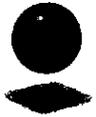


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GROUNDWATER AND LITHOLOGIC INVESTIGATION PLAN AREA OF CONCERN 561 (AOC
561) ZONE E CNC CHARLESTON SC
1/17/2002
CH2MHILL



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January 17, 2002

158814.ZE.PR.04

Dann Spariosu
U.S. Environmental Protection Agency
Region IV
61 Forsyth Street
Atlanta, GA 30303

Subject: Groundwater and Lithologic Investigation Plan
AOC 561, Zone E
Charleston Naval Complex, North Charleston, South Carolina

Dear Mr. Spariosu:

Purpose

The purpose of this investigation plan is to present a proposed focused hydrogeologic investigation, and rationale for the proposed work, at AOC 561.

Background and Recent Sampling

The RFI Addendum for AOC 559/560/561 presents the data collected at the site. A summary of the conclusions of the RFI Addendum is provided below.

One RFI groundwater well (E559GW005-see attached Figure 1) had elevated levels of chlorobenzene and dichlorobenzenes (DCBs) during the RFI (last sampling event in February 1997 found 530 ug/L). The RFI groundwater COPCs included benzene, chlorobenzene and (1,2- and 1,4-) dichlorobenzenes. Attempts to resample this well during the summer of 2001 were unsuccessful due to little or no groundwater in the well. Additional groundwater sampling using DPT (E559GP001 through E559GP005-see attached Figure 1) was performed in October 2001 to determine the extent of groundwater impacted by the COPCs previously detected in this groundwater well. DPT samples were collected at shallow (approximately 15 feet bls) and deep (28 feet bls) groundwater intervals at each of the five locations, including one DPT boring adjacent to the location of Monitor Well E559GW005.

The analytical results of these DPT samples showed only minor detections of chloromethane, carbon disulfide, chloroform, BTEX (no xylenes), cis/trans-1,2-dichloroethene, cis-1,2-dichloroethene, trichloroethene, and chlorobenzene. A summary of the analytical data for detected compounds is attached as Table 1. These minor detections were primarily estimated ("J"-flagged) concentrations below the reporting limit, and all are well below applicable MCLs and tap water RBCs.

A new permanent groundwater monitor well (E559GW006) was installed and sampled in November 2001. The analytical results of the sample from E559GW006 (which is screened from a depth of 9 to 19 feet bls) indicate the presence of VOCs, benzene, chlorobenzene, and 1,4-DCB at levels above MCLs. A summary of the analytical data for detected compounds is attached as Table 2. The screened interval of monitor well E559GW005 (where these same contaminants were first detected in 1996) is 2.5 to 11.5 feet bls. The screen interval overlap for the two wells is from 9 to 11.5 feet bls. At this same location, the slightly deeper DPT sample results (E559GP004 collected at 12 feet bls) indicated the absence of VOCs and suggest that the contamination is localized between 9 and 11.5 ft bls, possibly above a slightly retarding layer of soil.

Proposed Additional Investigation

Because the analytical results are not conclusive, CH2M-Jones is proposing the installation of three new monitor wells and advancing a Macro-Probe, or equivalent, at Monitor Well E599GW005 to collect and interpret a continuous lithologic section. The locations of the monitor wells and the Macro-Probe boring are presented on Figure 1 (attached). The rationale for each of the proposed wells and the Macro-Probe boring is presented below.

Shallow monitor wells are proposed to be installed approximately 30 feet upgradient and downgradient of Monitor Well E559GW005. Additionally a deep monitor well is proposed to be installed at the same location as the downgradient shallow well. The shallow wells are to be screened between approximately 5 to 15 ft bls. The actual screened interval will be determined in the field based on groundwater elevations, but will not exceed 18 ft bls. The deep well will be screened from approximately 18 to 28 ft bls. The maximum depth of the deep well screen is intended to coincide with the top of the Ashley formation (elevation -20, about 30 feet bls). The actual screened interval will be determined in the field based on the elevation of the Ashley formation.

The new monitor wells are expected to provide information on the extent of benzene-, chlorobenzene- and (1,2- and 1,4-) dichlorobenzene-impacted groundwater in the vicinity of monitor well E559GW005.

The Macro-Probe boring will be advanced using a Geoprobe unit equipped with acetate sampling sleeves or other equivalent sampling device to collect, record and interpret continuous lithologic log data from the land surface to an estimated total depth of 30 feet below land surface (top of the Ashley formation).

A written log will be generated which includes at a minimum: a description of the consistency, estimated grain size, plasticity, moisture content and lithology of the media encountered, with depths at which changes in lithology occur noted on the log. Any visual irregularities observed such as non-native fill material, visible staining/discoloration or contamination/chemical odors will also be noted on the log.

The Macro-Probe boring is intended to provide information on subsurface lithology in hopes of explaining the presence of benzene and chlorobenzenes detected in permanent monitor wells and their absence in adjacent DPT samples.

In accordance with R.61-79.265 Subpart F of the South Carolina Hazardous Waste Management Regulations and R.61-71 of the South Carolina Well Standards and Regulations, a request for well installation must be submitted to the South Carolina Department of Health and Environmental Control (SCDHEC) two weeks prior to the scheduled activity. The written request will include the purpose and details of the new monitor wells and will provide a map of their proposed locations.

After development and resting, water levels will be measured in E559GW005 and E559GW006, the three new wells, and nearby wells E559GW014, 14D, 003, and 03D. The wells will be purged and one groundwater sample will be collected from each well; samples will be delivered or sent via overnight carrier to an offsite laboratory where they will be analyzed for volatile organic compounds (VOCs) (to include DCBs) using EPA method 8260B. QTAT will be requested (2 days). BTEX compounds will be analyzed with lower detection limits; other compounds will be run with standard detection limits. Level 2 data package will be provided.

The sampling rationale and sample collection procedures will be performed in accordance with the Environmental Services Division *Standard Operating Procedures and Quality Assurance Manual* (ESDSOPQAM), (U.S. Environmental Protection Agency [EPA], 1996). The sample collection and analyses will also follow the procedures described in the approved Comprehensive Sampling and Analysis Plan (CSAP) portion of the *Final Comprehensive RFI Work Plan* (EnSafe/ Allen & Hoshall, 1994). The CSAP outlines all monitoring procedures to be performed during the investigation to characterize the environmental setting, source, and releases of hazardous constituents. In addition, the CSAP includes the Quality Assurance Plan (QAP) and Data Management Plan (DMP) to verify that all information and data are valid and properly documented. Sample analysis will be performed in accordance with the guidance in EPA's *Test Methods for Evaluating Solid Waste, SW-846, Revision 4* (1996b), Office of Solid Waste and Emergency Response (OSWER) and in the EPA Environmental Services Division *Laboratory Operations and Quality Control Manual* (ESDLOQCM) (1997).

The analytical results of the proposed groundwater sampling will be presented in a CMS WP for AOC 559/560/561.

If you have any questions, comments or require additional information please do not hesitate to contact us.

Sincerely,

CH2M HILL, Inc.

A handwritten signature in black ink, appearing to read "Dean Williamson". The signature is fluid and cursive, with the first name "Dean" being more prominent than the last name "Williamson".

Project Manager
(352) 335-5877 ext. 2208

enclosures

Cc: Tony Hunt, P.E./SOUTH DIV
Dean Williamson, P.E./CH2M HILL, GNV
Tom Beisel, P.G./CH2M HILL, ATL

TABLE 1
Organic Analytes Detected in Groundwater Probes – October 2001
AOC 559, Zone E, CNC

Parameter	Location	Depth (feet bls)	Concentration	Units	Qualifier	Drinking Water MCL ^a	Region III Tap Water RBC (HI = 0.1) ^b
Shallow Groundwater							
Chloroform	E559GP001	15	0.43	µg/L	J	80	
	E559GP003	20	0.38		J		
Cis-1,2-dichloroethene	E559GP004	12	0.64		J	70	
	E559GP005	14	0.52		J		
Trichloroethene	E559GP004	12	2.3		=	5	
Chlorobenzene	E559GP004	12	0.86		J	100	
	E559GP005	14	0.22		J		
Deep Groundwater							
Carbon disulfide	E559GP002	28	0.56		J	NL	100
Chloroform	E559GP001	28	0.36		J	80	
	E559GP002	28	0.42		J		
	E559GP004	28	1.1		=		
	E559GP005	24	0.45		J		
Benzene	E559GP002	28	0.22		J	5	
	E559GP003	28	0.54		J		
	E559GP005	24	0.14		J		
Toluene	E559GP002	28	0.34		J	1,000	
	E559GP003	28	0.44		J		
Ethylbenzene	E559GP002	28	0.25		J	700	
	E559GP003	28	0.25		J		
	E559GP005	24	0.24		J		

No detected concentrations exceed the MCL or EPA Region III Tap Water criteria.

= chemical detected at the concentration shown
 bls below land surface

J chemical is detected at concentration below the method detection limit; concentration is not known.

MCL Maximum Contaminant Level - the maximum permissible level of a contaminant in water which is delivered to any user of a public water system. MCLs are enforceable standards

NL not listed

TABLE 1

Organic Analytes Detected in Groundwater Probes – October 2001
AOC 559, Zone E, CNC

Parameter	Location	Depth (feet bls)	Concentration	Units	Qualifier	Drinking Water MCL ^a	Region III Tap Water RBC (HI = 0.1) ^b
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^a MCL - From EPA Drinking Water Standards and Health Advisories, Summer 2000.

^b RBCs (HI=0.1) were obtained from the EPA Region III RBC Table, (<http://www.epa.gov/epahome/search.html>), October 5, 2000, unless otherwise noted.

TABLE 2

Shallow Groundwater Analytical Results for Detected Compounds – November 2001
AOC 559, Zone E, CNC

Parameter	Location	Sampling Date	Concentration	Units	Qualifier	Drinking Water MCL ^a	Region III Tap Water RBC (HI = 0.1) ^b
Methylene Chloride	E559GW006	11/28/2001	0.44	µg/L	J	NL	4.1 ^d
Benzene			67		=	5	
Toluene			0.74		J	1,000	
Xylenes (Total)			5.3		=	10,000	
Cis/trans-1,2-dichloroethene			1.3		=	100	
Cis-1,2-dichloroethene			7.2		=	70	
1,2-dichloroethene (Total)			8.4		=		
Trichloroethene			0.22		J	5	
Tetrachloroethene			2.2		=	5	
Chlorobenzene			5,900		=	100	
1,4-Dichlorobenzene			720		=	75	

Concentrations in bolded and outlined text exceed the MCL or EPA Region III Tap Water criteria.

= chemical detected at the concentration shown

Bls below land surface

J chemical is detected at concentration below the method detection limit; concentration is not known.

MCL Maximum Contaminant Level - the maximum permissible level of a contaminant in water which is delivered to any user of a public water system. MCLs are enforceable standards.

NL not listed

^a MCL - From EPA Drinking Water Standards and Health Advisories, Summer 2000.

^b RBCs (HI=0.1) were obtained from the EPA Region III RBC Table, (<http://www.epa.gov/epahome/search.html>), October 5, 2000, unless otherwise noted.

^d Carcinogen-tap water RBC (HI=1) was used directly from the EPA Region III RBC Table, October 5, 2000.

