NS	μ g/L
Chloroform	WA			J	1.18	100	μ g/L
Chloroprene	WA			U	20	NS	μ g/L
cis-1,3-Dichloropropene	WA			U	5	NS	μ g/L
Dibromochloromethane	WA			U	5	NS	μ g/L
Dichlorodifluoromethane	WA			J	5.03	NS	μ g/L
Ethylbenzene	WA			U	5	700	μ g/L
Isobutyl alcohol	WA			U	20	NS	μ g/L
Methacrylonitrile	WA			U	20	NS	μ g/L
Methyl bromide	WA			U	10	NS	μ g/L
Methyl chloride	WA			U	10	NS	μ g/L
Methyl ethyl ketone	WA			U	10	NS	μ g/L
Methyl iodide	WA			U	10	NS	μ g/L
Methylene bromide	WA			U	10	NS	μ g/L
Methylene chloride	WA			U	5	5	μ g/L

FHB018B Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA			J	1.05	5	µg/L
Toluene	WA			J	1.77	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	100	NS	µg/L
Trichloroethylene	WA				5.36	5	µg/L
Trichlorofluoromethane	WA			U	5	NS	µg/L
Tritium	EMS				32800	20	pCi/ml
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA				23	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

FHB019

Field Measurements:

Sample Date: 3/05/94

Depth to Water: 2.55 ft below TOC

Water Level Elevation: 211.00 ft msl

pH: 4.73

Specific Conductance: 33 μ S/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	μ g/L
1,1,1-Trichloroethane	WA			U	5	200	μ g/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	μ g/L
1,1,2-Trichloroethane	WA			U	5	5	μ g/L
1,1-Dichloroethane	WA			U	5	NS	μ g/L
1,1-Dichloroethylene	WA			U	5	7	μ g/L
1,2,3-Trichloropropane	WA			U	10	NS	μ g/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	μ g/L
1,2-Dibromoethane	WA			U	20	NS	μ g/L
1,2-Dichloroethane	WA			U	5	5	μ g/L
1,2-Dichloroethylene (total)	WA				24.2	70	μ g/L
1,2-Dichloropropane	WA			U	5	5	μ g/L
2-Hexanone	WA			U	10	NS	μ g/L
4-Methyl-2-pentanone	WA			U	10	NS	μ g/L
Acetone	WA			U	10	NS	μ g/L
Acetonitrile (Methyl cyanide)	WA			U	20	NS	μ g/L
Acrolein	WA			U	10	NS	μ g/L
Acrylonitrile	WA			U	10	NS	μ g/L
Allyl chloride	WA			U	100	NS	μ g/L
Benzene	WA			U	5	5	μ g/L
Bromodichloromethane	WA			U	5	NS	μ g/L
Bromoform	WA			U	5	NS	μ g/L
Carbon disulfide	WA			U	5	NS	μ g/L
Carbon tetrachloride	WA			U	5	5	μ g/L
Chlorobenzene	WA			U	5	100	μ g/L
Chloroethane	WA			U	10	NS	μ g/L
Chloroform	WA			U	5	100	μ g/L
Chloroprene	WA			U	20	NS	μ g/L
cis-1,3-Dichloropropene	WA			U	5	NS	μ g/L
Dibromochloromethane	WA			U	5	NS	μ g/L
Dichlorodifluoromethane	WA			U	10	NS	μ g/L
Ethylbenzene	WA			U	5	700	μ g/L
Isobutyl alcohol	WA			U	20	NS	μ g/L
Methacrylonitrile	WA			U	20	NS	μ g/L
Methyl bromide	WA			U	10	NS	μ g/L
Methyl chloride	WA			U	10	NS	μ g/L
Methyl ethyl ketone	WA			U	10	NS	μ g/L
Methyl iodide	WA			U	10	NS	μ g/L
Methylene bromide	WA			U	10	NS	μ g/L
Methylene chloride	WA			U	5	5	μ g/L

FHB019 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA				5.33	5	µg/L
Toluene	WA			U	5	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	100	NS	µg/L
Trichloroethylene	WA				13.4	5	µg/L
Trichlorofluoromethane	WA			U	5	NS	µg/L
Tritium	EMS				20000	20	pCi/ml
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

FHB020

Field Measurements:

Sample Date: 3/05/94

Depth to Water: 3.73 ft below TOC

Water Level Elevation: 212.52 ft msl

pH: 4.88

Specific Conductance: 43 μ S/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	μ g/L
1,1,1-Trichloroethane	WA			U	5	200	μ g/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	μ g/L
1,1,2-Trichloroethane	WA			U	5	5	μ g/L
1,1-Dichloroethane	WA			U	5	NS	μ g/L
1,2,3-Trichloropropane	WA			U	10	NS	μ g/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	μ g/L
1,2-Dibromoethane	WA			U	20	NS	μ g/L
1,2-Dichloroethane	WA			U	5	5	μ g/L
1,2-Dichloroethylene (total)	WA			U	5	70	μ g/L
1,2-Dichloropropane	WA			U	5	5	μ g/L
2-Hexanone	WA			U	10	NS	μ g/L
4-Methyl-2-pentanone	WA			U	10	NS	μ g/L
Acetone	WA			U	10	NS	μ g/L
Acetonitrile (Methyl cyanide)	WA			U	100	NS	μ g/L
Acrolein	WA			U	500	NS	μ g/L
Acrylonitrile	WA			U	100	NS	μ g/L
Allyl chloride	WA			U	100	NS	μ g/L
Benzene	WA			U	5	5	μ g/L
Bromodichloromethane	WA			U	5	NS	μ g/L
Bromoform	WA			U	5	NS	μ g/L
Carbon disulfide	WA			U	5	NS	μ g/L
Carbon tetrachloride	WA			U	5	5	μ g/L
Chlorobenzene	WA			U	5	100	μ g/L
Chloroethane	WA			U	10	NS	μ g/L
Chloroform	WA			U	5	100	μ g/L
Chloroprene	WA			U	10	NS	μ g/L
cis-1,3-Dichloropropene	WA			U	5	NS	μ g/L
Dibromochloromethane	WA			U	5	NS	μ g/L
Dichlorodifluoromethane	WA			U	20	NS	μ g/L
Ethyl methacrylate	WA			U	20	NS	μ g/L
Ethylbenzene	WA			U	5	700	μ g/L
Isobutyl alcohol	WA			U	2000	NS	μ g/L
Methacrylonitrile	WA			U	20	NS	μ g/L
Methyl bromide	WA			U	10	NS	μ g/L
Methyl chloride	WA			U	10	NS	μ g/L
Methyl ethyl ketone	WA			U	10	NS	μ g/L
Methyl iodide	WA			U	10	NS	μ g/L
Methyl methacrylate	WA			U	20	NS	μ g/L
Methylene bromide	WA			U	20	NS	μ g/L

FHB020 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Methylene chloride	WA			U	5	5	µg/L
Pentachloroethane	WA			U	20	NS	µg/L
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA			U	5	5	µg/L
Toluene	WA			U	5	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	20	NS	µg/L
Trichloroethylene	WA			U	5	5	µg/L
Trichlorofluoromethane	WA			U	10	NS	µg/L
Tritium	EMS				22	20	pCi/ml
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

FHB020B

Field Measurements:

Sample Date: 3/05/94

Depth to Water: NA

Water Level Elevation: NA

pH: 4.88

Specific Conductance: 43 μ S/cm

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	μ g/L
1,1,1-Trichloroethane	WA			U	5	200	μ g/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	μ g/L
1,1,2-Trichloroethane	WA			U	5	5	μ g/L
1,1-Dichloroethane	WA			U	5	NS	μ g/L
1,2,3-Trichloropropane	WA			U	10	NS	μ g/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	μ g/L
1,2-Dibromoethane	WA			U	20	NS	μ g/L
1,2-Dichloroethane	WA			U	5	5	μ g/L
1,2-Dichloroethylene (total)	WA			U	5	70	μ g/L
1,2-Dichloropropane	WA			U	5	5	μ g/L
2-Hexanone	WA			U	10	NS	μ g/L
4-Methyl-2-pentanone	WA			U	10	NS	μ g/L
Acetone	WA			U	10	NS	μ g/L
Acetonitrile (Methyl cyanide)	WA			U	100	NS	μ g/L
Acrolein	WA			U	500	NS	μ g/L
Acrylonitrile	WA			U	100	NS	μ g/L
Allyl chloride	WA			U	100	NS	μ g/L
Benzene	WA			U	5	5	μ g/L
Bromodichloromethane	WA			U	5	NS	μ g/L
Bromoform	WA			U	5	NS	μ g/L
Carbon disulfide	WA			U	5	NS	μ g/L
Carbon tetrachloride	WA			U	5	5	μ g/L
Chlorobenzene	WA			U	5	100	μ g/L
Chloroethane	WA			U	10	NS	μ g/L
Chloroform	WA			U	5	100	μ g/L
Chloroprene	WA			U	10	NS	μ g/L
cis-1,3-Dichloropropene	WA			U	5	NS	μ g/L
Dibromochloromethane	WA			U	5	NS	μ g/L
Dichlorodifluoromethane	WA			U	20	NS	μ g/L
Ethyl methacrylate	WA			U	20	NS	μ g/L
Ethylbenzene	WA			U	5	700	μ g/L
Isobutyl alcohol	WA			U	2000	NS	μ g/L
Methacrylonitrile	WA			U	20	NS	μ g/L
Methyl bromide	WA			U	10	NS	μ g/L
Methyl chloride	WA			U	10	NS	μ g/L
Methyl ethyl ketone	WA			U	10	NS	μ g/L
Methyl iodide	WA			U	10	NS	μ g/L
Methyl methacrylate	WA			U	20	NS	μ g/L
Methylene bromide	WA			U	20	NS	μ g/L

FHB020B Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Methylene chloride	WA			U	5	5	µg/L
Pentachloroethane	WA			U	20	NS	µg/L
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA			U	5	5	µg/L
Toluene	WA			U	5	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	20	NS	µg/L
Trichloroethylene	WA			U	5	5	µg/L
Trichlorofluoromethane	WA			U	10	NS	µg/L
Tritium	EMS				25	20	pCi/ml
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

FVA001

Field Measurements:

Sample Date: 3/09/94

Depth to Water: NA

Water Level Elevation: NA

pH: NA

Specific Conductance: NA

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	µg/L
1,1,1-Trichloroethane	WA			U	5	200	µg/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	µg/L
1,1,2-Trichloroethane	WA			U	5	5	µg/L
1,1-Dichloroethane	WA			U	5	NS	µg/L
1,2,3-Trichloropropane	WA			U	10	NS	µg/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	µg/L
1,2-Dibromoethane	WA			U	20	NS	µg/L
1,2-Dichloroethane	WA			U	5	5	µg/L
1,2-Dichloroethylene (total)	WA			U	5	70	µg/L
1,2-Dichloropropane	WA			U	5	5	µg/L
2-Hexanone	WA			U	10	NS	µg/L
4-Methyl-2-pentanone	WA			U	10	NS	µg/L
Acetone	WA			U	10	NS	µg/L
Acetonitrile (Methyl cyanide)	WA			U	100	NS	µg/L
Acrolein	WA			U	500	NS	µg/L
Acrylonitrile	WA			U	100	NS	µg/L
Allyl chloride	WA			U	100	NS	µg/L
Benzene	WA			U	5	5	µg/L
Bromodichloromethane	WA			U	5	NS	µg/L
Bromoform	WA			U	5	NS	µg/L
Carbon disulfide	WA			U	5	NS	µg/L
Carbon tetrachloride	WA			U	5	5	µg/L
Chlorobenzene	WA			U	5	100	µg/L
Chloroethane	WA			U	10	NS	µg/L
Chloroform	WA			U	5	100	µg/L
Chloroprene	WA			U	10	NS	µg/L
cis-1,3-Dichloropropene	WA			U	5	NS	µg/L
Dibromochloromethane	WA			U	5	NS	µg/L
Dichlorodifluoromethane	WA			U	20	NS	µg/L
Ethyl methacrylate	WA			U	20	NS	µg/L
Ethylbenzene	WA			U	5	700	µg/L
Isobutyl alcohol	WA			U	2000	NS	µg/L
Methacrylonitrile	WA			U	20	NS	µg/L
Methyl bromide	WA			U	10	NS	µg/L
Methyl chloride	WA			U	10	NS	µg/L
Methyl ethyl ketone	WA			U	10	NS	µg/L
Methyl iodide	WA			U	10	NS	µg/L
Methyl methacrylate	WA			U	20	NS	µg/L
Methylene bromide	WA			U	20	NS	µg/L

FVA001 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Methylene chloride	WA			U	5	5	µg/L
Pentachloroethane	WA			U	20	NS	µg/L
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA			U	5	5	µg/L
Toluene	WA			U	5	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	20	NS	µg/L
Trichloroethylene	WA			U	5	5	µg/L
Trichlorofluoromethane	WA			U	10	NS	µg/L
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

QA2

Field Measurements: Trip Blank

Sample Date: NA

Depth to Water: NA

Water Level Elevation: NA

pH: NA

Specific Conductance: NA

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	µg/L
1,1,1-Trichloroethane	WA			U	5	200	µg/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	µg/L
1,1,2-Trichloroethane	WA			U	5	5	µg/L
1,1-Dichloroethane	WA			U	5	NS	µg/L
1,2,3-Trichloropropane	WA			U	10	NS	µg/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	µg/L
1,2-Dibromoethane	WA			U	20	NS	µg/L
1,2-Dichloroethane	WA			U	5	5	µg/L
1,2-Dichloroethylene (total)	WA			U	5	70	µg/L
1,2-Dichloropropane	WA			U	5	5	µg/L
2-Hexanone	WA			U	10	NS	µg/L
4-Methyl-2-pentanone	WA			U	10	NS	µg/L
Acetone	WA			U	10	NS	µg/L
Acetonitrile (Methyl cyanide)	WA			U	100	NS	µg/L
Acrolein	WA			U	500	NS	µg/L
Acrylonitrile	WA			U	100	NS	µg/L
Allyl chloride	WA			U	100	NS	µg/L
Benzene	WA			U	5	5	µg/L
Bromodichloromethane	WA			U	5	NS	µg/L
Bromoform	WA			U	5	NS	µg/L
Carbon disulfide	WA			U	5	NS	µg/L
Carbon tetrachloride	WA			U	5	5	µg/L
Chlorobenzene	WA			U	5	100	µg/L
Chloroethane	WA			U	10	NS	µg/L
Chloroform	WA			U	5	100	µg/L
Chloroprene	WA			U	10	NS	µg/L
cis-1,3-Dichloropropene	WA			U	5	NS	µg/L
Dibromochloromethane	WA			U	5	NS	µg/L
Dichlorodifluoromethane	WA			U	20	NS	µg/L
Ethyl methacrylate	WA			U	20	NS	µg/L
Ethylbenzene	WA			U	5	700	µg/L
Isobutyl alcohol	WA			U	2000	NS	µg/L
Methacrylonitrile	WA			U	20	NS	µg/L
Methyl bromide	WA			U	10	NS	µg/L
Methyl chloride	WA			U	10	NS	µg/L
Methyl ethyl ketone	WA			U	10	NS	µg/L
Methyl iodide	WA			U	10	NS	µg/L
Methyl methacrylate	WA			U	20	NS	µg/L
Methylene bromide	WA			U	20	NS	µg/L

QA2 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Methylene chloride	WA			U	5	5	µg/L
Pentachloroethane	WA			U	20	NS	µg/L
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA			U	5	5	µg/L
Toluene	WA			U	5	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	20	NS	µg/L
Trichloroethylene	WA			U	5	5	µg/L
Trichlorofluoromethane	WA			U	10	NS	µg/L
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

QA3

Field Measurements: Field Blank

Sample Date: NA

Depth to Water: NA

Water Level Elevation: NA

pH: NA

Specific Conductance: NA

Laboratory Analyses:

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
1,1,1,2-Tetrachloroethane	WA			U	10	NS	µg/L
1,1,1-Trichloroethane	WA			U	5	200	µg/L
1,1,2,2-Tetrachloroethane	WA			U	5	NS	µg/L
1,1,2-Trichloroethane	WA			U	5	5	µg/L
1,1-Dichloroethane	WA			U	5	NS	µg/L
1,2,3-Trichloropropane	WA			U	10	NS	µg/L
1,2-Dibromo-3-chloropropane	WA			U	20	0.2	µg/L
1,2-Dibromoethane	WA			U	20	NS	µg/L
1,2-Dichloroethane	WA			U	5	5	µg/L
1,2-Dichloroethylene (total)	WA			U	5	70	µg/L
1,2-Dichloropropane	WA			U	5	5	µg/L
2-Hexanone	WA			U	10	NS	µg/L
4-Methyl-2-pentanone	WA			U	10	NS	µg/L
Acetone	WA			U	10	NS	µg/L
Acetonitrile (Methyl cyanide)	WA			U	100	NS	µg/L
Acrolein	WA			U	500	NS	µg/L
Acrylonitrile	WA			U	100	NS	µg/L
Allyl chloride	WA			U	100	NS	µg/L
Benzene	WA			U	5	5	µg/L
Bromodichloromethane	WA			U	5	NS	µg/L
Bromoform	WA			U	5	NS	µg/L
Carbon disulfide	WA			U	5	NS	µg/L
Carbon tetrachloride	WA			U	5	5	µg/L
Chlorobenzene	WA			U	5	100	µg/L
Chloroethane	WA			U	10	NS	µg/L
Chloroform	WA			U	5	100	µg/L
Chloroprene	WA			U	10	NS	µg/L
cis-1,3-Dichloropropene	WA			U	5	NS	µg/L
Dibromochloromethane	WA			U	5	NS	µg/L
Dichlorodifluoromethane	WA			U	20	NS	µg/L
Ethyl methacrylate	WA			U	20	NS	µg/L
Ethylbenzene	WA			U	5	700	µg/L
Isobutyl alcohol	WA			U	2000	NS	µg/L
Methacrylonitrile	WA			U	20	NS	µg/L
Methyl bromide	WA			U	10	NS	µg/L
Methyl chloride	WA			U	10	NS	µg/L
Methyl ethyl ketone	WA			U	10	NS	µg/L
Methyl iodide	WA			U	10	NS	µg/L
Methyl methacrylate	WA			U	20	NS	µg/L
Methylene bromide	WA			U	20	NS	µg/L

QA3 Laboratory Analyses Continued

Analyte	Lab	Rep	Avg	Mod	Result	Standard	Units
Methylene chloride	WA			U	5	5	µg/L
Pentachloroethane	WA			U	20	NS	µg/L
Propionitrile	WA			U	50	NS	µg/L
Styrene	WA			U	5	100	µg/L
Tetrachloroethylene	WA			U	5	5	µg/L
Toluene	WA			U	5	1000	µg/L
trans-1,3-Dichloropropene	WA			U	5	NS	µg/L
trans-1,4-Dichloro-2-butene	WA			U	20	NS	µg/L
Trichloroethylene	WA			U	5	5	µg/L
Trichlorofluoromethane	WA			U	10	NS	µg/L
Vinyl acetate	WA			U	10	NS	µg/L
Vinyl chloride	WA			U	10	2	µg/L
Xylenes (total)	WA			U	5	10000	µg/L

Appendix B
Information on Electronic Data Diskettes

INFORMATION PROVIDED TO ESS ON ELECTRONIC DATA DISKETTES

Sample name	Laboratory sample number	Accuracy
Chain of custody number	Laboratory replicate	Number of dilutions
Sample date	Testname	Dilution factor
Received date	Extraction/digestion method	Instrument
Extraction date	Analysis method	Analyst
Extraction time	Detection limit	Nominal concentration
Analysis date	Result qualifier	
Analysis time	Analysis qualifier	
Analysis batch	Bias	
Laboratory code	Analytical result	

Appendix C

***Calculation of VOC Concentration
in the Headspace of a Well***

CALCULATION OF VOC CONCENTRATION IN THE HEADSPACE OF A WELL

Symbols:

H	= Henry's Law constant
S	= solubility in water
R	= gas constant
T	= temperature (K)
P _{vp}	= vapor pressure
Y _i	= mole fraction in gas
X _i	= mole fraction in water
P _T	= total pressure
P _i	= partial pressure of gas

EXAMPLE

Given: TCE concentration of 5000 ug/L in water at 20 degrees C (293K)

$$\text{Molecular weight of water} = \frac{1 \text{ mol}}{18 \text{ g}}$$

$$H_{\text{TCE}} = 1 \times 10^{-2} \left(\frac{\text{atm} \cdot \text{m}^3}{\text{mol}} \right)$$

$$\text{Molecular weight of TCE} = 131.5 \frac{\text{g}}{\text{mol}}$$

Find: TCE concentration in air.

SOLUTION:

$$H = \frac{P_{vp}}{S}$$

$$\frac{Y_i}{X_i} = \frac{H}{P_T} \Rightarrow Y_i = \left(\frac{H}{P_T} \right) X_i = \text{mole fraction within gas}$$

$$H_{\text{TCE}} = (1 \times 10^{-2} \frac{\text{atm} \cdot \text{m}^3}{\text{mol}_{\text{TCE}}}) (1000 \frac{\text{g}}{\text{L}}) \left(\frac{1 \text{ mol}_{\text{water}}}{18 \text{ g}} \right) \left(\frac{1000 \text{ L}}{\text{m}^3} \right)$$

$$H_{\text{TCE}} = 556 \frac{\text{atm} \cdot \text{mol}_{\text{water}}}{\text{mol}_{\text{TCE}}}$$

Calculate moles of TCE per liter of water for the given concentration.

$$\left(\frac{5000 \mu\text{g}}{\text{L}} \right) (1 \text{ L}) \left(\frac{1 \text{ mol}}{131.5 \text{ g}} \right) \left(\frac{10^{-6} \text{ g}}{\mu\text{g}} \right) = 3.8 \times 10^{-5} \text{ mol}_{\text{TCE}}$$

Calculate moles of water per liter of water

$$(1 L) \left(\frac{1000 g}{L} \right) \left(\frac{1 mol_{water}}{18 g} \right) = 55.6 mol_{water}$$

Calculate mole fraction in water

$$X_i = \frac{mol_{TCE}}{mol_{water}} = \frac{3.8 \times 10^{-5} mol_{TCE}}{55.6 mol_{water}} = 6.84 \times 10^{-7} \frac{mol_{TCE}}{mol_{water}}$$

Calculate mole fraction in gas

$$Y_i = \left(\frac{H}{P_T} \right) X_i$$

$$Y_i = \left(\frac{556 atm \cdot mol_{water}}{mol_{TCE}} \right) \left(\frac{1}{atm} \right) (6.84 \times 10^{-7} \frac{mol_{TCE}}{mol_{water}})$$

$$Y_i = 3.81 \times 10^{-4}$$

The partial pressure of gas at 1 atm = 3.81×10^{-4} atm

$$P_i V = n_i R T$$

$$n_i = \frac{M}{m}$$

Where: M = molecular weight of gas
m = mass of gas confined to volume V.

$$\frac{P_i}{RT} = \frac{n_i}{V}$$

$$\frac{n_i}{V} = \frac{3.81 \times 10^{-4} atm}{(0.08205 \frac{L \cdot atm}{mol \cdot K}) (293 K)}$$

$$\frac{n_i}{V} = (1.57 \times 10^{-5} \frac{mol}{L}) (131.5 \frac{g}{mol}) = 2.06 \times 10^{-3} \frac{g}{L}$$

Convert g/L to ug/m³

$$(2.06 \times 10^{-3} \frac{g}{L}) (10^6 \frac{\mu g}{g}) = 2.06 \times 10^3 \frac{\mu g}{L}$$

$$(2.06 \times 10^3 \frac{\mu g}{L}) (\frac{1 L}{1000 cm^3}) (1 \times 10^6 \frac{cm^3}{m^3}) = 2.06 \times 10^6 \frac{\mu g}{m^3}$$

Convert to ppmv

$$\frac{m_g}{m^3} = \frac{(ppmv) (mol wt)}{24.45}$$

$$ppmv = \frac{\frac{m_g}{m^3} (24.45)}{mol wt}$$

$$ppmv = 2.06 \times 10^6 \frac{\mu g}{m^3} (24.45) (\frac{1 mol}{131.5 g}) (\frac{1 mg}{1000 \mu g}) = 383 ppmv TCE$$