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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT ADDENDUM AREA OF CONCERN 525 (AOC 525) ZONE E CNC CHARLESTON SC

11/18/2003

CH2M HILL

RFI REPORT ADDENDUM

Area of Concern 525, Zone E

Charleston Naval Complex
North Charleston, South Carolina

SUBMITTED TO
U.S. Navy Southern Division
Naval Facilities Engineering Command

CH2M·Jones

November 2003

Contract N62467-99-C-0960

CH2MHILL TRANSMITTAL

To: Mr. David Scaturo
South Carolina Department of Health and Environmental Control
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

From: Dean Williamson/CH2M-Jones

Date: Nov. 18, 2003

Re: Revision 1 pages for *RFI Report Addendum, AOC 525, Zone E, Revision 0* – Originally Submitted on July 23, 2002

We Are Sending You:

X	**Attached**	Under separate cover via	
	Shop Drawings	Documents	Tracings
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2	Revision 1 pages for *RFI Report Addendum, AOC 525, Zone E, Revision 0* – Originally Submitted on July 23, 2002

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Copy To:

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

THE ATTACHED PAGES SHOULD BE INSERTED AS REPLACEMENTS IN THE *RFI REPORT ADDENDUM, AOC 525, ZONE E, REVISION 0* SUBMITTAL:

- REVISED COVER AND SPINE
- REVISED INSIDE COVER
- REVISION 1 CERTIFICATION PAGE
- REVISED PG. IV
- REVISED PGS. 1-1 AND 1-2
- REVISED PGS. 5-2 AND 5-3
- REVISED PG. 6-1
- REVISED PG. 7-1
- NEW APPENDIX D RESPONSES TO SCDHEC COMMENTS ON THE *RFI REPORT ADDENDUM, AOC 525, ZONE E, REVISION 0* (CH2M-JONES, JULY 2002)

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CH2MHILL

July 23, 2002

Mr. David Scaturo
South Carolina Department of Health and
Environmental Control
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Re: RFI Report Addendum (Revision 0) – AOC 525, Zone E

Dear Mr. Scaturo:

Enclosed please find four copies of the RFI Report Addendum (Revision 0) for AOC 525 in Zone E of the Charleston Naval Complex (CNC). This report has been prepared pursuant to agreements by the CNC BRAC Cleanup Team for completing the RCRA Corrective Action process.

The principal author of this document is Jim Edens. Please do not hesitate to contact him at 352/5877, extension 2491, should you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

cc: Rob Harrell/Navy, w/att
Gary Foster/CH2M HILL, w/att

RFI REPORT ADDENDUM

Area of Concern 525, Zone E

Charleston Naval Complex
North Charleston, South Carolina

SUBMITTED TO
U.S. Navy Southern Division
Naval Facilities Engineering Command

PREPARED BY
CH2M-Jones

November 2003

Revision 1
Contract N62467-99-C-0960
158814.ZE.PR.01

Certification Page for RFI Report Addendum (Revision 1) – AOC 525, Zone E

I, Dean Williamson, certify that this report has been prepared under my direct supervision. The data and information are, to the best of my knowledge, accurate and correct, and the report has been prepared in accordance with current standards of practice for engineering.

South Carolina

P.E. No. 21428

Dean Williamson, P.E.

11/10/2003

Date

Contents

Contents, Continued

Acronyms and Abbreviations

AOC	area of concern
AST	aboveground storage tank
BCT	BRAC Cleanup Team
BEQ	benzo(a)pyrene equivalent
BRAC	Base Realignment and Closure Act
BRC	background reference concentration
CA	corrective action
CMS	corrective measures study
CNC	Charleston Naval Complex
COC	chemical of concern
COPC	chemical of potential concern
DAF	dilution attenuation factor
EnSafe	EnSafe Inc.
EPA	U.S. Environmental Protection Agency
FRE	fixed-point risk evaluation
HHRA	human health risk assessment
IM	interim measure
HI	hazard index
LUC	land use control
MCL	maximum contaminant level
µg/kg	microgram per kilogram
mg/kg	milligram per kilogram
NAVBASE	Naval Base
NFA	no further action
OWS	oil/water separator
PCB	polychlorinated biphenyl
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation

Acronyms and Abbreviations, Continued

SCDHEC	South Carolina Department of Health and Environmental Control
SSL	soil screening level
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TDS	total dissolved solids
TCE	trichloroethene
UST	underground storage tank
VOC	volatile organic compound

Section 1.0

1.0 Introduction

In 1993, Naval Base (NAVBASE) Charleston was added to the list of bases scheduled for closure as part of the Defense Base Realignment and Closure Act (BRAC), which regulates closure and transition of property to the community. The Charleston Naval Complex (CNC) was formed as a result of the dis-establishment of the Charleston Naval Shipyard and NAVBASE on April 1, 1996.

Corrective Action (CA) activities are being conducted under the Resource Conservation and Recovery Act (RCRA) with the South Carolina Department of Health and Environmental Control (SCDHEC) as the lead agency for CA activities at the CNC. All RCRA CA activities are performed in accordance with the Final Permit (Permit No. SC0 170 022 560).

In April 2000, CH2M-Jones was awarded a contract to provide environmental investigation and remediation services at the CNC. This submittal has been prepared by CH2M-Jones to complete the RCRA Facility Investigation (RFI) for Area of Concern (AOC) 525 in Zone E of the CNC. The location of AOC 525 in Zone E is shown in Figure 1-1. Figure 1-2 shows an aerial photograph of AOC 525.

1.1 Background

AOC 525 consists of Paint Booth No. 35 in Building 223. Building 223 is located at the intersection of First Street and Roe Avenue in Zone E of the CNC. Paint Booth No. 35 was used to paint miscellaneous parts and was the oldest of five dry-filter type paint booths located inside Building 223. Paint Booth No. 35 operated under South Carolina Bureau of Air Quality Control Permit No. 0560-0002. Building 223 is currently being used as a paint shop by Metal Trades, Inc. Paint Booth No. 35 is reportedly no longer active.

Based on historical operations, the materials of concern identified in the *Final Zone E RFI Work Plan, Revision 1* (EnSafe Inc. [EnSafe]/Allen & Hoshall, 1995) for AOC 525 include paints, solvents, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals. This area of Zone E is zoned M2 (industrial). The CNC RCRA Permit identified AOC 525 as requiring an RFI.

The RFI was initially conducted by EnSafe, which prepared and submitted the *Zone E RFI Report, Revision 0* during 1997. Regulatory review was conducted on this document and

draft responses to the comments from SCDHEC were prepared by the Navy/EnSafe team. The comments and responses related to AOC 525 are provided in Appendix A.

1.2 Purpose of the RFI Report Addendum

The purpose of this RFI Report Addendum is to document the results of the previous RFI investigation conducted by the Navy/EnSafe team at AOC 525. This addendum also discusses the findings of previous investigations, existing site conditions, and surrounding area land use.

Prior to changing the status of any site in the CNC RCRA CA permit, the BRAC Cleanup Team (BCT) agreed that the following issues should be considered:

- Status of the RFI
- Presence of metals (inorganics) in groundwater
- Potential linkage to Solid Waste Management Unit (SWMU) 37, Investigated Sanitary Sewers at the CNC
- Potential linkage to AOC 699, Investigated Storm Sewers at the CNC
- Potential linkage of AOC 504, Investigated Railroad Lines at the CNC
- Potential linkage to surface water bodies (Zone J)
- Potential contamination associated with oil/water separators (OWSs)
- Relevance or need for land use controls (LUCs) at the site

Information regarding these issues is also provided in this RFI Report Addendum to expedite evaluation of closure of the site.

1.3 Report Organization

This RFI Report Addendum consists of the following sections, including this introductory section:

1.0 Introduction – Presents the purpose of and the background information relating to the RFI Report Addendum.

2.0 Summary of RFI Conclusions for AOC 525 – Summarizes the conclusions from the RFI investigations and risk evaluations for AOC 525.

3.0 Interim Measures and UST/AST Removals – Summarizes any interim measures (IMs) or underground storage tank (UST)/aboveground storage tank (AST) removal activities conducted at the site.

4.0 Summary of Additional Investigations – Summarizes any information collected after completion of the RFI report.

5.0 COPC/COC Refinement – Identifies and evaluates chemicals of potential concern (COPCs) based on current screening criteria using all RFI and additional data.

6.0 Summary of Information Related to Site Closeout Issues – Discusses the various issues that the BCT agreed to evaluate prior to site closeout.

7.0 Recommendations – Provides a recommendation for No Further Action (NFA) at AOC 525.

8.0 References – Lists the references used in this document.

Appendix A – Contains responses to SCDHEC comments for AOC 525 from the RFI report.

Appendix B – Contains excerpts from the RFI report, including the summaries of detected chemicals in soil and groundwater.

Appendix C – Contains an excerpt from the Memorandum "A Comprehensive Review of Common Laboratory Artifacts Detected in Environmental Samples From the Charleston Naval Complex," dated February 12, 1998, prepared for the BCT by Charlie Vernoy/EnSafe. This appendix also contains results of Zone E grid soil sample data regarding acetone contamination.

All tables and figures appear at the end of their respective sections.

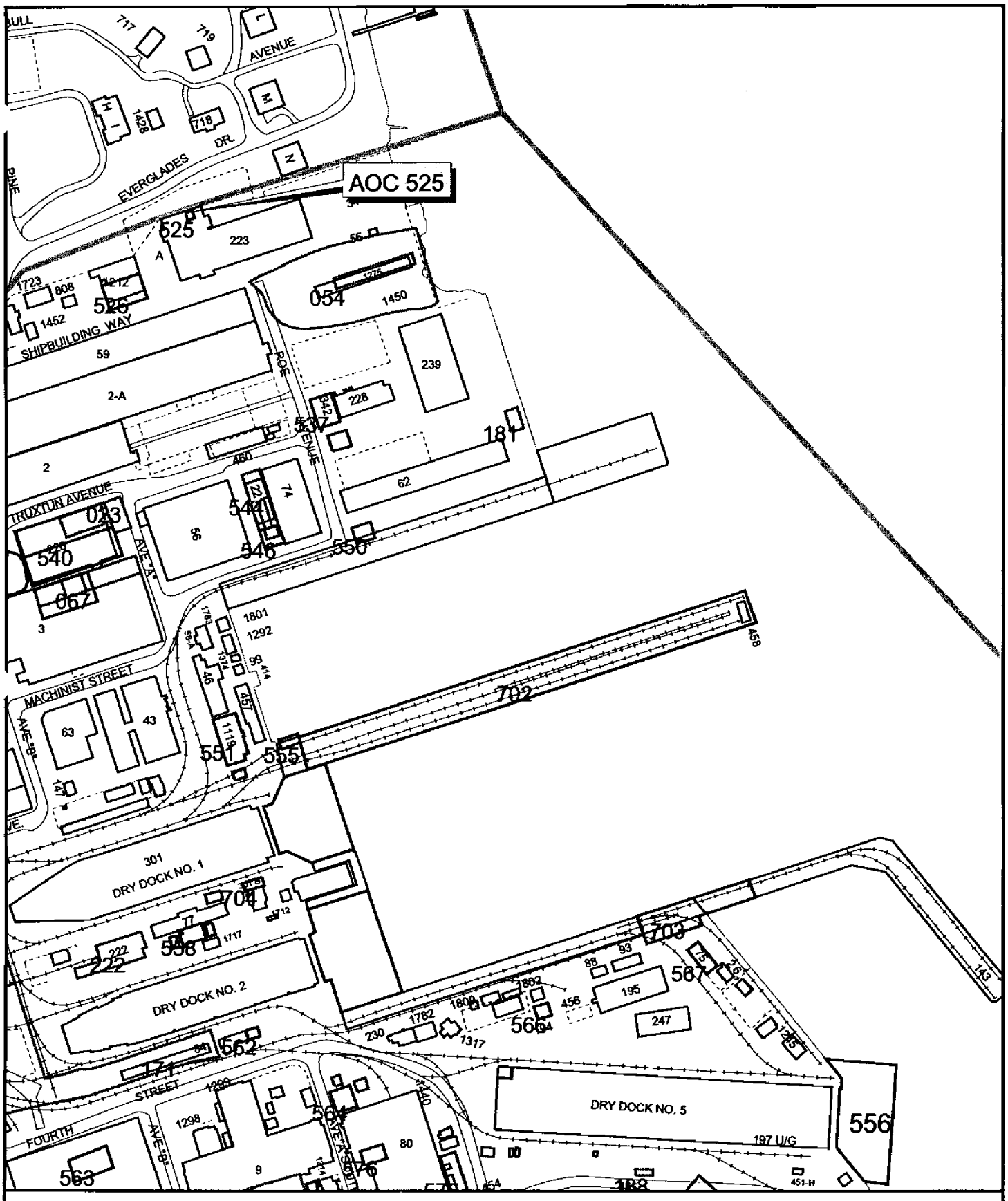

Figure 1-1
Location of AOC 525 in Zone E
Charleston Naval Complex

CH2MHILL

File Path: C:\18gis\CNC\cnc-egis.apr, Date: 25 Jun 2002 11:16, User: NMOUDRY, Figure 1-1 Location of AOC 525 in Zone E

NOTE: Aerial Photo Date is 1997

Fence
Railroads
Roads
Shoreline
AOC/SWMU Boundary
Buildings
Zone Boundary

N

0 40 80 Feet

1 inch = 50 feet

Figure 1-2
Site Map
AOC 525, Zone E
Charleston Naval Complex

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File Path: c:\18gis\projects\zone_e\non_priority\non_pro_fig2.apr, Date: 25 Jun 2002 11:29, User: NMOUDRY, AOC 525

Section 2.0

2.0 Summary of RFI Conclusions for AOC 525

This section summarizes the results and conclusions from the soil and groundwater investigation conducted at AOC 525 and reported in the *Zone E RFI Report, Revision 0* (EnSafe, 1997). Figures 2-1 and 2-2 show the soil and groundwater sampling locations respectively. Figure 2-3 shows shallow groundwater contours in the northern portion of Zone E.

As part of the Zone E RFI, soil and groundwater investigations were conducted at AOC 525 during 1995-1997. Appendix B contains the tables of detected compounds in soil and groundwater. The RFI report presented the results of these investigations and conclusions concerning contamination and risk, as summarized in the following sections. A further evaluation of chemicals of concern (COCs) at this site is provided in Section 5.0.

2.1 Soil Sampling and Analysis

Soil was sampled during one sampling event at AOC 525. Surface and subsurface soil samples were collected beneath the concrete floor from four soil boring locations near Paint Booth No. 35 (see Figure 2-1). The soil boring locations were identified as E525SB001 through E525SB004. Soil boring location E525SB001 was converted to monitoring well location E525GW001. Soil samples were analyzed for organotins, VOCs, SVOCs, pesticides, polychlorinated biphenyls (PCBs), metals and cyanide.

2.1.1 Surface Soil Results

During the RFI, surface soil detections of organic compounds were evaluated against the U.S. Environmental Protection Agency (EPA) Region III industrial risk-based concentrations (RBCs) (with a hazard index [HI]=0.1 for noncarcinogens). Surface soil detections of inorganic compounds were evaluated against the EPA Region III industrial RBCs (HI=0.1 for noncarcinogens) and the Zone E background reference concentrations (BRCs).

Section 10.19.5 Fate and Transport Assessment of the RFI report also compared the surface soil detections of organic and inorganic compounds to generic soil screening levels (SSLs) based on a dilution attenuation factor (DAF) of 10.

Detected concentrations of organic and inorganic compounds for surface soil samples were as follows:

- **Organotins:** Organotins were not detected in surface soil.
- **VOCs:** No VOCs were detected in surface soil above their respective industrial RBCs. One VOC, 2-butanone, was detected in one sample (525SB00401, 8.7 milligram per kilogram [mg/kg]) at a concentration above its SSL (4.0 mg/kg). Because 2-butanone was not detected in the subsurface sample collected at the same location (525SB00402, 1.3 UJ mg/kg) or in groundwater at the site, the detected concentration of 2-butanone in site soil was considered to be adequately attenuated with depth and protective of shallow groundwater. For these reasons, it was not considered a COC.
- **SVOCs:** SVOCs were not detected in surface soil above screening criteria.
- **Pesticides:** The nature and extent of contamination in soil section (Section 10.19.2 of the RFI report) reported that pesticides were not detected in surface soil above screening criteria. However, the fate and transport assessment section (10.19.5) reported that dieldrin was detected in surface soil sample 525SB00401 (3.2 microgram per kilogram [µg/kg]) above its SSL (2.0 µg/kg, DAF=10). Because dieldrin was not detected in the subsurface sample collected at the same location (525SB00402, 2.8 µg/kg) or in shallow groundwater at the site, the reported concentration of dieldrin was considered to be adequately attenuated with depth and protective of shallow groundwater. For these reasons, it was not considered a COC.
- **PCBs:** PCBs were not detected in surface soil.
- **Inorganics:** Inorganics were not detected in surface soil above the screening criteria.
- **Cyanide:** Cyanide was detected in one surface soil sample (525SB00201, 0.29 J mg/kg). The detected concentration was below its industrial RBC of 4,100 mg/kg (HI=0.1).

2.1.2 Subsurface Soil Results

During the RFI, subsurface soil detections of organic compounds were compared with generic SSLs (DAF=10). Subsurface soil detections of inorganic compounds were compared with generic SSLs (using a DAF=10) and the Zone E BRCs.

Detected concentrations of organic and inorganic compounds for subsurface soil samples were as follows:

- **Organotins:** Organotins were not detected in subsurface soil.
- **VOCs:** Methylene chloride slightly exceeded its SSL of 0.01 mg/kg in one subsurface soil sample (E525SB001, 0.011 mg/kg). Because methylene chloride was not detected in groundwater at the site, the concentration of methylene chloride was considered protective of shallow groundwater. Therefore it was not considered a COC.
- **SVOCs:** SVOCs were not detected in subsurface soil above the screening criteria.
- **Pesticides:** Pesticides were not detected in subsurface soil above the screening criteria.

- **PCBs:** PCBs were not detected in subsurface soil above laboratory detection limits.
- **Inorganics:** Inorganics were not detected in subsurface soil above the screening criteria.
- **Cyanide:** Cyanide was not detected in subsurface soil above laboratory detection limits.

2.2 Groundwater Sampling and Analysis

Groundwater was sampled during four sampling events at AOC 525. The data tables in Appendix H of the RFI report include data for the groundwater samples collected during all four sampling events at AOC 525. However, the RFI evaluated only the data from the first sampling event. Groundwater samples were collected from one shallow groundwater monitoring well E525GW001 shown in Figure 2-2. Groundwater samples collected from the first sampling event were analyzed for organotins, VOCs, SVOCs, pesticides, PCBs, metals, cyanide, chlorides, sulfates, and total dissolved solids (TDS).

2.2.1 Shallow Groundwater Results

During the RFI, detections in shallow groundwater samples were compared with the EPA Region III tap water RBCs and maximum contaminant levels (MCLs). Inorganics were also compared to the Zone E shallow groundwater BRCs.

Detected concentrations of organic and inorganic compounds in shallow groundwater samples collected during the first sampling event were as follows:

- **Organotins:** Organotins were not detected in shallow groundwater above laboratory detection limits.
- **VOCs:** VOCs were not detected in shallow groundwater above laboratory detection limits.
- **SVOCs:** SVOCs were not detected in shallow groundwater above laboratory detection limits.
- **Pesticides:** Pesticides were not detected in shallow groundwater above laboratory detection limits.
- **PCBs:** PCBs were not detected in shallow groundwater above laboratory detection limits.
- **Inorganics:** Inorganics were not detected in shallow groundwater above screening criteria.
- **Cyanide:** Cyanide was not detected in shallow groundwater above laboratory detection limits.

2.2.2 Deep Groundwater Results

Deep groundwater samples were not collected at AOC 525.

2.3 RFI Human Health Risk Assessment (HHRA)

The RFI report used a fixed-point risk evaluation (FRE) approach at this site. The FRE considered site resident and site worker scenarios. The detailed risk assessment for the AOC 525 site is presented in Section 10.19.6 of the RFI report.

2.3.1 Soils

The human health risk assessment (HHRA) for AOC 525 did not identify any COCs in surface or subsurface soils at AOC 525.

2.3.2 Groundwater

The HHRA for AOC 525 did not identify any COCs in shallow groundwater at AOC 525.

2.4 RFI Conclusions and Recommendations

The RFI report concluded that based on the analytical results and the FRE, no COCs for soil or shallow groundwater were identified that required further evaluation. The RFI recommended NFA for soil and groundwater at AOC 525 for the future industrial land use scenario.

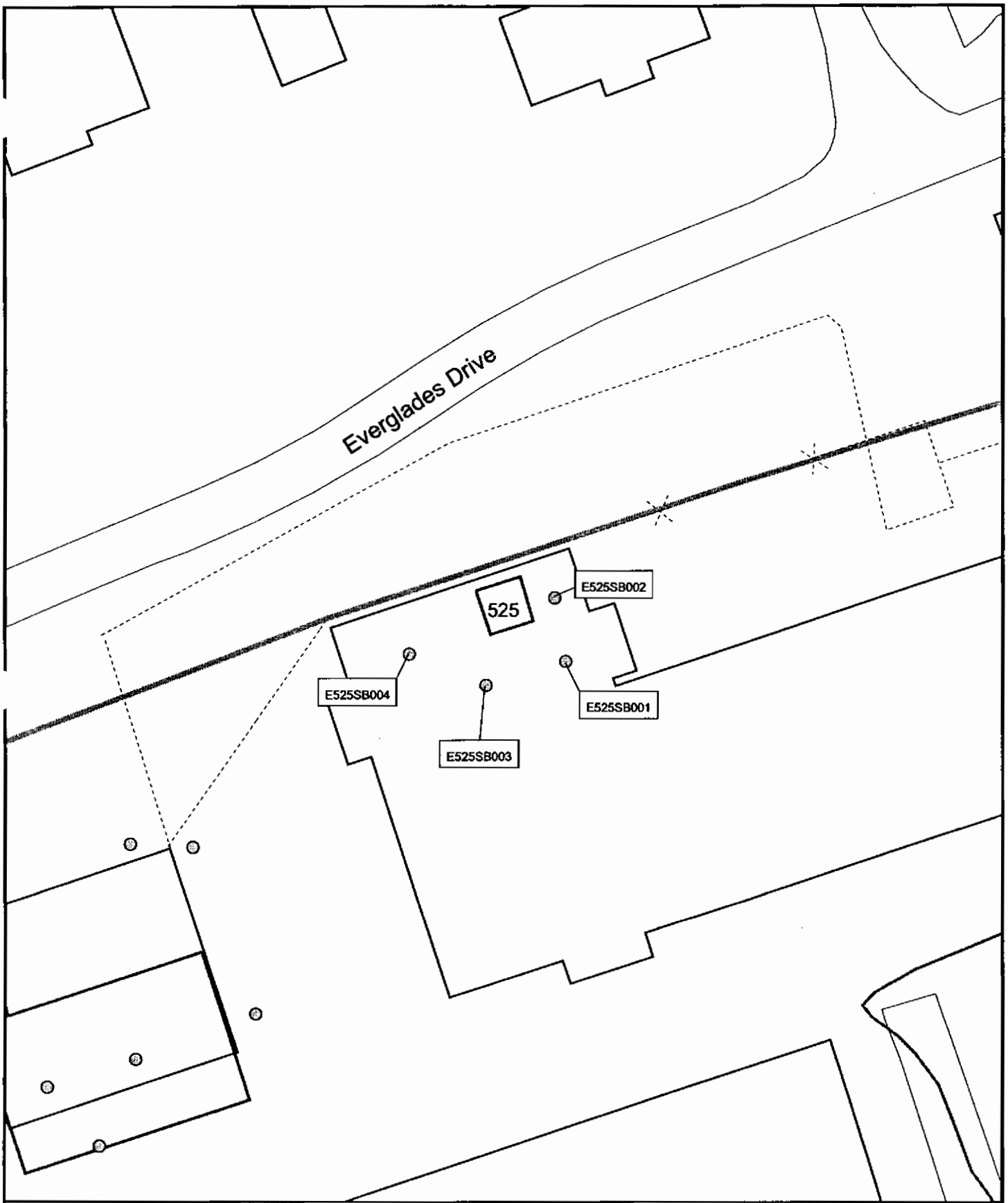

Figure 2-1
Soil Sample Locations
AOC 525, Zone E
Charleston Naval Complex

CH2MHILL

File Path: C:\18gis\Projects\Zone_E\AOC525\aoc525.apr, Date: 18 Jul 2002 8:03, User: NMOUDRY, Figure 2-1 Soil Samples

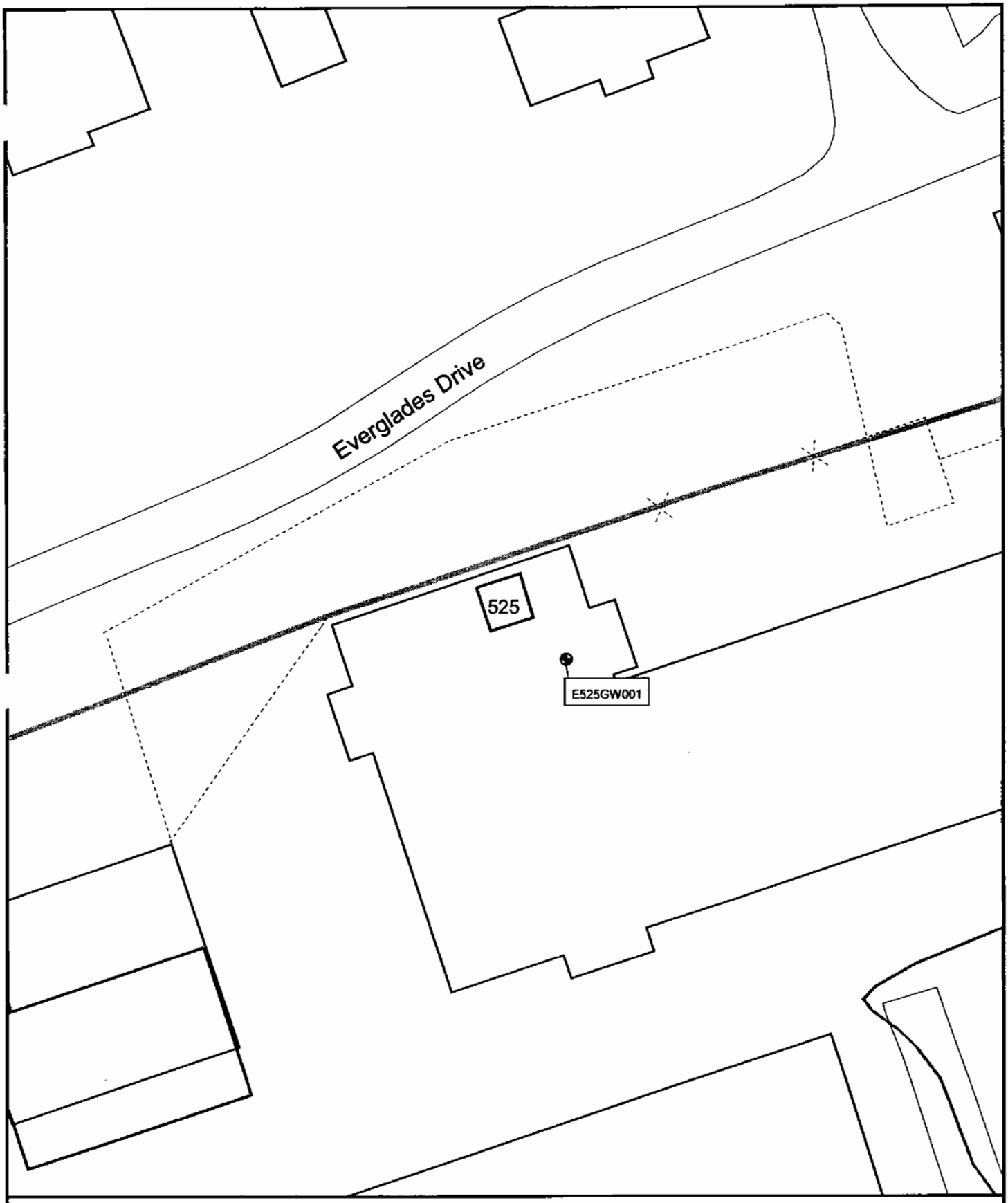

Figure 2-2
Monitoring Well Locations
AOC 525, Zone E
Charleston Naval Complex

CH2MHILL

File Path: c:\18gis\projects\zone_e\aoc525\aoc525.apr, Date: 26 Jun 2002 9:06, User: NMOUDRY, Figure 2-2 Monitoring Well Locations

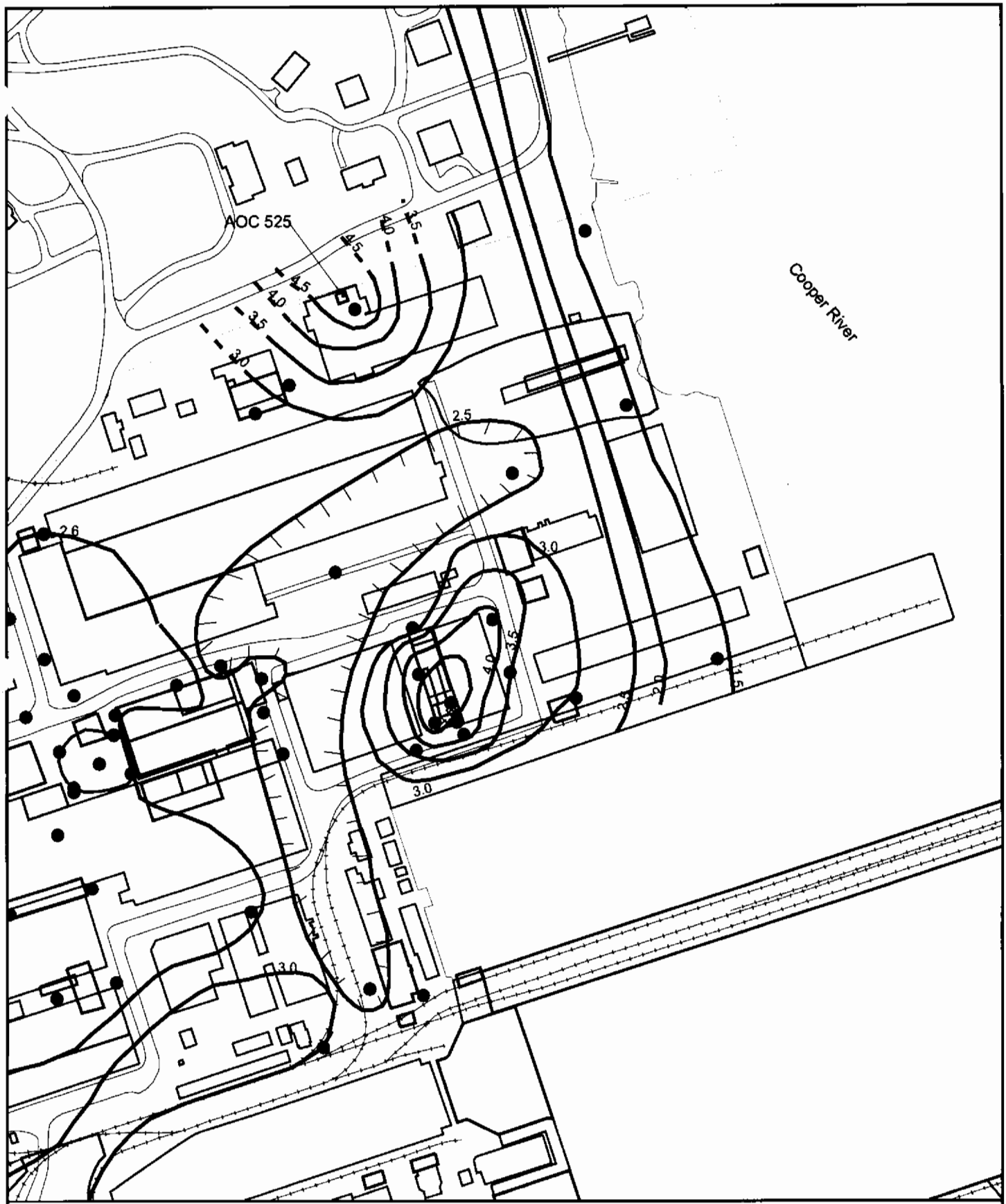

Figure 2-3
Shallow Groundwater Contours
AOC 525, Zone E
Charleston Naval Complex

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File Path: c:\18gis\projects\zone_e\zonee_gw\zonee_gw_figs.apr, Date: 09 Jul 2002 7:12, User: NMOUDRY, Figure 2-3 aoc 525

Section 3.0

1 3.0 Interim Measures and UST/AST Removals

2 3.1 UST/AST Removals

3 There are no known USTs or ASTs associated with AOC 525.

4 3.2 Interim Measures

5 No IMs have been conducted at AOC 525 to date.

Section 4.0

4.0 Summary of Additional Investigations

No additional investigations have been conducted at AOC 525 since the RFI field investigations conducted by EnSafe during the period of 1995 through 1997.

5.0 COPC/COC Refinement

The *Zone E RFI Report, Revision 0* (EnSafe, 1997) did not identify any soil or groundwater COCs for AOC 525 for the future industrial land use scenario based on the screening criteria presented in the Zone E RFI. Subsequent to submission of the RFI, the BCT has decided that VOCs detected in site soil should be screened against a generic SSL based on a DAF of 1. This section presents the re-screening of the VOC data.

Additionally, the Zone E RFI evaluated only groundwater data from the first sampling event for AOC 525. This section also evaluates detected compounds in the second through fourth groundwater sampling events.

5.1 VOCs in Soil

Acetone, 2-butanone, methylene chloride, and total xylenes were detected in soil samples at AOC 525. Tables 5-1 and 5-2 summarize the detections of VOCs in AOC 525 samples for surface and subsurface soil, respectively.

Acetone, 2-butanone, and methylene chloride were detected above their generic SSLs (DAF=1) in soil at AOC 525. VOCs were not detected in shallow groundwater samples, indicating that the current soil-groundwater equilibrium is sufficiently protective of groundwater. In addition, acetone, 2-butanone, and methylene chloride are common laboratory and/or field decontamination contaminants.

Because VOC concentrations in several soil samples exceeded the generic SSLs, a site-specific SSL was calculated for both an unpaved and paved scenario. The reported concentrations of VOCs above screening criteria were compared to the site-specific SSLs. The SSL calculation is consistent with the EPA's *Soil Screening Guidance: User's Guide* (EPA, 1996a) and the *Soil Screening Guidance: Technical Background Document* (EPA, 1996b). The unpaved and paved SSLs are shown in Tables 5-1 and 5-2. Table 5-3 presents the SSL calculations and input parameters for both paved and unpaved site conditions.

Because individual exceedances of the SSL do not necessarily represent a threat to local groundwater, mean VOC concentrations were compared to the site-specific SSLs. Table 5-4 presents the reported VOC concentrations and the calculated mean concentrations. The detected concentration of each sample was used in the calculation of the mean concentration. Generally, for samples where the compound was not detected, one-half the

reported value was used in the calculation. Methylene chloride was not detected in the samples collected at soil boring E525SB004, but the reporting limit was more than one order of magnitude above the calculated SSL. Therefore, the non-detect values for soil boring E525SB004 were not used in the mean concentration calculation for methylene chloride.

As can be seen in Table 5-4, the mean concentrations of acetone (1.08 mg/kg), 2-butanone (1.17 mg/kg), and methylene chloride (0.0043 mg/kg) are all below their respective paved SSLs. Mean concentrations of 2-butanone and methylene chloride are also below their unpaved site-specific SSL. Therefore, these two chemicals are not considered COCs.

Only acetone exceeds its unpaved site-specific SSL value. It was not detected in site groundwater. Because the site is currently occupied by a building and is expected to remain paved, there is no migration route of concern for acetone.

The isopropanol used to decontaminate field equipment during the RFI is known to have acetone as a trace contaminant (see excerpt from Memorandum from Charlie Vernoy/EnSafe to BCT, dated February 12, 1998, in Appendix C). Appendix C also presents a summary of acetone detections in Zone E grid soil samples from this memorandum. Acetone was detected in grid samples at concentrations ranging from 9 to 5,800 $\mu g/kg$. The acetone detected in soil at AOC 525 is within this range, further suggesting that it may be a sampling artifact and thus should not be considered a COC. However, as a conservative measure, acetone is retained at this time as a soil COC for the unpaved scenario only.

5.2 Groundwater

Groundwater samples were collected during four sampling events at AOC 525 as part of the RFI. The data for all four events are included in Appendix H of the RFI report. However, the RFI screening for AOC 525 was based on the groundwater data from the first sampling event only. Table 5-5 presents the detected compounds from the second through fourth groundwater sampling events.

Analytical results for groundwater samples were compared to MCLs, where available, or EPA Region III RBCs (HI=0.1) for compounds where MCLs were not available. Inorganic compounds were also compared to background concentrations. COPCs were identified based on exceedances of both the MCL and the range of background concentration (for inorganics).

The data in Table 5-5 show that inorganic compounds were all within the range of background concentrations and detected SVOCs were all below their respective RBCs (HI=0.1). Based on this information, groundwater COPCs were not identified at AOC 525.

5.3 COC Summary

For surface soil, no COCs were identified for human health risks. For protection of groundwater quality, acetone was identified as a COC for soil in an unpaved scenario only. However, acetone may have been detected due its presence in the isopropanol used to decontaminate sampling equipment or as a laboratory artifact. .In the event that the future land use changes such that Building 223 is targeted for removal and the area is planned to become unpaved, additional sampling should be undertaken at that time to confirm that acetone concentrations are not elevated in soil at the site. No soil COCs were identified for a paved scenario. COCs were not identified in shallow groundwater.

TABLE 5-2
VOCs Detected in Subsurface Soil
RFI Report Addendum, AOC 525, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (mg/kg)	Qualifier	$SSL_{generic}$ (DAF=1)	$SSL_{unpaved}$ (DAF=2.9)	SSL_{paved} (DAF=17)
Acetone	E525SB001	525SB00102	12/19/1995	0.049	J	0.8	0.4	2.4
	E525SB002	525SB00202	12/19/1995	0.065	J	0.8	0.4	2.4
	E525SB003	525SB00302	12/19/1995	0.063	J	0.8	0.4	2.4
	E525SB004	525SB00402	12/19/1995	**3.9**	=	0.8	0.4	2.4
Methylene Chloride	E525SB001	525SB00102	12/19/1995	0.011	=	0.001	0.009	0.054
	E525SB002	525SB00202	12/19/1995	0.003	J	0.001	0.009	0.054
	E525SB003	525SB00302	12/19/1995	0.004	J	0.001	0.009	0.054
Xylenes, Total	E525SB001	525SB00102	12/19/1995	0.002	J	9	NA	NA

J indicates that the compound was detected, the reported concentration is estimated.
= indicates that the compound was detected, the reported concentration is measured concentration.
$SSL_{generic}$ values are from the Soil Screening Guidance (EPA, 1996) except for 2-butanone which is from the EPA Region III RBC table (10,2000).
$SSL_{generic}$ value for total xylenes is based on the *o*-xylene SSL (EPA, 1996).
$SSL_{unpaved}$ values are calculated for site- and chemical-specific data (see Table 5-3).
SSL_{paved} values are calculated for site- and chemical-specific data (see Table 5-3).
Bold and boxed values exceed the SSL_{paved} value.
NA indicates that the information is not available or not applicable.

TABLE 5-3
Leachate Transport Analysis Model
RFI Report Addendum, AOC 525, Zone E, Charleston Naval Complex

							Parameter	Acetone	2-butanone	Methylene chloride
Chemical Specific Input Parameters										
Cw	=	Target groundwater concentration MCL (mg/L)						**6.10E-01**	**1.90E+00**	**5.00E-03**
H	=	Henry's Law Constant, dimensionless						**1.59E-03**	**1.93E-03**	**8.98E-02**
ks	=	Soil-water sorption coefficient (cm3 water / g soil = L/kg) = Koc x foc where						3.70E-02	1.17E+00	4.33E-01
		koc = organic carbon-water sorption coefficient, (cm3 (ml) water) / (g soluble organic carbon)						**1.00E+00**	**3.15E+01**	**1.17E+01**
		foc = Fraction of organic content, dimensionless					0.037			
Site Specific Input Parameters										
Sw	=	Width of Source Parallel to Groundwater Flow Direction		(impacted soil zone)	**8.6** m	28.3 ft				
da	=	Aquifer Thickness			**7.9** m	25.8 ft				
d	=	Groundwater Mixing Zone thickness	(paved)		**0.97** m	3.2 ft				
			(unpaved)		**1.83** m	6.0 ft				
i	=	Groundwater Gradient			**2.0E-03**	(unitless)				
Ks	=	Saturated Hydraulic Conductivity			**611.9** m/yr	2007.5 ft/yr				
θw	=	Volumetric Water Content of Soil Pore Space			**0.3** cm^3_{vapor}/cm^3_{soil}	0.3 in^3_{vapor}/in^3_{soil}				
θv	=	Volumetric Vapor Content of Soil Pore Space			**0.15** cm^3_{vapor}/cm^3_{soil}	0.15 in^3_{vapor}/in^3_{soil}				
ρs	=	Soil Bulk Density			**1.5** g/cm^3	93.64 lb_m/ft^3				
qi	=	Water Infiltration Rate	(paved)		**0.0086** m/yr	0.0283 ft/yr				
			(unpaved)		**0.1372** m/yr	0.4500 ft/yr				
		Partition Term, Cw/Csoil, (L/kg)						2.37E-01	1.37E+00	6.42E-01
		Dilution Term, dimensionless		(paved)	$\frac{C_{soil}}{C_w} = \left(\frac{\theta_w + K_s\rho_s + H\theta_v}{\rho_s}\right)\left(\frac{K_s i d + q_i S_w}{q_i S_w}\right)$			1.68E+01	1.68E+01	1.68E+01
				(unpaved)				2.87E+00	2.87E+00	2.87E+00
		Csoil/Cw =Partition term * Dilution term (mg/kg / mg/L) = L/kg		(paved)				3.98E+00	2.29E+01	1.08E+01
				(unpaved)				6.81E-01	3.92E+00	1.84E+00
		Calculated Site Specific Target Level for Soil								

TABLE 5-3
Leachate Transport Analysis Model
RFI Report Addendum, AOC 525, Zone E, Charleston Naval Complex

	Parameter	Acetone	2-butanone	Methylene chloride
C_{soil} calculated source soil concentration (SSL, mg/kg) Cw*(partion term)*(dilution term)	(paved)	2.4	43.6	0.054
	(unpaved)	0.4	7.5	0.0092

Notes:

Cwt is the MCL from EPA National Drinking Water Standards (March 2001)or US EPA Region III RBCs (October, 2000).
H from Table 36 of the Soil Screening Guidance; Technical Background Document (EPA, 1996), or the Hazardous Substance Data Bank (electronic)
Ks = koc x foc.
Koc from Table 39 of the Soil Screening Guidance; Technical Background Document (EPA, 1996), or the Hazardous Substance Data Bank (electronic)
Foc calculated as the mean foc from TOC measurements from Zone E.
Sw Estimated as longest dimension of AOC 525 ($[20^2+20^2]^{1/2}$=28.3).
d is calculated as $M = (0.0112\ L^2)^{0.5} + da\{1 - e^{[-L\ qi/Ks\ da]}\}$ or da, whichever is less.
Da is based on top of Ashley (-20 ft, GIS) - water level in monitor well 525GW001 (5.8 ft msl, 10/16/1006) presented in Table 2.1 of the Zone E RFI.
I Calculated from data in the Groundwater Monitoring Report ([6-3]/1520~0.002, CH2M HILL, 2001)
Ks Based on CH2M HILL's hydraulic conductivity theme in the GIS (5.5 ft/d).
θw is the default value presented in the Soil Screening Guidance: User's Guide (EPA, 1996)
θv is calculated as total porosity (0.45, assumed) - θw (0.3) = 0.15.
ρs is the default value presented in the Soil Screening Guidance: User's Guide (EPA, 1996)
qi is a derived value (5.4 in/yr) based on annual precipitation, evapo-transportation, and runoff coefficient values for the Charleston area.

TABLE 5-4
Calculated Mean Concentration and SSL Comparison
RFI Report Addendum, AOC 525, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Result (mg/kg)	Qualifier	Mean Concentration[a]	$SSL_{unpaved}$ (DAF=2.9)	SSL_{paved} (DAF=17)
Acetone	E525SB001	525SB00101	12/19/1995	0.011	UJ	1.08	0.4	2.4
		525SB00102		0.049	J			
	E525SB002	525SB00201		0.011	UJ			
		525SB00202		0.065	J			
	E525SB003	525SB00301		0.052	J			
		525SB00302		0.063	J			
	E525SB004	525SB00401		4.5	=			
		525SB00402		3.9	=			
Methyl ethyl ketone (2-Butanone)	E525SB001	525SB00101	12/19/1995	0.011	U	1.17	7.5	43.6
		525SB00102		0.011	U			
	E525SB002	525SB00201		0.011	U			
		525SB00202		0.012	U			
	E525SB003	525SB00301		0.011	U			
		525SB00302		0.012	U			
	E525SB004	525SB00401		8.7	J			
		525SB00402		1.3	UJ			
Methylene Chloride	E525SB001	525SB00101	12/19/1995	0.0020	J	0.0043 [b]	0.009	0.054
		525SB00102		0.0110	=			

TABLE 5-4
Calculated Mean Concentration and SSL Comparison
RFI Report Addendum, AOC 525, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Result (mg/kg)	Qualifier	Mean Concentration[a]	$SSL_{unpaved}$ (DAF=2.9)	SSL_{paved} (DAF=17)
Methylene Chloride	E525SB002	525SB00201		0.0040	J	0.0043 [b]	0.009	0.054
		525SB00202		0.0030	J			
	E525SB003	525SB00301		0.0020	J			
		525SB00302		0.0040	J			
	E525SB004	525SB00401		0.70	U			
		525SB00402		0.70	U			

U indicates that the compound was not detected, the reported concentration is the detection limit.
UJ indicates that the compound was not detected, the reported concentration is an estimated detection limit.
J indicates that the compound was detected, the reported concentration is an estimated concentration.
= indicates that the compound was detected, the reported concentration is the measured concentration.
[a] Mean concentration was calculated using the reported value for samples where the compound was detected and 1/2 the reported value for non-detects (U and UJ) unless noted otherwise.
[b] The mean concentration for methylene chloride is calculated without the samples results from soil boring E525SB004.

TABLE 5-5
Compounds Detected in Groundwater (Rounds 2 through 4)
RFI Report Addendum, AOC 525, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL	RBC (HI=0.1)	Range of Background
Aluminum	E525GW001	525GW00103	12/05/1996	203	=	NA	3,700	19 - 16,100
		525GW00104	02/27/1997	37.4	J			
Arsenic		525GW00104	02/27/1997	11.7	=	50	NA	3 - 316
Barium		525GW00102	08/09/1996	17.7	=	2,000	NA	6 - 398
		525GW00103	12/05/1996	74.2	J			
		525GW00104	02/27/1997	24.7	J			
Calcium		525GW00102	08/09/1996	26,500	=	NA	EN	1,170 - 260,000
		525GW00103	12/05/1996	109,000	=			
		525GW00104	02/27/1997	51,300	=			
Iron		525GW00102	08/09/1996	627	=	NA	1,100	144 - 76,600
		525GW00104	02/27/1997	2,970	=			
Magnesium		525GW00102	08/09/1996	4,900	=	NA	NA	790 - 1,160,000
		525GW00103	12/05/1996	7,430	=			
		525GW00104	02/27/1997	7,650	=			
Manganese		525GW00102	08/09/1996	736	=	NA	73	2 - 2,650
		525GW00103	12/05/1996	2.40	J			
		525GW00104	02/27/1997	1,680	=			

TABLE 5-5
Compounds Detected in Groundwater (Rounds 2 through 4)
RFI Report Addendum, AOC 525, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL	RBC (HI=0.1)	Range of Background
Nickel		525GW00103	12/05/1996	1.20	J	NA	73	0.9 - 17
		525GW00104	02/27/1997	0.82	J			
Potassium		525GW00102	08/09/1996	3,340	J	NA	EN	1,320 - 289,000
		525GW00103	12/05/1996	12,400	=			
		525GW00104	02/27/1997	6,800	=			
Sodium		525GW00102	08/09/1996	48,900	=	NA	EN	NA
		525GW00103	12/05/1996	16,200	=			
		525GW00104	02/27/1997	61,200	=			
Vanadium		525GW00103	12/05/1996	0.81	J	NA	26	0.6 - 26
2-Methylnaphthalene		525GW00102	08/09/1996	1.0	J	NA	12	NA
Acenaphthene		525GW00102	08/09/1996	8.0	J	NA	37	NA

J indicates that the compound was detected, the reported concentration is an estimated concentration.
= indicates that the compound was detected, the reported concentration is the measured concentration.
Range of background concentrations reported for Zone E.
NA indicates that the information is not available or not applicable.
EN indicates that the compound is an essential nutrient.

Section 6.0

6.0 Summary of Information Related to Site Closeout Issues

6.1 RFI Status

The *Zone E RFI Report, Revision 0* (EnSafe, 1997) addressed SWMUs/AOCs within Zone E of the CNC, including AOC 525. Based on the evaluation of site data, as discussed in this RFI Report Addendum, the RFI is considered complete.

In accordance with the RFI completion process, if a determination of No Further Investigation (NFI) is made upon completion of the RFI, then a site may proceed to either NFA status or to a corrective measures study (CMS).

The remaining subsections address the issues that the BCT agreed to evaluate prior to site closeout.

6.2 Presence of Inorganics in Groundwater

For the purpose of site closeout documentation, the inorganics in groundwater issue refers to the detection of several metals (primarily arsenic, thallium, and antimony) in groundwater at concentrations above the applicable MCL, preceded or followed by detections of these same metals below the MCL or below the practicable quantitation limit. Arsenic, thallium and antimony were not found above COPC screening criteria in groundwater at this site and were within range of background values, indicating that detected concentrations represent naturally-occurring concentrations. Further evaluation of this issue is not warranted.

6.3 Potential Linkage to SWMU 37, Investigated Sanitary Sewers at the CNC

There are no data suggesting that there was an impact to the sanitary sewers from AOC 525. Therefore, further evaluation of this issue is not warranted.

6.4 Potential Linkage to AOC 699, Investigated Storm Sewers at the CNC

There are no data that indicate that a linkage between AOC 525 and AOC 699, the investigated storm sewer, exists. Further evaluation of this issue is not warranted.

6.5 Potential Linkage to AOC 504, Investigated Railroad Lines at the CNC

There are no known connections between AOC 525 and the investigated railroad lines in Zone E at the CNC.

6.6 Potential Migration Pathways to Surface Water Bodies at the CNC

The nearest surface water body to AOC 525 is the Cooper River, which lies approximately 250 feet east of the site. The only potential migration pathway from the site to surface water is via overland flow via stormwater runoff. The entire site is covered with buildings and pavement, which eliminates contact of surface soil with stormwater. Similarly, runoff directed to the storm sewer system, which discharges to the Cooper River, does not contact the surface soil. Since the benzo(a)pyrene equivalent (BEQ) detections at the site are under concrete pavement, no further evaluation of a potential pathway for contaminant migration via stormwater runoff is warranted.

6.7 Potential Contamination in Oil/Water Separators (OWSs)

There are no oil water separators (OWSs) associated with AOC 525. In addition, there is no reference to an OWS at the site in the *Oil Water Separator Data* report (Department of the Navy, September 2000). Therefore, further evaluation of this issue is not warranted.

6.8 Land Use Controls (LUCs)

The BCT has agreed that all of Zone E will have some LUCs. At a minimum, these LUCs are expected to include restrictions against residential land use. Site-specific LUCs are also expected to be applied at specific sites within Zone E, depending on site-specific investigations. LUCs will be applied to limit the reuse of this site to non-residential use.

Section 7.0

7.0 Recommendations

The *Zone E RFI Report, Revision 0* (EnSafe, 1997) did not identify COCs in soil or shallow groundwater at AOC 525 for industrial or unrestricted land use. Based on an evaluation of the RFI data against current screening criteria adopted by the CNC BCT, along with site conditions as discussed above, no groundwater COCs were identified for the unrestricted or industrial land use scenarios. No soil COCs were identified for human health exposure concerns. Acetone was retained as a soil COC for the unpaved scenario only. Therefore, AOC 525 is suitable for continued industrial use.

AOC 525 is recommended for a focused CMS to address acetone in soil. The CMS will focus on a few remedies, such as LUCs and dig-and-haul..

Section 8.0

8.0 References

EnSafe Inc. *Zone E RFI Report, Revision 0, NAVBASE Charleston.* 1997.

EnSafe Inc./Allen & Hoshall. *Final RCRA Facility Assessment, NAVBASE Charleston.* July 1995.

EnSafe Inc./Allen & Hoshall. *Final Zone E RFI Work Plan, Revision 1, NAVBASE Charleston.* June 1995.

CH2M-Jones. *Technical Memorandum: A Summary of Inorganic Chemical Concentrations in Background Soil and Groundwater at the CNC.* 2001.

CH2M-Jones. *Technical Memorandum: Results from Additional Background Sampling of the CNC Railroad Lines and Naval Annex (Zone K). CNC.* August 2001.

South Carolina Department of Health and Environmental Control, Final RCRA Part B Permit No.

Appendix A

Response To Comments from Charles B. Watson — SCDHEC for Draft Zone E RCRA Facility Investigation Report Charleston Naval Complex

AOC 525

Comment 11

Arsenic and beryllium were detected above the residential RBC in surface soil. The vertical and horizontal extent of contamination should be determined.

EnSafe/Navy Response 11

Arsenic and beryllium were addressed in the site-specific risk assessment which identified the fact that each of these elements were well below their respective background reference concentrations.

CH2M-Jones Response 11

No additional comment.

Responses To Comments from Eric F. Cathcart — SCDHEC
for Draft Zone E RCRA Facility Investigation Report
Charleston Naval Complex

AOC 525
Comment 37
Manganese was detected above the residential RBC in shallow groundwater. The nature and extent should be evaluated. The RFI is therefore incomplete.

EnSafe/Navy Response 37
While it's true that manganese was detected at a concentration (905 µg/L) exceeding its tap water RBC, this detection was well below its background reference concentration of 2,560 µg/L.

CH2M-Jones Response 37

No additional comment.

Table 10.19.1.1
AOC 525
Soil Sampling Summary

Interval	Samples Proposed	Samples Collected	Analyses Proposed	Analyses Collected	Deviations
Upper	4	4	Standard Suite[a], organotins	Standard Suite[a], organotins	None
Lower	4	4	Standard Suite[a], organotins	Standard Suite[a], organotins	None

Note:
a = Standard Suite includes VOCs, SVOCs, metals, cyanide, and pesticides/PCBs

10.19.2 Nature of Contamination in Soil

Organic compound analytical results for soil are summarized in Table 10.19.2.1. Inorganic analytical results for soil are summarized in Table 10.19.2.2. Appendix H contains the complete data report for all samples collected in Zone E.

Table 10.19.2.1
AOC 525
Organic Compounds Detected in Soil (µg/kg)

Compound	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Industrial RBC	Number of Samples Exceeding RBC
VOCs						
Acetone	Upper	2/4	52.0 - 4,500	2,280	20,000,000	0
	Lower	4/4	49.0 - 3,900	1,020	NA	NA
2-Butanone (MEK)	Upper	1/4	8,700	8,700	100,000,000	0
Methylene chloride	Upper	3/4	2.00 - 4.00	2.67	760,000	0
	Lower	3/4	3.00 - 11.0	6.00	NA	NA
Xylene (Total)	Lower	1/4	2.00	2.00	NA	NA

Table 10.19.2.1
AOC 525
Organic Compounds Detected in Soil (µg/kg)

Compound	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Industrial RBC	Number of Samples Exceeding RBC
SVOCs						
Acenaphthene	Upper	1/4	100	100	12,000,000	0
	Lower	1/4	94.0	94.0	NA	NA
Dibenzofuran	Upper	1/4	90.0	90.0	820,000	0
Di-n-butylphthalate	Lower	1/4	140	140	NA	NA
Dimethyl phthalate	Upper	1/4	92.0	92.0	100,000,000	0
	Lower	1/4	160	160	NA	NA
Fluoranthene	Upper	1/4	140	140	8,200,000	0
	Lower	4/4	89.0 - 310	177	NA	NA
Fluorene	Upper	1/4	170	170	8,200,000	0
	Lower	1/4	94.0	94.0	NA	NA
Phenanthrene	Upper	1/4	520	520	8,200,000	0
	Lower	3/4	86.0 - 330	185	NA	NA
Pyrene	Upper	1/4	130	130	6,100,000	0
	Lower	3/4	150 - 280	213	NA	NA
SVOCs (B(a)P Equivalents)						
B(a)P Equiv.	Lower	2/4	0.0980 - 117	58.5	NA	NA
Benzo(a)anthracene	Lower	1/4	100	100	NA	NA
Benzo(b)fluoranthene	Lower	1/4	88.0	88.0	NA	NA
Benzo(k)fluoranthene	Lower	1/4	93.0	93.0	NA	NA
Benzo(a)pyrene	Lower	1/4	97.0	97.0	NA	NA
Chrysene	Lower	2/4	98.0 - 180	139	NA	NA

Table 10.19.2.1
AOC 525
Organic Compounds Detected in Soil (μg/kg)

Compound	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Industrial RBC	Number of Samples Exceeding RBC
Pesticides						
4,4'-DDD	Upper	1/4	8.20	8.20	24,000	0
	Lower	2/4	5.80 - 30.0	17.9	NA	NA
4,4'-DDE	Lower	3/4	4.50 - 58.0	25.8	NA	NA
4,4'-DDT	Upper	1/4	3.60	3.60	17,000	0
	Lower	2/4	4.40 - 5.10	4.75	NA	NA
Dieldrin	Upper	1/4	3.20	3.20	360	0
Endrin	Upper	3/4	4.60 - 43.0	18.9	61,000	0
	Lower	1/4	40.0	40.0	NA	NA
Heptachlor	Upper	4/4	3.30 - 54.0	17.2	1,300	0
	Lower	1/4	24.0	24.0	NA	NA

Notes:
μg/kg = Micrograms per kilogram
RBC = Risk-based concentration
NA = No industrial soil RBC established

Table 10.19.2.2
AOC 525
Inorganic Detections for Soil (mg/kg)

Element	Sample Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Industrial RBC	Reference Conc.	Number of Samples Exceeding RBC and RC
Aluminum (Al)	Upper	4/4	3,760 - 4,640	4,290	100,000	26,600	0
	Lower	4/4	4,550 - 5,560	5,010	NA	41,100	NA

Table 10.19.2.2
AOC 525
Inorganic Detections for Soil (mg/kg)

Element	Sample Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Industrial RBC	Reference Conc.	Number of Samples Exceeding RBC and RC
Antimony (Sb)	Upper	1/4	0.490	0.490	82	1.77	0
	Lower	3/4	0.540 - 0.950	0.703	NA	1.60	NA
Arsenic (As)	Upper	4/4	1.60 - 4.00	2.65	3.80	23.9	0
	Lower	4/4	3.00 - 5.10	4.23	NA	19.9	NA
Barium (Ba)	Upper	4/4	9.80 - 22.3	16.4	14,000	130	0
	Lower	4/4	22.6 - 52.9	38.0	NA	94.1	NA
Beryllium (Be)	Upper	4/4	0.110 - 0.200	0.150	1.30	1.70	0
	Lower	4/4	0.240 - 0.390	0.315	NA	2.71	NA
Cadmium (Cd)	Upper	1/4	0.130	0.130	100	1.50	0
	Lower	3/4	0.120 - 0.520	0.357	NA	0.960	NA
Calcium (Ca)	Upper	4/4	141 - 11,200	3,550	NA	NA	NA
	Lower	4/4	5,340 - 15,000	9,040	NA	NA	NA
Chromium (Cr)	Upper	4/4	3.80 - 6.20	5.05	1,000	94.6	0
	Lower	4/4	10.2 - 23.8	17.5	NA	75.2	NA
Cobalt (Co)	Upper	4/4	1.50 - 9.60	4.43	12,000	19.0	0
	Lower	4/4	1.90 - 8.40	3.75	NA	14.9	NA
Copper (Cu)	Upper	4/4	1.40 - 13.1	5.60	8,200	66.0	0
	Lower	4/4	12.1 - 53.2	30.5	NA	152	NA
Cyanide (CN)	Upper	1/4	0.290	0.290	4,100	0.500	0
Iron (Fe)	Upper	4/4	879 - 3,260	2,000	61,000	NA	0
	Lower	4/4	6,410 - 11,700	8,920	NA	NA	NA
Lead (Pb)	Upper	4/4	2.20 - 52.5	18.4	1,300	265	0
	Lower	4/4	51.0 - 382	188	NA	173	NA

Table 10.19.2.2
AOC 525
Inorganic Detections for Soil (mg/kg)

Element	Sample Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Industrial RBC	Reference Conc.	Number of Samples Exceeding RBC and RC
Magnesium (Mg)	Upper	4/4	105 - 387	216	NA	NA	NA
	Lower	4/4	488 - 1,050	810	NA	NA	NA
Manganese (Mn)	Upper	4/4	3.00 - 31.9	15.3	4,700	302	0
	Lower	4/4	48.7 - 109	87.7	NA	881	NA
Mercury (Hg)	Upper	1/4	0.0800	0.0800	61	2.60	0
	Lower	4/4	0.0700 - 0.150	0.123	NA	1.59	NA
Nickel (Ni)	Upper	4/4	2.20 - 4.70	2.98	4,100	77.1	0
	Lower	4/4	3.70 - 8.00	5.23	NA	57.0	NA
Potassium (K)	Upper	1/4	172	172	NA	NA	NA
	Lower	4/4	248 - 640	424	NA	NA	NA
Selenium (Se)	Lower	2/4	0.630 - 0.720	0.675	NA	2.40	NA
Silver (Ag)	Upper	1/4	0.940	0.940	1,000	NA	0
	Lower	2/4	0.310 - 0.540	0.425	NA	NA	NA
Sodium (Na)	Upper	3/4	49.3 - 125	77.4	NA	NA	NA
	Lower	4/4	54.7 - 114	89.6	NA	NA	NA
Vanadium (V)	Upper	4/4	3.20 - 5.40	4.48	1,400	94.3	0
	Lower	4/4	8.20 - 17.8	12.8	NA	155	NA
Zinc (Zn)	Upper	4/4	4.20 - 52.1	26.1	61,000	827	0
	Lower	4/4	54.5 - 315	151	NA	886	NA

Notes:
mg/kg = Milligrams per kilogram
RBC = Risk-based concentration
RC = Reference concentration
NA = No industrial RBC or RC established

Table 10.19.4.1
AOC 525
Inorganic Detections for First Quarter Groundwater
Shallow Monitoring Wells (μg/L)

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Tap Water RBC	Reference Conc.	MCL	Number of Samples Exceeding RBC and RC
Aluminum (Al)	1/1	309	309	3,700	2,810	NA	0
Iron (Fe)	1/1	276	276	1,100	NA	NA	0
Magnesium (Mg)	1/1	4,540	4,540	NA	NA	NA	NA
Manganese (Mn)	1/1	905	905	84.0	2,560	NA	0

Notes:
μg/L = Micrograms per liter
RBC = Risk-based concentration
RC = Reference concentration
NA = No RBC, MCL, or RC established

Inorganic Elements in Groundwater

Shallow Groundwater

Four metals were detected in the one shallow groundwater sample collected at AOC 525. No metal exceeded both its tap-water RBC and shallow groundwater RC.

10.19.5 Fate and Transport Assessment for AOC 525

AOC 525 is a paint booth in Building 223, surrounded by concrete and asphalt paving. Environmental media sampled as part of the AOC 525 RFI include surface soil, subsurface soil, and shallow groundwater. Potential constituent migration pathways investigated for AOC 525 include soil to groundwater, groundwater to surface water, and emission of VOCs from surface soil to air.

Findings regarding trace level methylene chloride and acetone contamination

Prepared for:Charlie Vernoy, EnSafe
February 9, 1998

Documentation concerning trace level methylene chloride and acetone contamination in a field investigation is very difficult to discover. Based on the review of many technical publications at several universities in St. Louis and extensive inquiries on the internet using five different databases for searches, Heartland ESI has not been able to discover evidence of prior papers concerning trace level contamination in the field. However, based on our extensive research, we have uncovered several documents which would support EnSafe's supposition that the concentrations of methylene chloride and acetone detected are field/laboratory contaminants.

Methylene chloride, CAS 75-09-2, is most widely used by companies that produce paint strippers, which have been determined to be a major contributor of hazardous waste generation in the Department of Defense. In addition, other companies use methylene chloride to clean metal surfaces. Thru the use of the strippers, it is plausible to ascertain that an uncertain amount of methylene chloride could randomly contaminate field samples without bias for quarterly monitoring. Methylene chloride is also categorized as a common laboratory contaminant that may be present in concentrations less than 25 μg/L or μg/Kg without being outside the technical acceptance criteria. Therefore, based on the presence of methylene chloride at the site in question as a component of paint strippers and cleaners and the allowable presence of methylene chloride in "blank" samples, all trace levels of methylene chloride, ($<$100 ppb or $<$10X methylene chloride CRQL) should be considered to be a field and/or laboratory contaminant.

The acetone, CAS 97-94-1, detected at the site can be attributed to the isopropanol utilized to decontaminate the sampling equipment. EnSafe used Fisher ACS grade isopropanol, which according to Ms. Deborah Hostetter, Senior Chemical Sales Specialist for Fisher Scientific, contains acetone as a contaminant. Deionized (DI) water rinses after the isopropanol decontamination is critical to insure that the isopropanol has been cleansed from the surface. After a field audit, EnSafe was instructed by the EPA to rinse the equipment with less DI water. If the equipment was not properly decontaminated with enough DI water to completely rid the equipment of isopropanol, traces of acetone would be present in field samples (as noted). Therefor, all trace acetone results ($<$100 ppb) can be attributed to the acetone contamination in the isopropanol.

Fisher Scientific Company

Chemical Manufacturing Division

Certificate of Analysis

1 Reagent Lane
Fair Lawn, NJ 07410
Phone: (201) 796-7100 Fax: (201) 796-1329

Catalog Number	A520	**Report Date**	10/10/97	**Mfg. Date**	10/3/97
Lot Number	970873	**Sample ID**	A520..970873.B1.		
Description	2-PROPANOL				

This is to certify that units of the above mentioned lot number were tested and found to comply with the specifications of the grade listed. The following are the actual analytical results obtained:

Result Name	Units	Test Value
APPEARANCE	PASS/FAIL	PASS-CLEAR, COLORLESS LIQUID
ASSAY	%	99.9000
COLOR	APHA	5
COPPER (Cu)	PPM	0.020
CARBONYL COMPOUNDS	%	0.00010
DENSITY	GM/ML	0.7810
EVAPORATION RESIDUE	%	0.0001
HEAVY METALS	PPM	0.20
IDENTIFICATION		PASS
IRON (Fe)	PPM	0.020
NICKEL (Ni)	PPM	0.020
TITRAT. ACID OR BASE	MEQ/GM.	0.000020
WATER (H2O)	%	0.002
SOLUBILITY IN WATER	PASS/FAIL	PASS

CERTIFIED BY

Lab Manager Fair Lawn

Edgar Estevez

Lab Manager BPF

Note: The data listed is valid for all package sizes of this lot of product, expressed as a extension of the catalog number listed above. If there are any questions with this certificate, please call Chemical Services at (800) 227-...1

Analytical Report

Fisher Scientific Company
Chemical Manufacturing Division

REV: 4,4
DATED: 4/23/97

ITEM CAT. NO.	ITEM NAME
A520	2-Propanol, Low Water, ACS
LOT NUMBER	QUANTITY BULK PART NO. BULK LOT NO.
ITEM FORMULA $(CH_3)_2CHOH$	MANUFACTURER VENDOR LOT

TESTS	SPECIFICATIONS	ACTUAL FINDINGS
Assay	99.5% $(CH_3)_2CHOH$ Minimum	
Color (APHA)	10 Maximum	
Copper (Cu)	0.1 ppm Maximum	
Description	Clear, Colorless Liquid	
Heavy Metals (as Pb)	1 ppm Maximum	
Identification	Pass Test	
Iron (Fe)	0.1 ppm Maximum	
Nickel (Ni)	0.1 ppm Maximum	
Residue after Evaporation	0.001% Maximum	
Solubility in Water	Pass Test	
Titratable Acid or Base	0.0001 meq/g Maximum	
Water (H_2O)	0.015% Maximum	
Carbonyl Compounds	Not more than 0.002% each of Propionaldehyde or acetone	

IDENTIFICATION TESTS:

A) Run infrared spectral scan of the sample in NaCL cell (path 0.025 mm). The sample should coincide with Aldrich I.R.3 - 70B.

B) The refractive index of the sample at 25pC should be from 1.3740 - 1.3760.

Analytical Report(contd)

Fisher Scientific Co.
Chemical Manufacturing Division

Item Cat#	Effective Date:	Revision#	Supersedes	Page#
A520	4/23/97	4,4	9/15/94	2

Chemist Signature:	Date:
Approved by:	Date:

Specifications & Analytical Methods Sheet

Fisher Scientific Company
Chemical Manufacturing Division

ITEM CAT. NO.	ITEM NAME	
A520	2-Propanol, Low Water, ACS	
ITEM FORMULA	FORMULA WEIGHT	BULK PART NO.
$(CH_3)_2CHOH$	60.09	
REVISION NO.	EFFECTIVE DATE	SUPERSEDES
4,4	4/23/97	9/15/94
ISSUED BY	Kishor Desai	
APPROVED BY	David Chang Product Developement	

PRECAUTION: DO NOT BREATHE FUMES. WORK IN A WELL-VENTILATED AREA.

REQUIREMENTS:

Assay	99.5% $(CH_3)_2CHOH$ Minimum
Color (APHA)	10 Maximum
Copper (Cu)	0.1 ppm Maximum
Description	Clear, Colorless Liquid
Heavy Metals (as Pb)	1 ppm Maximum
Identification	Pass Test
Iron (Fe)	0.1 ppm Maximum
Nickel (Ni)	0.1 ppm Maximum
Residue after Evaporation	0.001% Maximum
Solubility in Water	Pass Test
Titratable Acid or Base	0.0001 meq/g Maximum
Water (H_2O)	0.015% Maximum
Carbonyl Compounds	Not more than 0.002% each of Propionaldehyde or acetone

TESTS:

Follow the methods and procedures as detailed in the latest edition and supplement (if any) of the American Chemical Society publication "Reagent Chemicals". The current edition/supplement is detailed in an addendu to Fisher SOP #1.

ADDITIONS/CHANGES TO TESTING LISTED ABOVE:

ASSAY - Analyze by gas chromatography using the following parameters.

Instrument	: Varian 3500 or HP 5890
Detector	: Flame Ionization
Injector	: Capillary with Split Liner
Helium Make-up Flow	: As required

SAMS (contd)

Fisher Scientific Co.
Chemical Manufacturing Division

Item Cat#	Effective Date:	Revision#	Supersedes	Page#
A520	4/23/97	4,4	9/15/94	2

Column	: DB1 (J&W Scientific) or Equivalent
Column Dimensions	: 30 M x 0.53 mm I.D.
Film Thickness	: 5.0 micron
Injector Temp	: 250þC
Detector Temp	: 250þC
Oven Temp Initial	: 40þC
Initial Time	: 15 min
Program Rate	: 10þC/min
Final Temp	: 220þC
Final Time	: 2 min
Linear Velocity at 200þC	: 15 ± 1 cm/sec
Split Ratio	: 10:1
Detector Range	: 10
Attenuation	: 1
S/N Ratio	: 3
Area Reject	: 10
Chart Speed	: 1 cm/min
Injection Volume	: 1 þl

The approximate retention time of 2-Propanol is 5.9 minutes. Correct for Water content.

SOLUTION A - Evaporate 320 ml (250 gram) of sample to dryness on a steam bath. Add 3 ml of Nitric Acid, and digest for 2 minutes on a steam bath. Transfer the solution to the flask, dilute to the 25 ml mark (1 ml = 10 gram). This solution will be used in the determination of Copper, Iron and Nickel.

COPPER - Observe the absorption for Solution A on a suitable Atomic Absorption Spectrophotometer at 324. nm using established parameters. The absorption found should be less than that of a 1 ppm Copper (Cu) contro

DENSITY - Determine the density of the sample at 25þC on a suitable density meter.

IRON - Observe the absorption of Solution A on a suitable Atomic Absorption Spectrophotometer at 248.3 nn using established parameters. The absorption found should be less than that of a 1 ppm Iron (Fe) control.

NICKEL - Observe the absorption of Solution A on a suitable Atomic Absorption Spectrophotometer at 232.(nm using established parameters. The absorption found should be less than that of a 1 ppm Nickel (Ni) control

Carbonyl Compounds: Analyze the sample by polarography using the following parameter

Instrument	: Metrohm Polarecord Model 626
Mode	: DP
Pulse Amplitude (V/mVCm1)	:100
Scan Range (I/L)	:10 nA/mm
Drop Time(T drop/sec)	:1
Sweep Rate (T drop/sec)	:-2

SAMS (contd)

Fisher Scientific Co.
Chemical Manufacturing Division

Item Cat#	Effective Date:	Revision#	Supersedes	Page#
A520	4/23/97	4,4	9/15/94	3

Deareation Time : 10 minutes with helium or nitrogen

Procedure: To 5.0 g (6.4 ml) of sample in each of two 50 ml volumetric flasks, add 10.0 ml of pH 6.5 buffer[1], 2.0 ml of 2%; hydrazine sulfate solution and four drops of 0.2% TX-100[2]. To one of the flask, add 2.0 ml of 0.05 mg/ml standard[3] containing acetone & propionaldehyde.(sample plus standard mixture) Dilute each to volume with water and mix. Transfer a portion of the sample mixture into the cell, deareate and record the polarogram from -0.6V to -1.6V vs. SCE. Repeat with the sample plus standard mixture. The approximate peak potential for hydrazones of known carbonyl compounds are: acetone - 1.3V; propionaldehyde -1.2V.

The peak height for the sample should not be greater than one-half of the peak height for the sample plus standard.

HEAVY METALS - Evaporate 25.6 ml (20 gram) of sample in a beaker on the steam bath. Add 1 ml of 1 N Acetic Acid and 5 ml of Water, and digest on the steam bath for 3 minutes. Add 20 ml of Water to the beaker and adjust the pH to between 3 and 4 on a suitable pH meter, with either 1 N Acetic Acid or dilute Ammonium Hydroxide. Transfer the solution to a Nessler tube, dilute to 40 ml, and add 10 ml of Hydrogen Sulfide Water. The color developed in the sample tube should be less than a 0.02 mg Lead (Pb) control, and had 10 ml of Hydrogen sulfide water added to it.

WATER - Analyze by ACS method using 50.0 ml (39.7 gram) of sample.

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[1] Buffer Solution: Dissolve 10.0 g of anhydrous dibasic sodium phosphate (Na_2HPO_4) and 3.05 g of citric acid monohydrate in water and dilute to 500 ml.

[2] Available from Union Carbide Chemicals & Plastics Inc

[3] Standard: Into a 100 ml volumetric flask add about 90 ml of water. Pipet 0.62 ml of propionaldehyde and 0.64 ml of acetone (A18) into the flask and dilute to the mark with water (5 mg/ml standards). Pipet 1.0 ml of the 5 mg/ml standard into a 100 ml volumetric flask and dilute to the mark with water (0.05 mg/ml standard).

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
67-64-1 - Acetone
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
005-S-B003-02	RE	005SB00302	Soil	09/22/95	99.0000		UG/KG	23593	V
022-C-B001-01		022CB00101	Soil	09/07/95	12.0000		UG/KG	23447	V
022-S-B002-02		022SB00202	Soil	09/07/95	95.0000		UG/KG	23447	V
025-S-B011-02		025SB01102	Soil	02/28/96	16.0000		UG/KG	24830	V
053-S-B002-01		053SB00201	Soil	11/16/95	150.0000	J	UG/KG	24094	V
054-S-B011-02		054SB01102	Soil	11/21/95	79.0000	J	UG/KG	24133	V
054-S-B012-02		054SB01202	Soil	11/21/95	33.0000		UG/KG	24133	V
054-S-B013-02		054SB01302	Soil	11/21/95	170.0000		UG/KG	24133	V
054-S-B014-02		054SB01402	Soil	11/21/95	99.0000		UG/KG	24133	V
054-S-B024-02		054SB02402	Soil	11/28/95	30.0000		UG/KG	24159	V
054-S-B033-02		054SB03302	Soil	11/30/95	35.0000	J	UG/KG	24170	V
054-S-B034-01		054SB03401	Soil	11/30/95	35.0000	J	UG/KG	24170	V
065-S-B001-01		065SB00101	Soil	12/04/95	230.0000		UG/KG	24212	V
065-C-B001-01		065CB00101	Soil	12/04/95	160.0000	D	UG/KG	24212	V
065-S-B003-02		065SB00302	Soil	09/27/95	69.0000		UG/KG	23663	V
065-S-B004-01		065SB00401	Soil	09/27/95	34.0000		UG/KG	23663	V
065-S-B005-01		065SB00501	Soil	09/27/95	27.0000		UG/KG	23663	V
065-C-B005-01		065CB00501	Soil	09/27/95	290.0000		UG/KG	23663	V
065-S-B005-02		065SB00502	Soil	09/27/95	520.0000		UG/KG	23663	V
065-C-B005-02		065CB00502	Soil	09/27/95	140.0000		UG/KG	23663	V
065-S-B006-01		065SB00601	Soil	09/28/95	44.0000		UG/KG	23663	V
065-S-B006-02		065SB00602	Soil	09/28/95	18.0000		UG/KG	23663	V
065-S-B006-03		065SB00603	Soil	11/07/95	63.0000		UG/KG	24010	V
083-S-B001-01		083SB00101	Soil	11/30/95	6.0000	J	UG/KG	24170	V
083-S-B002-02		083SB00202	Soil	12/18/95	13.0000	J	UG/KG	24326	V
083-S-B003-01		083SB00301	Soil	12/14/95	88.0000	J	UG/KG	24326	V
083-S-B003-02		083SB00302	Soil	12/14/95	31.0000	J	UG/KG	24326	V
083-S-B004-01		083SB00401	Soil	12/14/95	58.0000	J	UG/KG	24326	V
083-S-B004-02	RE	083SB00402	Soil	12/14/95	60.0000	J	UG/KG	24326	V
083-S-B006-01		083SB00601	Soil	12/19/95	82.0000		UG/KG	24364	V
083-S-B007-01		083SB00701	Soil	12/14/95	27.0000	J	UG/KG	24326	V
083-S-B007-02		083SB00702	Soil	12/14/95	92.0000	J	UG/KG	24326	V
083-S-B008-01		083SB00801	Soil	12/14/95	67.0000		UG/KG	24326	V
083-S-B008-02		083SB00802	Soil	12/14/95	28.0000	J	UG/KG	24326	V
084-S-B004-02		084SB00402	Soil	12/01/95	730.0000		UG/KG	24206	V
084-S-B005-01		084SB00501	Soil	12/01/95	170.0000		UG/KG	24206	V
097-S-B003-01		097SB00301	Soil	09/18/95	34.0000		UG/KG	23535	V
097-C-B003-01		097CB00301	Soil	09/18/95	40.0000		UG/KG	23535	V
097-S-B003-02		097SB00302	Soil	09/18/95	40.0000		UG/KG	23535	V
100-S-B001-02		100SB00102	Soil	09/27/95	37.0000		UG/KG	23663	V
100-S-B002-02		100SB00202	Soil	09/27/95	130.0000		UG/KG	23663	V
100-S-B003-01		100SB00301	Soil	09/27/95	16.0000		UG/KG	23663	V
100-S-B003-02		100SB00302	Soil	09/27/95	24.0000		UG/KG	23663	V
102-S-B046-01		102SB04601	Soil	06/04/96	59.0000	J	UG/KG	25846	V
106-S-B002-01		106SB00201	Soil	09/21/95	58.0000		UG/KG	23593	V
106-S-B002-02		106SB00202	Soil	09/21/95	84.0000		UG/KG	23593	V
106-S-B003-01		106SB00301	Soil	09/21/95	28.0000		UG/KG	23593	V
106-S-B003-02		106SB00302	Soil	09/21/95	79.0000		UG/KG	23593	V
170-S-B001-02		170SB00102	Soil	01/03/96	19.0000	J	UG/KG	24431	V

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
67-64-1 - Acetone
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
170-S-B008-02		170SB00802	Soil	01/03/96	16.0000	J	UG/KG	24431	VA
170-S-B011-01		170SB01101	Soil	01/04/96	73.0000	J	UG/KG	24436	VA
170-S-B011-02		170SB01102	Soil	01/04/96	19.0000		UG/KG	24436	VA
170-S-B012-02		170SB01202	Soil	01/04/96	470.0000	J	UG/KG	24436	VA
170-S-B013-01		170SB01301	Soil	01/04/96	4400.0000		UG/KG	24436	VA
170-S-B014-01		170SB01401	Soil	01/04/96	210.0000	D	UG/KG	24436	VA
170-S-B014-02		170SB01402	Soil	01/04/96	50.0000		UG/KG	24436	VA
170-S-B015-01		170SB01501	Soil	01/04/96	310.0000	DJ	UG/KG	24436	VA
172-S-B001-01		172SB00101	Soil	09/08/95	300.0000	D	UG/KG	23447	VA
172-S-B001-02		172SB00102	Soil	09/08/95	66.0000	J	UG/KG	23447	VA
172-S-B003-01		172SB00301	Soil	09/08/95	75.0000	J	UG/KG	23447	VA
172-S-B003-02		172SB00302	Soil	09/08/95	100.0000	J	UG/KG	23447	VA
172-S-B004-01		172SB00401	Soil	09/08/95	31.0000	J	UG/KG	23447	VA
172-S-B004-02		172SB00402	Soil	09/08/95	77.0000	J	UG/KG	23447	VA
172-S-B005-01		172SB00501	Soil	09/08/95	180.0000	J	UG/KG	23447	VA
172-S-B005-02		172SB00502	Soil	09/08/95	45.0000	J	UG/KG	23447	VA
172-S-B006-01		172SB00601	Soil	09/08/95	250.0000	D	UG/KG	23447	VA
525-S-B001-02		525SB00102	Soil	12/19/95	49.0000	J	UG/KG	24364	VA
525-S-B002-02		525SB00202	Soil	12/19/95	65.0000	J	UG/KG	24364	VA
525-S-B003-01		525SB00301	Soil	12/19/95	52.0000	J	UG/KG	24364	VA
525-S-B003-02		525SB00302	Soil	12/19/95	63.0000	J	UG/KG	24364	VA
525-S-B004-01		525SB00401	Soil	12/19/95	4500.0000		UG/KG	24364	VA
525-S-B004-02		525SB00402	Soil	12/19/95	3900.0000		UG/KG	24364	VA
526-S-B007-01		526SB00701	Soil	11/17/95	120.0000	J	UG/KG	24105	VA
530-S-B001-01		530SB00101	Soil	01/09/96	24.0000	J	UG/KG	24464	VA
530-S-B001-02		530SB00102	Soil	01/09/96	10.0000	J	UG/KG	24464	VA
530-C-B001-02		530CB00102	Soil	01/09/96	25.0000	J	UG/KG	24464	VA
530-S-B002-01		530SB00201	Soil	01/09/96	68.0000		UG/KG	24464	VA
530-S-B002-02		530SB00202	Soil	01/09/96	11.0000	J	UG/KG	24464	VA
530-S-B003-01		530SB00301	Soil	01/09/96	41.0000		UG/KG	24464	VA
530-S-B003-02		530SB00302	Soil	01/09/96	25.0000		UG/KG	24464	VA
530-S-B004-01		530SB00401	Soil	01/09/96	60.0000		UG/KG	24464	VA
530-S-B004-02		530SB00402	Soil	01/09/96	20.0000	J	UG/KG	24464	VA
530-S-B005-01		530SB00501	Soil	01/09/96	480.0000	J	UG/KG	24464	VA
530-S-B005-02		530SB00502	Soil	01/09/96	35.0000		UG/KG	24464	VA
538-S-B004-01		538SB00401	Soil	08/28/95	38.0000	J	UG/KG	23359	VA
538-S-B004-02	RE	538SB00402	Soil	08/28/95	34.0000	J	UG/KG	23359	VA
538-S-B005-01		538SB00501	Soil	08/28/95	37.0000	J	UG/KG	23359	VA
538-S-B005-02		538SB00502	Soil	08/28/95	36.0000	J	UG/KG	23359	VA
538-S-B006-01		538SB00601	Soil	08/28/95	44.0000	J	UG/KG	23359	VA
538-S-B006-02		538SB00602	Soil	08/28/95	37.0000	J	UG/KG	23359	VA
538-S-B007-01		538SB00701	Soil	08/28/95	52.0000	J	UG/KG	23359	VA
538-S-B007-02		538SB00702	Soil	08/28/95	22.0000	J	UG/KG	23359	VA
538-S-B008-01		538SB00801	Soil	08/28/95	20.0000	J	UG/KG	23359	VA
538-S-B008-02		538SB00802	Soil	08/28/95	17.0000	J	UG/KG	23359	VA
538-S-B009-01		538SB00901	Soil	08/28/95	120.0000		UG/KG	23359	VA
538-S-B010-01		538SB01001	Soil	08/28/95	71.0000	J	UG/KG	23359	VA
538-S-B010-02		538SB01002	Soil	08/28/95	24.0000		UG/KG	23359	VA
539-S-B003-02		539SB00302	Soil	08/29/95	15.0000		UG/KG	23359	VA

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
67-64-1 - Acetone
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
542-S-B002-02		542SB00202	Soil	08/29/95	100.0000		UG/KG	23359	VA
544-S-B001-01		544SB00101	Soil	09/28/95	120.0000		UG/KG	23663	VA
544-S-B001-02		544SB00102	Soil	09/28/95	57.0000		UG/KG	23663	VA
544-S-B002-02		544SB00202	Soil	09/28/95	150.0000		UG/KG	23663	VA
544-S-B004-01		544SB00401	Soil	09/27/95	14.0000		UG/KG	23663	VA
544-S-B004-02		544SB00402	Soil	09/27/95	43.0000		UG/KG	23663	VA
548-S-B004-02		548SB00402	Soil	09/05/95	14.0000		UG/KG	23424	VA
551-C-B002-01		551CB00201	Soil	09/29/95	12.0000		UG/KG	23704	VA
551-C-B006-01	RE	551CB00601	Soil	09/29/95	18.0000	J	UG/KG	23704	VA
551-S-B006-02		551SB00602	Soil	09/29/95	580.0000		UG/KG	23704	VA
552-S-B001-01		552SB00101	Soil	09/28/95	110.0000		UG/KG	23663	VA
552-S-B001-02		552SB00102	Soil	09/28/95	120.0000		UG/KG	23663	VA
552-S-B002-01		552SB00201	Soil	09/28/95	18.0000		UG/KG	23663	VA
552-S-B002-02		552SB00202	Soil	09/28/95	17.0000		UG/KG	23663	VA
556-M-0004-01		556M000401	Sedmt	11/03/95	2000.0000	J	UG/KG	23969	VA
556-M-0005-01		556M000501	Sedmt	11/03/95	600.0000		UG/KG	23969	VA
556-M-0006-01		556M000601	Sedmt	11/03/95	300.0000		UG/KG	23969	VA
556-M-0007-01		556M000701	Sedmt	11/03/95	350.0000		UG/KG	23969	VA
556-M-0008-01		556M000801	Sedmt	11/03/95	560.0000		UG/KG	23969	VA
556-N-0008-01		556N000801	Sedmt	11/03/95	580.0000		UG/KG	23969	VA
558-C-C004-01		558CC00401	Soil	01/11/96	96.0000	J	UG/KG	24474	VA
559-S-B002-01		559SB00201	Soil	11/09/95	200.0000		UG/KG	24024	VA
559-S-B002-02		559SB00202	Soil	11/09/95	69.0000		UG/KG	24024	VA
559-S-B003-01	RE	559SB00301	Soil	11/09/95	110.0000		UG/KG	24024	VA
559-S-B004-01		559SB00401	Soil	11/10/95	14.0000		UG/KG	24029	VA
559-S-B008-02		559SB00802	Soil	11/06/95	220.0000		UG/KG	23980	VA
559-S-B009-01		559SB00901	Soil	11/13/95	19.0000	J	UG/KG	24029	VA
559-S-B009-02		559SB00902	Soil	11/13/95	79.0000		UG/KG	24029	VA
559-S-B010-01	RE	559SB01001	Soil	11/07/95	3.0000	J	UG/KG	23998	VA
559-S-B012-01		559SB01201	Soil	11/07/95	11.0000	J	UG/KG	23998	VA
559-S-B012-02		559SB01202	Soil	11/07/95	28.0000		UG/KG	23998	VA
559-S-B013-02	DL	559SB01302	Soil	11/06/95	1200.0000		UG/KG	23980	VA
559-S-B016-01		559SB01601	Soil	11/14/95	32.0000	J	UG/KG	24056	VA
559-S-B016-02		559SB01602	Soil	11/14/95	32.0000		UG/KG	24056	VA
559-S-B018-01		559SB01801	Soil	11/13/95	160.0000		UG/KG	24029	VA
559-S-B018-02		559SB01802	Soil	11/13/95	23.0000		UG/KG	24029	VA
559-S-B019-01		559SB01901	Soil	11/13/95	11.0000	J	UG/KG	24029	VA
559-S-B019-02		559SB01902	Soil	11/13/95	85.0000		UG/KG	24029	VA
559-S-B020-01		559SB02001	Soil	11/13/95	46.0000	J	UG/KG	24029	VA
559-S-B022-01		559SB02201	Soil	11/13/95	3.0000	J	UG/KG	24029	VA
559-S-B022-02		559SB02202	Soil	11/13/95	28.0000		UG/KG	24029	VA
559-S-B023-01		559SB02301	Soil	05/28/96	150.0000	J	UG/KG	25775	VA
559-S-B023-02		559SB02302	Soil	05/28/96	75.0000	J	UG/KG	25775	VA
559-S-B024-01		559SB02401	Soil	05/29/96	44.0000	J	UG/KG	25775	VA
562-S-B001-01		562SB00101	Soil	12/05/95	62.0000		UG/KG	24230	VA
562-S-B001-02		562SB00102	Soil	12/05/95	65.0000		UG/KG	24230	VA
563-S-B005-01		563SB00501	Soil	01/29/96	72.0000	J	UG/KG	24605	VA
564-S-B001-01	RE	564SB00101	Soil	09/08/95	81.0000	J	UG/KG	23447	VA
564-S-B002-01		564SB00201	Soil	09/08/95	58.0000	J	UG/KG	23447	VA

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
67-64-1 - Acetone
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
564-S-B002-02		564SB00202	Soil	09/08/95	32.0000	J	UG/KG	23447	VI
564-S-B003-01		564SB00301	Soil	09/08/95	10.0000	J	UG/KG	23447	VI
564-S-B003-02		564SB00302	Soil	09/08/95	34.0000	J	UG/KG	23447	VI
566-S-B001-01		566SB00101	Soil	09/09/95	44.0000		UG/KG	23474	VI
566-S-B001-02		566SB00102	Soil	09/09/95	72.0000		UG/KG	23474	VI
566-S-B002-01		566SB00201	Soil	09/09/95	50.0000		UG/KG	23474	VI
566-S-B002-02		566SB00202	Soil	09/09/95	94.0000		UG/KG	23474	VI
566-S-B003-01	RE	566SB00301	Soil	09/09/95	120.0000		UG/KG	23474	VI
566-S-B003-02		566SB00302	Soil	09/09/95	770.0000		UG/KG	23474	VI
566-S-B004-02		566SB00402	Soil	09/09/95	9.0000	J	UG/KG	23474	VI
566-S-B005-01		566SB00501	Soil	09/09/95	74.0000		UG/KG	23474	VI
566-S-B005-02		566SB00502	Soil	09/09/95	24.0000		UG/KG	23474	VI
569-S-B005-02		569SB00502	Soil	10/13/95	47000.0000		UG/KG	23801	VI
570-S-B002-02	DL	570SB00202	Soil	11/06/95	150.0000		UG/KG	23980	VI
570-S-B003-01		570SB00301	Soil	11/14/95	15.0000	J	UG/KG	24056	VI
570-S-B005-01		570SB00501	Soil	01/16/96	30.0000	J	UG/KG	24503	VI
570-S-B005-02		570SB00502	Soil	01/16/96	22.0000	J	UG/KG	24503	VI
570-S-B006-01		570SB00601	Soil	01/16/96	340.0000	J	UG/KG	24503	VI
570-S-B006-02		570SB00602	Soil	01/16/96	19.0000	J	UG/KG	24503	VI
570-S-B007-01		570SB00701	Soil	01/16/96	86.0000	J	UG/KG	24503	VI
570-S-B007-02	RE	570SB00702	Soil	01/16/96	7.0000	J	UG/KG	24503	VI
570-S-B008-02		570SB00802	Soil	01/16/96	17.0000		UG/KG	24503	VI
570-S-B009-01		570SB00901	Soil	01/16/96	57.0000	J	UG/KG	24503	VI
570-C-B009-01		570CB00901	Soil	01/16/96	89.0000		UG/KG	24503	VI
570-S-B009-02		570SB00902	Soil	01/16/96	100.0000	J	UG/KG	24503	VI
570-S-B010-01		570SB01001	Soil	01/16/96	81.0000		UG/KG	24503	VI
570-S-B010-02	RE	570SB01002	Soil	01/16/96	28.0000	J	UG/KG	24503	VI
570-S-B015-02		570SB01502	Soil	11/14/95	15.0000	J	UG/KG	24056	VI
571-C-C002-01		571LL00201	Soil	03/20/96	13.0000		UG/KG	24988	VI
571-C-C003-01		571LL00301	Soil	03/20/96	10.0000		UG/KG	24988	VI
572-S-B001-01		572SB00101	Soil	09/11/95	19.0000		UG/KG	23471	VI
572-S-B002-01		572SB00201	Soil	09/10/95	46.0000		UG/KG	23473	VI
572-S-B002-02		572SB00202	Soil	09/10/95	120.0000		UG/KG	23473	VI
572-S-B003-01		572SB00301	Soil	09/10/95	150.0000	J	UG/KG	23473	VI
572-S-B003-02	RE	572SB00302	Soil	09/10/95	270.0000		UG/KG	23473	VI
572-S-B004-01		572SB00401	Soil	09/10/95	29.0000		UG/KG	23473	VI
572-S-B004-02		572SB00402	Soil	09/10/95	44.0000		UG/KG	23473	VI
572-S-B005-01	RE	572SB00501	Soil	09/10/95	76.0000		UG/KG	23473	VI
572-S-B005-02		572SB00502	Soil	09/10/95	59.0000		UG/KG	23473	VI
572-S-B006-01		572SB00601	Soil	09/10/95	35.0000		UG/KG	23473	VI
572-S-B006-02		572SB00602	Soil	09/10/95	330.0000	J	UG/KG	23473	VI
572-S-B007-01		572SB00701	Soil	09/10/95	46.0000		UG/KG	23473	VI
572-S-B007-02		572SB00702	Soil	09/10/95	100.0000		UG/KG	23473	VI
572-S-B008-01	RE	572SB00801	Soil	09/10/95	36.0000	J	UG/KG	23473	VI
573-C-B001-01		573CB00101	Soil	10/31/95	48.0000		UG/KG	23922	VI
573-S-B002-01		573SB00201	Soil	09/11/95	22.0000		UG/KG	23471	VI
573-C-B002-01		573CB00201	Soil	09/11/95	39.0000		UG/KG	23471	VI
573-S-B002-02		573SB00202	Soil	09/11/95	72.0000		UG/KG	23471	VI
573-S-B003-01		573SB00301	Soil	09/11/95	46.0000		UG/KG	23471	VI

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

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Samples by Chemical Report

67-64-1 - Acetone

>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
573-S-B003-02		573SB00302	Soil	09/11/95	54.0000		UG/KG	23471	VI
573-C-B003-02		573CB00302	Soil	09/11/95	36.0000		UG/KG	23471	VI
573-C-B005-02		573CB00502	Soil	09/11/95	23.0000		UG/KG	23471	VI
574-S-B001-01	RE	574SB00101	Soil	11/30/95	28.0000	J	UG/KG	24170	VI
574-S-B001-02		574SB00102	Soil	11/30/95	69.0000	J	UG/KG	24170	VI
574-S-B002-01	RE	574SB00201	Soil	11/30/95	200.0000	J	UG/KG	24170	VI
574-S-B002-02		574SB00202	Soil	11/30/95	15.0000	J	UG/KG	24170	VI
574-S-B003-01		574SB00301	Soil	11/30/95	40.0000	J	UG/KG	24170	VI
574-S-B003-02		574SB00302	Soil	11/30/95	31.0000	J	UG/KG	24170	VI
574-S-B004-01		574SB00401	Soil	11/30/95	46.0000	J	UG/KG	24170	VI
574-S-B004-02		574SB00402	Soil	11/30/95	32.0000		UG/KG	24170	VI
574-S-B005-01		574SB00501	Soil	11/30/95	90.0000	J	UG/KG	24170	VI
574-S-B005-02		574SB00502	Soil	11/30/95	190.0000		UG/KG	24170	VI
576-S-B001-02		576SB00102	Soil	09/09/95	20.0000		UG/KG	23474	VI
576-S-B002-01		576SB00201	Soil	09/09/95	38.0000		UG/KG	23474	VI
576-S-B003-02		576SB00302	Soil	09/06/95	68.0000		UG/KG	23424	VI
576-S-B004-01		576SB00401	Soil	09/06/95	70.0000		UG/KG	23424	VI
576-S-B005-01		576SB00501	Soil	09/06/95	27.0000		UG/KG	23424	VI
576-S-B005-02		576SB00502	Soil	09/06/95	19.0000		UG/KG	23424	VI
578-S-B001-01		578SB00101	Soil	05/16/96	40.0000	J	UG/KG	25630	VI
578-S-B003-01	DL	578SB00301	Soil	05/16/96	300.0000	DJ	UG/KG	25630	VI
579-C-B004-01		579CB00401	Soil	09/12/95	13.0000		UG/KG	23484	VI
580-S-B001-01		580SB00101	Soil	09/14/95	160.0000		UG/KG	23502	VI
580-S-B001-02		580SB00102	Soil	09/14/95	27.0000		UG/KG	23502	VI
580-S-B002-01		580SB00201	Soil	09/14/95	120.0000		UG/KG	23502	VI
580-C-B002-01		580CB00201	Soil	09/14/95	63.0000		UG/KG	23502	VI
580-S-B003-01		580SB00301	Soil	09/14/95	180.0000		UG/KG	23502	VI
580-S-B003-02		580SB00302	Soil	09/14/95	220.0000		UG/KG	23502	VI
580-S-B005-01		580SB00501	Soil	09/14/95	38.0000		UG/KG	23502	VI
580-S-B006-01		580SB00601	Soil	09/14/95	58.0000		UG/KG	23502	VI
580-S-B006-02		580SB00602	Soil	09/14/95	51.0000		UG/KG	23502	VI
583-S-B002-01		583SB00201	Soil	09/15/95	93.0000		UG/KG	23535	VI
583-S-B003-02		583SB00302	Soil	09/18/95	66.0000		UG/KG	23535	VI
583-S-B004-02		583SB00402	Soil	09/15/95	40.0000		UG/KG	23535	VI
583-S-B005-02		583SB00502	Soil	09/15/95	24.0000		UG/KG	23535	VI
583-C-B006-01		583CB00601	Soil	09/15/95	82.0000		UG/KG	23535	VI
583-S-B007-02		583SB00702	Soil	09/18/95	110.0000		UG/KG	23535	VI
590-M-0001-01		590M000101	Sedmt	01/05/96	460.0000		UG/KG	24445	VI
590-S-B001-01		590SB00101	Soil	01/04/96	160.0000	J	UG/KG	24436	VI
590-S-B001-02		590SB00102	Soil	01/04/96	440.0000	J	UG/KG	24436	VI
590-S-B002-01		590SB00201	Soil	01/05/96	91.0000		UG/KG	24445	VI
590-S-B002-02		590SB00202	Soil	01/05/96	140.0000		UG/KG	24445	VI
590-S-B003-01		590SB00301	Soil	01/05/96	58.0000		UG/KG	24445	VI
590-S-B003-02		590SB00302	Soil	01/05/96	27.0000		UG/KG	24445	VI
590-S-B004-01		590SB00401	Soil	01/05/96	57.0000		UG/KG	24445	VI
590-S-B004-02		590SB00402	Soil	01/05/96	52.0000		UG/KG	24445	VI
590-S-B005-01		590SB00501	Soil	01/05/96	200.0000		UG/KG	24445	VI
590-S-B005-02		590SB00502	Soil	01/05/96	100.0000		UG/KG	24445	VI
596-S-B002-01	RE	596SB00201	Soil	10/23/95	150.0000		UG/KG	23859	VI

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

2905-00001 - CHARLESTON ZONE E
Samples by Chemical Report
67-64-1 - Acetone
>= 1.0000 for UG/KG - Hits Only

Sample ID	Ext.	Orig. ID	Type	Date	Result	VQual	Units	SDG #	
596-S-B007-02		596SB00702	Soil	10/23/95	260.0000		UG/KG	23859	VA
598-S-B001-02		598SB00102	Soil	09/19/95	78.0000		UG/KG	23560	VA
598-C-B002-02		598CB00202	Soil	09/19/95	38.0000		UG/KG	23560	VA
598-S-B003-02		598SB00302	Soil	09/20/95	26.0000		UG/KG	23560	VA
598-S-B004-01		598SB00401	Soil	09/20/95	29.0000	J	UG/KG	23560	VA
598-S-B004-02		598SB00402	Soil	09/20/95	37.0000		UG/KG	23560	VA
599-S-B003-01	RE	599SB00301	Soil	09/20/95	50.0000	J	UG/KG	23560	VA
599-S-B004-02	RE	599SB00402	Soil	09/20/95	58.0000		UG/KG	23560	VA
599-S-B005-01		599SB00501	Soil	09/20/95	60.0000		UG/KG	23560	VA
599-C-B005-02	RE	599CB00502	Soil	09/20/95	36.0000		UG/KG	23560	VA
602-S-B004-02		602SB00402	Soil	01/08/96	85.0000	J	UG/KG	24456	VA
603-S-B004-02		603SB00402	Soil	09/21/95	44.0000		UG/KG	23593	VA
604-S-B003-01	RE	604SB00301	Soil	01/08/96	90.0000	J	UG/KG	24456	VA
604-S-B003-02		604SB00302	Soil	01/08/96	110.0000	J	UG/KG	24456	VA
605-S-B003-01		605SB00301	Soil	09/21/95	44.0000		UG/KG	23593	VA
605-S-B004-01		605SB00401	Soil	09/21/95	180.0000		UG/KG	23593	VA
605-S-B006-02		605SB00602	Soil	09/22/95	54.0000		UG/KG	23593	VA
605-S-B008-01		605SB00801	Soil	09/22/95	41.0000		UG/KG	23593	VA
605-S-B008-02		605SB00802	Soil	09/22/95	45.0000		UG/KG	23593	VA
605-C-B010-01		605CB01001	Soil	09/21/95	40.0000		UG/KG	23593	VA
605-S-B011-01		605SB01101	Soil	09/21/95	160.0000		UG/KG	23593	VA
605-C-B011-02		605CB01102	Soil	09/21/95	17.0000		UG/KG	23593	VA
605-S-B012-02		605SB01202	Soil	05/31/96	48.0000	J	UG/KG	25805	VA
605-S-B015-02		605SB01502	Soil	05/31/96	170.0000	J	UG/KG	25805	VA
GDE-C-B001-01		GDECB00101	Soil	09/13/95	64.0000		UG/KG	23502	VA
GDE-C-B002-02		GDECB00202	Soil	09/13/95	33.0000		UG/KG	23502	VA
GDE-S-B003-01		GDESB00301	Soil	09/13/95	19.0000		UG/KG	23502	VA
GDE-S-B003-02		GDESB00302	Soil	09/13/95	26.0000		UG/KG	23502	VA
GDE-S-B006-01		GDESB00601	Soil	01/04/96	5800.0000		UG/KG	24436	VA
GDE-C-B006-01		GDECB00601	Soil	01/04/96	2500.0000		UG/KG	24436	VA
GDE-S-B006-02		GDESB00602	Soil	01/04/96	160.0000	J	UG/KG	24436	VA
GDE-S-B007-01		GDESB00701	Soil	01/08/96	230.0000	J	UG/KG	24456	VA
GDE-S-B007-02		GDESB00702	Soil	01/08/96	18.0000	J	UG/KG	24456	VA
GDE-S-B008-01		GDESB00801	Soil	09/13/95	38.0000		UG/KG	23502	VA
GDE-S-B008-02		GDESB00802	Soil	09/13/95	120.0000	J	UG/KG	23502	VA
GDE-S-B009-01		GDESB00901	Soil	09/12/95	85.0000		UG/KG	23484	VA
GDE-C-B009-01		GDECB00901	Soil	09/12/95	98.0000		UG/KG	23484	VA
GDE-S-B009-02	RE	GDESB00902	Soil	09/12/95	40.0000		UG/KG	23484	VA
GDE-S-B010-01		GDESB01001	Soil	09/12/95	18.0000		UG/KG	23484	VA
GDE-S-B010-02		GDESB01002	Soil	09/12/95	42.0000		UG/KG	23484	VA
GDE-C-B010-02		GDECB01002	Soil	09/12/95	76.0000		UG/KG	23484	VA
GDE-S-B011-01	RE	GDESB01101	Soil	01/16/96	59.0000	J	UG/KG	24503	VA
GDE-S-B011-02		GDESB01102	Soil	01/16/96	40.0000	J	UG/KG	24503	VA
GDE-S-B012-01		GDESB01201	Soil	09/12/95	14.0000		UG/KG	23484	VA
GDE-S-B013-01		GDESB01301	Soil	09/12/95	25.0000		UG/KG	23484	VA
GDE-S-B014-01		GDESB01401	Soil	11/10/95	38.0000	J	UG/KG	24029	VA
GDE-S-B014-02	RE	GDESB01402	Soil	11/10/95	11.0000	J	UG/KG	24029	VA
GDE-S-B016-02		GDESB01602	Soil	01/03/96	12.0000	J	UG/KG	24431	VA
GDE-S-B017-01		GDESB01701	Soil	02/28/96	10.0000	J	UG/KG	24830	VA

E N V I R O N M E N T A L S A F E T Y & D E S I G N S

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Samples by Chemical Report
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Sample ID	Ext. Orig. ID	Type	Date	Result	VQual	Units	SDG #	
GDE-C-B017-01	GDECB01701	Soil	02/28/96	23.0000		UG/KG	24830	VJ
GDE-S-B017-02	GDESB01702	Soil	02/28/96	9.0000	J	UG/KG	24830	VJ
GDE-S-B021-01	GDESB02101	Soil	03/01/96	72.0000		UG/KG	24855	VJ
GDE-S-B021-02	GDESB02102	Soil	03/01/96	26.0000		UG/KG	24855	VJ
GDE-S-B022-01	GDESB02201	Soil	02/28/96	12.0000	J	UG/KG	24830	VJ

*** End of Report ***

Appendix D

Engineering Comments Prepared by Jerry Stamps

1. Sections 1.1 and 6.4
   Section 1.1 states that water used to capture paint dust was discharged into the stormwater sewer system prior to the installation of the sanitary sewer system. Section 6.4, however, states that there is no data to suggest a link between AOC 525 and AOC 699 (Storm Sewer System). Given the history of the site, it appears as though a link does exist between the two sites. Consequently, the Navy must investigate AOC 699 in relation to AOC 525.

   CH2M-Jones Response:
   The statement provided in Section 1.1 of the RFIRA about the paint booth discharging to the storm sewer prior to 1972 was paraphrased based on information provided in the RFA report. After reviewing the RFA and information about the time at which Building 223 was constructed, it appears that it is impossible for any paint booths at AOC 525 to have discharged to the storm sewer prior to 1972. The reason for this is that Building 223 was not constructed until 1973. Therefore, there were no discharges from this building prior to 1973 since it did not yet exist and no discharges to the storm sewer could have occurred. The text in the RFIRA will be revised to reflect this corrected information. Based on this information, no investigation of AOC 699 relative to AOC 525 is warranted.

   It should also be noted that the RFA describes AOC 525 as "five dry filter-type paint booths" at Building 223. There is not data or information presented in the RFA or RFI reports that any water using operations occurred in these paint booths, only speculation in the RFA that one of the booths at AOC 525 might have been in operation prior to 1972 and could have used water. Please see CH2M-Jones' response to the comments on the AOC 525 RFIRA from Paul Bergstrand for a more complete discussion of this issue.

2. Section 2.1.1, Cyanide
   This section should state that the cyanide detection in sample 525SB00201 is below the EPA Region III Residential RBC rather than solely the Industrial RBC.

   CH2M-Jones Response:
   The suggested revision will be made.

3. Section 5.1, VOCs in Soil
   The EPA identifies the VOCs detected in the soil as common laboratory contaminants. The Navy should evaluate and provide the data validation summary to determine if these contaminants are site related or are laboratory artifacts.

   Please note that the Department has not accepted the Ensafe memorandum entitled *A Comprehensive Review of Common Laboratory Artifacts Detected in Environmental Samples from the Charleston Naval Base* (February, 1998). The Department maintains that the identification of detected compounds as laboratory artifacts must be supported by the QA/QC samples on a site-specific basis.

CH2M-Jones Response:
The laboratory QC blanks related to these samples will be reviewed to further assess this issue and relevant information will be provided as requested. Because the mean soil concentrations of 2-butanone and methylene chloride are below unpaved site-specific SSL values, these two chemicals should not be considered chemicals of concern (COCs) at this site regardless of the results of the laboratory QC samples.

4. Section 5.1, VOCs in Soil
It is stated that acetone exceeds the unpaved site-specific SSL but is below the paved SSL. Consequently, acetone was eliminated from further consideration because the area is paved. This implies that the pavement will be used as a land use control in addition to the reuse restriction expected to be applied over the entire Zone E. As such, a No Further Action determination is not appropriate, and the maintenance of the pavement is expected to be at least part of the final remedy for AOC 525. Of course, this comment does not apply should the Navy be able to demonstrate that the acetone is a laboratory artifact.

CH2M-Jones Response:
We will look to see whether there is any contamination of QC blanks with acetone. If the blanks show no acetone contamination, we understand that SCDHEC may choose to consider acetone a COC for soil from a leaching concern or to not consider it a COC, due to its confirmed presence in the decontamination fluid used on the equipment and occurrence as a common laboratory contaminant.

In the event that SCDHEC chooses to consider acetone a soil COC, the Navy and CH2M-Jones will change the recommendation for the site from NFA to a recommendation for a Corrective Measures Study (CMS), with pavement/land use controls as a presumptive remedy to ensure that the building or pavement which currently act to preclude infiltration remains in place. Because the site is already designated in an area that will have land use controls (Zone E), this is not expected to be a significant impact. There are currently no plans to develop this property or remove the building or existing pavement. We are in agreement with the approach proposed above by the SCDHEC reviewer.

5. Section 5.1.1
The Navy must present the calculated BEQ concentration for the subsurface soil. Though the Department has calculated this value (642.11 ppb) and determined it is below the screening value of 1400 ppb, the BEQ concentration for subsurface soil must be presented to complete the administrative record.

CH2M-Jones Response:
The requested BEQ value will be provided.

Hydrogeology Comments Prepared by Paul Bergstrand

AOC 525 is described as a paint booth in Building 223. A water curtain was used to capture paint dust before a dry filter system was installed. The water curtain system reportedly discharged to the storm sewer before 1972 and to the sanitary sewer after 1972.

The Navy has not described, sampled or addressed the water curtain system, the connections of the water curtain system to the storm and sanitary sewers or the storm and sanitary sewers.

A site visit was conducted on 4 September 2002 with Mr. Rob Harrell of SDIV, Mr. Jerry Stamps, Mr. Gil Rennhack, Mr. Don Hargrove and Mrs. JoCherie Overcash of DHEC. Large steel plates were noted to the north behind the painting booth (see Photos & Figure). The steel plates had holes drilled and water was visible below the steel plates. Sediments appeared to be under the steel plates. This area would be the most logical location for a paint booth water curtain settling basin. The area with the large steel plates has not been described, sampled or addressed.

The goal of the AOC 525 RFI Report Addendum was to complete the nature and extent investigation for chemicals of potential concern (COPCs) identified in surface soil, subsurface soil, and groundwater. Because the water curtain, storm sewer, sanitary sewer, and the probable paint booth water curtain settling basin have not been sampled or addressed, it is not apparent by this document that the goal was achieved. Because the RFI Report Addendum did not achieve the goal, the document should not be approved.

Comments and actions necessary to complete the RFI Report Addendum are summarized in the attachment. Several maps and figures have been included for reference.

Questions regarding this correspondence should be directed to me at 803.896.4016 or by e-mail at bergstpm@dhec.state.sc.us.

Hydrogeology Comments Prepared by Paul Bergstrand

RFI Report Addendum, AOC 525, Zone E, Revision 0

SCDHEC General Comments

1. AOC 525 is described as a paint booth in Building 223. The RFI indicates that a water curtain was used to capture paint dust before a dry filter system was installed. The water curtain reportedly discharged to the storm sewer before 1972 and to the sanitary sewer after 1972. The RFI report, however, did not provide any maps or figures representing the water curtain, the water curtain settling basin (if any) or the water curtain connections to the storm or sanitary sewer. A site visit to AOC 525 was conducted on 4 September 2002 with Mr. Rob Harrell of SDIV, Mr. Jerry Stamps, Mr. Gil Rennhack, Mr. Don Hargrove and Mrs. JoCherie Overcash of DHEC. Large steel plates were noted to the north of Building 223 directly behind the painting booth (see photos and Figure). The steel plates had holes drilled and water was visible below steel plates. Sediments were noted to be under the steel plates. This area would appear to be the most logical location for a paint booth water curtain settling basin. The Navy must describe the water curtain waste management process for this AOC and provide the appropriate "as built" drawings, diagrams and figures to show where and how the water curtain was used, any appurtenances such as a settling basin and the connections to the storm and sanitary sewers. The Navy may need to sample sediments under plates for paint waste. The presence of a settling basin would require acceptable sampling and suitable analysis. The Navy must collect appropriate storm and sanitary sewer samples in order to complete the RFI for this site.

CH2M-Jones Response:

The above representation of the AOC 525 paint booth as a "water current" paint booth is incorrect. Additionally, the reviewer makes several assertions about what the RFI states regarding paint booth operations at AOC 525 that we found was not possible to confirm in the RFI report. One statement above, which is similar to a statement provided in the RFIRA prepared by CH2M-Jones for this site, also appears to be impossible to be correct. Each of these problems with the SCDHEC reviewer's comments are discussed below.

The Final RCRA Facility Assessment report (EnSafe, 1995) clearly describes AOC 525 as consisting of "five dry-filter type paint booths." The RFA report never uses the phrase "water curtain" in any of its discussion of AOC 525 paint booths. Thus, the reviewer's representations of AOC 525 as a "water curtain" paint booth are incorrect. The phrase "water curtain" paint booth was also not found in any reference to AOC 525 in the RFI report.

We were unable to confirm the reviewer's statements that: "The RFI indicates that a water curtain was used to capture paint dust before a dry filter system was installed. The water curtain reportedly discharged to the storm sewer before 1972 and to the sanitary sewer after 1972." Our review of the draft Zone E RFI Report (Section 10.19, AOC 525 Paint Booth, Building 223, November 1997) did not reveal any of these statements in the RFI report nor the use of the phrase "water curtain" in any reference to the paint booths at AOC 525, nor could we locate any RFI reference to discharges from the AOC 525 paint booths to the

sanitary sewer after 1972. If the reviewer could provide specific page numbers to the RFI report where references to AOC 525 water curtains and discharges from the dry paint booths to the sanitary sewer occur, it would be helpful. However, based on the specific RFA description of AOC 525 consisting of five dry-filter type paint booths, the reviewer's suggestion that AOC 525 is comprised of a "water curtain" paint booth is incorrect.

The statement that the paint booths at AOC 525 discharged to the storm sewer prior to 1972, which originally occurred in the RFA and was the basis for a similar comment to a statement we provided in Section 1.1 of the RFIRA for AOC 525, is also incorrect. In fact, Building 223 was not constructed until 1973. Therefore, it is not possible for any paint booths at AOC 525 to have discharged to a sewer in 1972 (or prior to 1972), since Building 223 and the paint booths did not yet exist. The text in the RFIRA will be revised to reflect this corrected information. This issue is a key one because it indicates that the reason for the investigation of the dry-filter paint booths at AOC 525 was based on a lack of knowledge about when these dry filter-type paint booths were actually placed in operation.

The suggestion that water may have been used at one time in the dry filter paint booths at AOC 525 occurs once in the RFA report, section 5.6.3, Migration Pathways, of the AOC 525 discussion as follows: "Prior to 1972, water used to capture paint dust from the paint spray booths was discharged directly into the Cooper River."

A more generic statement about how paint booth wastes were handled at the CNC before 1972, but not confirmed in the case of the paint booths at AOC 525, appears later in the RFA report, in section 5.6.4, Evidence of Release: "The preliminary review found no spill reports, inspection reports, employee interviews, or visual observations which would indicate any release at this unit. However, prior to the 1972 installation of a sanitary sewer system, wastewaters containing paint wastes were discharged directly into the Cooper River. The age of Booth 35 suggests the possibility of past releases from this unit."

It appears that in spite of the lack of evidence of a release of contamination from these dry-filter paint booths, there was speculation at the time the RFA was prepared that a single dry filter paint booth, Booth 35, may have operated prior to 1972 and thus may have had wet-type operations prior to 1972. However, since Building 223 was not constructed until 1973 and the paint booths were not installed until after the building was constructed, such speculation about Booth 35 or the other booths being in operation prior to 1972 is clearly incorrect. The description of the paint booths as dry-filter operations and the construction of these facilities after 1973 suggests that the AOC 525 paint booths were in fact never water-using or "water curtain" paint booths.

Regarding the steel plates behind Building 223 referred to above, a construction drawing was located that indicates that these steel plates were part of operations of the facility "Shipbuilding Ways 343," which occupied the location of Building 223 prior to its construction. Thus, the steel plates do not have any relationship to paint booths at AOC 525. Speculation that these plates are part of a subsurface water curtain paint booth operation at AOC 525 are thus incorrect. A copy of the construction drawing showing these steel plates associated with Shipbuilding Ways 343 will be provided.

Based on the lack of any water curtain paint booths associated with AOC 525, the fact that the steel plates are not associated with AOC 525, and lack of contamination found at this site during the RFI, no further soil or groundwater investigations are warranted.

2. AOC 525 has only one shallow monitoring well, 525GW001, to assess groundwater at this site. The nearest shallow monitoring is approximately 175 feet to the south west of the AOC and is side gradient. The nearest upgradient monitoring well is >650 feet to the northwest. This results in the Navy defining the groundwater flow at this AOC with one monitoring well. Furthermore, the RFI Report Addendum has not fully addressed the waste management process of this AOC. Without understanding the site groundwater flow or the waste management process it is not possible to conclude that the single shallow monitoring well is adequate to assess the groundwater at this site. The Navy may need to install upgradient and downgradient monitoring wells. The Navy must demonstrate adequate groundwater assessment at this AOC.

CH2M-Jones Response:

The Zone E RFI work plan specified the level of groundwater sampling and investigation required for this site after careful review of site conditions, assessment of the potential for release and impacts to the environment, and evaluation of relevant operational data. The CNC BCT that developed and approved the Zone E RFI work plan considered a single well adequate to assess whether groundwater was impacted at the site. It was installed based on a thorough and appropriate review of site information and installed where the team believed it was most likely to detect impacts from site operations. Because of the time frame that the RFI work plan was developed (1994 to 1995), the CNC BCT members that developed the work plan were able to interview site personnel that had worked at the facility for many years and use information from these employees to refine the investigation work plan and best locate the sampling locations to detect potential contamination.

The well that was installed does not indicate the presence of contamination. Consequently, there is no reason to install additional wells, either upgradient or downgradient.

SCDHEC Specific Comments

3. Page 2-2, Section 2.1.2

This section states that "*Because methylene chloride was not detected in groundwater at the site, the concentration of methylene chloride was considered protective of shallow groundwater. Therefore it was not considered a COC.*" The Navy fails to consider or address the following:

A. The subsurface methylene chloride detection in 525SB001 has increased from the surface soil detection (0.002 mg/kg surface to 0.011 mg/kg subsurface). How or why there is an increase of methylene chloride in soil was not addressed.

B. The soil screening value for methylene chloride is 0.001 mg/kg. The soil detections in 525SB001 exceed the soil screening value. The groundwater from the only monitoring well (525GW001) was only sampled once for VOCs. One round of VOC analysis may not be sufficient to determine that the soil contamination levels are protective of groundwater.

The Navy must address these issues in order to document the methylene chloride levels in soil at 525SB001 are protective of groundwater. In order to demonstrate the soil contamination levels are protective of groundwater the Navy must purge and resample the well for SVOC and VOC analysis.

CH2M-Jones Response:
Methylene chloride concentrations in soil are addressed in the RFIRA per agreements presented in the CNC Project Team Notebook (CH2M-Jones, 2001), first using generic SSLs (DAF=1) and then using site-specific SSLs that are calculated based on both a paved and unpaved scenario. This chemical was found to be below its unpaved site-specific SSL, thus further assessment is not warranted.

As noted in the response to the following comment, in the event that we are unable to confirm why the four groundwater samples were not analyzed for VOCs and SVOCs at AOC 525, an additional groundwater sample will be collected and analyzed for VOCs to assess current groundwater quality.

4. Page 2-3, Section 2.2

This section states "*Groundwater was sampled during four sampling events at AOC 525.*" and "*However, the RFI evaluated only the data from the first sampling event.*" While this is technically correct this section fails to point out that groundwater was only sampled once for VOCs and twice for SVOCs during the four sampling events at AOC 525. AOC 525 is described as a paint spray booth which managed paint and paint solvents. The Zone E RFI Workplan proposed four rounds of groundwater VOC and SVOC sampling and analysis which would be appropriate for a paint spray booth. A decision, however, was made to limit groundwater VOC analysis to only one sampling event and SVOC analysis to two events. The Final Comprehensive Project Management Plan, dated July 1996, outlines a process to document the reduction of analytical parameters. The

documentation supporting the reduction of analytical parameters has not been provided.

It should be clearly noted that the Ensafe Draft RFI report did not provide any indication that groundwater analysis of VOCs and SVOCs had been limited or documentation as described above. The documentation regarding the reduction of groundwater analytical parameters must be provided and discussed in the revised RFI Report.

CH2M-Jones Response:
The RFI work plan indicated that four samples would be collected from the well at AOC 525 and analyzed for VOCs and SVOCs. We have been unable to confirm why the planned four samples were not analyzed for VOCs and SVOCs. However, we will continue to assess the reason for this; it is possible that this was discussed at a BCT meeting and a decision to reduce the sampling was documented. If we are unable to confirm how this decision was made, we agree to collect an additional groundwater sample from this well and analyze for VOCs and SVOCs.

5. Page 5-1, Section 5.1

The RFI Report Addendum states that "*Acetone, 2-butanone and methylene chloride were detected above their generic SSLs in soil at AOC 525.*" This section continues by stating the VOCs "*were not detected in shallow groundwater samples, indicating that the current soil-groundwater equilibrium is sufficiently protective of groundwater. In addition, acetone, 2-butanone and methylene chloride are common laboratory and/or field decontamination contaminants.*" The Navy has failed to support these conclusions for the following reasons.

A. The RFI assessment for soil and groundwater has not been completed.

B. The reduction of groundwater VOC analysis on the COPC/COC refinement has not been discussed and must also be considered.

C. The AOC is described as a paint spray booth and the chemicals such as acetone, 2- Butanone (Methyl Ethyl Ketone) and Methylene Chloride may be present in the environment as a result of Naval activity.

D. The Department understands that it is possible for environmental samples to become tainted with common laboratory and/or field decontamination contaminants. While the possibility of common laboratory and/or field decontamination contaminants is valid, the Navy has not provided any data to support this contention.

The Navy must provide adequate data to support the contention that the environmental samples had become tainted with common laboratory and/or field decontamination *contaminants*. After the Navy has completed additional sampling, as described in previous comments, this section must be reevaluated and revised as necessary.

CH2M-Jones Response:
We assume that the suggestion that the RFI is not completed is based on premise expressed in the first comment that AOC 525 consists of a water curtain paint booth and that the steel plates discussed in the first comment are a part of the water curtain system, and, as such, more investigation is required. Given that the steel plates are not a part of the AOC 525 paint booth system, and that AOC 525 is not a water curtain paint booth, we do not believe that additional investigations are necessary. The sample results do not indicate contamination that warrants further investigation.

6. Page 5-2, Section 5.2

The RFI Report Addendum states *"groundwater COPCs were not identified at AOC 525."* The Navy has failed to support this conclusion for the following reasons.

A. The RFI assessment for soil and groundwater is not complete.

B. The reduction of groundwater VOC analysis on the COPC/COC refinement has not been discussed and must also be considered.

After the Navy has completed additional sampling, as described in previous comments, this section must be reevaluated and revised as necessary.

CH2M-Jones Response:
Per previous comment responses and depending on whether another groundwater sample needs to be collected, this issue will be reconsidered as necessary.

7. Page 6-1. Sections 6.3 and 6.4

These sections of the RFI Report Addendum address potential linkage to the sanitary and storm sewers at the CNC. Both sections state *"There are no data suggesting that there was an impact to the sanitary sewers from AOC 525."* and *"There are no data that indicate a linkage between AOC 525 and AOC 699, the storm sewer, exists."* The report fails to note that the storm and sanitary sewers associated with AOC 525 did not have any analytical data collected. Therefore without analytical samples it would be impossible to have any data to *"suggest"* or *"indicate"* an impact to the sewers. The Navy must provide diagrams of the sanitary and storm sewers, the as built drawings of the water curtain system, and show how the water curtains drained into the sewers. The Navy must collect adequate storm sewer and sanitary sewer samples in order to complete this RFI investigation.

CH2M-Jones Response:
As previously discussed, there are no data in the RFA or RFI that indicate that water curtain paint booths are part of this AOC or that any discharges to the sewer occurred from these paint booths. Therefore we do not believe that additional investigations of the sewers are warranted. Because these paint booths were not constructed prior to 1973, they were not capable of discharging to the storm sewer. No references to these paint booths discharging to the sanitary sewers were found in the RFA or RFI.

8. Page 6-2, Section 6.6

   This *section* states "*...the Cooper River, which lies approximately 250 feet east of the site.*" The GIS indicates the Cooper River is more than 400 feet to the east of the site. Please review and revise as necessary.

   CH2M-Jones Response:
   The RFIRA will be revised are requested.

Necessary Actions

This is a brief summary of necessary actions for the Navy to conclude the RFI Report Addendum. The numbers correspond the comments. The Department will reevaluate all information in the revised RFI Report.

1 & 7. The Navy must describe the water curtain waste management process for this AOC and provide the appropriate "as built" drawings, diagrams and figures to show where and how the water curtain was used, any appurtenances such as a settling basin and the connections to the storm and sanitary sewers. The Navy may need to sample sediments under plates for paint waste. The presence of a settling basin would require acceptable sampling and suitable analysis. The Navy must collect appropriate storm and sanitary sewer samples in order to complete the RFI for this site.

   CH2M-Jones Response:
   Because the AOC 525 paint booths are dry-filter type, there are no water curtains associated with them. The steel plates behind Building 223 are not part of this AOC and are not a settling basin. No additional investigations of this AOC or sewers is necessary.

2. The Navy may need to install upgradient and downgradient monitoring wells. The Navy must demonstrate adequate groundwater assessment at this AOC.

   CH2M-Jones Response:
   There are no data indicating that additional groundwater investigations are required. We disagree with the need to install additional wells.

3. The Navy must document that the methylene chloride levels in soil at 525SB001 are protective of groundwater. In order to demonstrate the soil contamination levels are protective of groundwater Navy must purge and resample well 525GW001 for SVOC and VOC analysis.

   CH2M-Jones Response:
   We agree to collect and analyze an additional sample, unless we can document the reason (i.e., BCT agreement) why samples were not analyzed for VOCs and SVOCs.

4. The documentation regarding the reduction of groundwater analytical parameters must be provided and discussed in the revised RFI Report.

CH2M-Jones Response:
We will provide this information if it is available. Otherwise we will resample the well as previously discussed.

5 & 6. The Navy must provide adequate data to support the contention that the environmental samples had become tainted with common laboratory and/or field decontamination contaminants. After the Navy has completed additional sampling, as described in previous comments, the COPC/COC Section must be reevaluated and revised as necessary.

CH2M-Jones Response:
This is an option only for acetone, as discussed in our response to comments from Jerry Stamps. It is unnecessary for other VOCs.

8. The Navy must review the distance from AOC 525 to the Cooper River and revise the text as necessary.

CH2M-Jones Response:
The report will be revised as requested.

CH2MHILL TRANSMITTAL

To: Jerry Stamps
South Carolina Department of Health
and Environmental Control
Bureau of Land and Waste
Management
2600 Bull Street
Columbia, SC 29201

From: Dean Williamson/CH2M-Jones

Date: November 1, 2002

Re: CH2M-Jones' Responses to Comments by SCDHEC regarding the *RFI Report Addendum, Area of Concern 525, Zone E, Charleston Naval Complex* (Revision 0)

Quantity	Description
4	CH2M-Jones' Responses to Comments by SCDHEC regarding the *RFI Report Addendum, Area of Concern 525, Zone E, Charleston Naval Complex* (Revision 0) – Originally Submitted on July 23, 2002

If material received is not as listed, please notify us at once

Remarks:

Copy To:

Paul Bergstrand/SCDHEC, w/att
Rob Harrell/Navy, w/att
Gary Foster/CH2M-Jones, w/att

Engineering Comments Prepared by Jerry Stamps

1. Sections 1.1 and 6.4
   Section 1.1 states that water used to capture paint dust was discharged into the stormwater sewer system prior to the installation of the sanitary sewer system. Section 6.4, however, states that there is no data to suggest a link between AOC 525 and AOC 699 (Storm Sewer System). Given the history of the site, it appears as though a link does exist between the two sites. Consequently, the Navy must investigate AOC 699 in relation to AOC 525.

   CH2M-Jones Response:
   The statement provided in Section 1.1 of the RFIRA about the paint booth discharging to the storm sewer prior to 1972 was paraphrased based on information provided in the RFA report. After reviewing the RFA and information about the time at which Building 223 was constructed, it appears that it is impossible for any paint booths at AOC 525 to have discharged to the storm sewer prior to 1972. The reason for this is that Building 223 was not constructed until 1973. Therefore, there were no discharges from this building prior to 1973 since it did not yet exist and no discharges to the storm sewer could have occurred. The text in the RFIRA will be revised to reflect this corrected information. Based on this information, no investigation of AOC 699 relative to AOC 525 is warranted.

   It should also be noted that the RFA describes AOC 525 as "five dry filter-type paint booths" at Building 223. There is not data or information presented in the RFA or RFI reports that any water using operations occurred in these paint booths, only speculation in the RFA that one of the booths at AOC 525 might have been in operation prior to 1972 and could have used water. Please see CH2M-Jones' response to the comments on the AOC 525 RFIRA from Paul Bergstrand for a more complete discussion of this issue.

2. Section 2.1.1, Cyanide
   This section should state that the cyanide detection in sample 525SB00201 is below the EPA Region III Residential RBC rather than solely the Industrial RBC.

   CH2M-Jones Response:
   The suggested revision will be made.

3. Section 5.1, VOCs in Soil
   The EPA identifies the VOCs detected in the soil as common laboratory contaminants. The Navy should evaluate and provide the data validation summary to determine if these contaminants are site related or are laboratory artifacts.

   Please note that the Department has not accepted the Ensafe memorandum entitled *A Comprehensive Review of Common Laboratory Artifacts Detected in Environmental Samples from the Charleston Naval Base* (February, 1998). The Department maintains that the identification of detected compounds as laboratory artifacts must be supported by the QA/QC samples on a site-specific basis.

CH2M-Jones Response:
The laboratory QC blanks related to these samples will be reviewed to further assess this issue and relevant information will be provided as requested. Because the mean soil concentrations of 2-butanone and methylene chloride are below unpaved site-specific SSL values, these two chemicals should not be considered chemicals of concern (COCs) at this site regardless of the results of the laboratory QC samples.

4. Section 5.1, VOCs in Soil
It is stated that acetone exceeds the unpaved site-specific SSL but is below the paved SSL. Consequently, acetone was eliminated from further consideration because the area is paved. This implies that the pavement will be used as a land use control in addition to the reuse restriction expected to be applied over the entire Zone E. As such, a No Further Action determination is not appropriate, and the maintenance of the pavement is expected to be at least part of the final remedy for AOC 525. Of course, this comment does not apply should the Navy be able to demonstrate that the acetone is a laboratory artifact.

CH2M-Jones Response:
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In the event that SCDHEC chooses to consider acetone a soil COC, the Navy and CH2M-Jones will change the recommendation for the site from NFA to a recommendation for a Corrective Measures Study (CMS), with pavement/land use controls as a presumptive remedy to ensure that the building or pavement which currently act to preclude infiltration remains in place. Because the site is already designated in an area that will have land use controls (Zone E), this is not expected to be a significant impact. There are currently no plans to develop this property or remove the building or existing pavement. We are in agreement with the approach proposed above by the SCDHEC reviewer.

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The requested BEQ value will be provided.

Hydrogeology Comments Prepared by Paul Bergstrand

AOC 525 is described as a paint booth in Building 223. A water curtain was used to capture paint dust before a dry filter system was installed. The water curtain system reportedly discharged to the storm sewer before 1972 and to the sanitary sewer after 1972.

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The goal of the AOC 525 RFI Report Addendum was to complete the nature and extent investigation for chemicals of potential concern (COPCs) identified in surface soil, subsurface soil, and groundwater. Because the water curtain, storm sewer, sanitary sewer, and the probable paint booth water curtain settling basin have not been sampled or addressed, it is not apparent by this document that the goal was achieved. Because the RFI Report Addendum did not achieve the goal, the document should not be approved.

Comments and actions necessary to complete the RFI Report Addendum are summarized in the attachment. Several maps and figures have been included for reference.

Questions regarding this correspondence should be directed to me at 803.896.4016 or by e-mail at bergstpm@dhec.state.sc.us.

Hydrogeology Comments Prepared by Paul Bergstrand

RFI Report Addendum, AOC 525, Zone E, Revision 0

SCDHEC General Comments

1. AOC 525 is described as a paint booth in Building 223. The RFI indicates that a water curtain was used to capture paint dust before a dry filter system was installed. The water curtain reportedly discharged to the storm sewer before 1972 and to the sanitary sewer after 1972. The RFI report, however, did not provide any maps or figures representing the water curtain, the water curtain settling basin (if any) or the water curtain connections to the storm or sanitary sewer. A site visit to AOC 525 was conducted on 4 September 2002 with Mr. Rob Harrell of SDIV, Mr. Jerry Stamps, Mr. Gil Rennhack, Mr. Don Hargrove and Mrs. JoCherie Overcash of DHEC. Large steel plates were noted to the north of Building 223 directly behind the painting booth (see photos and Figure). The steel plates had holes drilled and water was visible below steel plates. Sediments were noted to be under the steel plates. This area would appear to be the most logical location for a paint booth water curtain settling basin. The Navy must describe the water curtain waste management process for this AOC and provide the appropriate "as built" drawings, diagrams and figures to show where and how the water curtain was used, any appurtenances such as a settling basin and the connections to the storm and sanitary sewers. The Navy may need to sample sediments under plates for paint waste. The presence of a settling basin would require acceptable sampling and suitable analysis. The Navy must collect appropriate storm and sanitary sewer samples in order to complete the RFI for this site.

CH2M-Jones Response:

The above representation of the AOC 525 paint booth as a "water current" paint booth is incorrect. Additionally, the reviewer makes several assertions about what the RFI states regarding paint booth operations at AOC 525 that we found was not possible to confirm in the RFI report. One statement above, which is similar to a statement provided in the RFIRA prepared by CH2M-Jones for this site, also appears to be impossible to be correct. Each of these problems with the SCDHEC reviewer's comments are discussed below.

The Final RCRA Facility Assessment report (EnSafe, 1995) clearly describes AOC 525 as consisting of "five dry-filter type paint booths." The RFA report never uses the phrase "water curtain" in any of its discussion of AOC 525 paint booths. Thus, the reviewer's representations of AOC 525 as a "water curtain" paint booth are incorrect. The phrase "water curtain" paint booth was also not found in any reference to AOC 525 in the RFI report.

We were unable to confirm the reviewer's statements that: "The RFI indicates that a water curtain was used to capture paint dust before a dry filter system was installed. The water curtain reportedly discharged to the storm sewer before 1972 and to the sanitary sewer after 1972." Our review of the draft Zone E RFI Report (Section 10.19, AOC 525 Paint Booth, Building 223, November 1997) did not reveal any of these statements in the RFI report nor the use of the phrase "water curtain" in any reference to the paint booths at AOC 525, nor could we locate any RFI reference to discharges from the AOC 525 paint booths to the

sanitary sewer after 1972. If the reviewer could provide specific page numbers to the RFI report where references to AOC 525 water curtains and discharges from the dry paint booths to the sanitary sewer occur, it would be helpful. However, based on the specific RFA description of AOC 525 consisting of five dry-filter type paint booths, the reviewer's suggestion that AOC 525 is comprised of a "water curtain" paint booth is incorrect.

The statement that the paint booths at AOC 525 discharged to the storm sewer prior to 1972, which originally occurred in the RFA and was the basis for a similar comment to a statement we provided in Section 1.1 of the RFIRA for AOC 525, is also incorrect. In fact, Building 223 was not constructed until 1973. Therefore, it is not possible for any paint booths at AOC 525 to have discharged to a sewer in 1972 (or prior to 1972), since Building 223 and the paint booths did not yet exist. The text in the RFIRA will be revised to reflect this corrected information. This issue is a key one because it indicates that the reason for the investigation of the dry-filter paint booths at AOC 525 was based on a lack of knowledge about when these dry filter-type paint booths were actually placed in operation.

The suggestion that water may have been used at one time in the dry filter paint booths at AOC 525 occurs once in the RFA report, section 5.6.3, Migration Pathways, of the AOC 525 discussion as follows: "Prior to 1972, water used to capture paint dust from the paint spray booths was discharged directly into the Cooper River."

A more generic statement about how paint booth wastes were handled at the CNC before 1972, but not confirmed in the case of the paint booths at AOC 525, appears later in the RFA report, in section 5.6.4, Evidence of Release: "The preliminary review found no spill reports, inspection reports, employee interviews, or visual observations which would indicate any release at this unit. However, prior to the 1972 installation of a sanitary sewer system, wastewaters containing paint wastes were discharged directly into the Cooper River. The age of Booth 35 suggests the possibility of past releases from this unit."

It appears that in spite of the lack of evidence of a release of contamination from these dry-filter paint booths, there was speculation at the time the RFA was prepared that a single dry filter paint booth, Booth 35, may have operated prior to 1972 and thus may have had wet-type operations prior to 1972. However, since Building 223 was not constructed until 1973 and the paint booths were not installed until after the building was constructed, such speculation about Booth 35 or the other booths being in operation prior to 1972 is clearly incorrect. The description of the paint booths as dry-filter operations and the construction of these facilities after 1973 suggests that the AOC 525 paint booths were in fact never water-using or "water curtain" paint booths.

Regarding the steel plates behind Building 223 referred to above, a construction drawing was located that indicates that these steel plates were part of operations of the facility "Shipbuilding Ways 343," which occupied the location of Building 223 prior to its construction. Thus, the steel plates do not have any relationship to paint booths at AOC 525. Speculation that these plates are part of a subsurface water curtain paint booth operation at AOC 525 are thus incorrect. A copy of the construction drawing showing these steel plates associated with Shipbuilding Ways 343 will be provided.

Based on the lack of any water curtain paint booths associated with AOC 525, the fact that the steel plates are not associated with AOC 525, and lack of contamination found at this site during the RFI, no further soil or groundwater investigations are warranted.

2. AOC 525 has only one shallow monitoring well, 525GW001, to assess groundwater at this site. The nearest shallow monitoring is approximately 175 feet to the south west of the AOC and is side gradient. The nearest upgradient monitoring well is >650 feet to the northwest. This results in the Navy defining the groundwater flow at this AOC with one monitoring well. Furthermore, the RFI Report Addendum has not fully addressed the waste management process of this AOC. Without understanding the site groundwater flow or the waste management process it is not possible to conclude that the single shallow monitoring well is adequate to assess the groundwater at this site. The Navy may need to install upgradient and downgradient monitoring wells. The Navy must demonstrate adequate groundwater assessment at this AOC.

CH2M-Jones Response:

The Zone E RFI work plan specified the level of groundwater sampling and investigation required for this site after careful review of site conditions, assessment of the potential for release and impacts to the environment, and evaluation of relevant operational data. The CNC BCT that developed and approved the Zone E RFI work plan considered a single well adequate to assess whether groundwater was impacted at the site. It was installed based on a thorough and appropriate review of site information and installed where the team believed it was most likely to detect impacts from site operations. Because of the time frame that the RFI work plan was developed (1994 to 1995), the CNC BCT members that developed the work plan were able to interview site personnel that had worked at the facility for many years and use information from these employees to refine the investigation work plan and best locate the sampling locations to detect potential contamination.

The well that was installed does not indicate the presence of contamination. Consequently, there is no reason to install additional wells, either upgradient or downgradient.

SCDHEC Specific Comments

3. Page 2-2, Section 2.1.2

This section states that "*Because methylene chloride was not detected in groundwater at the site, the concentration of methylene chloride was considered protective of shallow groundwater. Therefore it was not considered a COC.*" The Navy fails to consider or address the following:

A. The subsurface methylene chloride detection in 525SB001 has increased from the surface soil detection (0.002 mg/kg surface to 0.011 mg/kg subsurface). How or why there is an increase of methylene chloride in soil was not addressed.

B. The soil screening value for methylene chloride is 0.001 mg/kg. The soil detections in 525SB001 exceed the soil screening value. The groundwater from the only monitoring well (525GW001) was only sampled once for VOCs. One round of VOC analysis may not be sufficient to determine that the soil contamination levels are protective of groundwater.

The Navy must address these issues in order to document the methylene chloride levels in soil at 525SB001 are protective of groundwater. In order to demonstrate the soil contamination levels are protective of groundwater the Navy must purge and resample the well for SVOC and VOC analysis.

CH2M-Jones Response:
Methylene chloride concentrations in soil are addressed in the RFIRA per agreements presented in the CNC Project Team Notebook (CH2M-Jones, 2001), first using generic SSLs (DAF=1) and then using site-specific SSLs that are calculated based on both a paved and unpaved scenario. This chemical was found to be below its unpaved site-specific SSL, thus further assessment is not warranted.

As noted in the response to the following comment, in the event that we are unable to confirm why the four groundwater samples were not analyzed for VOCs and SVOCs at AOC 525, an additional groundwater sample will be collected and analyzed for VOCs to assess current groundwater quality.

4. Page 2-3, Section 2.2

This section states "*Groundwater was sampled during four sampling events at AOC 525.*" and "*However, the RFI evaluated only the data from the first sampling event.*" While this is technically correct this section fails to point out that groundwater was only sampled once for VOCs and twice for SVOCs during the four sampling events at AOC 525. AOC 525 is described as a paint spray booth which managed paint and paint solvents. The Zone E RFI Workplan proposed four rounds of groundwater VOC and SVOC sampling and analysis which would be appropriate for a paint spray booth. A decision, however, was made to limit groundwater VOC analysis to only one sampling event and SVOC analysis to two events. The Final Comprehensive Project Management Plan, dated July 1996, outlines a process to document the reduction of analytical parameters. The

documentation supporting the reduction of analytical parameters has not been provided.

It should be clearly noted that the Ensafe Draft RFI report did not provide any indication that groundwater analysis of VOCs and SVOCs had been limited or documentation as described above. The documentation regarding the reduction of groundwater analytical parameters must be provided and discussed in the revised RFI Report.

CH2M-Jones Response:
The RFI work plan indicated that four samples would be collected from the well at AOC 525 and analyzed for VOCs and SVOCs. We have been unable to confirm why the planned four samples were not analyzed for VOCs and SVOCs. However, we will continue to assess the reason for this; it is possible that this was discussed at a BCT meeting and a decision to reduce the sampling was documented. If we are unable to confirm how this decision was made, we agree to collect an additional groundwater sample from this well and analyze for VOCs and SVOCs.

5. Page 5-1, Section 5.1

The RFI Report Addendum states that "*Acetone, 2-butanone and methylene chloride were detected above their generic SSLs in soil at AOC 525.*" This section continues by stating the VOCs "*were not detected in shallow groundwater samples, indicating that the current soil-groundwater equilibrium is sufficiently protective of groundwater. In addition, acetone, 2-butanone and methylene chloride are common laboratory and/or field decontamination contaminants.*" The Navy has failed to support these conclusions for the following reasons.

A. The RFI assessment for soil and groundwater has not been completed.

B. The reduction of groundwater VOC analysis on the COPC/COC refinement has not been discussed and must also be considered.

C. The AOC is described as a paint spray booth and the chemicals such as acetone, 2- Butanone (Methyl Ethyl Ketone) and Methylene Chloride may be present in the environment as a result of Naval activity.

D. The Department understands that it is possible for environmental samples to become tainted with common laboratory and/or field decontamination contaminants. While the possibility of common laboratory and/or field decontamination contaminants is valid, the Navy has not provided any data to support this contention.

The Navy must provide adequate data to support the contention that the environmental samples had become tainted with common laboratory and/or field decontamination *contaminants*. After the Navy has completed additional sampling, as described in previous comments, this section must be reevaluated and revised as necessary.

CH2M-Jones Response:
We assume that the suggestion that the RFI is not completed is based on premise expressed in the first comment that AOC 525 consists of a water curtain paint booth and that the steel plates discussed in the first comment are a part of the water curtain system, and, as such, more investigation is required. Given that the steel plates are not a part of the AOC 525 paint booth system, and that AOC 525 is not a water curtain paint booth, we do not believe that additional investigations are necessary. The sample results do not indicate contamination that warrants further investigation.

6. Page 5-2, Section 5.2

The RFI Report Addendum states "*groundwater COPCs were not identified at AOC 525.*" The Navy has failed to support this conclusion for the following reasons.

A. The RFI assessment for soil and groundwater is not complete.

B. The reduction of groundwater VOC analysis on the COPC/COC refinement has not been discussed and must also be considered.

After the Navy has completed additional sampling, as described in previous comments, this section must be reevaluated and revised as necessary.

CH2M-Jones Response:
Per previous comment responses and depending on whether another groundwater sample needs to be collected, this issue will be reconsidered as necessary.

7. Page 6-1. Sections 6.3 and 6.4

These sections of the RFI Report Addendum address potential linkage to the sanitary and storm sewers at the CNC. Both sections state "*There are no data suggesting that there was an impact to the sanitary sewers from AOC 525.*" and "*There are no data that indicate a linkage between AOC 525 and AOC 699, the storm sewer, exists.*" The report fails to note that the storm and sanitary sewers associated with AOC 525 did not have any analytical data collected. Therefore without analytical samples it would be impossible to have any data to "*suggest*" or "*indicate*" an impact to the sewers. The Navy must provide diagrams of the sanitary and storm sewers, the as built drawings of the water curtain system, and show how the water curtains drained into the sewers. The Navy must collect adequate storm sewer and sanitary sewer samples in order to complete this RFI investigation.

CH2M-Jones Response:
As previously discussed, there are no data in the RFA or RFI that indicate that water curtain paint booths are part of this AOC or that any discharges to the sewer occurred from these paint booths. Therefore we do not believe that additional investigations of the sewers are warranted. Because these paint booths were not constructed prior to 1973, they were not capable of discharging to the storm sewer. No references to these paint booths discharging to the sanitary sewers were found in the RFA or RFI.

8. Page 6-2, Section 6.6

   This *section* states "*...the Cooper River, which lies approximately 250 feet east of the site.*" The GIS indicates the Cooper River is more than 400 feet to the east of the site. Please review and revise as necessary.

   CH2M-Jones Response:
   The RFIRA will be revised are requested.

Necessary Actions

This is a brief summary of necessary actions for the Navy to conclude the RFI Report Addendum. The numbers correspond the comments. The Department will reevaluate all information in the revised RFI Report.

1 & 7. The Navy must describe the water curtain waste management process for this AOC and provide the appropriate "as built" drawings, diagrams and figures to show where and how the water curtain was used, any appurtenances such as a settling basin and the connections to the storm and sanitary sewers. The Navy may need to sample sediments under plates for paint waste. The presence of a settling basin would require acceptable sampling and suitable analysis. The Navy must collect appropriate storm and sanitary sewer samples in order to complete the RFI for this site.

   CH2M-Jones Response:
   Because the AOC 525 paint booths are dry-filter type, there are no water curtains associated with them. The steel plates behind Building 223 are not part of this AOC and are not a settling basin. No additional investigations of this AOC or sewers is necessary.

2. The Navy may need to install upgradient and downgradient monitoring wells. The Navy must demonstrate adequate groundwater assessment at this AOC.

   CH2M-Jones Response:
   There are no data indicating that additional groundwater investigations are required. We disagree with the need to install additional wells.

3. The Navy must document that the methylene chloride levels in soil at 525SB001 are protective of groundwater. In order to demonstrate the soil contamination levels are protective of groundwater Navy must purge and resample well 525GW001 for SVOC and VOC analysis.

   CH2M-Jones Response:
   We agree to collect and analyze an additional sample, unless we can document the reason (i.e., BCT agreement) why samples were not analyzed for VOCs and SVOCs.

4. The documentation regarding the reduction of groundwater analytical parameters must be provided and discussed in the revised RFI Report.

CH2M-Jones Response:
We will provide this information if it is available. Otherwise we will resample the well as previously discussed.

5 & 6. The Navy must provide adequate data to support the contention that the environmental samples had become tainted with common laboratory and/or field decontamination contaminants. After the Navy has completed additional sampling, as described in previous comments, the COPC/COC Section must be reevaluated and revised as necessary.

CH2M-Jones Response:
This is an option only for acetone, as discussed in our response to comments from Jerry Stamps. It is unnecessary for other VOCs.

8. The Navy must review the distance from AOC 525 to the Cooper River and revise the text as necessary.

CH2M-Jones Response:
The report will be revised as requested.