N62604.AR.001239
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LETTER REPORT BASE-WIDE GROUNDWATER, SURFACE WATER, AND SEDIMENT SAMPLING FIELD PROGRAM AND ANALYTICAL RESULTS NCBC GULFPORT MS

3/24/1995

ABB ENVIRONMENTAL

ASEA BROWN BOVERI

March 24, 1995

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SUBJECT: Letter Report: Base-wide Groundwater, Surface Water, and Sediment Sampling Field Program and Analytical Results; Naval Construction Battalion Center (NCBC) Gulfport, Mississippi

INTRODUCTION

The base-wide sampling program undertaken in December 1994 was conducted to investigate (1) groundwater conditions at six sites located at the Naval Construction Battalion Center (NCBC) Gulfport in Gulfport, Mississippi, and (2) influent and effluent surface water and sediment quality with the base's drainage ditches. Groundwater samples were collected from existing monitoring wells. Surface water and sediments from these ditches were collected from nine locations along the NCBC boundary. Also, existing wells were resurveyed in support of a groundwater elevation survey.

As components of the Installation Restoration (IR) program, two previous investigations were performed to assess and characterize potential sources of contamination identified at NCBC Gulfport. These investigations included the 1985 Initial Assessment Study (IAS) and the 1987 Verification Study (VS) (Environmental Sciences and Engineering, Inc. [ESE]). The conclusions of these previous investigations indicated a need for additional data collection at seven sites at NCBC Gulfport, six of which are contained in this report. Site 6, Former Fire-Fighting Training Area, was not included in this program due to the additional investigative work conducted at that site in 1993 and 1994. In 1993, a Remedial Investigation and Feasibility Study (RI/FS) workplan was submitted to the Navy outlining proposed RI/FS activities at NCBC Gulfport to continue investigative work at sites identified during the IAS and the VS. This base-wide sampling activity was initiated due to the length of time which has elapsed since the Verification Stage (1987) and the present. The base-wide results from this effort will be used to verify the results identified during the 1987 investigation and will be incorporated into the Remedial Investigation. Additional information regarding the previous investigations at NCBC Gulfport can be found in the RI/FS workplan (ABB-ES, 1993).

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FIELD PROGRAM

Field activities for base-wide sampling were conducted from December 14 to 21, 1994. The field program for base-wide sampling included groundwater sampling from each of three existing monitoring wells at the six identified sites (Figure 1). The six site are as follows:

- Site 1, Disaster Recovery Disposal Area;
- Site 2, World War II Landfill;
- Site 3, Northwest Landfill and Burn Pit;
- Site 4, Golf Course Landfill;
- Site 5, Heavy Equipment Training Area Landfill; and
- Site 7, Rubble Disposal Area.

All monitoring wells at each of the above-mentioned sites were redeveloped prior to sampling. Because Site 7 intersects Site 2, the sites were combined and treated as one site for purposes of field investigations. Three monitoring wells (GPT-2-1, GPT-2-2, and GPT-2-3) serve to represent the groundwater conditions at Site 2 and Site 7. Detailed procedures for development and sampling are included in the Sampling and Analysis Plan of the Site Sampling Workplan for Base-wide Sampling (ABB-ES, 1994). A total of 15 monitoring wells were redeveloped and sampled during this investigation.

To generate a base-wide potentiometric surface map, all existing monitoring wells at these sites and one monitoring well at Site 6 and Site 8 were surveyed. The survey performed was a closed loop horizontal and vertical location survey conducted by a Mississippi-licensed land surveyor. The survey reported horizontal locations to the nearest 0.1 foot and the vertical locations to the nearest 0.01 foot. The survey is tied into an existing monitoring well at Site 6 and Site 8. Two rounds of water level measurements were collected from all wells that are screened across the water table to develop an accurate potentiometric surface map. Water levels were measured to the nearest 0.01 foot and recorded in the logbook. The potentiometric surface map developed from the second round on December 21, 1994, is presented on Figure 2.

Surface water and sediment samples were collected from drainage ditches located within base boundaries to evaluate the impact of base operations to local surface waters. Eight of the surface water and sediment locations were adjacent to the base boundary where the surface water and sediment flow off-base. One surface water and one sediment sample were collected where Canal No. 1 flows onto the base, to establish upstream conditions. In Figure 1, surface water and sediment locations are labeled SW and SD and numbered 1 through 9. For example, SW-1 refers to the location of surface water number 1. The sample collected at surface water number 1 is GPW00100. The sample collected at sediment location number 1 is GPD00100.

The investigation derived waste (IDW) associated with base-wide sampling included groundwater from well redevelopment operations, decontamination fluids, and expendable materials such as gloves and paper towels. The IDW was segregated by medium and disposed in accordance with U.S. Environmental Protection Agency (USEPA) Region IV Standard Operating procedures and Quality Assurance Manual (SOPQAM) (USEPA, 1991a).

The liquids were placed in new, 55-gallon, Department of Transportation- (DOT) approved drums. The drums were staged on wooden pallets and were covered in plastic sheeting. The drums were labeled indicating the date, contents, and where the contents were derived. The base will be responsible for disposing of the liquid IDW. Solid IDW (expendables) was double-bagged in plastic bags and disposed in a NCBC solid waste dumpster.

ANALYTICAL PROGRAM

Groundwater, surface water, and sediment samples were analyzed in accordance with USEPA SW-846 methods (USEPA, 1986) and Naval Energy and Environmental Support Activity (NEESA) Level C documentation (NEESA, 1988) for the analytes outlined on Table 1.

The types of quality assurance and quality control (QA/QC) samples collected during the field effort included duplicates, trip blanks, matrix spike and matrix spike duplicates (MS/MSD), rinsates, and field blanks. One duplicate sample was collected for every 10 samples of a single matrix. One set of MS/MSD samples were collected for each matrix since the total number of samples from any one matrix did not exceed 20. One field blank was collected from the source of distilled, organic-free water. One set of two trip blanks was contained and sent to the laboratory with each shipment for volatile organic analysis. One equipment rinsate was collected following every other decontamination event.

All samples collected were properly preserved, placed in coolers, and packed with bagged ice immediately after collection. All samples remained in the custody of the field operations leader until delivery to the courier service providing overnight shipment to the laboratory. All samples were shipped, complete with chain-of-custody forms, to the analytical laboratory within 24 hours for analysis. Upon arrival at the laboratory, the chain of custody and preservation of the samples were checked with the contents of each cooler by laboratory personnel. After verification, the chain-of-custody form was signed by laboratory personnel and the samples accepted for analysis.

RESULTS OF INVESTIGATIONS

This section presents the results of the groundwater elevation survey, the potentiometric surface map, and the validated analytical results from the groundwater, surface water, and sediment samples.

Groundwater Elevation Survey

Two complete rounds of water levels were measured during the field effort. A potentiometric map was developed using the new elevation survey data and the round of water level measurements from December 21, 1994 (Figure 2).

The potentiometric surface indicates that groundwater generally flows to the west. This flow direction is consistent with the results of previous groundwater elevation surveys. This direction of groundwater flow creates a situation, for most sites, where the monitoring wells are upgradient of the site. The hydraulic gradient ranges from 0.0021 foot per foot (ft/ft) to 0.0032 ft/ft as measured across *i*1 and *i*2 trend lines, respectively (Figure 2).

ANALYTICAL RESULTS

Tables 2 through 8 summarize analytical data for constituents detected in the groundwater, surface water, and sediments samples. The following subsections discuss the analytical results associated with samples collected from base-wide groundwater, surface water, and sediment samples.

Dioxin and Furan Compounds Detected in Groundwater Samples

The dioxin compound, octachlorodibenzo-p-dioxin (OCDD), was detected in all 15 groundwater samples collected. The potentiometric map (Figure 2) shows that the majority of the wells are located upgradient or cross gradient of the sites. The highest concentration of OCDD was an estimated 14,000 picograms per liter (pg/ℓ). Other cogeners of dioxin and furans were detected in groundwater samples from every site (see Tables 2 through 6), although the result from sample GPT-2-3 was the only one to contain 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) (5.5 pg/ℓ). Only the toxic equivalency value of the groundwater sample from GPT-4-3 exceeded the maximum contaminant limit (MCL) for 2,3,7,8-TCDD (30 pg/ℓ) at 34.14 pg/ℓ.

Organic Compounds Detected in Groundwater Samples

Herbicides and total petroleum hydrocarbons (TPH) were not detected in any of the groundwater samples. Tables 2 through 6 list the volatile organic compounds (VOCs) detected in groundwater samples. The most common VOC detected was acetone, which ranged from 3 to 32 micrograms per liter (μg/ℓ). The only semivolatile organic compounds (SVOCs) detected were bis(2-ethylhexyl)phthalate and 2,6-dinitrotoluene. Bis(2-ethylhexyl)phthalate was found in groundwater samples from every site and exhibited estimated concentrations ranging from 0.9 to 29 μg/ℓ. 2,6-Dinitrotoluene was only detected in sample GPT-4-3D, at an estimated concentration of 9 μg/ℓ. No pesticides or polychlorinated biphenyls (PCBs) were detected in the groundwater samples collected at sites 1 and 2. 4,4'-Dichlorodiphenyl trichloroethane (4,4'-DDT) was detected in groundwater samples at sites 3 and 5 at estimated levels ranging from 0.014 to 0.047 μg/ℓ. At site 4, additional pesticides were detected in groundwater samples, especially from wells GPT-4-1 and GPT-4-3 (see Tables 2 through 6).

Inorganics Detected in Groundwater Samples

Inorganics were detected in all of the groundwater samples. Tables 2 through 6 present the inorganics detected and their associated values. Overall samples GPT-4-3 and GPT-4-3D exhibited the highest levels of inorganics.

Conclusions for Analytes Detected in Groundwater

The MCL for 2,3,7,8-TCDD was exceeded in only one sample, GPT-4-3, where the toxic equivalency value was determined to be 34.14 pg/ℓ. The toxic equivalency is determined based on the MCL for 2,3,7,8-TCDD (30 pg/ℓ), which is considered to be the most potent carcinogen in the dioxin and furan families. Toxicologists believe that polychlorinated dibenzodioxins and polychlorinated dibenzofurans (PCDDs/PCDFs) with chlorine atoms at the 2,3,7, and 8 positions (2,3,7,8 substituted compounds) in the molecules can mimic the toxic properties of 2,3,7,8-TCDD. The USEPA-developed toxicity equivalency factors (TEFs) to quantify the carcinogenity of these compounds relative to 2,3,7,8-TCDD.

Sample GPT-2-3 was the only groundwater sample to have 2,3,7,8-TCDD detected in it.

None of the maximum concentrations of organic compounds detected in the groundwater samples exceeded their associated MCLs. In summary, low concentrations of VOCs, SVOCs, and pesticides were detected. No herbicides or TPH were detected.

Inorganic constituents were present in all groundwater samples. MCLs were exceeded for arsenic, lead, and thallium at Site 4. MCLs for lead and thallium were exceeded at Sites 3 and 5 and exceeded for lead only at Site 1.

Groundwater sample GPT-4-3 detected the highest quantity of constituents and the greatest concentrations in the monitoring wells that were sampled. GPT-4-3 is the only monitoring well actually installed within the boundaries of a known site, in this case a landfill; therefore, elevated concentrations of metals would be expected.

Dioxin and Furan Compounds Detected in Surface Water Samples

OCDD and 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) were the only dioxin or furan compounds detected in the surface water. OCDD was detected in every surface water sample except GPW00800. The estimated concentrations ranged from 97 to 640 pg/ℓ. 1,2,3,4,6,7,8-HpCDD was detected in nearly half of the surface water samples (see Table 7) and ranged in concentration from 27 to 54 pg/ℓ. See Figure 3 for the dioxin/furan characterization map for surface water and sediment samples.

Organic Compounds Detected in Surface Water Samples

Acetone was the only VOC detected in the surface water samples. The levels ranged from 15 to 26 μg/ℓ. A variety of SVOCs listed on Table 7 were detected. Sample GPW00800 (see Figure 1 for location) resulted in the majority of SVOC compounds detected. Low levels of pesticides and TPH were also detected in several surface water samples (Table 7). No herbicide compounds were detected.

Inorganic Compounds Detected in Surface Water Samples

Inorganics were detected in all surface water samples. Table 7 details the inorganics detected and their associated values. The inorganics were generally detected in low levels. Lead levels were below drinking water MCLs in all samples, and no mercury was detected.

Conclusions for Constituents Detected in Surface Water Samples

Low levels of VOC, SVOC, dioxin compounds, TPH, and pesticides were detected in the surface water samples collected. Sample GPW00800 resulted in the greatest number SVOC compounds, however, the levels of contamination were relatively low. Inorganics were detected in all surface water samples, but the concentrations were not significantly elevated.

Dioxin and Furan Compounds Detected in the Sediment Samples

Elevated levels of dioxin and furan compounds were detected in sediment samples GPD00100 (74 picograms per gram [pg/g]) and GPD00300 (150 pg/g); these locations are shown on Figure 1. These results were based on toxic equivalency, but concentrations of 2,3,7,8-TCDD were also detected, as indicated in Table 8. The highest levels of 2,3,7,8-TCDD were detected in fine-grained sediments on base property, just south of North Outflow #3 (samples GPD00300 and GPD00300D). These samples contained levels of 2,3,7,8-TCDD at 110 and 120 pg/g, which showed good correlation between sample and duplicate sample. The samples were collected and split from the same augered boring. The depth of the boring was less that 0.3 foot. The remainder of the dioxin and furan compounds contributed to the toxic equivalency values (see Figure 3).

Organic Compounds Detected in Sediment Samples

VOCs were detected in all sediment samples. Elevated levels of acetone were detected in samples GPD00100 and GPD003/003D. Elevated concentrations of TPH were detected in GPD003/003D as well (Table 8). Elevated levels of SVOCs were detected in GPD00800 and GPD00900. Specifically, in GPD00900, flouranthene was detected at an estimated concentration of 5,500 micrograms per kilogram (μg/kg), pyrene at 2,800 μg/kg, chrysene at 2,800 μg/kg, and benzo(b)fouranthene at 3,700 μg/kg. Low levels of pesticide compounds were detected in all sediment samples except GPD00200 and GPD00700. No PCB or herbicide compounds were detected.

Inorganic Compounds Detected in Sediment Samples

Table 8 summarizes the inorganics analyses and corresponding results. Inorganics were detected in all sediment samples. Elevated levels of lead were detected in sediment samples GPD00100, GPD003/003D, and GPD00900.

Conclusions for Constituents Detected in Sediment Samples

Elevated levels of dioxin and furan compounds were detected in two sediment locations (GPD00100 and GPD00300/0030D). The toxic equivalency of the levels in GPD00300 and the

duplicate sample GPD0030D were above State, risk-based action levels for these compounds. The levels for 2,3,7,8-TCDD were 110 and 120 pg/g, respectively, for GPD00300 and GPD003D. Elevated levels of lead, TPH, and acetone were also found within samples GPD00300 and GPD003D. This correlation may be indicative of a pathway for contaminant sources that exist on the base, including Site 8 and the degreasing operation at Buildings 399 and 400.

SUMMARY

Groundwater, surface water, and sediment samples were collected in December 1994 and analyzed in accordance with USEPA SW-846 methods (USEPA, 1986) and NEESA Level C documentation (NEESA, 1988) for target compound list (TCL) VOCs, TCL SVOCs, TCL pesticides and PCBs, TAL inorganics, herbicides (8150), dioxins and furans (8290), and TPH (418.1).

The potentiometric map indicates that groundwater is generally flowing west across the base. Based on this trend of groundwater flow direction, most of the monitoring wells are either upgradient or cross-gradient from the identified sites.

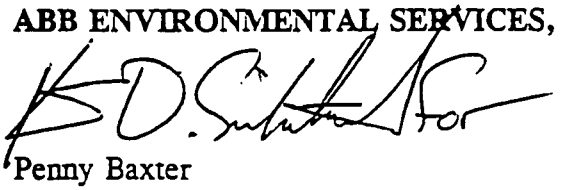
Results of these analyses indicate significant levels of dioxin and furan contamination in two sediment sample locations. One, near the location where Canal No. 1 enters the base, and the other near the effluent of a ditch at Outflow North #3. The sample and associated duplicate at Outflow North #3 (GPD003/003D) has reported toxic equivalent concentrations of 150 and 139 pg/g, which are above State, risk based, action levels.

Organic compounds were detected in groundwater, surface water, and sediment samples. The common contaminant was acetone, which exhibited elevated levels that possibly correspond to elevated levels of dioxin compounds in sediment samples.

Inorganics were detected in all samples. Elevated levels of lead were reported from sediment samples GPD001, GPD003/003D, and GPD009. Overall, the highest levels of inorganics were reported from the sample in the groundwater from well GPT-4-3, which is installed within the limits of the Golf Course Landfill.

Sincerely,

ABB ENVIRONMENTAL SERVICES, INC.



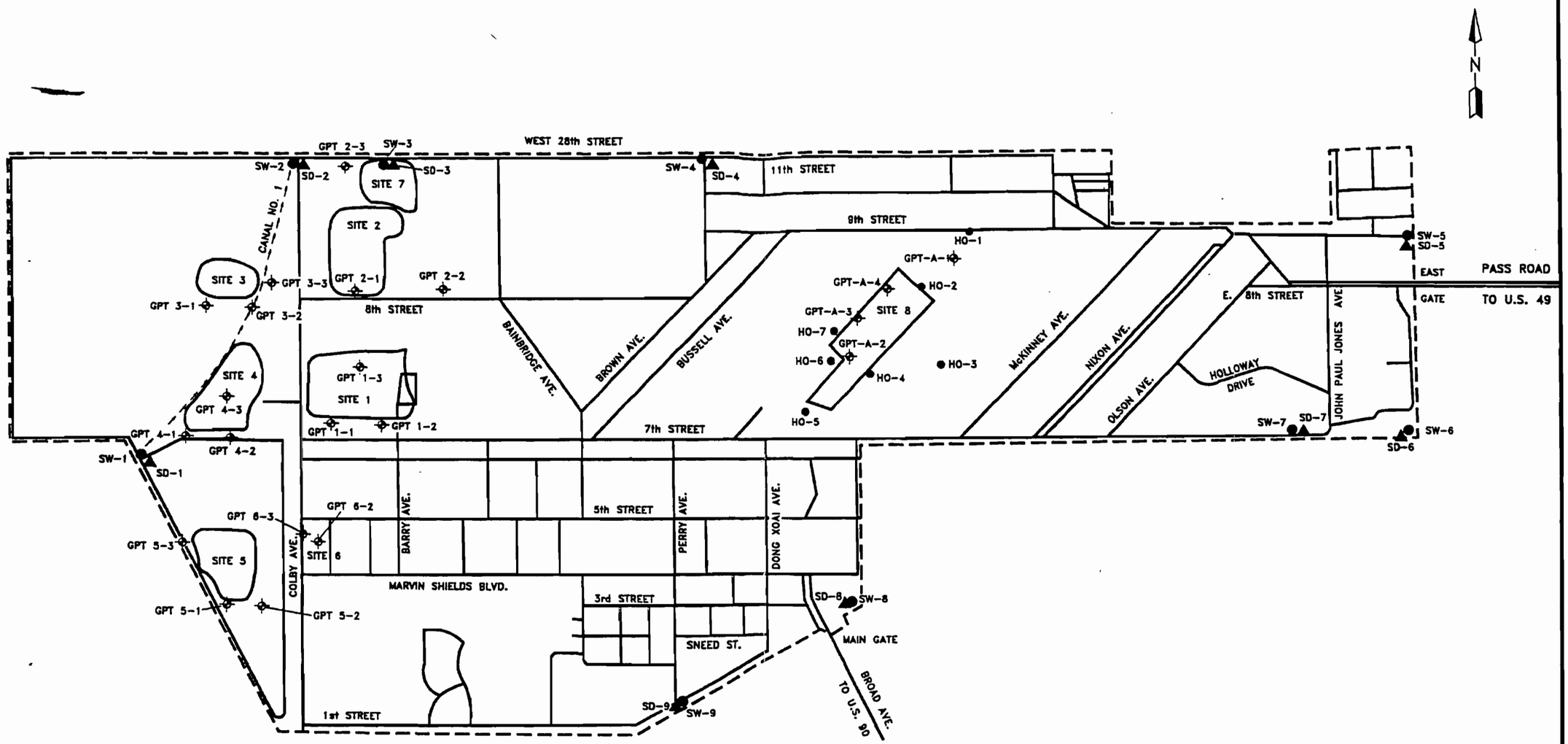
Penny Baxter
Senior Project Manager

pc:

Attachments

ATTACHMENT 1

FIGURES



LEGEND

- SW-1 ● SURFACE WATER SAMPLE LOCATIONS
- SD-1 ▲ SEDIMENT SAMPLE LOCATIONS
- GPT-A-4 ⊕ MONITORING WELL LOCATION
- HO-7 ● WELL POINT LOCATIONS
- BASE BOUNDARY
- SITE 3 SITE LOCATIONS

0 500 1000

SCALE: 1" = 1000'

FIGURE 1

NCBC FACILITY LAYOUT

LETTER REPORT
BASEWIDE SAMPLING

NCBC GULFPORT
GULFPORT, MISSISSIPPI

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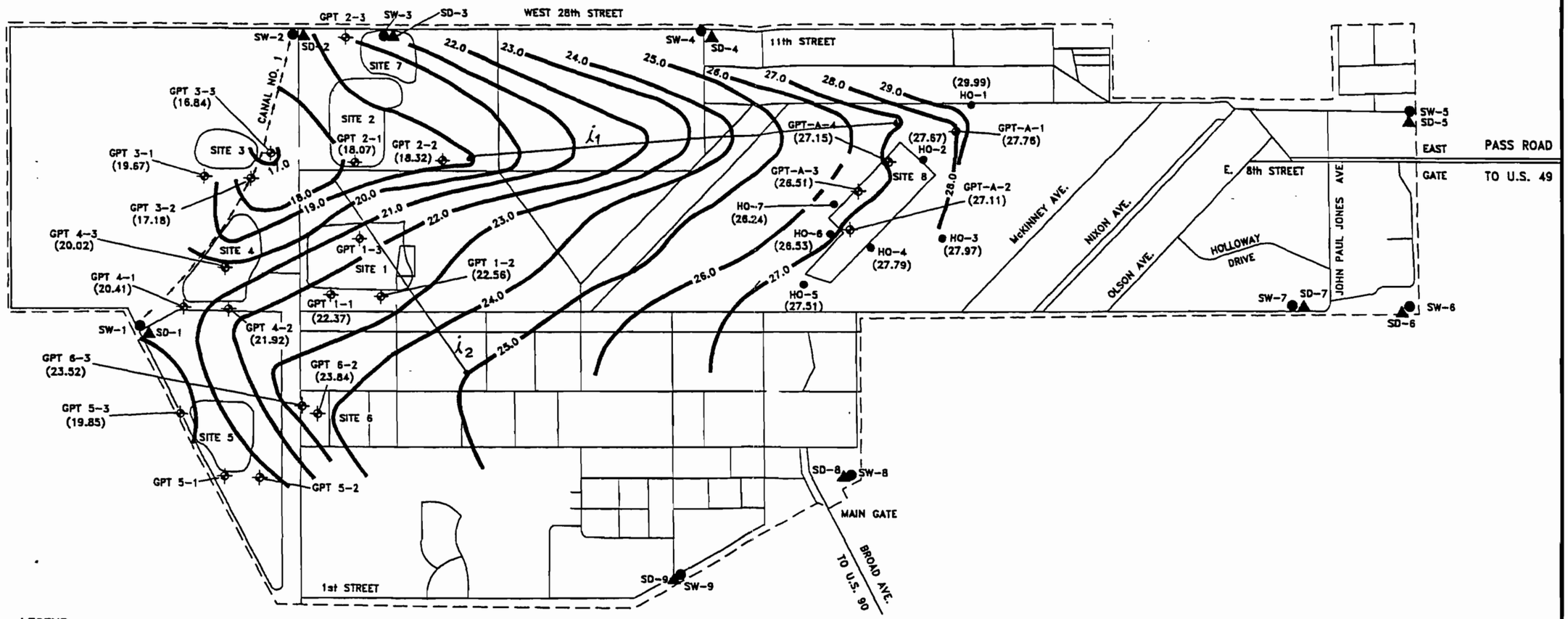

LEGEND

- SW-1 ● SURFACE WATER SAMPLE LOCATIONS
- SD-1 ▲ SEDIMENT SAMPLE LOCATIONS
- GPT-A-4 ⊕ MONITORING WELL LOCATION
- HO-7 ● WELL POINT LOCATIONS
- BASE BOUNDARY
- SITE 3 SITE LOCATIONS

0 500 1000
SCALE: 1" = 1000'

FIGURE 2

GROUNDWATER POTENTIOMETRIC MAP OF DECEMBER 1994

LETTER REPORT
BASEWIDE SAMPLING

NCBC GULFPORT
GULFPORT, MISSISSIPPI

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ATTACHMENT 2

TABLES

Table 1
Base-wide Sampling Program Summary

Base-wide Letter Report
Naval Construction Battalion Center
Gulfport, Mississippi

Media/Sample Type	Quantity of Samples						
	TCL VOCs	TCL SVOCs	TCL Pest/PCB	TAL Inorganics	Herbicides	Dioxins and Furans	TPH
Groundwater	15	15	15	15	15	15	15
Surface water	9	9	9	9	9	9	9
Sediment	9	9	9	9	9	9	9
Field duplicates							
Groundwater	2	2	2	2	2	2	2
Surface water	1	1	1	1	1	1	1
Sediment	1	1	1	1	1	1	1
MS/MSD							
Groundwater	1	1	1	1	1	1	1
Surface water	1	1	1	1	1	1	1
Sediment	1	1	1	1	1	1	1
Quality control							
Trip blanks	6	0	0	0	0	0	0
Rinsate blanks	2	2	2	2	2	2	2
Field blanks	1	1	1	1	1	1	1

Notes: TCL = target compound list.
VOCs = volatile organic compounds.
SVOCs = semivolatile organic compounds.
Pest/PCB = pesticides and polychlorinated biphenyls.
TAL = target analyte list.
TPH = total petroleum hydrocarbons.
MS/MSD = matrix spike and matrix spike duplicate.

Table 7 (continued)
Analytes Detected in Surface Water

Base-wide Letter Report
Naval Construction Battalion Center
Gulfport, Mississippi

Analyte	Sample Number									
	GPW00100	GPW00200	GPW00300	GPW0030D	GPW00400	GPW00500	GPW00600	GPW00700	GPW00800	GPW00900
alpha-Chlordane	ND	ND	ND	ND	ND	0.041 J	0.073 J	ND	ND	ND
gamma-Chlordane	ND	ND	ND	ND	ND	0.038 J	0.085 J	ND	ND	ND
Herbicides	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dioxins and Furans (pg/ℓ)										
1,2,3,4,6,7,8-HpCDD	ND	ND	39	40	31	ND	54	ND	27	ND
OCDD	150	97	310	310	280	ND	640	ND	380	190
Inorganics (µg/ℓ)										
Aluminum	475	193 J	717	1,740	303	647	660	132 J	623	356
Antimony	ND	2.6 J	ND	2.8 J	2.7 J	ND	ND	6.3 J	ND	ND
Arsenic	3.2 J	4.7 J	6.6 J	8.0 J	4.1 J	7.3 J	ND	ND	ND	ND
Barium	21.6 J	46.6 J	38.7 J	71.8 J	44.3 J	31.3 J	36.7 J	17.1 J	21.8 J	27.4 J
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	4,880 J	14,500	26,300	47,400	25,500	45,700	37,400	11,200	31,200	20,500
Chromium	ND	6.6 J	ND	3.3 J	ND	ND	ND	ND	ND	ND
Cobalt	2.1 J	ND	ND	ND	ND	ND	ND	2.2 J	ND	ND
Copper	12.6 J	ND	7.4 J	9.0 J	4.7 J	23.3 J	ND	ND	4.3 J	4.8 J
Iron	8,070	1,480	2,080	4,720	895	1,250	1,160	427	604	898
Lead	ND	ND	2.1 J	5.8 J	ND	4.8 J	2.2 J	ND	ND	12.3 J
Magnesium	1,200 J	3,350 J	2,090 J	3,680 J	2,090 J	2,400 J	2,570 J	1,470 J	2,460 J	1,570 J
Manganese	168	43.8	61.7	119	16.1	32.9	37.3	22.1	10.1 J	25.2
Mercury	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	17.2 J	ND	ND	3.8 J	ND	28.2 J	ND	2.6 J	2.5 J	3.8 J

See notes at end of table.

Table 7
Analytes Detected in Surface Water

Base-wide Letter Report
Naval Construction Battalion Center
Gulfport, Mississippi

Analyte	Sample Number									
	GPW00100	GPW00200	GPW00300	GPW00300D	GPW00400	GPW00500	GPW00600	GPW00700	GPW00800	GPW00900
Volatile Organic Compounds (µg/ℓ)										
Acetone	ND	ND	15	26	ND	ND	ND	ND	ND	ND
Semivolatile Organic Compounds (µg/ℓ)										
Pentachlorophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5 J
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	1 J	ND
Carbazole	ND	ND	ND	ND	ND	ND	ND	ND	0.5 J	ND
di-n-Butylphthalate	ND	ND	0.5 J	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	4 J	ND
Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	3 J	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	0.8 J	ND
Chrysene	ND	ND	ND	ND	ND	ND	ND	ND	3 J	ND
bis(2-ethylhexyl)Phthalate	ND	ND	ND	ND	ND	5 J	ND	2 J	31	5 J
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	4 J	ND
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	1 J	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	2 J	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	2 J	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	ND	ND	2 J	ND
TPH	ND	ND	1.7 J	2.0 J	ND	ND	ND	ND	ND	ND
Pesticides and PCBs (µg/ℓ)										
Dieldrin	ND	ND	ND	ND	ND	0.019 J	ND	ND	ND	ND
4-4'DDD	ND	ND	ND	ND	ND	0.018 J	0.03 J	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND	0.10 J	ND	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND	ND	ND	0.029 J	0.019 J	ND	ND

See notes at end of table.

Table 7 (continued)
Analytes Detected in Surface Water

Base-wide Letter Report
Naval Construction Battalion Center
Gulfport, Mississippi

Analyte	Sample Number									
	GPW0010 0	GPW00200	GPW00300	GPW0030D	GPW00400	GPW00500	GPW00600	GPW00700	GPW00800	GPW0090 0
Potassium	1,820 J	892 J	943 J	1,690 J	991 J	623 J	249 J	295 J	400 J	452 J
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium	4,330 J	7,810 J	8,300 J	14,300 J	10,500 J	4,920 J	13,500 J	6,120 J	4,960 J	6,950 J
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	1.8 J	ND	1.2 J	3.5 J	ND	2.8 J	1.8 J	ND	1.5 J	1.1 J
Zinc	ND	ND	213 J	384 J	ND	68.4 J	96.9 J	ND	103 J	141 J

Notes: µg/ℓ = micrograms per liter.
ND = not detected.
J = estimated value.
TPH = total petroleum hydrocarbons.
PCBs = polychlorinated biphenyls.
DDD = dichlorodiphenyl dichloroethane.
DDT = dichlorodiphenyl trichloroethane.
pg/ℓ = picograms per liter.
HpCDD = heptachlorodibenzo-p-dioxin.
OCDD = octachlorodibenzo-p-dioxin.

Table 8
Analytes Detected in Sediments

Base-wide Letter Report
Naval Construction Battalion Center
Gulfport Mississippi

Analyte	Sample Number									
	GPD00100	GPD00200	GPD00300	GPD0030D	GPD00400	GPD00500	GPD00600	GPD00700	GPD00800	GPD00900
Volatile Organic Compounds (µg/kg)										
Acetone	65	16	190	88	17	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	3 J	4 J	9 J	5 J
2-Butanone	15 J	ND	53	22 J	ND	ND	ND	ND	ND	ND
Semivolatile Organic Compounds (µg/kg)										
Pentachlorophenol	ND	ND	ND	ND	ND	ND	ND	ND	76 J	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	1,100	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	65 J	ND
Carbazole	ND	ND	ND	ND	ND	ND	ND	ND	290 J	ND
Fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	5,500 J	160 J
Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	2,800	120 J
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	1,800	78 J
Chrysene	ND	ND	ND	ND	ND	ND	ND	ND	2,800	120 J
bis(2-ethylhexyl)Phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	85 J
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	3,700	150 J
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	960	48 J
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	1,600	80 J
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	1,200	72 J
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	320 J	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	ND	ND	1,200	72 J
TPH (mg/kg)	120	ND	290	320	120	46	41	27	110	130

See notes at end of table.

Table 8 (continued)
Analytes Detected In Sediments

Base-wide Letter Report
Naval Construction Battalion Center
Gulfport Mississippi

Analyte	Sample Number									
	GPD00100	GPD00200	GPD00300	GPD00300D	GPD00400	GPD00500	GPD00600	GPD00700	GPD00800	GPD00900
Pesticides and PCBs (µg/kg)										
Dieldrin	ND	ND	ND	ND	ND	0.63 J	ND	ND	ND	ND
4-4'DDE	1.8 J	ND	ND	ND	ND	ND	ND	ND	ND	2.7 J
Endrin	0.96 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD	1.3 NJ	ND	ND	1.3 J	0.53 J	1.7 J	2.7 J	ND	ND	2.3 J
4,4'-DDT	ND	ND	ND	ND	ND	ND	4.8 J	ND	ND	ND
alpha-Chlordane	ND	ND	0.84 J	0.98 J	0.59 J	2.2 J	5.5 J	ND	ND	4.0
gamma-Chlordane	ND	ND	0.91 J	1.4 J	1.1 J	2.3 J	6.6 J	ND	2.4 NJ	2.9 J
Herbicides	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dioxins and Furans (pg/g)										
2,3,7,8-TCDF	2.9	ND	17	20	ND	ND	ND	ND	ND	ND
2,3,4,7,8-PeCDF	7.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3,4,7,8-HxCDF	20	ND	9.6	11	ND	ND	ND	ND	ND	3.6
1,2,3,6,7,8-HxCDF	ND	ND	13	18	ND	ND	ND	ND	ND	ND
2,3,4,6,7,8-HxCDF	15	ND	7.3	7.6	ND	ND	ND	ND	ND	ND
1,2,3,4,6,7,8-HpCDF	190	ND	150	150	ND	8.7	21	ND	6.6	47
1,2,3,4,7,8,9-HpCDF	19	ND	12	13	ND	ND	ND	ND	ND	ND
OCDF	520	ND	420	420	10	13	39	ND	12	89
2,3,7,8-TCDD	9.4	ND	110	120	0.62	ND	ND	ND	ND	ND
1,2,3,4,7,8-HxCDD	14	ND	12	13	ND	ND	ND	ND	4.3	5.7
1,2,3,6,7,8-HxCDD	80	ND	27	28	ND	ND	ND	ND	5.2	10
1,2,3,7,8,9-HxCDD	36	ND	27	26	ND	ND	3.3	ND	19	13

See notes at end of table.

Table 8 (continued)
Analytes Detected In Sediments

Base-wide Letter Report
Naval Construction Battalion Center
Gulfport Mississippi

	Sample Number									
Analyte	GPD00100	GPD00200	GPD00300	GPD0030D	GPD00400	GPD00500	GPD00600	GPD00700	GPD00800	GPD00900
1,2,3,4,6,7,8-HpCDD	1,900	8.5	750	730	10	23	58	ND	96	180
OCDD	23,000	110	8,500	8,100	100	160	700	19	2,200	2,200
Inorganics (mg/kg)										
Aluminum	14,600	521	15,100	24,000	495	494	1,330	209	3,070	4,950
Antimony	0.93 J	ND	1.5 J	1.6 J	0.56 J	1.1 J	0.83 J	1.1 J	0.87 J	0.92 J
Arsenic	8.6	ND	17.9	18.5	1.2 J	1.4 J	1.3 J	ND	4.1	2.9 J
Barium	42.6 J	1.9 J	57.6 J	67.8 J	1.6 J	2.7 J	4.5 J	1.5 J	11.8 J	16.2 J
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	ND	ND	0.95 J	0.98 J	ND	ND	ND	ND	ND	ND
Calcium	2,140	327 J	1,940 J	2,070 J	3,630	3,940	455 J	129 J	1,740	1,200 J
Chromium	17.5	1.2 J	25.2	32.8	1.6 J	2.1 J	2.2 J	0.77 J	5.0	6.8
Cobalt	3.7 J	ND	3.9 J	5.0 J	ND	0.51 J	ND	ND	0.75 J	1.1 J
Copper	7.2 J	ND	11.8	13.9	ND	0.90 J	1.1 J	ND	6.2 J	4.7 J
Iron	12,100 J	525 J	15,300 J	17,700 J	578 J	995 J	1,650 J	355 J	4,820 J	4,540 J
Lead	22.0	ND	42.7	47.8	2.3	5.6	4.6	2.8	12.6	34.0
Magnesium	533 J	34.6 J	449 J	774 J	38.7 J	73.6 J	66.4 J	21.3 J	490 J	212 J
Manganese	41.3	4.3	43.8	53.0	8.1	6.3	16.4	7.1	40.6	22.1
Mercury	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	8.1 J	ND	9.3 J	13.0 J	ND	ND	ND	ND	ND	ND
Potassium	261 J	ND	192 J	378 J	ND	ND	ND	ND	99.4 J	108 J
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

See notes at end of table.

Table 8 (continued)
Analytes Detected in Sediments

Base-wide Letter Report
Naval Construction Battalion Center
Gulfport Mississippi

Analyte	Sample Number									
	GPD00100	GPD00200	GPD00300	GPD0030D	GPD00400	GPD00500	GPD00600	GPD00700	GPD00800	GPD00900
Sodium	263 J	133 J	424 J	515 J	183 J	161 J	158 J	142 J	237 J	272 J
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	28.1	1.3 J	35.3	44.7	1.3 J	3.1 J	3.3 J	0.66 J	8.5 J	10.8 J
Zinc	51.9	ND	158	150	ND	ND	24.4	ND	51.3	96.8

Notes: µg/kg = micrograms per kilogram.
ND = not detected.
J = estimated value.
TPH = total petroleum hydrocarbons.
PCBs = polychlorinated biphenyls.
DDE = dichlorodiphenyl dichloroethene.
DDD = dichlorodiphenyl dichloroethane.
DDT = dichlorodiphenyl trichloroethane.
NJ = presumptive evidence for the presence of the material at an estimated value.
pg/g = picograms per gram.
TCDF = tetrachlorodibenzofuran.
PeCDF = pentachlorodibenzofuran.
HxCDF = hexachlorodibenzofuran.
HpCDF = heptachlordibenzofuran.
OCDF = octachlorodibenzofuran.
TCDD = tetrachlorodibenzo-p-dioxin.
HxCDD = hexachlorodibenzo-p-dioxin.
HpCDD = heptachlorodibenzo-p-dioxin.
OCDD = octachlorodibenzo-p-dioxin.
mg/kg = milligrams per kilogram.

ATTACHMENT 3

GLOSSARY

GLOSSARY

1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin
4,4'-DDT	4,4'-Dichlorodiphenyl trichloroethane
ABB-ES	ABB Environmental Services, Inc.
DOT	Department of Transportation
ESE	Environmental Sciences and Engineering, Inc.
ft/ft	feet (foot) per foot
IAS	Initial Assessment Study
IDW	investigation derived waste
IR	Installation Restoration
µg/ℓ	micrograms per liter
µg/kg	micrograms per kilogram
MCL	maximum contaminant limit
MS/MSD	matrix spike and matrix spike duplicates
NCBC	Naval Construction Battalion Center
NEESA	Naval Energy and Environmental Support Activity
OCDD	octachlorodibenzo-p-dioxin
PCBs	polychlorinated biphenyls
PCDDs/PCDFs	polychlorinated dibenzodioxins and polychlorinated dibenzofurans
pg/ℓ	picograms per liter
pg/g	picograms per gram
QA/QC	quality assurance and quality control
RI/FS	Remedial Investigation and Feasibility Study
SD	sediment locations
SOPQAM	Standard Operating procedures and Quality Assurance Manual
SVOC	semivolatile organic compound
SW	surface water locations
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCL	target compound list
TEFs	toxicity equivalency factors
TPH	total petroleum hydrocarbons

GLOSSARY (continued)

USEPA	U.S. Environmental Protection Agency
VOCs	volatile organic compounds
VS	Verification Study

ATTACHMENT 4

REFERENCES

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ABB Environmental Services, Inc. (ABB-ES), 1993, Remedial Investigation and Feasibility Study Workplan.

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GLOSSARY (continued)

USEPA	U.S. Environmental Protection Agency
VOCs	volatile organic compounds
VS	Verification Study

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