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CNC CHARLESTON
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TECHNICAL MEMORANDUM ZONE A AREA OF CONCERN 506 WITH TRANSMITTAL CNC CHARLESTON SC

7/12/1999

ENSAFE INC.

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY CHARLESTON NAVAL COMPLEX NORTH CHARLESTON, SOUTH CAROLINA

ZONE A TECHNICAL MEMORANDUM
AOC 506

CTO-029
Contract Number: N62467-89-D-0318

Prepared for:

Department of the Navy
Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina

Prepared by:

EnSafe Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134
(901) 372-7962

July 12, 1999
Revision: 0

Release of this document requires prior notification of the Commanding Officer of the Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina.

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

5090/11
Code 18710
July 14, 1999

Mr. John Litton, P.E.
Director, Division of Hazardous and Infectious Waste Management
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

Subj: SUBMITTAL OF AOC 506 TECHNICAL MEMORANDUM PROPOSING NFA STATUS

Dear Mr. Litton:

The purpose of this letter is to submit the enclosed Technical Memorandum for AOC 506. This site was recommended for placement in the CMS process by the Zone A RFI conditional approval letter from SC DHEC. After EnSafe submitted a preliminary technical memorandum the project team visited the site and discussed the need for further action. Based on that discussion the Navy, SC DHEC, and EnSafe agreed that No Further Action was required for that site. The purpose of this letter and the attached technical memorandum is to formalize the decision for record purposes.

The Navy requests that the Department and the USEPA review and provide comment or approval whichever is appropriate. If you should have any questions please contact Billy Drawdy or myself at (843) 743-9985 and (843) 820-5543 respectively.

Sincerely,

David P. Dodds

DAVID P. DODDS
Remedial Project Manager
Installation Restoration III

Encl:
(1) Technical Memorandum for AOC 506, dated 12 July 1999

Copy to:
SCDHEC (Paul Bergstrand, Mihir Mehta), USEPA (Dann Spariosu)
CSO Naval Base Charleston (Billy Drawdy), SOUTHNAVFACENGCOM (Tony Hunt)

ENSAFE

M e m o r a n d u m

Date: 12 July 1999

To: Mihir Mehta, David Dodds, Paul Bergstrand, Dann Spariosu

From: Todd Haverkost

Re: Zone A RFI Conditional Approval, AOC 506 Benzo(a)pyrene SSL Evaluation

---

AOC 506 is a former flammable storage shelter identified as Building 1629. This facility was used from 1942 to 1996 to store hazardous/flammable materials awaiting shipment for disposal. Building 1629 was an open-air storage shed composed of metal poles supporting a steel truss frame with sheet metal covering. The shed was constructed on a 21' x 30' concrete slab that was surrounded by wire fencing. The shed and fencing were removed sometime between the RFA site visit in 1994 when operations in 1996 at the facility ceased. This site was investigated during the RFI and was tentatively recommended for inclusion in the CMS solely based on leaching potential of semi-volatile organic compounds (SVOCs) as identified in the fate and transport evaluation. The intent of this memo is to re-visit existing data and present new data to provide the project team with an opportunity to make a risk management decision regarding the final recommendations for this site.

The Zone A RFI Report conditional approval letter issued by SCDHEC, dated 29 January 1999, recommended that a localized removal action be performed at AOC 506 due to the leaching potential of benzo(a)pyrene equivalents (BEQs). During the RFI, soil samples were collected at 6 locations from the 0-1' and 3-5' foot intervals. BEQs were detected at a concentration of 8377 μg/Kg in surface soil at soil boring 506SB001, which exceeded the generic soil screening level (SSL) of 4000 μg/Kg. The only other detections of BEQs were in the subsurface samples collected from 506SB002 (362 μg/Kg) and 506SB004 (210 μg/Kg). Excerpts from the RFI report are included as Attachment A to provide additional background regarding the sampling results and the data screening process. Rather than proceed with the removal action, the Navy and EnSafe proposed to collect additional data to supplement the existing site data in an effort to demonstrate that the generic SSLs used in the fate and transport assessment are overly conservative for this site and that a leaching concern does not exist. The reason the Navy and EnSafe felt the generic SSL

was very conservative was that its derivation used a default dilution attenuation factor (DAF) of 10 rather than a DAF of 20 as suggested in the *USEPA Soil Screening Guidance: Technical Background Document*. The DAF of 10 was selected since it was presumed that the sandy soil at the site would have a low total organic carbon (TOC) value. This approach was agreed upon by members of the Project Team as documented in the response to SCDHEC comment #4 dated November 5, 1997 (the response document is dated August 7, 1998). Because of the SSL exceedance, a shallow monitoring well was installed at the location of 506SB001 to reduce the uncertainty of whether or not the BEQ concentrations in soil actually pose a threat to groundwater. The groundwater samples greatly reduce the uncertainty, but do not completely eliminate it since the age of the release and the travel time to groundwater are not really addressed unless samples are collected over time to account for temporal variation. The groundwater samples collected during two separate sampling events from this well were non-detect for BEQs, further suggesting the SSL used was appropriate for a preliminary screening value to determine if further assessment was warranted but should not be used as an action level.

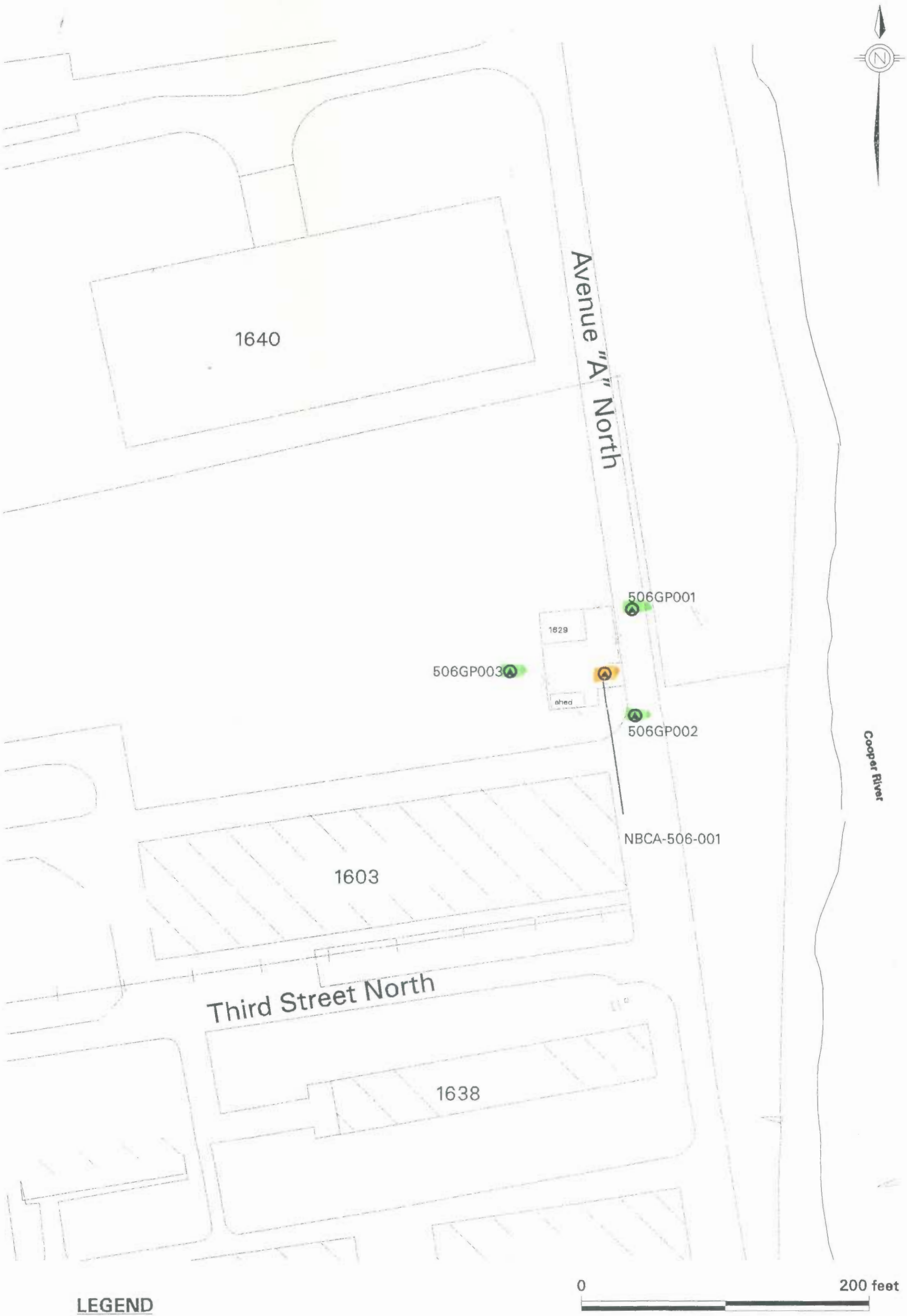
In discussions between the Navy, SCDHEC, and EnSafe, it was agreed that a site specific SSL should be calculated using the soil/water partioning equation found in the *USEPA Soil Screening Guidance: Technical Background Document* and that a leach test be performed using the Synthetic Precipitation Leaching Procedure (SPLP) developed to model an acid rain leaching environment. The SPLP test is independent of the age of the release and was selected to help validate or invalidate the results of the site specific SSL calculations and the groundwater data. The SPLP method may not be entirely suitable for soils contaminated with oily constituents, but used in conjunction with other information such as the site specific SSL and site specific groundwater results, it does provide one more valuable piece of data to consider when making a weight of evidence decision. The key data gap identified for the completion of the SSL calculation was the absence of a site specific total organic carbon value. In February 1999, additional soil samples were collected at the 506SB001 location from the 3-5' interval. The samples were analyzed for SPLP and TOC.

The SPLP results (Attachment B) were non-detect for BEQs and for carbazole, which was not mentioned earlier, but also exceeded its generic SSL. Please note that the quantitation limits listed on the analytical reports are higher than the respective tap water RBCs and/or MCLs for these constituents. As a result, the laboratory's method detection limit (MDL) study has also been included for the reviewer's benefit. Had either constituent been detected above the MDL but below the quantitation limit, it would have been reported as a "J" flagged or estimated value. The detection limit for BEQs still exceeds the MCL and RBC because these values are extremely low and cannot be achieved with this particular analytical method. Even so the SPLP results indicate that, in the area of highest concentration, the BEQs were not detected above the MDL of 2.6 μg/L which is only slightly above the MCL of 0.2 μg/L.

To calculate a site specific SSL, the default values for soil porosity, dry soil bulk density, fraction organic carbon, and hydraulic conductivity were replaced with data collected from AOC 506 or from nearby sites in Zone A which had a similar soil type. Following the procedures outlined in the EPA guidance, an SSL of 722.2 μg/Kg was calculated for BEQs assuming no dilution or attenuation, and with a 0.5 acre source area with BEQ concentrations distributed uniformly from ground surface to the water table (Attachment C). Under the conservative assumptions made previously regarding sandy soil and applying a DAF of 10, the resulting SSL is 7222 μg/Kg. The decision to use a DAF of 10 was based on the assumption that most of the soil in Zone A is sandy. However, the site specific TOC result of 3540 mg/Kg is more characteristic of a heavier organic rich soil which adds justification to the argument that it may be more appropriate to use the EPA default DAF of 20. The calculated SSL with a DAF 20 is 14,444 μg/Kg. The BEQ level of 8,377 μg/Kg at 506SB001 does exceed the lower SSL but is well below the higher value which EnSafe believes to be more applicable to this site. Another important factor that should be considered at this site is that the entire site is less than 0.1 acres and that the surface interval sample from 506SB001 was non-detect for BEQs. Conceivably, the SSL could even be higher at this site if the size of the site and distribution of the contaminants are considered.

In conclusion, the site specific SSL using a DAF of 10 indicates that BEQs have some potential to leach to groundwater at unacceptable levels. The exceedance of a SSL only means that further evaluation should be considered. As a result, groundwater samples were obtained and a leaching test was performed to collect the empirical data necessary to determine whether or not the BEQ concentrations actually pose a threat to groundwater. The SPLP results and 2 rounds of groundwater data, both of which were non-detect for BEQs (and carbazole), provide the most compelling evidence that the BEQs are not leaching. Considering the age of the unit and the depth to groundwater, one could reasonably assume that if groundwater were to be impacted, it would have occurred by now. The SSLs used during the RFI were appropriate for screening purposes but should not be used as an action level. The tentative recommendations made in the RFI report to include the site in the CMS and the SCDHEC recommendation to perform a removal action appear to be overly conservative. The Navy and EnSafe feel no further action is warranted at AOC 506.

Attachment A



LEGEND

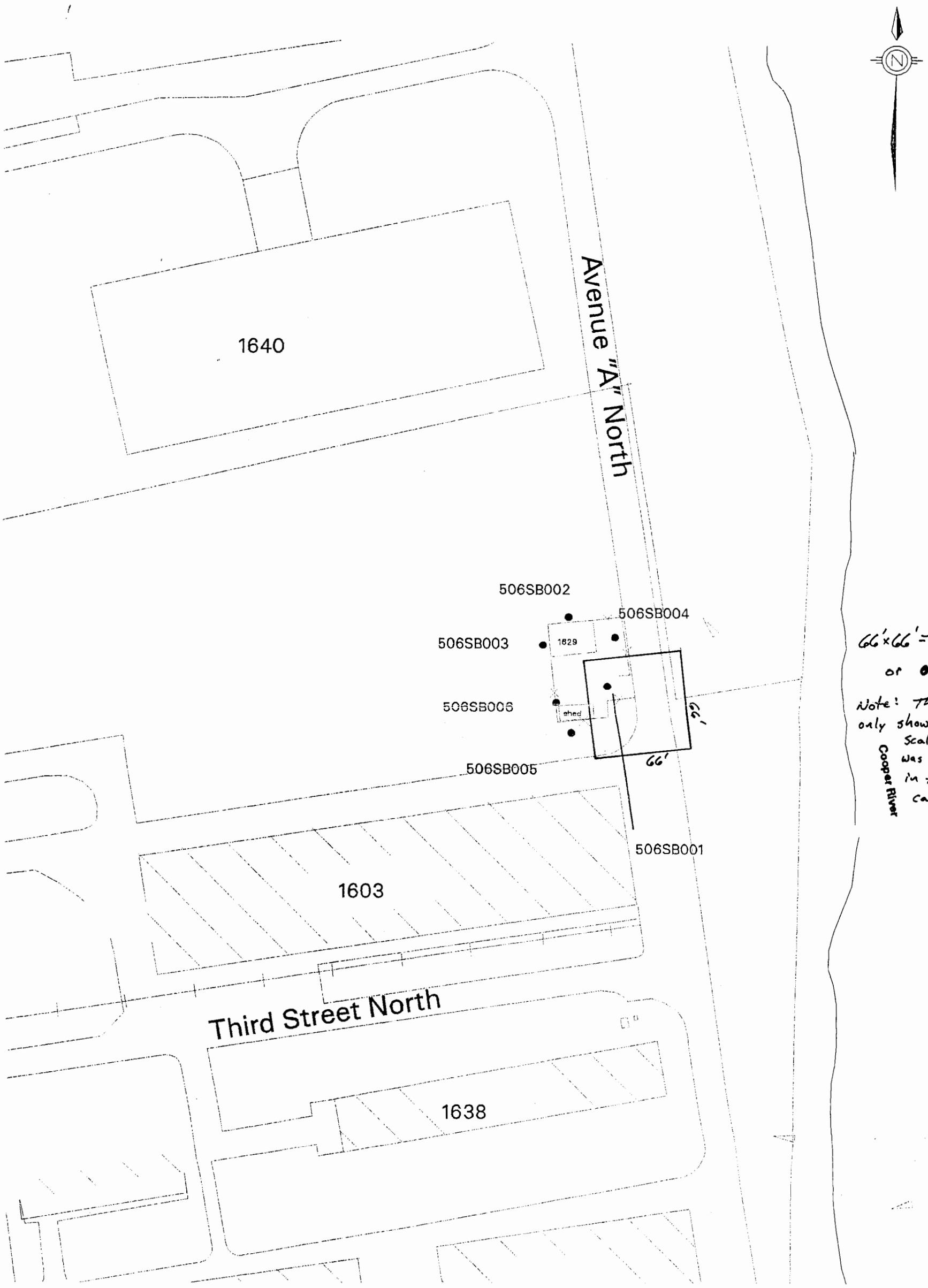
Shallow Monitoring Well

Geoprobe Borings

Zone A RCRA Facility
Investigation Report
Naval Base Charleston
Charleston, SC

FIGURE 10.7.2 - AOC 506
Groundwater Sample Locations

file: /home3/projects/charleston_dir/m_hancher/fig1062.aml



66'x66' = 4356 ft²
or 0.1 acres

Note: This is only shown for scale and was not used in the SSL calculation.

LEGEND

- Soil Boring

0 — 200 feet

Zone A RCRA Facility Investigation Report
Naval Base Charleston
Charleston, SC

FIGURE 10.7.1 - AOC 506
Soil Sample Locations

file: /home2/projects/charleston_dir/m_hancher/fig10f1.aml

Table 10.7.2
AOC 506
Organic Compounds Detected in Soil

Compound	Sampling Interval	Frequency of Detection	Range of Detection (μg/kg)	Mean of Detections (μg/kg)	RBC (μg/kg)	Number of Samples Exceeding RBC
Volatile Organic Compounds (12 samples collected: 6 upper interval and 6 lower interval, 1 sample duplicated for Appendix IX analysis)						
Toluene	Upper	2/6	1.3 - 1.7	1.5	16,000,000	0
	Lower	4/6	2.4 - 9.2	4.8	NA	NA
Semivolatile Organic Compounds (12 samples collected: 6 upper interval and 6 lower interval, 1 sample duplicated for Appendix IX analysis)						
BEQ[a]	Upper	0/6	NA	NA	88	0
	Lower	3/6	210 - 8,377	3,008	NA	NA
Acenaphthene	Upper	0/6	NA	NA	4,700,000	0
	Lower	1/6	600	NA	NA	NA
Acenaphthylene	Upper	0/6	NA	NA	4,700,000	0
	Lower	1/6	970	NA	NA	NA
Anthracene	Upper	0/6	NA	NA	23,000,000	0
	Lower	1/6	1,800	NA	NA	NA
Benzo(a)anthracene	Upper	0/6	NA	NA	880	0
	Lower	2/6	300 - 5,700	3,000	NA	NA
Benzo(a)pyrene	Upper	0/6	NA	NA	88	0
	Lower	3/6	210 - 5,400	1,980	NA	NA
Benzo(b)-fluoranthene	Upper	0/6	NA	NA	880	0
	Lower	2/6	370 - 8,000	4,190	NA	NA
Benzo(g,h,i)perylene	Upper	0/6	NA	NA	3,100,000[b]	0
	Lower	2/6	270 - 3,100	1,690	NA	NA
Benzo(k)-fluoranthene	Upper	0/6	NA	NA	8,800	0
	Lower	1/6	390	NA	NA	NA

Table 10.7.2
AOC 506
Organic Compounds Detected in Soil

Compound	Sampling Interval	Frequency of Detection	Range of Detection (μg/kg)	Mean of Detections (μg/kg)	RBC (μg/kg)	Number of Samples Exceeding RBC
Semivolatile Organic Compounds (12 samples collected: 6 upper interval and 6 lower interval, 1 sample duplicated for Appendix IX analysis)						
Carbazole	Upper	0/6	NA	NA	32,000	0
	Lower	1/6	1,200	NA	NA	NA
Chrysene	Upper	0/6	NA	NA	88,000	0
	Lower	3/6	250 - 6,500	2,390	NA	NA
Dibenzofuran	Upper	0/6	NA	NA	310,000	0
	Lower	1/6	1,200	NA	NA	NA
Dibenz(a,h)-anthracene	Upper	0/6	NA	NA	88	0
	Lower	1/6	1,300	NA	NA	NA
Fluoranthene	Upper	0/6	NA	NA	3,100,000	0
	Lower	2/6	350 - 750	550	NA	NA
Fluorene	Upper	0/6	NA	NA	3,100,000	0
	Lower	1/6	1,800	NA	NA	NA
Indeno(1,2,3-cd)-pyrene	Upper	0/6	NA	NA	880	0
	Lower	2/6	250 - 3,000	1,620	NA	NA
2-methylnaphthalene	Upper	0/6	NA	NA	3,100,000[c]	0
	Lower	1/6	580	NA	NA	NA
Naphthalene	Upper	0/6	NA	NA	3,100,000	0
	Lower	2/6	350 - 550	450	NA	NA
Phenanthrene	Upper	0/6	NA	NA	3,100,000[b]	0
	Lower	2/6	530 - 11,000	5,760	NA	NA
Pyrene	Upper	0/6	NA	NA	2,300,000	0
	Lower	1/6	690	NA	NA	NA

Notes:
a = Calculated from method described in USEPA *Interim Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment*, Bulletin No. 2, November 1995.
b = RBC not available for this compound; fluoranthene RBC used as surrogate.
c = RBC not available for this compound; naphthalene RBC used as surrogate.
NA = Not applicable

Semivolatile Organic Compounds in Soil

No SVOCs were detected in any of the first-interval samples at AOC 506. Nineteen SVOCs were detected in the second-interval samples. Five exceeded their SSL: benzo(a)anthracene (730 μg/kg), benzo(a)pyrene (4,100 μg/kg), benzo(b)fluoranthene (2,300 μg/kg), carbazole (240 μg/kg), and dibenz(a,h)anthracene (700 μg/kg). Also, the resulting BEQ calculation exceeds the SSL for benzo(a)pyrene.

All of the exceedances were in one second-interval sample, 506SB00102. The concentrations detected in this sample were benzo(a)anthracene (5,700 μg/kg), benzo(a)pyrene (5,400 μg/kg), benzo(b)fluoranthene (8,000 μg/kg), carbazole (1,200 μg/kg), and dibenz(a,h)anthracene (1,300 μg/kg). The only other second-interval samples in which cPAHs were detected were 506SB00202 and 506SB00402, but these detections were below the respective SSLs.

Inorganics in Soil

Twenty metals were detected in soil at AOC 506. Three warrant further evaluation: cobalt, manganese, and tin.

Cobalt was detected above the RC (1.7 mg/kg) in both of the detections in six lower-interval samples. These detections do not exceed the SSL (990 mg/kg) for cobalt.

Manganese was detected above the RC (85.5 mg/kg) in two second-interval samples – 506SB00102 and 506SB00202. This detection does not exceed the SSL (550 mg/kg) for manganese.

Tin does not have an RC or RBC for comparison of the second-interval detection. This detection does not exceed the SSL (5,500 mg/kg) for tin.

10.7.5.1 AOC 506 — Soil to Groundwater Cross-Media Transport

Tables 10.7.7 and 10.7.8 compare the maximum detected concentrations of organic and inorganic chemicals reported in soil to risk-based soil screening levels considered protective of groundwater. As shown on Table 10.7.7, five organics — benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, carbazole, and dibenzo(a,h)anthracene — were identified for further evaluation of soil to groundwater migration based on the screening process presented in Section 6. None of these organic chemicals were reported in shallow groundwater (including four rounds of groundwater sampling). As shown on Table 10.7.8, two inorganics — chromium and mercury — were identified for further evaluation of soil to groundwater migration. Chromium was detected in groundwater at a concentration less than its groundwater screening values; mercury was not detected in groundwater (including four rounds of groundwater sampling).

All of the organic exceedences were reported in a single subsurface soil sample (506SB00102). Soil concentrations reported for these organic chemicals are not likely to present a widespread threat to AOC 506 groundwater based on their limited areal extent at concentrations above their SSLs. Mercury was reported in a single surface soil sample (506SB00201) at a concentration of 1.3 mg/kg which marginally exceeds its SSL of 1 mg/kg. Although chromium was reported in one surface soil sample and four subsurface soil samples at concentrations exceeding its SSL, it was not reported in any soil sample at a concentration exceeding its background reference value. For screening purposes, chromium was conservatively assumed to exist in its soluble hexavalent state. Hexachrome analyses at AOC 506 and elsewhere in Zone A suggest that chromium in soil exists predominantly in less soluble valence states. These findings suggest that concentrations of inorganic soil constituents do not appreciably threaten AOC 506 groundwater.

10.7.5.2 AOC 506 — Groundwater to Surface Water Cross-Media Transport

As shown on Table 10.7.7, no organic constituents were detected in AOC 506 shallow groundwater above tap water RBCs or surface water saltwater AWQCs. Therefore, it has been

Table 10.7.7
Organic Compounds Detected in Surface Soil, Subsurface Soil, and Shallow Groundwater
Comparison to Cross-media SSLs, Tap Water RBCs, and Saltwater Surface Water Chronic Screening Levels
NAVBASE-Charleston, Zone A: AOC 506
Charleston, South Carolina

Parameter	Maximum Concentration				Screening Concentration *									
	Surface Soil	Subsurface Soil	Shallow GW	Deep GW	Soil to GW	Soil to Air	Tap Water RBC	Saltwater Surf. Wtr. Chronic	Soil Units	Water Units	Leaching Potential	Volatil-ization Potential	Ground-Water Migration Concern	Surface Water Migration Concern
Volatile Organic Compounds														
Acetone	60	56	ND	NA	8000	1E+08	3700	NDA	UG/KG	UG/L	NO	NO	NO	NO
2-Butanone	ND	4.75	ND	NA	3900 c	NDA	1900	NDA	UG/KG	UG/L	NO	NO	NO	NO
Carbon disulfide	ND	3.6	1.6	NA	16000	720000	1000	NDA	UG/KG	UG/L	NO	NO	NO	NO
1,1-Dichloroethane	ND	ND	5.1	NA	12000	1300000	810	NDA	UG/KG	UG/L	NO	NO	NO	NO
Methylene chloride	ND	1.2	ND	NA	10	13000	4.1	2560	UG/KG	UG/L	NO	NO	NO	NO
Toluene	1.7	9.2	ND	NA	6000	650000	750	37	UG/KG	UG/L	NO	NO	NO	NO
Trichlorofluoromethane	ND	ND	33	NA	10000 c	790000	1300	NDA	UG/KG	UG/L	NO	NO	NO	NO
Semivolatile Organic Compounds														
Acenaphthene	ND	600	ND	NA	290000	NDA	2200	9.7	UG/KG	UG/L	NO	NO	NO	NO
Acenaphthylene	ND	970	ND	NA	96000 c	NDA	1500	NDA	UG/KG	UG/L	NO	NO	NO	NO
Anthracene	ND	1800	ND	NA	5900000	NDA	11000	NDA	UG/KG	UG/L	NO	NO	NO	NO
Benzo(g,h,i)perylene	ND	3100	ND	NA	1.2E+08 c	NDA	1500	NDA	UG/KG	UG/L	NO	NO	NO	NO
Benzo(a)pyrene equivalents														
Benzo(a)anthracene	ND	5700	ND	NA	800	NDA	0.092	NDA	UG/KG	UG/L	YES	NO	NO	NO
Benzo(a)pyrene	ND	5400	ND	NA	4000	NDA	0.0092	NDA	UG/KG	UG/L	YES	NO	NO	NO
Benzo(b)fluoranthene	ND	8000	ND	NA	2500	NDA	0.092	NDA	UG/KG	UG/L	YES	NO	NO	NO
Benzo(k)fluoranthene	ND	390	ND	NA	25000	NDA	0.92	NDA	UG/KG	UG/L	NO	NO	NO	NO
Chrysene	ND	6500	ND	NA	80000	NDA	9.2	NDA	UG/KG	UG/L	NO	NO	NO	NO
Dibenzo(a,h)anthracene	ND	1300	ND	NA	800	NDA	0.0092	NDA	UG/KG	UG/L	YES	NO	NO	NO
Indeno(1,2,3-cd)pyrene	ND	3000	ND	NA	7000	NDA	0.092	NDA	UG/KG	UG/L	NO	NO	NO	NO
Carbazole	ND	1200	ND	NA	300	NDA	3.4	NDA	UG/KG	UG/L	YES	NO	NO	NO
Dibenzofuran	ND	1200	ND	NA	42000 c	120000	150	NDA	UG/KG	UG/L	NO	NO	NO	NO
Fluoranthene	ND	750	ND	NA	2200000	NDA	1500	1.6	UG/KG	UG/L	NO	NO	NO	NO
Fluorene	ND	1800	ND	NA	280000	NDA	1500	NDA	UG/KG	UG/L	NO	NO	NO	NO
2-Methylnaphthalene	ND	580	ND	NA	230000 c	NDA	1500	NDA	UG/KG	UG/L	NO	NO	NO	NO
Naphthalene	ND	550	ND	NA	42000	NDA	1500	23.5	UG/KG	UG/L	NO	NO	NO	NO
Phenanthrene	ND	11000	ND	NA	900000 c	NDA	1500	NDA	UG/KG	UG/L	NO	NO	NO	NO
Pyrene	ND	690	ND	NA	2100000	NDA	1100	NDA	UG/KG	UG/L	NO	NO	NO	NO

Explanations of screening procedures appear in Section 6.2.
Frequency and range of detections, average detected concentrations, and number of screening concentration exceedances appear in Table 10.7.2 and 10.7.5.

* Screening Concentrations:
Soil to GW - Generic SSLs based on DAF = 10, adapted from USEPA Soil Screening Guidance: Technical Background Document, May 1996 (first preference), or calculated using values from Table 6.2
Soil to Air - From USEPA Soil Screening Guidance: Technical Background Document, May 1996 (first preference), or USEPA Region III Risk-Based Concentration Table, June 1996
Tap Water RBC - From USEPA Region III Risk-Based Concentration Table, October 1997
Salt Water Surface Water Chronic - From USEPA Supplemental Guidance to RAGS: Region 4 Bulletins, Ecological Risk Assessment, November 1995, Table 2

c - Calculated soil to groundwater SSL value (See Table 6.2)

GW - Groundwater
NA - Not applicable
ND - Not detected
NDA - No data available
RBC - Risk-based concentration
SSL - Soil screening level
UG/KG - Micrograms per kilogram
UG/L - Micrograms per liter

CHARLESTON - ZONE A
NAVAL BASE CHARLESTON ZONE A (NBCH)
AOC 506 - SVOCs in Soil

SW846-SVOA															
	SAMPLE ID ------->	506-S-B001-01		506-S-B001-02		506-S-B002-01		506-S-B002-02		506-S-B003-01		506-S-B003-02	
	ORIGINAL ID ----->	506SB00101		506SB00102		506SB00201		506SB00202		506SB00301		506SB00302	
	LAB SAMPLE ID --->	L5586-23		L5586-24		L5586-21		L5586-22		L5586-19		L5586-20	
	ID FROM REPORT -->	506SB00101		506SB00102		506SB00201		506SB00202		506SB00301		506SB00302	
	SAMPLE DATE ----->	10/11/95		10/11/95		10/11/95		10/11/95		10/11/95		10/11/95	
	DATE EXTRACTED -->	10/25/95		10/25/95		10/25/95		10/25/95		10/25/95		10/25/95	
	DATE ANALYZED --->	11/06/95		11/03/95		11/02/95		11/02/95		11/02/95		11/06/95	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	UG/KG		UG/KG		UG/KG		UG/KG		UG/KG		UG/KG	
CAS #	Parameter	L5586	VAL	L5586	VAL	L5586	VAL	L5586	VAL	L5586	VAL	L5586	VAL
108-95-2	Phenol	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
111-44-4	bis(2-Chloroethyl)ether	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
95-57-8	2-Chlorophenol	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
541-73-1	1,3-Dichlorobenzene	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
106-46-7	1,4-Dichlorobenzene	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
100-51-6	Benzyl alcohol	1400.	U	1400.	U	1600.	U	1500.	U	1500.	U	1400.	U
95-50-1	1,2-Dichlorobenzene	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
95-48-7	2-Methylphenol (o-Cresol)	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
39638-32-9	Bis(2-Chloroisopropyl)Ether	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
621-64-7	N-Nitroso-di-n-propylamine	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
67-72-1	Hexachloroethane	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
98-95-3	Nitrobenzene	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
78-59-1	Isophorone	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
88-75-5	2-Nitrophenol	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
105-67-9	2,4-Dimethylphenol	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
65-85-0	Benzoic acid	3600.	U	3700.	U	4000.	U	3900.	U	3800.	U	3700.	U
111-91-1	bis(2-Chloroethoxy)methane	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
120-83-2	2,4-Dichlorophenol	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
120-82-1	1,2,4-Trichlorobenzene	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
91-20-3	Naphthalene	710.	U	550.	J	790.	U	320.	J	760.	U	730.	U
106-47-8	4-Chloroaniline	1400.	U	1400.	U	1600.	U	1500.	U	1500.	U	1400.	U
87-68-3	Hexachlorobutadiene	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
59-50-7	4-Chloro-3-methylphenol	1400.	U	1400.	U	1600.	U	1500.	U	1500.	U	1400.	U
91-57-6	2-Methylnaphthalene	710.	U	580.	J	790.	U	780.	U	760.	U	730.	U
77-47-4	Hexachlorocyclopentadiene	710.	U	730.	UJ	790.	U	780.	U	760.	U	730.	U
88-06-2	2,4,6-Trichlorophenol	710.	U	730.	UJ	790.	U	780.	U	760.	U	730.	U
95-95-4	2,4,5-Trichlorophenol	710.	U	730.	UJ	790.	U	780.	U	760.	U	730.	U
91-58-7	2-Chloronaphthalene	710.	U	730.	UJ	790.	U	780.	U	760.	U	730.	U
88-74-4	2-Nitroaniline	3600.	U	3700.	UJ	4000.	U	3900.	U	3800.	U	3700.	U
131-11-3	Dimethyl phthalate	710.	U	730.	UJ	790.	U	780.	U	760.	U	730.	U
208-96-8	Acenaphthylene	710.	U	970.	J	790.	U	780.	U	760.	U	730.	U
606-20-2	2,6-Dinitrotoluene	710.	U	730.	UJ	790.	U	780.	U	760.	U	730.	U
99-09-2	3-Nitroaniline	3600.	U	3700.	UJ	4000.	U	3900.	U	3800.	U	3700.	U
83-32-9	Acenaphthene	710.	U	600.	J	790.	U	780.	U	760.	U	730.	U
51-28-5	2,4-Dinitrophenol	3600.	U	3700.	UJ	4000.	U	3900.	U	3800.	U	3700.	U
100-02-7	4-Nitrophenol	3600.	U	3700.	UJ	4000.	U	3900.	U	3800.	U	3700.	U

*** Validation Complete ***

CHARLESTON - ZONE A
NAVAL BASE CHARLESTON ZONE A (NBCH)
AOC 506 - SVOCs in Soil

SW846-SVOA															
	SAMPLE ID ------->	506-S-B001-01		506-S-B001-02		506-S-B002-01		506-S-B002-02		506-S-B003-01		506-S-B003-02	
	ORIGINAL ID ----->	506SB00101		506SB00102		506SB00201		506SB00202		506SB00301		506SB00302	
	LAB SAMPLE ID --->	L5586-23		L5586-24		L5586-21		L5586-22		L5586-19		L5586-20	
	ID FROM REPORT -->	506SB00101		506SB00102		506SB00201		506SB00202		506SB00301		506SB00302	
	SAMPLE DATE ----->	10/11/95		10/11/95		10/11/95		10/11/95		10/11/95		10/11/95	
	DATE EXTRACTED -->	10/25/95		10/25/95		10/25/95		10/25/95		10/25/95		10/25/95	
	DATE ANALYZED --->	11/06/95		11/03/95		11/02/95		11/02/95		11/02/95		11/06/95	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	UG/KG		UG/KG		UG/KG		UG/KG		UG/KG		UG/KG	
CAS #	Parameter	L5586	VAL	L5586	VAL	L5586	VAL	L5586	VAL	L5586	VAL	L5586	VAL
132-64-9	Dibenzofuran	710.	U	1200.	J	790.	U	780.	U	760.	U	730.	U
121-14-2	2,4-Dinitrotoluene	710.	U	730.	UJ	790.	U	780.	U	760.	U	730.	U
84-66-2	Diethylphthalate	710.	U	730.	UJ	790.	U	780.	U	760.	U	730.	U
7005-72-3	4-Chlorophenylphenylether	710.	U	730.	UJ	790.	U	780.	U	760.	U	730.	U
86-73-7	Fluorene	710.	U	1800.	J	790.	U	780.	U	760.	U	730.	U
100-01-6	4-Nitroaniline	3600.	U	3700.	U	4000.	U	3900.	U	3800.	U	3700.	U
534-52-1	2-Methyl-4,6-Dinitrophenol	3600.	U	3700.	U	4000.	U	3900.	U	3800.	U	3700.	U
86-30-6	N-Nitrosodiphenylamine	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
101-55-3	4-Bromophenyl-phenylether	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
118-74-1	Hexachlorobenzene	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
87-86-5	Pentachlorophenol	3600.	U	3700.	U	4000.	U	3900.	U	3800.	U	3700.	U
85-01-8	Phenanthrene	710.	U	11000.		790.	U	430.	J	760.	U	730.	U
120-12-7	Anthracene	710.	U	1800.		790.	U	780.	U	760.	U	730.	U
86-74-8	Carbazole	710.	U	1200.		790.	U	780.	U	760.	U	730.	U
84-74-2	Di-n-butylphthalate	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
206-44-0	Fluoranthene	710.	U	39000.	UR	790.	U	660.	J	760.	U	730.	U
129-00-0	Pyrene	710.	U	19000.	UR	790.	U	520.	J	760.	U	730.	U
85-68-7	Butylbenzylphthalate	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
91-94-1	3,3'-Dichlorobenzidine	1400.	U	1400.	U	1600.	U	1500.	U	1500.	U	1400.	U
56-55-3	Benzo(a)anthracene	710.	U	5700.		790.	U	230.	J	760.	U	730.	U
218-01-9	Chrysene	710.	U	6500.		790.	U	340.	J	760.	U	730.	U
117-81-7	bis(2-Ethylhexyl)phthalate (BEHP)	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
117-84-0	Di-n-octyl phthalate	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
205-99-2	Benzo(b)fluoranthene	710.	U	8000.		790.	U	430.	J	760.	U	730.	U
207-08-9	Benzo(k)fluoranthene	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
50-32-8	Benzo(a)pyrene	710.	U	5400.		790.	U	280.	J	760.	U	730.	U
193-39-5	Indeno(1,2,3-cd)pyrene	710.	U	3000.		790.	U	160.	J	760.	U	730.	U
53-70-3	Dibenz(a,h)anthracene	710.	U	1300.		790.	U	780.	U	760.	U	730.	U
191-24-2	Benzo(g,h,i)perylene	710.	U	3100.		790.	U	190.	J	760.	U	730.	U
106-44-5	4-Methylphenol (p-Cresol)	710.	U	730.	U	790.	U	780.	U	760.	U	730.	U
108-60-1	2,2'-oxybis(1-Chloropropane)	NR		NR		NR		NR		NR		NR	

*** Validation Complete ***

CHARLESTON - ZONE A
NAVAL BASE CHARLESTON ZONE A (NBCH)
AOC 506 - SVOCs in Soil

SW846-SVOA															
	SAMPLE ID ------->	506-S-B004-01		506-S-B004-02		506-S-B005-01		506-S-B005-02		506-S-B006-01		506-S-B006-02	
	ORIGINAL ID ----->	506SB00401		506SB00402		506SB00501		506SB00502		506SB00601		506SB00602	
	LAB SAMPLE ID --->	L5586-25		L5586-26		L5586-27		L5586-28		L5586-15		L5586-16	
	ID FROM REPORT -->	506SB00401		506SB00402		506SB00501		506SB00502		506SB00601		506SB00602	
	SAMPLE DATE ----->	10/11/95		10/11/95		10/11/95		10/11/95		10/11/95		10/11/95	
	DATE EXTRACTED -->	10/25/95		10/25/95		10/25/95		10/25/95		10/25/95		10/25/95	
	DATE ANALYZED --->	11/02/95		11/03/95		11/06/95		11/02/95		11/02/95		11/02/95	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	UG/KG		UG/KG		UG/KG		UG/KG		UG/KG		UG/KG	
CAS #	Parameter	L5586	VAL	L5586	VAL	L5586	VAL	L5586	VAL	L5586	VAL	L5586	VAL
108-95-2	Phenol	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
111-44-4	bis(2-Chloroethyl)ether	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
95-57-8	2-Chlorophenol	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
541-73-1	1,3-Dichlorobenzene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
106-46-7	1,4-Dichlorobenzene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
100-51-6	Benzyl alcohol	1500.	U	1800.	U	1500.	U	1600.	U	1500.	U	1500.	U
95-50-1	1,2-Dichlorobenzene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
95-48-7	2-Methylphenol (o-Cresol)	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
39638-32-9	Bis(2-Chloroisopropyl)Ether	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
621-64-7	N-Nitroso-di-n-propylamine	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
67-72-1	Hexachloroethane	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
98-95-3	Nitrobenzene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
78-59-1	Isophorone	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
88-75-5	2-Nitrophenol	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
105-67-9	2,4-Dimethylphenol	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
65-85-0	Benzoic acid	3700.	U	4500.	U	3900.	U	4000.	U	3700.	U	3900.	U
111-91-1	bis(2-Chloroethoxy)methane	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
120-83-2	2,4-Dichlorophenol	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
120-82-1	1,2,4-Trichlorobenzene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
91-20-3	Naphthalene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
106-47-8	4-Chloroaniline	1500.	U	1800.	U	1500.	U	1600.	U	1500.	U	1500.	U
87-68-3	Hexachlorobutadiene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
59-50-7	4-Chloro-3-methylphenol	1500.	U	1800.	U	1500.	U	1600.	U	1500.	U	1500.	U
91-57-6	2-Methylnaphthalene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
77-47-4	Hexachlorocyclopentadiene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
88-06-2	2,4,6-Trichlorophenol	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
95-95-4	2,4,5-Trichlorophenol	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
91-58-7	2-Chloronaphthalene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
88-74-4	2-Nitroaniline	3700.	U	4500.	U	3900.	U	4000.	U	3700.	U	3900.	U
131-11-3	Dimethyl phthalate	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
208-96-8	Acenaphthylene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
606-20-2	2,6-Dinitrotoluene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
99-09-2	3-Nitroaniline	3700.	U	4500.	U	3900.	U	4000.	U	3700.	U	3900.	U
83-32-9	Acenaphthene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
51-28-5	2,4-Dinitrophenol	3700.	U	4500.	U	3900.	U	4000.	U	3700.	U	3900.	U
100-02-7	4-Nitrophenol	3700.	U	4500.	U	3900.	U	4000.	U	3700.	U	3900.	U

*** Validation Complete ***

CHARLESTON - ZONE A
NAVAL BASE CHARLESTON ZONE A (NBCH)
AOC 506 - SVOCs in Soil

SW846-SVOA													
	SAMPLE ID ------->	506-S-B004-01		506-S-B004-02		506-S-B005-01		506-S-B005-02		506-S-B006-01		506-S-B006-02	
	ORIGINAL ID ----->	506SB00401		506SB00402		506SB00501		506SB00502		506SB00601		506SB00602	
	LAB SAMPLE ID --->	L5586-25		L5586-26		L5586-27		L5586-28		L5586-15		L5586-16	
	ID FROM REPORT -->	506SB00401		506SB00402		506SB00501		506SB00502		506SB00601		506SB00602	
	SAMPLE DATE ----->	10/11/95		10/11/95		10/11/95		10/11/95		10/11/95		10/11/95	
	DATE EXTRACTED -->	10/25/95		10/25/95		10/25/95		10/25/95		10/25/95		10/25/95	
	DATE ANALYZED --->	11/02/95		11/03/95		11/06/95		11/02/95		11/02/95		11/02/95	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	UG/KG		UG/KG		UG/KG		UG/KG		UG/KG		UG/KG	
CAS #	Parameter	L5586	VAL	L5586	VAL	L5586	VAL	L5586	VAL	L5586	VAL	L5586	VAL
132-64-9	Dibenzofuran	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
121-14-2	2,4-Dinitrotoluene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
84-66-2	Diethylphthalate	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
7005-72-3	4-Chlorophenylphenylether	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
86-73-7	Fluorene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
100-01-6	4-Nitroaniline	3700.	U	4500.	U	3900.	U	4000.	U	3700.	U	3900.	U
534-52-1	2-Methyl-4,6-Dinitrophenol	3700.	U	4500.	U	3900.	U	4000.	U	3700.	U	3900.	U
86-30-6	N-Nitrosodiphenylamine	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
101-55-3	4-Bromophenyl-phenylether	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
118-74-1	Hexachlorobenzene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
87-86-5	Pentachlorophenol	3700.	U	4500.	U	3900.	U	4000.	U	3700.	U	3900.	U
85-01-8	Phenanthrene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
120-12-7	Anthracene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
86-74-8	Carbazole	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
84-74-2	Di-n-butylphthalate	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
206-44-0	Fluoranthene	740.	U	350.	J	790.	U	790.	U	750.	U	780.	U
129-00-0	Pyrene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
85-68-7	Butylbenzylphthalate	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
91-94-1	3,3'-Dichlorobenzidine	1500.	U	1800.	U	1500.	U	1600.	U	1500.	U	1500.	U
56-55-3	Benzo(a)anthracene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
218-01-9	Chrysene	740.	U	250.	J	790.	U	790.	U	750.	U	780.	U
117-81-7	bis(2-Ethylhexyl)phthalate (BEHP)	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
117-84-0	Di-n-octyl phthalate	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
205-99-2	Benzo(b)fluoranthene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
207-08-9	Benzo(k)fluoranthene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
50-32-8	Benzo(a)pyrene	740.	U	210.	J	790.	U	790.	U	750.	U	780.	U
193-39-5	Indeno(1,2,3-cd)pyrene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
53-70-3	Dibenz(a,h)anthracene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
191-24-2	Benzo(g,h,i)perylene	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
106-44-5	4-Methylphenol (p-Cresol)	740.	U	900.	U	790.	U	790.	U	750.	U	780.	U
108-60-1	2,2'-oxybis(1-Chloropropane)	NR		NR		NR		NR		NR		NR	

*** Validation Complete ***

CHARLESTON - ZONE A
NAVAL BASE CHARLESTON ZONE A (NBCH)
AOC 506 - SVOCs in Groundwater

SW846-SVOA

SAMPLE ID ------->	506-G-W001-01
ORIGINAL ID ----->	506GW00101
LAB SAMPLE ID --->	L5997-36
ID FROM REPORT -->	506GW00101
SAMPLE DATE ----->	12/07/95
DATE EXTRACTED -->	12/14/95
DATE ANALYZED --->	12/21/95
MATRIX ---------->	Water
UNITS ----------->	UG/L

CAS #	Parameter	L5997	VAL
108-95-2	Phenol	10.	U
111-44-4	bis(2-Chloroethyl)ether	10.	U
95-57-8	2-Chlorophenol	10.	U
541-73-1	1,3-Dichlorobenzene	10.	U
106-46-7	1,4-Dichlorobenzene	10.	U
100-51-6	Benzyl alcohol	21.	U
95-50-1	1,2-Dichlorobenzene	10.	U
95-48-7	2-Methylphenol (o-Cresol)	10.	U
39638-32-9	Bis(2-Chloroisopropyl)Ether	10.	U
621-64-7	N-Nitroso-di-n-propylamine	10.	U
67-72-1	Hexachloroethane	10.	U
98-95-3	Nitrobenzene	10.	U
78-59-1	Isophorone	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
65-85-0	Benzoic acid	52.	UJ
111-91-1	bis(2-Chloroethoxy)methane	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
120-82-1	1,2,4-Trichlorobenzene	10.	U
91-20-3	Naphthalene	10.	U
106-47-8	4-Chloroaniline	21.	U
87-68-3	Hexachlorobutadiene	10.	U
59-50-7	4-Chloro-3-methylphenol	21.	U
91-57-6	2-Methylnaphthalene	10.	U
77-47-4	Hexachlorocyclopentadiene	10.	U
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	10.	U
91-58-7	2-Chloronaphthalene	10.	U
88-74-4	2-Nitroaniline	52.	U
131-11-3	Dimethyl phthalate	10.	U
208-96-8	Acenaphthylene	10.	U
606-20-2	2,6-Dinitrotoluene	10.	U
99-09-2	3-Nitroaniline	52.	U
83-32-9	Acenaphthene	10.	U
51-28-5	2,4-Dinitrophenol	52.	U
100-02-7	4-Nitrophenol	52.	U

*** Validation Complete ***

CHARLESTON - ZONE A
NAVAL BASE CHARLESTON ZONE A (NBCH)
AOC 506 - SVOCs in Groundwater

SW846-SVOA

SAMPLE ID ------->	506-G-W001-01
ORIGINAL ID ----->	506GW00101
LAB SAMPLE ID --->	L5997-36
ID FROM REPORT -->	506GW00101
SAMPLE DATE ----->	12/07/95
DATE EXTRACTED -->	12/14/95
DATE ANALYZED --->	12/21/95
MATRIX ---------->	Water
UNITS ----------->	UG/L

CAS #	Parameter	L5997	VAL
132-64-9	Dibenzofuran	10.	U
121-14-2	2,4-Dinitrotoluene	10.	U
84-66-2	Diethylphthalate	10.	U
7005-72-3	4-Chlorophenylphenylether	10.	U
86-73-7	Fluorene	10.	U
100-01-6	4-Nitroaniline	21.	UJ
534-52-1	2-Methyl-4,6-Dinitrophenol	52.	U
86-30-6	N-Nitrosodiphenylamine	10.	U
101-55-3	4-Bromophenyl-phenylether	10.	U
118-74-1	Hexachlorobenzene	10.	U
87-86-5	Pentachlorophenol	52.	U
85-01-8	Phenanthrene	10.	U
120-12-7	Anthracene	10.	U
86-74-8	Carbazole	10.	U
84-74-2	Di-n-butylphthalate	10.	U
206-44-0	Fluoranthene	10.	U
129-00-0	Pyrene	10.	U
85-68-7	Butylbenzylphthalate	10.	U
91-94-1	3,3'-Dichlorobenzidine	21.	U
56-55-3	Benzo(a)anthracene	10.	U
218-01-9	Chrysene	10.	U
117-81-7	bis(2-Ethylhexyl)phthalate (BEHP)	10.	U
117-84-0	Di-n-octyl phthalate	10.	U
205-99-2	Benzo(b)fluoranthene	10.	U
207-08-9	Benzo(k)fluoranthene	10.	U
50-32-8	Benzo(a)pyrene	10.	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.	U
53-70-3	Dibenz(a,h)anthracene	10.	U
191-24-2	Benzo(g,h,i)perylene	10.	U
106-44-5	4-Methylphenol (p-Cresol)	10.	U
108-60-1	2,2'-oxybis(1-Chloropropane)	NR	

*** Validation Complete ***

CHARLESTON - ZONE A
CHARLESTON ZONE A - QUARTERLY GW
AOC 506 - SVOCs in Groundwater

SW846-SVOA

SAMPLE ID ------->	506-G-W001-04
ORIGINAL ID ----->	506GW00104
LAB SAMPLE ID --->	6434-02
ID FROM REPORT -->	506GW00104
SAMPLE DATE ----->	10/10/96
DATE EXTRACTED -->	10/14/96
DATE ANALYZED --->	10/23/96
MATRIX ---------->	Water
UNITS ---------->	UG/L

CAS #	Parameter	6434	VAL
108-95-2	Phenol	10.	U
111-44-4	bis(2-Chloroethyl)ether	10.	U
95-57-8	2-Chlorophenol	10.	U
541-73-1	1,3-Dichlorobenzene	10.	U
106-46-7	1,4-Dichlorobenzene	10.	U
100-51-6	Benzyl alcohol	10.	U
95-50-1	1,2-Dichlorobenzene	10.	U
95-48-7	2-Methylphenol (o-Cresol)	10.	U
108-60-1	2,2'-oxybis(1-Chloropropane)	10.	UJ
106-44-5	4-Methylphenol (p-Cresol)	10.	U
621-64-7	N-Nitroso-di-n-propylamine	10.	U
67-72-1	Hexachloroethane	10.	U
98-95-3	Nitrobenzene	10.	U
78-59-1	Isophorone	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
65-85-0	Benzoic acid	50.	UJ
111-91-1	bis(2-Chloroethoxy)methane	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
120-82-1	1,2,4-Trichlorobenzene	10.	U
91-20-3	Naphthalene	10.	U
106-47-8	4-Chloroaniline	10.	U
87-68-3	Hexachlorobutadiene	10.	U
59-50-7	4-Chloro-3-methylphenol	10.	U
91-57-6	2-Methylnaphthalene	10.	U
77-47-4	Hexachlorocyclopentadiene	10.	U
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	25.	U
91-58-7	2-Chloronaphthalene	10.	U
88-74-4	2-Nitroaniline	25.	U
131-11-3	Dimethyl phthalate	10.	U
208-96-8	Acenaphthylene	10.	U
606-20-2	2,6-Dinitrotoluene	10.	U
99-09-2	3-Nitroaniline	25.	U
83-32-9	Acenaphthene	10.	U
51-28-5	2,4-Dinitrophenol	25.	UJ

*** Validation Complete ***

CHARLESTON - ZONE A
CHARLESTON ZONE A - QUARTERLY GW
AOC 506 - SVOCs in Groundwater

SW846-SVOA

SAMPLE ID ------->	506-G-W001-04
ORIGINAL ID ----->	506GW00104
LAB SAMPLE ID --->	6434-02
ID FROM REPORT -->	506GW00104
SAMPLE DATE ----->	10/10/96
DATE EXTRACTED -->	10/14/96
DATE ANALYZED --->	10/23/96
MATRIX ---------->	Water
UNITS ----------->	UG/L

CAS #	Parameter	6434	VAL
100-02-7	4-Nitrophenol	25.	U
132-64-9	Dibenzofuran	10.	U
121-14-2	2,4-Dinitrotoluene	10.	U
84-66-2	Diethylphthalate	10.	U
7005-72-3	4-Chlorophenylphenylether	10.	U
86-73-7	Fluorene	10.	U
100-01-6	4-Nitroaniline	25.	U
534-52-1	2-Methyl-4,6-Dinitrophenol	25.	U
86-30-6	N-Nitrosodiphenylamine	10.	U
101-55-3	4-Bromophenyl-phenylether	10.	U
118-74-1	Hexachlorobenzene	10.	U
87-86-5	Pentachlorophenol	25.	U
85-01-8	Phenanthrene	10.	U
120-12-7	Anthracene	10.	U
86-74-8	Carbazole	10.	U
84-74-2	Di-n-butylphthalate	10.	U
206-44-0	Fluoranthene	10.	U
129-00-0	Pyrene	10.	U
85-68-7	Butylbenzylphthalate	10.	U
91-94-1	3,3'-Dichlorobenzidine	10.	U
56-55-3	Benzo(a)anthracene	10.	U
218-01-9	Chrysene	10.	U
117-81-7	bis(2-Ethylhexyl)phthalate (BEHP)	10.	U
117-84-0	Di-n-octyl phthalate	10.	U
205-99-2	Benzo(b)fluoranthene	10.	U
207-08-9	Benzo(k)fluoranthene	10.	U
50-32-8	Benzo(a)pyrene	10.	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.	U
53-70-3	Dibenz(a,h)anthracene	10.	U
191-24-2	Benzo(g,h,i)perylene	10.	U
110-86-1	Pyridine	10.	U
103-33-3	Azobenzene	10.	U
62-53-3	Aniline	NR	
62-75-9	N-Nitrosodimethylamine	NR	

*** Validation Complete ***

Attachment B

SOUTHWEST LABORATORY OF OKLAHOMA, INC.
1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

ENSAFE INC.
5724 SUMMER TREES DRIVE
MEMPHIS, TN 38134

REPORT : 37527.01

REPORTED : 03/16/99

Attn: BLAKE COUTURE

PROJECT : ZONE A, RELEASE 87
LAB# : 37527.01
SAMPLE #: 506SB00102
LOCATION:
MATRIX : Soil

SAMPLED : 02/23/99
SUBMITTED: 02/24/99

%MOISTURE: 13.2

MISCELLANEOUS REPORTED ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**	UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
ORGANIC CARBON	3540	mg/kg		02/25/99	EPA 415.1/SW 9060

Data File: /chem/p.i/p990305a.b/p19861.d
Report Date: 12-Mar-1999 10:11

Southwest Laboratory of Oklahoma

TARGET COMPOUNDS

Client Name: ENSAFE
Client Sample ID: 06SB00102
Sample Location:
Lab Sample ID: 37527.01
Sample Type: WATER
Analysis Type: SV
Data Type: MS DATA
Misc Info: MS540*TB990225A1*INSTP*ENSAFE*37527.01*500ML/1ML/2UL*

Client SDG: 37527
Sample Date:
Sample Point:
Date Received: 02/24/99
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
108-95-2	Phenol	20.00	U
111-44-4	bis(2-Chloroethyl)ether	20.00	U
95-57-8	2-Chlorophenol	20.00	U
541-73-1	1,3-Dichlorobenzene	20.00	U
106-46-7	1,4-Dichlorobenzene	20.00	U
100-51-6	Benzyl alcohol	20.00	U
95-50-1	1,2-Dichlorobenzene	20.00	U
95-48-7	2-Methylphenol	20.00	U
108-60-1	bis(2-Chloroisopropyl)ether	20.00	U
106-44-5	4-Methylphenol	20.00	U
621-64-7	N-Nitroso-di-n-propylamine	20.00	U
67-72-1	Hexachloroethane	20.00	U
98-95-3	Nitrobenzene	20.00	U
78-59-1	Isophorone	20.00	U
88-75-5	2-Nitrophenol	20.00	U
105-67-9	2,4-Dimethylphenol	20.00	U
111-91-1	bis(2-Chloroethoxy)methane	20.00	U
65-85-0	Benzoic Acid	50.00	U
120-82-1	1,2,4-Trichlorobenzene	20.00	U
91-20-3	Naphthalene	20.00	U
106-47-8	4-Chloroaniline	20.00	U
87-68-3	Hexachlorobutadiene	20.00	U
59-50-7	4-Chloro-3-methylphenol	20.00	U
91-57-6	2-Methylnaphthalene	20.00	U
77-47-4	Hexachlorocyclopentadiene	20.00	U
88-06-2	2,4,6-Trichlorophenol	20.00	U
95-95-4	2,4,5-Trichlorophenol	50.00	U
120-83-2	2,4-Dichlorophenol	20.00	U
91-58-7	2-Chloronaphthalene	20.00	U
88-74-4	2-Nitroaniline	50.00	U
131-11-3	Dimethylphthalate	20.00	U
208-96-8	Acenaphthylene	20.00	U
606-20-2	2,6-Dinitrotoluene	20.00	U
121-14-2	2,4-Dinitrotoluene	20.00	U
99-09-2	3-Nitroaniline	50.00	U
83-32-9	Acenaphthene	20.00	U
51-28-5	2,4-Dinitrophenol	50.00	U
100-02-7	4-Nitrophenol	50.00	U
132-64-9	Dibenzofuran	20.00	U

Data File: /chem/p.i/p990305a.b/p19861.d
Report Date: 12-Mar-1999 10:11

Southwest Laboratory of Oklahoma

TARGET COMPOUNDS

Client Name: ENSAFE
Client Sample ID: 06SB00102
Sample Location:
Lab Sample ID: 37527.01
Sample Type: WATER
Analysis Type: SV
Data Type: MS DATA
Misc Info: MS540*TB990225A1*INSTP*ENSAFE*37527.01*500ML/1ML/2UL*

Client SDG: 37527
Sample Date:
Sample Point:
Date Received: 02/24/99
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
84-66-2	Diethylphthalate	20.00	U
86-73-7	Fluorene	20.00	U
7005-72-3	4-Chlorophenyl-phenylether	20.00	U
100-01-6	4-Nitroaniline	50.00	U
86-30-6	N-Nitrosodiphenylamine	20.00	U
534-52-1	4,6-Dinitro-2-methylphenol	50.00	U
101-55-3	4-Bromophenylphenylether	20.00	U
118-74-1	Hexachlorobenzene	20.00	U
87-86-5	Pentachlorophenol	50.00	U
85-01-8	Phenanthrene	20.00	U
120-12-7	Anthracene	20.00	U
84-74-2	Di-n-butylphthalate	20.00	U
206-44-0	Fluoranthene	20.00	U
129-00-0	Pyrene	20.00	U
85-68-7	Butylbenzylphthalate	20.00	U
56-55-3	Benzo(a)anthracene	20.00	U
91-94-1	3,3'-Dichlorobenzidine	40.00	U
218-01-9	Chrysene	20.00	U
117-81-7	bis(2-Ethylhexyl)phthalate	17.67	J
117-84-0	Di-n-octylphthalate	20.00	U
205-99-2	Benzo(b)fluoranthene	20.00	U
207-08-9	Benzo(k)fluoranthene	20.00	U
50-32-8	Benzo(a)pyrene	20.00	U
53-70-3	Dibenz(a,h)anthracene	20.00	U
193-39-5	Indeno(1,2,3-cd)pyrene	20.00	U
191-24-2	Benzo(g,h,i)perylene	20.00	U
86-74-8	Carbazole	20.00	U
367-12-4	2-Fluorophenol	131.79	
4165-62-2	Phenol-d5	131.26	
4165-60-0	Nitrobenzene-d5	77.16	
321-60-8	2-Fluorobiphenyl	77.86	
118-79-6	2,4,6-Tribromophenol	86.45	
98904-43-9	Terphenyl-d14	70.78	
93951-73-6	2-Chlorophenol-d4	124.03	
2199-69-1	1,2-Dichlorobenzene-d4	64.47	

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

Semivolatile

Test Code MS500
Method SW846 8270C
Matrix Water-Soil
Extract Volume 1000 mL - 30g
Initial Calibration 10, 20, 50, 80, 100 ng,%RSD for CCC compounds=30%, SPCC=RF >
Continuing Calibration 50 ng, %D = 20% for CCC Compounds, SPCC = RF > 0.05

COMPOUND		CAS NUMBE	PQL's		MDL's	
			WATER	SOIL	WATER	SOIL
			ug/L	ug/Kg	ug/L	ug/Kg
1,2,4-Trichlorobenzene		120-82-1	10	330	3.7	65
1,2-Dichlorobenzene		95-50-1	10	330	3.7	74
1,3-Dichlorobenzene		541-73-1	10	330	4.1	31
1,4-Dichlorobenzene	*	106-46-7	10	330	4.2	58
2,3,4,6-Tetrachlorophenol		58-90-2	10	330	8.2	71
2,4,5-Trichlorophenol		95-95-4	50	1600	6.1	120
2,4,6-Trichlorophenol	*	88-06-2	10	330	4.6	85
2,4-Dichlorophenol	*	120-83-2	10	330	4.7	70
2,4-Dimethylphenol		105-67-9	10	330	4.0	210
2,4-Dinitrophenol	**	51-28-5	50	1600	7.1	64
2,4-Dinitrotoluene		121-14-2	10	330	2.9	74
2,6-Dinitrotoluene		606-20-2	10	330	3.1	85
2-Chloronaphthalene		91-58-7	10	330	3.3	63
2-Chlorophenol		95-57-8	10	330	5.0	92
2-Methylnaphthalene		91-57-6	10	330	3.2	43
2-Methylphenol		95-48-7	10	330	5.1	170
2-Nitroaniline		88-74-4	10	1600	3.4	57
2-Nitrophenol	*	88-75-5	10	330	7.7	93
3,3'-Dichlorobenzidine		91-94-1	20	660	3.3	6.4
3-Nitroaniline		99-09-2	50	1600	57	3.6
4,6-Dinitro-2-methylphenol		534-52-1	50	1600	7.3	93
4-Bromophenyl-phenylether		101-55-3	10	330	3.1	72
4-Chloro-3-methylphenol	*	59-50-7	10	330	4.1	75
4-Chloroaniline		106-47-8	10	330	4.6	87
4-Chlorophenyl-phenylether		7005-72-3	10	330	4.1	49
4-Methylphenol		106-44-5	10	330	6.0	220
4-Nitroaniline		100-01-6	50	1600	2.5	62
4-Nitrophenol	**	100-02-7	50	1600	7.1	93
Acenaphthene	*	83-32-9	10	330	3.4	65
Acenaphthylene		208-96-8	10	330	3.5	69
Anthracene		120-12-7	10	330	2.7	47
Benzo(a)anthracene		56-55-3	10	330	2	56
Benzo(a)pyrene	*	50-32-8	10	330	2.6	38
Benzo(b)fluoranthene		205-99-2	10	330	2.8	160
Benzo(g,h,i)perylene		191-24-2	10	330	2.8	81
Benzo(k)fluoranthene		207-08-9	10	330	4.2	96
Benzoic acid		65-85-0	50	1600	7.9	440
Benzyl alcohol		100-51-6	10	330	5.2	98
Buytylbenzylphthalate		85-68-7	10	330	0.3	87

WATER MDLS PERFORMED ON INST V <01/09/98>
SOIL MDL'S PERFORMED ON INST P <01/08/98>
NR = NonRoutine Compounds. Analyzed only upon request.

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

Semivolatile

Test Code MS500
Method SW846 8270C
Matrix Water-Soil
Extract Volume 1000 mL - 30g
Initial Calibration 10, 20, 50, 80, 100 ng,%RSD for CCC compounds=30%, SPCC=RF >
Continuing Calibration 50 ng, %D = 20% for CCC Compounds, SPCC = RF > 0.05

COMPOUND		CAS NUMBE	PQL's		MDL's	
			WATER	SOIL	WATER	SOIL
			ug/L	ug/Kg	ug/L	ug/Kg
Carbazole		86-74-8	10	330	2.3	89
Chrysene		218-1-9	10	330	2.5	51
Di-n-octylphthalate	*	117-84-0	10	330	1.8	46
Dibenz(a,h)anthracene		53-70-3	10	330	3.0	150
Dibenzofuran		132-64-9	10	330	3.3	50
Diethylpthalate		84-66-2	10	330	0.4	64
Fluoranthene	*	206-44-0	10	330	2.2	71
Fluorene		86-73-7	10	330	3.2	40
Hexachlorobenzene		118-74-1	10	330	2.8	59
Hexachlorobutadiene	*	87-68-3	10	333	3.3	56
Hexachlorocyclopentadiene	**	77-47-4	10	330	0.6	73
Hexachloroethane		67-72-1	10	330	3.6	120
Indeno(1,2,3-cd)pyrene		193-39-5	10	330	3.3	280
Isophorone		78-59-1	10	330	4.1	69
N-Nitroso-di-n-propylamine	**	621-64-7	10	330	4.1	110
N-Nitrosodiphenylamine	*	86-30-6	10	330	2.0	56
Naphthalene		91-20-3	10	330	3.7	30
Nitrobenzene		98-95-3	10	330	3.8	74
Pentachlorophenol	*	87-86-5	50	1600	8.4	130
Phenanthrene		85-01-8	10	330	2.9	42
Phenol	*	108-95-2	10	330	4.2	66
Pyrene		129-00-2	10	330	2.4	47
bis(2-Chloroethoxy)methane		111-91-1	10	330	4.0	69
bis(2-Chloroethyl)ether		111-44-4	10	330	3.5	61
bis(2-Chloroisopropyl)ether		108-60-1	10	330	4.5	73
bis(2-Ethylhexyl)phthalate		117-81-7	10	330	1.9	80

* CCC compounds **SPCC compounds

WATER MDLS PERFORMED ON INST. H <01/09/98>

SOIL MDLS PERFORMED ON INST. H <01/08/98>

Attachment C

SOIL SCREENING LEVEL PARTITIONING EQUATION FOR MIGRATION TO GROUNDWATER

ZONE A: AOC 506

SIMPLIFYING ASSUMPTIONS FOR SSL MIGRATION TO GW PATHWAY

1) Infinite source
2) Uniform contamination distribution from surface to top aquifer
3) No contamination attentuation (i.e., adsorption, biodegradation)
4) Instantaneous and linear equilibrium soil-water partitioning
5) Homogeneous, isotropic, unconfined aquifer
6) Receptor well at downgradient edge of source and screened in plume
7) No contaminant attenuation in aquifer
8) No NAPLs present.

$SSL_{(soil)} = C_w[K_d + (\theta_w + \theta_a H')/\rho_b]$

where:

$SSL_{(soil)}$ = screening level in soil (mg/kg)

C_w = target soil leachate conc. (mg/l) [MCL]

K_d = soil-water partition coeff.

θ_w = water filled soil porosity (L_{water}/L_{soil})

θ_a = air-filled soil porosity (L_{water}/L_{soil})

ρ_b = dry soil bulk density (kg/L)

H' = Henry's law constant (dimensionless)

other variables:

f_{oc} = fraction organic carbon in soil (g/g)

K_{oc} =soil organic carbon/water partition coeff (L/kg)

Site-Specific Input Data:

n (Zone A)# =	0.35
K_h* (ft/d) =	1.1
convert to m/yr =	122.38
ρb (sand/sty sd) lb/fi	122.34
convert to kg/L =	1.959
f_{oc} [A](mg/kg)=	3540
as % =	0.00354

ZONE A Kh (ft/d)

506001=	1.1
Qs* =	3.6

** geomean of all Qs deposits regardless of depth*

 # avg of 3 STs from sand <13.5 ft bgs

Literature Data:

Contaminant = benzo(a)pyrene

C_w = 2.00E-04 MCL [mg/l]

H' = 4.63E-05

K_{oc} = 1.02E+06

1) Calc. avg. soil moist. content.

Assume n represents avg. annual soil moisture conditions

$\theta_w = n(I/K_h)$^[1/(2b+3)]

I = infiltration rate (in/yr) = 1.2

convert to m/yr = 0.03048

1/(2b+3) = soil-specific exponential parameter (unitless)

= 0.09 for sand

θ_w = 0.166

2) Calc. avg. air-filled soil porosity

$n = \theta_w + \theta_a$

θa = 0.184

3) Calc. Kd

$K_d = K_{oc} * f_{oc}$

K_d = 3610.8

4) Calc. SSL (soil)

$SSL_{(soil)}$ = 0.722177

in ug/kg = 722.177

5) Apply dilution attenuation factor

Assuming 0.5 acre source area:

At DAF = 10 SSL = 7,222 ug/kg

At DAF = 20 SSL = 14,444 ug/kg