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CNC CHARLESTON  
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U S NAVY RESPONSE TO REGULATOR COMMENTS TO RCRA FACILITY INVESTIGATION  
REPORT ADDENDUM AREA OF CONCERN 551 AND 552 (AOCS 551 AND 552) ZONE E  
WITH TRANSMITTAL CNC CHARLESTON SC  
9/17/2003  
CH2M HILL

AOCs 551 + 552 Zone E

Additional Response to Comments RFI Report Addendum (RO)

# CH2MHILL TRANSMITTAL

**To:** David Scaturo  
South Carolina Department of Health  
and Environmental Control  
Bureau of Land and Waste  
Management  
8901 Farrow Road  
Columbia, SC 29203

**From:** Dean Williamson/CH2M-Jones

**Date:** Sept. 17, 2003

**R :** CH2M-Jones' Responses to Comments by SCDHEC regarding the *RFI Report Addendum, AOCs 551 and 552, Zone E, Revision 0* – Originally Submitted on October 19, 2002

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4	Responses to Comments by SCDHEC regarding the <i>RFI Report Addendum, AOCs 551 and 552, Zone E, Revision 0</i> – Originally Submitted on October 19, 2002

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Copy To:

Dann Spariosu/USEPA, w/att  
Rob Harrell/Navy, w/att  
Gary Foster/CH2M-Jones, w/att

## Comments Prepared by Jerry Stamps

### Comment 2

The Department contends that the consistently high metals in sample 551SB006 may be indicative of a release. Though these concentrations may not be above the EPA Region III Industrial RBC, there is a clear trend that the metals results are much higher than the metals detected in the other soil samples collected in this vicinity. Given the uncertainty associated with soil sampling, the possibility exists that the highest metals concentrations were not sampled. The Department recommends that sample 551SB006 be bracketed by additional soil samples to ensure that metals concentrations are not left in place, which may exceed the industrial standard.

### **CH2M-Jones Response:**

*In response to the above comment, CH2M-Jones conducted soil sampling around soil boring location E551SB006 during May 2003, in accordance with the Sampling and Analysis Plan (SAP) for AOCs 551 and 552, Zone E (CH2M-Jones, 2003), which was reviewed and approved by SCDHEC. The SAP called for collection and analysis of surface and subsurface soil samples from four locations, each approximately 10 feet from E551SB006. These sample locations were identified as E551SB008, E551SB009, E551SB010, and E551SB011. Sample boring E551SB008 could not be advanced due to subsurface obstructions in this area. Surface and subsurface soils in the remaining three boring locations were sampled for antimony, cadmium, lead, and zinc. The analytical results are summarized in attached Table 1, and the analytical results reports and data validation summaries are included in Attachment A of these responses. This information will also be included in Revision 1 of the RFI Report Addendum for AOCs 551 and 552.*

*As presented in Table 1, none of the detected metals concentrations exceeds the unrestricted or industrial land use screening criteria adopted by the CNC BCT, indicating that an elevated source of metals does not appear to exist in the vicinity of E551SB006. We recommend that no further investigation of soils at this site is necessary.*

## Hydrogeology Comments Prepared by Jo Cherie Overcash

The Navy has provided adequate response to the Division of Hydrogeology's Comments as follows:

**Comment 1:** The RCRA Permit identifies area of concern (AOC) 552 as a Former Galvanizing Shop at the NE Corner of Dry Dock #1. In correspondence dated October 15, 2002, the Division of Hydrogeology stated that the Navy should discuss the galvanizing process that occurred in former Building 1030. In the above referenced Response to Comments, the Navy states that based on historical records it is doubtful that Building 1030 housed a galvanizing shop. The Navy has presented adequate details to substantiate this claim.

**Comment 2:** No response was required to this Comment.

**Comment 3:** The Navy agreed to submit historical shallow and deep groundwater data for this area of the Base. The groundwater elevation data is pertinent to determine whether the existing monitoring wells (E551GW001, E551GW002, and E551GW02D) are sufficient to monitor both AOC 551 and AOC 552. See Comment 4.

**CH2M-Jones Response:**

*Available historical and recent groundwater elevation data will be included in Appendix A of Revision 1 of the RFI Report Addendum for AOCs 551 and 552 and referenced in the text.*

**Comment 4:**

- a. The Navy states that existing monitoring wells E551GW002 and E551GW02D are downgradient of AOC 552. However, the Navy has submitted insufficient data to determine whether the three AOC 551 monitoring wells referenced in Comment 3 are upgradient, downgradient or sidegradient to AOC 552. At this present time, the facility's geographic information system (GIS) database depicts an easterly shallow groundwater flow in this area. Under this scenario the referenced monitoring wells would be sidegradient of AOC 552. Based on differing data (RFIRA Appendix A Figure A and the GIS) and the lack of historical groundwater data, the Division of Hydrogeology contends that there is insufficient data to determine whether the three existing wells could monitor a potential release from AOC 552.

**CH2M-Jones Response:**

a. CH2M-Jones believes that the existing monitoring wells at AOC 551 and 552 are adequate for the site for the following reasons:

1. AOC 552 has been determined not to have been used as a galvanizing shop, as noted in Comment 1 above. It appears to have been simply a small office building. Consequently, there is no need to monitor groundwater at AOC 552, as there is no reason to suspect a release.
2. No soil COCs were identified for either AOC 551 or 552 as part of the RFI or during the subsequent soil sampling conducted as part of this response to comments (see response to Jerry Stamps' Comment 2). The soil samples have not indicated that soil contamination is present that represents a leaching concern.
3. Wells E551GW002 and E551GW02D are both downgradient of AOC 551, as indicated in both the 2002 groundwater elevation data (see Figure A-1 of Appendix A of the RFI Report Addendum) and the 1998 data in the GIS.

b. Moreover, historically, uninterrupted groundwater flow is toward the Cooper River. It is more likely that groundwater from the E551GW001 location would simply migrate to the River (approximately 60 feet) than that it would migrate inland as depicted on Figure A-1 (May 2002). While available records indicate that AOC 552 may not have been a galvanizing shop, surface and subsurface soil data at the E551SB006 location indicates an adverse impact of inorganics to the environment. Additional data is needed regarding the concentration of inorganics in surface and subsurface soil at this location. If the concentration of an inorganic in subsurface soil is not protective of groundwater quality,

then the Division of Hydrogeology may require the installation of a permanent groundwater monitoring well at AOC 552.

**CH2M-Jones Response:**

*b. CH2M-Jones collected additional surface and subsurface soil samples during May 2003. As indicated in the response to Comment 1 by Jerry Stamps on the initial Response to Comments on the RFI Report Addendum, there were no detections of metals above the unrestricted land use criteria, indicating that site soils do not appear to be significantly impacted by metals. None of the recent or historical surface or subsurface soil samples exceeded their respective SSLs, indicating that the groundwater in this area has not been impacted by metals due to activities related to AOCs 551 and 552. We propose that no additional groundwater monitoring wells are needed at AOC 552.*

**Comment 5:** See response to 3&4.

**Comment 6:** The Navy states that clarification of groundwater data will be provided to include the number of groundwater sampling events, the parameters analyzed during each event, and explanation of the GIS qualifiers.

**CH2M-Jones Response:**

*During the RFI, the two shallow monitoring wells and one deep monitoring well at AOCs 551 and 552 were sampled for metals during four sampling events in 1996 and 1997. SVOCs were sampled during two sampling events in 1996. VOCs were sampled during a total of four sampling events, two of which occurred in 1996 and two of which occurred in 1998. The Zone E RFI Report, Revision 0 (EnSafe, 1997) was prepared before the 1998 groundwater sampling events were conducted. The text in Revision 1 of the RFI Report Addendum for AOCs 551 and 552 will be edited to include a clarification of the number of sampling events conducted at this site and the parameters analyzed during these events, as explained above.*

*The GIS qualifiers referred to in this comment are associated with additional groundwater samples collected for VOC analysis during March and October 1998. These samples appear to have been collected as part of an evaluation of the potential for natural attenuation of VOCs at the site. Samples collected at CNC during the initial RFI to assess monitored natural attenuation parameters have often included an "a" at the end of the sample ID, which is the case with the 1998 groundwater samples collected at this site, which are associated with the "S" qualifiers.*

*As indicated in the response to the initial Comment 6 by Jo Cherie Overcash, data with qualifiers beginning with an "S" can be used in decision-making. Attached Table 3 shows VOC detections with either an "SJ" or "S=" qualifiers, which can be considered estimated and actual detections above laboratory detection limits, respectively. As indicated in Table 3, only the VOCs 1,2-dichloroethene (1,2-DCE), trichloroethene (TCE), tetrachloroethene (PCE) and methylene chloride have either an "SJ" or "S=" qualifier. The rest of the analytical results appear with an "SU" qualifier, indicating detections below laboratory detection limits. As shown in Table 3, these detections above laboratory detection limits have been preceded and/or followed by detections below their respective MCLs and/or below*

*laboratory detection limits, indicating that the VOCs detected in these wells are not persistent and do not appear to be a threat to groundwater quality. The above information will be included in Revision 1 of the RFI Report Addendum for AOCs 551 and 552.*

**Comment 7:** The Navy will clarify the occurrence of and analysis for methylene chloride.

**CH2M-Jones Response:**

*The text in Section 5.1.3 of Revision 1 of the RFI Report Addendum for AOCs 551 and 552 will be edited to clarify that methylene chloride and other VOCs were analyzed during four sampling events conducted at the site during 1996 and 1998.*

**Comment 8:** The Navy has agreed that there is a potential upgradient source of deep groundwater contamination in this area of the Base. The Navy states that groundwater samples will be collected from deep monitoring well E551GW02D to determine groundwater quality with regard to volatile organic compounds (VOCs) at this time. This information coupled with historical groundwater flow may aid the Navy in identifying an upgradient source of contamination.

**CH2M-Jones Response:**

*The Navy's response to the initial Comment 8 by Jo Cherie Overcash did not indicate a definitive agreement that there is a source of VOCs upgradient of AOCs 551 and 552, only that there is a likelihood of an upgradient source.*

*In response to this comment, CH2M-Jones collected an additional groundwater sample for VOC analysis from E551GW02D during May 2003 to assess current groundwater quality in the deeper zone of the aquifer near AOC 551. Attached Table 4 shows the analytical results from this sampling event, which indicate that no VOCs were detected above laboratory detection limits in the sample from E551GW02D. The recent data do not indicate that the groundwater in the deeper zone of the aquifer near AOCs 551 and 552 is currently being impacted by an upgradient source. We propose that no additional groundwater investigation at this site is needed.*

**TABLE 1**  
Surface and Subsurface Soil Detections - May 2003 Soil Sampling  
AOCs 551 and 552 RFI Report Addendum, Zone E, Charleston Naval Complex

Parameter	StationID	SampleID	Result (mg/kg)	Qualifier	Date Collected	EPA Region III RBC (with a HI = 0.1) (mg/kg)	SSL (DAF= 10) (mg/kg)	Max. Zn E Backgrd. Conc. (mg/kg)
<b>Surface Soil</b>								
Antimony	E551SB009	551SB00901	0.712	U	05/20/2003	3.1	3	7.4
	E551SB010	551SB01001	0.742	U	05/19/2003			
	E551SB011	551SB01101	0.701	U	05/20/2003			
Cadmium	E551SB009	551SB00901	0.53	J	05/20/2003	8	4	1.5
	E551SB010	551SB01001	0.088	U	05/19/2003			
	E551SB011	551SB01101	0.60	J	05/20/2003			
Lead	E551SB009	551SB00901	1.24	=	05/20/2003	400	400	400
	E551SB010	551SB01001	39.70	=	05/19/2003			
	E551SB011	551SB01101	150.00	=	05/20/2003			
Zinc	E551SB009	551SB00901	16.70	=	05/20/2003	2,346	6,200	855
	E551SB010	551SB01001	44.50	=	05/19/2003			
	E551SB011	551SB01101	143.00	=	05/20/2003			
<b>Subsurface Soil</b>								
Antimony	E551SB009	551SB00902	0.711	U	05/20/2003	NA	3	1.6
	E551SB010	551SB01002	0.789	U	05/19/2003			
	E551SB011	551SB01102	0.856	U	05/20/2003			
Cadmium	E551SB009	551SB00902	0.47	J	05/20/2003	NA	4	0.96
	E551SB010	551SB01002	0.094	U	05/19/2003			
	E551SB011	551SB01102	0.34	J	05/20/2003			
Lead	E551SB009	551SB00902	9.97	=	05/20/2003	NA	400	322
	E551SB010	551SB01002	5.95	=	05/19/2003			
	E551SB011	551SB01102	132.00	=	05/20/2003			
Zinc	E551SB009	551SB00902	30.60	=	05/20/2003	NA	6,200	438
	E551SB010	551SB01002	40.70	=	05/19/2003			
	E551SB011	551SB01102	165.00	=	05/20/2003			

NA not applicable

J indicates an estimated value. One or more quality control (QC) parameters were outside control limits or the value was detected below the laboratory's quantification limit.

U indicates that the concentration was not detected.

UJ indicates that the concentration was not detected and is estimated.

**TABLE 2**  
Groundwater Elevation Measurement Data - May 2002  
*AOCs 551 and 552 RFI Report Addendum, Zone E, Charleston Naval Complex*

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>	<b>DTW</b>	<b>GW Elevation (ft above msl)</b>	<b>Date</b>	<b>Time</b>	<b>Comm nts</b>
E551GW001	376600	2317421	8.18	4.85	3.33	05/14/2002	13:47	
E551GW002	376612	2317326	8.46	6.35	2.11	05/14/2002	13:45	
EGDEGW17A	376509	2317245	8.56	5.56	3.00	05/14/2002	14:30	

**TABLE 3**  
 VOC Detections in Groundwater, 1998 Sampling  
 AOCs 551 and 552 RFI Report Addendum, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Result ( $\mu\text{g/L}$ )	Qualifier	Date Sampled	EPA Region III Tapwater RBC (HI=0.1) ( $\mu\text{g/L}$ )	MCL ( $\mu\text{g/L}$ )
1,2-Dichloroethene	551GW00101	E551GW001	5.0	U	04/09/1996	5.48	70
	551GW00101a	E551GW001	5.0	SU	03/05/1998		
	551GW00102	E551GW001	5.0	U	07/24/1996		
	551GW00201	E551GW002	5.0	U	04/09/1996		
	551GW00201a	E551GW002	5.0	SU	03/04/1998		
	551GW00202	E551GW002	5.0	U	07/25/1996		
	551GW02D01	E551GW02D	5.0	U	04/10/1996		
	551GW02D01a	E551GW02D	7.0	S=	03/04/1998		
	551GW02D02	E551GW02D	5.0	U	07/25/1996		
Methylene chloride	551GW00101	E551GW001	5.0	U	04/09/1996	4.1	5
	551GW00101a	E551GW001	5.0	SU	03/05/1998		
	551GW00102	E551GW001	5.0	U	07/24/1996		
	551GW00102a	E551GW001	2.0	SJ	10/10/1998		
	551GW00201	E551GW002	5.0	U	04/09/1996		
	551GW00201a	E551GW002	5.0	SU	03/04/1998		
	551GW00202	E551GW002	5.0	U	07/25/1996		
	551GW00202a	E551GW002	2.0	SJ	10/10/1998		
	551GW02D01	E551GW02D	5.0	U	04/10/1996		
	551GW02D01a	E551GW02D	5.0	SU	03/04/1998		
	551GW02D02	E551GW02D	5.0	U	07/25/1996		
	551GW02D02a	E551GW02D	2.0	SJ	10/10/1998		
	551GW02DN1	E551GW02D	5.0	U	05/19/2003		
	Trichloroethylene	551GW00101	E551GW001	5.0	U		
551GW00101a		E551GW001	5.0	SU	03/05/1998		
551GW00102		E551GW001	4.0	J	07/24/1996		
551GW00102a		E551GW001	5.0	SU	10/10/1998		
551GW00201		E551GW002	5.0	U	04/09/1996		
551GW00201a		E551GW002	5.0	SU	03/04/1998		
551GW00202		E551GW002	5.0	U	07/25/1996		
551GW00202a		E551GW002	5.0	SU	10/10/1998		
551GW02D01		E551GW02D	2.0	J	04/10/1996		
551GW02D01a		E551GW02D	21.0	S=	03/04/1998		
551GW02D02		E551GW02D	2.0	J	07/25/1996		
551GW02D02a		E551GW02D	1.0	SJ	10/10/1998		
551GW02DN1		E551GW02D	5.0	U	05/19/2003		

**TABLE 3**  
VOC Detections in Groundwater, 1998 Sampling  
AOCs 551 and 552 RFI Report Addendum, Zone E, Charleston Naval Complex

Parameter	Sample ID	Station ID	Result ( $\mu\text{g/L}$ )	Qualifier	Date Sampled	EPA Region III Tapwater RBC (HI=0.1) ( $\mu\text{g/L}$ )	MCL ( $\mu\text{g/L}$ )
Tetrachloroethylene	551GW00101	E551GW001	5.0	U	04/09/1996	1.1	5
	551GW00101a	E551GW001	5.0	SU	03/05/1998		
	551GW00102	E551GW001	5.0	U	07/24/1996		
	551GW00102a	E551GW001	5.0	SU	10/10/1998		
	551GW00201	E551GW002	5.0	U	04/09/1996		
	551GW00201a	E551GW002	5.0	SU	03/04/1998		
	551GW00202	E551GW002	5.0	U	07/25/1996		
	551GW00202a	E551GW002	5.0	SU	10/10/1998		
	551GW02D01	E551GW02D	2.0	J	04/10/1996		
	551GW02D01a	E551GW02D	2.0	SJ	03/04/1998		
	551GW02D02	E551GW02D	5.0	U	07/25/1996		
	551GW02D02a	E551GW02D	5.0	SU	10/10/1998		
	551GW02DN1	E551GW02D	5.0	U	05/19/2003		

$\mu\text{g/L}$  micrograms per liter

MCL maximum Contaminant Level

U indicates that the concentration was not detected laboratory detection limit.

UJ indicates that the concentration was not detected and is estimated.

S indicates that the data was not formally validated, but can be used for COPC screening and decision-making

Data in **bold** indicates exceedance of screening criteria

**TABLE 4**  
 Analytical Results of Groundwater Sampling at E552GW02D, AOCs 551 and 552, May 2003  
 AOCs 551 and 552 RFI Report Addendum, Zone E, Charleston Naval Complex

Parameter	Station ID	Sample ID	Result (mg/kg)	Qualifier	Date Sampled
1,1,1-Trichloroethane	E551GW02D	551GW02DN1	5	U	05/19/2003
1,1,2,2-Tetrachloroethane	E551GW02D	551GW02DN1	5	U	05/19/2003
1,1,2-Trichloroethane	E551GW02D	551GW02DN1	5	U	05/19/2003
1,1-Dichloroethane	E551GW02D	551GW02DN1	5	U	05/19/2003
1,1-Dichloroethene	E551GW02D	551GW02DN1	5	U	05/19/2003
1,2,3-Trichlorobenzene	E551GW02D	551GW02DN1	5	U	05/19/2003
1,2,4-Trichlorobenzene	E551GW02D	551GW02DN1	5	U	05/19/2003
1,2-Dichlorobenzene	E551GW02D	551GW02DN1	5	U	05/19/2003
1,2-Dichloroethane	E551GW02D	551GW02DN1	5	U	05/19/2003
1,2-Dichloroethene (total)	E551GW02D	551GW02DN1	5	U	05/19/2003
1,2-Dichloropropane	E551GW02D	551GW02DN1	5	U	05/19/2003
1,3-Dichlorobenzene	E551GW02D	551GW02DN1	5	U	05/19/2003
1,4-Dichlorobenzene	E551GW02D	551GW02DN1	5	U	05/19/2003
2-Hexanone	E551GW02D	551GW02DN1	10	U	05/19/2003
Acetone	E551GW02D	551GW02DN1	10	U	05/19/2003
Benzene	E551GW02D	551GW02DN1	5	U	05/19/2003
Bromodichloromethane	E551GW02D	551GW02DN1	5	U	05/19/2003
Bromoform	E551GW02D	551GW02DN1	5	U	05/19/2003
Bromomethane	E551GW02D	551GW02DN1	10	U	05/19/2003
Carbon Disulfide	E551GW02D	551GW02DN1	5	U	05/19/2003
Carbon Tetrachloride	E551GW02D	551GW02DN1	5	U	05/19/2003
Chlorobenzene	E551GW02D	551GW02DN1	5	U	05/19/2003
Chloroethane	E551GW02D	551GW02DN1	10	U	05/19/2003
Chloroform	E551GW02D	551GW02DN1	5	U	05/19/2003
Chloromethane	E551GW02D	551GW02DN1	10	UJ	05/19/2003
cis-1,2-Dichloroethylene	E551GW02D	551GW02DN1	5	U	05/19/2003
cis-1,3-Dichloropropene	E551GW02D	551GW02DN1	5	U	05/19/2003
Dibromochloromethane	E551GW02D	551GW02DN1	5	U	05/19/2003
Ethylbenzene	E551GW02D	551GW02DN1	5	U	05/19/2003
m+p Xylene	E551GW02D	551GW02DN1	5	U	05/19/2003
Methyl ethyl ketone (2-Butanone)	E551GW02D	551GW02DN1	10	U	05/19/2003
Methyl isobutyl ketone (4-Methyl-2-pentanone)	E551GW02D	551GW02DN1	10	U	05/19/2003
Methylene Chloride	E551GW02D	551GW02DN1	5	U	05/19/2003
o-Xylene	E551GW02D	551GW02DN1	5	U	05/19/2003
Styrene	E551GW02D	551GW02DN1	5	U	05/19/2003
Tetrachloroethylene (PCE)	E551GW02D	551GW02DN1	5	U	05/19/2003

**TABLE 4**  
 Analytical Results of Groundwater Sampling at E552GW02D, AOCs 551 and 552, May 2003  
 AOCs 551 and 552 RFI Report Addendum, Zone E, Charleston Naval Complex

Parameter	Station ID	Sample ID	Result (mg/kg)	Qualifier	Date Sampled
Toluene	E551GW02D	551GW02DN1	5	U	05/19/2003
trans-1,2-Dichloroethene	E551GW02D	551GW02DN1	5	U	05/19/2003
trans-1,3-Dichloropropene	E551GW02D	551GW02DN1	5	U	05/19/2003
Trichloroethylene (TCE)	E551GW02D	551GW02DN1	5	U	05/19/2003
Vinyl acetate	E551GW02D	551GW02DN1	10	U	05/19/2003
Vinyl chloride	E551GW02D	551GW02DN1	10	U	05/19/2003
Xylenes, Total	E551GW02D	551GW02DN1	5	U	05/19/2003

$\mu\text{g/L}$  micrograms per liter

MCL maximum contaminant level

U indicates that the concentration was not detected laboratory detection limit.

UJ indicates that the concentration was not detected and is estimated.

**Attachment A**

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Analytical Data Summary

09/17/2003 1:33 PM

StationID E551GW02D  
 Sampl ID 551GW02DN1  
 DateCollected 05/19/2003  
 DateExtracted 05/28/2003  
 DateAnalyzed 05/28/2003  
 SDGNumber 80593

Parameter	Units		
Chloromethane	ug/L	10	UJ
Vinyl chloride	ug/L	10	U
Bromomethane	ug/L	10	U
Chloroethane	ug/L	10	U
1,1-Dichloroethene	ug/L	5	U
Acetone	ug/L	10	U
Carbon Disulfide	ug/L	5	U
Methylene Chloride	ug/L	5	U
trans-1,2-Dichloroethene	ug/L	5	U
1,1-Dichloroethane	ug/L	5	U
Vinyl acetate	ug/L	10	U
Methyl ethyl ketone (2-Butanone)	ug/L	10	U
cis-1,2-Dichloroethylene	ug/L	5	U
1,2-Dichloroethene (total)	ug/L	5	U
Chloroform	ug/L	5	U
1,1,1-Trichloroethane	ug/L	5	U
Carbon Tetrachloride	ug/L	5	U
1,2-Dichloroethane	ug/L	5	U
Benzene	ug/L	5	U
Trichloroethylene (TCE)	ug/L	5	U
1,2-Dichloropropane	ug/L	5	U
Bromodichloromethane	ug/L	5	U
2-Chloroethyl vinyl ether	ug/L	10	R
cis-1,3-Dichloropropene	ug/L	5	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L	10	U
Toluene	ug/L	5	U
trans-1,3-Dichloropropene	ug/L	5	U
1,1,2-Trichloroethane	ug/L	5	U
2-Hexanone	ug/L	10	U
Tetrachloroethylene (PCE)	ug/L	5	U

Analytical Data Summary

09/17/2003 1:33 PM

<b>StationID</b>	E551GW02D
<b>Sampl ID</b>	551GW02DN1
<b>DateCollected</b>	05/19/2003
<b>DateExtracted</b>	05/28/2003
<b>DateAnalyzed</b>	05/28/2003
<b>SDGNumber</b>	80593

<b>Parameter</b>	<b>Units</b>		
Dibromochloromethane	ug/L	5	U
Chlorobenzene	ug/L	5	U
Ethylbenzene	ug/L	5	U
m+p Xylene	ug/L	5	U
o-Xylene	ug/L	5	U
Xylenes, Total	ug/L	5	U
Styrene	ug/L	5	U
Bromoform	ug/L	5	U
1,1,2,2-Tetrachloroethane	ug/L	5	U
1,3-Dichlorobenzene	ug/L	5	U
1,4-Dichlorobenzene	ug/L	5	U
1,2-Dichlorobenzene	ug/L	5	U
1,2,4-Trichlorobenzene	ug/L	5	U
1,2,3-Trichlorobenzene	ug/L	5	U

Analytical Data Summary

09/17/2003 1:33 PM

StationID	E551SB009		E551SB009		E551SB010		E551SB010		E551SB010	
Sampl ID	551SB00901 (0-1ft)		551SB00902 (3-5ft)		551SB01001 (0-1ft)		551SB01002 (3-5ft)		551SB01003	
DateCollected	05/20/2003		05/20/2003		05/19/2003		05/19/2003		05/20/2003	
DateExtracted	05/22/2003		05/22/2003		05/22/2003		05/22/2003		05/22/2003	
DateAnalyzed	05/23/2003		05/23/2003		05/23/2003		05/23/2003		05/23/2003	
SDGNumber	80591		80591		80591		80591		80591	
Parameter	Units									
Antimony	mg/kg	0.712	U	0.711	U	0.742	U	0.789	U	0.701
Cadmium	mg/kg	0.532	J	0.473	J	0.088	U	0.094	U	0.597
Lead	mg/kg	1.24	=	9.97	=	39.7	=	5.95	=	150
Zinc	mg/kg	16.7	=	30.6	=	44.5	=	40.7	=	143

Analytical Data Summary

09/17/2003 1:33 PM

<b>StationID</b>	B011	E551SB011
<b>SampleID</b>	01 (0-1ft)	551SB01102 (3-5ft)
<b>DateCollected</b>	/2003	05/20/2003
<b>DateExtracted</b>	/2003	05/22/2003
<b>DateAnalyzed</b>	/2003	05/23/2003
<b>SDGNumber</b>	591	80591

<b>Parameter</b>	<b>Units</b>			
Antimony	mg/kg	U	0.856	U
Cadmium	mg/kg	J	0.34	J
Lead	mg/kg	=	132	=
Zinc	mg/kg	=	165	=

## Data Validation Summary - Charleston Naval Complex - Zone E, AOC 551 & 552

TO: Sam Naik/CH2M HILL/ATL

FROM: Amy Juchem/CH2M HILL/GNA  
Herb Kelly/CH2M HILL/GNA

DATE: July 24, 2003

The purpose of this memorandum is to present the results of the data validation process for the samples collected AOC 551 & 552 in Zone E. The samples were collected on May 19 and 20, 2003.

The specific samples and analytical fractions reviewed are summarized below in **Table 1**.

The Quality Control areas that were reviewed and the resulting findings are documented within each subsection that follows. This data was validated for compliance with the analytical method requirements. This process also included a review of the data to assess the accuracy, precision, and completeness based upon procedures described in the guidance documents such as the Environmental Protection Agency (EPA) *National Functional Guidelines for Inorganic Data Review (EPA 2002)* and *National Functional Guidelines for Organic Data Review (EPA 1999)*. Quality assurance/quality control (QA/QC) summary forms and data reports were reviewed.

Samples were submitted to General Engineering Laboratories, Inc., in Charleston, South Carolina, for the following analyses: SW-846 8260 Volatile Organic Compounds (VOC) and Metals following SW-846 6010 Series methodology.

Sample results that were not within the acceptance limits were appended with a qualifying flag, which consisted of a single- or double-letter code that indicated a possible problem with the data. The qualifying flags originated during the data review and validation processes. These also include the secondary, or the two-digit "sub-qualifier" flags. The secondary qualifiers provide the reasoning behind the assignment of a qualifier flag to the data. The secondary qualifiers are presented and defined below.

**Attachment 1** lists the changes in data qualifiers, due to the validation process.

The following primary flags were used to qualify the data:

- [=] Detected. The analyte was analyzed for and detected at the concentration shown.
- [J] Estimated. The analyte was present but the reported value may not be accurate or precise.
- [U] Undetected. The analyte was analyzed for but not detected above the method detection limit.
- [UJ] Detection limit estimated. The analyte was analyzed for but qualified as not detected; the result is estimated.
- [R] Rejected. The data is not useable.

### Secondary Data Validation Qualifiers

Code	Definition
2S	Second Source
2C	Second Column Confirmation
BL	Blank
BD	Blank Spike/Blank Spike Duplicate or (LCS/LCSD) Precision
BS	Blank Spike/LCS
CC	Continuing Calibration Verification
DL	Dilution
FD	Field Duplicate
HT	Holding Time
IB	In-Between (metals - B's → J's )
IC	Initial Calibration
IS	Internal Standard
LD	Lab Duplicate
LR	Concentration exceeded Linear Range
MD	MS/MSD or LCS/LCSD Precision
MS	Matrix Spike/Matrix Spike Duplicate
OT	Other (see DV worksheet)
PD	Pesticide Degradation
PS	Post Spike
RE	Re-extraction/Re-analysis
SD	Serial Dilution
SS	Spiked Surrogate
TD	Total vs Dissolved
TN	Tune

Table 1 - Chemical Analytical Methods – Field and Quality Control Samples

SDG	Sample ID	Lab Sample ID	Matrix	Sample Type	Date Collected	VOC SW8260B	Metals SW8260B
80591	551SB00901	80591001	SO	N	05/20/03		X
80591	551SB00902	80591002	SO	N	05/20/03		X
80591	551SB01001	80591003	SO	N	05/19/03		X
80591	551SB01002	80591004	SO	N	05/19/03		X
80591	551SB01101	80591005	SO	N	05/20/03		X
80591	551SB01102	80591006	SO	N	05/20/03		X
80591	1200427334	1200427334	SQ	LB			X
80591	1200427335	1200427335	SQ	BS			X
80593	551TW02DN1	80593001	WQ	TB	05/19/03	X	
80593	551EW02DN1	80593002	WQ	EB	05/19/03	X	
80593	551GW02DN1	80593003	WG	N	05/19/03	X	
80593	551EB008N1	80593004	WQ	EB	05/19/03		X
80593	1200429645	1200429645	WQ	LB			X
80593	1200429646	1200429646	WQ	BS			X
80593	551EB008N1MS	1200430278	WQ	MS	05/19/03		X
80593	551EB008N1SD	1200430279	WQ	SD	05/19/03		X
80593	1200430643	1200430643	WQ	LB		X	
80593	1200430646	1200430646	WQ	BS		X	
80593	551GW02DN1MS	1200430647	WG	MS	05/19/03	X	
80593	551GW02DN1SD	1200430648	WG	SD	05/19/03	X	
80593	1200435744	1200435744	WQ	LB		X	
80593	1200435745	1200435745	WQ	BS		X	

**MATRIX CODE**

WG – Ground Water  
WQ - Water QC Samples  
SO – Soil  
SQ - Soil QC Samples

**SAMPLE TYPE CODE**

BS - Blank Spike  
EB - Equipment Blank  
LB - Laboratory Blank  
N - Native Sample  
MS – Matrix Spike  
SD – Matrix Spike Duplicate  
TB – Trip Blank

**ANALYSIS CODE**

VOC - Volatile Organic Compounds

## Organic Parameters

### Quality Control Review

The following list represents the QA/QC measures that were reviewed during the data quality evaluation procedure for organic data.

- **Holding Times** – The holding times are evaluated to verify that samples were extracted and analyzed within holding times.
- **Blank samples** – Method blanks, trip blanks and equipment blanks were provided for this project. Blank samples enable the reviewer to determine if an analyte may be attributed to sampling or laboratory procedures, rather than environmental contamination from site activities.
- **Surrogate Recoveries** – Surrogate Compounds are added to each sample and the recoveries are used to monitor lab performance and possible matrix interference.
- **Lab Control Sample (LCS)** – This sample is a "controlled matrix", either laboratory reagent water or Ottawa sand, in which target compounds have been added prior to extraction/analysis. The recoveries serve as a monitor of the overall performance of each step during the analysis, including sample preparation.
- **Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples** – Spike recovery is used to evaluate potential matrix interferences, as well as accuracy. Precision information is also determined by calculating the reproducibility between the recoveries of each spiked parameter.
- **GC/MS Tuning** – The mass spectrum of the tuning compound is evaluated for method compliance. The criteria are established to verify the proper mass assignment and mass resolution.
- **Initial Calibration** – The initial calibration ensures that the instrument is capable of producing acceptable qualitative and quantitative data for the compounds of interest.
- **Continuing Calibration** – The continuing calibration checks satisfactory performance of the instrument and its predicted response to the target compounds.
- **Internal Standards** – The internal standards (retention time and response) are evaluated for method compliance. The internal standards are used in quantitation of the target parameters and monitor the instrument sensitivity and response for stability during each analysis.

## Volatile Organic Compounds (VOC) Analyses

The QA/QC parameters for VOC analyses for all of the samples were within acceptable control limits, except as noted below:

### Blanks

The VOC target parameters detected in blank samples are listed below:

- Toluene was detected in the equipment blank, 551EW02DN1, below the reporting limit at 0.5 ug/L. Associated field sample was non-detect for Toluene.

No results were qualified due to blank contamination.

### Recoveries - Surrogate, MS/MSD and LCS

All Surrogate, Matrix Spike (MS), Matrix Spike Duplicate (MSD) and Laboratory Control Sample (LCS) recoveries were within acceptable quality control limits, except as noted in Table 2 below.

**TABLE 2**

Surrogate, MS/MSD, and LCS Recoveries Out of QC Limits: VOC  
Charleston Naval Complex, Zone E, AOC 551 & 552, Charleston, SC

SDC	Sample	Parameter	Recovery	Recovery Limits	Associated Samples	Flag
80593	551GW02DN1 MS/MSD	Chloromethane	65.8* / 76.6	70-130	551GW02DN1	Detects-J; Non-Detects-UJ
		2-Chloroethyl vinyl ether	0* / 0*	70-130	551GW02DN1	Detects-J; Non-Detects-R
80593	1200430646 LCS	Acetone	138*	70-130	551TW02DN1 (TB); 551EW02DN1 (EB); 551GW02DN1	Detects only - J
80593	551TW02DN1	Dibromofluoromethane (surrogate)	123*	80-120	551TW02DN1 (TB)	Detects only – J (TB – No flags applied)
		Toluene-d8 (surrogate)	117*	88-110		
		Bromofluorobenzene (surrogate)	117*	86-115		
80593	551EW02DN1	Toluene-d8 (surrogate)	114*	88-110	551EW02DN1 (EB)	Detects only – J (EB – No flags applied)
* - out of control limits						

## Initial and Continuing Calibration Criteria

All initial calibration criteria and continuing calibration criteria were met, except as listed in Table 3.

**TABLE 3**

Exceptions to Initial Calibration Criteria and Continuing Calibration Criteria: VOC  
Charleston Naval Complex, Zone E, AOC 551 & 552, Charleston, SC

Location/Calibration Date	Analyte	%Relative Standard Deviation (RSD) Difference (90.0%)	Associated Samples
VOA2-CCAL-05/27/03, 2025	Methylene chloride	26.6% high	551TW02DN1 (TB); 551EW02DN1 (EB); 551GW02DN1
	Dibromochloromethane	22.6% high	
	Bromoform	22.8% high	

Flags were applied to the compounds in the associated samples in the following manner:

- When the percent difference (%D) was high in the continuing calibration standards, detected compounds were flagged "J", as estimated. Non-detected compounds were not flagged.

## Inorganic Parameters

### Quality Control Review

The following list represents the QA/QC measures that are typically reviewed during the data quality evaluation procedure for inorganic parameters.

- **Holding Times** – The holding times are evaluated to verify that samples were extracted and analyzed within holding times.
- **Blank samples** – Sample preparation, initial calibration blanks/continuing calibration blanks, and equipment blanks were provided for this project. Blank samples enable the reviewer to determine if an analyte may be attributed to sampling or laboratory procedures, rather than environmental contamination from site activities.
- **Lab Control Sample (LCS)** – This sample is a "controlled matrix", in which target parameters have been added prior to digestion/analysis. The recoveries serve as a monitor of the overall performance of each step during the analysis, including sample preparation.
- **Pre/Post Digestion Spike (MS/MSD)** – Spike recovery is used to evaluate potential matrix interferences, as well as accuracy. Precision information is also determined by calculating the reproducibility between the recoveries of each spiked parameter.
- **ICP Interference Check Sample** – This sample verifies the lab's interelement and background correction factors.
- **Initial Calibration Verification** – This parameter ensures that the instrument is capable of producing acceptable quantitative data for the target analyte list to be measured.
- **Continuing Calibration Verification** – This one-point, mid-range parameter establishes that the initial calibration is still valid by checking the performance of the instrument on a continual basis.
- **ICP Serial Dilution** – The serial dilution of samples quantitated by ICP determines whether or not significant physical or chemical interferences exist due to the sample matrix.

## Metals Analyses

The QA/QC parameters for the Metals analyses for all of the samples were within acceptable control limits, except as noted below.

## Blanks

The Metals target parameters detected in blank samples are listed in [Table 4](#).

**TABLE 4**

Blank Contamination: Metals

Charleston Naval Complex, Zone E, AOC 551 & 552, Charleston, SC

Site	Lab Sample ID	Sample ID	Sample Type	Parameter	Lab Result	Units	Flag Blank Contamination (5x Blank) Value (5x Blank)
80591	CCB		CCB	Zinc	0.550	ug/L	0.1375 mg/Kg
80591	1200427334	1200427334	LB	Zinc	0.101	mg/Kg	0.505 mg/Kg
80591	80593004	551EB008N1	EB	Zinc	1.20	ug/L	0.300 mg/Kg
80593	80593004	551EB008N1	EB	Zinc	1.20	ug/L	0.300 mg/Kg
80593	CCB		CCB	Lead	3.49	ug/L	17.45 ug/L
80593	CCB		CCB	Antimony	3.75	ug/L	18.75 ug/L
80593	CCB		CCB	Zinc	0.976	ug/L	4.88 ug/L
80593	1200429645	1200429645	LB	Lead	2.40	ug/L	12.0 ug/L
80593	1200429645	1200429645	LB	Zinc	1.98	ug/L	9.9 ug/L

If a target parameter was reported in a field sample, and the concentration was below the level determined to be due to blank contamination (5 times the concentration in the associated QC blank samples), it was flagged as "U", not detected. Initial and continuing calibration blanks were also evaluated for possible contamination.

No data were qualified due to blank contamination.

## Rejected Data

One result was qualified as "R", rejected, due to associated QC parameters out of criteria, such that there is not a valid result for that parameter in each sample. The rejected data are summarized in Table 5 below. The only compound rejected was 2-Chloroethyl vinyl ether. This compound is very reactive and is not detected under acidic conditions, such as those used in preservation of field samples.

**TABLE 5**  
Data Qualification Summary: Rejected Data  
Charleston Naval Complex, Zone E, AOC 551 & 552, Charleston, SC

State	Sample ID	Parameter Class	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reason
80593	551GW02DN1	VOA	2-Chloroethyl vinyl ether	10	U	10	R	ug/L	MS

## Conclusion

A review of the analytical data submitted regarding the investigation of Zone E, AOC 551 & 552, at the Charleston Naval Complex, Charleston, South Carolina by CH2M HILL has been completed. An overall evaluation of the data indicates that the sample handling, shipment, and analytical procedures have been adequately completed, and that the analytical results should be considered usable as qualified.

As discussed above, there was a specific result that was rejected, in which the data cannot be used. With the exception of this result, the validation review demonstrated that the analytical systems were generally in control and the data can be used in the decision making process.

Attachment 1 - Changed Qualifiers and Results  
 Zone E, AOC 551 and 552 - Data Validation

Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
METAL	SW6010B	CADMIUM	80591	551SB00901	80591001	SO	0.532	B	0.532	J	mg/kg	IB
METAL	SW6010B	CADMIUM	80591	551SB00902	80591002	SO	0.473	B	0.473	J	mg/kg	IB
METAL	SW6010B	CADMIUM	80591	551SB01101	80591005	SO	0.597	B	0.597	J	mg/kg	IB
METAL	SW6010B	CADMIUM	80591	551SB01102	80591006	SO	0.34	B	0.34	J	mg/kg	IB
VOA	SW8260B	2-Chloroethyl vinyl ether	80593	551GW02DN1	80593003	WG	10	U	10	R	ug/L	MS
VOA	SW8260B	CHLOROMETHANE	80593	551GW02DN1	80593003	WG	10	U	10	UJ	ug/L	MS