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NCBC GULFPORT
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CONTINUED PERIODIC MONITORING WORK PLAN NCBC GULFPORT MS

10/12/1999

HARDING LAWSON ASSOCIATES

October 12, 1999

Southern Division
Naval Facilities Engineering Command
ATTN: Arthur Conrad
P.O. Box 190010
2155 Eagle Drive
North Charleston, SC 29418

Dear Mr. Conrad:

SUBJECT: Continued Periodic Monitoring Workplan, Naval Construction Battalion Center (NCBC), Gulfport, Mississippi
Contract No. N62467-89-D0317/150

INTRODUCTION

This Continued Periodic Monitoring Workplan was developed as an extension of the Groundwater Monitoring Report (Harding Lawson Associates [HLA], 1999) to make specific long-term groundwater monitoring recommendations for each of the Installation Restoration (IR) sites at NCBC Gulfport. The focus of both the Groundwater Monitoring Report and this plan is dioxin and chemicals that can significantly impact the fate and transport of dioxin in groundwater. This program was not intended to replace a more comprehensive RI/FS that will investigate additional media (e.g., surface water and surface soil) and additional analytes (e.g., metals).

The Agreed Order (1997) called for periodic long-term monitoring of sites that contained groundwater samples with dioxin levels above action levels. The Continued Periodic Monitoring Plan will not revisit detailed discussions of the data generated during the implementation of the Groundwater Monitoring Workplan (ABB Environmental Services, Inc. [ABB-ES], 1997), but will restate the primary conclusions. In addition, this letter will recommend additional activities at sites where groundwater contamination is above action levels and remains undelineated.

The following paragraphs examine each IR site and present specific recommendations and goals for long-term monitoring. Certain sites are grouped together for brevity if the conclusions and recommendations are similar. Attachment A contains figures discussed in the text, and Attachment B contains Table 1, which lists the monitoring wells recommended for long-term monitoring.

Sites 1, 2, and 3. Downgradient monitoring wells were installed at each of these sites during the Groundwater Monitoring Investigation (see Attachment A, Figure A-1, the potentiometric surface map). Groundwater samples from all the monitoring wells were analyzed for the following constituents:

- SW-846, 8290 dioxins and furans
- SW-846, 8150B chlorinated pesticides
- U.S. Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP), volatile organic compounds (VOCs)
- USEPA CLP, semivolatile organic compounds
- USEPA CLP, organochlorine pesticides

Dioxin levels from the wells at these sites were all significantly below action levels. The action levels used during this investigation were either the maximum contaminant levels (MCLs) established by the USEPA (1996), or the USEPA Region III Risk Based Concentration (RBC) values (USEPA, 1999), if no MCL was established for a given compound. Otherwise, the only compounds detected were pesticides at levels well below action levels.

Given that these sites were all closed prior to the storage and handling of herbicide orange at this base and none of the samples produced compounds above action levels, it is recommended that no further groundwater sampling be collected at Sites 1, 2, or 3 at this time.

Site 4. Two phases of groundwater sampling were completed at Site 4 including 14 direct-push samples and 7 monitoring well samples. Significantly, all samples produced dioxin results below action levels. No tetrachlorodibenzodioxin (TCDD), 2,4-dichlorophenoxyacetic acid (2,4-D), or 2,4,5-trichlorophenoxy-acetic acid (2,4,5-T) were reported, which is a strong indication that herbicide orange was not disposed of at this site.

However, a chlorinated solvent plume was discovered and partially delineated on the southwestern part of the site. The VOC plume included vinyl chloride (up to 65 parts per billion [ppb]), 1,2-dichloroethene (1,2-DCE) (up to 540 ppb), trichloroethene (TCE) (up to 22 ppb), and 1,1,2-trichloroethane (1,1,2-TCA) (at 9 ppb) all of which were above the MCLs established for those chemicals. The VOC plume is in the lower reaches (20 to 35 feet below land surface [bls]) of the surficial aquifer near the local clay layer. In this area the gradient of the surficial aquifer is nearly stagnant, so significant horizontal movement is unlikely. The stronger vertical gradient is not likely to aid the downward migration of contamination significantly deeper due to the presence of the clay layer. The presence of these VOC is likely due to the disposal of chlorinated cleaning compounds reported to have taken place at this landfill. The age of these activities (1966-1972) and the ratios of breakdown chemicals (vinyl chloride) to parent chemicals (1,1,2 TCA) suggest that significant breakdown has taken place.

Based on the two phases of groundwater sampling conducted at Site 4, no continued sampling for herbicide orange or dioxin is recommended. However, the presence of a chlorinated solvent plume was confirmed, and additional activities should be initiated to complete the delineation of this plume. These activities should include the installation of upgradient and downgradient vertical extent wells (Attachment A, Figure A-2) screened on top of the local clay layer. This monitoring well is necessary because of the potential for vertical migration.

Given the apparent amount degradation of the chlorinated solvents plume that has already taken place, the presence of a local clay layer, and the low hydraulic gradient, Site 4 appears to be a good candidate for monitored natural attenuation. It is, therefore, recommended that long-term monitoring at Site 4 follow the USEPA guidance document *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater* (USEPA, 1998). This would determine if monitored natural attenuation as a remedy or remedy component is supported by site-specific data and analysis.

To determine the appropriateness of monitored natural attenuation, the following actions should be taken.

1. A round of groundwater samples from wells 4-12, 4-13, 4-14, 4-15, and the two additional monitoring wells mentioned above analyzed for the following constituents:

    - VOC and SVOC compounds;
    - Dissolved oxygen;
    - Nitrate;
    - Iron (II);
    - Sulfate;
    - Methane;
    - Alkalinity;
    - Oxidation-reduction potential;
    - Dissolved hydrogen;
    - Temperature, pH, and conductivity; and
    - Chloride.

2. Aquifer parameter estimation by conducting three additional slug tests, two short-duration pumping tests, and determining site-specific hydraulic gradient.

3. Perform pre-model calculations and document indicators of natural attenuation.

After these steps are taken, a model simulating natural attenuation would be developed and a Monitored Natural Attenuation Plan is developed.

Site 5. Two phases of groundwater sampling were conducted at Site 5. The sampling included 17 direct-push samples and 8 monitoring well samples. Significantly, no TCDD, 2,4-D, or 2,4,5-T were reported, which is a strong indication that herbicide orange was not disposed of at this site. However, elevated levels of other dioxin congeners were sufficient to elevate the toxicity equivalent (TEQ) to 80.83 parts per

quadrillion (ppq) in GPT-05-14, which is well above the MCL of 30 ppq. These congeners are consistent with the incineration of chlorinated solvents.

Two additional wells south and west of GPT-05-14 (Attachment A, Figure A-3) are necessary to delineate this dioxin-contaminated groundwater. These additional wells are especially important due to the proximity of this contamination to the family housing projects.

It is recommended that continued periodic monitoring include the sampling of the two additional monitoring wells and GPT-05-13 and GPT-05-14 twice a year for 3 years or until the initiation of Groundwater Remediation Workplan activities, whichever is sooner.

Site 7. Groundwater Monitoring Investigation activities at Site 7 only included the installation and sampling of one downgradient well GPT-07-01 (Attachment A, Figure A-4). However, this sample produced a TEQ of 51.6 ppq, not including an estimated TCDD result of 25.4 ppq. The sample result was above the MCL of 30 ppq, and the presence of TCDD is a concern as it may be an indication of herbicide orange or pentachlorophenol disposal.

It is recommended that the two wells physically located on Site 7 (GPT-07-01 and GPT-02-03) be resampled to confirm the presence of TCDD. Concurrently, a focused geophysical study of Site 7 should be conducted to delineate the individual disposal cells to guide a small (8- to 12-sample) direct-push study to determine the extent of dioxin-contaminated groundwater at the site. Finally, two to three additional wells would be required to monitor groundwater conditions using the same schedule as outlined for Site 5. Following the completion of these activities, an addendum letter for Site 7 will be added to the Continued Periodic Monitoring Plan that identifies the specific monitoring wells to be sampled.

Site 8. Dioxin contamination in the groundwater at Site 8 has been fully delineated. During the Groundwater Investigation, 24 direct-push samples were collected and 10 additional wells were installed. Interestingly, a groundwater drainage divide exists at Site 8 along the 8A and 8B boundary that trends northeast-southwest. To assess downgradient groundwater conditions, monitoring wells were installed with an even distribution around Site 8 (Attachment A, Figure A-5).

It is recommended that continued monitoring of Site 8 include semiannual sampling of four monitoring wells (GPT-08-06, GPT-08-07, GPT-08-09, and GPT-08-13) for 3 years or until the initiation of Groundwater Remediation Activities.

CONCLUSIONS

The recommendations included in this Continued Periodic Monitoring Plan are intended to meet the requirements outlined in the Agreed Order (No. 3466-97) by confirming and monitoring dioxin-contaminated groundwater above action levels until the Groundwater Remediation Workplan (also required by the Agreed Order) can be generated and initiated.

The recommendations for activities related to the chlorinated solvent plume at Site 4 are included so that action on this groundwater contamination can take place as early and efficiently as possible.

Sincerely,

Harding Lawson Associates

Robert Fisher, P.G.
Technical Lead

Penny Baxter, P.G.
Project Manager

cc: Gordon Crane, NCBC Gulfport

[02540-]

Attachments:

Attachment A: Figures
Attachment B: Table
Attachment C: Glossary
Attachment D: References

ATTACHMENT A

FIGURES

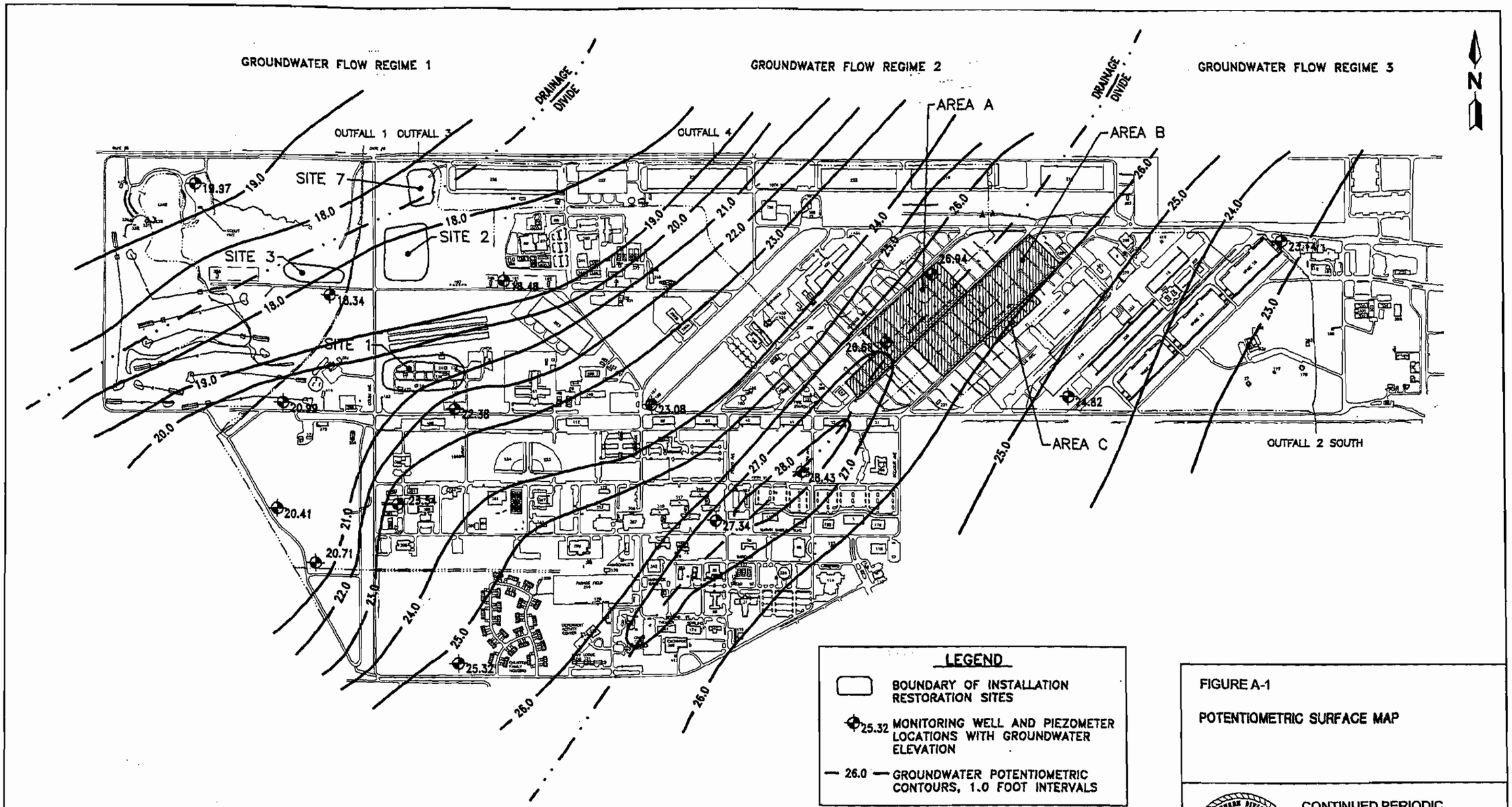
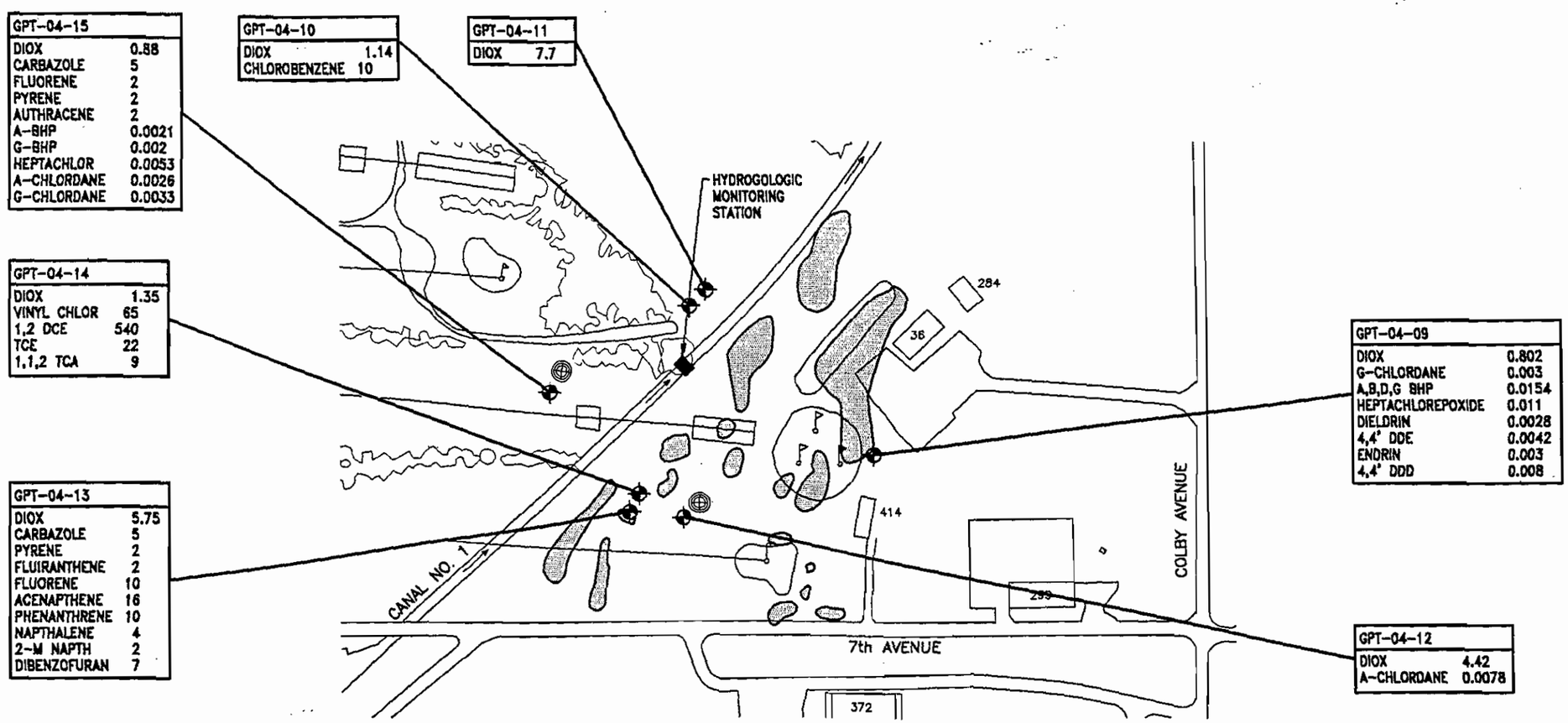


FIGURE A-1

POTENTIOMETRIC SURFACE MAP

CONTINUED PERIODIC MONITORING PLAN

NAVAL CONSTRUCTION BATALLION CENTER GULFPORT, MISSISSIPPI



LEGEND

- EXISTING MONITORING WELL
- PROPOSED MONITORING WELL
- MAGNETIC ANOMALY

NOTE

DIOXIN RESULTS ARE SHOWN IN ppq (PARTS PER QUADRILLION). ALL OTHER RESULTS ARE IN ppb (PARTS PER BILLION).

0 100 200
SCALE: 1" = 200'

FIGURE A-2

PHASE II SAMPLE LOCATIONS AND RESULTS AT SITE 4

CONTINUED PERIODIC MONITORING PLAN

NAVAL CONSTRUCTION BATALLION CENTER GULFPORT, MISSISSIPPI

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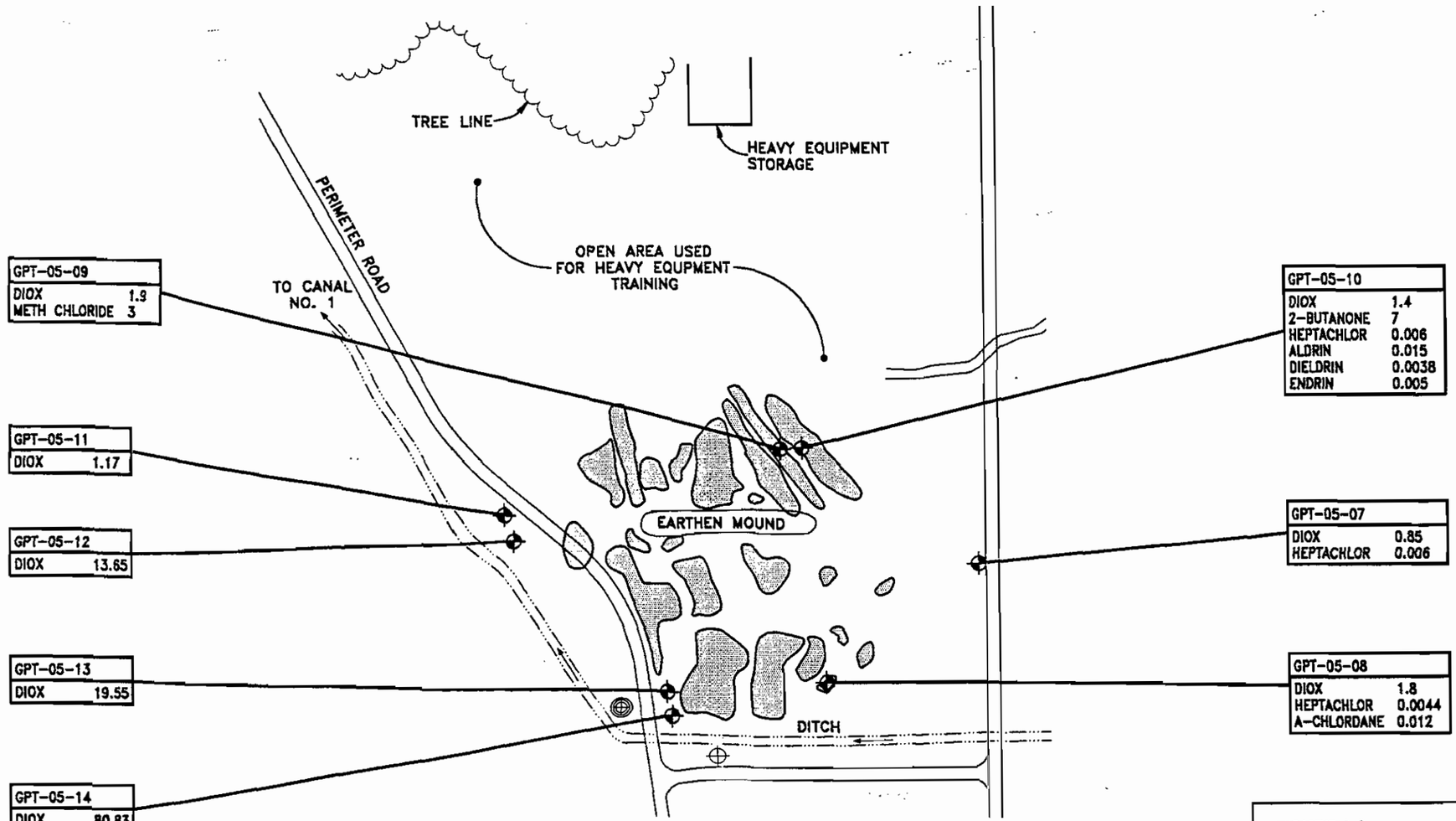

LEGEND

- EXISTING MONITORING WELL
- PROPOSED MONITORING WELL
- MAGNETIC ANOMALY

NOTE

DIOXIN RESULTS ARE SHOWN IN ppq (PARTS PER QUADRILLION). ALL OTHER RESULTS ARE IN ppb (PARTS PER BILLION).

0 100 200
SCALE: 1" = 200'

FIGURE A-3

PHASE II SAMPLING LOCATIONS AND RESULTS AT SITE 5

CONTINUED PERIODIC MONITORING PLAN
NAVAL CONSTRUCTION BATALLION CENTER
GULFPORT, MISSISSIPPI

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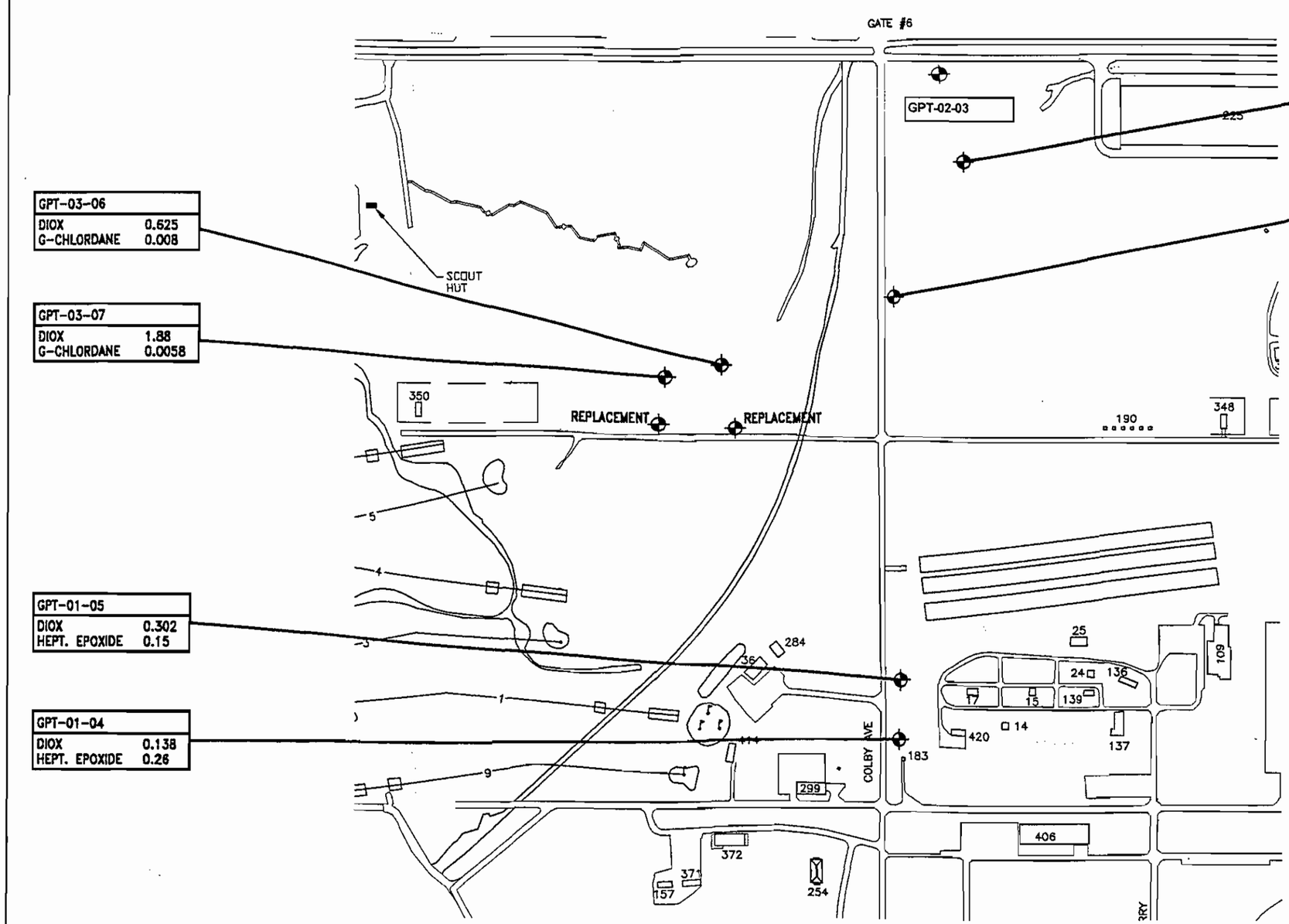


N

LEGEND

MONITORING WELL

NOTE

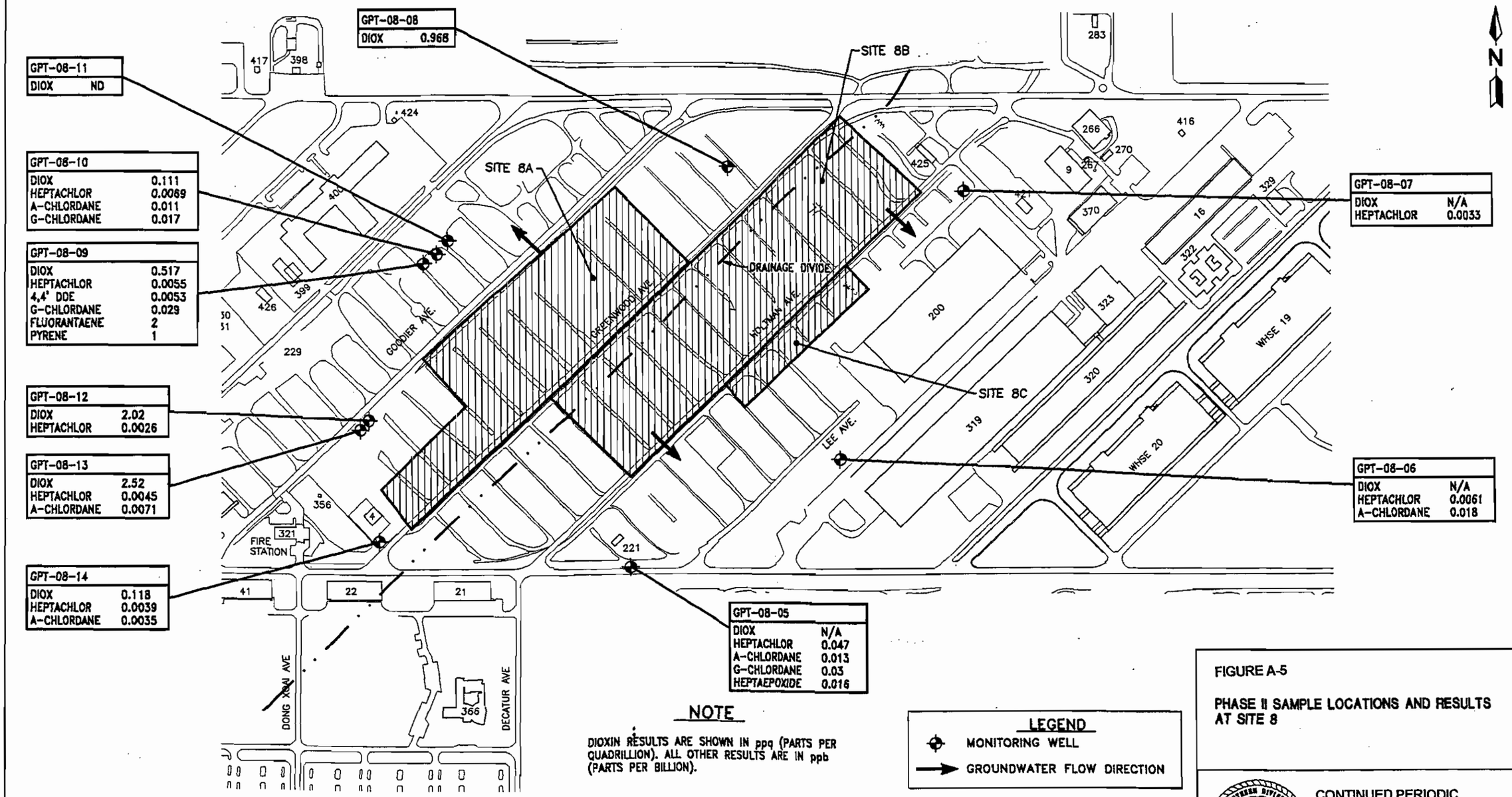
DIOXIN RESULTS ARE SHOWN IN ppq (PARTS PER QUADRILLION). ALL OTHER RESULTS ARE IN ppb (PARTS PER BILLION).

FIGURE A-4

PHASE II SAMPLE LOCATIONS AND RESULTS AT SITES 1, 2, 3 AND 7

CONTINUED PERIODIC MONITORING PLAN

NAVAL CONSTRUCTION BATALLION CENTER GULFPORT, MISSISSIPPI



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NOTE

DIOXIN RESULTS ARE SHOWN IN ppq (PARTS PER QUADRILLION). ALL OTHER RESULTS ARE IN ppb (PARTS PER BILLION).

LEGEND

- MONITORING WELL
- GROUNDWATER FLOW DIRECTION

FIGURE A-5

PHASE II SAMPLE LOCATIONS AND RESULTS AT SITE 8

CONTINUED PERIODIC MONITORING PLAN

NAVAL CONSTRUCTION BATALLION CENTER GULFPORT, MISSISSIPPI

ATTACHMENT B

TABLE

Table 1
Long-term Monitoring Wells Recommendations

Continued Periodic Monitoring Plan
Naval Construction Battalion Center
Gulfport, Mississippi

Site	Monitoring Wells	Analytes	Frequency
Site 4	4-12 4-13 4-14 4-15 4-16* 4-17*	VOC SVOC Dissolvable oxygen Nitrate Chloride Iron Sulfate Methane Alkalinity Redox Temperature pH Conduit	Once, as part of monitored natural attenuation.
Site 5	5-13 5-14 5-15* 5-16*	Dioxins VOC Pesticides	Twice annually for 3 years or until initiation of groundwater remediation.
Site 7	2-3 7-1	Dioxins VOC	Once, as part of delineation activities at site 7. Followed by addendum for continuous monitoring.
Site 8	8-6 8-7 8-9 8-13	Dioxins, VOC	Twice annually for 3 years or until initiation of groundwater remediation.

* Proposed well.

Notes: VOC = volatile organic compound.
SVOC = semivolatile organic compound.
Redox = oxidation-reduction potential.

ATTACHMENT C

GLOSSARY

GLOSSARY

bls	below land surface
CLP	Contract Laboratory Program
2,4-D	2,4-dichlorophenoxyacetic acid
1,2-DCE	1,2-dichloroethene
IR	Installation Restoration
MCL	maximum contaminant level
NCBC	Naval Construction Battalion Center
ppb	parts per billion
ppq	parts per quadrillion
RBC	Risk Based Concentration
RI/FS	Remedial Investigation and Feasibility Study
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
1,1,2-TCA	1,1,2-trichloroethane
TCDD	tetrachlorodibenzodioxin
TCE	trichloroethene
TEQ	toxicity equivalent
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

ATTACHMENT D

REFERENCES

REFERENCES

ABB Environmental Services, Inc. 1997. *Groundwater Monitoring Workplan, NCBC, Gulfport, Mississippi*. Prepared for SOUTHNAVFAC-ENGCOM. Contract No. N62467-89-D-0317/128 (November).

Harding Lawson Associates. 1999. *Groundwater Monitoring Report, NCBC Gulfport, Mississippi*. Prepared for SOUTHNAVFACENGCOM. Contract No. N62467-89-D-0317.

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USEPA. 1999. Risk-*Based Concentration Table*. USEPA Region III, Philadelphia, PA. www.epa.gov/reg3hwmd/ risk/riskmenu.htm (April 12).

USEPA. 1998. *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater*.