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CNC CHARLESTON
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CONFIRMATORY SAMPLING WORK PLAN AREA OF CONCERN 726 (AOC 726) ZONE H REVISION 1 CNC CHARLESTON SC

05/01/2006

CH2M HILL

CONFIRMATORY SAMPLING WORK PLAN

AOC 726, Zone H

CONFIRMATORY SAMPLING WORK PLAN
AOC 726, Zone H

Charleston Naval Complex
North Charleston, South Carolina

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

CH2M-Jones

PREPARED BY
CH2M-Jones

May 2006

May 2006

Contract N62467-99-C-0960

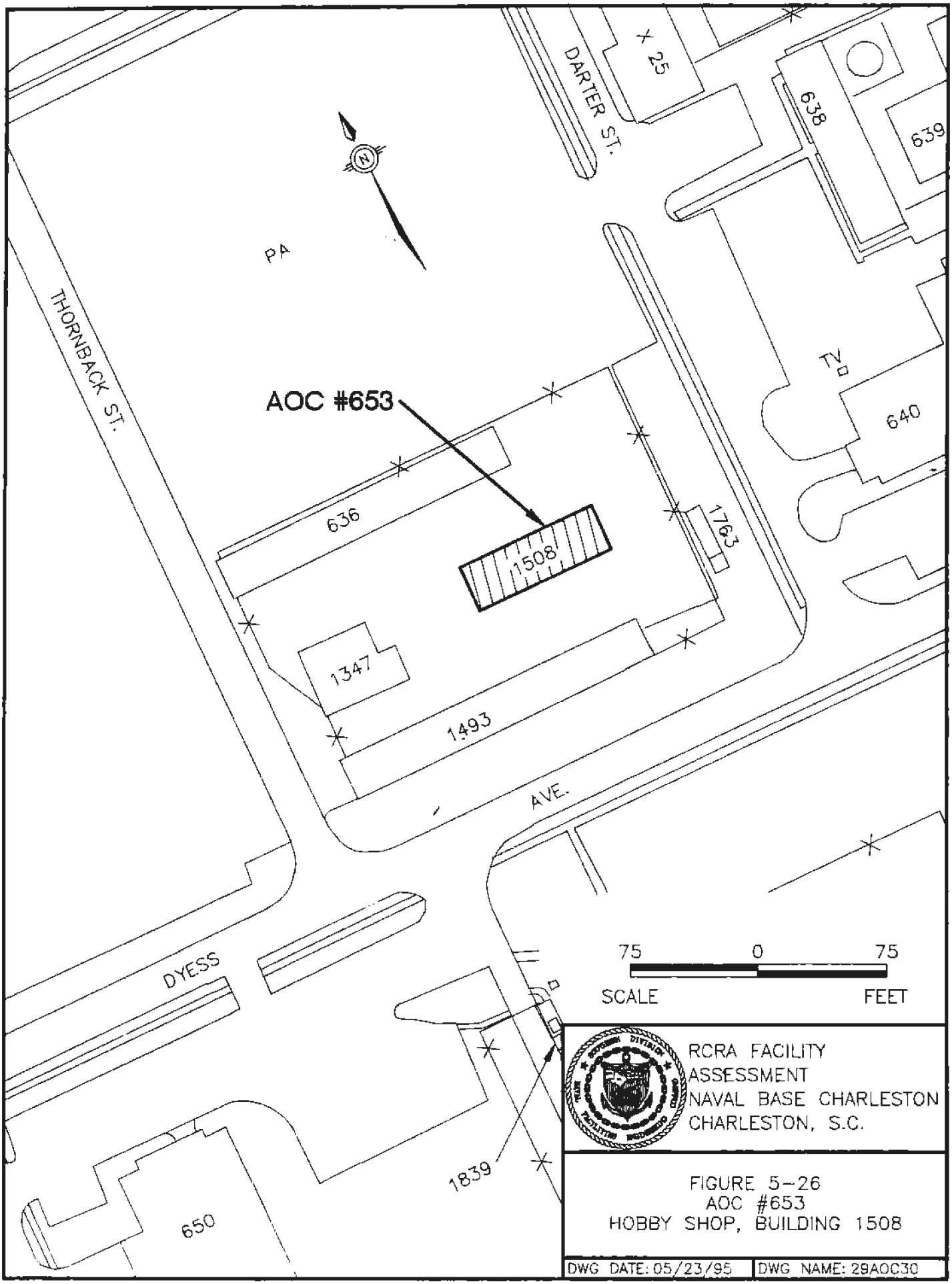
5.26 AOC #653 — Hobby Shop, Building 1508

5.26.1 Unit Characteristics

AOC #653 consists of the Morale, Welfare, and Recreation Department hobby shop located in Building 1508. The hobby shop was constructed in 1972, and is used by both civilian and military personnel to perform automotive maintenance activities for their personal vehicles. The hobby shop has also been used for automotive steam cleaning and painting activities. Building 1508 is constructed of cinder block walls, with a metal roof and a concrete floor. The building paint, which may contain lead, is in poor condition. Two hydraulic lifts are located inside the building; one hydraulic lift is located outside. A two-bay car wash is also attached to the building. Three 40-gallon steel hydraulic fluid storage tanks are also located at the facility. The tanks are approximately 22 years old and are used in operating the hydraulic lift located at the north end of the facility. No floor drains or sumps are known to have been associated with this unit. According to the 1983 Initial Assessment Study of Naval Base Charleston by Environmental Science and Engineering, Inc., Building 1508 was constructed on fill material. The building is constructed on a concrete foundation; the surrounding pavement is asphalt. Building 1508 is located at map coordinates H-20 on Figure 5-D. The AOC location is shown in Figure 5-26.

5.26.2 Waste Characteristics

Materials used within this unit include automotive-related oils, gasoline, diesel fuel, hydraulic oil, solvent-type parts cleaners, car washing compounds, spray waxes, Freon, and various cleaners and detergents. Oily rags, empty oil cans, and oil-dry compound are also stored within the building for later offsite disposal. The constituents of concern are VOCs, heavy metals, and petroleum hydrocarbons. It is unknown whether PCB-containing hydraulic oil or lead-based paints were ever used at this facility; therefore, PCBs and lead are also a constituents of concern.


DARTER ST.
X 25
638
639
PA
THORNBACK ST.
AOC #653
640
636
1508
1763
1347
1493
AVE.
DYESS
75
0
75
SCALE
FEET
1839
650
RCRA FACILITY
ASSESSMENT
NAVAL BASE CHARLESTON
CHARLESTON, S.C.
FIGURE 5-26
AOC #653
HOBBY SHOP, BUILDING 1508
DWG DATE: 05/23/95
DWG NAME: 29AOC30

5.26.3 Migration Pathways

Due to the presence of underground lifts and storage tanks, soil and groundwater are potential migration pathways for this unit. Surface water runoff is also a potential migration pathway, since many automotive repair activities occur outside the building. Due to the presence of VOCs, subsurface-gas and air migration are also potential pathways.

5.26.4 Evidence of Release

According to a 31 July 1991 Zone Inspection Report, heavy oil residue was present on the pavement in the vicinity of the hydraulic lifts and the spray wash areas. Oil residue had soaked into the asphalt and could not be cleaned by absorbent material. During the site inspection, oil stains and a petroleum odor were noted in and around Building 1508.

According to facility personnel, one of the underground storage tanks at the site is currently leaking severely An estimated 100 gallons of hydraulic fluid leaked from this tank in 1993. Use of the tank has been discontinued:, however, the tank has not been removed.

5.26.5 Exposure Potential

AOC #653 is not in close proximity to any residential areas or sensitive environments. However, due to the external location of facility operations, exposure potential exists for Naval Base Charleston employees who frequent the vicinity of the unit and future users of the site.

5.26.6 Recommended Action

An RFI is recommended for this unit due to the evidence of past releases at this unit as well as the associated multiple migration pathways.

9.11 AOC 653

AOC 653 is in the vicinity of a hydraulic fluid storage tank located at the west end of Building 1508 (one of the four buildings which make up the automotive hobby shop complex). The tank is no longer in use due to suspected leakage. In addition to fluids in the tank, various paints, solvents, thinners, and petroleum products have been used and stored at the site and may also have been released. Soil and groundwater sampling were conducted at AOC 653 to investigate the presence of residual contamination resulting from the leaking tank and other possible spills.

Results of TPH analysis for samples collected in the vicinity of the leaking hydraulic fluid storage tank indicate that petroleum hydrocarbon contamination is present at AOC 653. The highest concentration of TPH (42,000 mg/kg) was at sample location 653SB003. The degree of contamination indicated by the concentration of petroleum hydrocarbon compounds was not reflected in the results of SW-846 method analyses for SVOCs and VOCs. Groundwater contamination was not apparent in the vicinity of the petroleum contamination of soil as evidenced by the VOC, SVOC, and TPH analyses. Apparently, little contamination from soil has migrated into the groundwater of the area. Figure 9.26 illustrates the distribution of TPH detected in surface soil samples collected at AOC 653. The screening level was exceeded in all four surface-interval samples. Only two second-interval samples were analyzed for TPH. Both samples contained TPH over the screening level (Figure 9.27).

No ecological risk is anticipated for AOC 653 due to the lack of suitable habitat, and lack of ecological receptors.

At AOC 653, the total soil pathway risk for site residents and site workers was calculated as 9E-7 and 2E-7, respectively. No noncarcinogenic COCs were identified for soil pathways. AOC 653 surface soil is recommended for inclusion in the CMS process solely on the basis of

TPH concentrations. Table 9.11 summarizes human health risk assessment results. Due to the minimal risk/hazard identified at AOC 653, no risk/hazard maps have been prepared

The total shallow groundwater pathway risk for site residents and site workers was calculated as 8E-4 and 2E-4, respectively. The child resident hazard index was computed as 7, and the adult resident and site worker hazard indices were 3 and 1. The sole contributor to shallow groundwater risk and hazard was arsenic in NBCH653001. However, no arsenic hit was reported above the corresponding MCL. AOC 653 shallow groundwater is recommended for inclusion in the CMS process on the basis of projected resident and worker risk. However, if MCLs are strictly followed with respect to establishing groundwater remedial goals, no corrective measure would be required.

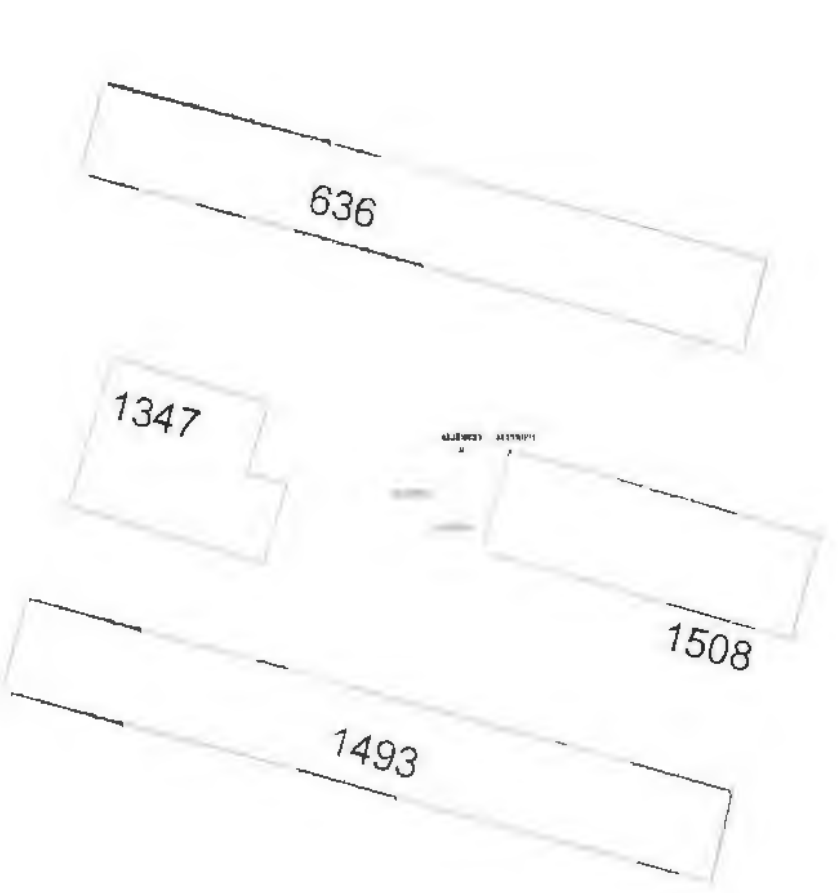
No fate and transport concerns were identified for AOC 653

An interim measure, which involved the removal of the hydraulic fluid storage tank and associated impacted soil has been completed. The details of this interim action will be provided in a report prepared by the environmental detachment.

Table 9.11
Zone H Conclusion Summary
AOC 653

	Unacceptable Risks for Human Health in Residential Scenario (Y/N)	**Chemicals Driving Risk**
Surface Soil	No, ILCR < 1E-6	NA
Shallow Groundwater	Yes, ILCR 8E-4, HI=7	As
Deep Groundwater	NA	NA
	Above Levels of Concern (Y/N)	**Total TEQ (ppb)**
Dioxin in Surface Soil	No	3.071-43.571 pg/g 2,3,7,8-TCDD equivalents
Dioxin in Shallow Groundwater	No	ND
Dioxin in Deep Groundwater	NA	NA
	TPH Present at Concentrations >100 ppm (Y/N)	**Maximum Detected Concentration (ppm)**
Soil	Y	42,000

Note:
NA = Not Applicable



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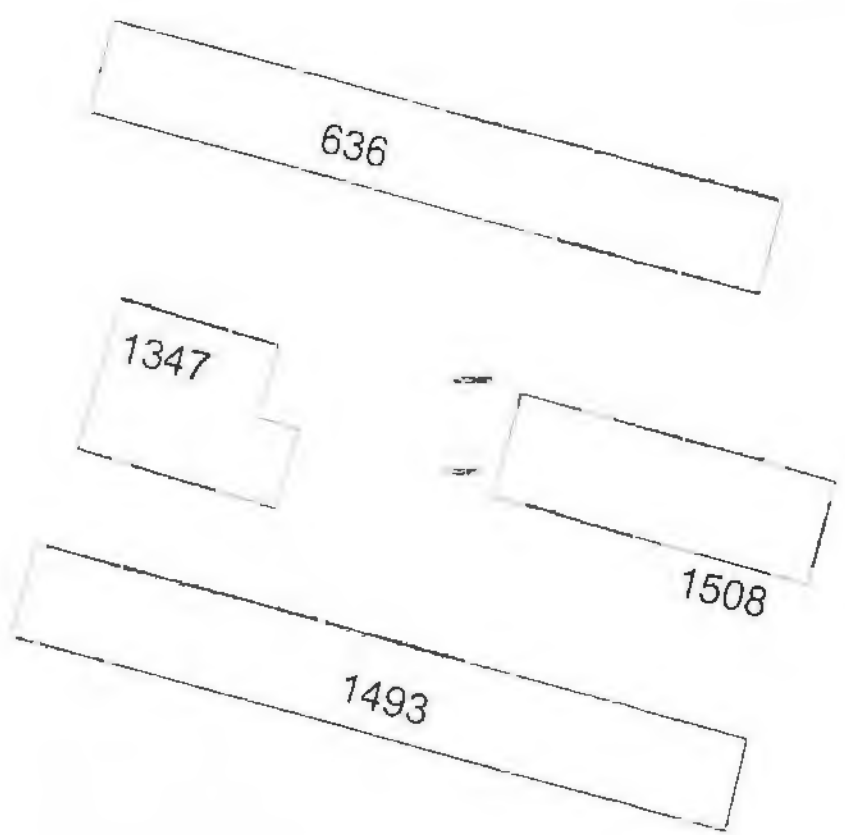
ZONE H
FINAL RCRA FACILITY
INVESTIGATION REPORT
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 9.35
AOC 853
Surface Soil
TPH Concentrations



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0 25 50 75 100 Feet

ZONE H
FINAL RCRA FACILITY
INVESTIGATION REPORT
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 9.27
AOC 853
Subsurface Soil
TPH Concentrations

DATE: 8/17/98 PROJ NAME: RFI853.APR

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

June 8, 2006

Commander (Dudley Patrick)
SOUTHNAVFACENGCOM
2155 Eagle Drive
North Charleston, SC 29406

RE: Approval
Confirmatory Sampling Work Plan, AOC 726, Zone H, Revision 1
Charleston Naval Complex (CNC)
SC0 170 022 560

Dear Mr. Patrick:

The Corrective Action Engineering and the Hydrogeology Sections of the South Carolina Department of Health and Environmental Control (Department) have completed the review of the above referenced document, which was received on May 30, 2006. This review was based upon applicable State and Federal Regulations, and the CNC Hazardous Waste Permit, effective October 21, 2005. The Department hereby approves the above referenced document. The Department anticipated that this work plan will be implemented and the results reported as soon as possible.

If you have any questions or concerns, please contact me at (803) 896-4285.

Sincerely,

Jerry Stamps, Engineer Associate
Corrective Action Engineering Section
Division of Waste Management
Bureau of Land and Waste Management

Attachment:
Memorandum from Don Hargrove to Jerry Stamps dated June 8, 2006

cc: Rick Richter, EQC Region 7, Charleston
Gary Foster, PE, CH2M-Jones
Dean Williamson, PE, CH2M-Jones
Dann Spariosu, PhD, EPA Region 4
Don Hargrove, Hydrogeology
Ms. Susan Grantham

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

MEMORANDUM

TO: Jerry Stamps, Engineering Associate
Corrective Action Section
Division of Waste Management
Bureau of Land and Waste Management

FROM: Donald C. Hargrove, Hydrogeologist
RCRA Hydrogeology Section I
Division of Hydrogeology
Bureau of Land and Waste Management

DATE: 8 June 2006

RE: Charleston Naval Complex (CNAV)
Charleston County
SC0170022560

Confirmatory Sampling Work Plan, AOC-726, Zone H
Revision 1
(May 2006)

The Division of Hydrogeology has reviewed the document listed above, dated 24 May 2006. The document was received by the Department on 30 May 2006. This document provides some historical background on AOC-726, discusses the environmental sampling and analyses that have taken place for Area of Concern (AOC)-726, and proposes soil and groundwater sampling as part of a Confirmatory Sampling effort. This document also contains responses to comments generated during reviews of the Rev.0 version, and incorporates said responses into this Rev. 1 version, by means of replacement pages.

This document was reviewed with respect to R.61-71 of the South Carolina Well Standards, R.61-79 of the South Carolina Hazardous Waste Management Regulations (SCHWMR), and appropriate guidance documents.

The Division of Hydrogeology has determined that the Navy has adequately addressed the comments, and incorporated them into this Rev. 1 version. It is therefore recommended that this document can be approved and implemented as written. Monitoring well Approval # HW-06-040 has been written, allowing for the installation of the monitoring wells proposed in this work plan (see attached).

If you have any questions concerning this decision, please contact me at (803) 896-4033.

DD.060382.DCH

Attachment: MWA #HW-06-040

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

Temporary Monitoring Well Approval

Approval is hereby granted to:

Commander (Dudley Patrick) SOUTHNAVFACENGCOM
2155 Eagle Drive
North Charleston, SC 29406

Facility: Naval Base Station Charleston (CNAV)
Charleston, South Carolina
Charleston County
SC0-170-022-560

This approval is for the installation of nine (9) temporary groundwater-monitoring wells at AOC-726. The temporary monitoring wells are to be installed in the locations as illustrated on Figure 4-1 (attached), and per the proposed construction details provided in the AOC-726 Confirmation Sampling Work Plan (dated May 2006). The temporary monitoring wells are to be installed following all of the applicable requirements of R.61-71.

Please note that R.61-71 requires the following:

1. All wells shall be drilled, constructed, and abandoned by a South Carolina certified well driller per R.61-71.D.1.
2. That a minimum of (48) hours prior to initiation of drilling activities, notice shall be provided to Christine Sanford-Coker, District Hydrogeologist, at the EQC Region 7, Charleston Office (843-740-1590).
   All wells shall be drilled, constructed, and abandoned by a South Carolina certified well driller per R.61-71.D.1.
2. A Water Well Record Form or other form provided or approved by the Department shall be completed and submitted to Donald C. Hargrove, Division of Hydrogeology, South Carolina Department of Health and Environmental Control within 30 days after well completion or abandonment unless another schedule has been approved by the Department. The form should contain the "as-built" construction details and all other information required by R.61-71.H.1.f.

3. All analytical data and water levels obtained from each monitoring well shall be submitted to Donald C. Hargrove, Division of Hydrogeology, South Carolina Department of Health and Environmental Control within 30 days of receipt of laboratory results unless another schedule has been approved by the Department as required by R.61-71.H.1.d.

4. All temporary monitoring wells shall be abandoned within 5 days of borehole completion using appropriate methods as required by R.61-71.H.4.c. The appropriate method is: *A Temporary Direct Push Well that does not penetrate a confining layer shall be abandoned by forced injection of neat cement, bentonite-cement, or 20% high solids sodium bentonite grout through a tremie pipe after the sampling device has been removed.* R.61-71.H.4.c (3)

5. If any of the information provided to the Department changes, the Author (Donald C Hargrove) shall be notified a minimum of twenty-four hours prior to well construction as required by R.61-71.H.1.a.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and R.61-71 of the South Carolina Well Standards and Regulations, dated April 26, 2002.

Date of Issuance: 8 May 2006 **Approval #: HW-06-040**

Approval granted by:

Donald C. Hargrove, Hydrogeologist
Bureau of Land and Waste Management
South Carolina Department of Health and
Environmental Control

Attachment: Figure 4-1, Proposed Groundwater Sampling Locations

cc: Jerry Stamps, Corrective Action Engineering
Christine Sanford-Coker, EQC, Region 7, Charleston
Dann Spariosu, Federal Facilities Section, USEPA Region IV
Gary Foster, P.E./ Ch2M Hill /ATL

Dean Williamson, P.E./ Ch2M Hill/ GNV
File #50484

NOTE: Aerial Photo Date is 1997
NOTE: Original figure created in color

N

0 200 400 Feet

1 inch = 226.315 feet

Figure 4-1
Proposed Soil and Groundwater Sampling Locations
AOC 726 CS Work Plan
Charleston Naval Complex

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

Temporary Monitoring Well Approval

Approval is hereby granted to:

Commander (Dudley Patrick) SOUTHNAVFACENGCOM
2155 Eagle Drive
North Charleston, SC 29406

Facility: Naval Base Station Charleston (CNAV)
Charleston, South Carolina
Charleston County
SC0-170-022-560

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   All wells shall be drilled, constructed, and abandoned by a South Carolina certified well driller per R.61-71.D.1.
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5. If any of the information provided to the Department changes, the Author (Donald C Hargrove) shall be notified a minimum of twenty-four hours prior to well construction as required by R.61-71.H.1.a.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and R.61-71 of the South Carolina Well Standards and Regulations, dated April 26, 2002.

Date of Issuance: 8 May 2006 **Approval #: HW-06-040**

Approval granted by:

Donald C. Hargrove, Hydrogeologist
Bureau of Land and Waste Management
South Carolina Department of Health and
Environmental Control

Attachment: Figure 4-1, Proposed Groundwater Sampling Locations

cc: Jerry Stamps, Corrective Action Engineering
Christine Sanford-Coker, EQC, Region 7, Charleston
Dann Spariosu, Federal Facilities Section, USEPA Region IV
Gary Foster, P.E./ Ch2M Hill /ATL

Dean Williamson, P.E./ Ch2M Hill/ GNV
File #50484

NOTE: Aerial Photo Date is 1997
NOTE: Original figure created in color

N

0 200 400 Feet

1 inch = 226.315 feet

Figure 4-1
Proposed Soil and Groundwater Sampling Locations
AOC 726 CS Work Plan
Charleston Naval Complex

File Path: c:\18gis\cnc\cnc-eqis.apr, Date: 18 May 2006 15:44, User: DWILLIAM, EGIS: Charleston Naval Complex - Figure 4-1 Proposed Soil and Groundwater Sampling Locations

CH2M HILL
3011 SW Williston Road
Gainesville, FL
32608-3928
P.O. Box 147009
Gainesville, FL
32614-7009
Tel 352.335.7991
Fax 352.335.2959

CH2MHILL

May 24, 2006

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

Re: Confirmatory Sampling Work Plan (Revision 1) – AOC 726, Zone H

Dear Mr. Scaturo:

Enclosed please find two copies of the Confirmatory Sampling Work Plan (Revision 1) for AOC 726 in Zone H 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.

Please contact me at 352/335-5877, ext. 2280, if you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

cc: Dann Spariosu/USEPA, w/att
Kathryn Stewart/Navy, w/att
Gary Foster/CH2M HILL, w/att

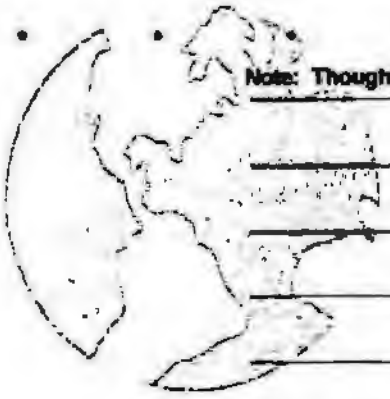
359 Northstream Drive
Aiken, SC 29805
Phone: 803-641-0078
Fax: 803-641-0078

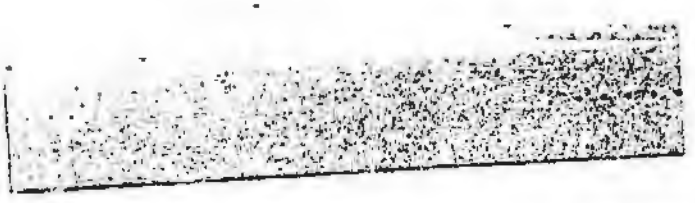
facsimile transmittal

To:	Tony Hunt, BRAC	**From:**	Susan A. Grantham
Fax:	843-820-5563	**Date:**	April 18, 2006
Phone:	843-820-5607	**Pages:**	8-including cover
Re:	Charleston Naval Base	**CC:**	

☐ Urgent ☒ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

Note: Thought you needed to be brought back in the loop. Call me with any questions.





Susan Grantham
359 Northstream Drive
Aiken, SC 29805
803-641-0078

April 18, 2006

David Scaturo, P.E., P.G.
South Carolina DHEC
2600 Bull Street
Columbia, SC 29201

Re: Work Plan for AOC 726

Dear Mr. Scaturo:

Thank you for allowing me to review the Navy/CH2M Hill/Jones projected Sampling Work Plan for AOC 726 in Zone H. In previous conversations with both you and Jerry Stamps, Wyatt's main concern is that ALL future personnel that are contracted to perform work on the Charleston Naval Complex be aware of the conditions prior to work. The first line of defense is full disclosure. The Navy, RDA, CH2M Hill/Jones, JJ&G, as well as the General Contractor (in this case CR Hipp) have a PARAMOUNT duty to protect the personnel and public first and foremost. Full disclosure of all environmental issues should be required and included in the bidding process, prior to the job being awarded. All blueprints/plans should have a Safety Health Plan attached, all pages should be clearly marked and chemicals (whether confirmed or suspected) should be outlined. Full disclosure of plans, specifications and permits should be signed off by prospective bidders acknowledging receipt of the documentation. Before accepting/awarding bids, all certifications (HAZWOPPER), licensing and insurance requirements should be verified and required prior to the awarding of any contract or subcontract.

Upon review of said Work Plan, I noted a variety discrepancies and omissions through out, and I will address same in the order that they are presented in the Work Plan;

Section 2.0 Unit Characteristics

Page 2-1-Lines 22-28: This paragraph indicates that Wyatt & Wyatt did not provide the results of any of the sampling from PSC Safety or Microbac Laboratory or STEP to the Navy. This is totally incorrect and a complete fabrication. I have correspondence dated June 2003 from RDA and CR Hipp acknowledging all sampling results and blood test results that were provided to them, were furnished to the Navy. I also have correspondence dated June 2003 from the Navy to the RDA and CR Hipp advising them to order Wyatt's men back to work. All documentation that was provided to the Navy, RDA and CR Hipp was sent immediately upon Wyatt & Wyatt's receipt from the laboratories. SCDHEC was provided the documentation after the Navy, RDA and CR Hipp received their copies.

Page 2-2- Line 23: "Results did not indicate detection of GRO & DRO". Both Gasoline and Diesel create hexane gas.

Lines 24-25: I have a concern that CH2M-Hill/Jones is trying to indicate that the hexane sampling results were due to laboratory contamination.

Section 3.0 Previous Site Investigations Near AOC 726

Page 3-1- Lines 2-19: This did not indicate the date the sampling was performed. According to Table 3-1 no sampling has been done since 1998. The "qualifier" on 3 of the 6 results were "estimated" or "inaccurate or "not precise". Unacceptable.

Paragraphs 3.2.1 through 3.24- All are described as USTs. All were utilized for fuel/diesel storage, and are located within AOC 653 within AOC 726. All have leaked. No specifics regarding "corrective actions". All are in the vicinity of AOC 726. AOC 726, AOC 653 were not detailed in the Dig Permit 053, although they were known AOC's as outlined in Environmental Impact Statement- see attached.

3.3 General Geologic Setting Near AOC 726
Page 3-2- Lines 21-29

In Appendix E- "Boring Logs" there are only 2 and both are dated in 1994, and performed by the first "clean-up crew" Ensafe/Allen & Hoshall. I am

to conclude that was the last time the Monitoring Wells were "monitored" and have not been sampled by CH2M Hill/Jones. This is absolutely unacceptable. This means that since CH2M Hill/Jones was awarded the clean-up contract (23 Million dollars by the EDA) they have not tested the soil and water or monitored the wells. All monitoring wells should be analyzed on an annual basis for water and soil contamination, in an effort to observe whether the methods of cleaning up the contamination is producing positive results or getting worse, as well as observing the water migration trend throughout the Base.

What is interesting to note that on a Daniel Island Marine Terminal Environmental Impact Statement, specifically Figure Number 4.14.2-2, AOC 653- reflects petroleum contaminated soil. (See attached) Although it was omitted from the Dig Permit No. 053.

Section 4.0 Confirmatory Sampling Work Plan for AOC 726

Page 4-1 Lines 4-7: They are referring to "specific soil and groundwater sampling recommendations. But later in this chapter (Page 4-4, Lines 3 & 4) they state that the analysis of groundwater rather than soil would be more reliable. I believe that both should be required to have an accurate reading, and not one that is "estimated". The proposed sampling areas reflected on Figure 4-1 should also include manholes 7 & 8- just North of the other proposed sampling areas located on Halsey Street. We have to assume that sooner or later the force main will be eventually tapped into and it would be remiss not to consider monitoring wells and soil analysis to be needed for future personnel's safety.

Paragraph 4.2.4 Health and Safety Requirements:

Lines 7 through 12: Personnel working at the site will be required to comply with EPA Level D personal protective equipment. Once all personnel have arrived at the site as part of a mobilization for this work, a project briefing and health and safety orientation meeting will be held. Daily "tailgate" safety meetings will be conducted to address any site-specific issues encountered during work.

The following should be substituted and required:

1. According to PSC Safety it should be Level B personal protective equipment. Why are we not walking on the side of caution?

2. Any meeting, weekly, safety or "tailgate" would be required to have a log sheet and ALL attendees shall be required to sign. Minutes of the meetings shall be kept and dispersed to all subcontractors weekly, and will sign acknowledging receipt of minutes.

3. ALL personnel working on the CNC shall be required to sign an "Acceptance of Documentation" sheet acknowledging receipt of all HSP, Permits, Plans, Specifications, "Environmental Condition of Property Map", and copies of any contracts between the Owner and General Contractor.

4. General Contractors and Subcontractor personnel shall be HAZWOPER certified (as required by BRAC) and will be required to attach said HAZWOPER certification to Bid documents, prior to any work awarded or being performed.

5. Any and ALL AOC's, UST's, SWMU's, shall be marked appropriately with signage, whether "closed" or not. ALL suspected areas of contamination shall be flagged and signage posted according to Federal Regulations.

6. All future Deeds shall reflect the AOC within the boundaries of the property of that specific Deed. Transferor of said property shall be required to disclose all contaminants within the property boundaries, whether confirmed or suspected. Transferor, at their expense, shall provide a recent industrial/residential hygiene survey (within 60 days prior to transfer of property). An independent, qualified Engineering Firm shall provide said Analysis/Survey and include a DPT analysis and PID analysis (water and soil) reflecting a depth of 15bls. In no event shall CH2M-Hill/Jones provide said analysis. Results of said analysis shall be reported and signed off by perspective purchasers of property, acknowledging receipt and results, hazards (if any) and proposed clean up recommendations. An "Environmental Condition of Property Map" shall be provided to perspective purchasers.

Section 5.0 Appendix A- Dig Permit No. 53

I'm referring to correspondence dated January 17, 2002 from Tony Hunt, BRAC Environmental Coordinator and addressed to Tom Fressilli, Caretaker Site Officer Hand- written at the top of the correspondence "FOR CSO FILE COPY ONLY- TAF...(Tom Fresselli)

The letter appears and has been presented as a part of Dig Permit No. 053- After our exposure, that is when the dig permit was furnished to Wyatt, it was missing several pages and the BRAC letter above was also excluded as part of the Dig Permit.

Paragraph 2..... "This would require a contractor trained in Hazardous Waste Operations to hand auger to a planned depth. During the installation of the force main, if the landfill contents are encountered the Contractor will be required to either remove and properly dispose of the waste (at their expense) or replace the fill in the excavation to a depth of at least two feet above the debris and install the force main at the new elevation."

CR Hipp received their HAZWOPER certification in September 2003. This is crucial to note, as their certification was issued AFTER their Contract date with the Navy/RDA and Wyatt's exposure. Hipp knew about the contamination- as the RDA advised them in their contract with Hipp. Hipp should have been required to be HAZWOPER certified before their contract was signed as required by BRAC. In Hipp's contract with the RDA, RDA required Hipp to be responsible for all safety equipment and protective gear needed to do the job. Hipp didn't disclose the contamination, so Hipp saved a lot of money. The non-disclosure of Hipp and RDA was money motivated.

Paragraph 3..... "Any work must be done at CNCRA's risk. For Navy personnel, the Navy requires at a minimum that all excavation work within the SWMU, AOC and petroleum contaminated sites (as shown on the Environmental Condition of Property Map) be done by personnel properly trained in HAZWOPER.

The portion of the correspondence that Mr. Fresselli chose to make part of the dig permit did not reflect any portion of paragraph 3- specifically the requirement of the HAZWOPER certification. The "Environmental Condition

of the Property Map should have been one of the documents distributed to all subcontractors. It was not. This is an unacceptable and a negligent exclusion and opens up the CNCRA to an enormous liability as far as BRAC is concerned.

Another major concern is the pipe schematics of the Charleston Naval Base reflect the pipes are directly connected to the City of Charleston's pipes. The pipes are leaching these chemical contaminants into the citizens of the City of Charleston. Every time the tide goes in or out of the CNC, the migration of the contamination is getting farther on the base and deeper into the gravel beds.

Please continue to keep me apprised, and I certainly appreciate your input as well as your sincere concern to protect the personnel and public. Until we speak again, I remain

Sincerely yours,

Susan A. Grantham

CC: Tony Hunt, BRAC Environmental Coordinator
Via facsimile- 843-820-5563

TABLE 4.14.2-2 (Continued)

CHARLESTON NAVAL SHIPYARD HAZARDOUS MATERIALS SITES
Daniel Island Marine Cargo Terminal
Environmental Impact Statement

Site No.	Zone	Site Description	Status/Comments
AOC 653	H	Leaking hydraulic fuel storage tank	Excavated approximately 5 feet deep select areas of petroleum contaminated soil.
UST 656 (AOC 655)	H	Approximately 300 gallons of No. 2 fuel oil was spilled.	Removed 5,600-gallon underground heating oil tank. Site contains soil and groundwater contamination.
AOC 659	H	Site of a 30,000-gallon aboveground storage tank containing diesel.	No clean-up started to date. Site contains soil contamination.
UST 851A, UST851B (AOC 663) and SWMU 136	H	AOC 663 is a diesel pump station and SWMU 136 is a hazardous waste satellite accumulation area	Removed 500-gallon underground storage tanks 851A and 851B which contained gasoline and diesel. Soil and groundwater contamination detected.
UST NS45-TNK-1 (AOC 666)	H	Underground fuel storage tank that contained fuel oil.	Removed 25,000-gallon underground fuel oil storage tank NS45. Soil and groundwater contamination was detected.
AOC 667 and SWMU 138	H	AOC was a vehicle maintenance area and SWMU 138 stored Hazardous waste.	No clean-up started to date. Soil contamination was detected.
AOC 670	H	Field located south of Building 1697	No clean-up started to date.
UST NS4-TNK-1 (AOC 675)	I	Fuel oil storage	Removed 25,000-gallon underground fuel oil storage tank NS4.

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March 22, 2006

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

Re: Confirmatory Sampling Work Plan (Revision 0) – AOC 726, Zone H

Dear Mr. Scaturo:

Enclosed please find two copies of the Confirmatory Sampling Work Plan (Revision 0) for AOC 726 in Zone H 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.

Please contact me at 352/335-5877, ext. 2280, if you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

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

CONFIRMATORY SAMPLING WORK PLAN

AOC 726, Zone H

Charleston Naval Complex
North Charleston, South Carolina

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

PREPARED BY
CH2M-Jones

May 2006

Revision 1
Contract N62467-99-C-09602
258814.PM.13

Certification Page for Confirmatory Sampling Work Plan (Revision 1) – AOC 726, Zone H

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

Permit No. 21428

Dean Williamson, P.E.

5/19/2006

Date

Contents

Contents, Continued

Appendices

Acronyms and Abbreviations

=	detected, the analyte was analyzed for and detected at the concentration shown
AOC	area of concern
AST	aboveground storage tank
BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure Act
CA	corrective action
CNC	Charleston Naval Complex
CNCRA	CNC Redevelopment Authority
COC	chemical of concern
COPC	chemical of potential concern
CS	confirmatory sampling
CSWP	Confirmatory Sampling Work Plan
CSAP	Comprehensive Sampling and Analysis Plan
DPT	direct push technology
DQO	data quality objective
DRO	diesel range organics
EDD	electronic data deliverable
EnSafe	EnSafe Inc.
EPA	U.S. Environmental Protection Agency
ESDSOPQAM	EPA Environmental Services Division *Standard Operating Procedures and Quality Assurance Manual*
ESDLOQCM	EPA Environmental Services Division *Laboratory Operations and Quality Control Manual*
FID	flame ionization detector
ft bls	feet below land surface
General Engineering	General Engineering and Environmental, LLC
GRO	gasoline range organics

Acronyms and Abbreviations, Continued

HI	hazard index
HSP	Health and Safety Plan
IDW	investigation-derived waste
J	estimated, the analyte was present but the reported value may not be accurate or precise
MCL	maximum contaminant level
msl	mean sea level
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
NAVBASE	Naval Base
NC	not collected
OSWER	Office of Solid Waste and Emergency Response (EPA)
PCB	polychlorinated biphenyl
PID	photoionization detector
PPE	personal protective equipment
ppm	parts per million
PSC	PSC Safety and Health Services, Inc
QA/QC	quality assurance/quality control
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SCDHEC	South Carolina Department of Health and Environmental Control
SJ	screening data, qualified as estimated
SOP	standard operating procedure

Acronyms and Abbreviations, Continued

STEP	Solutions To Environmental Problems
SWMU	Solid Waste Management Unit
SVOC	semivolatile organic compound
TCE	trichloroethene
UST	underground storage tank
VOC	volatile organic compound
Wyatt and Wyatt	Wyatt and Wyatt Construction Co., Inc.
WP	Work Plan

SECTION 1.0

Introduction

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. 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.

On January 9, 2006, SCDHEC issued a letter to the Navy indicating that a new Area of Concern (AOC) had been identified at the CNC. The AOC was described as the location at which workers from Wyatt and Wyatt Construction Co., Inc. (Wyatt and Wyatt) potentially encountered hazardous constituents while working on a construction project. Subsequent to this letter, the new AOC was designated as AOC 726. This Confirmatory Sampling Work Plan (CSWP) has been prepared to address SCDHEC's request for a work plan to assess whether or not a release of hazardous constituents by the Navy has occurred at AOC 726.

SECTION 2.0

Unit Characteristics

2.0 Unit Characteristics

2.1 AOC 726 Description

AOC 726 has been identified as the area at which workers from Wyatt and Wyatt potentially encountered hazardous constituents while working on a sewer line construction project.

Prior to implementing the project, the Navy issued Dig Permit No. 53, dated January 22, 2002, to the CNC Redevelopment Authority (CNCRA). A copy of this permit is provided in **Appendix A** of this WP. The Environmental Review Comments in the dig permit stated:

> *"This project proposes the following: (a) to repair/replace significant pump stations, lines, and manholes.*
>
> *The Navy has identified that in this area a release of hazardous substances has occurred, but corrective actions have not yet been implemented. It is recommended that contractor personnel ensure necessary precautions are taken to minimize dermal exposure to any workers who may come in contact with the soil. If contamination is discovered at any time during the course of excavating, digging, trenching, probing, or any other intrusive activity, whether contamination is expected or not, all work shall be stopped immediately and the CSO shall be notified. Any soil that exhibits an odor, is visually discolored or has objects in it that would indicate the possibility of a release of chemicals requires notification."*

Wyatt and Wyatt performed construction activities related to the sewer construction project between March and June 11, 2003. During this period, Wyatt and Wyatt indicated that its personnel exhibited symptoms of exposure to contaminants.

2.2 Soil and Groundwater Analysis by STEP

According to information received from SCDHEC regarding environmental investigations at AOC 726, Wyatt and Wyatt hired Solutions To Environmental Problems (STEP) to collect soil and water samples from an excavation on May 22, 2003, due to concerns about possible exposure of its workers to contaminants. The location at which the samples were collected was identified only as an excavation along Halsey Street. Neither CH2M-Jones nor the Navy has been provided with the specific locations at which sampling was conducted or the complete results of this sampling and analysis effort. Based on the summary of this

sampling effort obtained from SCDHEC, a copy of which is provided as **Appendix B**, the following information is presented:

- Groundwater samples from a trench approximately 14 feet below land surface (ft bls) were collected out of a backhoe bucket. Soil samples were collected from freshly excavated soil from a trench depth of approximately 12 to 14 ft bls. Samples of soil and water were submitted to Microbac Laboratories, Maryville, TN. Soil samples were analyzed for gasoline range organics (GRO), diesel range organics (DRO), and volatile organic compounds (VOCs). Water samples were analyzed for GRO and VOCs. Air monitoring was conducted using photoionization detectors (PIDs), a flame ionization detector (FID), and colorimetric tubes. Air samples were collected from just above freshly excavated soil and submitted to LabCorp for analysis of vinyl chloride and total hydrocarbons as hexane.

- FID readings indicated a peak of 5,000 parts per million (ppm) with average readings 3 inches from freshly excavated soil of 500 to 2,500 ppm with levels falling to 100 to 400 ppm after 5 minutes of the soil being exposed to air. PID readings had a peak of 127 ppm with a 7 to 12 ppm average within 3 inches of freshly exposed soil. Colorimetric tube samples indicated the presence of petroleum hydrocarbons and indicated negative readings for methane and butane. Air samples indicated the presence of hexane and were below detection limits for vinyl chloride. The summary states that hexane was the prevalent analyte detected in all samples and that groundwater and soil samples indicated the presence of several VOCs and other analytes.

The results did not indicate that GRO or DRO were detected.

As noted above, neither CH2M-Jones nor the Navy has been provided with the detailed analytical results of the soil and groundwater sampling. However, the certificate of analysis that was obtained by CH2M-Jones from SCDHEC indicates that the concentration of hexane was less than 0.005 milligrams per liter (mg/L). The certificate of analysis does not indicate to which sample these results apply. To date, CH2M-Jones has not received any laboratory certificates for this sampling effort which confirm the detection of any specific analytes.

In addition, it is not known whether trip blanks, laboratory blanks, or other Quality Assurance/Quality Control (QA/QC) data were collected and analyzed. Hexane is considered by the U.S. Environmental Protection Agency (EPA) to be a common laboratory contaminant and is frequently found in laboratory blanks. When hexane is found in

laboratory blanks, EPA guidance provides that hexane concentrations up to ten times the level found in the blanks be considered as possibly or likely to be due to laboratory contamination.

2.3 Soil and Groundwater Analysis by PSC Safety and Health Services, Inc.

On June 11, 2003, PSC Safety and Health Services, Inc. (PSC) conducted an industrial hygiene survey for Wyatt and Wyatt, which included the collection and analysis of soil samples from four locations in the vicinity where Wyatt and Wyatt believed potential exposure of its workers to hazardous chemicals may have occurred. The following information is based on the *Industrial Hygiene Sampling Report* prepared by PSC, dated June 27, 2003 (PSC, 2003). A copy of this report is provided in **Appendix C**.

Air monitoring was performed using a PID. PID readings were taken from soil excavated from depths of 8 and 15 ft bls. Ambient air was sampled directly above the soil as it was removed from the excavation. Some PID readings were taken while soil was in the excavator bucket.

The PID readings from the four sampling areas are summarized in **Table 2-1**. **Figure 2-1** shows the general locations at which these samples were collected, based on the descriptions provided in the PSC report.

It was also noted in the PSC report that later on June 11, 2003; a second excavation was made at approximately the same depth and adjacent to Location 1. The purpose of the second excavation at this location was to allow representatives of General Engineering and Environmental, LLC (General Engineering) to obtain PID readings of the site soil. Neither PSC nor General Engineering obtained significant PID readings from the second excavation at Location 1.

Soil samples were also collected from Locations 1 and 4 and analyzed for VOCs and petroleum hydrocarbons. The analytes reported in these samples are summarized in **Table 2-2**. EPA Region 3 Risk-Based Concentrations (RBCs) are available for three of the detected constituents. The residential RBCs (concentrations that would be acceptable under a residential land use scenario) are shown in **Table 2-2**. As demonstrated in the tahle, concentrations of detected chemicals for which an RBC is available are below the residential RBC.

2.4 Soil and Groundwater Analysis by General Engineering

General Engineering conducted a soil contaminant survey at the location of the sewer line construction at the Coast Guard Long Term Storage Yard and along Dyess Avenue on July 8, 2003, for the CNCRA. CH2M-Jones has received only a summary of this survey. A copy of this summary is provided in **Appendix D.**

Excavations were dug at two locations along Dyess Avenue. CH2M-Jones has not been provided with the specific locations of these excavations. However, it is assumed that the excavations were performed between PSC soil sampling locations 1 and 2 shown on **Figure 2-1**.

Soil samples from multiple intervals at each location were screened for organic vapors using a PID. Elevated PID readings were reported for several samples during the early portion of the excavation and elevated PID readings were also noted in the headspace of several sample jars (in which excavated soil had presumably been placed).

Gas concentrations were measured using a PID and four gas meters at the bottom of the excavation immediately after excavating. The PID reading was 0 ppm. Carbon monoxide and hydrogen sulfide readings were also 0 ppm.

After completion of the initial measurements, the excavations were covered with a polyethylene sheet. After approximately two hours, a slit was cut in the sheet and PID readings of the gas beneath the sheet were measured. A PID reading of 30 to 40 ppm was measured in both excavations using this method. A charcoal tube and Tedlar bag (air) samples were collected from the bottom of the excavations at this time.

The excavations were left covered and retested on the morning of July 9, 2003. PID readings of approximately 10 to 12 ppm were measured.

An unspecified number of soil samples were reportedly submitted to the laboratory for analysis of VOCs, semivolatile organic chemicals (SVOCs), pesticides, herbicides, and polychlorinated bipheyls (PCBs). CH2M-Jones has received an analytical report for only one of these soil samples. The detected chemicals are summarized in **Table 2-3**. The concentrations of the three chemicals reported in the General Engineering sampling results are all several orders of magnitude below the EPA Region 3 RBCs.

The General Engineering report indicated that no contaminants were detected in the charcoal tube or Tedlar bag samples.

2.5 Location of AOC 726

Based on the available data, the location of AOC 726 is assumed to include the general route of the new sewer line along Dyess Avenue, starting at the approximate location of PSC soil sampling Location 1, extending up Dyess Avenue to Halsey Street, then extending up Halsey Street to the entrance to the Coast Guard long term parking lot. The general alignment of the new sewer line that was installed in this area is shown on **Figure 2-2**.

Areas of particular interest include PSC soil sampling Locations 1 and 4, at which detections of VOCs were reported. In addition, according to the Wyatt and Wyatt "daily log," obtained from SCDHEC (see **Appendix C**), the workers' reported symptoms were indicated to be particularly significant during work between manholes 6 and 5, and between manholes 6 and 7. The approximate manhole locations are shown on **Figure 2-2**.

Shallow groundwater gradients in the vicinity of AOC 726 are shown in **Figure 2-3**. The general direction of flow is towards the Cooper River.

TABLE 2-1
PID Readings for Soil Measured by PSC
Confirmatory Sampling Work Plan, AOC 726, Zone H, Charleston Naval Complex

Location ID	Description	Soil PID Readings	Jar Headspace Readings
1	Between Buildings 640 and 79 on Dyess Avenue.	Peak of 420 ppm, consistent at 120 to 140 ppm. Soil collected at ~ 15 ft bls.	Greater than 9,999 ppm
2	Northwest corner of Coast Guard long term parking lot on Halsey St.	3 ppm. Soil collected at ~ 15 ft bls.	Greater than 9,999 ppm
3	Just west of entrance gate along fence on north side of Coast Guard long term parking lot on Halsey St.	0 ppm	NC
4	East of and adjacent to Location 3.	Peak of 5 ppm Soil collected at ~ 15 ft bls.	Greater than 9,999 ppm

ft bls feet below land surface
NC not collected
ppm parts per million

TABLE 2-2
Results of Soil Analyses by PSC
Confirmatory Sampling Work Plan, AOC 726, Zone H, Charleston Naval Complex

Location/Parameter	Location 1	Location 4	EPA Region 3 Residential RBC
Total Petroleum Hydrocarbons[a]	18 mg/m^3	12 mg/m^3	Not applicable
Bromomethane	1,070 µg/kg	457 µg/kg	110,000 µg/kg at HI = 0.1
Chloroform	87 µg/kg	< 50 µg/kg	100,000 µg/kg at HI = 0.1
Iodomethane	734 µg/kg	< 500 µg/kg	Not available
Methylene Chloride	87 µg/kg	< 50 µg/kg	8,500 µg/kg at HI = 0.1

[a] Results for Total Petroleum Hydrocarbons in soil are typically reported in milligrams per kilogram (mg/kg). The units used in the table above are as reported in the *Industrial Hygiene Sampling Report* (PSC, 2003).

EPA U.S. Environmental Protection Agency
HI Hazard Index
µg/kg micrograms per kilogram
mg/m^3 milligrams per cubic meter

TABLE 2-3
Results of Soil Analysis by General Engineering
Confirmatory Sampling Work Plan, AOC 726, Zone H, Charleston Naval Complex

Sample/Parameter	Excavation #1, at 15 feet	EPA Region 3 Residential RBC
Di-n-butylphthalate	52.5 µg/kg	7,800,000 µg/kg at HI = 0.1
4,4'-DDE	0.662 µg/kg	1,900 µg/kg
4,4'-DDT	1.83 µg/kg	1,900 µg/kg
Acetone	11.3 µg/kg	7,800,000 µg/kg

EPA U.S. Environmental Protection Agency
HI Hazard Index
µg/kg micrograms per kilogram

NOTE: Aerial Photo Date is 1997
NOTE: Original figure created in color

FIGURE 2-1
PSC Soil Sampling Locations
Based on *Industrial Hygiene Sampling Report* (PSC, 2003)
AOC 726, Zone H, Charleston Naval Complex

NOTE: Aerial Photo Date is 1997
NOTE: Original figure created in color

North

0 200 400

1 inch = 311.183 feet

FIGURE 2-2
Approximate Locations of New Sewer Line and Manholes
AOC 726, Zone H, Charleston Naval Complex

NOTE: Aerial Photo Date is 1997
NOTE: Original figure created in color

inferred
known

N

0 200 400 Feet

1 inch = 241.745 feet

Figure 2-3
Shallow Groundwater Contours
AOC 726 CS Work Plan
Zone H, Charleston Naval Complex

File Path: c:\18gis\cnc\cnc-egis.apr, Date: 18 May 2006 14:37, User: DWILLIAM, EGIS: Charleston Naval Complex - Figure 2-3 Shallow Groundwater Contours

SECTION 3.0

Previous Site Investigations Near AOC 726

3.0 Previous Site Investigations Near AOC 726

3.1 Site Investigations Related to RCRA Sites

The results of previous groundwater sampling and analyses conducted during (RCRA Facility Investigation) RFI activities in the vicinity of AOC 726 were reviewed to assess whether contamination similar to that described in **Section 2.0** had been previously detected in this area.

Several direct push technology (DPT) borings were installed to collect groundwater samples related to Solid Waste Management Unit (SWMU 37) (sanitary sewer) in the vicinity of AOC 726. **Figure 3-1** shows these DPT sampling locations. Only one VOC (chlorobenzene) was detected in a single sample, LH037GP11, at a concentration of 13.5 micrograms per liter (µg/L). This result is below the chlorobenzene drinking water Maximum Contaminant Level (MCL) of 100 µg/L. No VOCs were detected in any of the other samples.

Figure 3-2 shows the locations of monitoring wells installed as part of the RFI in the vicinity of AOC 726. Only those monitoring wells that are labeled in **Figure 3-2** were installed as part of the RFI. These wells include monitoring wells installed to investigate AOC 653 as well as several grid wells installed in Zone H to assess the background groundwater quality. **Table 3-1** shows the results of detections of VOCs from those samples. Several detections of acetone, a common laboratory contaminant, were noted. One detection of trichloroethene (TCE) above its drinking water MCL of 5 µg/L was noted in well HGDHGW003.

3.2 UST Closures Near AOC 726

Several underground storage tanks (USTs) or aboveground storage tanks (ASTs) were identified that have been closed at buildings located near AOC 726. **Figure 3-3** identifies the building locations at which these UST closures occurred; the wells that can be seen on **Figure 3-3** near each of these buildings were installed as part of the UST closure activities. All USTs that were formerly located at these sites have been properly closed through SCDHEC's petroleum program. A brief description of each is presented below.

3.2.1 Building 650 – Former Post Office

A 1,000-gallon UST, used for fuel oil storage, was closed in 1996. During tank removal a slight sheen was noted on water in the excavation. The appropriate corrective measures were implemented, groundwater monitoring has been completed, and the site is closed.

3.2.2 Building 648 – Former Brig

A 2,000-gallon UST used for fuel oil storage and a 1,000-gallon AST used for diesel storage were closed in 1996. During tank removal, some product was noted on the water table and a ¼-inch hole was noted in the UST. The AST did not have any holes or leaks. The appropriate corrective measures were implemented, groundwater monitoring has been completed, and the site is closed.

3.2.3 Building NS-79 – Former Dispensary and Dental Clinic

A 10,000 gallon UST used for fuel oil storage and 500-gallon AST used for fuel oil storage were removed in 1996. Neither tank was observed to have holes or pitting when removed. Groundwater monitoring has been completed and the site is closed.

3.2.4 Building 640 – Former Chief Petty Officer Club

A 3,000-gallon UST used for fuel oil storage and a 1,000-gallon AST used for fuel oil storage were removed in 1997. During UST removal, a hole in the tank was noted. The appropriate corrective measures were implemented, groundwater monitoring has been completed, and the site is closed.

3.3 General Geologic Setting Near AOC 726

The boring logs for monitoring wells H653GW001 and H653GW002 are provided in **Appendix** E. These wells were installed approximately 100 ft from Dyess Avenue at AOC 653 in the vicinity of AOC 726. The logs show that the shallow aquifer in this area consists of interbedded sands and clays to a depth of approximately 15 ft bls. Marsh clay was encountered at H653GW001 at approximately 15 ft bls. Based on these borings logs and similar boring logs for wells installed in Zone H of the CNC, the shallow aquifer is expected to be comprised largely of interbedded sands, silts, and clays to a depth of approximately -33 to -45 ft mean seal level (msl), approximately at which depth the Ashley Formation is present.

TABLE 3-1
Summary of VOCs Detected in RCRA-related Wells Near AOC 726
Confirmatory Sampling Work Plan, AOC 726, Zone H, Charleston Naval Complex

VOC	Station ID	Sample ID	Date Collected	Result (µg/L)	Qualifier
Acetone	H009GW002	009G000210	7/19/2000	11.0	=
Acetone	H009GW002	009GW00202a	9/27/1998	2.0	SJ
1,2-Dichlorobenzene	H009GW02D	009GW02DM7	9/9/2002	0.58	J
Acetone	HGDHGW003	GDHGW00305	7/27/1998	190.0	J
Acetone	HGDHGW003	GDHGW00306	11/11/1998	10.0	=
Trichloroethylene (TCE)	HGDHGW003	GDHGW003C1	10/20/1999	20.0	=
Acetone	HGDHGW06D	GDHGW06D06	11/12/1998	10.0	=

µg/L micrograms per liter

VOC volatile organic compound

= The analyte was analyzed for and detected at the concentration shown.

J The analyte is reported as an estimated concentration (the analyte was present but the reported value may not be accurate or precise).

SJ Represents screening data that were qualified as estimated.

NOTE: Aerial Photo Date is 1997
NOTE: Original figure created in color

Groundwater Probe
SEWER-LINE/MANHOLE-NS
SEWER-LINE/MANHOLE
SEWER-FLOW-ARROW

North

0 200 400
1 inch = 244.31 feet

FIGURE 3-1
DTP Groundwater Sampling Locations Near AOC 726
AOC 726, Zone H, Charleston Naval Complex

NOTE: Aerial Photo Date is 1997
NOTE: Original figure created in color

Abandoned
Active

North

0 200 400

1 inch = 204.409 feet

FIGURE 3-2
RCRA-related Groundwater Wells Analyzed for VOCs in the Vicinity of AOC 726
AOC 726, Zone H, Charleston Naval Complex

NOTE: Aerial Photo Date is 1997
NOTE: Original figure created in color

North

0 200 400

1 inch = 204.409 feet

FIGURE 3-3
Buildings Near AOC 726 with Former USTs
AOC 726, Zone H, Charleston Naval Complex

SECTION 4.0

Confirmatory Sampling Work Plan for AOC 726

4.0 Confirmatory Sampling Work Plan for AOC 726

4.1 Purpose and Objectives

This CSWP is intended to determine the presence or absence of contamination in the vicinity of the area identified as AOC 726. General requirements for the WP are presented first, followed by specific soil and groundwater sampling recommendations.

4.2 General Requirements

4.2.1 Data Quality Assurance Requirements

The fieldwork and laboratory work conducted as part of this CSWP will be performed in accordance with the requirements of the CNC Comprehensive Sampling and Analysis Plan (CSAP) (EnSafe Inc. [EnSafe], 1996) and the EPA Environmental Services Division *Standard Operating Procedures and Quality Assurance Manual* (ESDSOPQAM, 1996).

The overall data quality objectives for the RFI are EPA Data Quality Objective (DQO) Level III for contaminant identification and quantification. Required field and laboratory QA/QC samples will be collected as required by the CSAP. Subcontractor data will be validated by the CH2M-Jones project chemist prior to final interpretation and submittal.

4.2.2 Data Management Requirements

The CS field data documentation procedures and laboratory data deliverables will be in accordance with the approved CSAP (EnSafe, 1996) and the ESDSOPQAM (EPA, 1996a). Field documentation includes site photographs, field sampling logbooks, sample shipping chain of custody forms, soil boring logs, well construction forms and diagrams. Laboratory documentation includes raw data, instrument calibration logs, sample custody forms, validation summary reports, and final data deliverables.

4.2.3 Reporting Requirements

After completion of the fieldwork, the laboratory analysis of samples, and the screening of analytical results, CH2M-Jones will submit a CS Report (Revision 0) to the BRAC Cleanup Team (BCT) for review and comment. BCT comments will be addressed in writing, and

revised document pages or a full Revision 1 document will be prepared and submitted for review. Reports will be submitted in both electronic and hard copy format.

4.2.4 Health and Safety Requirements

CH2M-Jones places significant emphasis on the health and safety of our personnel, subcontractors, and the local community. All fieldwork completed as part of this RFI will be performed in accordance with the CH2M-Jones *Site-Specific Health and Safety Plan (HSP)* (CH2M-Jones, 2000). Personnel working at the site will be required to comply with EPA Level D personal protective equipment (PPE) requirements, as specified in the HSP, with provisions to upgrade to Level C, if appropriate. Once all personnel have arrived at the site as part of the mobilization for this work, a project briefing and health and safety orientation meeting will be held. Daily "tailgate" safety meetings will be conducted to address any site-specific issue encountered during work.

4.2.5 Sampling Methodology

Sampling locations will be marked or staked in the field prior to the initiation of field work, and the necessary agencies and departments will be notified regarding activities planned at these locations. Clearance and marking of existing underground water, natural gas, telephone, electrical and other utility lines, which are potential hazards at the site, will be performed. Once utilities are marked and identified, sampling locations will be adjusted as needed.

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

Consistent with previous soil sampling activities at the CNC, surface soil samples will be collected from 0 to 1 ft bls and the target depth for subsurface soil samples will be from 3 to

5 ft bls. If groundwater is encountered at a depth less than 5 ft bls, the subsurface soil sample will be collected from 2 ft above groundwater down to the top of groundwater.

Groundwater samples will be collected using a Geoprobe® or similar DPT equipment. Standard DPT procedures will be used to collect a discrete groundwater sample from the target sample depth. Upon completion of sampling, DPT borings will be filled to the land surface with bentonite grout, in accordance with Rule 61-71.10.B of the South Carolina Well Standards and Regulations. The bentonite grout will be comprised of Portland cement and clean potable water with no more than 5 percent bentonite. Boring locations will be marked with the station ID for the survey team to establish horizontal location coordinates.

4.2.6 Investigation-Derived Waste Management and Disposal

The investigation-derived waste (IDW) that is expected to be generated as part of this investigation includes soil cuttings, purge water, equipment decontamination wastes, and used PPE. As it is generated, IDW will be containerized in labeled 55-gallon drums and characterized in accordance with South Carolina Hazardous Waste Management Regulations (SCDHEC R.61-79.261). Filled containers will be transported to the less-than-90-day storage facility located at Building 1824. After the analytical results have been received and reviewed, the containers will be transported to a permitted and licensed facility for proper treatment/disposal.

4.2.7 Sample Handling and Chain of Custody

Sample collection procedures and site conditions at the time of sampling will be documented in a field logbook by the field team leader. Samples will be collected in prepared containers supplied by the laboratory vendor, using preprinted chain of custody logsheets and coolers for transport of the samples. Samples will be iced as appropriate and transported by the sampling team to the laboratory for analysis, maintaining the chain of custody at all times after sampling occurs until analysis is complete. Sample handling procedures will adhere to the standard procedures in the approved CSAP portion of the CNC RFI Work Plan (EnSafe/Allen & Hoshall, 1994).

4.2.8 Analysis of Samples

Samples will be delivered to a subcontracted laboratory for chemical analysis by EPA methods and/or standard operating procedures (SOPs) for screening methods to achieve Level II EPA DQOs. The subcontracted laboratory will meet the EPA DQO Level II criteria specified in the approved CNC CSAP (EnSafe, 1996). Sample analysis will be performed in accordance with the guidance in EPA's *Test Methods for Evaluating Solid Waste, SW-846,*

Revision 4 (1996b), Office of Solid Waste and Emergency Response (OSWER) and in the EPA Environmental Services Division *Laboratory Operations and Quality Control Manual* (ESDLOQCM) (1997).

4.3 Proposed Sampling and Analysis

Previous sampling efforts by PSC and General Engineering included collection and analysis of soil samples from the saturated zone as well as analysis of groundwater samples and ambient air monitoring. A variety of PID readings recorded elevated readings. Such readings are caused by VOCs. Two soil samples collected by PSC indicated the presence of VOCs (including bromomethane and iodomethane) at a depth of approximately 15 ft bls. The depth to groundwater in this part of the CNC is typically less than about 5 ft bls. Therefore, it can be concluded that these soil samples were collected from the saturated zone of the shallow aquifer.

Both soil and groundwater samples will be collected. The locations for soil and groundwater sampling are as follows:

CH2M-Jones proposes to collect surface and subsurface soil at three sampling locations. These sampling locations are at locations were significant odors were reported by the Wyatt and Wyatt construction team, (as described in their "Daily Log;" see **Appendix C**). **Figure 4-1** shows these proposed locations (as green circles), at Manholes 5, 6, and 8. Each sample will be analyzed for VOCs, GRO and DRO.

CH2M-Jones proposes to collect nine groundwater samples located along the alignment of AOC 726 using DPT methods. The proposed sample locations are shown (as green triangles) in **Figure 4-1**. These sampling locations are considered the locations most likely to detect contamination based on the previous sampling conducted at the site by others (as described in Section 2.0 of this WP) and based on the locations at which Wyatt and Wyatt worker symptoms were reported to be most significant (see **Appendix C**).

At each location, a discrete groundwater sample will be collected from approximately 12 to 15 ft bls. A DPT well screen with a length of approximately 3 ft will be used to collect the groundwater samples. Each sample will be analyzed for VOCs, GRO, and DRO.

A State of South Carolina-certified well driller will be utilized for DPT boring installation. The driller will be supervised by a CH2M-Jones field hydrogeologist or engineer who will be responsible for the conduct of all field activities. DPT boring logs will be prepared to document the details of DPT sample collection for submittal to SCDHEC.

4.3.3 SCDHEC Well Installation Request

In accordance with Rule R.61-79.265, Subpart F of the South Carolina Hazardous Waste Management Regulations and R.61-71 of the South Carolina Well Standards and Regulations, a request for the advancement of the DPT groundwater sampling locations is required to be submitted to SCDHEC two weeks prior to the scheduled activity. The written request describes the purpose of the sampling activity and presents a figure showing proposed locations and proposed abandonment techniques.

4.3.4 Data Analysis and Screening

Initial screening of analytical results will be conducted as soon as final unvalidated results are available from the laboratory to determine which chemicals may be indicated as chemicals of potential concern (COPCs) and which locations may be affected. After data validation is completed, flagged/corrected results will then be electronically downloaded into a screening database to determine COPCs for each affected media, using current screening criteria.

An evaluation and presentation of COPC screening against current criteria, as well as the COPC/chemical of concern (COC) refinement analysis, will be presented in a CS Report after completion of the sampling and analysis proposed herein.

4.3.5 Project Schedule

The fieldwork for this site is expected to be conducted no later than May 2006 (pending SCDHEC review and approval of this CSWP) with a duration of approximately one week. The laboratory turnaround schedule for producing data reports is expected to be approximately 4 to 6 weeks from the time of sampling. Data quality review, flagging of data, and data validation are expected to require approximately two weeks after receipt of the electronic data deliverable (EDD) from the lab. Data analysis and report preparation are expected to require approximately 45 days after receipt of final validated data, placing an approximate report submittal date in July 2006.

NOTE: Aerial Photo Date is 1997
NOTE: Original figure created in color

Figure 4-1
Proposed Soil and Groundwater Sampling Locations
AOC 726 CS Work Plan
Charleston Naval Complex

File Path: c:\18gis\cnc\cnc-egis.apr, Date: 18 May 2006 15:44, User: DWILLIAM, EGIS: Charleston Naval Complex - Figure 4-1 Proposed Soil and Groundwater Sampling Locations

SECTION 5.0

References

5.0 References

CH2M-Jones. 2000. *Site-specific Health and Safety Plan.* Charleston Naval Complex.

EnSafe Inc./ Allen & Hoshall. 1994. *Final Comprehensive RFI Work Plan.* May.

EnSafe Inc./ Allen & Hoshall. 1996. *Final Comprehensive Sampling and Analysis Plan.* RCRA Facility Investigation. July.

U.S. Environmental Protection Agency (EPA). 1996a. *Environmental Services Division Standard Operating Procedures and Quality Assurance Manual (ESDSOPQAM).* Region IV, Environmental Services Division.

U.S. Environmental Protection Agency (EPA). 1996b *Test Methods for Evaluation of Solid Waste (SW-846), 4th Edition.*

U.S. Environmental Protection Agency (EPA). 1997. *Environmental Services Division Laboratory Operations and Quality Control Manual.* Region IV, Environmental Services Division.

PSC Safety and Health Services, Inc. 2003. *Industrial Hygiene Sampling Report.* Prepared for Wyatt and Wyatt Construction Company, Inc. June.

APPENDIX A

Dig Permit No. 53

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 190010
2155 EAGLE DRIVE
NORTH CHARLESTON, S.C. 29419-9010

5090
Ser CSO/007
22 January 2002

Mr. Sean McDonell
Charleston Naval Complex Redevelopment Authority
1360 Truxton Avenue, Suite 300
North Charleston, SC 29405-2005

Dear Mr. McDonell:

SUBJECT: UTILITY SYSTEMS IMPROVEMENTS PHASE III – SEWER M10-N039-MJ-B

Your letter of 8 January forwarded a request to repair/replace significant pump stations, lines, and manholes for the portion of the complex south of Viaduct Road gate, for our consideration and approval. The work will be taking place at or near contaminated areas. In these areas, the Navy has identified a release of hazardous substances has occurred, but corrective actions have not been implemented. It is recommended that contractor personnel ensure necessary precautions are taken to minimize dermal exposure to any workers who may come in contact with the soil. If contamination is discovered at any time during the course of this project, whether contamination is expected or not, all work shall be stopped immediately and the CSO shall be notified. Any soil that exhibits an odor, is visually discolored or has objects in it that would indicate the possibility of a release of chemicals requires notification to the RDA and CSO.

The enclosed digging permit is partially and conditionally approved. Digging cannot be permitted to install a section of the sewer line (station 48+00 to 55+00) as shown on sheet C1.7 of the project drawings. The proposed line would traverse a former settling pond and the soil contains calcium hydroxide as explained in the comments attached to the permit. Since land use restrictions are likely to be incorporated into the property deed to prevent all excavations in this area, this section of line must be rerouted. It is suggested that the main be continued along Bainbridge Avenue from station 48 + 55, under the Viaduct Road overpass, and then routed to station 57 + 45 along the north side of Viaduct Road. Also, digging can be permitted for the installation of the section of sewer system force main (station 14+00 to 40+00) as shown on drawing sheets C1.5 and C1.6), but only upon the condition that adequate overburden is maintained over landfill debris that might be encountered in this area. If landfill materials are encountered, the contractor must be required, at no expense to the Navy, to either remove and dispose of the waste or replace the fill in the excavation to a

depth of at least two feet above the debris and install the force main at the new elevation. For other specific contaminants that may be encountered during execution of this project, please see the comments attached to the digging permit. Any soil excavated during this project shall be stored on site and returned to the excavation after work is done. No soil can leave the base without environmental testing. If excess soil is not able to be reused and needs to be disposed of, please notify the CSO for testing and disposal instructions.

If you have any questions concerning the conditions placed on this digging permit, please contact Tony Hunt at 743-2062 or Amy Daniell at 743-9985.

Sincerely,

Tom Fressilli

Tom Fressilli
Caretaker Site Officer
By the direction of the Commander

For CSO
file copy
Original

17 January 02

Mr. Tom Fressilli
Caretaker Site Officer

Subject: Utility Systems Improvements Phase III – Sewer M10-N039-MJ-B

Dear Tom:

I have reviewed the subject documentation on the utility systems improvements at the Charleston Naval Complex and provide the following comments.

1. The section of the sanitary sewer line (sheet C1.7 of the plans) from between stations 50+00 and 55+00 traverses a Solid Waste Management Unit (SMWU) #11 on the Navy's RCRA Part B permit. This area was once a Acetylene manufacturing plant and there is Calcium Hydroxide sediment remaining in the subsurface. Land Use Restrictions will likely be incorporated into the property deeds to prevent excavation in the future therefore it is not recommended that the sewer line be placed in this area. A more suitable route would be to continue the main under Viaduct Road from Station 48+55 and cross Bainbridge on the other side of Viaduct Road. This would also appear less costly since it would only cross one paved area versus three.

2. The section of the sanitary sewer system force main (sheets C1.5 and C1.6) from Station 14+00 to 40+00 traverses SWMU #9 on the Navy's RCRA Part B permit. This area is known as the Old Landfill. Information on the contents of the landfill are provided in the memorandum from CH2M Jones accompanying this excavation permit. Land Use Restrictions will be included in the property deeds conveyed by the Navy to prevent future excavation at this site without the proper notification and authorization of the Navy and SCDHEC. While there may be less objectionable routes for this force main, the Navy agrees that sufficient overburden should exist along Bainbridge Avenue in the planned route to avoid encountering landfill contents. In order to ensure landfill contents are not encountered it is highly recommended that soil borings be taken to the planned excavation depth to determine if adequate overburden exists. This would require a contractor trained in Hazardous Waste Operations to hand auger to planned depth. During the installation of the force main, if landfill contents are encountered the contractor will be required to either remove and properly dispose of the waste (at their expense) or replace the fill in the excavation to a depth of at least two feet above the debris and install the force main at the new elevation.

3. Any work must be done at CNCRA's risk. For Navy personnel, the Navy requires at a minimum that all excavation work within the boundaries of Solid Waste Management Units (SWMU), Areas of Concern (AOC) and petroleum contaminated sites (as shown on the Environmental Condition of Property Map) be done by personnel properly trained in Hazardous Waste Operations (HAZWOPER).

I will be glad to answer any questions you may have.

Tony Hunt

Tony Hunt, P.E.,
BRAC Environmental Coordinator,
Southern Division, Naval Facilities Engineering Command

CHARLESTON CARETAKER SITE OFFICE EXCAVATION PERMIT

CSO Log Number = 053
Request Date = 8 January 2002
Comments Date = 17 January 2002
Location = South End of Naval Complex

Environmental Review Comments

This project proposes the following: (a) to repair/replace significant pump stations, lines, and manholes.

The Navy has identified that in this area a release of hazardous substances has occurred, but corrective actions have not yet been implemented. It is recommended that contractor personnel ensure necessary precautions are taken to minimize dermal exposure to any workers who may come in contact with the soil. If contamination is discovered at any time during the course of excavating, digging, trenching, probing, or any other intrusive activity, whether contamination is expected or not, all work shall be stopped immediately and the CSO shall be notified. Any soil that exhibits an odor, is visually discolored or has objects in it that would indicate the possibility of a release of chemicals requires notification.

No soil shall leave the base without permission. Any soil excavated should be stored on site and returned to the excavation after the work is done. Sidewalk and pavement debris shall be disposed of as construction waste.

If excess soil cannot be reused at the excavation site, the CSO should be notified prior to disposal for testing and disposal instructions. If you have any questions, please contact Amy Daniell or Rick Nielson at 743-9985.

CH2M-JONES, LLC

January 16, 2002

To: Charleston Caretaker Site Office (CSO)
From: CH2M-JONES, LLC

Subject: DIG PERMIT FOR UTILITY SYSTEM IMPORVEMENTS (SEWER M10-N039-MJ-B), PERMIT NUMBER 053

CH2M-JONES, LLC, in cooperation with the Navy has reviewed the attached Dig Permit, CSO log number 053, and identified that portions of the proposed work areas are within or adjacent to Solid Waste Management Units (SWMUs), Areas of Concern (AOCs), and Underground Storage Tank (UST) sites. CH2M-JONES, LLC has provided a summary of the sites and contaminates that could be encountered during the Utility Improvement Phase III work. CH2M-JONES, LLC has included selected hard copies and figures obtained from the RCRA Facility Investigation (RFI) Report for particular sites and a map identifying UST sites that are near areas of proposed work. Should the reviewer require additional information, the RFI Report is on public record and should be utilized as necessary.

In addition to being aware of potential contaminates that may be encountered during sewer upgrades; the contractor performing the work should know that most SWMUs, AOCs, and UST sites have groundwater monitoring wells. The contractor shall stay a minimum distance of five feet away from all monitoring wells.

Site Summaries:

SWMU 11 is located near the interchange formed by the junction of Bainbridge Avenue and Viaduct Road. From the 1940s to early 1970s the site was a settling pond used for the disposal of calcium hydroxide generated as a byproduct of the production of acetylene gas. The proposed work transverses directly across this former settling pond. A layer of calcium hydroxide (white product) a few inches thick has been identified between 3 and 6 feet below land surface. The pH of this material has been measured and recorded at levels greater than eleven. Along with the calcium hydroxide layer, other construction type debris was identified at the site. The RCRA Facility Investigation Report (RFI) did not identify any industrial soil pathway Contaminates of Concern (COCs) for SWMU 11; however, serious consideration should be given to relocating the proposed section of sewer piping that crosses SWMU 11.

SWMU 8 is located on Hobson Avenue between Buildings 161 and X10. This area was known as the sludge pits and operated from 1944 to 1977. This site contained three unlined pits utilized for the open dumping of used oil from naval vessels. The RFI identified arsenic and Benzo (a) Pyrene Equivalents (BEQs) as site worker COCs. Remedial activities performed at the site removed large quantities of oil/oil impacted soils. Oil impacted soils and groundwater may still be encountered. Additionally, piping that carried the waste oil from the piers to the sludge pits are still in place. Partial removal of this piping during remedial activities found the piping wrapped in felt like material that was identified as Asbestos Containing Material (ACM).

SWMU 9 is a former landfill area that covers several acres. The RFI has identified COCs in soil and groundwater; however, work performed along Bainbridge Avenue mostly encountered normal backfill material. The contractor should be aware of the landfill footprint and realize the potential exists to encounter landfill debris. The contractor may want to consider performing test digs along the planned line of pipe installation prior to installation.

SWMU 13 is a former firefighting training area on Dyess Avenue that includes Buildings 204, 1303, 1306, 1309, 1310, 1313, 1744, and 1834. Diesel fuel and gasoline were utilized while training personnel in firefighting techniques. Extensive soil sampling was performed and BEQs accounted as the primary contributor in risk calculations. Soil exposure scenarios showed there were no COCs identified for the hypothetical site worker.

AOC 666 located near Osprey Street and Partridge Avenue was investigated to assess soil and groundwater near a UST site that supplied No. 2 fuel oil to a heating Plant (Facility NS-44). The RFI identified some risks from soil (BEQs, N-nitroso-di-n-propylamine, arsenic, and PCB) and groundwater risks were vinyl chloride and chloromethane.

AOC 633 is located near Viaduct on Hobson Avenue (Building 451C). The site is an electrical substation and the RFI identified low levels of PCB's inside substation that are scheduled for remediation early in 2002. No COCs were identified by the RFI for site workers.

AOC 709 (Zone G Grid Sample Area) is located between buildings 224 and 641 on Hobson Avenue. This site was remediated for low levels of PCB contamination in the surface soil.

AOC 643 is an electrical substation ()Building 125 and a UST site at Building 123 on Hobson Avenue. The RFI identified BEQs and arsenic as COCs for a site worker scenario. It was also determined that subsurface contaminate levels showed three contaminants (PCB, arsenic, and dieldrin) exceeded Soil Screening Levels (SSLs) as a possible contributor to groundwater contamination.

AOC 671 is located between piers "Q" and "R" and was a metering house (Building 3905G) along with its two associated 25,000-gallon USTs. No COCs were identified for site worker soil pathway scenarios. Groundwater industrial scenario identified arsenic, mercury, manganese and thallium as COCs.

AOC 675, 676, and 677 are located at Buildings NS-2, 3 and NS-4 between piers "S" and "T". This site is currently being transferred to the UST program. Contaminates that may be encountered include petroleum contaminates. No COCs were identified in the RFI for soil or groundwater for site worker scenarios.

AOC 678 and 679 is located between piers "T" and "U" near Building NS-1. The RFI did not identify any soil or groundwater pathway COCs.

UST site at Building 681 on Hobson Avenue (petroleum contamination may be encountered).

UST site at Building NS-71 near Bordelon Avenue and Proteus Street (petroleum contamination may be encountered).

UST site at Building 640 on Dyess Avenue (petroleum contamination may be encountered).

UST site at Building NS-79 on Dyess Avenue (petroleum contamination may be encountered).

Respectfully,
CH2M-JONES, LLC

Jed Hearnes
Site Superintendent

APPENDIX B

Environmental Sampling Information at AOC 726

Microbac Laboratories, Inc.
SOUTH CAROLINA DIVISION
603 S MAIN STREET
NEW ELLENTON, SC 29809
(803) 652-3324 FAX (803) 652-7995
JONATHAN WHEELER, LAB DIRECTOR
http://www.microbac.com E-Mail: southcarolina@microbac.com

STATE CERT ID.
SC DHEC #02002
A2LA #1814-01
Exp 01/31/04

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · CONSUMER PRODUCTS
WATER · AIR · WASTES · FOOD · PHARMACEUTICALS · NUTRACEUTICALS

CERTIFICATE OF ANALYSIS

WYATT & WYATT INC.
PAUL WYATT SR.
P.O. BOX 280
GRANITEVILLE,SC 29829

Date Reported	5/28/2003
Date Received	5/23/2003
Order Number	0305-00253
Invoice No.	1639
Cust #	W025

Cust P.O.

Subject: WYATT & WYATT

SMP	Test	Method	Result	Date	Time	Tech
001	**CHARLESTON NAVAL SHIPYARD**			**Sampled on 05/22/2003 @ 15:00**		
	VARIOUS ORGANICS	SEE ATTACHMENT	SEE NOTES BELOW	5/28/2003	9:00	KNX

HEXANE WAS ANALYZED BY MICROBAC KNOXVILLE DIVISION. THE RESULT WAS <0.005 mg/L.

Certified By: _____

The following subcontract laboratories may be used as indicated:

CHD = Microbac Laboratories-Camp Hill Division – Lab ID. NY11650, Expires 4/01/2003.
CSR = CSRA Analytical – Lab ID. FL E87619 - Expires 06/30/03.
KTY = Microbac Laboratories-Kentucky Division – Lab ID. 0085.02, Expires 12/31/03.
GEL = General Engineering Laboratories, Charleston, SC., SC DHEC #10120.
FLI = Friend Laboratory, Inc. (a Microbac facility) Lab ID NY10252, Expires 04/01/03.

SOLUTIONS TO ENVIRONMENTAL PROBLEMS
1906 Floyd Culler Court • Oak Ridge, Tennessee 37830
Telephone 423/481-7837 • Fax 423/481-0390

SAMPLE STRATEGY

Samples were collected to identify potential chemical contaminants which may be the source of recent worker claims of ill effects and noxious odors. Groundwater samples were collected out of the trackhoe bucket from a trench depth of approximately 14 feet. Soil samples were collected from freshly excavated soil from a trench depth of approximately 12-14 feet. Samples of water and soil were collected in appropriate VOC containers and submitted to Microbac laboratories located in Maryville, TN. Soil samples were analyzed for Gasoline Range Organics (GRO), Diesel Range Organics, and Volatile Organic Compounds (VOC's). Water samples were submitted for VOC's and GRO's. Instantaneous air monitoring was conducted utilizing direct reading instruments inclusive of an FID, PID, and colorimetric tubes. Integrated air samples were collected using a low volume air sampling pump and charcoal media. The air samples were collected on top of freshly excavated soil and were packaged and submitted to LabCorp. Integrated samples were analyzed specifically for Vinyl Chloride and Total Hydrocarbons as Hexane.

SAMPLE RESULTS

Sample results in the groundwater and soil indicated concentrations of several VOC's and other analytes. Sample results also indicated higher concentrations of the same analyte in the water samples than in the soil samples. Instantaneous PID readings indicated a peak of 5000 ppm with average readings 3" from freshly exposed soil of 500-2500ppm with levels falling to 100-400ppm after 5 minutes of the soil's exposure to air. Instantaneous PID readings indicated a peak of 187 ppm with a 7-12 ppm average within 3" of freshly exposed soil. Colorimetric tube samples indicated the presence of petroleum hydrocarbons and indicated a negative reading for methane and butane. Air samples submitted to LabCorp indicated concentrations of hexane and were below detection limits for vinyl chloride. The prevalent analyte found in all samples, including air, was Hexane. Other analytes found in ground and soil samples can be found in the attached analytical results.

PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

STEP's preliminary conclusion is that there is possibly a plume of decomposed gasoline leaching from an old tank or drum into the sampled trench via the groundwater. The symptoms of Hexane exposure through inhalation are light-headedness, nausea, headaches, and irritation of the eyes, nose, and throat. Hexane and other VOC's detected in the freshly excavated soil and groundwater volatilize quickly. This may explain its absence in stockpile samples, reported by LAW Engineering. Due to the analytes found in the samples collected, STEP recommends an additional 3 days of instantaneous and integrated air monitoring. The monitoring should utilize direct reading instruments (FID, PID, and Colorimetric tubes) to evaluate short term exposures and ambient air levels. STEP also recommends the use of personal air sampling pumps with appropriate media to evaluate employee exposure in comparison with allowable OSHA PELs and

Sincerely,

Jeffrey W. Stokes For

Michael D. Palmer CIH, CSP, CHMM

Appearance And Odor: CLEAR, LITTLE IF ANY COLOR, ODOR-CHARACTERISTIC
Boiling Point: 150 TO 158F
Vapor Pressure (MM Hg/70 F): 140 @ 20C
Vapor Density (Air=1): > AIR
Specific Gravity: 0.674
Evaporation Rate And Ref: 8.10
Solubility In Water: NEGLIGIBLE
Percent Volatiles By Volume: 100

Fire and Explosion Hazard Data

Flash Point: -20F,-29C
Flash Point Method: TCC
Lower Explosive Limit: 1.0
Upper Explosive Limit: 8.0
Extinguishing Media: EXTINGUISH WITH DRY CHEMICAL, CO2 OR A UNIVERSAL TYPE FOAM.
Special Fire Fighting Proc: USE SCBA. WATER SPRAY MAY BE USEFUL IN MINIMIZING VAPORS & COOLING CONTAINERS EXPOSED TO HEAT & FLAME. AVOID SPREADING BURNING LIQUID W/WATER USED FOR COOLING.
Unusual Fire And Expl Hazrds: FLASHBACK ALONG VAPOR TRAIL MAY OCCUR. EXTREMELY FLAMMABLE & MAY IGNITE W/HEAT, SPARKS, FLAME OR STATIC ELEC. IF CONTAINER IS NOT PROPERLY COOLED IT MAY EXPLODE.

Reactivity Data

Stability: YES
Materials To Avoid: THIS PRODUCT IS INCOMPATIBLE WITH STRONG ACIDS OR BASES, OXIDIZING AGENTS AND SELECTED AMINES.
Hazardous Decomp Products: COMBUSTION MAY YIELD CARBON MONOXIDE AND/OR CARBON DIOXIDE.
Hazardous Poly Occur: NO

Health Hazard Data

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
[redacted]
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Signs/Symptoms Of Overexp: [redacted]
Med Cond Aggravated By Exp: [redacted]
HOLD EYELIDS APART & FLUSH EYE W/CLEAN WATER. GET MEDICAL AID. SKIN: REMOVE CONTAMINATED CLOTHING. WASH AREA THOROUGHLY W/MILD SOAP & WATER. GET MEDICAL AID. INHALE: MOVE VICTIM TO FRESH AIR. CPR OR OXYGEN AS NEEDED. IMMEDIATE MEDICAL AID. INGEST: DO NOT INDUCE VOMITING OR GIVE ANYTHING BY MOUTH BECAUSE THIS MATERIAL CAN ENTER LUNGS. GET MEDICAL AID.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: STAY UPWIND & AWAY FROM SPILL. KEEP IGNITION SOURCES AWAY. VENTILATE AREA. A UNIVERSAL TYPE FOAM MAY BE USED TO SUPPRESS

Boiling Point: 150 TO 156F
Vapor Pressure (MM Hg/70 F): 140 @ 20C
Vapor Density (Air=1): > AIR
Specific Gravity: 0.674
Evaporation Rate And Ref: 8.10
Solubility In Water: NEGLIGIBLE
Percent Volatiles By Volume: 100

Fire and Explosion Hazard Data

Flash Point: -20F,-29C
Flash Point Method: TCC
Lower Explosive Limit: 1.0
Upper Explosive Limit: 8.0
Extinguishing Media: EXTINGUISH WITH DRY CHEMICAL, CO2 OR A UNIVERSAL TYPE FOAM.
Special Fire Fighting Proc: USE SCBA. WATER SPRAY MAY BE USEFUL IN MINIMIZING VAPORS & COOLING CONTAINERS EXPOSED TO HEAT & FLAME. AVOID SPREADING BURNING LIQUID W/WATER USED FOR COOLING.
Unusual Fire And Expl Hazrds: FLASHBACK ALONG VAPOR TRAIL MAY OCCUR. EXTREMELY FLAMMABLE & MAY IGNITE W/HEAT, SPARKS, FLAME OR STATIC ELEC. IF CONTAINER IS NOT PROPERLY COOLED IT MAY EXPLODE.

Reactivity Data

Stability: YES
Materials To Avoid: THIS PRODUCT IS INCOMPATIBLE WITH STRONG ACIDS OR BASES, OXIDIZING AGENTS AND SELECTED AMINES.
Hazardous Decomp Products: COMBUSTION MAY YIELD CARBON MONOXIDE AND/OR CARBON DIOXIDE.
Hazardous Poly Occur: NO

Health Hazard Data

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: IRRITATION OF THE EYES, SKIN, NOSE & THROAT, DIGESTIVE SYS. EYE: DIRECT CONTACT MAY CAUSE STINGING, TEARING, REDNESS. SKIN: PROLONGED/REPEATED USE MAY CAUSE REDNESS, BURNING AND DRYING & PERIPHERAL NERVE DAMAGE. INGEST: NAUSEA. LUNG ASPIRATION.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Signs/Symptoms Of Overexp: NERVOUS SYS DEPRESSION: HEADACHE, DROWSINESS, DIZZINESS, LOSS OF COORDINATION AND FATIGUE. ASPIRATION: MATERIAL ENTERS LUNGS WHEN SWALLOWING OR VOMITING & CAUSES LUNG INFLAMMATION & DAMAGE. REPORTS HAVE ASSOCIATED REPEATED/PROLONGED OCCUPATIONAL OVER-EXPOSURE TO SOLVENTS WITH PERMANENT BRAIN AND NERVOUS SYSTEM DAMAGE.
Med Cond Aggravated By Exp: PRE-EXISTING SKIN DISEASE IS MORE SUSCEPTIBLE TO EFFECTS OF THIS MATERIAL. LUNG DISORDERS MAY BE AGGRAVATED BY EXPOSURE. PRE-EXISTING HEART DISORDERS MAY BE MORE SUSCEPTIBLE TO IRREGULAR HEART BEATS.
HOLD EYELIDS APART & FLUSH EYE W/CLEAN WATER. GET MEDICAL AID. SKIN: REMOVE CONTAMINATED CLOTHING. WASH AREA THOROUGHLY W/MILD SOAP & WATER. GET MEDICAL AID. INHALE: MOVE VICTIM TO FRESH AIR. CPR OR OXYGEN AS NEEDED. IMMEDIATE MEDICAL AID. INGEST: DO NOT INDUCE VOMITING OR GIVE ANYTHING BY MOUTH BECAUSE THIS MATERIAL CAN ENTER LUNGS. GET MEDICAL AID.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: STAY UPWIND & AWAY FROM SPILL. KEEP IGNITION SOURCES AWAY. VENTILATE AREA. A UNIVERSAL TYPE FOAM MAY BE USED TO SUPPRESS

APPENDIX C

Industrial Hygiene Sampling Report

Jeff
Dir 2-05

WYATT & WYATT
CONSTRUCTION CO., INC.
P.O. Box 280 • 100 Woodward Road • Graniteville, SC 29829 • Phone: 803-663-9259 • Fax: 80[illegible] 1379

August 1, 2005

DHEC
2600 Bull Street
Columbia, SC 29201-1708

Certified Mail
7003 3110 0001 5744 541[illegible]

Attn: David Scaturo, P.E., P.G., Manager
Corrective Action Engineering Section
Bureau of Land Management

Re: Request to Re-evaluate the Human Health Environmental Indicator (CA725)
Charleston Naval Complex

Dear David:

I have enclosed the following, per your request:

1. PSC Safety and Health Services, Inc. Industrial Hygiene Sampling Report [illegible] a Preliminary Report.
2. Daily Log from 02/2003 thru 06/2003.

I have highlighted various areas in the report from PSC Safety for your convenience. Thanks for your help. Please advise if you may require anything further, I'll be glad to help in any way I can.

Sincerely,

Susan Grantham, on behalf of
Paul D. Wyatt, Sr.
Wyatt & Wyatt Construction Co., Inc.

PSC Safety and Health Services, Inc.
11424-C Kingston Pike · Knoxville, TN 37922 · (865) 777-1401 · Fax (865) 777-140

June 23, 2003

Mr. Paul D. Wyatt, Sr.
Wyatt & Wyatt Construction Company, Inc.
PO Box 280
100 Woodward Lake Road
Graniteville, SC 29829

RE: **Charleston Naval Redevelopment Authority**
Utility System Improvements - Phase III Sewer
Preliminary Industrial Hygiene Survey Report

Dear Mr. Wyatt:

Per your conversation with Kris Thomasson, the following letter provides a preliminary r the Industrial Hygiene (IH) survey conducted on the Utility System Improvements - Pha Sewer project on June 11, 2003 by Kris Thomasson, CSP of PSC Safety and Health Ser (PSC).

The IH survey consisted of monitoring for the presence of volatile organics/inorganics u photo ionization detector (PID) and collecting four soil samples. Air monitoring with t and soil samples were collected at four locations as directed by Wyatt Construction.

PID readings were taken of soil excavated from depths of 8-feet and 15-feet. Ambient a (sampled directly above the soil) and head space (measured in air space above soil in jar) w PID readings were collected to evaluate the concentrations of volatiles being emitted from excavated soil. PID ambient air concentrations ranged from peaks of 4 parts per million to 420 ppm of excavated soil. Head space concentrations for two of the four locations ex the maximum detection range (10,000 ppm) for the unit. The highest PID readings were f location #1 identified as Buildings 640 and 79 on Dyess Avenue and location #4.

Soil samples collected from locations #1 & 4 were sent for laboratory analysis. Soil samp results from location #1 indicated the presence of four halogens (Bromomethane, Chlorofo Iodomethane, Methylene Chloride), and results from location #4 indicated the presence of halogen (Bromomethane).

Based on the PID and soil sample results, PSC recommends that personal air sampling be conducted of employees working in the affected areas to quantify their potential exposure t suspect air contaminants.

Sincerely,

Michael D. Palmer CSP, CIH, CHMM
President
PSC Safety and Health Services, Inc.

PSC Safety and Health Services, Inc.
11424-C Kingston Pike · Knoxville, TN 37922 · (865) 777-1401 · Fax (865) 777-1404 · psc@pscsafety.com

INDUSTRIAL HYGIENE SAMPLING REPORT

Prepared For:
Wyatt & Wyatt Construction Company, Inc.
PO Box 280
100 Woodward Lake Road
Graniteville, SC 29829

Prepared By:

PSC Safety and Health Services, Inc.
11424-C Kingston Pike
Knoxville, TN 37922

June 27, 2003

EXECUTIVE SUMMARY

On June 11, 2003 PSC Safety and Health Services, Inc. (PSC) conducted an industrial hygiene survey on the Utility System Improvements – Phase III Sewer project. Monitoring was conducted for the presence of volatile organic/inorganic compounds using a photo ionization detector (PID), direct reading instrument. Soil samples were also collected and submitted to a laboratory accredited by the American Industrial Hygiene Association (AIHA). Sampling was conducted by Kris Thomasson, CSP of PSC at locations as directed by Wyatt Construction.

The PID readings were taken of soil excavated from depths of approximately 8-feet and 15-feet. Ambient air (sampled directly above the excavated soil) and head space (measured in air space above soil in the jar) type PID readings were collected to evaluate the concentrations of volatiles being emitted from the excavated soil. PID ambient air concentrations ranged from peaks of 3 and 5 parts per million (ppm) to 420 ppm of excavated soil. Head space concentrations for three of the four locations exceeded the maximum detection range (10,000 ppm) for the unit. The highest PID readings were from location #1 identified as Building 640 and 79 on Dyess Avenue and location #4 which is identified as the north side of the Coast Guard - Long Term Parking lot on Halsey street.

Soil samples taken from locations #1 and #4 were sent for laboratory analysis. Soil sample results from location #1 indicated the presence of four halogens (Bromomethane, Chloroform, Iodomethane, Methylene Chloride), and results from location #4 indicated the presence of one halogen (Bromomethane).

PSC recommends that personal air sampling of employees working in the affected areas be conducted to quantify their potential exposure to suspect air contaminants. Until such time as the personal exposures can be quantified, and based on elevated PID readings obtained, the detected presence of some halogens and organics in the soil samples and noticeable odors during the sampling, it is recommended that any worker use Level B personal protective equipment, which includes a supplied air system and chemical protective clothing, as described in Appendix B of the Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120 – Hazardous Waste Operations and Emergency Response (Hazwoper) standard. This recommendation is based on 29CFR1910.120(c)(5)(iii-iv), 1910.120(g), and 1910.120(h).

INTRODUCTION

On June 11, 2003 PSC Safety and Health Services, Inc. (PSC) conducted an industrial hygiene survey on the Utility System Improvements – Phase III Sewer project. Monitoring was conducted for the presence of volatile organic/inorganic compounds using a photo ionization detector (PID), direct reading instrument. Soil samples were also collected and submitted to Analytics Corporation (Analytics) a laboratory accredited by the American Industrial Hygiene Association (AIHA). Sampling was conducted by Kris Thomasson, CSP of PSC at locations as directed by Wyatt Construction. The objective of the survey was to evaluate the presence of contaminants in the soil that could be the source of symptoms being reported by employees of Wyatt & Wyatt Construction Co., Inc. (Wyatt & Wyatt) during excavation work as part of the Utility Systems Improvements Phase III – Sewer project.

This report is for the sole use of Wyatt & Wyatt Construction Company, Incorporated. Use of this report by any other parties will be at such party's sole risk, and PSC disclaims liability for any such use or reliance by third parties. The results presented in this report are indicative of conditions only during the time of the survey. This study does not purport to include every health hazard at this location, and only those areas and exposures specifically mentioned were evaluated.

1.0 Sampling and Analytical Methods

Monitoring was conducted for the presence of volatile organic/inorganic compounds using a photo ionization detector (PID), direct reading instrument. Soil samples were also collected and submitted to a laboratory accredited by the American Industrial Hygiene Association (AIHA).

PID readings were taken of soil excavated from depths of approximately 8 ft. and 15 ft. Ambient air was sampled directly above the soil as it was removed from the excavation and placed on the ground immediately adjacent. Some readings were taken while soil was in the bucket of the Track-hoe prior to being placed on the spoils pile.

Head space readings were collected from soil placed into 1000 ml glass sample jars provided by Analytics. The jars were filled to approximately ¾ full then a latex glove was stretched over the top of the jar and secured in place with a rubber band. The sealed jar containing the soil was the allowed to sit unopened for 20-30 minutes. The latex covering the jar was punctured and the probe of the PID was inserted into the head space of the sample jar. Readings were recorded and the soil was returned to the pile of excavated materials.

Bulk soil samples were collected at four locations. A 1000 ml glass sample jar provided by Analytics was filled with soil collected from approximately 15 ft. deep at each of the four excavations being evaluated. The sample jars were closed with the lids provided and then taped closed to ensure the seal remained intact during shipping. Samples from locations designated as #1 and #4 were sent for laboratory analysis. Soil samples were packed on ice in a cooler provided by Analytics and shipped to the laboratory using Chain of Custody procedures.

2.0 Sampling Results and Discussion

2.1 PID Readings at Sample Location #1

Initial PID readings of ambient air concentrations above the excavated soil at location #1 between Building 640 and 79 on Dyess Avenue, reached a peak of 420 ppm and were consistent at levels of 120-140 ppm. These readings were obtained from soil pulled from approximately 15 ft. deep. The initial excavation was backfilled after these samples were collected. Head space readings obtained using the methods described in section 1.0 were beyond the capacity of the PID used (>9999 ppm). A bulk soil sample was collected at this location.

A second excavation at approximately the same depth and adjacent to the initial excavation was made following the evaluation of the other three locations. The purpose of the second excavation was to allow representatives of General Engineering & Environmental, LLC to obtain PID readings of the site. Neither PSC or General Engineering and Environmental, LLC obtained significant readings from the second excavation.

2.2 PID Readings at Sample Location #2

This site is located at the northwest corner of the Coast Guard Long Term parking lot on Halsey St. PID readings reached a peak of 3 ppm from soil collected at approximately 15 ft. deep. Head space readings obtained using the methods described in section 1.0 were beyond the capacity of the PID used (>9999 ppm).

2.3 PID Readings at Sample Location #3

This site is located just west of the entrance gate along the fence on the north side of the Coast Guard Long Term parking lot on Halsey St., and west of/ adjacent to location #4 described below. PID readings did not indicate the presence of any volatile organic/inorganic compounds (0 ppm) from soil collected in this location. Head space readings were not obtained for this sample location.

2.4 PID Readings at Sample Location #4

This site is located just west of the entrance gate along the fence on the north side of the Coast Guard Long Term parking lot on Halsey St., and east of/ adjacent to location #3 described above. PID readings taken with soil in the bucket of the track-hoe reached a peak of 5 ppm from soil collected at approximately 15 ft. deep. Head space readings obtained using the methods described in section 1.0 were beyond the capacity of the PID used (>9999 ppm).

2.5 Bulk Soil Sample Analysis

Two of the bulk soil samples collected were submitted to Analytics for analysis of volatile organics and total petroleum hydrocarbons. The results are indicated on the table below. Items in bold indicate the presence of that substance in the soil sample. Results with < indicate levels below the detection limit of the analysis method used.

Contaminant	Analytical Method	Sample Results Location #1	Sample Results Location #4
Total Petroleum Hydrocarbons	TPH-IR	18 mg/m^3	12 mg/m^3
Volatile Organics:			
1,1dichloroethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,1 dichloroethene	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,1 dichloropropene	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,1,1 Trichloroethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,1,1,2 Tetrachloroethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,1,2 Trichloroethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,1,2,2 Tetrachloroethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,2 Dibromo-3-Chloropropane	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,2 Dibromoethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,2 Dichlorobenzene	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,2 Dichloroethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,2 Dichloropropane	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,2,3 Trichlorobenzene	NIOSH 8260	<500 ug/kg	<500 ug/kg
1,2,3 Trichloropropane	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,2,4 Trichlorolbenzene	NIOSH 8260	<500 ug/kg	<500 ug/kg
1,2,4 Trimethylbenzene	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,3 Dichlorobenzene	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,3 Dichloropropane	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,3,5 Trimethylbenzene	NIOSH 8260	<50 ug/kg	<50 ug/kg
1,4 Dichlorobenzene	NIOSH 8260	<50 ug/kg	<50 ug/kg
2,2-Dichloropropane	NIOSH 8260	<50 ug/kg	<50 ug/kg
2-Butanone	NIOSH 8260	<50 ug/kg	<50 ug/kg
2-Chloroethyl Vinyl Ether	NIOSH 8260	<50 ug/kg	<50 ug/kg
2-Chlorotoluene	NIOSH 8260	<50 ug/kg	<50 ug/kg
2-Hexanone	NIOSH 8260	<50 ug/kg	<50 ug/kg
4-Chlorotoluene	NIOSH 8260	<50 ug/kg	<50 ug/kg
4-Methyl-2-Pentanone	NIOSH 8260	<250 ug/kg	<250 ug/kg
Acetone	NIOSH 8260	<250 ug/kg	<250 ug/kg
Acetonitrile	NIOSH 8260	<50 ug/kg	<50 ug/kg
Acrolien	NIOSH 8260	<50 ug/kg	<50 ug/kg
Acrylonitrile	NIOSH 8260	<50 ug/kg	<50 ug/kg

Contaminant	Analytical Method	Sample Results Location #1	Sample Results Location #4
Benzene	NIOSH 8260	<50 ug/kg	<50 ug/kg
Bromobenzene	NIOSH 8260	<50 ug/kg	<50 ug/kg
Bromochloromethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
Bromodichloromethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
Bromoform	NIOSH 8260	<50 ug/kg	<50 ug/kg
Bromomethane	**NIOSH 8260**	**1070 ug/kg**	**457 ug/kg**
Carbon Tetrachloride	NIOSH 8260	<50 ug/kg	<50 ug/kg
Carbon disulfide	NIOSH 8260	<50 ug/kg	<50 ug/kg
Chlorobenzene	NIOSH 8260	<50 ug/kg	<50 ug/kg
Chlorodibromomethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
Chloroethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
Chloroform	**NIOSH 8260**	**87.0 ug/kg**	<50 ug/kg
Chloromethane	NIOSH 8260	<100 ug/kg	<100 ug/kg
Cis-1,2 Dichloroethene	NIOSH 8260	<50 ug/kg	<50 ug/kg
Cis-1,3 Dichloroethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
Dibromomethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
Dichlordiflouromethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
Ethyl Methacrylate	NIOSH 8260	<50 ug/kg	<50 ug/kg
Ethybenzene	NIOSH 8260	<50 ug/kg	<50 ug/kg
Hexachlorobutadiene	NIOSH 8260	<500 ug/kg	<500 ug/kg
Iodomethane	**NIOSH 8260**	**734 ug/kg**	<500 ug/kg
Isopropyl Ether	NIOSH 8260	<50 ug/kg	<50 ug/kg
Isopropyl benzene	NIOSH 8260	<50 ug/kg	<50 ug/kg
M, P Xylene	NIOSH 8260	<100 ug/kg	<100 ug/kg
Methacrylonitrile	NIOSH 8260	<50 ug/kg	<50 ug/kg
Methyl methacrylate	NIOSH 8260	<50 ug/kg	<50 ug/kg
Methyl t-Butyl Ether	NIOSH 8260	<50 ug/kg	<50 ug/kg
Methylene Chloride	**NIOSH 8260**	**87.0 ug/kg**	<50 ug/kg
N-Butylbenzene	NIOSH 8260	<50 ug/kg	<50 ug/kg
N-Propylbenzene	NIOSH 8260	<50 ug/kg	<50 ug/kg
Naphthalene	NIOSH 8260	<500 ug/kg	<500 ug/kg
O-Xylene	NIOSH 8260	<50 ug/kg	<50 ug/kg
P-Isopropyltoluene	NIOSH 8260	<50 ug/kg	<50 ug/kg
Sec-Butylbenzene	NIOSH 8260	<50 ug/kg	<50 ug/kg
Styrene	NIOSH 8260	<50 ug/kg	<50 ug/kg
Tert-Butylbenzene	NIOSH 8260	<50 ug/kg	<50 ug/kg
Tetrachloroethene	NIOSH 8260	<50 ug/kg	<50 ug/kg
Toluene	NIOSH 8260	<50 ug/kg	<50 ug/kg
Trans-1, 2 Dichloroethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
Trans-1,3 Dichloropropene	NIOSH 8260	<50 ug/kg	<50 ug/kg
Trichloroethene	NIOSH 8260	<50 ug/kg	<50 ug/kg
Trichlorofluoromethane	NIOSH 8260	<50 ug/kg	<50 ug/kg
Vinyl Chloride	NIOSH 8260	<50 ug/kg	<50 ug/kg
Vinyl Acetate	NIOSH 8260	<50 ug/kg	<50 ug/kg

3.0 Conclusions and Recommendations

The presence of some halogens and organics above normal background levels were identified through direct reading instrumentation air monitoring and soil sample analysis by Analytics Corporation.

PSC recommends that personal air sampling of employees working in the affected areas be conducted to quantify their potential exposure to suspect air contaminants.

Until such time as the personal exposures can be quantified, and based on elevated PID readings obtained, the detected presence of some halogens and organics in the soil samples and noticeable odors during the sampling, and symptoms reported by employees, it is recommended that workers use Level B personal protective equipment, which includes a supplied air system and chemical protective clothing, as described in Appendix B of the Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120 – Hazardous Waste Operations and Emergency Response (Hazwoper) standard. This recommendation is based on 29CFR1910.120(c)(5)(iii-iv), 1910.120(g), and 1910.120(h).

**NOTE

Hazardous Materials that Wyatt & Wyatt's men may have been exposed to for 14 weeks based on the information in the SCDHEC "Dig Permit 053"..

BEQ's
**PCB's (VERY BAD SUBSTANCE)
N-nitroso-di-n-propylamine
ARSENIC
Dieldrin
Mercury
Manganese
Thulium
Petroleum contamination
**Hexane (was detected 5/28/03)

CHARLESTON NAVAL COMPLEX
DAILY LOG

Thursday, February 20 thru Monday, February 24 Wyatt contracted (via Purchase Order 05-23569-013) with C.R. Hipp Construction, Inc. (Hipp) and agreed to provide equipment and labor for installation of underground piping in accordance with supplied general requirements, bid specifications and working drawings. Drawings were the only documents that Wyatt received. No general requirements document nor project specifications were received. No copies of any permits or environmental assessments were received, nor any possible environmental concerns disclosed at the time of contract.

Tuesday, February 25 thru Monday, March 3 Wyatt developed a phasing work plan to accomplish contract obligations. We planned to start at manhole 323E, end of the line. Wyatt shared the strategy with Hipp so pile driving operations could be accomplished ahead of our scheduled operations. Hipp agreed and began their work.

Tuesday, March 4 thru Wednesday, March 12 Hipp's pile driving was not complete as previously agreed and there were no available work areas to commence our excavation operations. Our workers pre-cut all the timber saddles while waiting for Hipp to complete pile driving in the vicinity of manhole 323E. Hipp's pile driving operations encountered unknown obstacles. Two steam lines and two communication duct banks halted pile driving east of Hobson Street. Pile driving west to east along Halsey Street encountered electrical interference between Dyess Avenue and Hobson Street.

Thursday, March 13 through Friday, March 21 Wyatt began excavation at manhole 6 since no other areas were available to us. We excavated, graded, poured footer and set manhole 6. We installed the first 60' of 20" ductile iron pipe south along Dyess Avenue. Our workers began complaining of foul odors and reported them to Hipp's Superintendent and Charleston Naval Complex Redevelopment Authority's (RDA's) Inspector. Our workers were told that the area was swamp land and that the odors were to be expected. All materials were to be supplied by Hipp, so Wyatt requested backfill material once the pipe was bedded. We backfilled with excavated material as directed by on-site inspectors, although material was saturated, unsuitable, and could not be compacted. The material was sloppy and required weeks of drying time before any equipment could access across the backfilled trenched areas. The seam between the adjacent undisturbed earth and backfilled trenches cracked as the top couple inches of backfill material dried and became crusty. We fabricated a plywood "doghouse" form to use with sheet piling around the end of the previously-laid pipe when the trench box was moved so we could install the next joint of pipe without the saturated backfill slumping and running into our current work area.

Monday, March 24 thru Wednesday, March 26 Wyatt continued installing pipe toward manhole 5 at Thornback Avenue. Unpleasant smells became worse, but they weren't consistent along the trench. Some areas were worse than others. Production rates fell. Our workers began exhibiting flu-like symptoms such as headaches, nausea, aches and tiredness. They were lethargic and their energy levels were diminished. Motor coordination lessened. Still, they were reassured by Hipp, RDA and the Project Safety Officer, Kenny Angel, that the smells were merely typical swamp odors. I got sick personally and had to be driven home. I had all the

symptoms of a heart attack. I had chest pain and irregular heartbeat. I went to the hospital and they confirmed the irregular heartbeat. They monitored me until all of my bodily functions seemed to return to normal, then discharged me. I am physically ill and depressed. My motor coordination and reaction times are diminished. Meanwhile, at an area adjacent to our operations, tankers and pumps were being set up in a parking lot and Wyatt was asked to relocate stored materials in order for that unknown operation to commence. We obliged and moved the pipe as requested. We questioned what was happening with the tanks and pumps and we were told that live ammunition and hospital syringes were discovered during separate excavation operations in that area.

Thursday, March 27 Wyatt excavated, graded and poured the concrete footing for manhole 5. We fabricated a steel "doghouse" template to replace the plywood one.

Friday, March 28 thru Sunday, March 30 Wyatt waited for concrete footing at manhole 5 to cure. No other areas were available for work.

Monday, March 31 Wyatt uncovered manhole 5 footing. We excavated and prepared to set manhole 5.

Tuesday, April 1 thru Tuesday, April 8 Wyatt set manhole 5 and 20" ductile iron pipe. We repaired 4" service line.

Wednesday, April 9 Wyatt repaired an unexpected (not shown on the drawings) 21" storm drain damaged by Hipp's pile driving operations. Our operations were halted while we fought to keep the current site dewatered. We pumped extraordinary amounts of (presumed) stormwater.

Thursday, April 10 thru Sunday, April 20 Wyatt waiting for a work area to be made available to us.

Monday, April 21 and Tuesday, April 22 Wyatt again pumped (presumed) stormwater and installed 20" ductile iron pipe

Wednesday, April 23 Wyatt set manholes 3 and 4. We installed 20" ductile iron pipe and fittings.

Thursday, April 24 and Friday, April 25 Wyatt installed 20" and 8" ductile iron pipe and fittings. We poured 4 cubic yards of concrete.

Monday, April 28 Wyatt again pumped (presumed) stormwater for 5 hours. We poured 2 cubic yards of concrete at manholes 3 and 4 for the drop inverts.

Tuesday, April 29 thru Tuesday, May 6 Wyatt installed 20" ductile iron pipe at manhole 3 toward manhole 2.

Wednesday, May 7 Wyatt installed 20" ductile iron pipe and replaced 36' of 16" storm line.

Thursday, May 8 Wyatt installed 20" ductile iron pipe. We were asked to halt our operations short of manhole 2 until the pile driving and prep work was completed by Hipp. We were told that a limited area in the vicinity of manhole 6 was available for us to work. We mobilized labor and equipment back to manhole 6.(*We could have dropped back to the 8" Gravity Sewer (Dwg.C1.8 between Station 8 + 04.07 & Station 14 + 10.31 & existing Manholes 73-B, if we had been given our clearance badges that we applied for in March 2003.)

Friday, May 9 Wyatt installed 20' of 20" ductile iron pipe from manhole 6 toward manhole 7. Workers again became sick with headaches, nausea, dysentery, and skin rashes.

Monday, May 12 and Tuesday, May 13 Wyatt installed 40' of 20" ductile iron pipe. We stopped approximately 45' short of the manhole 7 because a live tie-in will be necessary once the entire system is in place. Wyatt formed the footing at manhole 7 and poured 3 cubic yards of concrete.

Wednesday, May 14 We set the box for manhole 8. Wyatt set forms for manhole 8 since area had already been excavated. Heavy odors were present again. We encountered what we suspected to be raw sewage. Again, workers became ill. Inspectors and safety representatives from Hipp and RDA assured Wyatt workers that the suspected raw sewage was just typical smelly swamp sludge. Since our workers were sick, we informed Hipp and RDA that our men could not continue to work in the sewage and smell that they were encountering. At this point RDA inspector made a decision to call the Navy inspector to come and inspect the site. The Navy representative showed up on the site and the first thing he said was " Your digging permit states that the Contractor is responsible for protecting their men against contaminated materials" due to this area is contaminated. No inspectors or safety personnel ever mentioned contamination. This was the first time anyone had ever mentioned the digging permit or contamination to Wyatt. Mr. Wyatt then turned and asked Andy Campbell about the permit. Andy replied "a copy of the permit is in Hipp's file and we were welcome to review it if we had only ask. We had no knowledge of any contamination at the project site. No provided documents mentioned anything about contamiuation. No postings at the job site alerted us that the site was contaminated. NO inspectors or safety personnel ever mentioned contamination. Since learning of the contaminated project site, we have limited work to non-earth-disturbing activities.

Thursday, May 15 Wyatt resumed welding steel.

Friday, May 16 Wyatt poured 3 cubic yards of concrete for manhole 8 footing. We welded steel at the "shop" for balance of the day because there were no other available areas for us to work.

Monday, May 19 Since there were still no accessible areas available for us to work, we welded I-beams for lift station. We backfilled and put gravel in driveway so cars could get in & out of parking lot. Wyatt resumed welding steel.

Tuesday, May 20 Wyatt continued welding steel.

Wednesday, May 21 Wyatt modified beams and continued welding steel. We received a copy of the expired Charleston Caretaker Site Office Excavation Permit 053 and associated (partial) documentation of the RCRA Facility Investigation Report at the Weekly Progress Meeting. Documents disclose contamination at the project site.

Thursday, May 22 Wyatt continued welding steel. We set the trench box between manholes 3 and 2.

Friday, May 23 thru Tuesday, May 27 Wyatt waited for Hipp to drive pile and have an area or areas available for us to continue work. We unloaded beams and continued welding steel.

Wednesday, May 28 Unloaded 5' I-beams, fabricated steel beams for shoring box. Wyatt continued welding and waiting for Hipp to make a place available for us to work. Mike Coyle, Wyatt's foreman, attended the Weekly Progress Meeting. He had a skin rash, his eyes were irritated, and he recently had an unexplained weight loss. Before the discussion of any illnesses and symptoms of Wyatt's employees, Hipp excused their pile driving subcontractor from the meeting.

Thursday, May 29 and Friday, May 30 Wyatt continued welding and waiting for Hipp to drive pile and have an area or areas available for us to continue work.

Saturday, May 31 thru Tuesday, June 3 Wyatt continued waiting for Hipp to drive pile and have an area or areas available for us to continue work.

Wednesday, June 4 Wyatt presented independent test lab results to Hipp, indicating that the project site was contaminated with hexane.

Wednesday, June 11 Wyatt received a copy of a letter at the Weekly Progress Meeting, dated June 10, from Hipp to RDA stating that the work has stopped as per the General Conditions of Hipp's contract. After the meeting concluded, I went to the field and asked one of Hipp's foremen if he was aware that the project area was contaminated. He responded negatively.

APPENDIX D

Soil Contaminant Survey

GENERAL ENGINEERING & ENVIRONMENTAL, LLC

Meeting Today's Needs with a Vision for Tomorrow

August 4, 2003

Mr. Gene Knisley, P.E.
Charleston Naval Complex Redevelopment Authority
1360 Truxton Ave., Suite 300
Charleston, South Carolina 29405

Re: Sample Collection and Analysis
Sewer Line Construction Site

Dear Mr. Knisley:

General Engineering & Environmental, LLC (General Engineering) conducted on July 8, 2003 a soil contaminant survey at the sewer line construction site located at the Coast Guard Long Term Storage Yard and along Dyess Avenue on the former Charleston Naval Shipyard. The purpose of this survey was to identify soil contaminants that could be the source of health symptoms reported by workers installing a new sewer line.

FIELD MEASUREMENTS

James R. Holtzclaw Ph.D., C.I.H. and Carol Sandel of General Engineering conducted the survey. Excavations were dug at two locations along Dyess Avenue. Soil samples including multiple duplicates at each location were collected from several different excavation depths and placed in glass jars for subsequent quantitative analysis in the laboratory. Gas samples were collected in Tedlar bags and on charcoal tubes for subsequent qualitative analysis in the laboratory.

Excavated soils were surveyed using a photoionization detector (PID) to identify the presence of volatile hydrocarbon contaminants. Elevated readings from the PID were noted for several soil samples during the early portion of the excavation and elevated readings were also noted when the headspace of several of the sample jars was measured. No response from the PID was noted during soil screening in the late morning or early afternoon, unless the sample was very wet.

Gas concentrations at the bottom of the approximately 15 – 20 foot deep excavations were measured using the PID and a four gas meter immediately after completion of the excavation. The total hydrocarbon concentration measured with the PID was 0 ppm. Carbon monoxide and hydrogen sulfide concentrations measured with the four gas meter were 0 ppm. The oxygen content measured with the four gas meter was 21 %.

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After completion of the initial measurements in the excavation, the excavations were covered with a polyethylene sheet that was covered along the edges with the excavated soil. After approximately two hours, a small slit was cut in the polyethylene sheet and the gas concentration at the bottom of the excavation was measured again. Gas concentrations measured by the four gas meter were 0 ppm and approximately 19.4% oxygen for both excavations. The PID reading was approximately 30 – 40 ppm for both excavations. The charcoal tube and Tedlar bag samples were collected from the bottom of the covered excavations.

The excavations were left covered and re-tested on the morning of July 9, 2003. Gas concentrations measured by the four gas meter were 0 ppm and 21 % oxygen for both excavations. The PID reading was approximately 10 - 12 ppm for both excavations.

LABORATORY ANALYES

Representative soil samples were submitted to the laboratory for the analysis of volatile organics, semi-volatile organics, pesticides, herbicides, and Polychlorinated biphenyls (PCBs). Additionally, the volatile organic analyses included a list of tentatively identified compounds (TICs) which is used to identify non-target compounds in the samples. The laboratory analyses did not identify the presence of a significant organic contaminant in the samples. Only common, background laboratory contaminants were identified in the volatile and semi-volatile organic analyses. No contaminants were identified in the herbicide and PCB analyses. Trace levels of DDE were found in all samples and barely measurable levels of Dieldrin and/or DDT were found in two samples. The laboratory certificates of analysis are included for your information.

Qualitative analyses of the charcoal tubes and the Tedlar bags were conducted in our laboratory. No chemical contamination was observed in the samples.

DISCUSSION

There is a disagreement between the field measurements conducted with the PID and the subsequent laboratory analyses of the collected soil samples. The PID field measurements conducted on July 8, 2003 are similar to those obtained on June 11, 2003 – elevated PID readings were obtained during the morning and from the headspace of soil sample containers, but not during soil screening conducted later in the morning or afternoon. On the other hand, laboratory analysis of soil samples collected during the June 11 and July 8 surveys did not identify the presence of any volatile organic contaminants in the soil samples. The laboratory analyses suggest that there may have been a problem with the PID field measurements.

To resolve the disagreement between the field and laboratory analyses, the PID manufacturer (Photovac) was contacted on July 25, 2003. During the telephone conversation between Dr. Holtzclaw and a technical expert at Photovac, the Photovac representative noted that he had observed from time to time, problems similar to that

observed above. According to the Photovac representative, the most likely explanation is that a small amount of water vapor is condensing on the collection screen inside the PID. This condition can, for a variety of reasons, allow an electrical current to reach the detector circuitry thereby producing a false signal. The condition most likely to cause water condensation in the PID is when the temperature of the PID detection chamber is less than that of the sample gas. This is also the condition that one would expect when a PID is taken from an air-conditioned environment to the field during the summer, and also when sampling the headspace of soil containers that have been left in the sun (i.e., they are warm). You would also expect the likelihood of this problem to decrease as the PID is operated and its internal temperature equilibrates with the ambient temperature. All of this is consistent with the observed field results.

Based on the above discussion, we must conclude that the field PID results are, at best, inconclusive and that the laboratory results should be relied upon.

CONCLUSIONS

No chemical contaminants were detected in any of the soil samples in sufficient quantities to produce the health symptoms reported by site workers. However, it is interesting to note that we did detect trace quantities of DDE in the soil samples and that trace quantities of DDE were detected in blood screens of at least some of the workers reporting health problems. Consequently, we suggest that the RDA and its subcontractors review their site safety plans and take appropriate precautions to prevent contact with soils that may be contaminated with pesticides. If you wish, I will be happy to assist with the development of a suitable site safety plan.

If I can answer any questions or provide you with additional information regarding our results to date, please contact me at my cell phone number, 697-2196. Thank you for the opportunity to assist you with your industrial hygiene needs.

Yours very truly,

James R. Holtzclaw, Ph.D, C.I.H.
Senior Staff Scientist

fc: cncr00103_rpt.doc

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Certificate of Analysis

Company : Charleston Naval Complex Redevelopment
Address : 1360 Truxton ave.
Charleston, South Carolina 29405

Report Date: July 25, 2003

Contact: Sean McDonald
Project: Construction Site Evaluation

Client Sample ID: Excavation #1 @ 15'
Sample ID: 83757003
Matrix: Soil
Collect Date: 08-JUL-03 12:15
Receive Date: 08-JUL-03
Collector: GEL
Moisture: 27.6%

Project: CNCR00103C
Client ID: CNCR001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-GC/MS											
3510/8270C TCL BNA Soil											
1,1'-Biphenyl	U	ND	24.4	460	ug/kg	1	KGB1	07/18/03	1725	263647	1
1,2,4-Trichlorobenzene	U	ND	17.5	460	ug/kg	1					
1,2-Dichlorobenzene	U	ND	13.8	460	ug/kg	1					
1,3-Dichlorobenzene	U	ND	15.7	460	ug/kg	1					
1,4-Dichlorobenzene	U	ND	21.6	460	ug/kg	1					
2,4,5-Trichlorophenol	U	ND	23.9	460	ug/kg	1					
2,4,6-Trichlorophenol	U	ND	37.8	460	ug/kg	1					
2,4-Dichlorophenol	U	ND	28.5	460	ug/kg	1					
2,4-Dimethylphenol	U	ND	230	460	ug/kg	1					
2,4-Dinitrophenol	U	ND	230	921	ug/kg	1					
2,4-Dinitrotoluene	U	ND	35.0	460	ug/kg	1					
2,6-Dinitrotoluene	U	ND	46.0	460	ug/kg	1					
2-Chloronaphthalene	U	ND	18.9	46.0	ug/kg	1					
2-Chlorophenol	U	ND	21.2	460	ug/kg	1					
2-Methyl-4,6-dinitrophenol	U	ND	230	460	ug/kg	1					
2-Methylnaphthalene	U	ND	23.0	46.0	ug/kg	1					
2-Nitrophenol	U	ND	23.5	460	ug/kg	1					
3,3'-Dichlorobenzidine	U	ND	230	460	ug/kg	1					
4-Bromophenylphenylether	U	ND	47.0	460	ug/kg	1					
4-Chloro-3-methylphenol	U	ND	230	460	ug/kg	1					
4-Chloroaniline	U	ND	230	460	ug/kg	1					
4-Chlorophenylphenylether	U	ND	27.2	460	ug/kg	1					
4-Nitrophenol	U	ND	230	460	ug/kg	1					
Acenaphthene	U	ND	11.0	46.0	ug/kg	1					
Acenaphthylene	U	ND	23.0	46.0	ug/kg	1					
Anthracene	U	ND	23.0	46.0	ug/kg	1					
Atrazine	U	ND	46.0	460	ug/kg	1					
Benzaldehyde	U	ND	82.0	460	ug/kg	1					
Benzo(a)anthracene	U	ND	23.0	46.0	ug/kg	1					
Benzo(a)pyrene	U	ND	23.0	46.0	ug/kg	1					
Benzo(b)fluoranthene	U	ND	23.0	46.0	ug/kg	1					
Benzo(ghi)perylene	U	ND	23.0	46.0	ug/kg	1					
Benzo(k)fluoranthene	U	ND	23.0	46.0	ug/kg	1					
Butylbenzylphthalate	U	ND	39.6	460	ug/kg	1					
Carbazole	U	ND	23.0	460	ug/kg	1					
Chrysene	U	ND	23.0	46.0	ug/kg	1					
Di-n-butylphthalate	J	52.2	33.1	460	ug/kg	1					

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Certificate of Analysis

Company : Charleston Caval Complex Redevelopment
Address : 1360 Truxtun ave.
Charleston, South Carolina 29405

Report Date: July 25, 2003

Contact: Sean McDonald

Project: Construction Site Evaluation

Client Sample ID: Excavation #1 @ 15'
Sample ID: 83757003

Project: CNCR00103C
Client ID: CNCR001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-GC/MS											
3510/8270C TCL BNA Soil											
Di-n-octylphthalate	U	ND	41.9	460	ug/kg	1					
Dibenzo(a,h)anthracene	U	ND	23.0	46.0	ug/kg	1					
Dibenzofuran	U	ND	23.5	460	ug/kg	1					
Diethylphthalate	U	ND	24.4	460	ug/kg	1					
Dimethylphthalate	U	ND	25.3	460	ug/kg	1					
Diphenylamine	U	ND	30.8	460	ug/kg	1					
Fluoranthene	U	ND	23.0	46.0	ug/kg	1					
Fluorene	U	ND	5.52	46.0	ug/kg	1					
Hexachlorobenzene	U	ND	27.6	460	ug/kg	1					
Hexachlorobutadiene	U	ND	17.5	460	ug/kg	1					
Hexachlorocyclopentadiene	U	ND	230	460	ug/kg	1					
Hexachloroethane	U	ND	30.4	460	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	ND	23.0	46.0	ug/kg	1					
Isophorone	U	ND	22.1	460	ug/kg	1					
N-Nitrosodipropylamine	U	ND	31.3	460	ug/kg	1					
Naphthalene	U	ND	23.0	46.0	ug/kg	1					
Nitrobenzene	U	ND	28.1	460	ug/kg	1					
Pentachlorophenol	U	ND	230	460	ug/kg	1					
Phenanthrene	U	ND	23.0	46.0	ug/kg	1					
Phenol	U	ND	17.5	460	ug/kg	1					
Pyrene	U	ND	23.0	46.0	ug/kg	1					
alpha-Terpineol	U	ND	59.4	460	ug/kg	1					
bis(2-Chloroethoxy)methane	U	ND	17.0	460	ug/kg	1					
bis(2-Chloroethyl) ether	U	ND	51.6	460	ug/kg	1					
bis(2-Chloroisopropyl)ether	U	ND	15.2	460	ug/kg	1					
bis(2-Ethylhexyl)phthalate	BJ	163	41.4	460	ug/kg	1					
m,p-Cresols	U	ND	46.0	460	ug/kg	1					
m-Nitroaniline	U	ND	230	460	ug/kg	1					
o-Cresol	U	ND	35.9	460	ug/kg	1					
o-Nitroaniline	U	ND	230	460	ug/kg	1					
p-Nitroaniline	U	ND	51.1	460	ug/kg	1					
Semi-Volatiles-HERB											
8151A Herbicides Soil											
2,4,5-T	U	ND	0.477	13.8	ug/kg	20	YS1	07/18/03	1625	263666	2
2,4,5-TP	U	ND	0.549	13.8	ug/kg	20					
2,4-D	U	ND	0.807	13.8	ug/kg	20					
Semi-Volatiles-Pesticide & PCB											
8081 Perticides & PCB Soil											
4,4'-DDD	U	ND	0.290	1.84	ug/kg	1	MM	07/18/03	1828	263668	3
4,4'-DDE	J	0.662	0.249	1.84	ug/kg	1					
4,4'-DDT	J	1.83	0.525	1.84	ug/kg	1					

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Charleston, South Carolina 29405

Report Date: July 25, 2003

Contact: Sean McDonald

Project: Construction Site Evaluation

Client Sample ID: Excavation #1 @ 15'
Sample ID: 83757003

Project: CNCR00103C
Client ID: CNCR001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide & PCB											
8081 Pesticides & PCB Soil											
Aldrin	U	ND	0.237	0.921	ug/kg	1					
Aroclor-1016	U	ND	6.91	23.0	ug/kg	1					
Aroclor-1221	U	ND	19.5	23.0	ug/kg	1					
Aroclor-1232	U	ND	11.5	23.0	ug/kg	1					
Aroclor-1242	U	ND	11.5	23.0	ug/kg	1					
Aroclor-1248	U	ND	6.91	23.0	ug/kg	1					
Aroclor-1254	U	ND	3.45	23.0	ug/kg	1					
Aroclor-1260	U	ND	6.91	23.0	ug/kg	1					
Chlordane (tech.)	U	ND	9.19	11.5	ug/kg	1					
Dieldrin	U	ND	0.237	1.84	ug/kg	1					
Endosulfan I	U	ND	0.111	0.921	ug/kg	1					
Endosulfan II	U	ND	0.214	1.84	ug/kg	1					
Endosulfan sulfate	U	ND	0.253	1.84	ug/kg	1					
Endrin	U	ND	0.279	1.84	ug/kg	1					
Endrin aldehyde	U	ND	0.279	1.84	ug/kg	1					
Endrin ketone	U	ND	0.299	1.84	ug/kg	1					
Heptachlor	U	ND	0.146	0.921	ug/kg	1					
Heptachlor epoxide	U	ND	0.124	0.921	ug/kg	1					
Methoxychlor	U	ND	1.85	9.21	ug/kg	1					
Toxaphene	U	ND	17.3	46.0	ug/kg	1					
alpha-BHC	U	ND	0.160	0.921	ug/kg	1					
beta-BHC	U	ND	0.131	0.921	ug/kg	1					
delta-BHC	U	ND	0.131	0.921	ug/kg	1					
gamma-BHC (Lindane)	U	ND	0.115	0.921	ug/kg	1					
Volatile Organics											
5035/8260B TCL in Solid											
1,1,1-Trichloroethane	U	ND	0.732	1.38	ug/kg	1	CDS1	07/15/03	0239	263390	4
1,1,2,2-Tetrachloroethane	U	ND	1.26	1.38	ug/kg	1					
1,1,2-Trichloroethane	U	ND	0.746	1.38	ug/kg	1					
1,1-Dichloroethane	U	ND	0.649	1.38	ug/kg	1					
1,1-Dichloroethylene	U	ND	0.691	1.38	ug/kg	1					
1,2-Dichloroethane	U	ND	0.594	1.38	ug/kg	1					
1,2-Dichloropropane	U	ND	0.663	1.38	ug/kg	1					
2-Butanone	U	ND	5.17	6.91	ug/kg	1					
2-Hexanone	U	ND	5.21	6.91	ug/kg	1					
4-Methyl-2-pentanone	U	ND	5.57	6.91	ug/kg	1					
Acetone		11.3	4.86	6.91	ug/kg	1					
Benzene	U	ND	0.622	1.38	ug/kg	1					
Bromodichloromethane	U	ND	0.677	1.38	ug/kg	1					
Bromoform	U	ND	0.677	1.38	ug/kg	1					
Bromomethane	U	ND	0.691	1.38	ug/kg	1					
Carbon disulfide	U	ND	3.26	6.91	ug/kg	1					

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Report Date: July 25, 2003

Contact: Sean McDonald
Project: Construction Site Evaluation

Client Sample ID: Excavation #1 @ 15'
Sample ID: 83757003

Project: CNCR00103C
Client ID: CNCR001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Volatile Organics											
5035/8260B TCL in Solid											
Carbon tetrachloride	U	ND	0.677	1.38	ug/kg	1					
Chlorobenzene	U	ND	0.566	1.38	ug/kg	1					
Chloroethane	U	ND	1.12	1.38	ug/kg	1					
Chloroform	U	ND	0.718	1.38	ug/kg	1					
Chloromethane	U	ND	0.511	1.38	ug/kg	1					
Dibromochloromethane	U	ND	0.691	1.38	ug/kg	1					
Ethylbenzene	U	ND	0.525	1.38	ug/kg	1					
Methylene chloride	U	ND	1.86	6.91	ug/kg	1					
Styrene	U	ND	0.539	1.38	ug/kg	1					
Tetrachloroethylene	U	ND	0.525	1.38	ug/kg	1					
Toluene	U	ND	0.470	1.38	ug/kg	1					
Trichloroethylene	U	ND	0.622	1.38	ug/kg	1					
Vinyl acetate	U	ND	2.46	6.91	ug/kg	1					
Vinyl chloride	U	ND	0.773	1.38	ug/kg	1					
Xylenes (total)	U	ND	0.539	1.38	ug/kg	1					
cis-1,2-Dichloroethylene	U	ND	0.649	1.38	ug/kg	1					
cis-1,3-Dichloropropylene	U	ND	0.594	1.38	ug/kg	1					
trans-1,2-Dichloroethylene	U	ND	0.732	1.38	ug/kg	1					
trans-1,3-Dichloropropylene	U	ND	0.345	1.38	ug/kg	1					

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3550B	3550B BNA Soil Prep-8270C Analysis	JPB	07/16/03	1627	263646
SW846 3550B	3550B PCB Prep Soil	JPB	07/16/03	1625	263667
SW846 5035	5035/8260B Prep	TLW	07/14/03	2100	263389
SW846 8151A	8151A Herbicides Prep in Soil	JPB	07/16/03	1624	263665

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 8270C	
2	SW846 8151A	
3	SW846 8081	
4	SW846 8260B	

Surrogate recovery	Test	Recovery %	Acceptable Limits
2,4,6-Tribromophenol	3510/8270C TCL BNA Soil	98%	(21%-111%)
2-Fluorobiphenyl	3510/8270C TCL BNA Soil	77%	(19%-99%)
2-Fluorophenol	3510/8270C TCL BNA Soil	85%	(21%-97%)

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Report Date: July 25, 2003

Contact: Sean McDonald
Project: Construction Site Evaluation

Client Sample ID: Excavation #1 @ 15'
Sample ID: 83757003

Project: CNCR00103C
Client ID: CNCR001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Nitrobenzene-d5		3510/8270C TCL BNA Soil			79%			(21%-101%)			
Phenol-d5		3510/8270C TCL BNA Soil			85%			(19%-101%)			
p-Terphenyl-d14		3510/8270C TCL BNA Soil			76%			(20%-116%)			
2,4-Dichlorophenylacetic acid		8151A Herbicides Soil			65%			(43%-129%)			
4cmx		8081 Pesticides & PCB Soil			101%			(51%-114%)			
Decachlorobiphenyl		8081 Pesticides & PCB Soil			92%			(51%-121%)			
Bromofluorobenzene		5035/8260B TCL in Solid			106%			(66%-139%)			
Dibromofluoromethane		5035/8260B TCL in Solid			102%			(68%-142%)			
Toluene-d8		5035/8260B TCL in Solid			99%			(68%-134%)			

Notes:
The Qualifiers in this report are defined as follows :

< Result is less than amount reported.
> Result is greater than amount reported.
B Target analyte was detected in the sample as well as the associated blank.
BD Flag for results below the MDC or a flag for low tracer recovery.
E Concentration of the target analyte exceeds the instrument calibration range.
H Analytical holding time exceeded.
J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
P The response between the confirmation column and the primary column is >40%D.
U Indicates the target analyte was analyzed for but not detected above the detection limit.
UI Uncertain identification for gamma spectroscopy.
X Lab-specific qualifier-please see case narrative, data summary package or contact your project manager for details.
Y QC Samples were not spiked with this compound.
h Sample preparation or preservation holding time exceeded.

The above sample is reported on a dry weight basis except where prohibited by the analytical procedure.
Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Jim Holtzclaw.

Reviewed by

APPENDIX E

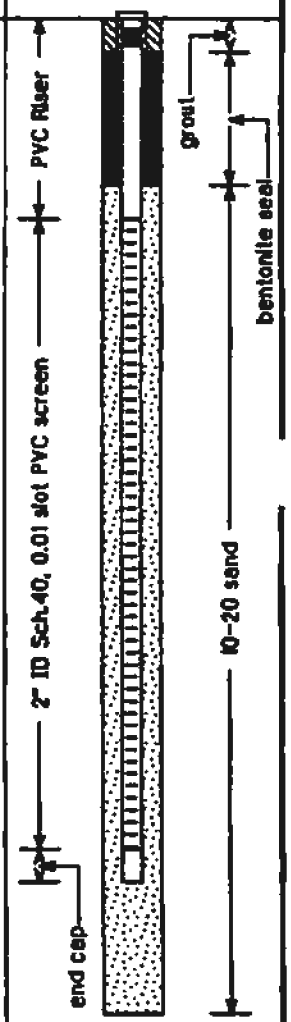
Boring Logs

EnSafe/Allen & Hoshall

Monitoring Well NBCH653001

Project: *Zone H-Naval Base Charleston*	Coordinates: *23233.82 E, 37237.88 N*
Location: *Charleston, SC*	Surface Elevation: *6.3 feet msl*
Started at *1440 on 9-12-94*	TOC Elevation: *6.0 feet msl*
Completed at *1500 on 9-12-94*	Depth to Groundwater: *2.26 feet TOC* Measured: *12-8-95*
Drilling Method: *4.25" ID (7.5" OD) HSA with split spoon*	Groundwater Elevation: *3.84 feet msl*
Drilling Company: *Alliance Environmental*	Total Well Depth: *13 feet bgs*
Geologist: *B. Dotson*	Well Screen: *3 to 12.5 feet bgs*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Asphalt, utilities cleared.	
							CL	Clay: dark gray, silty, stiff.	3.3
							SP	Sand: dark gray, fine to medium with shell fragments, well-sorted, saturated.	2.8
5			1	75	0				1.8
							CL	Clay: grey, with sand and shells that increase in content toward bottom of spoon, saturated.	1.7
10			2	75	0				-3.2
							SP	Sand: with shell fragments.	-6.7
							OL	Clay: dark gray to black, silty (marshy smell).	-7.2
15			3	75	0				-9.2
20									



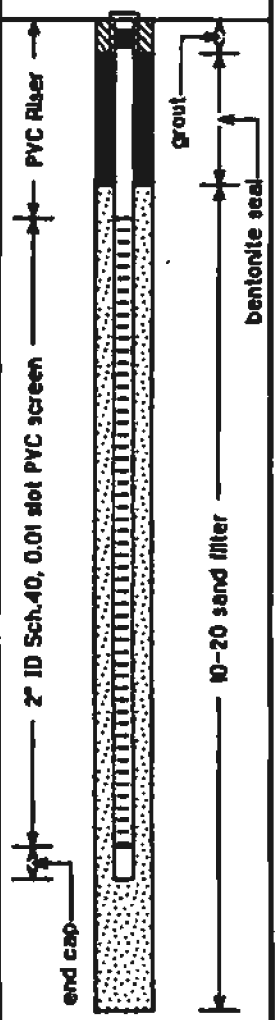
EnSafe/Allen & Hoshall

Monitoring Well NBCH853002

Project: *Zone H-Naval Base Charleston*	Coordinates: *2323290.91 E, 37214.44 N*
Location: *Charleston, SC*	Surface Elevation: *6.4 feet msl*
Started at *1800 on 9-12-94*	TOC Elevation: *6.26 feet msl*
Completed at *1825 on 9-12-94*	Depth to Groundwater: *2.92 feet TOC* Measured: *12-8-95*
Drilling Method: *4.25" ID (7.5" OD) HSA with split spoon*	Groundwater Elevation: *3.34 feet msl*
Drilling Company: *Alliance Environmental*	Total Well Depth: *13 feet bgs*
Geologist: *B. Dotson*	Well Screen: *3.0 to 12.5 feet bgs*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Surface conditions: Asphalt. Post-holed to 2 to 3 feet.	
							FILL	Clay: black, sandy, gravelly, fill material, apparently oil-stained, moist.	3.4 / 2.9
5			1	100			CL	Clay: dark gray to black, sandy, some grass pieces, moist.	1.4
									1.6
							SC	Sand: gray, fine, clayey, saturated, spots of marshy clay.	2.8
10			2	50				Shelby tube from 10-12': 0% recovery—conditions were too sandy.	
			3	0				Shelby tube from 12-14': Minimal recovery—6" in tube.	
			4	25					
15									
20									

WELL DIAGRAM



APPENDIX F

Responses to SCDHEC Comments on the Revision 0 CSWP

This document presents CH2M-Jones' responses to the South Carolina Department of Health and Environmental Control's (SCDHEC's) comments on the *Confirmatory Sampling Report, AOC 726, Zone H, Revision 0* (CH2M-Jones, 2006).

Engineering Comments Made by Jerry Stamps

1. **Section 4.3**
   Per Ms. Grantham's comments (see attached), the Navy must sample near manholes 7 and 8, north of the sampling locations proposed on Halsey Street to ensure all areas of suspected contamination are adequately investigated.

   CH2M-Jones Response:
   Groundwater samples will be added at manholes 7 and 8. These samples will be collected in the same manner and at the same depths as the other groundwater samples.

2. **Section 4.3**
   The Navy provides the rationale for limiting samples to DPT only; however, in order to minimize potential data gaps, the Navy must collect surface and subsurface soil samples from select DPT locations corresponding to areas of suspected contamination. Particularly, the Department is interested in soil samples near the manholes identified in the field notes provided by Ms. Grantham where odors were detected. The Department is willing to work with the Navy to identify these locations.

   CH2M-Jones Response:
   Surface and subsurface samples will be collected near the locations of Manholes 5, 6, and 8. These locations correspond to areas where the strongest odors were reportedly encountered during installation of the sewer line, according to the Wyatt and Wyatt daily log provided to CH2M-Jones.

   Soil sampling will be conducted in accordance with the overall soil sampling procedures previously used at the CNC. Surface samples will be collected from 0 to 1 foot below land surface (ft bls). Subsurface samples will be collected from 3 to 5 ft bls. However, if groundwater is found to be present at less than 5 ft bls, the subsurface soil sample will be moved up such that the saturated zone is not sampled. Soil samples will be analyzed for volatile organic compounds (VOCs), diesel range organics (DRO), and gasoline range organics (GRO).

3. **Section 4.3**
   As indicated in the work plan, the PID readings collected by PSC at locations 1, 2, and 4 were greater than 9,999 ppm; however, the samples collected from locations 1 and 4 for laboratory analysis did not indicate VOC concentrations which would substantiate such high PID readings. The Department is concerned that fuel range hydrocarbons may have caused the elevated readings. Therefore, the Department recommends analyzing samples for DRO and GRO to serve as indicators for the potential presence of petroleum contamination.

   CH2M-Jones Response:
   DRO and GRO will be added to the analytical list for soil and groundwater samples.

Hydrogeology Comments Made by Don Hargrove

1. **Section 4.1, Purpose and Objectives**
   This section should be revised to state that the purpose of this confirmatory sampling effort is to determine presence or absence of contamination. If contamination is determined to be present, a RCRA Facility Investigation (RFI) will then be required to delineate the nature and extent of contamination.

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

2. **Section 4.2.5, Sampling Methodology**
   This section describes how the proposed temporary monitoring wells will be abandoned, but does not give adequate detail concerning the composition of the grout to be used. It has been the experience of this reviewer, that when DPT wells are typically installed, sampled, and subsequently abandoned, the drillers have, on occasion, abandoned the wells by filling the borehole with pure bentonite. This method of abandonment is not acceptable. The text in this section does specify that the wells will be abandoned using bentonite grout. However, in order to avoid improper abandonment issues, the grout composition should be expressly described. An acceptable grout mixture would specify that grout composed of Portland cement and clean, potable water will be used. Additionally, if bentonite is to be incorporated into the grout, it should be specified that the grout will contain not more than five (5) percent bentonite by weight. Please refer to the South Carolina Well Standards (R.61-71.H) for reference. The text should be revised to include the specifications for the composition of the grout.

   CH2M-Jones Response:
   The grout used for abandoning the boreholes will be a bentonite grout meeting the South Carolina Well Standards (R.61-71.H). The text will be modified to clarify this.

3. **Section 4.3, Proposed Sampling and Analysis:**
   A) This section proposes the collection of seven (7) groundwater samples at the locations shown on Figure 4-1. However, Figure 4-1 indicates eight (8) proposed locations. The Figure or the text should be revised to include the actual number of proposed sampling locations.

   B) No groundwater samples are currently proposed in the area near Manhole 8. The proposed groundwater sampling locations should be revised to include sampling near Manhole 8, and Figure 4-1 should be revised to include these new locations.

   CH2M-Jones Response:
   Groundwater sampling locations will be added at manholes 7 and 8. A total of 9 groundwater samples will be collected and analyzed.

   Figure 4-1 inadvertently included an extra groundwater sampling location along Halsey Street between manhole 6 and the entrance to the U.S. Coast Guard long-term parking lot. The figure will be revised to show the new sampling locations.

4. **Figures:**
The figures included in this work plan do not show the direction(s) of groundwater flow. Please revise the figures to include this information.

CH2M-Jones Response:
Groundwater flow at the site is generally towards the Cooper River. A groundwater contour map will be included in Section 2.0.