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Round 2 Summary Report

for

Denitrification-Based Biodegradation Pilot Test Navy Exchange Service Station

Naval Air Station Brunswick, Maine

Naval Facilities Engineering Command Mid-Atlantic

Contract Number N62472-03-D-0057
Contract Task Order 14

May 2007

TETRA TECH

TETRA TECH

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Project Number GN4590

Mr. Lonnie Monaco
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Reference: CLEAN Contract No. N62472-03-D-0057
Contract Task Order (CTO) No. 14

Subject: Round 1 and Round 2 Summary Reports
Navy Exchange Service Station
Naval Air Station, Brunswick, Maine

Dear Mr. Monaco:

As discussed during the May 15, 2007 telephone conference call, I have submitted copies of the Round 1 and Round 2 Summary Reports for Denitrification-Based Biodegradation at the Navy Exchange Service Station to the list shown below. Both reports were prepared as final documents. I have also placed a copy of each document on our FTP Site if someone needs a digital version.

Please contact me at (978) 474-8431 if you have any questions.

Very truly yours,

Arnold Ostrofsky

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ROUND 2 SUMMARY REPORT

FOR

DENITRIFICATION-BASED BIODEGRADATION
PILOT TEST
NAVY EXCHANGE SERVICE STATION

NAVAL AIR STATION
BRUNSWICK, MAINE

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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1.0 INTRODUCTION

Tetra Tech NUS, Inc. (TtNUS) has prepared this summary report for the Navy Exchange (NEX) Service Station Site located at the Naval Air Station (NAS) in Brunswick, Maine (Figures 1-1 and 1-2). This report was prepared for the United States Navy (Navy) Engineering Field Activity Northeast Naval Facilities Engineering Command under Contract Number N62472-03-D-0057, Contract Task Order 014. The purpose of this report is to summarize the results of the Round 2 field and sampling activities completed during October 2005. The field activities were performed in accordance with the *Final Work Plan for Denitrification-Based Biodegradation Pilot Test* (TtNUS, November 2004).

1.1 PILOT TEST OBJECTIVE

The objective of the pilot test is to assess the effectiveness of the Geovation Technologies, Inc.'s (Geovation) Denitrification-Based Biodegradation (DBB) process to mitigate sorbed-phase petroleum hydrocarbon contamination in the vicinity of the NEX Service Station. This assessment will be based on whether the site-specific remedial goal of 500 mg/Kg of gasoline range organics (GRO) can be achieved in the saturated soil using the DBB process.

1.2 DENITRIFICATION-BASED BIODEGRADATION PROCESS

Geovation's DBB process involves the application of N-Blend, a proprietary, nitrate-based electron acceptor reagent, into saturated subsurface soils contaminated with gasoline-related petroleum hydrocarbons. The N-Blend reagent stimulates the growth of naturally-occurring denitrification microbes, thereby increasing the rate of biodegradation of the gasoline-related petroleum hydrocarbons.

1.3 PILOT TEST PROGRAM

The pilot test consists of performing baseline monitoring, treating a portion of the residual source area by applying Geovation's N-Blend reagent into selected monitoring wells and mini-wells, performing periodic sampling and analysis, and evaluating the data to assess the DBB process effectiveness. Geovation was subcontracted by TtNUS to perform the baseline monitoring of biogeochemical conditions and molecular analysis, perform additions of the N-Blend reagent into the mini-wells, and assess the status of microbial activity during the pilot test. TtNUS is performing baseline and periodic soil and groundwater sampling to determine whether the 500 mg/Kg GRO treatment goal can be attained through in-situ anaerobic biodegradation using the native microbes present in the pilot test area.

The area being treated for the pilot study is depicted in Figure 1-2. This area is bounded approximately by Burbank Avenue to the north and by the northwestern corner of Building 27 to the south. The test area footprint corresponds to the lower half of one of the two residual source areas delineated during the 2003 investigation.

Because the pilot test involves the stimulation of naturally-occurring microbes in the test area, the growth of the microbiological population is expected to increase gradually, and biodegradation is expected to occur over a period of 12 to 18 months after the initial application of N-Blend. Ten major applications supplemented by four minor additions of N-Blend were planned over an approximate 12-month period to foster the growth of the denitrification microbes and to increase the degradation rate. The actual rates and quantities of reagent added vary from event to event based on field conditions and measurements. The additions are expected to occur over an 18-month period due to low water table conditions encountered during the summer of 2005, which prolonged the reagent addition schedule. Geovation periodically monitors various field conditions and determine the application quantities for each event. Prior to the Round 2 sampling event, the nitrate reagent was applied in October, November, and December 2004, and during January, April, June, July, August, and September of 2005. Sub-freezing conditions during March 2005 prevented applications of N-Blend. Because microbial communities develop (reproduce) gradually, application of nutrients over an extended period allows the applied nitrate to be utilized by the microbes rather than migrating out of the pilot test area.

Based on the delineation of contaminant extent, N-Blend was dispersed into some of the 17 addition wells (DB-01 to DB-17) installed in September 2004, three existing air sparging wells (AS-6, AS-7, and AS-8), various existing monitoring wells, two mini-wells (DB19 and DB-19) installed during March 2005, and several monitoring wells located upgradient of the pilot test area to distribute the reagent into the test portion of the residual source area.

Baseline and periodic sampling of soil and groundwater, as proposed in the *Final Work Plan for Denitrification-Based Biodegradation Pilot Test* (TtNUS, 2004), have been performed to evaluate the progress of the biodegradation. The three periodic sampling events were planned for an 18-month period, with each periodic event occurring approximately 6 months apart. Results of the 2004 baseline and the first (March 2005) periodic sampling events are presented in Section 1.5 and 1.6, respectively. The Round 2 (October 2005) soil and groundwater sampling results are presented in this summary report. Results of each periodic event are compared with the baseline sampling results to assess the pilot test progress. Because of the modified schedule, Round 3 sampling is planned for July 2006.

1.4 2003 SITE ENVIRONMENTAL CONDITIONS AND STATUS

As a result of past releases of gasoline from corroded fuel lines and the bulk storage of petroleum products associated with the NEX Service Station, soil and groundwater underlying the area spanned by the NEX Service Station and Building 27 were contaminated by petroleum hydrocarbons, specifically the gasoline range organics (GROs). As presented in the *Corrective Action Plan* (EA, 2003), two areas of residual GRO contamination remained in subsurface soil along with two plumes of contaminated groundwater. The areas of GRO-contaminated groundwater (dissolved phase) and soil (sorbed phase) delineated in 2003 are depicted in Figures 1-3 and 1-4, respectively.

Previous efforts to remove petroleum hydrocarbon contaminated soil included: excavation and removal of 440 tons of petroleum product-contaminated soil in 1992; soil vapor extraction/air sparging (SVE/AS) treatment implemented from 1993 through 2003; and a limited in-situ chemical oxidation (ISCO) pilot test performed during 2002. While SVE/AS had been effective in removing some of the petroleum hydrocarbons from subsurface soil, it was ineffective in addressing the sorbed-phase mass present in the saturated overburden materials present in the area between the NEX Service Station and Building 27. Application of ISCO resulted in the unwanted partial mobilization of sorbed-phase GRO and did not appear to decrease the petroleum hydrocarbons in the saturated soil.

A limited baseline biodegradation evaluation was performed in June 2003 to assess site-specific biogeochemical conditions. The results of the study indicated that anaerobic and reducing conditions were dominant within the plume, that microbial populations were discernable in the source areas, and that the presence of ammonium indicated that anaerobic processes via denitrification were occurring. These conditions favored the anaerobic degradation of the petroleum hydrocarbons through the denitrification process. As a result, denitrification-based biodegradation was evaluated in the *Focused Feasibility Study* (EA 2004) and presented in the *Corrective Action Plan* (EA 2004) as the recommended remedial action. With the acceptance of the *Corrective Action Plan* by the Maine Department of Environmental Protection (MADEP), Navy designed the pilot test program to evaluate the effectiveness of the denitrification-based biodegradation of gasoline petroleum hydrocarbons.

1.5 2004 BASELINE ENVIRONMENTAL CONDITIONS

In preparation for the initiation of the in-situ biodegradation pilot test, baseline sampling and chemical analysis of groundwater and soil samples were completed during August and September 2004. Results of the baseline GRO concentrations in groundwater and soil are presented in the *Baseline Summary Report for Denitrification-Based Biodegradation Pilot Test* (TtNUS, 2005). Interpreted distributions of baseline

groundwater GRO, groundwater BTEX (benzene, toluene, ethylbenzene, and xylenes), and soil GRO extent are depicted in Figures 1-5 through 1-7, respectively.

Comparison of the baseline 2004 (Figure 1-5) and 2003 (Figure 1-3) GRO groundwater results indicated that the delineated extents of the GRO plume were comparable during the two sampling events. Dissolved-phase GRO concentrations of up to 28 mg/L were detected in the pilot test area during the baseline event. The 2004 data indicated that only low concentrations of methyl tert-butyl ether (MTBE) were detected in a few samples. MTBE did not appear to be a significant contaminant.

However, the interpreted extent of GRO-contaminated soil (exceeding 500 mg/Kg) appeared to be greater in the 2003 delineation (Figure 1-4) than in the baseline 2004 delineation (Figure 1-7). It is likely that heterogeneity in the soil stratigraphy and in the distribution of petroleum hydrocarbons account for some of the disparity.

To assess the types of organic compounds present in the petroleum hydrocarbons, four soil samples from the 2004 baseline sampling event were analyzed using the Massachusetts volatile petroleum hydrocarbon (VPH) method, which provided for the analysis of aromatics in the C9 - C10 range and aliphatics in the C5 - C8 and C9 - C12 ranges. Also, the VPH method provides identification of specific aromatic compounds (benzene, ethylbenzene, naphthalene, toluene, m&p-xylenes, and o-xylene) and MTBE. Based on the utility of the information provided for aromatic and aliphatic petroleum hydrocarbons, the VPH analytical method was recommended for use during the subsequent periodic sampling events.

A set of existing monitoring wells in the pilot test area were sampled during August 2004 and the samples provided to Geovation for biogeochemical and microbiological analysis to evaluate the status of the microbial populations in the pilot test area and assess whether bioaugmentation was needed support the pilot study. The evaluations are presented in the *Baseline Microbiological and Biogeochemical Assessment Letter Report* (Geovation, 2004).

Based on the microbiological data, Geovation concluded that there was an abundance of anaerobic microorganisms present in the pilot test area using epi-fluorescent light microscopy. Genetic sequencing using denaturing gradient gel electrophoresis (DGGE) analysis identified a diverse consortia of microbes (bacteria, fungi, and archaea), and the presence of denitrifyers and hydrocarbon-degrading bacteria and fungi. Further, the polymerase chain reaction (PCR) analysis identified the presence of the benzyl succinate synthase (BssA) gene, which is associated with anaerobic, aromatic-hydrocarbon degrading bacteria. The data, taken as a whole, indicated the presence of an abundant microbial community capable of denitrification and degradation of aromatic hydrocarbons.

The geochemical data indicated that favorable anaerobic and reducing conditions existed in the plume and that the distribution of nitrogen species (nitrate, nitrite, and ammonium) and phosphates indicated ongoing denitrification.

Because of the abundance of the microbial population at the pilot test site and the already favorable anaerobic conditions, Geovation concluded that bioaugmentation (addition of microbes) was not required to support the pilot test.

1.6 ROUND 1 ENVIRONMENTAL CONDITIONS

The first periodic sampling event (Round 1) was completed during March 2005, and the results are presented in the *Round 1 Summary Report* (TtNUS, 2005). Round 1 represented conditions approximately 5 months after the initiation of N-Blend additions during October 2004. Selected boring locations and depth intervals were targeted for the Round 1 sampling to provide comparison with the 2004 baseline results. Monitoring wells were selected for sampling to provide a representative distribution in the plume. The interpreted extent of groundwater GRO and the distributions of VPH aromatics and VPH aliphatics are depicted in Figures 1-8 through 1-10, respectively. The interpreted extent of soil GRO and the distribution of VPH aromatics and VPH aliphatics are depicted in Figures 1-11 through 1-13, respectively. Based on the Round 1 sampling program, the following conclusions were reached:

Groundwater Contamination

- The extent of the interpreted GRO plumes during the baseline (2004) and Round 1 (March 2005) sampling events were approximately the same. Groundwater GRO concentrations were generally comparable as well.

- The baseline and Round 1 plume extents and concentrations were also comparable to those observed previously during 2003 (post in-situ chemical oxidation pilot test).

- Based on available Round 1 data, there did not appear to be discernible changes in GRO concentrations that could be attributable to the denitrification-based biodegradation. However, stimulation of microbial population growth and increasing the biodegradation processes would require time because this is a biological system and growth is non-linear.

- The sum of VPH aromatic concentrations was approximately twice as high as the sum of VPH aliphatics. These results indicated that the aromatic hydrocarbons were predominant in the dissolved phase.

- The primary contributors to the total VPH aromatic in groundwater consisted of xylenes (total), toluene, and ethylbenzene. Benzene, which is a carcinogenic compound, was not detected in any sample. MTBE was only detected at low concentration in one sample.

Soil Contamination

- The interpreted extent of GRO-contaminated saturated soil in Round 1 (March 2005) appeared to be comparable to the interpreted baseline extent (2004). Both interpreted extents of contamination exceeding the 500 mg/Kg clean-up goal were smaller than the previously identified extent in 2003.

- The areal extent of the GRO contamination exceeding the site-specific 500 mg/Kg GRO cleanup goal was limited to the area bounded approximately by DB-18, DB-05, DB-15, and DP-9.

- The sum of VPH aromatic concentrations was generally equal to the sum of aliphatic concentrations for highly-contaminated soil samples, indicating that the saturated soil within the pilot test area appeared to be contaminated almost equally by aromatics and aliphatics.

- Neither benzene nor MTBE was detected in any of the Round 1 soil samples.

- For soil samples with elevated GRO or total VPH concentrations, the detected targeted aromatic analytes (comprising ethylbenzene, naphthalene, toluene, xylenes) represent between 9 and 35 percent of the total aromatic hydrocarbon presence. These results indicate using only BTEX data will provide an inaccurate assessment of aromatic petroleum hydrocarbons.

Microbial Population

By June 2005, Geovation had completed one dispersion test and six N-Blend addition events. Geovation's approach was to gradually increase the nitrate doses for each successive application, resulting in the increase of desirable microbial populations, and the efficient consumption of the nitrate within the test area. Groundwater samples were collected and analyzed by Geovation for microbial and geochemical parameters. Results of Geovation's evaluations are presented in the *Microbiological and Biogeochemical Assessment Progress Report* (Geovation, October 2005), submitted previously under separate cover, and are summarized below.

Using epi-fluorescent light microscopy, Geovation quantified the microbial populations and determined that the microbial population in the vicinity of Line 1 had increased between the baseline event (August

2004) and June 2005. Maximum cell count in the plume increased from 1.03 x 10^7 cells/mL to 4.74 x 10^7 cells/mL.

Using denaturing gradient gel electrophoresis (DGGE) analysis, samples were analyzed to identify bacterial, archaeal, and fungal DNA through gene sequencing. Results indicated that the microbial community became less diverse over time in response to N-Blend treatment. Prior to nitrate applications, the microbial consortia consisted of alpha-, beta-, gamma-, and delta- subdivisions of proteobacteria. After treatment, beta-proteobacteria were found to be dominant. The DGGE analysis was supplemented by real-time polymerase chain reaction (rtPCR) to identify the benzyl succinate synthase (BssA) gene, which is affiliated with anaerobic, aromatic hydrocarbon degrading bacteria. The rtPCR determined that there was an increase of three to four orders of magnitude in BssA gene copies relative to the baseline measurements, indicating a substantial increase of microbes capable of anaerobic degradation of aromatic hydrocarbons. The rtPCR also targeted two genes (*nir*S and *nir*K) associated with respiratory nitrate reduction. The rtPCR identified an approximate five-fold increase in total *nir*S and *nir*K between the baseline and April 2005.

Key nitrogen species (nitrate, nitrite, and ammonium) and phosphate species (orthophosphate, complex phosphate) indicated good dispersion of the N-Blend reagent throughout the test area. Increases in nitrite and decreases in ammonium concentrations indicated robust denitrification activity.

With the microbiological and geochemical data taken as a whole, the results indicated that the microbial population had increased, had become less diverse, and was dominated by bacteria capable of anaerobic denitrification.

1.7 MODIFICATIONS TO THE PLANNED SCOPE

While the majority of field activities were completed in accordance with the *Final Work Plan for Denitrification-Based Biodegradation Pilot Test* (TtNUS, November 2004), modifications to the planned activities were required in response to changes in investigation conditions.

VPH Analysis – The *Work Plan* specified GRO analysis of soil and groundwater samples. Based on previous communications with the MEDEP, analysis for Volatile Petroleum Hydrocarbons (VPH) for four samples was added to the baseline event. Because of the utility of the information provided (aromatics, aliphatics and targeted compounds), VPH was retained for future sampling events. During Round 1, paired GRO and VPH analysis were performed, with good correlation of the results. Also, the VPH analysis allowed for a more detailed evaluation of the types of hydrocarbons that may be degraded by the

denitrification process. Paired GRO and VPH analysis was selected for both the Round 2 and Round 3 sampling events.

The Massachusetts VPH Method 04-1 (May 2004, rev. 1.1) provides for the identification of ranges of aromatic and aliphatic hydrocarbons, targeted analytes (benzene, ethylbenzene, naphthalene, toluene, m&p-xylenes, and o-xylene) and MTBE. The VPH method provides characterization of hydrocarbon ranges while the GRO method provides a total value for all organic compounds within the gasoline range.

Nitrate and Nitrite Analysis - Groundwater samples were originally planned for analysis of ammonium (a biodegradation waste product), as evidence of microbial activity. Upon further discussion between Geovation and TtNUS, it was determined that nitrate and nitrite analysis would be more useful to Geovation during the periodic sampling events to evaluate aquifer conditions. The MEDEP was notified of the proposed change in chemical analysis, and concurrence was provided for the modification (per electronic mail of March 16, 2005).

Nitrate Reagent Applications – As proposed in the *Work Plan*, it was intended that some of the mini-wells would not be used for reagent addition. These locations would be useful in assessing whether the denitrification process could expand beyond the immediate vicinity of the application wells. However, as the pilot test progressed, it was necessary to use all the mini-wells to apply the N-Blend reagent at one time or another. Therefore, it may be necessary to advance new borings during Round 3 to evaluate the pilot test biodegradation effectiveness in areas that were not subject to direct applications of reagent.

Another refinement of the reagent application was required. Because of the relatively high groundwater velocities and the need to minimize offsite migration of the nitrate reagent, Geovation determined that application of reagent into the upgradient portion of the GRO plume would provide a longer retention time of nitrates in the Line 1 mini-wells, where the highest GRO concentrations occurred. An added benefit from the action is that some of the petroleum hydrocarbons upgradient of the pilot test area will also be treated as part this program.

2.0 FIELD INVESTIGATION ACTIVITIES

Summaries of the field activities completed as part of the Round 2 sampling event are included in this Section. All field activities were completed in accordance with the *Final Work Plan for Denitrification-Based Biodegradation Pilot Test* (TtNUS, November 2004), with the exception of changes noted in Section 1.7.

2.1 GROUNDWATER SAMPLING

Groundwater samples were collected from 12 existing monitoring and mini-wells (MW-DP09, MW-DP13, MW-DB01, MW-DB04, MW-DB07, MW-DB10, MW-DB11, MW-DB14, SDP-5, and MW-300 through MW-302) and one new well (DB-18) from October 17 to 19, 2005. Table 2-1 presents the water levels and elevations in the wells samples. The field measurement of water quality parameters are presented in table 2-2. Table 2-3 presents the sample summary, which lists the samples collected and the analyses performed. The sample log sheets are presented in Appendix A. Table 2-4 presents the well construction summary for wells installed in the pilot test area and the vicinity of the NEX Service Station.

All wells were sampled following the EPA Region 1 procedure, *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells* (EPA SOP No. GW 001), as summarized below:

- Peristaltic pumps and dedicated ¼-inch inner diameter [I.D.] Teflon-lined tubing was used to purge the wells.

- Wells were purged at flow rates between 100 and 400 mL/min to minimize drawdown. The drawdown did not exceed 0.3 feet in any of the wells sampled.

- The water level, pumping rate, turbidity, DO, ORP, specific conductance, temperature, pH, and any other relevant observations were recorded every 3 to 5 minutes. The groundwater parameters were measured using a Horiba U-22 multi-parameter meter along with a separate turbidity meter. Stabilization was considered to be achieved when three consecutive readings, taken at 3- to 5-minute intervals, were within the defined limits. The final readings are presented in Table 2-2.

- Groundwater samples were obtained from the sample tubing filled with water to the sample point and free of air bubbles or air pockets to minimize changes in the water chemistry upon contact with the atmosphere.

A separate sample was collected for each analysis from each monitoring well. Groundwater samples were submitted to Katahdin Analytical Services, Inc. (Katahdin) of Westbrook, Maine for 21-day turnaround analysis of GRO (Maine HETL Method 4.2.17), VPH (MADEP Method 04-1.1), and nitrate/nitrite (EPA Method 353.2). Katahdin is approved by the State of Maine for GRO analysis. Quality assurance/quality control (QA/QC) samples were also collected including field duplicates, rinsate blanks, trip blanks, and laboratory QC samples.

Water level measurements for the wells sampled were converted into elevations and a water table surface map was prepared, as depicted in Figure 2-1. This interpretation is limited by the number of wells sampled.

Table 2-2 presents the summary of field groundwater quality parameters measured prior to the sampling of the wells. Inspection of the table indicates that the dissolved oxygen levels were relatively low (0.4 to 4.7 mg/L, averaging 1.3 mg/L). The oxidation-reduction potential ranged from 145 mV to -112 mV, indicating reducing conditions. These geochemical measurements are consistent with anaerobic and reducing conditions, which favor denitrifying biodegradation processes.

2.2 SOIL SAMPLING

For Round 2, soil samples were collected from the same borehole locations and depth intervals sampled during the Round 1 event. The soil samples were collected within 1 foot south of 13 soil borings (MW-DB01, MW-DB03, MW-DB05, MW-DB08, MW-DB09, MW-DB10, MW-DB12, MW-DB13, MW-DB15, MW-DB17, and MW-300 through MW-302). Previously, during Round 1, soil samples were collected within 1 foot southeast of the selected borings. This approach allowed for collection of undisturbed soil samples that would be representative of subsurface conditions at each borehole location.

Appendix B presents the soil boring logs. For these borings, soil samples were logged from the same intervals identified in the Round 1 sampling event. Soil samples were collected using a 1.5-inch I.D. sampler with a 4-foot disposable plastic liner sleeve. Refer to the *Baseline Summary Report* (TtNUS, February 2005) for the complete soil profiles for these borings.

During the baseline and Round 1 event (for DB-18 and DB-19, only), the TtNUS field geologist determined sample collection depths based on the highest concentration of organic vapors as determined by the photoionization detector (PID) readings, or from portions showing visual or olfactory evidence of petroleum hydrocarbon contamination.

Table 2-3 presents the sample summary, which lists the soil samples collected and the analyses performed.

Yarmouth Environmental Services, Inc. (YES) of Yarmouth, Maine, the TtNUS drilling subcontractor, used a direct-push technology (DPT) rig to advance sleeved samplers into the subsurface. YES retrieved the sleeved samplers, sliced open the acetate sleeves containing the soil cores, and provided the opened samplers to TtNUS. Soil samples were then collected by TtNUS personnel in accordance with TtNUS Standard Operating Procedure (SOP) SA-1.3 as described below. The TtNUS field geologist representative performed the following activities during soil sampling:

- Identified the sample depth interval and collected soils for laboratory analyses.
- Screened each soil sample using a PID.
- Determined the amount of soil sloughed in the top of the sampler.
- Recorded observations for the intervals sampled including: the depth of change in each stratum and any other pertinent visual observations (i.e., discoloration, odors, residual product).
- Decontaminated TtNUS soil sampling equipment prior to each use.

Two sample containers were filled for each sampling location for both GRO and VPH analysis. In order to limit variability between the VPH and GRO analyses due to heterogeneities inherent in soil and between different sub-samples, the analytical laboratory was instructed to use the same sample aliquot for both GRO and VPH analyses. The soil sampling methodology is presented below:

- A pre-tare weighted 40-mL amber VOA vial containing 10 mL of methanol was labeled with the sample location number.
- A grab soil core (about 10 g) was collected with a 10-mL pre-cut syringe. The soil sample was extruded into the 40-mL VOC vial and immersed with 10 mL of methanol.
- The vial was capped and shaken to mix the preservative with the sample.
- The preserved sample was weighed and the value was recorded in the sample collection/ preservation log.

Samples were packed with ice and shipped to Katahdin Analytical at 4 degrees Celsius for chemical analysis.

QA/QC samples were also collected as part of the soil investigation including field duplicates, rinsate (equipment) blanks, laboratory QC samples, and trip blanks. All quality control samples were collected according to the schedules outlined in the *Work Plan*.

All soil samples were identified in accordance with the sample location identification system presented in the *Work Plan*. Soil samples were handled and delivered in accordance with the chain-of-custody procedures detailed in the *Work Plan*. Required data were recorded on the boring logs, which were used

as sample log sheets, including sample device used, sampling personnel, date and time of sample collection, and analyses to be performed.

3.0 SAMPLING RESULTS

The Round 2 soil and groundwater chemical analytical results are presented in this section.

3.1 GROUNDWATER

Table 3-1 presents the Round 2 groundwater analytical results, while Table 3-2 presents a chronological summary of the baseline and periodic sampling data for trend analysis. The interpreted extent of dissolved phase GRO, VPH aromatic hydrocarbons, and VPH aliphatic hydrocarbons in the pilot test area are depicted in Figures 3-1, 3-2, and 3-3, respectively. (Note: concentrations in table 3-2 are presented in units of µg/L while units of mg/L are used in Figures 3-1 through 3-3).

3.1.1 Round 2 Groundwater Contamination

GRO - Groundwater GRO concentrations (Figure 3-1) detected during October 2005 (Round 2) ranged from non-detect (0.10 U µg/L) to 43,000 µg/L (at DB-14). The highest GRO concentrations were detected in the area encompassed approximately between DB-01 and DB-14.

VPH – Total VPH (as sum of aliphatics and aromatics) concentrations are generally in good correlation with the corresponding GRO concentrations, with the exception of DB-01 (20,000 µg/L GRO vs 44,000 µg/L total VPH).

The VPH analytical results were evaluated separately as aromatic and aliphatic hydrocarbons. The purpose of this division is to allow for tracking and evaluation of potential preferential biodegradation effects during the remainder of the pilot test. Changes in VPH aromatics or VPH aliphatics over time may provide insight into the types of petroleum hydrocarbons that can be degraded by the denitrifying bacteria.

The VPH aromatic hydrocarbon concentrations consist of the sum of the C9 – C10 aromatic hydrocarbons and the targeted aromatic analytes (including benzene, ethylbenzene, naphthalene, toluene, m&p-xylenes, and o-xylene). VPH aliphatic concentrations consist of the sum of the C5 - C8 and the C9 – C12 range concentrations.

Based on the Round 2 analytical results, the following may be inferred:

- In general, the highest total VPH contamination in groundwater appears to occur in the vicinity between DB-01 and DB-14, which is within the pilot test area.

- The sum of VPH aromatics ranged from non-detect (100 U µg/L) to 29,100 µg/L (DB-14). The interpreted extent of the VPH aromatics is similar to that of the GRO, and extends from the three storage tanks to the vicinity of MW-301 (Figure 3-2).

- The sum of VPH aliphatics ranged from non-detect (100 U µg/L) to 19,700 µg/L (DB-14). The interpreted extent of the VPH aliphatics is similar to the GRO footprint (Figure 3-3).

- In a number of the samples with detectable petroleum hydrocarbons, the sum of VPH aromatic concentrations were approximately 60 percent higher than sum of VPH aliphatics. These results indicate that the aromatic hydrocarbons are predominant in the dissolved phase.

- For some samples (where the sum of aromatics exceeded 7,000 µg/L), the primary contributors consisted of total xylenes, ethylbenzene, and toluene.

- Neither benzene nor MTBE was detected in any of the Round 2 groundwater samples.

Nitrates/Nitrites – These results, presented in Table 3-1, were provided to Geovation to determine the status of these parameters so that appropriate nitrate reagent doses could be estimated for future additions.

3.1.2 Groundwater Trend Analysis

Trends in the GRO, VPH aromatic, and VPH aliphatic concentrations are presented in the following narrative. Table 3-2 presents the summary of groundwater GRO and VPH results for the baseline and periodic events. Figures 3-1 through 3-3 depict the interpreted extent of Round 2 GRO, VPH aromatics, and VPH aliphatics. Figures 3-4 through 3-6 depict trends for these three parameters for specific monitoring wells.

Summary statistics for the groundwater results (Table 3-2) were used to prepare the “box plots” (Figure 3-7) for concentrations from the baseline event (August 2004) through Round 2 (October 2005). Non-detect values were set equal to 0 for calculation of the statistics. Box plots are used to provide graphical summaries of data including the minimum, first quartile (25th percentile), median (50th percentile), third quartile (75th percentile), and maximum concentrations for the plume during each of the monitoring events. The “box”, bracketed by the first and third quartiles, represents the middle 50 percent of the data set.

The baseline samples were obtained from existing monitoring wells installed before starting the pilot test. Rounds 1 and 2 samples were obtained primarily from new mini-wells (DB-series) situated within the pilot test area.

Evaluation of VPH results is only limited to Rounds 1 and 2 because this analytical method was only included after the baseline event to supplement the GRO analysis.

GRO

The dissolved-phase GRO plume extent for Round 2 (Figure 3-1) was generally comparable in size with the Round 1 (Figure 1-8) and baseline August 2004 (Figure 1-5) footprints, as represented by the 1000 µg/L (1 mg/L) concentration contour interval. However, within the plume, the interpreted 20,000 µg/L and 40,000 µg/L concentration contours were smaller during Round 2 than during the previous sampling events. Decreases in GRO concentrations are evident at most monitoring well locations based on comparison of Round 2 and Round 1 results (Table 3-2) and as graphically depicted in Figure 3-4. The greatest decrease occurred at DB01; GRO declined from 45,000 µg/L to 20,000 µg/L. Increases in GRO, although minor, were noted in several monitoring wells (DB14, MW-DP13, and MW-SDP05).

Review of the box plots, Figure 3-7, indicates that the median GRO concentration increased between the baseline and Round 1, and then decreased between Rounds 1 and 2. The results indicate that groundwater GRO concentrations in the plume have declined.

VPH Aromatics

The dissolved-phase VPH aromatic plume extent for Round 2 (Figure 3-2) was generally comparable in size with the Round 1 footprint (Figure 1-9), as represented by the 1000 µg/L (1 mg/L) concentration contour. However, within the plume, the interpreted 10,000 µg/L (10 mg/L) and 20,000 µg/L (20 mg/L) concentration contours appeared to be smaller during Round 2 than during the previous sampling events. Decreases in VPH aromatic concentrations are evident at most monitoring well locations based on comparison of Round 2 and Round 1 results (Table 3-2) and as graphically depicted in Figure 3-5. Increases in VPH aromatics, although minor, were noted in several monitoring wells (DB14, MW-DP13, and MW-SDP05).

Review of the box plots, Figure 3-7, indicates that the median total VPH aromatic hydrocarbon concentration decreased between Rounds 1 and 2. The size of the “box” (data between the 1st and 3rd quartiles) decreased as well, meaning that there was less spread in the data for the middle 50 percent of the VPH aromatic concentrations. Both the 1st and 3rd quartiles for Round 2 were lower than in Round 1,

indicating a downward trend in the data. These results indicate that groundwater VPH aromatic concentrations in the plume have declined.

VPH Aliphatics

The dissolved-phase VPH aliphatic plume extent for Round 2 (Figure 3-3) was interpreted to be larger than the Round 1 footprint (Figure 1-10), as represented by the 1000 µg/L (1 mg/L) concentration contour. However, within the plume, the interpreted 10,000 µg/L (10 mg/L) concentration contour appeared to be similar in size. Examination of Round 1 data revealed elevated detection limits for some non-detect values (i.e., 5000 U µg/L at DB04, 2000 U µg/L at MW-300, and 10,000 U µg/L at MW-SDP05), which were higher than the detected concentrations for those wells in Round 2. The Round 1 footprint might have been different if the detection limits had been lower and aliphatics were present at or above those lower detection limits.

There were fewer reductions in VPH aliphatic concentrations between Rounds 1 and 2, based on the review of Table 3-2 and as graphically depicted in Figure 3-6. VPH aliphatics appeared to have increased at some wells locations.

Review of the box plots, Figure 3-7, indicates that the median VPH aliphatics hydrocarbon concentration increased slightly between Rounds 1 and 2, in part reflecting more detected values in Round 2. The size of the "box" (data between the 1st and 3rd quartiles) decreased, indicating less spread for the middle 50 percent of the data. . As discussed above, the high detection limits in Round 1 may have prevented the detection of aliphatics at some well locations. Had the detection limits been lower, the box plots depictions would have been different. These results indicate that there have been some decreases in groundwater VPH aliphatic concentrations, but not as many as for the VPH aromatics.

General

Evaluation of the data indicates that groundwater GRO concentrations have declined between Rounds 1 and 2, primarily the result of decreases in the VPH aromatic hydrocarbons. Although there have been some decreases in the VPH aliphatic concentrations, a strong downward trend has not been shown. Based on the observed increases of denitrifying microbial population (as presented in Section 1.6), favorable nitrate/nitrite/ammonium conditions, and favorable geochemical conditions (low dissolved oxygen and reducing conditions), it is reasonable to conclude that biodegradation of gasoline petroleum hydrocarbons is occurring. The data suggest that the aromatic hydrocarbons are more readily degraded than the aliphatic hydrocarbons.

3.2 SOIL

The soil analytical results for GRO and VPH are presented in Table 3-3. Table 3-4 presents a chronological summary of the baseline and periodic data for trend analysis. The interpreted lateral extent of GRO, VPH aromatics, and VPH aliphatics in the pilot test area are presented in Figures 3-8, 3-9, and 3-10, respectively.

3.2.1 Round 2 Soil Contamination

GRO - Soil GRO concentrations (Figure 3-8) detected during the Round 2 event ranged between non-detect (2.5 U mg/Kg) to 6,100 mg/Kg (DB-01, 8-9 ft interval). The areal extent of GRO contamination exceeding the site-specific 500 mg/Kg GRO cleanup goal is limited to the area bounded approximately by DB-18, DB-02, DB-15, and DP-2.

VPH – The soil VPH analytical results were evaluated as aromatic and aliphatic hydrocarbons to assess the types of petroleum hydrocarbons present and to track and evaluate potential preferential biodegradation effects.

Comparison of the total VPH concentrations with corresponding GRO results for the same sample indicates generally good agreement between the numerical values. In some cases, the total VPH was slightly higher; in others, the GRO was higher. These differences are likely the result of differences in the analytical methods. However, by having both the GRO and VPH analysis performed using the extract from the same sample containers, the effect of sample heterogeneity on analytical result has been greatly reduced.

Review of the VPH data for highly contaminated soil samples indicated that the sum of aromatic hydrocarbon concentrations were generally higher than the sum of aliphatic concentrations, which may be primarily due to elevated detection limits for the aliphatics.

The sum of VPH aromatics ranged from non-detect (27 U mg/Kg) to 3000 mg/Kg (DB-01). The interpreted extent of the VPH aromatics is similar to that of the GRO, and extends from the three storage tanks to the vicinity of monitoring well B27-DP2 (Figure 3-9). The October 2005 extent of VPH aromatics was interpreted to be slightly smaller than the GRO extent.

Of the targeted aromatic analytes detected by the VPH method, only xylenes and ethylbenzene were present in the soil samples. MTBE was not detected in any sample.

For soil samples containing elevated GRO or total VPH concentrations (exceeding 500 mg/Kg), the detected targeted aromatic analytes (comprising detected ethylbenzene and xylenes) represent between 0 and 16 percent of the total VPH aromatic hydrocarbon presence.

The sum of VPH aliphatics ranged from non-detect (27 U mg/Kg) to 640 mg/Kg (DB-10). The interpreted extent of the VPH aliphatics (Figure 3-10) is smaller than that of the GRO (Figure 3-8).

In general, the highest total VPH contamination within the pilot test area appears to occur in the vicinity between monitoring well DP-9 and DB-09.

3.2.2 Soil Trend Analysis

Trends in the soil GRO, VPH aromatic, and VPH aliphatic concentrations are presented in the following narrative. Table 3-4 presents the summary of soil GRO and VPH results for the baseline and periodic events. Figures 3-8 through 3-10 depict the interpreted extent of Round 2 GRO, VPH aromatics, and VPH aliphatics. Figures 3-11 through 3-13 depict the GRO trends for specific boring locations. Figures 3-14 and 3-15 depict trends for VPH aromatics and aliphatics for boring locations where either the GRO or VPH values exceeded the 500 mg/Kg goal.

Soil summary statistics (Table 3-4) were used to prepare box plots (Figure 3-16) for concentrations from the baseline event (August 2004) through Round 2 (October 2005). Non-detect values were set equal to 0 for calculation of the statistics.

The baseline and Rounds 1 and 2 samples were obtained from borings co-located with the monitoring and mini-wells.

Evaluation of VPH results is limited to Rounds 1 and 2 because this analytical method was included after the baseline event to supplement the GRO analysis.

GRO

The areal extent of GRO-contaminated soil exceeding the 500 mg/Kg cleanup goal in October 2005 (Figure 3-8) appears to be slightly larger than the 2004 baseline conditions (Figure 1-7), but comparable to the Round 1 conditions (Figure 1-11). However, the core area of GRO contamination decreased between Round 1 (10,000 mg/Kg concentration contour) and Round 2 (5,000 mg/Kg) concentration contour. Maximum concentrations at the core declined from 11,000 mg/Kg to 6,100 mg/Kg at DB01.

Table 3-4 presents a summary of the soil data that tracks GRO and VPH results from the baseline through Round 2 at specific boring and depth intervals. Review of the available data indicates that sorbed GRO concentrations declined between the baseline event and Round 2. GRO at some locations increased slightly, but the greatest changes occurred in samples where elevated GRO concentrations (higher than the target 500 mg/Kg) were detected during the baseline event. GRO concentrations decreased between 33 to 99 percent for these highly contaminated samples (Table 3-4).

Figures 3-11 to 3-13 depict changes in GRO for samples in the three rows of mini-wells (Lines 1 through 3). Lines 1, 2, and 3 are identified in Figure 2-1. Line 1, consisting of DB-01 through DB-08, and DB-18 and DB-19, showed the greatest reductions in GRO between the baseline or Round 1 event and the Round 2 event. Line 2, consisting of DB-09 through DB-12, also experienced a significant decline in GRO at DB-09, the most contaminated location. In Line 3, DB-13 through DB-17, most GRO concentrations remained unchanged. At DB-15, in the 8- to 9-foot interval, GRO increased between Rounds 1 and 2, but still remained below 500 mg/Kg.

Figure 3-16 depicts the box plots for soil GRO between the baseline event (September 2004) and Round 2 (October 2005). Median GRO values increased between the baseline event and Round 1, but declined by Round 2 (Table 3-4). Maximum GRO concentrations also declined during this period. The "boxes", representing data between the 1st and 3rd quartiles, increased in size between the baseline and Round 2, indicating a greater spread in the data despite lowered median and maximum concentrations. Examination of the data indicates that there were more non-detect values in the baseline and Round 1 data than in the Round 2 results, which contained more low concentration results. As a result, the "box" was larger in Round 2 only because more detected (but low GRO) concentrations occurred in the Round 2 data. As a check, the mean (average) GRO concentrations were calculated: baseline – 1333 mg/Kg, Round 1 – 1353 mg/Kg, and Round 2 – 490 mg/Kg.

Overall, the results indicate decreases in GRO concentrations at most sample stations with elevated petroleum hydrocarbon contamination (exceeding 500 mg/Kg) between the baseline and Round 2 events. Based on favorable microbial population counts and geochemical conditions, it is reasonable to conclude that the in-situ biodegradation is effective in decreasing the GRO presence in saturated soil.

VPH Aromatics

The sorbed-phase VPH aromatic extent for Round 2 (Figure 3-9) was larger in size than the Round 1 footprint (Figure 1-12), as represented by the 10 mg/Kg concentration contour. However, Round 1's interpreted 5,000 mg/Kg contour was eliminated by Round 2, which represents a reduction in VPH aromatics mass or presence. Review of Table 3-4 and Figure 3-14 show that the VPH aromatics have declined at all sample stations with elevated petroleum hydrocarbon presence.

Review of the box plots (Figure 3-16) indicates that median VPH aromatic hydrocarbon concentrations decreased between Round 1 (17 mg/Kg) and Round 2 (0 mg/Kg), similar to the GRO box plots for the various sampling events. Maximum VPH aromatic concentrations (Table 3-4) also declined during this period. The "boxes", representing data between the 1st and 3rd quartiles, increased in size between Round 1 and Round 2, indicating a greater spread in the data despite lowered median and maximum concentrations. However, the mean (average) VPH aromatic values dropped from 709 mg/Kg to 609 mg/Kg, which also indicates an overall decrease of the aromatics.

The "box" was larger in Round 2 because more non-detect concentrations occurred in the Round 1 data, which affects the size of the box.

Figures 3-14 depicts trends for VPH aromatics for sample locations where elevated concentrations of contamination (i.e., GRO or VPH exceeding 500 mg/Kg) have been detected. The VPH aromatic concentrations decreased between Rounds 1 and 2 at most sample locations that were evaluated.

Although only four soil samples were analyzed for VPH during the baseline event, aliphatics were detected in all samples while toluene was detected in one sample. During Round 1, the targeted aromatic analytes detected included ethylbenzene, naphthalene, toluene, and total xylenes. During Round 2, only xylenes and ethylbenzene were detected. Possible explanations for variability in detected petroleum hydrocarbon presence include: 1) VPH aromatics are more readily degraded through anaerobic denitrifying processes, 2) petroleum hydrocarbons are continuing to enter into the pilot test area from upgradient locations, and 3) heterogeneities occur in the soil collected from the same boring locations.

For soil samples containing elevated GRO or total VPH concentrations (exceeding 500 mg/Kg), the targeted aromatic analytes (consisting of detected ethylbenzene and xylenes) represent between 0 and 16 percent of the total aromatic hydrocarbon presence. Previously during Round 1, the targeted aromatic analytes represented between 9 and 35 percent of the total VPH aromatic hydrocarbon presence. These results indicate that the classic "BTEX" hydrocarbons are capable of being biodegraded by the denitrifying microbes.

VPH Aliphatics

The sorbed-phase VPH aliphatic extent for Round 2 (Figure 3-10) was larger in size than the Round 1 footprint (Figure 1-13), as represented by the 1 mg/Kg concentration contour. However, Round 1's interpreted 5,000 mg/Kg contour was eliminated by Round 2, which represents a reduction in VPH aliphatics mass or presence.

Review of Table 3-4 and Figure 3-15 show that the VPH aliphatics have declined in most sample stations with elevated petroleum hydrocarbon presence (except DB-19). The results indicated that VPH aliphatic concentrations decreased in the same samples as did the VPH aromatics. These interim results suggest that both the aliphatics and aromatics are being degraded similarly by the microbes.

Review of the box plots, Figure 3-16, indicates that median VPH aliphatic hydrocarbon concentrations decreased between Rounds 1 (28 mg/Kg) and 2 (0 mg/Kg), similar to the GRO box plots for the various sampling events. Maximum VPH aliphatic concentrations (Table 3-4) also declined during this period. The "box", representing 50 percent of the aliphatic data between the 1st and 3rd quartiles, decreased in size between the baseline and Round 2, indicating an overall decrease in aliphatic concentrations.

General

Evaluation of the data indicates that soil GRO concentrations have declined between Rounds 1 and 2 as the result of decreases in both the VPH aromatic and aliphatic hydrocarbons. Based on the observed increases of denitrifying microbial population (as presented in Section 1.6) and favorable geochemical conditions, it is reasonable to conclude that biodegradation of gasoline petroleum hydrocarbons is occurring in the soil. In soil, unlike groundwater, the data suggest that the both aromatic and aliphatic hydrocarbons are being equally degraded.

Review of Figures 3-11 and 3-12 indicate that GRO at elevated concentrations could be decreased by denitrification to below the 500 mg/Kg remediation goal. At two sample locations, the remediation goal was achieved: GRO concentrations at DB03-1011 (8,800 mg/Kg – Round 1) and DB05-0809 (5,300 mg/Kg - Round 1) to 120 mg/Kg and 370 mg/Kg, respectively.

Although the 500 mg/Kg goal has been attained in portions of the test area, this goal may not have been attained for the other portions, which may be attributed to one or more of the following factors:

- baseline petroleum hydrocarbon concentrations were higher,
- insufficient nitrate reagent was added,
- more time is required allow biodegradation processes to be completed, or
- biodegradation processes are forming intermediary compounds that are still undergoing degradation, but are still being detected as GRO, aromatics, or aliphatics.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 CONCLUSIONS

Based on the Round 2 sampling program, the following conclusions were reached:

Groundwater Contamination

- The interpreted GRO plume extents for the baseline (2004), Round 1 (March 2005), and Round 2 (October 2005) sampling events were approximately the same. However, GRO concentrations in the plume core decreased by Round 2.

- Maximum and median GRO concentrations decreased between the baseline and Round 2 sampling events, which represent decreases in GRO mass.

- The microbiological assessment performed in July 2005 indicated that the microbial population had increased and geochemical conditions favored denitrifying processes as the result of the reagent applications.

- Based on the evaluation of microbiological and geochemical factors, and on quantifiable decreases in groundwater GRO concentrations, it is reasonable to conclude that denitrification-based biodegradation is on-going and effective.

- In a number of the samples with detectable petroleum hydrocarbons, the total VPH aromatic concentrations were approximately 60 percent higher than the total VPH aliphatics. These results indicate that the aromatic hydrocarbons are predominant in the dissolved phase.

- For some samples (where the sum of aromatics exceeded 7,000 µg/L), the primary contributors consisted of total xylenes, ethylbenzene, and toluene.

- Neither benzene nor MTBE was detected in any of the Round 2 groundwater samples.

- MTBE was detected in one sample at low concentration only during Round 1. The elimination of MTBE cannot be attributed to biodegradation. MTBE is highly miscible in water and it is likely that advection in the plume is the principal mechanism for MTBE dissipation.

- Review of the available data suggests that the aromatic hydrocarbons are more readily degraded than the aliphatic hydrocarbons by the denitrifying microbes. Possible factors may be that the VPH aromatics are generally more water soluble and have lower molecular weights than the aliphatics, which could allow for better degradation.

Soil Contamination

- The areal extent of GRO-contaminated soil exceeding the 500 mg/Kg cleanup goal during Round 2 appeared to be slightly larger than the baseline conditions, but was comparable to Round 1 conditions.

- The core area of GRO contamination decreased between Round 1 (10,000 mg/Kg concentration contour) to Round 2 (5,000 mg/Kg concentration contour). Maximum concentrations at the core declined from 11,000 mg/Kg to 6,100 mg/Kg.

- The areal extent of the GRO contamination exceeding the site-specific 500 mg/Kg GRO cleanup goal is limited to the area bounded approximately by DB-18, DP-3, DB-11, and DB-15.

- Review of the VPH data for highly contaminated soil samples indicated that the sum of aromatic hydrocarbon concentrations was generally higher comparable to the sum of aliphatic concentrations.

- Of the targeted analytes, ethylbenzene and xylenes were detected in Round 2, in contrast with Round 1 when toluene was also detected.

- For soil samples containing elevated GRO or total VPH concentrations (exceeding 500 mg/Kg), the targeted aromatic analytes (consisting of detected ethylbenzene and xylenes) represent between 0 and 16 percent of the total aromatic hydrocarbon presence. Previously during Round 1, targeted aromatic analytes represented between 9 and 35 percent of the total VPH aromatic hydrocarbon presence. These results indicate that denitrifying microbes are capable of degrading the “BTEX” hydrocarbons.

- Available data indicate that VPH aromatics and aliphatics decreased between the Round 1 and Round 2 sampling events. Both aromatic aliphatic hydrocarbons appear to be readily degraded.

- Based on the evaluation of microbiological and geochemical factors, and quantifiable decreases in soil GRO concentrations (and VPH aromatics and aliphatics), it is reasonable to conclude that denitrification-based biodegradation is on-going and effective.

- The remediation goal of 500 mg/Kg of GRO appears to be achievable, as demonstrated by comparing Rounds 1 and 2 data for two sample locations with elevated GRO presence.

Analytical Methods

- The use of the same soil sample aliquot for paired GRO and VPH analysis resulted in generally very good correlation between the two data sets. Heterogeneity in the sample matrix and contaminant distribution is minimized by obtaining the methanol extract from the same sample container for both analyses.

- Some variations between GRO and total VPH results are expected because different analytical methods were used.

4.2 RECOMMENDATIONS

Based on the Round 2 findings, these recommendations are proposed for the Round 3 sampling event:

Pilot Test

- The same monitoring wells and borings sampled during Rounds 1 and 2 will be resampled during Round 3 so that comparable data are developed and trends in petroleum hydrocarbon degradation can be monitored and evaluated.

- As presented in Section 1.7, all mini-wells have been used for nitrate applications. Therefore no borings remain that can be used as controls to evaluate biodegradation effects where reagent was not directly applied. Therefore, it is recommended that additional borings be advanced midway between Lines 1 and 2 (2 borings), and midway between Lines 2 and 3 (2 borings) to evaluate treatment effectiveness. Soil samples from these new borings will be submitted for analysis of GRO and VPH.

- Remaining N-Blend applications will be targeted for the period when the water table is expected to be high so that residual petroleum hydrocarbon present in the vadose zone can also be treated. The proposed application period will occur during March through April 2006.

Soil Analysis

- Based on the results of the sampling events, paired GRO and VPH analyses should continue to be used to identify volatile petroleum hydrocarbons presence.

- Because GRO and VPH analyses will be performed to compare analytical results, the analyses should continue to be performed using only one sub-sample vial rather than collecting two distinct grab samples, which may lead to variability in soil contaminant concentrations.

- To better assess the degradation of the petroleum hydrocarbons, it is recommended that a few samples be collected and analyzed for VOCs (including the Tentatively Identified Compounds) using EPA Method 8260B to compare with baseline VOCs analytical results. These results will provide useful information in assessing the types of petroleum hydrocarbons that undergo degradation better under denitrifying conditions. The data may also be useful in assessing whether intermediate compounds are being formed that could affect the GRO results.

Next Periodic Sampling Event

- The next sampling event was originally scheduled for the March 2006. However, the pilot test program duration will need to be extended so that the remaining N-Blend may be applied during March through April 2006, when the water table is high, to effectively treat residual petroleum hydrocarbons in the depth intervals that were dewatered during the low water table conditions encountered during 2005. It is expected that the nitrate reagent be used by the microbes for at least two or three months before Round 3 sampling is performed. Round 3 sampling is anticipated for July 2006.

Proposed Continuation of DBB Treatment

The pilot test results indicate that a period of time is required to allow denitrifying microbes to increase in population so that they can effectively degrade the gasoline range petroleum hydrocarbons. The pilot test is scheduled to end during summer 2006, although untreated GRO-contaminated soil remain. Because there is already a thriving microbial population in the pilot test area and in the upgradient area, it would be beneficial to continue the N-Blend treatment to maintain this population and continue the remediation of the GRO-contaminated soil. If treatment is discontinued, this denitrifying population will likely diminish in size, become less effective in biodegradation, and another “ramping up” period would be required to regain effective degradation rates. Therefore, Navy proposes that N-Blend additions be continued and the

in-situ biodegradation processes can be sustained to achieve the successful remediation of the remainder of the GRO-contaminated soil.

TABLES

TABLE 2-1

OCTOBER 2005 GROUNDWATER ELEVATION SUMMARY
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

WELL IDENTIFICATION	WELL INSIDE DIAMETER (inch)	WATER LEVEL MP ELEVATION (feet-NGVD)	TOP OF SCREEN (feet-BGS)	BOTTOM OF SCREEN (feet-BGS)	DEPTH TO GROUNDWATER Oct. 20, 2005 (feet-BMP)	GROUNDWATER ELEVATION Oct. 20, 2005 (feet-NGVD)
B27-DP4	1.00	60.19	2.0	9.0	2.76	57.43
DB-04	1.00	66.58	5.0	11.5	6.94	59.64
DB-08	1.00	67.18	5.0	11.5	7.00	60.18
DB-14	1.00	66.11	5.0	13.5	7.62	58.49
DB-17	1.00	65.90	5.0	9.5	6.64	59.26
DB-18*	1.00	66.10	5.0	15.7	6.75	59.35
NASB-8	2.00	59.22	3.5	13.5	1.95	57.27
NASB-23	2.00	67.29	5.0	21.0	6.55	60.74
NASB-24	4.00	65.31	4.0	14.0	4.16	61.15
NASB-25	4.00	64.29	5.0	15.0	6.27	58.02
NASB-26	2.00	66.67	5.0	13.0	6.32	60.35
NASB-225	2.00	64.61	5.0	15.0	dry	NA
NASB-226	2.00	62.22	8.0	13.0	4.58	57.64
NASB-250	1.00	60.54	0.5	12.5	2.64	57.90
NASB-251	1.00	62.39	3.0	15.0	3.92	58.47
NASB-252	1.00	59.86	2.0	12.0	2.75	57.11
MW-302	1.00	59.89	3.0	7.0	2.45	57.44
SDP-5	1.00	65.93	4.0	14.0	6.55	59.38

Notes: *Water level MP estimated; well not surveyed.

Abbreviations:
BGS - below ground surface
MP - measuring point
BMP - below measuring point
NGVD - National Geodetic Vertical Datum of 1929

TABLE 2-2

OCTOBER 2005 GROUNDWATER FIELD PARAMETER MEASUREMENTS SUMMARY
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

Well ID	Sample Date	Depth Sampled	Pump Type	Initial Clock Time	Final Clock Time	Water Depth Below MP (ft)	Purge Rate (mL/min)	Cum. Volume Purged (gal)	Temp (oC)	Spec. Cond. (mS/cm)	pH	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Comments
DB-01	10/18/2005	10	Peristaltic	0840	915	6.45	100	3	16.1	1.0	5.9	-110	0.5	1.8	
DB-04	10/17/2005	8	Peristaltic	1440	1515	6.43	100	3	17.1	2.4	6.5	145	2.0	21	
DB-07	10/17/2005	8.5	Peristaltic	1425	1525	7.04	100	6	15.9	5.4	6.0	-46	4.7	2.4	
DB-10	10/18/2005	8.5	Peristaltic	1400	1510	6.25	100	6	15.5	1.8	6.0	15	1.3	55	Tan/brown
DB-11	10/18/2005	8.5	Peristaltic	1305	1350	6.6	125	6	15.5	1.4	5.9	-32	1.4	22	
DB-14	10/19/2005	8.5	Peristaltic	0855	0935	7.64	100	3	14.9	1.9	5.8	-52	0.5	0.5	
DB-18	10/18/2005	10	Peristaltic	1000	1110	6.82	100	6	16.0	1.3	6.7	-121	0.4	4.7	
DP-09	10/19/2005	9.5	Peristaltic	1615	1645	6.85	100	3	15.7	1.0	6.7	-51	2.3	1.7	
DP-13	10/19/2005	10	Peristaltic	1400	1445	6.63	100	4	17.6	1.8	6.6	-112	0.9	14	
MW300	10/19/2005	10	Peristaltic	1035	1105	7.85	100	3	16.1	0.8	6.2	-110	0.7	0.0	
MW301	10/19/2005	8.5	Peristaltic	1132	1200	6.49	100	3	15.4	0.5	5.8	43	0.7	2.4	
MW302	10/19/2005	5	Peristaltic	1225	1300	2.49	100	3	15.8	0.4	5.7	45	0.7	1.2	
SDP5	10/18/2005	9	Peristaltic	1520	1555	6.33	100	3	15.5	1.8	5.9	12	0.9	4.9	

TABLE 2-3

SAMPLE SUMMARY
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

MATRIX	LOCATION	SAMPLE ID	DATE	QC TYPE	GRO	Nitrate/ Nitrite	VPH
Groundwater	DB01	NEX-GW-DB01	18-Oct-05	None	X	X	X
Groundwater	DB04	NEX-GW-DB04	17-Oct-05	None	X	X	X
Groundwater	DB07	NEX-GW-DB07	17-Oct-05	None	X	X	X
Groundwater	DB10	NEX-GW-DB10	18-Oct-05	None	X	X	X
Groundwater	DB11	NEX-GW-DB11	18-Oct-05	None	X	X	X
Groundwater	DB14	NEX-GW-DB14	19-Oct-05	None	X	X	X
Groundwater	DB18	NEX-GW-DB18	18-Oct-05	None	X	X	X
Groundwater	MW-DP13	NEX-GW-DP13	19-Oct-05	None	X	X	X
Groundwater	DB04	NEX-GW-DUP01	17-Oct-05	Field Dup. of NEX-GW-DB04	X	X	X
Groundwater	MW-DP13	NEX-GW-DUP02	19-Oct-05	Field Dup. of NEX-GW-DP13	X	X	X
Groundwater	MW300	NEX-GW-MW300	19-Oct-05	None	X	X	X
Groundwater	MW300	NEX-GW-MW300-101905	19-Oct-05	None	X	X	X
Groundwater	MW301	NEX-GW-MW301	19-Oct-05	None	X	X	X
Groundwater	MW301	NEX-GW-MW301-101905	19-Oct-05	None	X	X	X
Groundwater	MW302	NEX-GW-MW302	19-Oct-05	None	X	X	X
Groundwater	MW-DP09	NEX-GW-MWDP09	19-Oct-05	None	X	X	X
Groundwater	MW-SDP05	NEX-GW-SDP5	18-Oct-05	None	X	X	X
Soil	DB01	NEX-S02-DB01-0809	19-Oct-05	None	X		X
Soil	DB01	NEX-S02-DB01-1213	19-Oct-05	None	X		X
Soil	DB03	NEX-S02-DB03-1011	18-Oct-05	None	X		X
Soil	DB03	NEX-S02-DB03-1213	18-Oct-05	None	X		X
Soil	DB05	NEX-S02-DB05-0809	18-Oct-05	None	X		X
Soil	DB05	NEX-S02-DB05-0910	18-Oct-05	None	X		X
Soil	DB08	NEX-S02-DB08-0809	18-Oct-05	None	X		X
Soil	DB08	NEX-S02-DB08-1011	18-Oct-05	None	X		X
Soil	DB09	NEX-S02-DB09-0809	19-Oct-05	None	X		X
Soil	DB09	NEX-S02-DB09-1112	19-Oct-05	None	X		X
Soil	DB10	NEX-S02-DB10-0708	18-Oct-05	None	X		X
Soil	DB10	NEX-S02-DB10-0910	18-Oct-05	None	X		X
Soil	DB10	NEX-S02-DB10-1212	18-Oct-05	None	X		X
Soil	DB12	NEX-S02-DB12-0910	18-Oct-05	None	X		X
Soil	DB13	NEX-S02-DB13-0910	18-Oct-05	None	X		X
Soil	DB13	NEX-S02-DB13-1213	18-Oct-05	None	X		X
Soil	DB15	NEX-S02-DB15-0809	18-Oct-05	None	X		X
Soil	DB15	NEX-S02-DB15-1011	18-Oct-05	None	X		X
Soil	DB17	NEX-S02-DB17-0809	18-Oct-05	None	X		X
Soil	DB17	NEX-S02-DB17-0910	18-Oct-05	None	X		X
Soil	DB18	NEX-S02-DB18-0910	19-Oct-05	None	X		X
Soil	DB18	NEX-S02-DB18-1415	19-Oct-05	None	X		X
Soil	DB19	NEX-S02-DB19-0809	19-Oct-05	None	X		X
Soil	DB19	NEX-S02-DB19-1213	19-Oct-05	None	X		X
Soil	DB05	NEX-S02-DUP01	18-Oct-05	Field Dup. of NEX-S02-DB05-0910	X		X
Soil	DB13	NEX-S02-DUP02	18-Oct-05	Field Dup. of NEX-S02-DB13-0910	X		X
Soil	DB09	NEX-S02-DUP03	19-Oct-05	Field Dup. of NEX-S02-DB09-0809	X		X
Soil	MW300	NEX-S02-MW300-0910	18-Oct-05	None	X		X
Soil	MW300	NEX-S02-MW300-1213	18-Oct-05	None	X		X
Soil	MW300	NEX-S02-MW300-1414	18-Oct-05	None	X		X
Soil	MW300	NEX-S02-MW300-1515	18-Oct-05	None	X		X
Soil	MW301	NEX-S02-MW301-0708	18-Oct-05	None	X		X
Soil	MW301	NEX-S02-MW301-0910	18-Oct-05	None	X		X
Soil	MW302	NEX-S02-MW302-0304	18-Oct-05	None	X		X
Soil	MW302	NEX-S02-MW302-0506	18-Oct-05	None	X		X
Blank	Blank	NEX-GW-TB01-101705	17-Oct-05	Trip Blank	X		X
Blank	Blank	NEX-GW-TB02-101905	19-Oct-05	Trip Blank	X		X
Blank	Blank	NEX-S02-RB01	18-Oct-05	Rinsate Blank			X
Blank	Blank	NEX-S02-RB02	18-Oct-05	Rinsate Blank			X
Blank	Blank	NEX-S02-RB03	19-Oct-05	Rinsate Blank			X
Blank	Blank	NEX-S02-TB01	18-Oct-05	Trip Blank			

TABLE 2-3

SAMPLE SUMMARY
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE
PAGE 2 OF 2

MATRIX	LOCATION	SAMPLE ID	DATE	QC TYPE	GRO	Nitrate/ Nitrite	VPH
Blank	Blank	NEX-S02-DIUF-FB01	18-Oct-05	Source Blank	X		X
Blank	Blank	NEX-S02-DIUF-FB02	18-Oct-05	Source Blank	X		X
Blank	Blank	NEX-S02-DIUF-FB03	19-Oct-05	Source Blank	X		X

abbr: GRO - gasoline range organics by Maine HETL Method
VPH - MADEP volatile petroleum hydrocarbons method

TABLE 2-4

MONITORING WELL CONSTRUCTION SUMMARY
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

WELL IDENTIFICATION	WELL INSIDE DIAMETER (inch)	TOP OF SCREEN (feet-bgs)	BOTTOM OF SCREEN (feet-bgs)
B27-DP2	1.00	2.0	9.0
B27-DP4	1.00	2.0	6.0
DB-01	1.00	5.0	13.8
DB-02	1.00	5.0	14.5
DB-03	1.00	5.0	13.0
DB-04	1.00	5.0	11.5
DB-05	1.00	5.0	10.5
DB-06	1.00	5.0	10.0
DB-07	1.00	5.0	12.0
DB-08	1.00	5.0	11.5
DB-09	1.00	5.0	13.0
DB-10	1.00	5.0	12.0
DB-11	1.00	5.0	11.5
DB-12	1.00	5.0	10.0
DB-13	1.00	5.0	15.5
DB-14	1.00	5.0	13.5
DB-15	1.00	5.0	12.0
DB-16	1.00	5.0	11.0
DB-17	1.00	5.0	9.5
DB-18	1.00	5.0	15.7
DB-19	1.00	5.0	13.6
DP-01	1.25	5.0	15.0
DP-02	1.25	5.0	15.0
DP-03	1.25	5.0	15.0
DP-09	1.00	5.0	15.0
DP-13	1.25	5.0	15.0
DP-15	1.25	5.0	15.0
DP-19	1.00	4.0	14.0
MW-300	1.00	5.0	14.0
MW-301	1.00	5.0	12.0
MW-302	1.00	3.0	7.0
NASB-8	2.00	3.5	13.5
NASB-23	2.00	5.0	21.0
NASB-24	4.00	4.0	14.0
NASB-25	4.00	5.0	15.0
NASB-26	2.00	5.0	13.0
NASB-225	2.00	5.0	15.0
NASB-226	2.00	8.0	13.0
NASB-250	1.00	0.5	12.5
NASB-251	1.00	3.0	15.0
NASB-252	1.00	2.0	12.0
SDP-5	1.00	4.0	14.0

Abbreviations:
BGS - below ground surface
BMP - below measuring point
MP - measuring point
NGVD - National Geodetic Vertical Datum of 1929

TABLE 3-1

ROUND 2 GROUNDWATER ANALYTICAL RESULTS
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE
PAGE 1 OF 2

Sample Number		NEX-GW-DB01	NEX-GW-DB04	NEX-GW-DUP01	NEX-GW-DB07	NEX-GW-DB10	NEX-GW-DB11	NEX-GW-DB14	NEX-GW-DB18	NEX-GW-DP13	NEX-GW-DUP02	NEX-GW-MW300
Sample Location		DB01	DB04	MW-DB04	DB07	DB10	DB11	DB14	DB18	MW-DP13	MW-DP13	MW300
Date Sampled		10/18/2005	10/17/2005	10/17/2005	10/17/2005	10/18/2005	10/18/2005	10/19/2005	10/18/2005	10/19/2005	10/19/2005	10/19/2005
Dup				DUP01						DUP02	DUP02	
QC Identifier												
	CRITERIA											
	Maine Guidelines [2]											
Gasoline Range Organic Analysis (ug/L) [1]	50	20000	5800	4400	10 U	8800	4300	43000	9500	15000	13000	8200
Volatile Petroleum Hydrocarbons (ug/L) [3]												
Unadjusted C5-C8 Aliphatics	NA	7400	1100 J	2000 U	100 U	1600 J	1800 J	8400	4900	3500 J	3100 J	610 J
Unadjusted C9-C12 Aliphatics	NA	36000	4800	5000	100 U	7300	3000	42000	8300	11000	12000	4500
Total VPH (Sum of unadjusted C5 C12 Aliphatics)		**43400**	**5900**	**5000**	**100 U**	**8900**	**4800**	**50400**	**13200**	**14500**	**15100**	**5110**
VPH Ranges (ug/L)												
C5-C8 Aliphatics	NA	7200	1100 J	2000 U	100 U	1600 J	1800 J	7700	3300	3300 J	2900 J	590 J
C9-C12 Aliphatics	NA	11000	1000 J	1200 J	100 U	1700 J	2000 U	12000	2200	5000 U	3600 J	1000
C9-C10 Aromatics	NA	9700	3800	3800	100 U	4400	2200	8800	3800	3400 J	3100 J	2400
Targeted VPH Analytes (ug/L)												
Benzene	NA	250 U	100 U	100 U	5 U	100 U	100 U	250 U	100 U	250 U	250 U	50 U
Ethylbenzene	NA	2000	100 U	100 U	5 U	140 U	100 U	2500	360	1000	960	360
Naphthalene	NA	680 U	100 U	100 U	5 U	140 U	100 U	520 U	160 U	450 U	280 U	110 U
Toluene	NA	250 U	100 U	100 U	5 U	100 U	100 U	680 U	1600	250 U	250 U	50 U
m&p-Xylene	NA	10000	200 U	200 U	10 U	870	200 U	12000	1600	4200	4000	650
o-Xylene	NA	4100	100 U	100 U	5 U	220 U	100 U	5800	420	340 U	310 U	82 U
Methyl tert-Butyl Ether	35	250 U	100 U	100 U	5 U	100 U	100 U	250 U	100 U	250 U	250 U	50 U
Sum of VPH Aliphatics (C5-C8, C9-C12) (ug/L)	NA	**18200**	**2100**	**1200**	**100 U**	**3300**	**1800**	**19700**	**5500**	**3300**	**6500**	**1590**
Sum of Aromatics (C9-C10 & targeted analytes)[4] (ug/L)	NA	**25800**	**3800**	**3800**	**100 U**	**5270**	**2200**	**29100**	**7360**	**8600**	**8060**	**3410**
Total VPH (Sum of C5-C12 aliphatics, C9-C10 aromatics, & targeted analytes)[4] (ug/L)	NA	**44000**	**5900**	**5000**	**100 U**	**8570**	**4000**	**48800**	**12860**	**11900**	**14560**	**5000**
Wet Chemistry Analysis (mg/L)												
NITRATE-N	NA	19	400	570	2700	190	140	150	73	110	110	33
NITRITE-N	NA	0.098	0.24	0.34	0.17	0.35	0.24	0.61	8.1	1.6	1.6	0.037 J

TABLE 3-1

ROUND 2 GROUNDWATER ANALYTICAL RESULTS
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE
PAGE 2 OF 2

Sample Number		NEX-GW-MW301	NEX-GW-MW302	NEX-GW-MWDP09	NEX-GW-SDP5	NEX-GW-TB01-	NEX-GW-TB02-
Sample Location		MW301	MW302	MW-DP09	MW-SDP5		
Date Sampled		10/19/2005	10/19/2005	10/19/2005	10/18/2005	10/17/2005	10/19/2005
Dup							
QC Identifier							
	CRITERIA						
	Maine Guidelines [2]						
Gasoline Range Organic Analysis (ug/L) [1]	50	290	14	3900	14000	NA	10 U
Volatile Petroleum Hydrocarbons (ug/L) [3]							
Unadjusted C5-C8 Aliphatics	NA	500 U	100 U	2000 U	2200	100 U	100 U
Unadjusted C9-C12 Aliphatics	NA	500 U	100 U	3600	11000	100 U	100 U
Total VPH (Sum of unadjusted C5 C12 Aliphatics)		**500 U**	**100 U**	**3600**	**13200**	**100 U**	**100 U**
VPH Ranges (ug/L)							
C5-C8 Aliphatics	NA	500 U	100 U	2000 U	2200	100 U	100 U
C9-C12 Aliphatics	NA	500 U	100 U	1100 J	2600	100 U	100 U
C9-C10 Aromatics	NA	500 U	100 U	1200 J	5100	100 U	100 U
Targeted VPH Analytes (ug/L)							
Benzene	NA	25 U	5 U	100 U	100 U	5 U	5 U
Ethylbenzene	NA	25 U	5 U	180 U	260 U	5 U	5 U
Naphthalene	NA	25 U	5 U	140 U	180 U	5 U	5 U
Toluene	NA	25 U	5 U	100 U	100 U	5 U	5 U
m&p-Xylene	NA	50 U	10 U	820	2100	10 U	10 U
o-Xylene	NA	25 U	5 U	250 U	580	5 U	5 U
Methyl tert-Butyl Ether	35	25 U	5 U	100 U	100 U	5 U	5 U
Sum of VPH Aliphatics (C5-C8, C9-C12) (ug/L)	NA	**500 U**	**100 U**	**1100**	**4800**	**100 U**	**100 U**
Sum of Aromatics (C9-C10 & targeted analytes)[4] (ug/L)	NA	**500 U**	**100 U**	**2020**	**7780**	**100 U**	**100 U**
Total VPH (Sum of C5-C12 aliphatics, C9-C10 aromatics, & targeted analytes)[4] (ug/L)	NA	**500 U**	**100 U**	**3120**	**12580**	**100 U**	**100 U**
Wet Chemistry Analysis (mg/L)							
NITRATE-N	NA	72	1.9	82	230	NA	NA
NITRITE-N	NA	0.038 J	0.052 J	1.4	0.22	NA	NA

Notes:

1) Maine HETL Method 4.2.17

2) *Procedural Guidelines for Establishing Action Levels and Remediation Goals for the Remediation of Oil Contaminanted Soil and Groundwater in Maine*, Maine DEP, Revised March 13, 2000.

3) Massachusetts VPH Method May 2004, r 1.1

4) without MTBE

Black Background - Criterion Exceeded

Abbr:

* - From dilution analysis

J - Quantitation approximate

UJ - Detection limit approximate

NA - Not analyzed for

ND - Not detected

R - Rejected

U - Not detected;

GRO - gasoline range oragnics

VPH - volatile petroleum hydrocarbons

TABLE 3-2

SUMMARY OF GROUNDWATER DATA
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION BRUNSWICK, MAINE
PAGE 1 OF 2

WELL	DATE	GRO [1]	VPH [2]	VPH Aro [3]	VPH Ali [4]
DB01	Aug-04	na	na	na	na
DB01	Mar-05	45000	49630	32350	17100
DB01	Oct-05	20000	44000	25800	18200
DB01	Apr-06				
DB04	Aug-04	na	na	na	na
DB04	Mar-05	14000	13000	13000	5000 U
DB04	Oct-05	5800	5900	3800	2100
DB04	Apr-06				
DB07	Aug-04	na	na	na	na
DB07	Mar-05	75	100 U	100 U	100 U
DB07	Oct-05	10 U	100 U	100 U	100 U
DB07	Apr-06				
DB10	Aug-04	na	na	na	na
DB10	Mar-05	12000	18660	13360	5300
DB10	Oct-05	8800	8570	5270	3300
DB10	Apr-06				
DB11	Aug-04	na	na	na	na
DB11	Mar-05	5700	7700	3600	4100
DB11	Oct-05	4300	4000	2200	1800
DB11	Apr-06				
DB14	Aug-04	na	na	na	na
DB14	Mar-05	40000	51320	34820	16500
DB14	Oct-05	43000	48800	29100	19700
DB14	Apr-06				
DB18	Aug-04	na	na	na	na
DB18	Mar-05	14000	13860	10560	3300
DB18	Oct-05	9500	12860	7360	5500
DB18	Apr-06				
MW-DP13	Aug-04	25000	na	na	na
MW-DP13	Mar-05	12000	8870	3770	5100
MW-DP13	Oct-05	15000	11900	8600	3300
MW-DP13	Apr-06				
MW300	Sep-04	28000	na	na	na
MW300	Mar-05	6200	6930	6930	2000 U
MW300	Oct-05	8200	5000	3410	1590
MW300	Apr-06				
MW301	Sep-04	27	na	na	na
MW301	Mar-05	630	570	570	500 U
MW301	Oct-05	290	500 U	500 U	500 U
MW301	Apr-06				
MW302	Sep-04	19	na	na	na
MW302	Mar-05	28	100 U	100 U	100 U
MW302	Oct-05	14	100 U	100 U	100 U
MW302	Apr-06				
MW-DP09	Aug-04	14000	na	na	na
MW-DP09	Mar-05	12000	16940	11400	5500

TABLE 3-2

SUMMARY OF GROUNDWATER DATA
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION BRUNSWICK, MAINE
PAGE 2 OF 2

WELL	DATE	GRO [1]	VPH [2]	VPH Aro [3]	VPH Ali [4]
MW-DP09	Oct-05	3900	3120	2020	1100
MW-DP09	Apr-06				
MW-SDP05	Aug-04	25000	na	na	na
MW-SDP05	Mar-05	9600	4100	4100	10000 U
MW-SDP05	Oct-05	14000	12580	7780	4800
MW-SDP05	Apr-06				

GROUNDWATER SUMMARY STATISTICS [5]					
	1st Quartile	Min.	Median	Max.	3rd Quartile
GRO Aug 2004	0	0	2100	28000	17000
GRO Mar 2005	5700	28	12000	45000	14000
GRO Oct 2005	3900	0	8200	43000	14000
VPH ARO Mar 2005	3600	0	6930	34820	13000
VPH ARO Oct 2005	2020	0	3800	29100	7780
VPH ALI Mar 2005	0	0	1650	16500	5150
VPH ALI Oct 2005	1100	0	2100	19700	4400

Notes:

1. GRO - gasoline range organics, by Maine HETL Method 4.2.17 (ug/L)
2. Total VPH - volatile petroleum hydrocarbons, Massachusetts VPH Method (May 2004, rev. 1.1) (ug/L). Total VPH = sum of C5-C12 aliphatics, C9-C10 aromatics, and targeted VPH analytes w/o MTBE.
3. Aro - C9-C10 aromatics & targeted analytes w/o MTBE (ug/L)
4. Ali - C5-C8 & C9-C12 aliphatics w/o MTBE (ug/L)
5. Non-detect values = 0 for statistical analysis. Data in ug/L

Abbr: na - not applicable

TABLE 3-3

ROUND 2 SOIL ANALYTICAL RESULTS
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

Sample Number		NEX-S02-DB01-0809	NEX-S02-DB01-1213	NEX-S02-DB03-1011	NEX-S02-DB03-1213	NEX-S02-DB05-0809	NEX-S02-DB05-0910	NEX-S02-DUP01	NEX-S02-DB08-0809	NEX-S02-DB08-1011	NEX-S02-DB09-0809	NEX-S02-DUP03	NEX-S02-DB09-1112	NEX-S02-DB10-0708	NEX-S02-DB10-0910	NEX-S02-DB10-1212	NEX-S02-DB12-0910	NEX-S02-DB13-0910
Sample Location		DB01	DB01	DB03	DB03	DB05	DB05	DB05	DB08	DB08	DB09	DB09	DB09	DB10	DB10	DB10	DB12	DB13
Date Sampled		10/19/2005	10/19/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/19/2005	10/19/2005	10/19/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005
Dup							DUP01	DUP01			DUP03	DUP03						DUP02
QC Identifier		None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None
	CRITERIA																	
Gasoline Range Organic Analysis (mg/Kg) [1]	**500 [2]**	6100 EB	5.3 EB	120 EB	3.2 U	370 EB	32 EB	11 EB	0.9 JEB	3.1 U	820 EB	1200 EB	4.9 U	3 U	1600 EB	2.7 U	2.5 U	14 EB
Volatile Petroleum Hydrocarbons (ug/L) [3]																		
Unadjusted C5-C8 Aliphatics		2300 U	27 U	61	29 U	380	31 U	42 U	27 U	27 U	1000 U	980 U	53 U	30 U	640	29 U	27 U	27 U
Unadjusted C9-C12 Aliphatics		3300	27 U	77	29 U	350	31 U	42 U	27 U	27 U	1000 U	1400	53 U	30 U	580	29 U	27 U	27 U
Total VPH (Sum of unadjusted C5 - C12 Aliphatics)		3300	27 U	138	29 U	730	31 U	42 U	27 U	27 U	1000 U	1400	53 U	30 U	1220	29 U	27 U	27 U
VPH Ranges (mg/Kg)																		
C5-C8 Aliphatics		2300 U	27 U	61	29 U	380	31 U	42 U	27 U	27 U	1000 U	980 U	53 U	30 U	640	29 U	27 U	27 U
C9-C12 Aliphatics		2300 U	27 U	29 U	29 U	200	31 U	42 U	27 U	27 U	1000 U	980 U	53 U	30 U	290 U	29 U	27 U	27 U
C9-C10 Aromatics		3000	27 U	58	29 U	140 J	31 U	42 U	27 U	27 U	1000 J	1100	53 U	30 U	480	29 U	27 U	27 U
Targeted VPH Analytes (mg/Kg)																		
Benzene		110 U	1.3 U	1.4 U	1.4 U	7.9 U	1.5 U	2 U	1.3 U	1.3 U	49 U	47 U	2.5 U	1.4 U	14 U	1.4 U	1.3 U	1.3 U
Ethylbenzene		63 J	1.3 U	2.3	1.4 U	7.9 U	1.5 U	2 U	1.3 U	1.3 U	49 U	47 U	2.5 U	1.4 U	14 U	1.4 U	1.3 U	1.3 U
Naphthalene		170 U	1.3 U	4 U	1.4 U	7.9 U	1.5 U	2 U	1.3 U	1.3 U	86 U	47 U	2.5 U	1.4 U	14 U	1.4 U	1.3 U	1.3 U
Toluene		110 U	1.3 U	1.4 U	1.4 U	7.9 U	1.5 U	2 U	1.3 U	1.3 U	49 U	47 U	2.5 U	1.4 U	14 U	1.4 U	1.3 U	1.3 U
m&p-Xylene		270	2.6 U	9.4	2.8 U	16 U	3 U	4.1 U	2.6 U	2.6 U	98 U	95 U	5.1 U	2.8 U	28 U	2.8 U	2.6 U	3.1
o-Xylene		110 U	1.3 U	3.2	1.4 U	7.9 U	1.5 U	2 U	1.3 U	1.3 U	49 U	47 U	2.5 U	1.4 U	14 U	1.4 U	1.3 U	1.2 J
Methyl tert-Butyl Ether		110 U	1.3 U	1.4 U	1.4 U	7.9 U	1.5 U	2 U	1.3 U	1.3 U	49 U	47 U	2.5 U	1.4 U	14 U	1.4 U	1.3 U	1.3 U
Sum of VPH Aliphatics (C5-C8, C9-C12) (mg/Kg)		**2300 U**	**27 U**	**61**	**29 U**	**580**	**31 U**	**42 U**	**27 U**	**27 U**	**1000 U**	**980 U**	**53 U**	**30 U**	**640**	**29 U**	**27 U**	**27 U**
Sum of Aromatics (C9-C10 & targeted analytes)[4] (mg/Kg)		**3333**	**27 U**	**72.9**	**29 U**	**140**	**31 U**	**42 U**	**27 U**	**27 U**	**1000**	**1100**	**53 U**	**30 U**	**480**	**29 U**	**27 U**	**4.3**
Total VPH (Sum of C5-C12 aliphatics, C9-C10 aromatics & targeted analytes)[4] (mg/kg)		**3333**	**27 U**	**133.9**	**29 U**	**720**	**31 U**	**42 U**	**27 U**	**27 U**	**1000**	**1100**	**53 U**	**30 U**	**1120**	**29 U**	**27 U**	**4.3**

TABLE 3-3

ROUND 2 SOIL ANALYTICAL RESULTS
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

Sample Number		NEX-S02-DUP02	NEX-S02-DB13-1213	NEX-S02-DB15-0809	NEX-S02-DB15-1011	NEX-S02-DB17-0809	NEX-S02-DB17-0910	NEX-S02-DB18-0910	NEX-S02-DB18-1415	NEX-S02-DB19-0809	NEX-S02-DB19-1213	NEX-S02-MW300-0910	NEX-S02-MW300-1213	NEX-S02-MW300-1414	NEX-S02-MW300-1515	NEX-S02-MW301-0708	NEX-S02-MW301-0910	NEX-S02-MW302-0304
Sample Location		DB13	DB13	DB15	DB15	DB17	DB17	DB18	DB18	DB19	DB19	MW300	MW300	MW300	MW301	MW301	MW301	MW302
Date Sampled		10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/19/2005	10/19/2005	10/19/2005	10/19/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005
Dup		DUP02																
QC Identifier		None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None
	CRITERIA																	
Gasoline Range Organic Analysis (mg/Kg) [1]	**500 [2]**	14 EB	2.5 U	250 EB	36 EB	3.1 U	2.5 U	20 EB	7.9 EB	4600 EB	2.5 U	220 EB	22 EB	6.1 EB	3 U	NA	2.5 U	NA
Volatile Petroleum Hydrocarbons (ug/L) [3]																		
Unadjusted C5-C8 Aliphatics		27 U	27 U	52 U	27 U	36 U	27 U	27 U	27 U	4000	27 U	270	27 U	27 U	33 U	27 U	27 U	27 U
Unadjusted C9-C12 Aliphatics		27 U	27 U	140	27 U	36 U	27 U	27 U	27 U	4200	27 U	440	27 U	27 U	33 U	27 U	27 U	27 U
Total VPH (Sum of unadjusted C5 - C12 Aliphatics)		27 U	27 U	140	27 U	36 U	27 U	27 U	27 U	8200	27 U	710	27 U	27 U	33 U	27 U	27 U	27 U
VPH Ranges (mg/Kg)																		
C5-C8 Aliphatics		27 U	27 U	52 U	27 U	36 U	27 U	27 U	27 U	4000	27 U	270	27 U	27 U	33 U	27 U	27 U	27 U
C9-C12 Aliphatics		27 U	27 U	29 J	27 U	36 U	27 U	27 U	27 U	2600 U	27 U	250	27 U	27 U	33 U	27 U	27 U	27 U
C9-C10 Aromatics		27 U	27 U	110	27 U	36 U	27 U	27 U	27 U	2800	27 U	180	27 U	27 U	33 U	27 U	27 U	27 U
Targeted VPH Analytes (mg/Kg)																		
Benzene		1.3 U	1.3 U	2.5 U	1.3 U	1.8 U	1.3 U	1.3 U	1.3 U	130 U	1.3 U	6.4 U	1.3 U	1.3 U	1.6 U	1.3 U	1.3 U	1.3 U
Ethylbenzene		1.3 U	1.3 U	2.5 U	1.3 U	1.8 U	1.3 U	1.3 U	1.3 U	96 J	1.3 U	4.9 J	1.3 U	1.3 U	1.6 U	1.3 U	1.3 U	1.3 U
Naphthalene		1.3 U	1.3 U	2.5 U	1.3 U	1.8 U	1.3 U	1.3 U	1.3 U	130 U	1.3 U	8.8 U	1.3 U	1.3 U	2.5 U	1.3 U	1.3 U	1.3 U
Toluene		1.3 U	1.3 U	2.5 U	1.3 U	1.8 U	1.3 U	1.3 U	1.3 U	130 U	1.3 U	6.4 U	1.3 U	1.3 U	1.6 U	1.3 U	1.3 U	1.3 U
m&p-Xylene		3	2.6 U	5 U	2.6 U	3.5 U	2.6 U	2.6 U	2.6 U	420	2.6 U	13 U	2.6 U	2.6 U	3.1 U	2.6 U	2.6 U	2.6 U
o-Xylene		1.2 J	1.3 U	2.5 U	1.3 U	1.8 U	1.3 U	1.3 U	1.3 U	130 U	1.3 U	6.9	1.3 U	1.3 U	1.6 U	1.3 U	1.3 U	1.3 U
Methyl tert-Butyl Ether		1.3 U	1.3 U	2.5 U	1.3 U	1.8 U	1.3 U	1.3 U	1.3 U	130 U	1.3 U	6.4 U	1.3 U	1.3 U	1.6 U	1.3 U	1.3 U	1.3 U
Sum of VPH Aliphatics (C5-C8, C9-C12) (mg/Kg)		**27 U**	**27 U**	**29**	**27 U**	**0**	**27 U**	**27 U**	**27 U**	**4000**	**27 U**	**520**	**27 U**	**27 U**	**0**	**27 U**	**0**	**27 U**
Sum of Aromatics (C9-C10 & targeted analytes)[4] (mg/Kg)		**4.2**	**27 U**	**110**	**27 U**	**0**	**27 U**	**27 U**	**27 U**	**3316**	**27 U**	**191.8**	**27 U**	**27 U**	**0**	**27 U**	**0**	**27 U**
Total VPH (Sum of C5-C12 aliphatics, C9-C10 aromatics & targeted analytes)[4] (mg/kg)		**4.2**	**27 U**	**139**	**27 U**	**0**	**27 U**	**27 U**	**27 U**	**7316**	**27 U**	**711.8**	**27 U**	**27 U**	**0**	**0**	**0**	**27 U**

TABLE 3-3

ROUND 2 SOIL ANALYTICAL RESULTS
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

Sample Number		NEX-S02-MW302-0506	NEX-S02-TB01	NEX-S02-DIUF-FB01	NEX-S02-DIUF-FB02	NEX-S02-DIUF-FB03	NEX-S02-RB01	NEX-S02-RB02	NEX-S02-RB03
Sample Location		MW302							
Date Sampled		10/18/2005	10/17/2005	10/18/2005	10/18/2005	10/19/2005	10/18/2005	10/18/2005	10/19/2005
Dup									
QC Identifier		None	Trip Blank	Source Blank	Source Blank	Source Blank	Rinsate Blank	Rinsate Blank	Rinsate Blank
	CRITERIA								
Gasoline Range Organic Analysis (mg/Kg) [1]	**500 [2]**	2.5 U	2.5 U	10 U	10 U	10 U	41	10 U	10 U
Volatile Petroleum Hydrocarbons (ug/L) [3]									
Unadjusted C5-C8 Aliphatics		27 U	27 U	100 U	100 U	100 U	100 U	100 U	100 U
Unadjusted C9-C12 Aliphatics		27 U	27 U	100 U	100 U	100 U	100 U	100 U	100 U
Total VPH (Sum of unadjusted C5 - C12 Aliphatics)		27 U	27 U	100 U	100 U	100 U	100 U	100 U	100 U
VPH Ranges (mg/Kg)									
C5-C8 Aliphatics		27 U	27 U	100 U	100 U	100 U	100 U	100 U	100 U
C9-C12 Aliphatics		27 U	27 U	100 U	100 U	100 U	100 U	100 U	100 U
C9-C10 Aromatics		27 U	27 U	100 U	100 U	100 U	100 U	100 U	100 U
Targeted VPH Analytes (mg/Kg)									
Benzene		1.3 U	1.3 U	5 U	5 U	5 U	5 U	5 U	5 U
Ethylbenzene		1.3 U	1.3 U	5 U	5 U	5 U	5 U	5 U	5 U
Naphthalene		1.3 U	1.3 U	5 U	5 U	5 U	5 U	2.9 J	5 U
Toluene		1.3 U	1.3 U	5 U	5 U	5 U	5 U	3.1 J	5 U
m&p-Xylene		2.6 U	2.6 U	10 U	10 U	10 U	10 U	10 U	10 U
o-Xylene		1.3 U	1.3 U	5 U	5 U	5 U	5 U	5 U	5 U
Methyl tert-Butyl Ether		1.3 U	1.3 U	5 U	5 U	5 U	5 U	5 U	5 U
Sum of VPH Aliphatics (C5-C8, C9-C12) (mg/Kg)		**27 U**	**27 U**	**100 U**	**100 U**	**100 U**	**100 U**	**100 U**	**100 U**
Sum of Aromatics (C9-C10 & targeted analytes)[4] (mg/Kg)		**27 U**	**27 U**	**100 U**	**100 U**	**100 U**	**100 U**	**6**	**100 U**
Total VPH (Sum of C5-C12 aliphatics, C9-C10 aromatics & targeted analytes)[4] (mg/kg)		**27 U**	**27 U**	**100 U**	**100 U**	**100 U**	**100 U**	**6**	**100 U**

Notes:

1) Black Background - Criterion Exceeded

2) *Procedural Guidelines for Establishing Action Levels and Remediation Goals for the Remediation of Oil Contaminanted Soil and Groundwater in Maine* , Maine DEP, Revised March 13,

3) Massachusetts VPH Method

4) without MTBE

Abbr:

* - From dilution analysis

J - Quantitation approximate

NA - Not analyzed for

U - Not detected;

UJ - Detection limit approximate

TABLE 3-4

SUMMARY OF SOIL GRO AND VPH DATA
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

LOCATION-DEPTH	DATE	GRO[1]	VPH[2]	VPH Aro[3]	VPH Ali[4]
DB01-0809	Sep-04	10000	NA	NA	NA
DB01-0809	Mar-05	11000	16000	8240	7000
DB01-0809	Oct-05	6100	3333	3333	2300 U
DB01-0809	Apr-06				
DB01-1213	Sep-04	3.5 U			
DB01-1213	Mar-05	52	31 U	3.2	30 U
DB01-1213	Oct-05	5.3	27 U	27 U	27 U
DB01-1213	Apr-06				
DB03-1011	Sep-04	8900			
DB03-1011	Mar-05	8800	6800	2799	3400
DB03-1011	Oct-05	120	133.9	72.9	61
DB03-1011	Apr-06				
DB03-1213	Sep-04	11 U			
DB03-1213	Mar-05	52	31	2.9	28
DB03-1213	Oct-05	3.2U	29 U	29 U	29 U
DB03-1213	Apr-06				
DB05-0809	Sep-04	5300			
DB05-0809	Mar-05	220	340	42	290
DB05-0809	Oct-05	370	720	120	580
DB05-0809	Apr-06				
DB05-0910	Sep-04	18 U			
DB05-0910	Mar-05	2.5 U	31	2.9	28
DB05-0910	Oct-05	32	31 U	31 U	31 U
DB05-0910	Apr-06				
DB08-0809	Sep-04	3.0 U			
DB08-0809	Mar-05	2.6 U	28 U	1.3 U	27 U
DB08-0809	Oct-05	0.9	27 U	27 U	27 U
DB08-0809	Apr-06				
DB08-1011	Sep-04	2.5 U			
DB08-1011	Mar-05	2.8 U	28 U	2.6 U	27 U
DB08-1011	Oct-05	3.1 U	27 U	27 U	27 U
DB08-1011	Apr-06				
DB09-0809	Sep-04	9000			
DB09-0809	Mar-05	11000	9800	2240	3400
DB09-0809	Oct-05	820	1000	1000	1000 U
DB09-0809	Apr-06				
DB09-1112	Sep-04	19 U			
DB09-1112	Mar-05	17	32 U	1.3 U	32 U
DB09-1112	Oct-05	4.9 U	53 U	53 U	53 U
DB09-1112	Apr-06				
DB10-0910	Sep-04	5.6	30	1.8 U	30
DB10-0910	Mar-05	720	610	242	27 U
DB10-0910	Oct-05	1600	1120	480	640
DB10-0910	Apr-06				
DB10-1212	Sep-04	3.4 U			
DB10-1212	Mar-05	2.5 U	27 U	1.3 U	27 U

TABLE 3-4

SUMMARY OF SOIL GRO AND VPH DATA
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

LOCATION-DEPTH	DATE	GRO[1]	VPH[2]	VPH Aro[3]	VPH Ali[4]
DB10-1212	Oct-05	2.7 U	29 U	29 U	29 U
DB10-1212	Apr-06				
DB12-0910	Sep-04	3.1 U			
DB12-0910	Mar-05	3.3 U	33 U	1.6 U	33 U
DB12-0910	Oct-05	2.5 U	27 U	27 U	27 U
DB12-0910	Apr-06				
DB13-0910	Sep-04	12			
DB13-0910	Mar-05	17	30 U	1.4 U	30 U
DB13-0910	Oct-05	14	4.3	4.3	27 U
DB13-0910	Apr-06				
DB13-1213	Sep-04	3.7 U			
DB13-1213	Mar-05	6.2	30 U	1.5 U	30 U
DB13-1213	Oct-05	2.5 U	27 U	27 U	27 U
DB13-1213	Apr-06				
DB15-0809	Sep-04	76			
DB15-0809	Mar-05	260	320	130	170
DB15-0809	Oct-05	250	139	110	29
DB15-0809	Apr-06				
DB15-1011	Sep-04	14			
DB15-1011	Mar-05	18	30 U	1.4 U	30 U
DB15-1011	Oct-05	36	27 U	27 U	27 U
DB15-1011	Apr-06				
DB17-0809	Sep-04	5.4			
DB17-0809	Mar-05	2.5 U	27 U	1.3 U	27 U
DB17-0809	Oct-05	3.1 U	36 U	36 U	36 U
DB17-0809	Apr-06				
DB17-0910	Sep-04	2.8 U			
DB17-0910	Mar-05	3.4	30 U	1.4 U	30 U
DB17-0910	Oct-05	2.5 U	27 U	27 U	27 U
DB17-0910	Apr-06				
DB18-0910	Sep-04	NA	NA	NA	NA
DB18-0910	Mar-05	16	28 U	6.1	29 U
DB18-0910	Oct-05	20	27 U	27 U	27 U
DB18-0910	Apr-06				
DB18-1415	Sep-04	NA	NA	NA	NA
DB18-1415	Mar-05	5.9	29 U	18.6	29 U
DB18-1415	Oct-05	7.9	27 U	27 U	27 U
DB18-1415	Apr-06				
DB19-0809	Sep-04		NA	NA	NA
DB19-0809	Mar-05	7000	12100	6830	3300
DB19-0809	Oct-05	4600	7316	3316	4000
DB19-0809	Apr-06				
DB19-1213	Sep-04	NA	NA	NA	NA
DB19-1213	Mar-05	5.7	30 U	1.4 U	30 U
DB19-1213	Oct-05	2.5 U	27 U	27 U	27 U
DB19-1213	Apr-06				

TABLE 3-4

SUMMARY OF SOIL GRO AND VPH DATA
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

LOCATION-DEPTH	DATE	GRO[1]	VPH[2]	VPH Aro[3]	VPH Ali[4]
MW300-0910	Sep-04	10			
MW300-0910	Mar-05	16	28 U	1.4 U	28 U
MW300-0910	Oct-05	220	711.8	191.9	520
MW300-0910	Apr-06				
MW300-1213	Sep-04	2.6 U			
MW300-1213	Mar-05	7.5	31 U	1.5 U	31 U
MW300-1213	Oct-05	22	27 U	27 U	27 U
MW300-1213	Apr-06				
MW301-0708	Sep-04	3.3 U	9.5	2.4	9.5
MW301-0708	Mar-05	13	30 U	1.4 U	30 U
MW301-0708	Oct-05	0.82	27 U	27 U	27 U
MW301-0708	Apr-06				
MW301-0910	Sep-04	2.9 U			
MW301-0910	Mar-05	7	27 U	1.7	27 U
MW301-0910	Oct-05	2.5 U	27 U	27 U	27 U
MW301-0910	Apr-06				
MW302-0304	Sep-04	2.5 U			
MW302-0304	Mar-05	2.8 U	28 U	1.7	28 U
MW302-0304	Oct-05	2.5 U	27 U	27 U	27 U
MW302-0304	Apr-06				
MW302-0506	Sep-04	2.9 U			
MW302-0506	Mar-05	3.1 U	33	3.2	33
MW302-0506	Oct-05	2.5 U	27 U	27 U	27 U
MW302-0506	Apr-06				

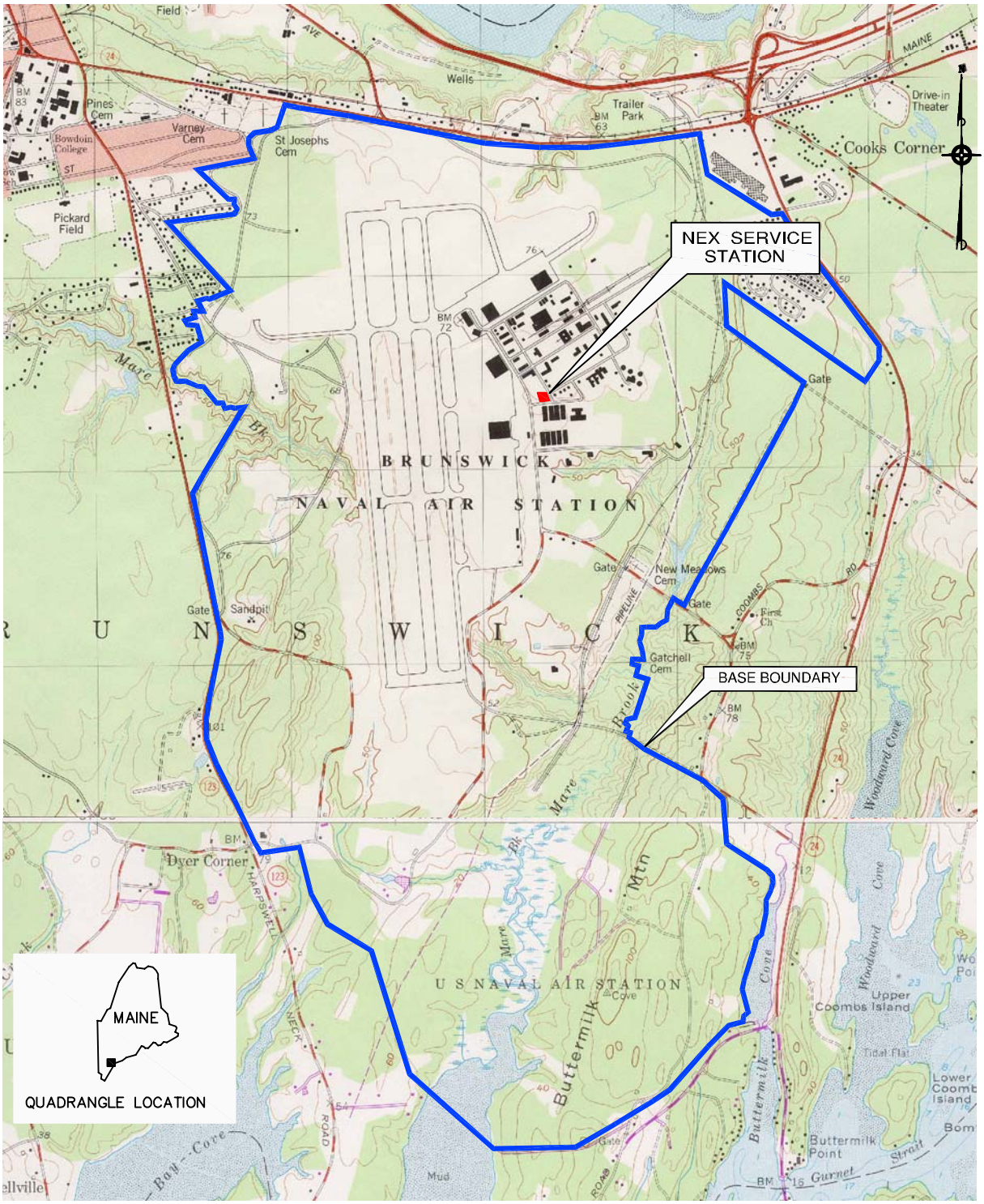
SOIL SUMMARY STATISTICS					
	Min. (0th Quartile)	1st Quartile	Median (2nd Quartile)	3rd Quartile	Max. (4th Quartile)
GRO Sep 2004	0	0	0	12	10000
GRO Mar 2005	0	0	13	52	11000
GRO Oct 2005	0	0	5.3	120	6100
VPH ARO Mar 2005	0	0	1.7	18.6	8240
VPH ARO Oct 2005	0	0	0	72.9	3333
VPH ALI Mar 2005	0	0	0	28	7000
VPH ALI Oct 2005	0	0	0	0	4000

Notes:

1. GRO - gasoline range organics, by Maine HETL Method 4.2.17 (mg/Kg).
2. VPH - volatile petroleum hydrocarbons, Massachusetts VPH Method (May 2004, rev. 1.1) (mg/Kg). Total VPH = sum of C5-C12 aliphatics, C9-C10 aromatics, and targeted VPH aromatics w/o MTBE.
3. Aro - C9-C10 aromatics & targeted analytes w/o MTBE. (mg/Kg).
4. Ali - C5-C8 & C9-C12 aliphatics (mg/Kg).
5. Non-detect values = 0 for statistical analysis. Data in mg/Kg.

Abbr: na - not applicable

FIGURES



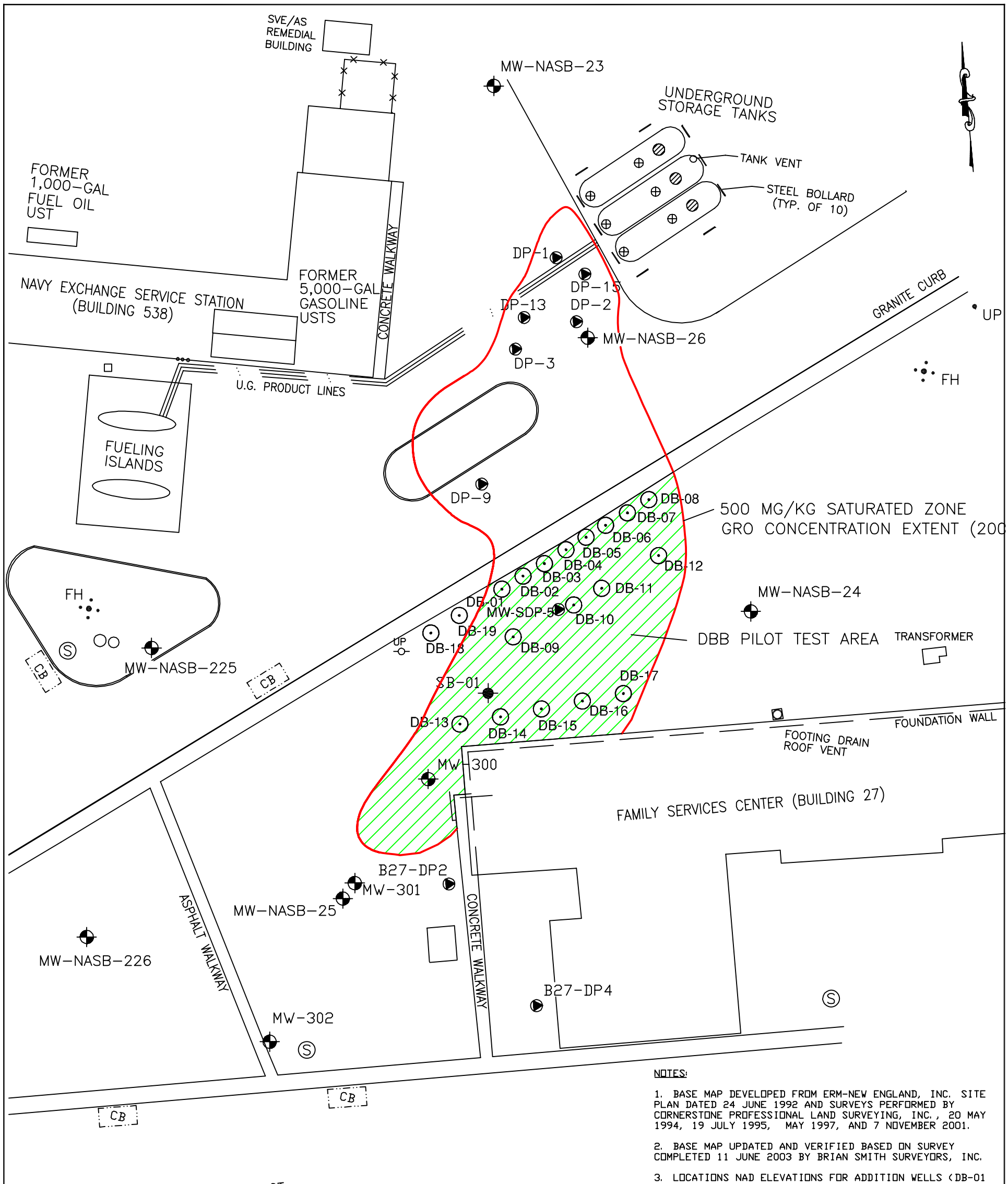
SOURCE: A PORTION OF THE FOLLOWING USGS QUADRANGLE SHEETS – BRUNSWICK, MAINE (1980) AND ORRS ISLAND, MAINE (1957, PHOTOREVISITED 1978)

1000′ 0′ 2000′ 4000′

TETRA TECH NUS, INC.

SITE LOCATION MAP
NAVY EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

SCALE	AS NOTED
FILE	\4590\W5206381D\FIG_1-1A.DWG
REV 0	DATE 01/18/06
FIGURE NUMBER	1-1



NOTES:

1. BASE MAP DEVELOPED FROM ERM-NEW ENGLAND, INC. SITE PLAN DATED 24 JUNE 1992 AND SURVEYS PERFORMED BY CORNERSTONE PROFESSIONAL LAND SURVEYING, INC., 20 MAY 1994, 19 JULY 1995, MAY 1997, AND 7 NOVEMBER 2001.

2. BASE MAP UPDATED AND VERIFIED BASED ON SURVEY COMPLETED 11 JUNE 2003 BY BRIAN SMITH SURVEYORS, INC.

3. LOCATIONS NAD ELEVATIONS FOR ADDITION WELLS (DB-01 TO DB-17) AND NEW MONITORING WELLS (MW-300, -301, -302) SURVEYED BY OEST ASSOCIATES, INC. ON NOVEMBER 2, 2004.

4. ADDITIONAL WELLS DB-18 AND DB-19 LOCATIONS APPROXIMATE.

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	UNDERGROUND STRUCTURE
	PILOT TEST AREA

GRAPHIC SCALE

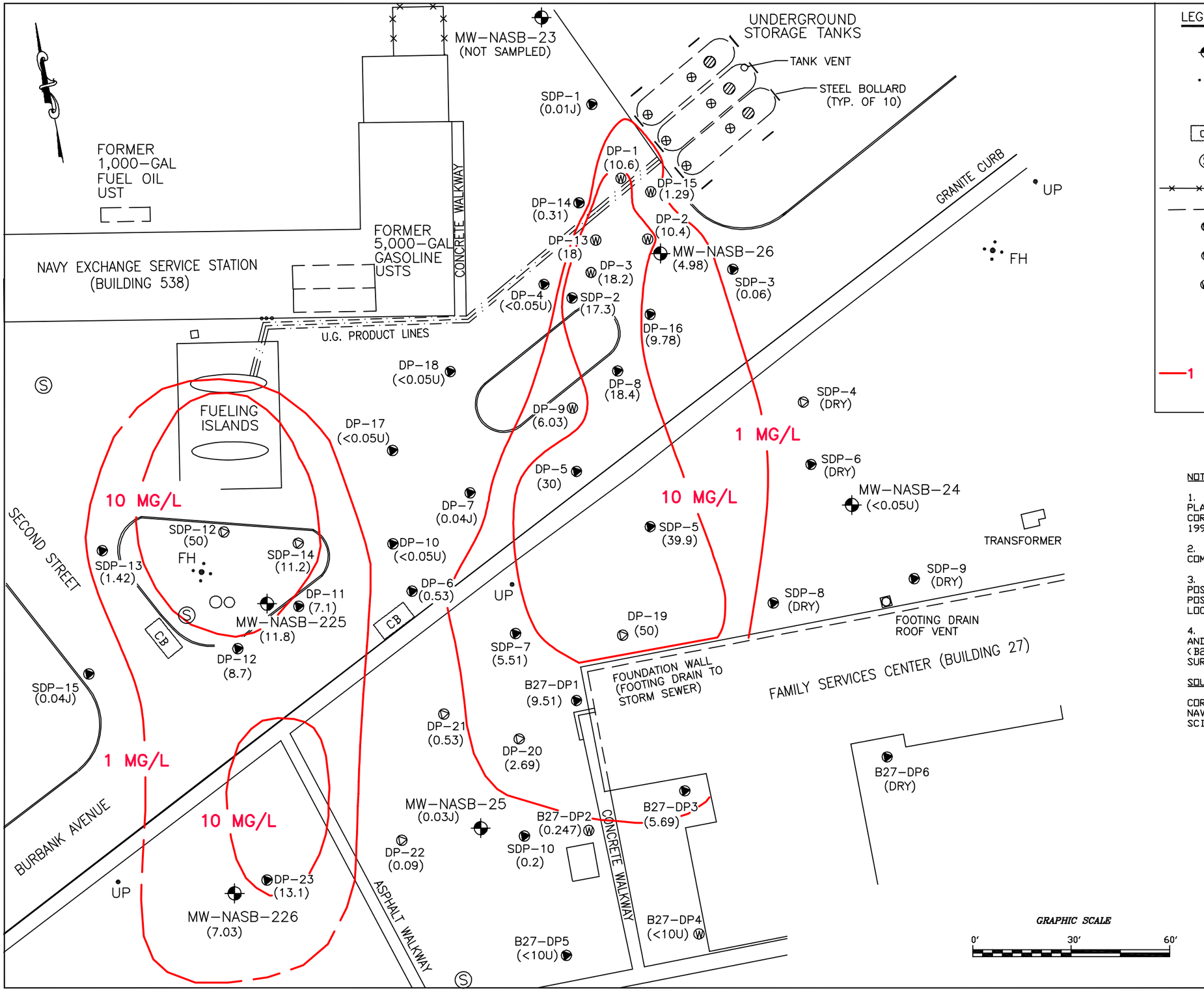
0' 30' 60'

TETRA TECH NUS, INC.

SITE PLAN & PILOT TEST
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
\4590\W5206381D\FIG_1-2.DWG	AS NOTED

FIGURE NUMBER	REV	DATE
1-2	0	01/18/06



LEGEND

- MONITORING WELL
- FH — FIRE HYDRANT WITH BOLLARDS
- UP — UTILITY POLE
- CB — STORMWATER CATCH BASIN
- MANHOLE
- EXISTING CHAIN LINK FENCE
- UNDERGROUND STRUCTURE
- DIRECT-PUSH SOIL BORING (LOCATION CONFIRMED BY SURVEY)
- DIRECT-PUSH SOIL BORING (LOCATION BASED ON FIELD NOTES)
- DIRECT-PUSH SOIL BORING COMPLETED AS 1.5-IN. FLUSH MOUNT MONITORING WELL

B27 = LIMITED DIRECT-PUSH INVESTIGATION AT BUILDING 27 (9-10 JUNE 2003).
DP = POST-ISCO DIRECT PUSH SOIL BORING (22-24 MAY 2002).
SDP = POST-ISCO SUPPLEMENTAL DIRECT-PUSH SOIL BORING (18-20 JUNE 2002).

1 MG/L — TOTAL DISSOLVED-PHASE TPH-GRO CONCENTRATION ISOPLETH (DASHED WHERE INFERRED)

NOTES:

1. BASE MAP DEVELOPED FROM ERM-NEW ENGLAND, INC. SITE PLAN DATED 24 JUNE 1992 AND SURVEYS PERFORMED BY CORNERSTONE PROFESSIONAL LAND SURVEYING, INC., 20 MAY 1994, 19 JULY 1995, MAY 1997, AND 7 NOVEMBER 2001.

2. BASE MAP UPDATED AND VERIFIED BASED ON SURVEY COMPLETED 18 JUNE 2003 BY BRIAN SMITH SURVEYORS, INC.

3. 1-IN. FLUSH MOUNTED MICRO-WELLS WERE INSTALLED AT POST-ISCO DIRECT-PUSH SOIL BORING LOCATION DP-19 AND POST-ISCO SUPPLEMENTAL DIRECT-PUSH SOIL BORING LOCATION SDP-5 ON 10 JUNE 2003.

4. NEWLY INSTALLED MICRO-WELLS (AT LOCATIONS DP-19 AND SPD-5) AND ALL B27 DIRECT-PUSH SOIL BORINGS (B27-DP1 THROUGH B27-DP6) WERE SURVEYED BY BRIAN SMITH SURVEYORS ON 10 JUNE 2003.

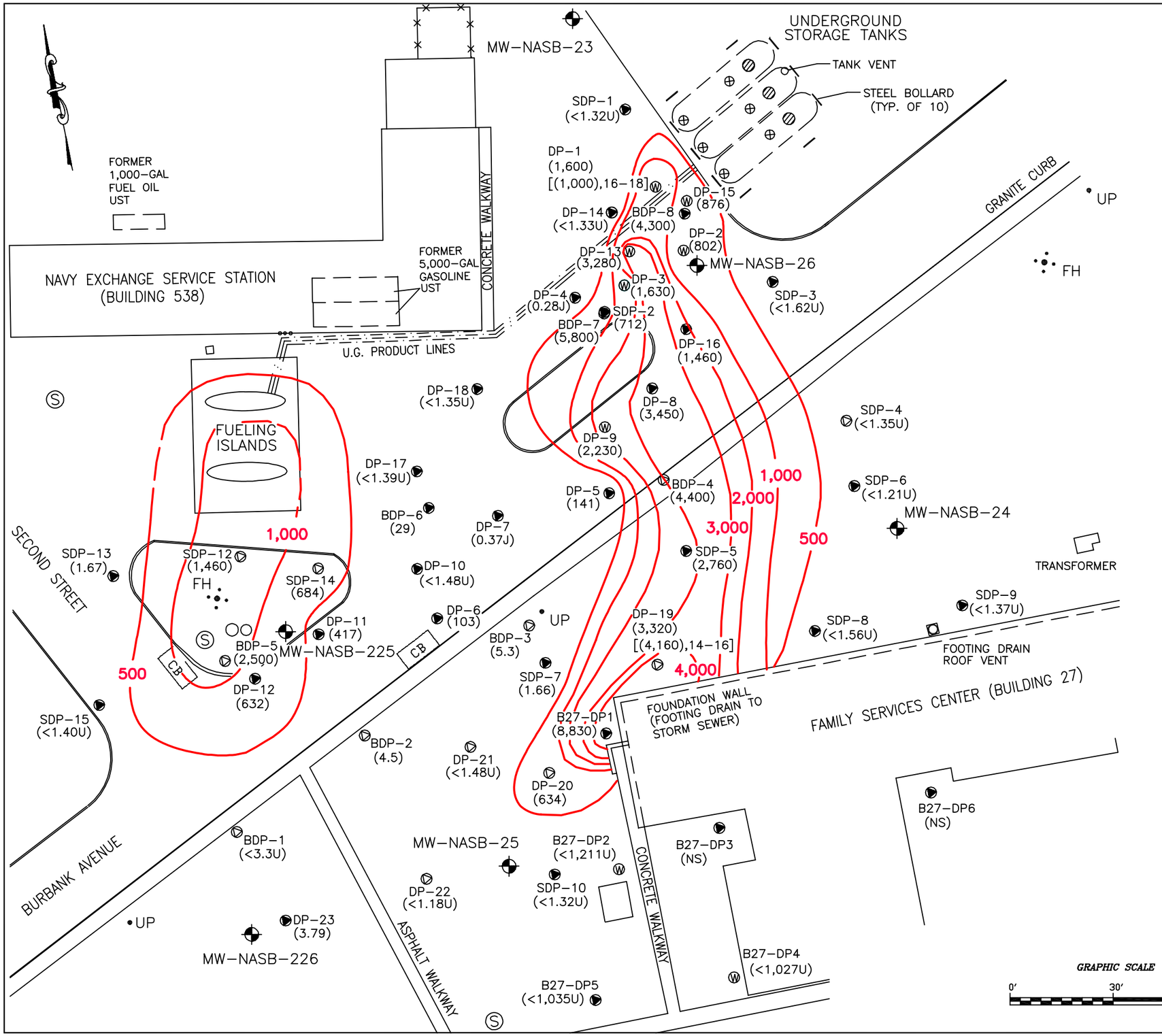
SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

TETRA TECH NUS, INC.

DISSOLVED-PHASE TPH-GRO CONCENTRATIONS
FOLLOWING IN-SITU CHEMICAL OXIDATION INJECTION
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE \4590\W5206381D\FIG_1-3.DWG	SCALE AS NOTED
FIGURE NUMBER 1-3	REV 2 — DATE 01/18/06



LEGEND

- MONITORING WELL
- FH — FIRE HYDRANT WITH BOLLARDS
- UP — UTILITY POLE
- CB — STORMWATER CATCH BASIN
- MANHOLE
- EXISTING CHAIN LINK FENCE
- UNDERGROUND STRUCTURE
- DIRECT-PUSH SOIL BORING (LOCATION CONFIRMED BY SURVEY)
- DIRECT-PUSH SOIL BORING (LOCATION BASED ON FIELD NOTES)
- DIRECT-PUSH SOIL BORING COMPLETED AS 1.5-IN FLUSH MOUNT MONITORING WELL
- DP-1 (1,600) [(1,000),16-18] — (TPH-GRO CONCENTRATION) (mg/kg) NS = NOT SAMPLED NOTE: UNLESS OTHERWISE NOTED, SOIL SAMPLING INTERVAL IS 8-12 FT BGS. [TPH-GRO CONCENTRATION AT 16-18 FT BGS]
- 500 — TOTAL SORBED-PHASE TPH-GRO CONCENTRATION ISOPLETH (DASHED WHERE INFERRED)

B27 = LIMITED DIRECT-PUSH INVESTIGATION AT BUILDING 27 (9-10 JUNE 2003).
BDP = BASELINE DIRECT-PUSH SOIL BORING (20 MARCH 2002).
DP = POST-ISCO DIRECT PUSH SOIL BORING (22-24 MAY 2002).
SDP = POST-ISCO SUPPLEMENTAL DIRECT-PUSH SOIL BORING (18-20 JUNE 2002).

NOTES:

1. BASE MAP DEVELOPED FROM ERM-NEW ENGLAND, INC. SITE PLAN DATED 24 JUNE 1992 AND SURVEYS PERFORMED BY CORNERSTONE PROFESSIONAL LAND SURVEYING, INC., 20 MAY 1994, 19 JULY 1995, MAY 1997, AND 7 NOVEMBER 2001.

2. BASE MAP UPDATED AND VERIFIED BASED ON SURVEY COMPLETED 11 JUNE 2003 BY BRIAN SMITH SURVEYORS, INC.

3. BASELINE DIRECT-PUSH POINTS MAY OVER-REPRESENT CURRENT SATURATED ZONE TPH-GRO CONCENTRATIONS. TPH-GRO CONCENTRATION ISOPLETHS WERE DEVELOPED PRIMARILY BASED ON POST-ISCO DIRECT-PUSH DATA (i.e., DP AND SDP SOIL BORINGS).

4. 1-IN. FLUSH MOUNTED MICRO-WELLS WERE INSTALLED AT POST-ISCO DIRECT-PUSH SOIL BORING LOCATION DP-19 AND POST-ISCO SUPPLEMENTAL DIRECT-PUSH SOIL BORING LOCATION SDP-5 ON 10 JUNE 2003.

5. NEWLY INSTALLED MICRO-WELLS (AT LOCATIONS DP-19 AND SPD-5) AND ALL B27 DIRECT-PUSH SOIL BORINGS (B27-DP1 THROUGH B27-DP6) WERE SURVEYED BY BRIAN SMITH SURVEYORS ON 10 JUNE 2003.

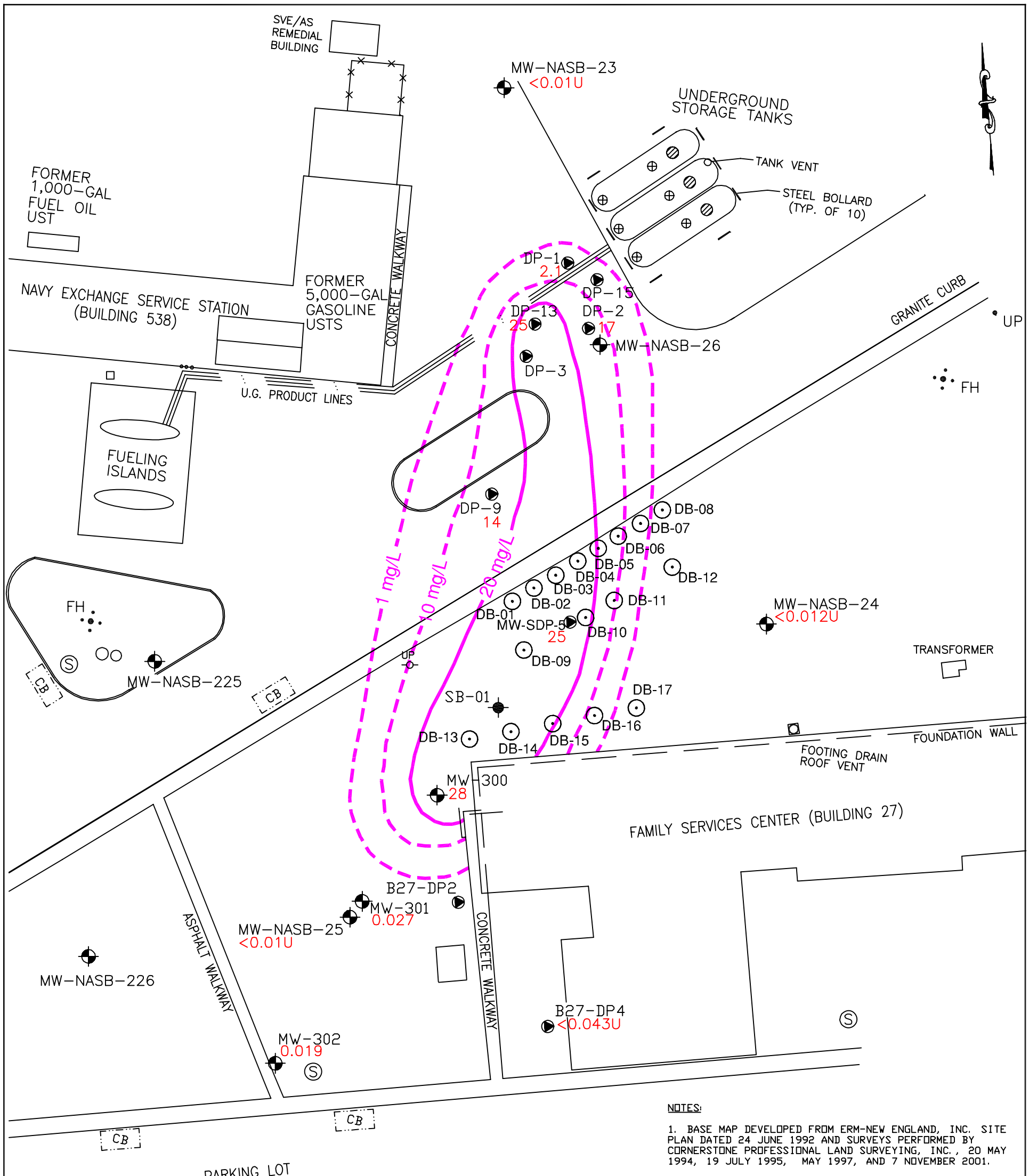
SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

TETRA TECH NUS, INC.

SATURATED ZONE SOIL TPH-GRO CONCENTRATIONS
FOLLOWING IN-SITU CHEMICAL OXIDATION INJECTION
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE \4590\W52063B1D\FIG_1-4.DWG	SCALE AS NOTED
FIGURE NUMBER 1-4	REV 2 — DATE 01/25/06



NOTES:

1. BASE MAP DEVELOPED FROM ERM-NEW ENGLAND, INC. SITE PLAN DATED 24 JUNE 1992 AND SURVEYS PERFORMED BY CORNERSTONE PROFESSIONAL LAND SURVEYING, INC., 20 MAY 1994, 19 JULY 1995, MAY 1997, AND 7 NOVEMBER 2001.

2. BASE MAP UPDATED AND VERIFIED BASED ON SURVEY COMPLETED 11 JUNE 2003 BY BRIAN SMITH SURVEYORS, INC.

3. LOCATIONS NAD ELEVATIONS FOR ADDITION WELLS (DB-01 TO DB-17) AND NEW MONITORING WELLS (MW-300, -301, -302) SURVEYED BY DEST ASSOCIATES, INC. ON NOVEMBER 2, 2004.

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	EXISTING CHAIN LINK FENCE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL GRO CONCENTRATION IN GROUNDWATER (mg/L) – DASHED WHERE ESTIMATED

GRAPHIC SCALE

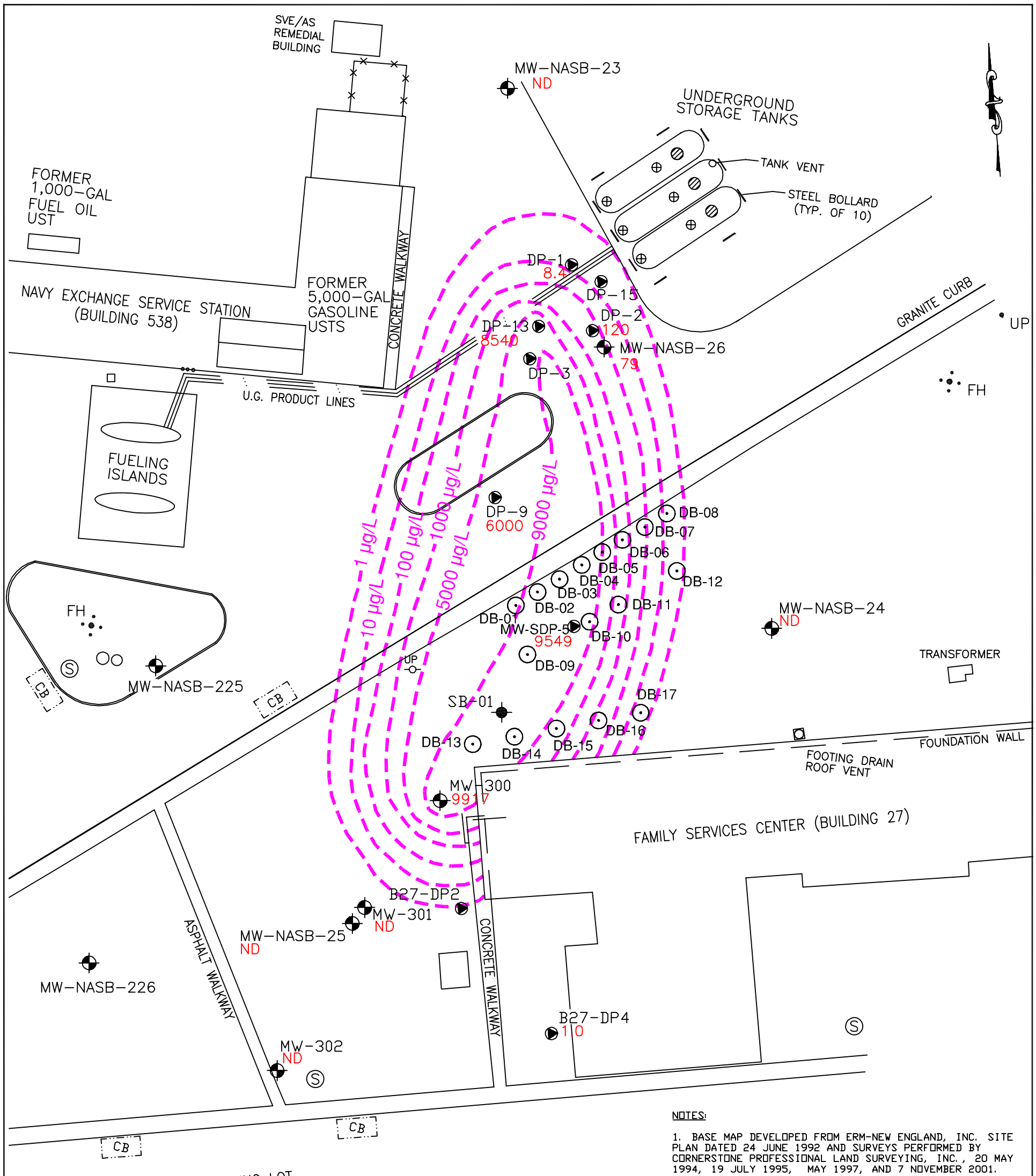
0' 30' 60'

TETRA TECH NUS, INC.

BASELINE 2004 DISSOLVED PHASE GRO CONCENTRATIONS IN GROUNDWATER
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
\4590\W5206381D\FIG_1-5.DWG	AS NOTED

FIGURE NUMBER	REV	DATE
1-5	0	01/18/06



NOTES:

1. BASE MAP DEVELOPED FROM ERM-NEW ENGLAND, INC. SITE PLAN DATED 24 JUNE 1992 AND SURVEYS PERFORMED BY CORNERSTONE PROFESSIONAL LAND SURVEYING, INC., 20 MAY 1994, 19 JULY 1995, MAY 1997, AND 7 NOVEMBER 2001.

2. BASE MAP UPDATED AND VERIFIED BASED ON SURVEY COMPLETED 11 JUNE 2003 BY BRIAN SMITH SURVEYORS, INC.

3. LOCATIONS NAD ELEVATIONS FOR ADDITION WELLS (DB-01 TO DB-17) AND NEW MONITORING WELLS (MW-300, -301, -302) SURVEYED BY DEST ASSOCIATES, INC. ON NOVEMBER 2, 2004.

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	EXISTING CHAIN LINK FENCE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL BTEX CONCENTRATION IN GROUNDWATER (µg/L) – DASHED WHERE ESTIMATED

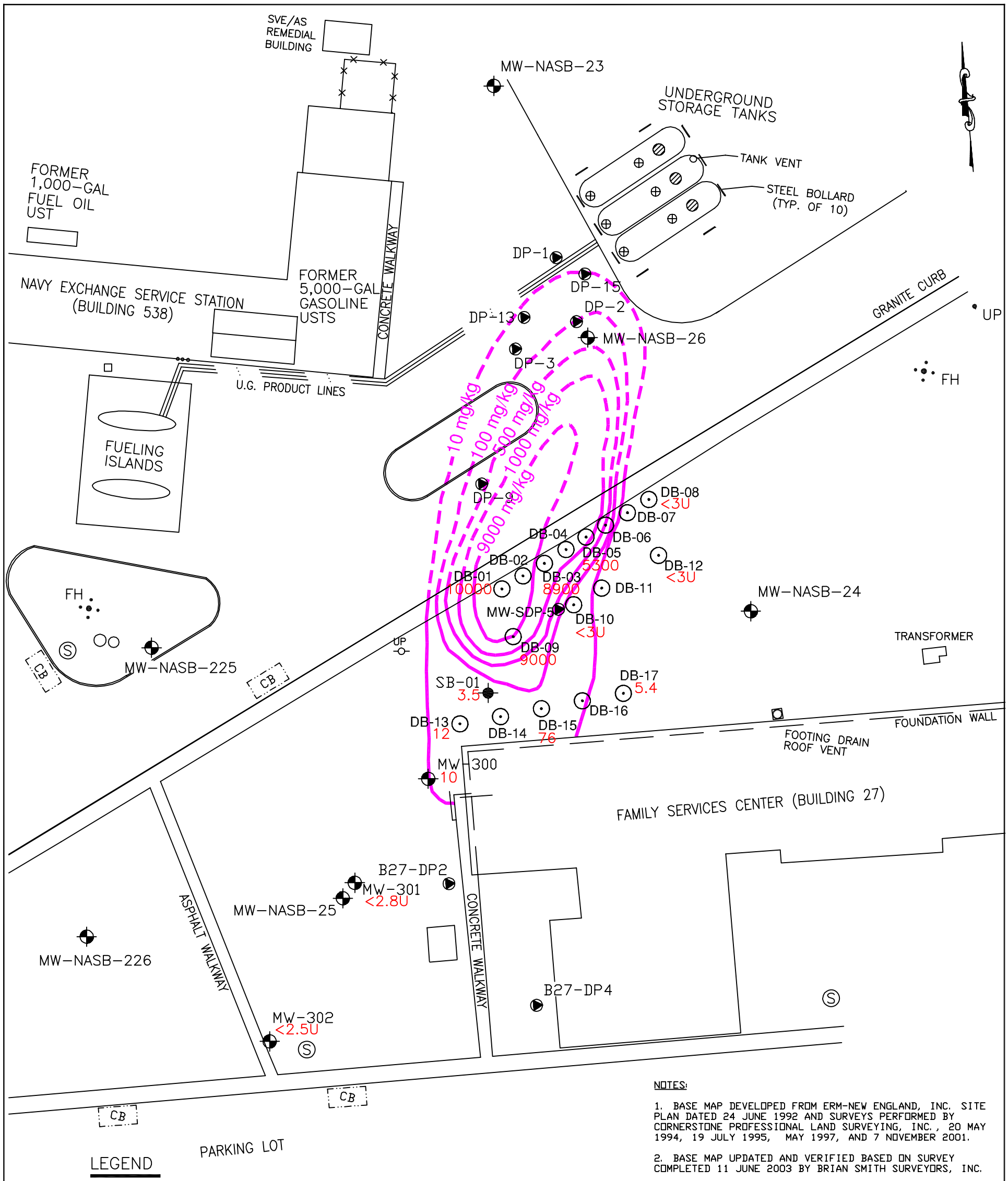
GRAPHIC SCALE

0′ 30′ 60′

TETRA TECH NUS, INC.

BASELINE (2004) DISSOLVED PHASE BTEX CONCENTRATIONS IN GROUNDWATER
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
\4590\W5206381D\FIG_1-6.DWG	AS NOTED
FIGURE NUMBER 1-6	REV 0 / DATE 01/18/06



LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	EXISTING CHAIN LINK FENCE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL GRO CONCENTRATION IN SOIL (mg/kg) – DASHED WHERE ESTIMATED

GRAPHIC SCALE

0′ 30′ 60′

NOTES:

1. BASE MAP DEVELOPED FROM ERM-NEW ENGLAND, INC. SITE PLAN DATED 24 JUNE 1992 AND SURVEYS PERFORMED BY CORNERSTONE PROFESSIONAL LAND SURVEYING, INC., 20 MAY 1994, 19 JULY 1995, MAY 1997, AND 7 NOVEMBER 2001.

2. BASE MAP UPDATED AND VERIFIED BASED ON SURVEY COMPLETED 11 JUNE 2003 BY BRIAN SMITH SURVEYORS, INC.

3. LOCATIONS NAD ELEVATIONS FOR ADDITION WELLS (DB-01 TO DB-17) AND NEW MONITORING WELLS (MW-300, -301, -302) SURVEYED BY DEST ASSOCIATES, INC. ON NOVEMBER 2, 2004.

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

TETRA TECH NUS, INC.

BASELINE (2004) SOIL GRO CONCENTRATIONS
UPPER SATURATED ZONE
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
\4590\W5206381D\FIG_1-7.DWG	AS NOTED

FIGURE NUMBER	REV	DATE
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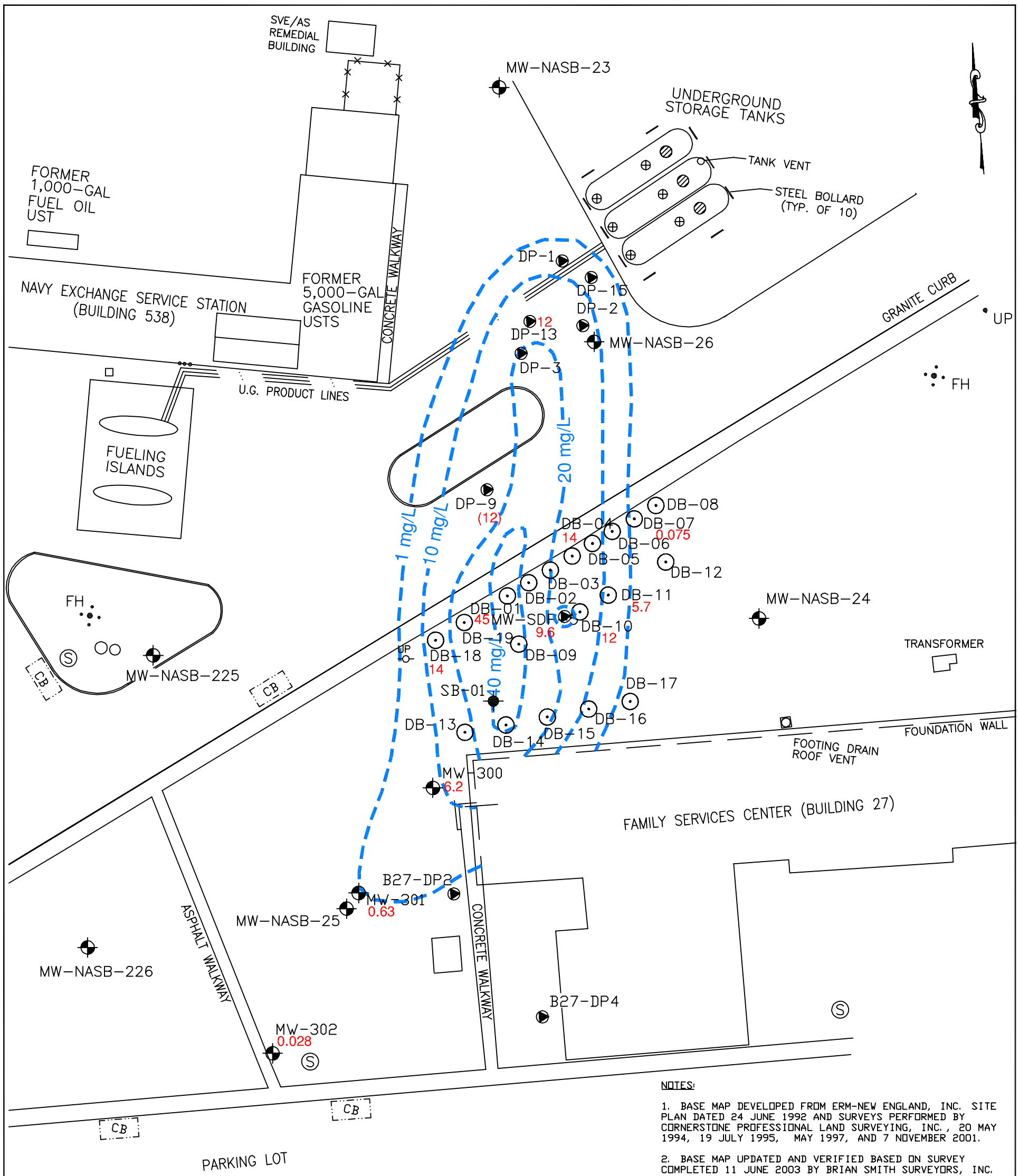


LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004/2005)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL GRO CONCENTRATION IN GROUNDWATER (mg/L) – DASHED WHERE ESTIMATED

GRAPHIC SCALE

0' 30' 60'

NOTES:

1. BASE MAP DEVELOPED FROM ERM-NEW ENGLAND, INC. SITE PLAN DATED 24 JUNE 1992 AND SURVEYS PERFORMED BY CORNERSTONE PROFESSIONAL LAND SURVEYING, INC., 20 MAY 1994, 19 JULY 1995, MAY 1997, AND 7 NOVEMBER 2001.

2. BASE MAP UPDATED AND VERIFIED BASED ON SURVEY COMPLETED 11 JUNE 2003 BY BRIAN SMITH SURVEYORS, INC.

3. LOCATIONS NAD ELEVATIONS FOR ADDITION WELLS (DB-01 TO DB-17) AND NEW MONITORING WELLS (MW-300, -301, -302) SURVEYED BY DEST ASSOCIATES, INC. ON NOVEMBER 2, 2004.

4. ADDITIONAL WELLS DB-18 AND DB-19 LOCATIONS APPROXIMATE.

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

TETRA TECH NUS, INC.

ROUND 1 (MARCH 2005) GROUNDWATER GRO CONCENTRATIONS

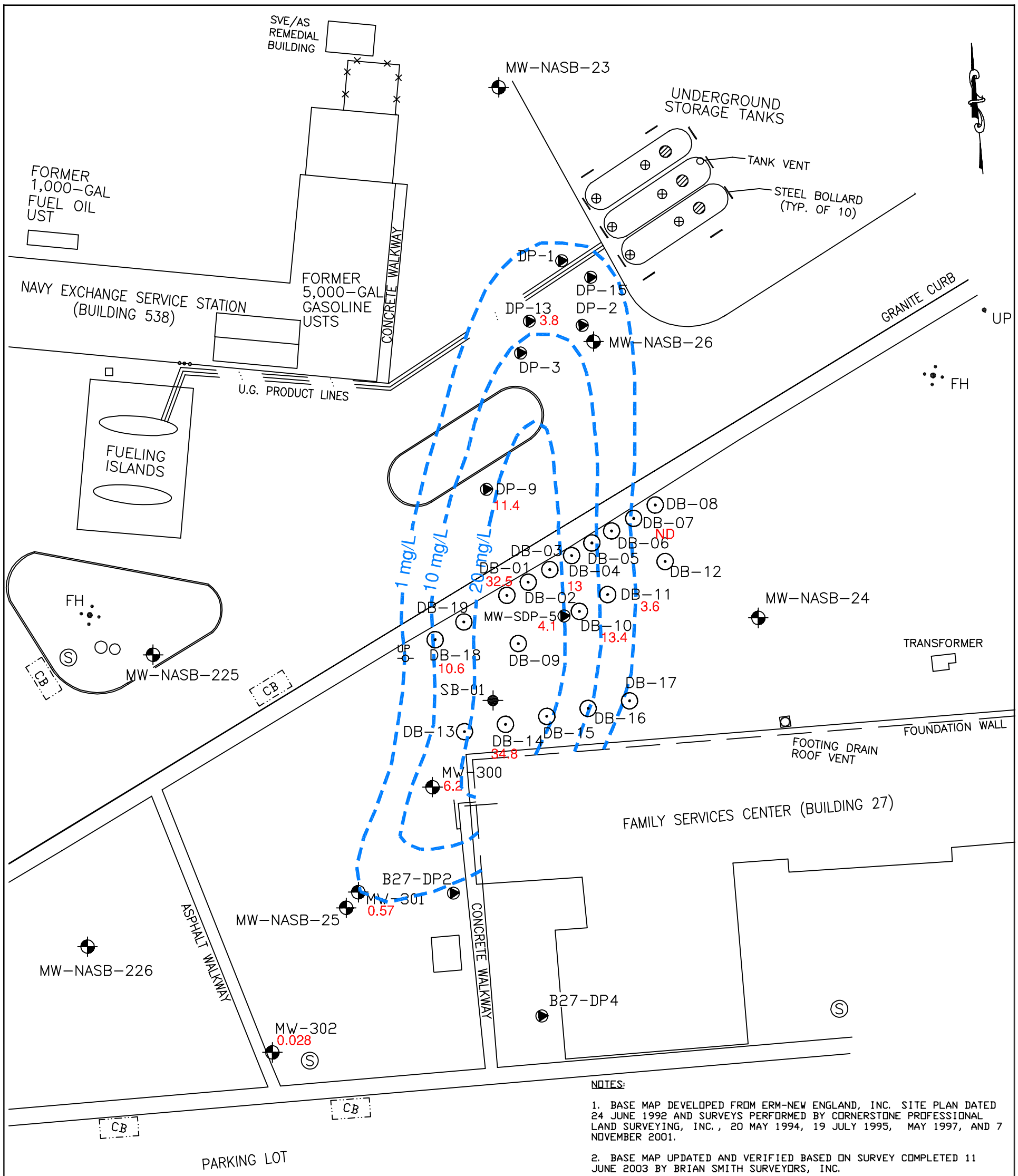
NAVAL EXCHANGE SERVICE STATION

US NAVY NAVFAC EFANE

NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
\4590\W5206381D\FIG_1-8.DWG	AS NOTED

FIGURE NUMBER	REV	DATE
1-8	0	01/18/06



NOTES:

1. BASE MAP DEVELOPED FROM ERM-NEW ENGLAND, INC. SITE PLAN DATED 24 JUNE 1992 AND SURVEYS PERFORMED BY CORNERSTONE PROFESSIONAL LAND SURVEYING, INC., 20 MAY 1994, 19 JULY 1995, MAY 1997, AND 7 NOVEMBER 2001.

2. BASE MAP UPDATED AND VERIFIED BASED ON SURVEY COMPLETED 11 JUNE 2003 BY BRIAN SMITH SURVEYORS, INC.

3. LOCATIONS NAD ELEVATIONS FOR ADDITION WELLS (DB-01 TO DB-17) AND NEW MONITORING WELLS (MW-300,-301,-302) SURVEYED BY DEST ASSOCIATES, INC. ON NOVEMBER 2, 2004.

4. ADDITIONAL WELLS DB-18 AND DB-19 LOCATIONS APPROXIMATE.

5. VPH - MASSACHUSETTS VOLATILE PETROLEUM HYDROCARBON METHOD

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004/2005)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL VPH AROMATICS CONCENTRATION IN GROUNDWATER (mg/L) - DASHED WHERE ESTIMATED

GRAPHIC SCALE

0' 30' 60'

TETRA TECH NUS, INC.

ROUND 1 (MARCH 2005) GROUNDWATER
VPH AROMATIC HYDROCARBON CONCENTRATIONS
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
\4590\W5206381D\FIG_3-2.DWG	AS NOTED

FIGURE NUMBER	REV	DATE
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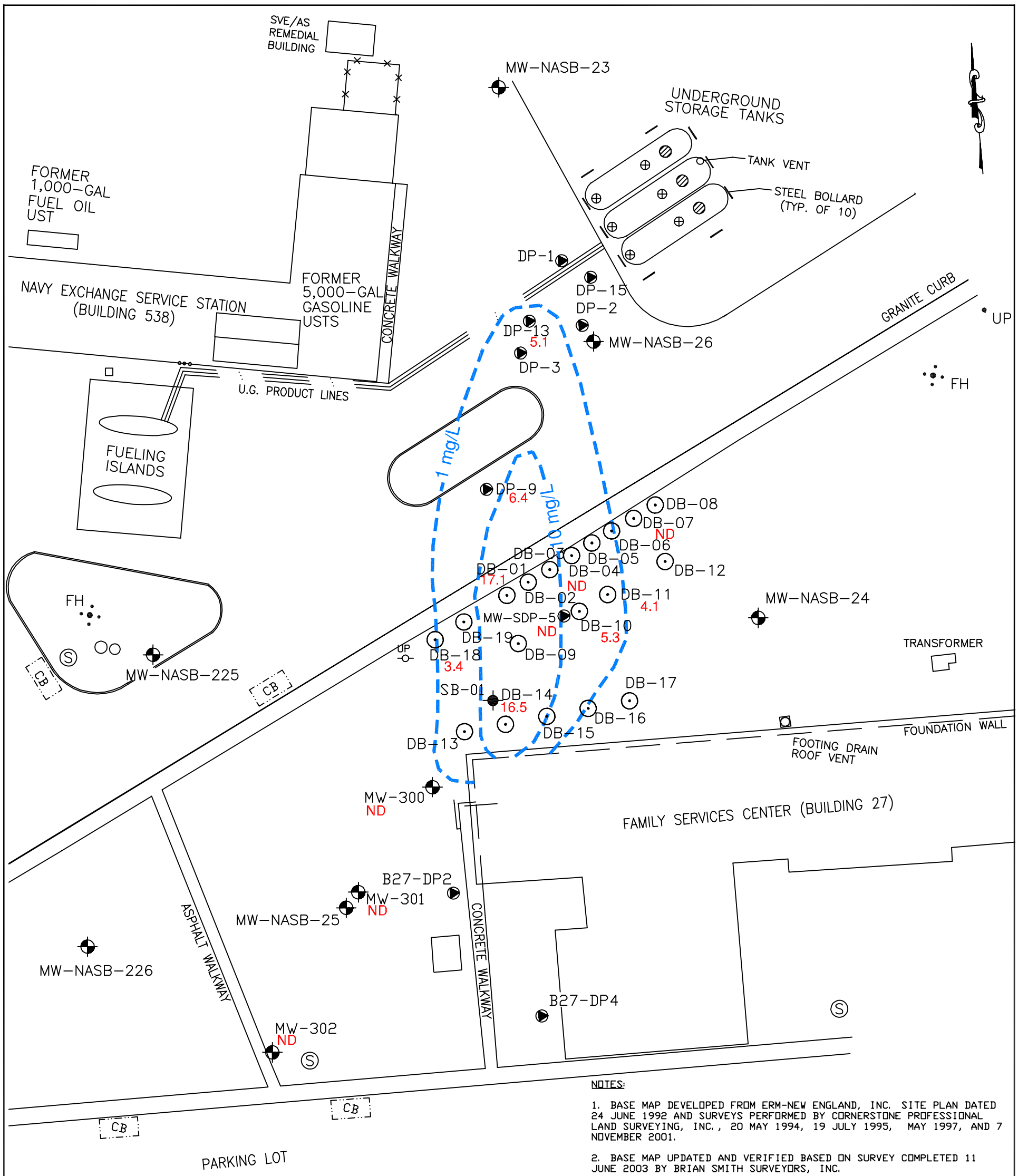

NOTES:

1. BASE MAP DEVELOPED FROM ERM-NEW ENGLAND, INC. SITE PLAN DATED 24 JUNE 1992 AND SURVEYS PERFORMED BY CORNERSTONE PROFESSIONAL LAND SURVEYING, INC., 20 MAY 1994, 19 JULY 1995, MAY 1997, AND 7 NOVEMBER 2001.

2. BASE MAP UPDATED AND VERIFIED BASED ON SURVEY COMPLETED 11 JUNE 2003 BY BRIAN SMITH SURVEYORS, INC.

3. LOCATIONS NAD ELEVATIONS FOR ADDITION WELLS (DB-01 TO DB-17) AND NEW MONITORING WELLS (MW-300,-301,-302) SURVEYED BY DEST ASSOCIATES, INC. ON NOVEMBER 2, 2004.

4. ADDITIONAL WELLS DB-18 AND DB-19 LOCATIONS APPROXIMATE.

5. VPH - MASSACHUSETTS VOLATILE PETROLEUM HYDROCARBON METHOD

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004/2005)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL VPH ALIPHATIC (C5-C8,C9-C12) CONCENTRATION IN GROUNDWATER (mg/L) - DASHED WHERE ESTIMATED

GRAPHIC SCALE

0' 30' 60'

TETRA TECH NUS, INC.

ROUND 1 (MARCH 2005) GROUNDWATER
VPH ALIPHATIC HYDROCARBON CONCENTRATIONS
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
\4590\W5206381D\FIG_1-10.DWG	AS NOTED

FIGURE NUMBER	REV	DATE
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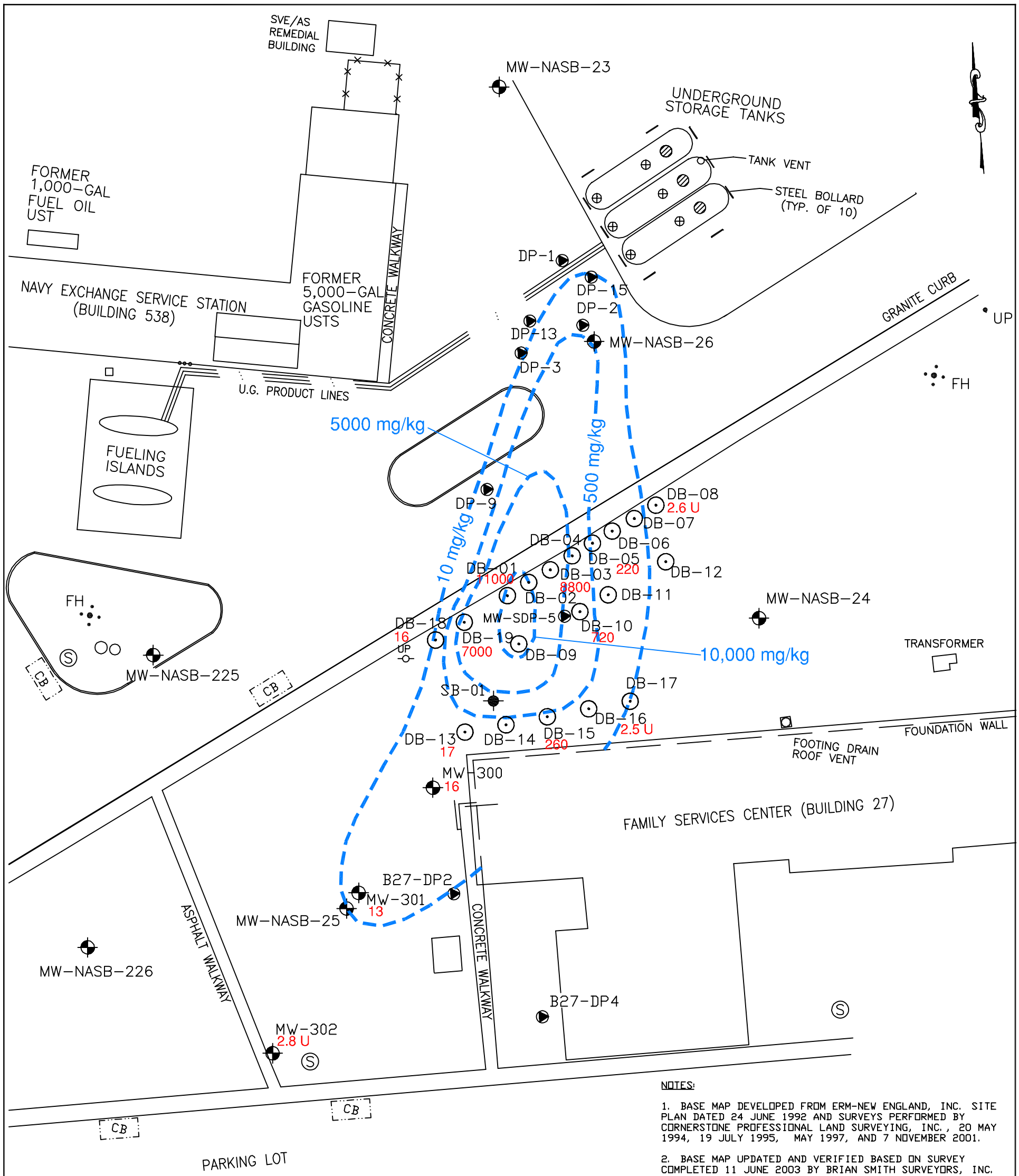


LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004/2005)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL GRO CONCENTRATION IN SOIL (mg/kg) – DASHED WHERE ESTIMATED

GRAPHIC SCALE

0' 30' 60'

NOTES:

1. BASE MAP DEVELOPED FROM ERM-NEW ENGLAND, INC. SITE PLAN DATED 24 JUNE 1992 AND SURVEYS PERFORMED BY CORNERSTONE PROFESSIONAL LAND SURVEYING, INC., 20 MAY 1994, 19 JULY 1995, MAY 1997, AND 7 NOVEMBER 2001.

2. BASE MAP UPDATED AND VERIFIED BASED ON SURVEY COMPLETED 11 JUNE 2003 BY BRIAN SMITH SURVEYORS, INC.

3. LOCATIONS NAD ELEVATIONS FOR ADDITION WELLS (DB-01 TO DB-17) AND NEW MONITORING WELLS (MW-300, -301, -302) SURVEYED BY DEST ASSOCIATES, INC. ON NOVEMBER 2, 2004.

4. ADDITIONAL WELLS DB-18 AND DB-19 LOCATIONS APPROXIMATE.

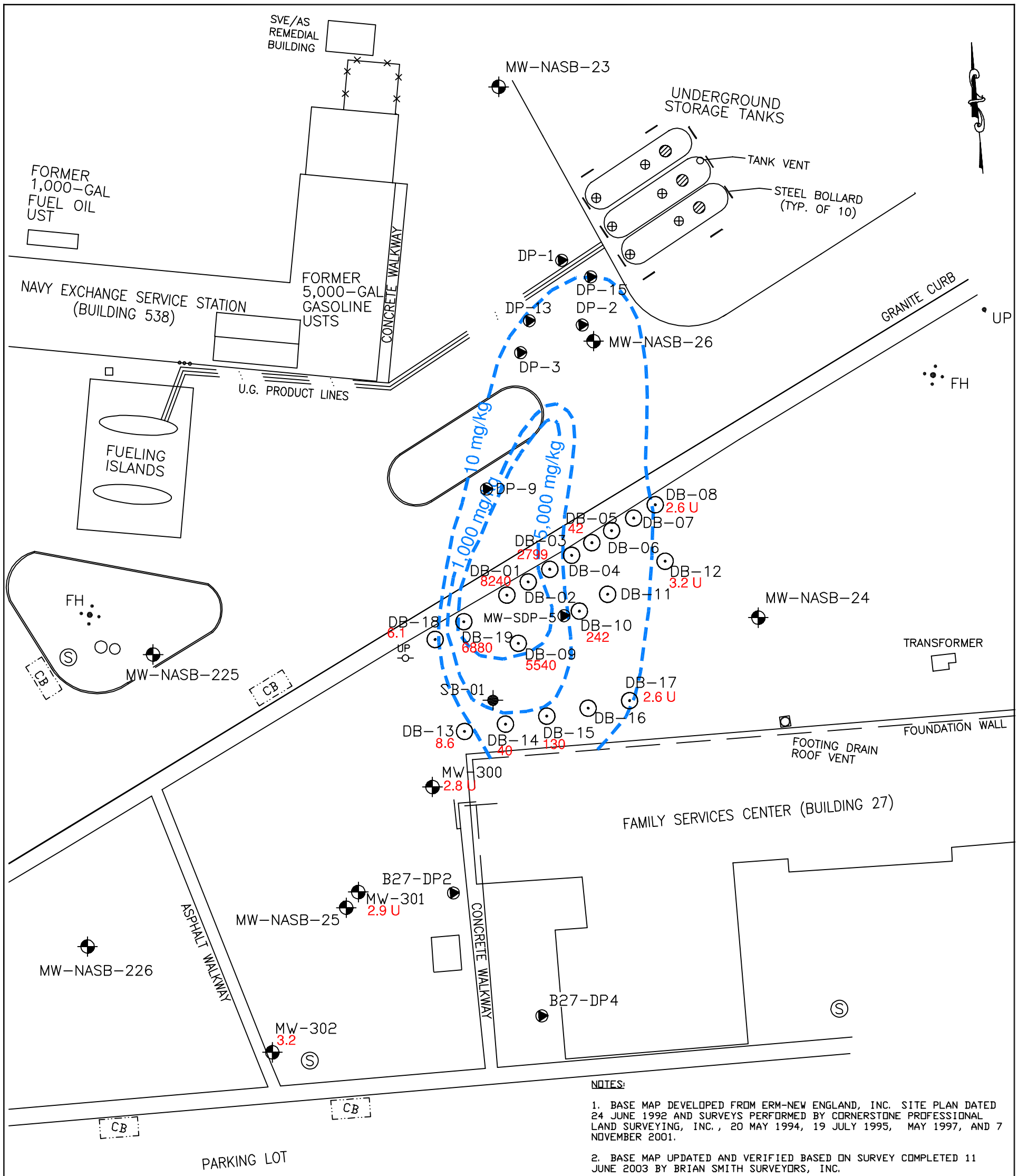
SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

TETRA TECH NUS, INC.

ROUND 1 (MARCH 2005) SOIL GRO CONCENTRATIONS
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
\4590\W5206381D\FIG_3-4.DWG	AS NOTED
FIGURE NUMBER 1-11	REV 0 / DATE 01/18/06



NOTES:

1. BASE MAP DEVELOPED FROM ERM-NEW ENGLAND, INC. SITE PLAN DATED 24 JUNE 1992 AND SURVEYS PERFORMED BY CORNERSTONE PROFESSIONAL LAND SURVEYING, INC., 20 MAY 1994, 19 JULY 1995, MAY 1997, AND 7 NOVEMBER 2001.

2. BASE MAP UPDATED AND VERIFIED BASED ON SURVEY COMPLETED 11 JUNE 2003 BY BRIAN SMITH SURVEYORS, INC.

3. LOCATIONS NAD ELEVATIONS FOR ADDITION WELLS (DB-01 TO DB-17) AND NEW MONITORING WELLS (MW-300,-301,-302) SURVEYED BY DEST ASSOCIATES, INC. ON NOVEMBER 2, 2004.

4. ADDITIONAL WELLS DB-18 AND DB-19 LOCATIONS APPROXIMATE.

5. VPH - MASSACHUSETTS VOLATILE PETROLEUM HYDROCARBON METHOD

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004/2005)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL VPH AROMATICS CONCENTRATION IN SOIL (mg/kg) - DASHED WHERE ESTIMATED

GRAPHIC SCALE

0' 30' 60'

TETRA TECH NUS, INC.

ROUND 1 (MARCH 2005) SOIL
VPH AROMATIC HYDROCARBON CONCENTRATIONS
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
\4590\W5206381D\FIG_1-12.DWG	AS NOTED

FIGURE NUMBER	REV	DATE
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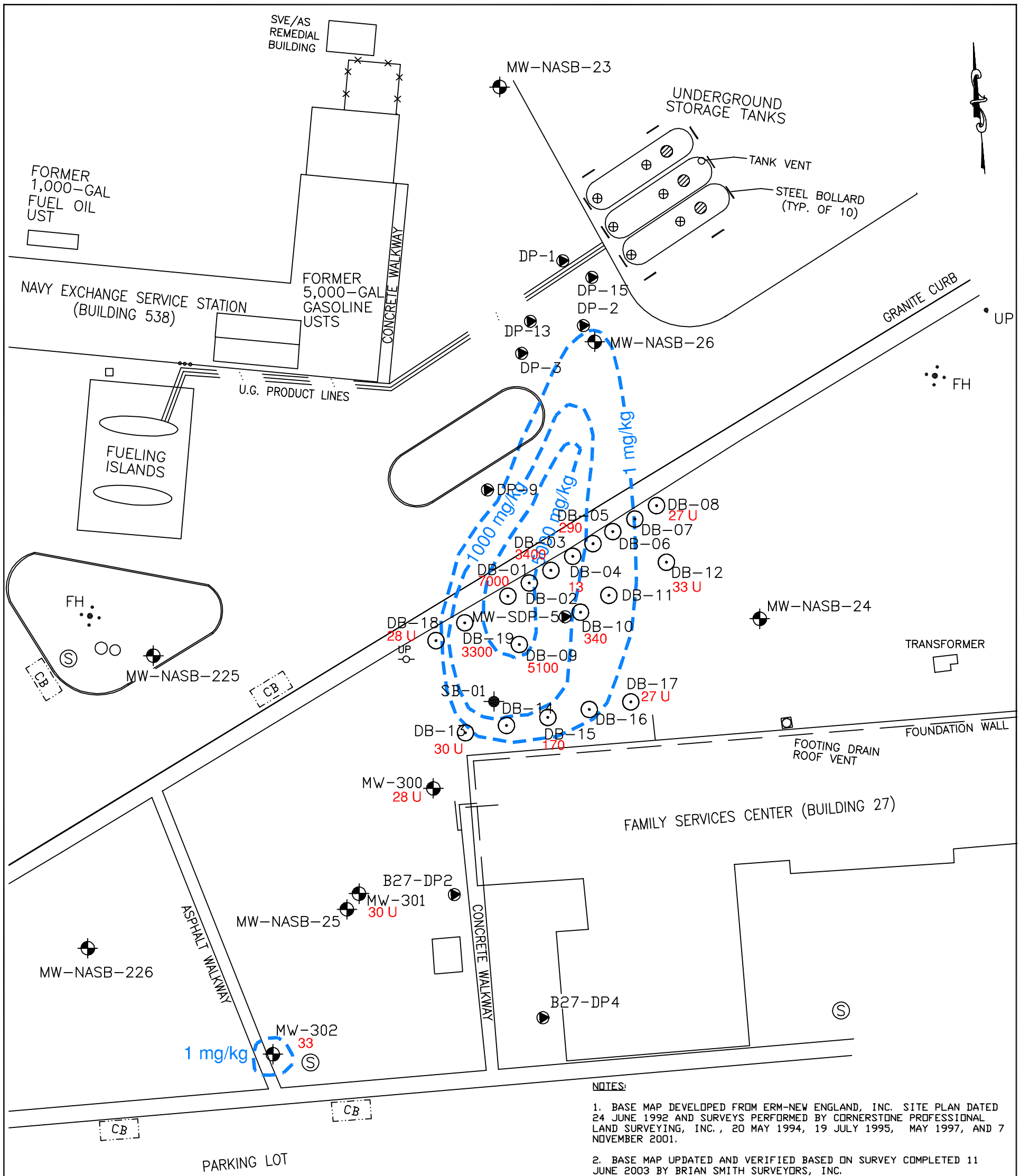


NOTES:

1. BASE MAP DEVELOPED FROM ERM-NEW ENGLAND, INC. SITE PLAN DATED 24 JUNE 1992 AND SURVEYS PERFORMED BY CORNERSTONE PROFESSIONAL LAND SURVEYING, INC., 20 MAY 1994, 19 JULY 1995, MAY 1997, AND 7 NOVEMBER 2001.

2. BASE MAP UPDATED AND VERIFIED BASED ON SURVEY COMPLETED 11 JUNE 2003 BY BRIAN SMITH SURVEYORS, INC.

3. LOCATIONS NAD ELEVATIONS FOR ADDITION WELLS (DB-01 TO DB-17) AND NEW MONITORING WELLS (MW-300,-301,-302) SURVEYED BY DEST ASSOCIATES, INC. ON NOVEMBER 2, 2004.

4. ADDITIONAL WELLS DB-18 AND DB-19 LOCATIONS APPROXIMATE.

5. VPH - MASSACHUSETTS VOLATILE PETROLEUM HYDROCARBON METHOD

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004/2005)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
—— ——	UNDERGROUND STRUCTURE
———	LINE OF EQUAL VPH ALIPHATIC (C5-C8,C9-C12) CONCENTRATION IN SOIL (mg/kg) - DASHED WHERE ESTIMATED

GRAPHIC SCALE

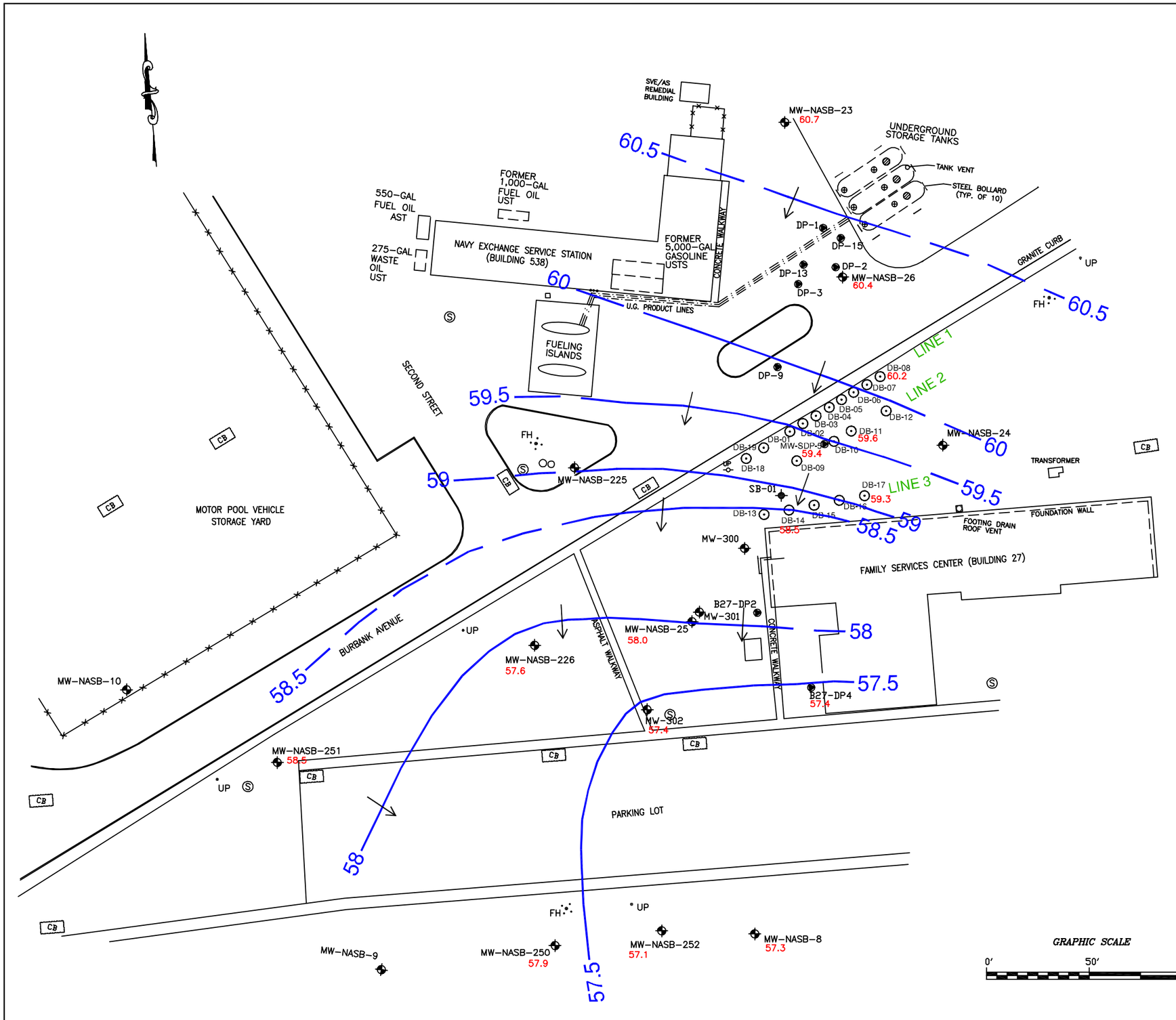
0' 30' 60'

TETRA TECH NUS, INC.

ROUND 1 (MARCH 2005) SOIL
VPH ALIPHATIC HYDROCARBON CONCENTRATIONS
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
\4590\W5206381D\FIG_3-6.DWG	AS NOTED

FIGURE NUMBER	REV	DATE
1-13	0	01/18/06



LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	EXISTING CHAIN LINK FENCE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL WATER TABLE ELEVATION IN FEET, OCTOBER 20, 2005 DASHED WHERE INFERRED
60.2	ELEVATION (FEET) NGVD 1929
	GROUNDWATER FLOW DIRECTION

NOTES:

1. BASE MAP DEVELOPED FROM ERM-NEW ENGLAND, INC. SITE PLAN DATED 24 JUNE 1992 AND SURVEYS PERFORMED BY CORNERSTONE PROFESSIONAL LAND SURVEYING, INC., 20 MAY 1994, 19 JULY 1995, MAY 1997, AND 7 NOVEMBER 2001.

2. BASE MAP UPDATED AND VERIFIED BASED ON SURVEY COMPLETED 11 JUNE 2003 BY BRIAN SMITH SURVEYORS, INC.

3. LOCATIONS AND ELEVATIONS FOR ADDITION WELLS (DB-01 TO DB-17) AND NEW MONITORING WELLS (MW-300,-301,-302) SURVEYED BY DEST ASSOCIATES, INC. ON NOVEMBER 2, 2004.

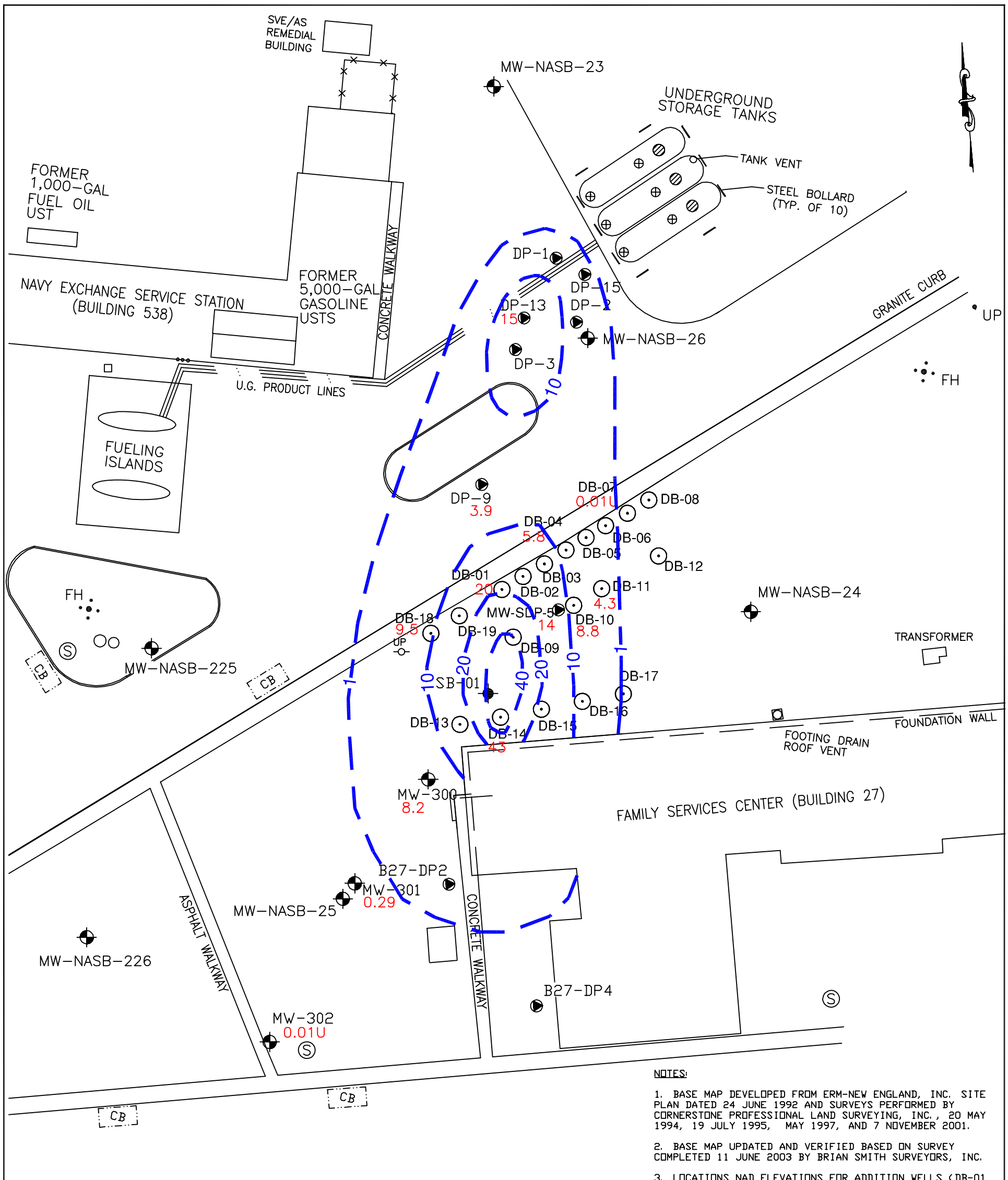
SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

TETRA TECH NUS, INC.

WATER TABLE SURFACE – OCTOBER 2005
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE DWG\4590\W5206381D\FIG_2-1.DWG	SCALE AS NOTED	
FIGURE NUMBER 2-1	REV 0	DATE 01/25/06



NOTES:

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2. BASE MAP UPDATED AND VERIFIED BASED ON SURVEY COMPLETED 11 JUNE 2003 BY BRIAN SMITH SURVEYORS, INC.

3. LOCATIONS NAD ELEVATIONS FOR ADDITION WELLS (DB-01 TO DB-17) AND NEW MONITORING WELLS (MW-300, -301, -302) SURVEYED BY DEST ASSOCIATES, INC. ON NOVEMBER 2, 2004.

4. ADDITIONAL WELLS DB-18 AND DB-19 LOCATIONS APPROXIMATE.

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL GRO CONCENTRATION IN GROUNDWATER (mg/L) – DASHED WHERE APPROXIMATE

GRAPHIC SCALE

0' 30' 60'

TETRA TECH NUS, INC.

ROUND 2 (OCTOBER 2005)
GROUNDWATER GRO CONCENTRATIONS
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
DWG\4590\W5206381D\FIG_3-1.DWG	AS NOTED

FIGURE NUMBER	REV	DATE
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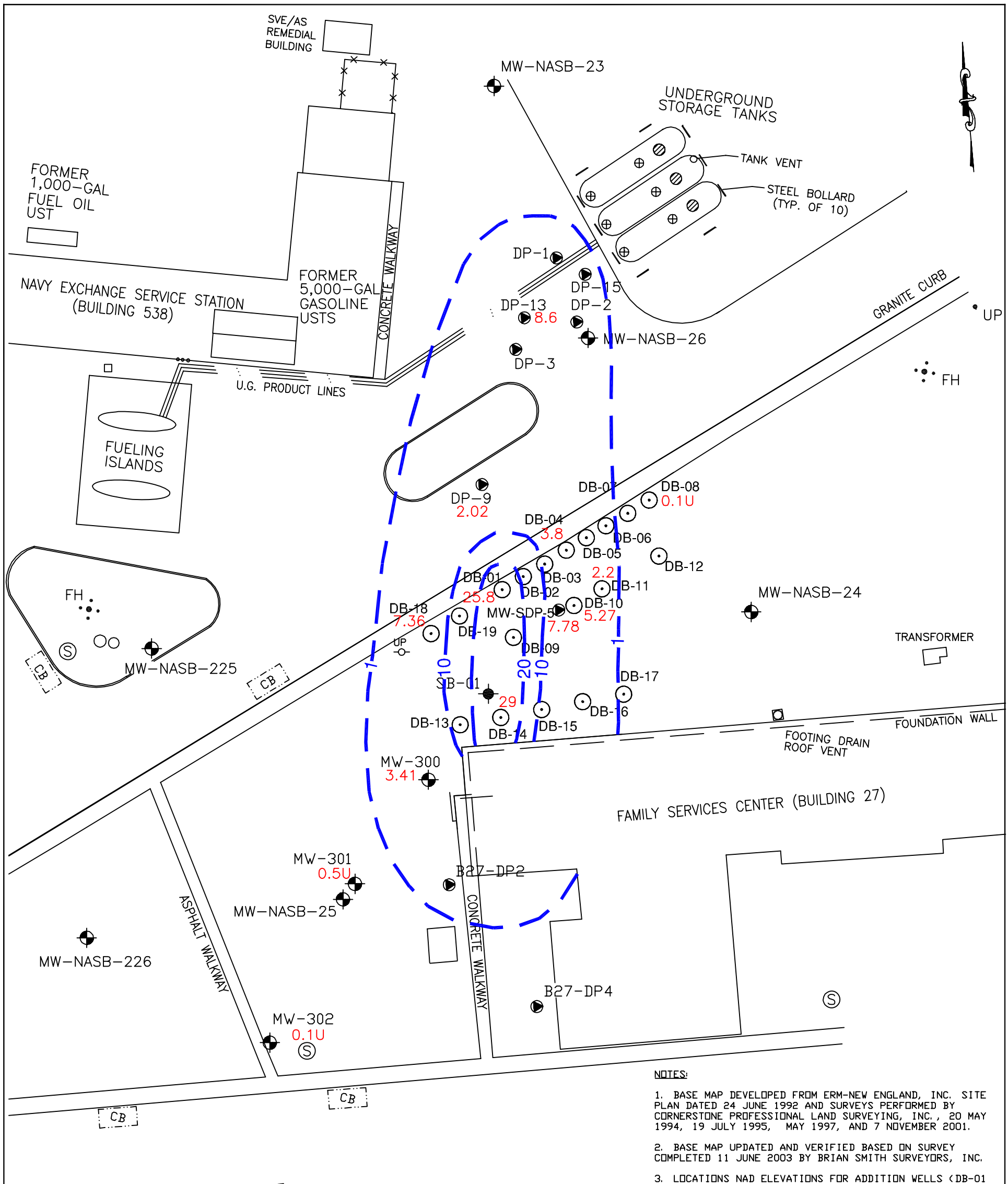

NOTES:

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4. ADDITIONAL WELLS DB-18 AND DB-19 LOCATIONS APPROXIMATE.

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL VPH AROMATICS CONCENTRATION IN GROUNDWATER (mg/L) – DASHED WHERE APPROXIMATE

GRAPHIC SCALE

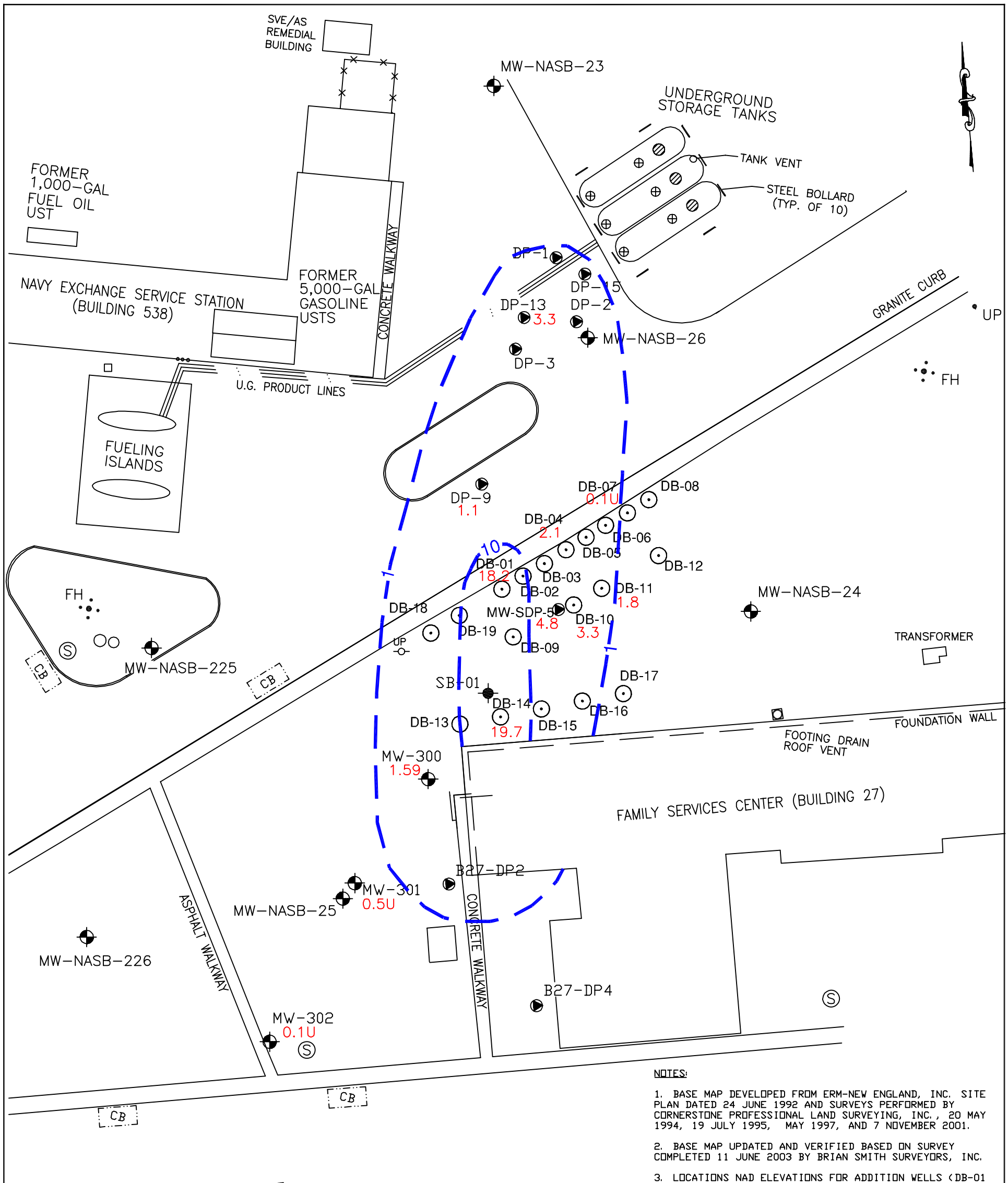
0′ 30′ 60′

TETRA TECH NUS, INC.

ROUND 2 (OCTOBER 2005) GROUNDWATER
VPH AROMATIC HYDROCARBON CONCENTRATIONS
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
DWG\4590\W5206381D\FIG_3-2.DWG	AS NOTED

FIGURE NUMBER	REV	DATE
3-2	0	01/18/06



NOTES:

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4. ADDITIONAL WELLS DB-18 AND DB-19 LOCATIONS APPROXIMATE.

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL VPH ALIPHATIC (C5-C8,C9-C12) CONCENTRATION IN GROUNDWATER (mg/L) - DASHED WHERE APPROXIMATE

GRAPHIC SCALE

0' 30' 60'

TETRA TECH NUS, INC.

ROUND 2 (OCTOBER 2005) GROUNDWATER
VPH ALIPHATIC HYDROCARBON CONCENTRATIONS
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
DWG\4590\W5206381D\FIG_3-3.DWG	AS NOTED

FIGURE NUMBER	REV	DATE
3-3	0	01/17/06

FIGURE 3-4
GRO TREND IN GROUNDWATER
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

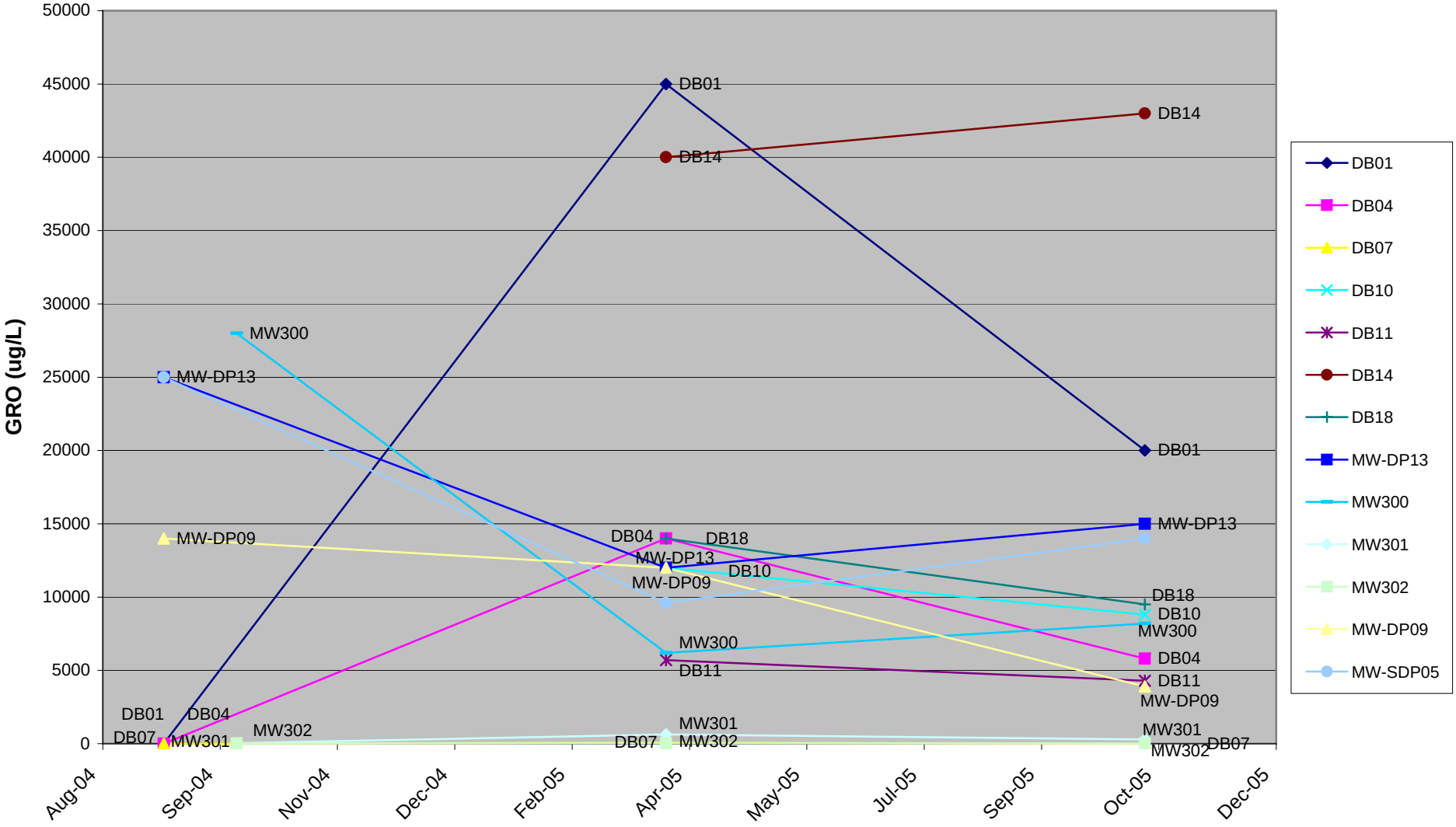


FIGURE 3-5
VPH AROMATICS TREND IN GROUNDWATER
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

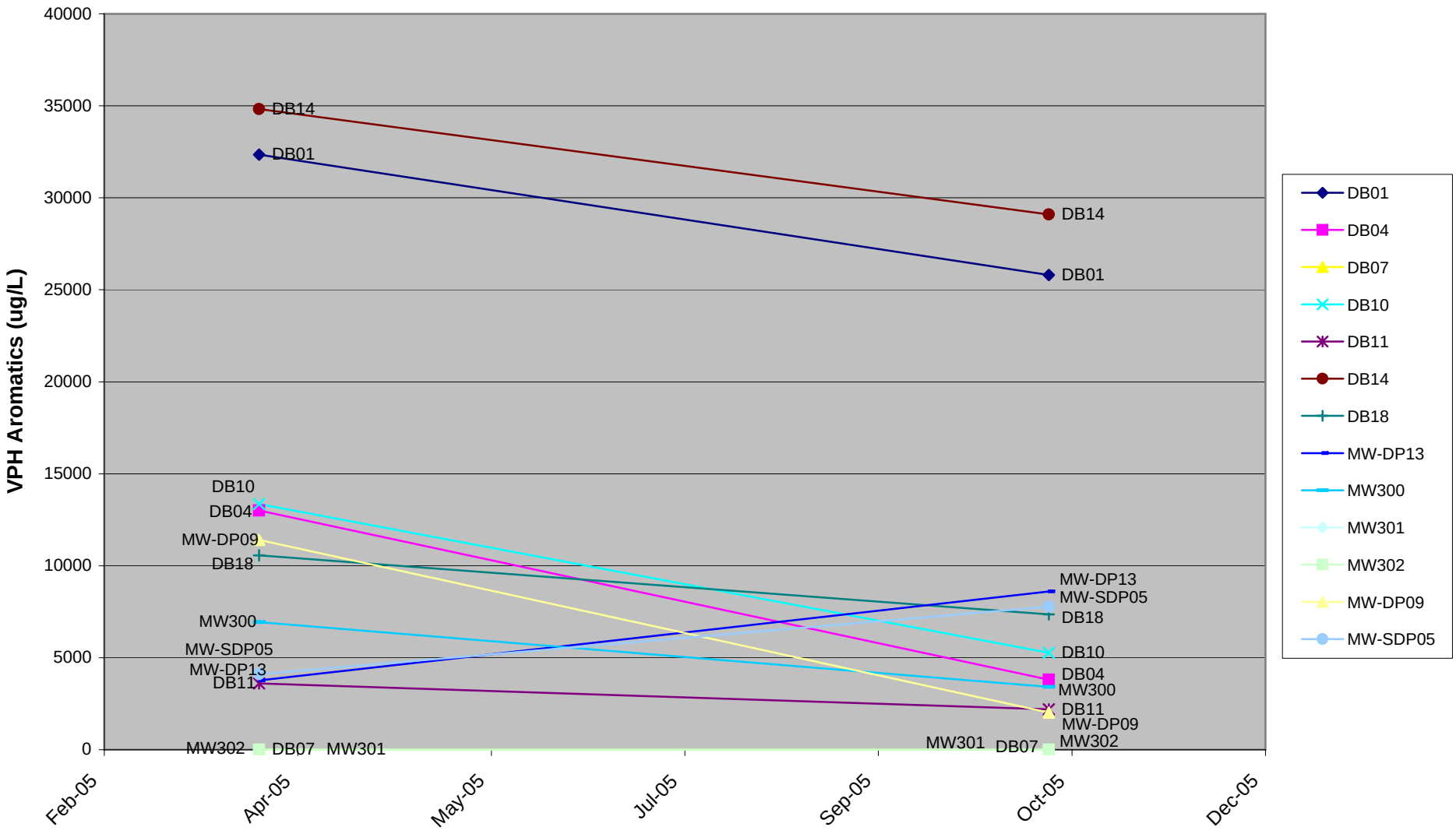


FIGURE 3-6
VPH ALIPHATICS TREND IN GROUNDWATER
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

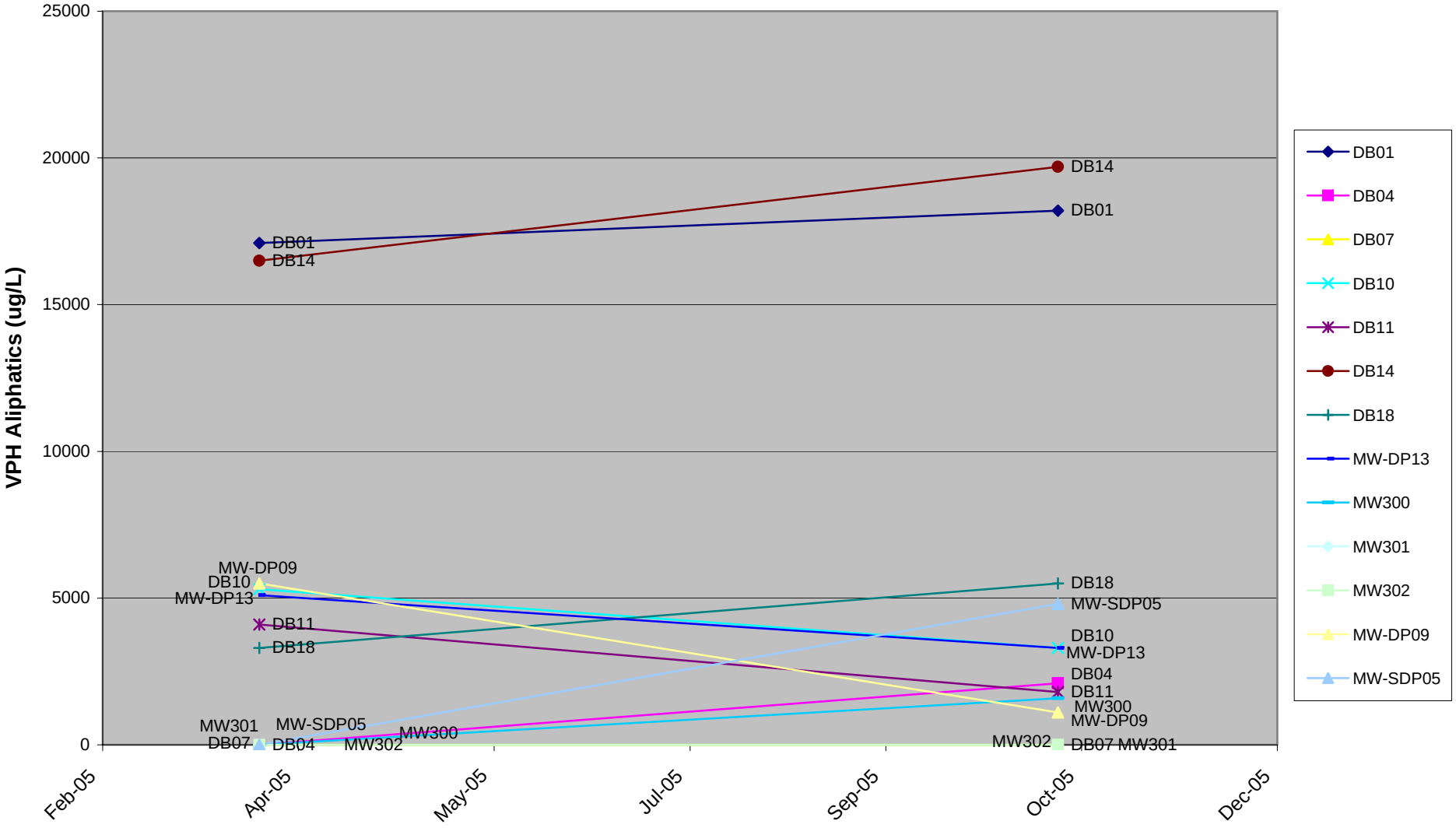
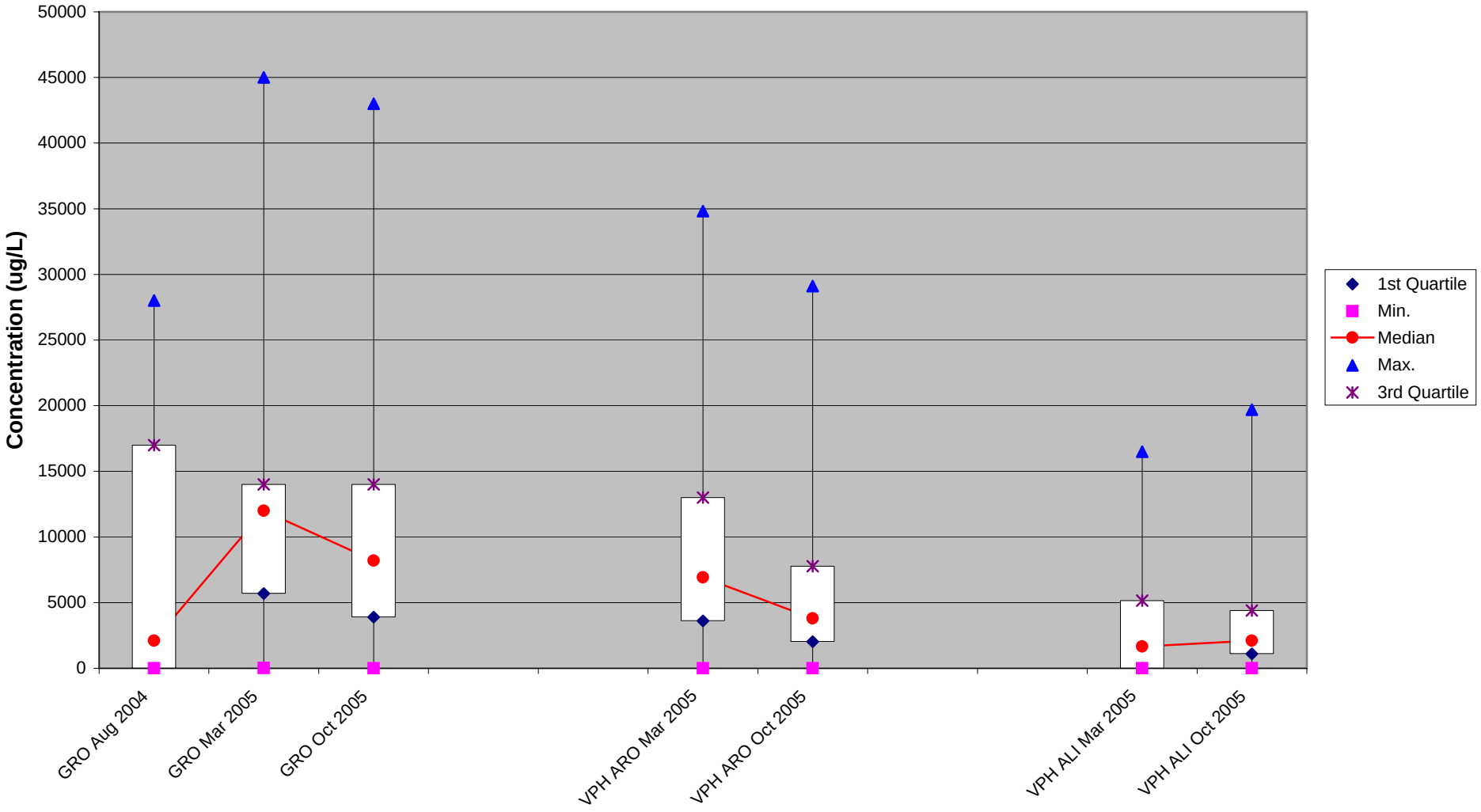
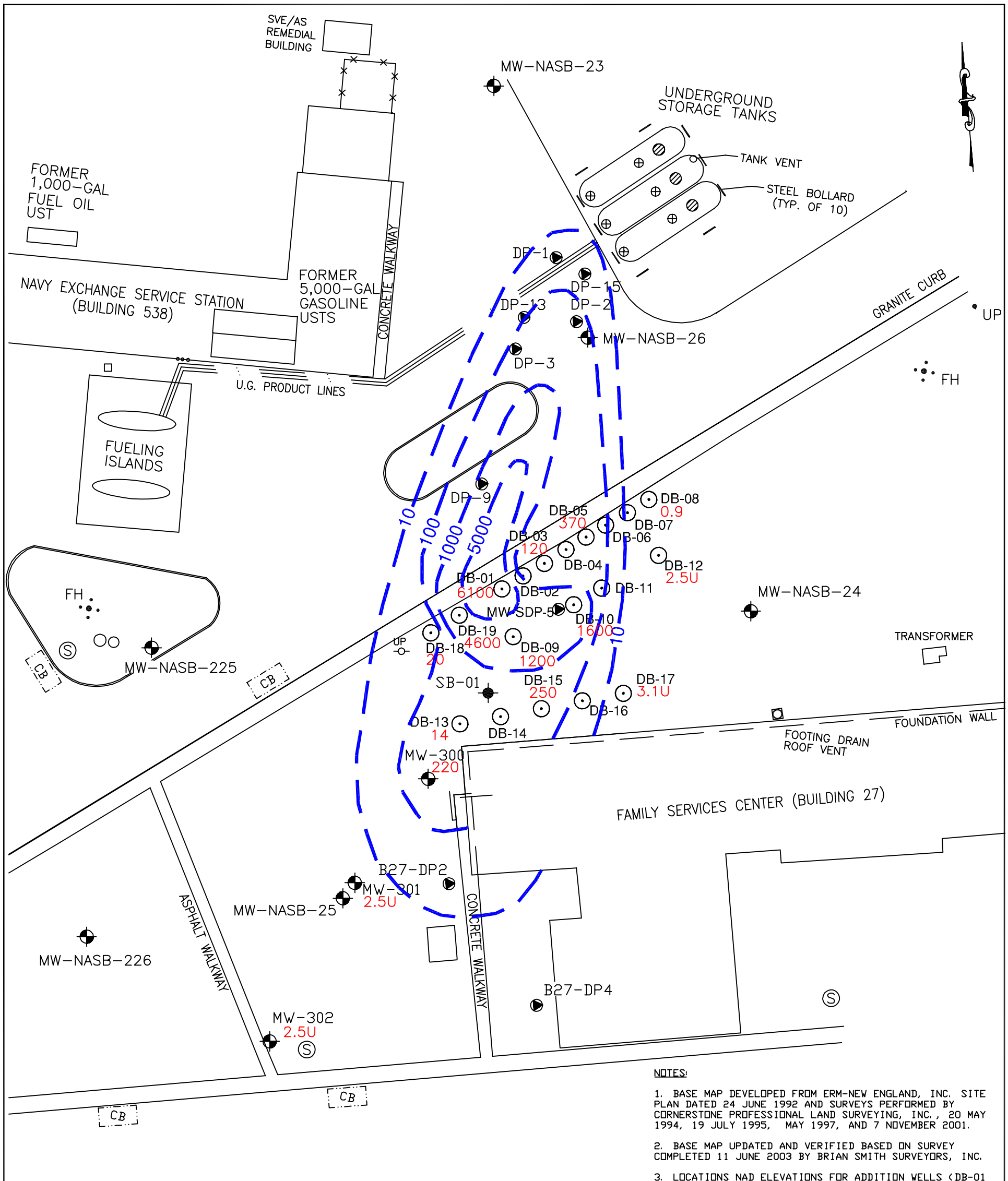


FIGURE 3-7
GROUNDWATER BOX PLOTS
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE





NOTES:

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3. LOCATIONS NAD ELEVATIONS FOR ADDITION WELLS (DB-01 TO DB-17) AND NEW MONITORING WELLS (MW-300, -301, -302) SURVEYED BY DEST ASSOCIATES, INC. ON NOVEMBER 2, 2004.

4. ADDITIONAL WELLS DB-18 AND DB-19 LOCATIONS APPROXIMATE.

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL GRO CONCENTRATION IN SOIL (mg/kg) – DASHED WHERE APPROXIMATE

GRAPHIC SCALE

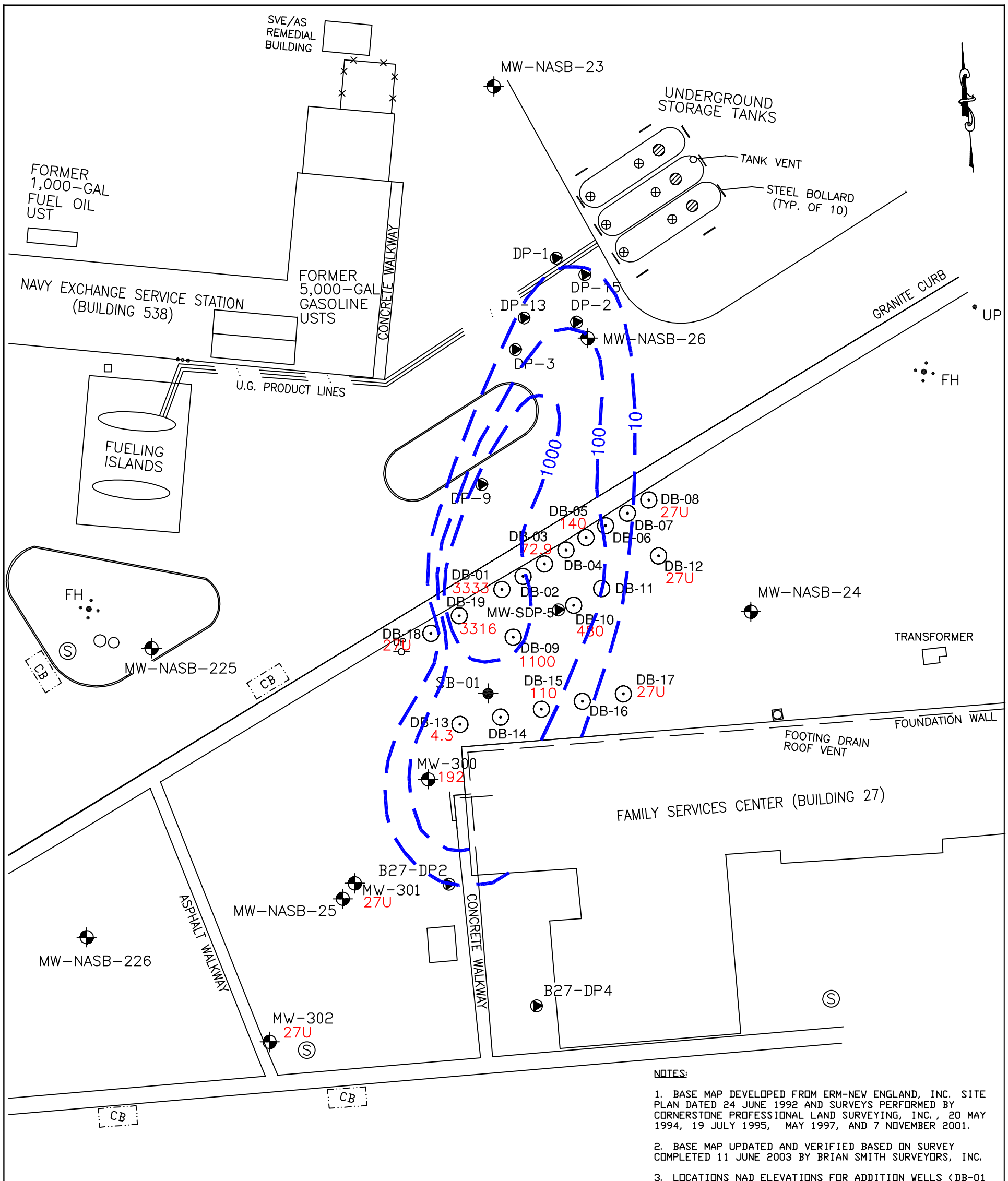
0′ 30′ 60′

TETRA TECH NUS, INC.

ROUND 2 (OCTOBER 2005)
SOIL GRO CONCENTRATIONS
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
DWG\4590\W5206381D\FIG_3-8.DWG	AS NOTED

FIGURE NUMBER	REV	DATE
3-8	0	01/25/06



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4. ADDITIONAL WELLS DB-18 AND DB-19 LOCATIONS APPROXIMATE.

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL VPH AROMATICS CONCENTRATION IN SOIL (mg/kg) – DASHED WHERE APPROXIMATE

GRAPHIC SCALE

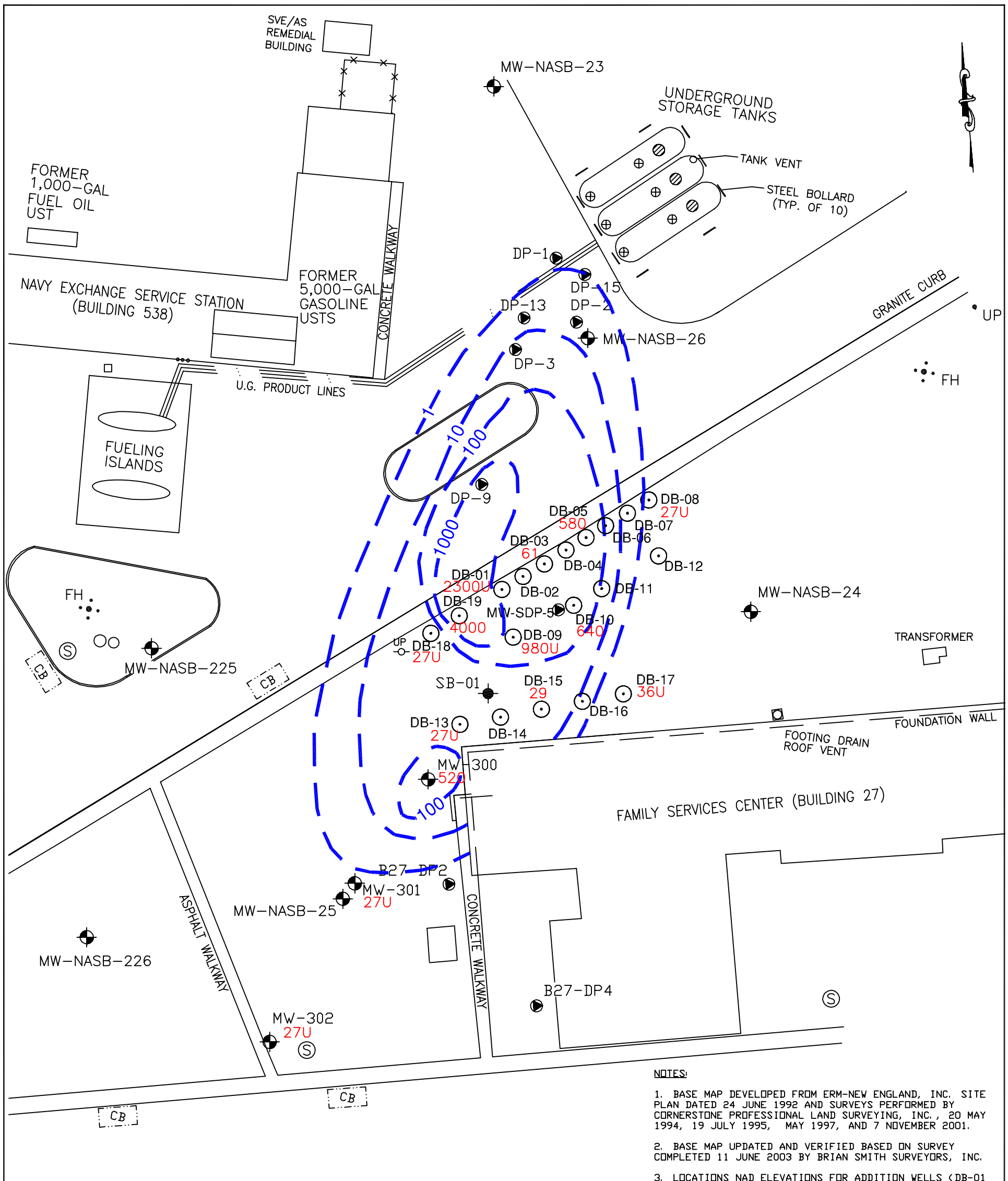
0′ 30′ 60′

TETRA TECH NUS, INC.

ROUND 2 (OCTOBER 2005) SOIL
VPH AROMATICS HYDROCARBON CONCENTRATIONS
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
DWG\4590\W5206381D\FIG_3-9.DWG	AS NOTED

FIGURE NUMBER	REV	DATE
3-9	0	01/25/06



NOTES:

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4. ADDITIONAL WELLS DB-18 AND DB-19 LOCATIONS APPROXIMATE.

SOURCE:

CORRECTIVE ACTION PLAN, NAVY EXCHANGE SERVICE STATION, NAVAL AIR STATION, BRUNSWICK, MAINE; EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. MARCH 2004.

LEGEND

MW-NASB-24	MONITORING WELL (2-INCH OR 4-INCH INSIDE DIAMETER)
DB-01	DIRECT-PUSH N-BLEND ADDITION WELL (2004)
B27-DP2	DIRECT-PUSH MONITORING WELL
SB-01	DIRECT-PUSH SOIL BORING (2004)
FH	FIRE HYDRANT WITH BOLLARDS
UP	UTILITY POLE
CB	STORM WATER CATCH BASIN
S	SEWER MANHOLE
	UNDERGROUND STRUCTURE
	LINE OF EQUAL VPH ALIPHATIC (C5-C8,C9-C12) CONCENTRATION IN SOIL (mg/kg) - DASHED WHERE APPROXIMATE

GRAPHIC SCALE

0' 30' 60'

TETRA TECH NUS, INC.

ROUND 2 (OCTOBER 2005) SOIL
VPH ALIPHATIC HYDROCARBON CONCENTRATIONS
NAVAL EXCHANGE SERVICE STATION
US NAVY NAVFAC EFANE
NAVAL AIR STATION, BRUNSWICK, MAINE

FILE	SCALE
DWG\4590\W5206381D\FIG_3-10.DWG	AS NOTED

FIGURE NUMBER	REV	DATE
3-10	0	01/25/06

FIGURE 3-11
SOIL GRO IN LINE 1
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

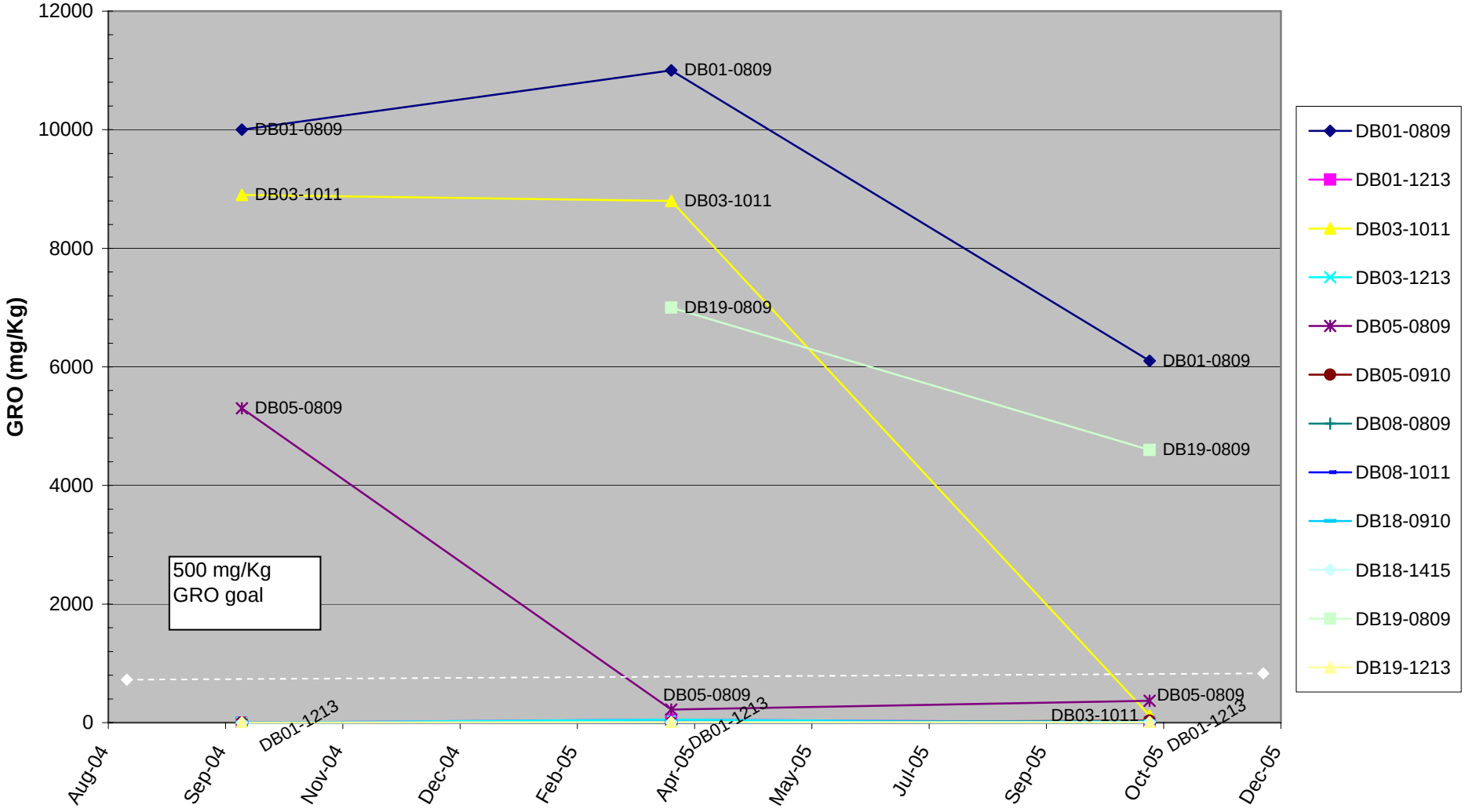


FIGURE 3-12
SOIL GRO IN LINE 2
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

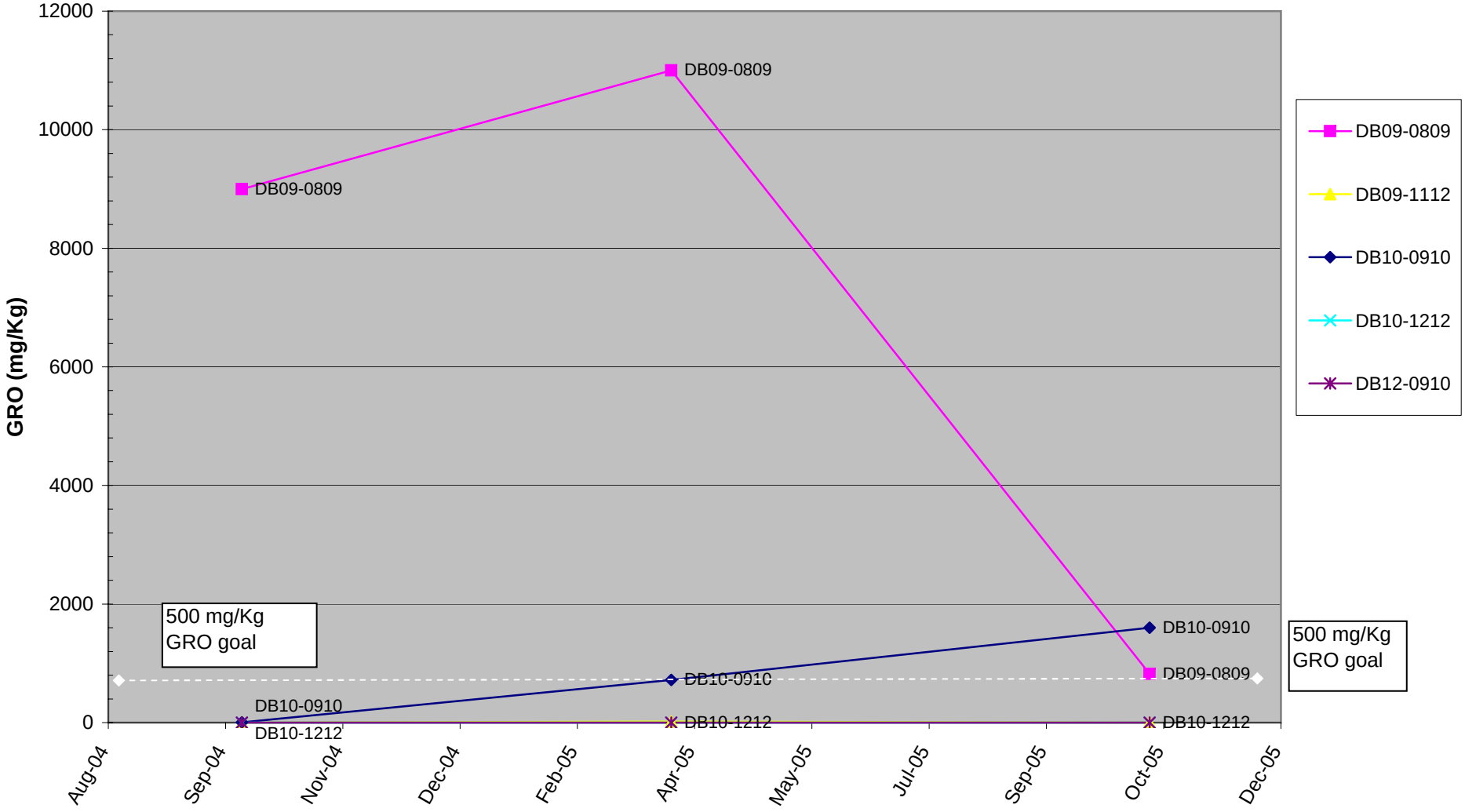


FIGURE 3-13
SOIL GRO IN LINE 3
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE

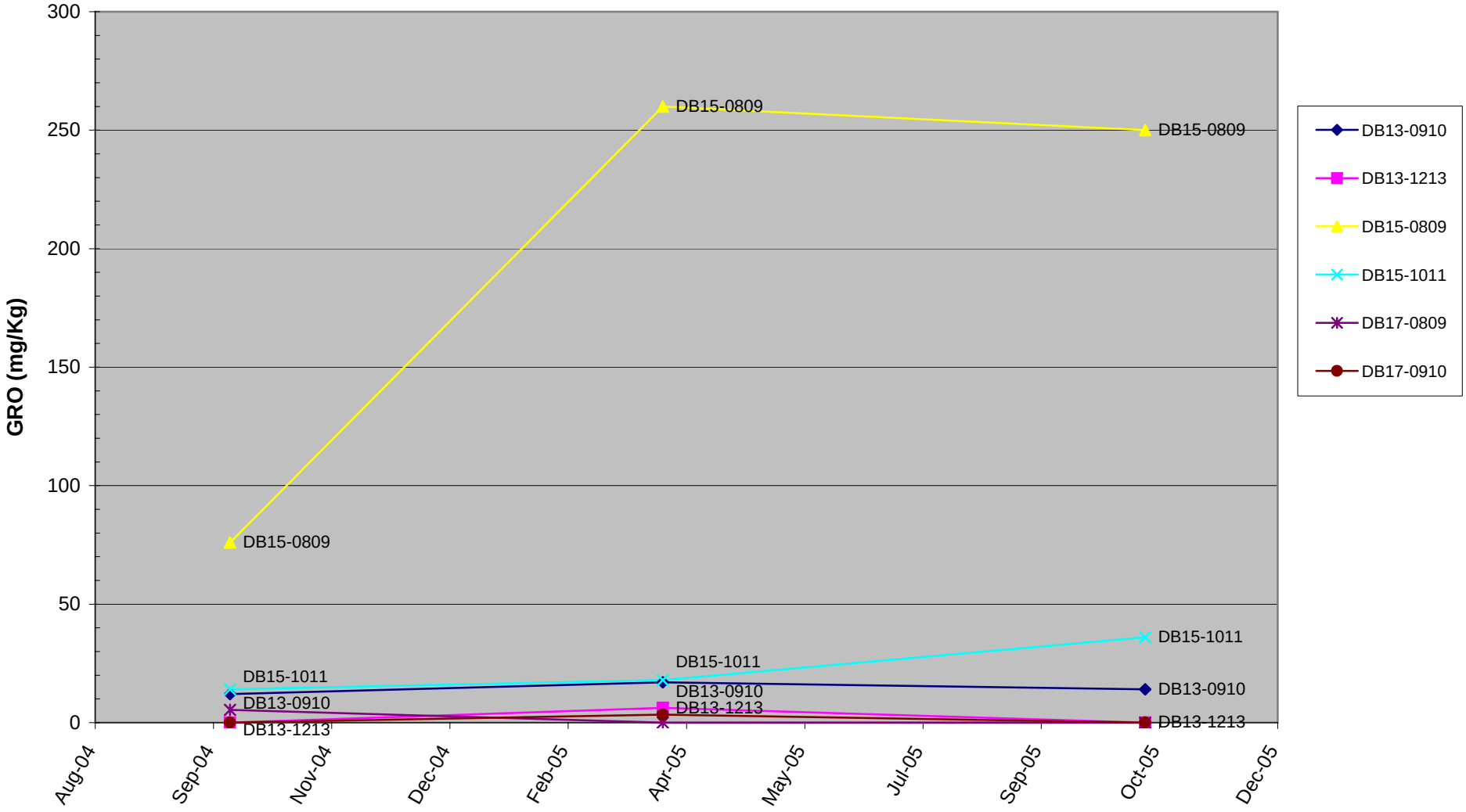
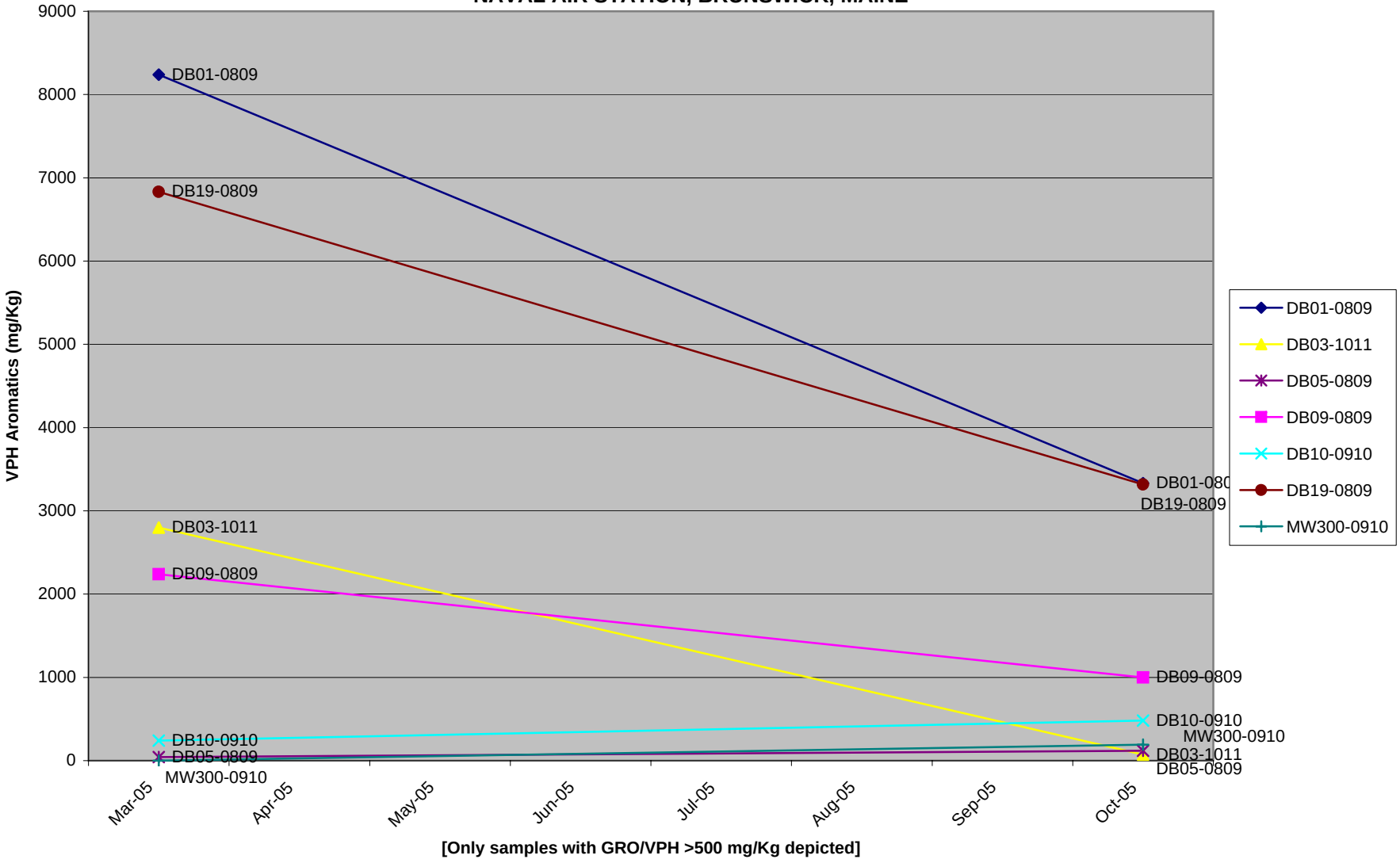
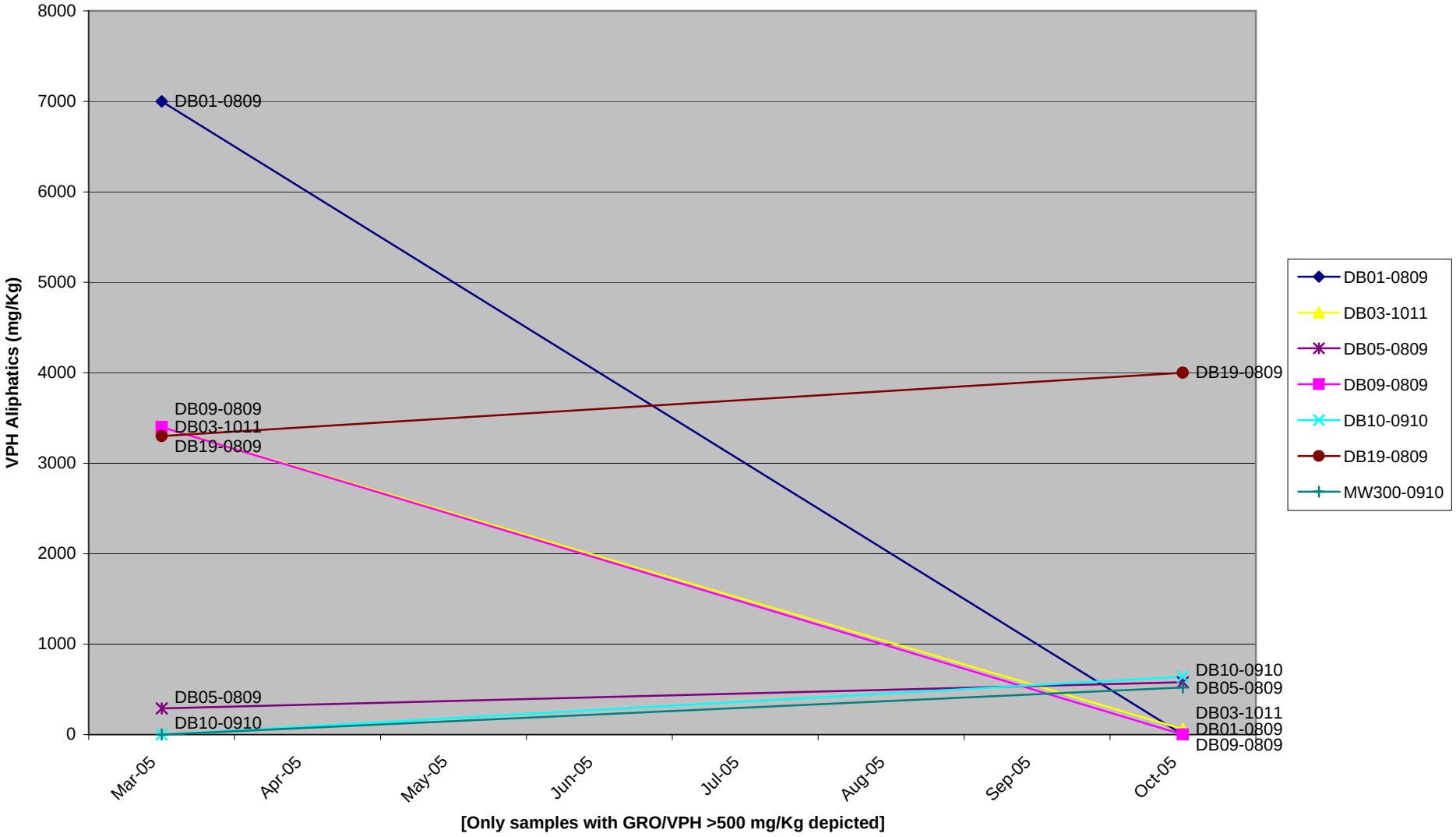


FIGURE 3-14
SOIL VPH AROMATICS TREND
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE



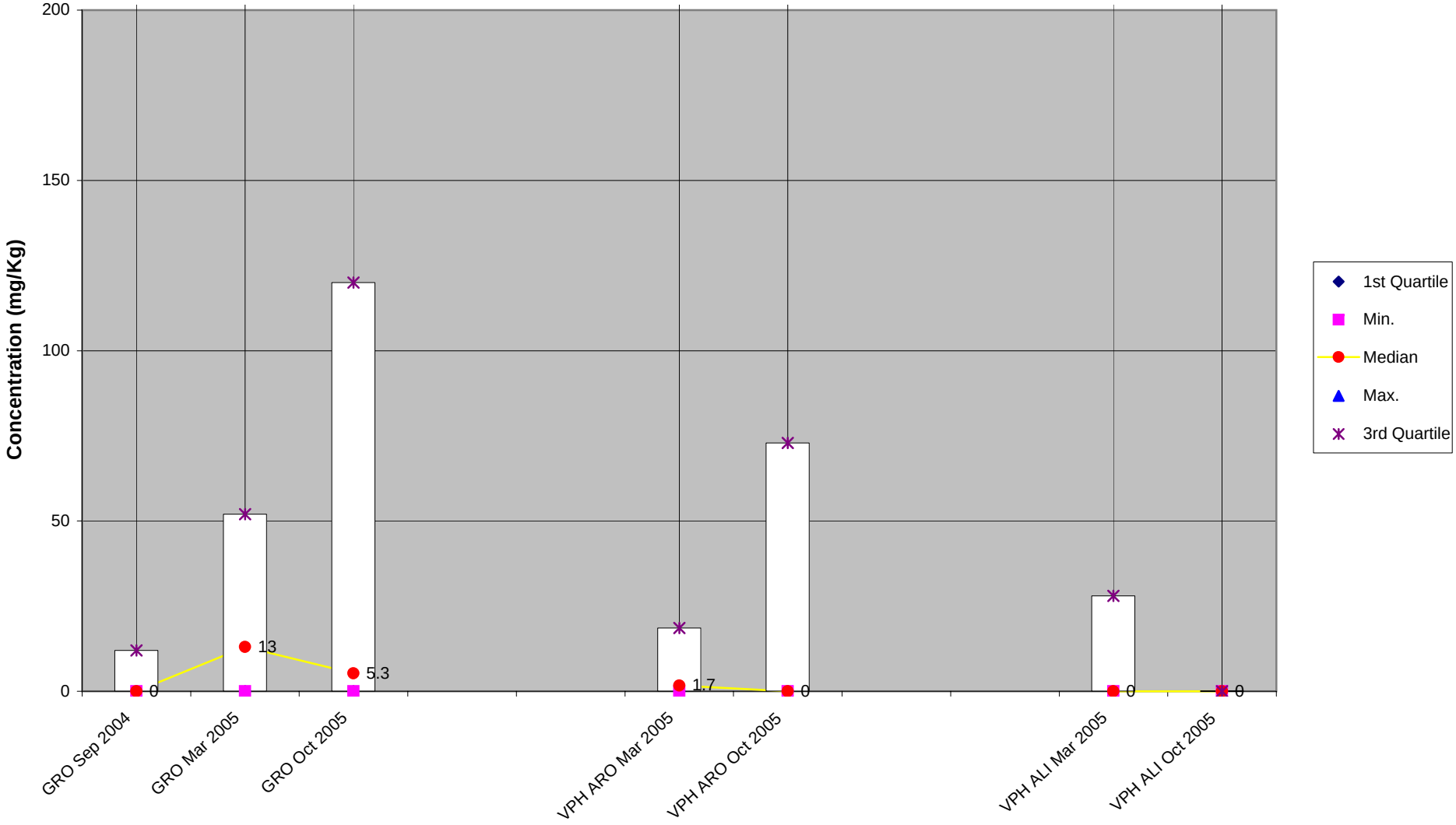
[Only samples with GRO/VPH >500 mg/Kg depicted]

FIGURE 3-15
SOIL VPH ALIPHATICS TREND
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE



[Only samples with GRO/VPH >500 mg/Kg depicted]

FIGURE 3-16
SOIL BOX PLOTS
NAVY EXCHANGE SERVICE STATION
NAVAL AIR STATION, BRUNSWICK, MAINE



APPENDIX A

GROUNDWATER SAMPLE COLLECTION LOGS

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - "LOW FLOW" GROUNDWATER

Site Name: Navy Exchange Service Station
Sample ID: NEx-gw-0B01

Tetra Tech NUS Job No./PMS N4590-0515
QC: NA (If applicable)

Sample Method: low flow
Depth Sampled: ~10 Feet Screened Interval Depth 5-14 feet
Sample Date & Time: 10 / 18 / 5 0915 hours /Dup
Sampler(s): C. Sanchez
Data Recorded By: C. Sanchez Signature: Craig Sanchez
Notes:

T_0: 6.53

H&S Survey Meter 0.0 PPM Field Instrument Group A/B/C/D
Pre-pump insertion WL - ft Post - pump insertion WL - ft

Analysis	Bottle Lot#	Analysis	Bottle Lot #	Analysis	Bottle Lot #
vph	nitrite				
gro					
nitrate					

Clock Time 24hr	Water Depth below MP ft	Pump Dial 1	Purge Rate ml/min	Cum. Volume Purged liters	Temp °C	Spec. Cond. 2 ~µS/cm	pH	ORP/Eh3 mv	DO mg/L	Turbidity NTU	Comments
0840	6.57		400		18.7	1.5	6.1	-129	0.4	25	
0845	6.45		200		16.1	1.1	5.9	-114	0.5	~~-115~~ 65	5.6
0850	6.45		100		16.1	1.0	5.9	-114	0.5	3.1	
0855	6.45		100		16.2	1.0	5.9	-112	0.5	2.7	
0900	6.45		100		16.1	1.0	5.9	-113	0.5	2.5	
0905	6.45		100		16.1	1.0	5.9	-111	0.5	2.1	
0910	6.45		100	3.0 gal	16.1	1.0	5.9	-110	0.5	1.8	
0915			parameter stable / collect sample								

1. Pump dial setting (for example: hertz, cycle/min, etc.)
2. Siemens per cm (same as umhos/cm) at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

Tt NUS Form 0009

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - "LOW FLOW" GROUNDWATER

Site Name: Navy Exchange Service Station
Sample ID: NEX-gw-DB04

Tetra Tech NUS Job No./PMS N45910-0515
QC: DUP01 (If applicable)

Sample Method: Low Flow
Depth Sampled: 8 Feet Screened Interval Depth 5-11.5 feet
Sample Date & Time: 10 / 17 / 5 1515 hours 1520 Dup 12/10/05
Sampler(s): C. Sanchez
Data Recorded By: Signature: Craig Sanchez
Notes:

$\nabla_0 = 6.41$

H&S Survey Meter ____ PPM Field Instrument Group A/B/C/D
Pre-pump insertion WL NA ft Post - pump insertion WL NA ft

Analysis	Bottle Lot#	Analysis	Bottle Lot #	Analysis	Bottle Lot #
gro	Nitrite				
vph					
Nitrate					

Clock Time 24hr	Water Depth below MP ft	Pump Dial 1	Purge Rate ml/min	Cum. Volume Purged liters	Temp °C	Spec. Cond. 2 mS/cm	pH	ORP/Eh3 mv	DO mg/L	Turbidity NTU	Comments
1440	6.61		400		18.1	4.4	6.4	165	2.2	75	
1445	6.65		100		17.4	4.4	6.5	152	2.2	42	
1450	6.64		100		17.3	3.7	6.5	148	2.1	24	
1455	6.50		100		17.2	3.2	6.5	147	2.0	24	
1500	6.45		100		17.1	2.8	6.5	146	2.0	25	
1505	6.43		100		17.1	2.5	6.5	146	2.1	23	
1510	6.43		100	3.0 gal	17.1	2.4	6.5	145	2.0	21	
1515		Parameters stabel / sample collected									

1. Pump dial setting (for example: hertz, cycle/min, etc.)
2. Siemens per cm (same as umhos/cm) at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

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12 HCl 40 ml
1 125 ml

TETRA TECH NUS, INC.

SAMPLE LOG SHEET - "LOW FLOW" GROUNDWATER

Site Name: NEX-(BRUNSWICK) SERVICE STATION
Sample ID: ~~DB-07~~ NEX-GW-DB-07

Tetra Tech NUS Job No./PMS N4590-0515
QC: Lab QC (If applicable)

Sample Method: LOW FLOW
Depth Sampled: 8.5 Feet Screened Interval Depth 5-12 feet
Sample Date & Time: 10 / 17 / 05 1525 hours — /Dup
Sampler(s): J DRISCOLL
Data Recorded By: J DRISCOLL Signature: [signature]
Notes:

H&S Survey Meter _____ PPM Field Instrument Group A/B/C/D
Pre-pump insertion WL NA ft Post - pump insertion WL NA ft

Analysis	Bottle Lot#	Analysis	Bottle Lot #	Analysis	Bottle Lot #
GRO					
VPH					
Nitrate/Nitrite					

Clock Time 24hr	Water Depth below MP ft	Pump Dial 1	Purge Rate ml/min	Cum. Volume Purged liters	Temp °C	Spec. Cond. 2 mS/cm	pH	±10 ORP/Eh3 mv	DO mg/L	<5 Turbidity NTU	Comments
1425	5.91		100		17.38	15.5	6.12	31	0.93	10	
1430	~~7.15~~ 7.11		100		16.47	11.3	6.04	53	2.31	130	
1435	7.12		100		16.46	7.75	6.00	61	2.93	65	
1440	7.16		100		16.34	6.50	5.96	64	3.61	50	
1445	7.14		100		16.15	6.41	5.97	63	3.68	29	
1450	7.13		100		16.08	6.13	5.95	58	3.94	15	
1455	7.19		100		16.06	5.79	5.94	38	4.17	11	
1500	7.12		100		16.04	5.84	5.95	-1	4.15	7.7	
1505	7.10		100		16.00	5.65	5.93	-30	4.37	5.7	
1510	7.02		100		15.96	5.66	5.96	-37	4.53	4.1	
1515	7.09		100		15.86	5.46	5.94	-38	4.60	3.4	
1520	7.04		100		15.86	5.43	5.96	-44	4.63	3.0	
1525				6 gal's	15.90	5.37	5.95	-46	4.70	2.4	
1525			Parameters stable / Sample collected								

1. Pump dial setting (for example: hertz, cycle/min, etc.)
2. Siemens per cm (same as umhos/cm) at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

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TETRA TECH NUS, INC.

SAMPLE LOG SHEET - "LOW FLOW" GROUNDWATER

Site Name: Navy Exchange Service Station
Sample ID: NEX-gw-DB10

Tetra Tech NUS Job No./PMS N4590-0515
QC: - (If applicable)

Sample Method: Low Flow
Depth Sampled: ~8.5 Feet Screened Interval Depth 5-12 feet
Sample Date & Time: 10 / 18 / 20 1510 hours ___ /Dup
Sampler(s):
Data Recorded By: C. Sanchez Signature: Craig Sanchez
Notes:

$\bar{V}_0$: 6.24

H&S Survey Meter 0.0 PPM Field Instrument Group A/B/C/D
Pre-pump insertion WL - ft Post - pump insertion WL - ft

Analysis	Bottle Lot#	Analysis	Bottle Lot #	Analysis	Bottle Lot #
glo	nitrite				
TOC					
nitrate					

Clock Time 24hr	Water Depth below MP ft	Pump Dial 1	Purge Rate ml/min	Cum. Volume Purged liters	Temp °C	Spec. Cond. 2 mS/cm	pH	ORP/Eh3 mv	DO mg/L	Turbidity NTU	Comments
1400	6.21		450		15.5	4.1	6.3	13	1.2	500	tan/brown
1405	6.51		250		15.6	3.9	6.2	14	1.2	300	
1410	6.50		150		15.6	3.3	6.2	15	1.2	250	
1415	6.47		125		15.6	2.8	6.2	17	1.2	240	
1420	6.44		100		15.6	2.4	6.1	18	1.2	207	
1425	6.40		100		15.5	2.2	6.1	18	1.3	154	
1430	6.37		100		15.4	2.0	6.0	19	1.3	145	
1435	6.33		100		15.4	1.8	6.1	22	1.3	100	
1440	6.30		100		15.4	1.9	6.0	23	1.3	78	
1445	6.28		100		15.5	1.5	6.0	17	1.3	75	
1450	6.25		100		15.5	1.8	6.0	16	1.2	65	
1455	6.25		100		15.5	1.8	6.0	16	1.3	60	
1500	6.24		100		15.5	1.8	6.0	16	1.3	61	
1505	6.25		100	6 gals	15.5	1.8	6.0	15	1.3	55	
1510			Parameters stable - Sample collected								

1. Pump dial setting (for example: hertz, cycle/min, etc.)
2. Siemens per cm (same as umhos/cm) at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

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TETRA TECH NUS, INC.

SAMPLE LOG SHEET - "LOW FLOW" GROUNDWATER

Site Name: Navy Exchange Service Station
Sample ID: NEX-gw-DB11

Tetra Tech NUS Job No./PMS N4590-0515
QC: - (If applicable)

Sample Method: Low flow
Depth Sampled: ~8.5 Feet Screened Interval Depth 5.0-11.5 feet
Sample Date & Time: 10 / 18 / 05 1350 hours — /Dup
Sampler(s):
Data Recorded By: C. Sanchez Signature: Craig Sanchez
Notes:

E_0: 6.20

H&S Survey Meter 0.0 PPM Field Instrument Group A/B/C/D
Pre-pump insertion WL - ft Post - pump insertion WL - ft

Analysis	Bottle Lot#	Analysis	Bottle Lot #	Analysis	Bottle Lot #
gro	nitrite				
vph					
nitrate					

Clock Time 24hr	Water Depth below MP ft	Pump Dial 1	Purge Rate ml/min	Cum. Volume Purged liters	Temp °C	Spec. Cond. 2 mμS/cm	pH	ORP/Eh3 mv	DO mg/L	Turbidity NTU	Comments
1305	6.60		350		16.3	2.6	6.4	-12	2.3	130	
1310	6.60		150		15.6	1.7	6.1	-17	1.2	60	
1315	6.61		150		15.6	1.8	6.1	-20	1.4	51	
1320	6.63		150		15.6	1.8	6.1	-24	1.3	45	
1325	6.63		125		15.6	1.6	6.1	-23	1.6	36	
1330	6.63		125		15.5	1.5	6.0	-30	1.6	26	
1335	6.62		125		15.5	1.4	6.0	-31	1.5	25	
1340	6.60		125		15.5	1.4	5.9	-31	1.4	24	
1345	6.60		125	6 gals	15.5	1.4	5.9	-32	1.4	22	
1350			Parameters stable / Sample collected								

1. Pump dial setting (for example: hertz, cycle/min, etc.)
2. Siemens per cm (same as umhos/cm) at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

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TETRA TECH NUS, INC.

SAMPLE LOG SHEET - "LOW FLOW" GROUNDWATER

Site Name: Navy Exchange Service Station
Sample ID: NEx-GW-0B14

Tetra Tech NUS Job No./PMS N4590-0515
QC: – (If applicable)

Sample Method: Low Flow
Depth Sampled: _____ Feet Screened Interval Depth _____ feet
Sample Date & Time: 10 / 19 / 05 0935 hours – /Dup
Sampler(s): C. Sanchez
Data Recorded By: C. Sanchez Signature: Craig Sanchez
Notes:

∇_0 = 7.56

H&S Survey Meter 0.0 PPM Field Instrument Group A/B/C/D
Pre-pump insertion WL – ft Post - pump insertion WL – ft

Analysis	Bottle Lot#	Analysis	Bottle Lot #	Analysis	Bottle Lot #
VOA					
gro					
nitrate	nitrite				

Clock Time 24hr	Water Depth below MP ft	Pump Dial 1	Purge Rate ml/min	Cum. Volume Purged liters	Temp °C	Spec. Cond. 2 mS/cm	pH	ORP/Eh3 mv	DO mg/L	Turbidity NTU	Comments
0955	7.65		325		16.4	0.40	5.7	44	0.9	1.9	
0900	7.65		100		15.6	1.0	5.7	0	0.7	1.0	
0910	7.65		100		15.6	2.0	5.8	-36	0.5	0.5	
0920	7.65		100		15.2	1.9	5.8	-46	0.5	0.5	
0925	7.65		100		15.1	1.9	5.8	-49	0.5	0.5	
0930	7.64		100	3 gals	14.9	1.9	5.8	-52	0.5	0.5	
0935			collect sample								

1. Pump dial setting (for example: hertz, cycle/min, etc.)
2. Siemens per cm (same as umhos/cm) at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

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TETRA TECH NUS, INC.

SAMPLE LOG SHEET - "LOW FLOW" GROUNDWATER

Site Name: Navy Exchange Service Station
Sample ID: NEX-gw-0818

Tetra Tech NUS Job No./PMS N4590 0515
QC: – (If applicable)

Sample Method: low flow
Depth Sampled: _____ Feet Screened Interval Depth _____ feet
Sample Date & Time: 10 / 18 / 05 1140 hours ___/Dup
Sampler(s): C. Sanchez
Data Recorded By: C. Sanchez Signature: Craig Sanchez
Notes:

V_0 = 6.90

H&S Survey Meter _____ PPM Field Instrument Group A/B/C/D
Pre-pump insertion WL NA ft Post - pump insertion WL NA ft

Analysis	Bottle Lot#	Analysis	Bottle Lot #	Analysis	Bottle Lot #
gro	nitrite				
vph					
nitrate					

Clock Time 24hr	Water Depth below MP ft	Pump Dial 1	Purge Rate ml/min	Cum. Volume Purged liters	Temp °C	Spec. Cond. 2 mS/cm	pH	ORP/Eh3 mv	DO mg/L	Turbidity NTU	Comments
1000	6.83		450		15.9	4.1	6.7	-23	2.1	100	
1005	6.81		250		15.7	2.1	6.4	-26	1.7	210	
1010	6.80		100		15.8	1.8	6.6	-45	0.8	307	
1015	6.80		100		15.8	1.4	6.6	-86	0.6	213	
1020	6.81		100		15.8	1.4	6.6	-95	0.6	128	
1025	6.82		100		15.8	1.4	6.6	-105	0.6	101	
1030	6.81		100		15.8	1.3	6.6	-107	0.5	73	
1035	6.80		100		15.8	1.3	6.7	-108	0.5	32	
1045	6.82		100		15.9	1.3	6.7	-115	0.5	20	
1050	6.82		100		15.9	1.3	6.7	-117	0.4	11	
1055	6.82		100		16.0	1.3	6.7	-119	0.4	8.7	
1100	6.81		100		16.0	1.3	6.6	-120	0.4	7.1	
1105	6.82		100	6 gals	16.0	1.3	6.7	-121	0.4	4.7	
1110			Parameters stable / sample collected								

1. Pump dial setting (for example: hertz, cycle/min, etc.)
2. Siemens per cm (same as umhos/cm) at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

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TETRA TECH NUS, INC.

SAMPLE LOG SHEET - "LOW FLOW" GROUNDWATER

Site Name: Navy Exchange @ CS 10-9-5
Sample ID: NEX-gw-0809

Tetra Tech NUS Job No./PMS N4590-0515
QC: – (If applicable)

Sample Method: Low Flow
Depth Sampled: 9.5 Feet Screened Interval Depth _____ feet
Sample Date & Time: 10 / 19 / 5 1645 hours – /Dup
Sampler(s): _____
Data Recorded By: C. Sanchez Signature: Craig Sanchez
Notes:

H&S Survey Meter 0.0 PPM Field Instrument Group (A)/B/C/D
Pre-pump insertion WL NA ft Post - pump insertion WL NA ft

Analysis	Bottle Lot#	Analysis	Bottle Lot #	Analysis	Bottle Lot #
vph	nitrite				
gro					
nitrate					

Clock Time 24hr	Water Depth below MP ft	Pump Dial 1	Purge Rate ml/min	Cum. Volume Purged liters	Temp °C	Spec. Cond. 2 mS/cm	pH	ORP/Eh3 mv	DO mg/L	Turbidity NTU	Comments
1615	6.85		350		15.5	1.1	6.5	-33	4.0	25	
1620	6.87		200		15.5	1.0	6.6	-37	3.5	17	
1625	6.89		100		15.6	1.0	6.6	-41	2.7	10	
1630	6.87		100		15.5	1.1	6.7	-47	2.5	7.1	
1635	6.86		100		15.6	1.1	6.5	-49	2.5	3.2	
1640	6.85		100	2.5 gal	15.7	1.0	6.7	-51	2.3	1.7	
1645	parameters		Stable	/ collect	Sample						

1. Pump dial setting (for example: hertz, cycle/min, etc.)
2. Siemens per cm (same as umhos/cm) at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

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TETRA TECH NUS, INC.

SAMPLE LOG SHEET - "LOW FLOW" GROUNDWATER

Site Name: NEX Service Station
Sample ID: NEX-gw-DP13

Tetra Tech NUS Job No./PMS N4590-0515
QC: — DUPO2 (If applicable)

Sample Method: Low Flow
Depth Sampled: 10 Feet Screened Interval Depth 5-15 feet
Sample Date & Time: 10/19/05 1445 hours 1450/Dup
Sampler(s):
Data Recorded By: J PRISCOLL Signature: [signature]
Notes:

$D_o = 6.62$

H&S Survey Meter 0.0 PPM Field Instrument Group A/B/C/D
Pre-pump insertion WL — ft Post - pump insertion WL — ft

Analysis	Bottle Lot#	Analysis	Bottle Lot #	Analysis	Bottle Lot #
VPH	+				
GRO					
NITRATE	NITRITE				

Clock Time 24hr	Water Depth below MP ft	Pump Dial 1	Purge Rate ml/min	Cum. Volume Purged liters	Temp °C	Spec. Cond. 2 mS/cm	pH	ORP/Eh3 mv	DO mg/L	Turbidity NTU	Comments
1400	6.65		100		19.41	1.96	6.18	-50	0.68	50	
1405	6.64		100		18.15	1.99	6.26	-67	0.76	31.7	
1410	6.65		100		18.12	1.93	6.34	-85	0.82	55	
1415	6.64		100		17.96	1.88	6.42	-98	0.89	18	
1420	6.63		100		18.02	1.81	6.43	-103	0.92	18	
1425	6.62		100		17.47	1.87	6.43	-99	0.98	17	
1430	6.63		100		17.71	1.77	6.47	-104	0.96	15	
1435	6.62		100		17.80	1.77	6.50	-107	0.95	16	
1440	6.63		100		17.62	1.77	6.56	-112	0.89	14	
1445			parameters stable / collect sample								

1. Pump dial setting (for example: hertz, cycle/min, etc.)
2. Siemens per cm (same as umhos/cm) at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

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TETRA TECH NUS, INC.

SAMPLE LOG SHEET - "LOW FLOW" GROUNDWATER

Site Name: Navy Exchange Service Station
Sample ID: NEX-gw-MW300

Tetra Tech NUS Job No./PMS N4590-0515
QC: - (If applicable)

Sample Method: Low Flow
Depth Sampled: _____ Feet Screened Interval Depth _____ feet
Sample Date & Time: 10 / 19 / 05 1105 hours — /Dup
Sampler(s): C. Sanchez
Data Recorded By: C. Sanchez Signature: Craig Sanchez
Notes:

∇_0: 7.83

H&S Survey Meter 0.0 PPM Field Instrument Group A/B/C/D
Pre-pump insertion WL - ft Post - pump insertion WL - ft

Analysis	Bottle Lot#	Analysis	Bottle Lot #	Analysis	Bottle Lot #
VPH					
GRO					
Nitrate	Nitrate				

Clock Time 24hr	Water Depth below MP ft	Pump Dial 1	Purge Rate ml/min	Cum. Volume Purged liters	Temp °C	Spec. Cond. 2 uS/cm	pH	ORP/Eh3 mv	DO mg/L	Turbidity NTU	Comments
1035	7.86		200	~~700~~ (5)	16.83	0.617	6.03	-99	6.60	266	
1040	7.84		↓	↓	16.21	0.679	6.07	-103	0.64	1.7	
1045	7.84				16.23	0.719	6.10	-105	0.66	1.1	
1050	7.84				16.12	0.778	6.13	-107	0.66	0.30	
1055	7.85				16.10	0.806	6.14	-109	0.67	0.25	
1100	7.85			3	16.11	0.828	6.16	-110	0.67	0.00	
1105		Parameters stable - Sample collected									

1. Pump dial setting (for example: hertz, cycle/min, etc.)
2. Siemens per cm (same as umhos/cm) at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

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TETRA TECH NUS, INC.

SAMPLE LOG SHEET - "LOW FLOW" GROUNDWATER

Site Name: NEX Service Station Brunswick, ME
Sample ID: NEX-gw-MW301

Tetra Tech NUS Job No./PMS N4590-0575
QC: — (If applicable)

Sample Method: Low Flow
Depth Sampled: _____ Feet Screened Interval Depth _____ feet
Sample Date & Time: 10 / 19 / 05 1200 hours — /Dup
Sampler(s): _____
Data Recorded By: JMD Signature: [signature]
Notes:
$\nabla_0 = 6.38$

H&S Survey Meter 0.0 PPM Field Instrument Group A/B/C/D
Pre-pump insertion WL — ft Post - pump insertion WL _____ ft

Analysis	Bottle Lot#	Analysis	Bottle Lot #	Analysis	Bottle Lot #
VPH	Nitrite				
GRO					
Nitrate					

Clock Time 24hr	Water Depth below MP ft	Pump Dial 1	Purge Rate ml/min	Cum. Volume Purged liters	Temp °C	Spec. Cond. 2 uS/cm	pH	ORP/Eh3 mv	DO mg/L	Turbidity NTU	Comments
1132	6.47		200	~~200~~ 65	16.28	0.556	5.84	27	0.83	12	
1137	6.45		↓	↓	15.64	0.535	5.81	33	0.71	6.2	
1142	6.42				15.53	0.521	5.81	38	0.71	4.1	
1147	6.41				15.52	0.513	5.80	40	0.72	3.5	
1152	6.47		↓	↓	15.44	0.505	5.79	42	0.68	3.10	
1157	6.49			30 gal	15.41	0.466	5.80	43	0.68	2.4	
1200		Parameters stable / collected sample									

1. Pump dial setting (for example: hertz, cycle/min, etc.)
2. Siemens per cm (same as umhos/cm) at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

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TETRA TECH NUS, INC.

SAMPLE LOG SHEET - "LOW FLOW" GROUNDWATER

Site Name: NEX - gw - MW302
Sample ID: NEX Service station

Tetra Tech NUS Job No./PMS N4590-0515
QC: — (If applicable)

Sample Method: Low Flow
Depth Sampled: 5 Feet Screened Interval Depth 3-7 feet
Sample Date & Time: 10 / 19 / 05 1300 hours /Dup
Sampler(s):
Data Recorded By: JDRiscoll Signature: [signature]
Notes: [redacted] J_o = 2.38

H&S Survey Meter 0.0 PPM Field Instrument Group A/B/C/D
Pre-pump insertion WL — ft Post - pump insertion WL — ft

Analysis	Bottle Lot#	Analysis	Bottle Lot #	Analysis	Bottle Lot #
vph					
gro					
nitrate	nitrite				

Clock Time 24hr	Water Depth below MP ft	Pump Dial 1	Purge Rate ml/min	Cum. Volume Purged liters	Temp °C	Spec. Cond. 2 mS/cm	pH	ORP/Eh3 mv	DO mg/L	Turbidity NTU	Comments
1225	2.46		100		16.09	0.379	5.70	54	1.00	8.5	
1230	2.42		100		15.68	0.370	5.73	52	0.88	4.0	
1235	2.43		100		15.69	0.366	5.72	51	0.90	3.5	
1240	2.46		100		15.68	0.356	5.70	50	0.92	2.3	
—	—		100		—	~~0.~~	~~5.44~~	—	—	PUMP	BATTERY SWITCH
1250	2.49		100		15.79	0.357	5.74	44	0.78	7.5	
1255	2.49		100		15.77	0.356	5.71	45	0.74	1.2	
1300			parameters		stable	/ sample		collected			

1. Pump dial setting (for example: hertz, cycle/min, etc.)
2. Siemens per cm (same as umhos/cm) at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

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TETRA TECH NUS, INC.

SAMPLE LOG SHEET - "LOW FLOW" GROUNDWATER

Site Name: Navy Exchange Service Station
Sample ID: NEX-GW-SB05

Tetra Tech NUS Job No./PMS N4590-0515
QC: - (If applicable)

Sample Method: Low Flow
Depth Sampled: 9 Feet Screened Interval Depth 4-14 feet
Sample Date & Time: 10 / 18 / 05 1555 hours /Dup
Sampler(s): C. Sanchez
Data Recorded By: C. Sanchez Signature: Craig Sanchez
Notes:

$\bar{V}_0$: 6.33

H&S Survey Meter 0.0 PPM Field Instrument Group A/B/C/D
Pre-pump insertion WL - ft Post - pump insertion WL - ft

Analysis	Bottle Lot#	Analysis	Bottle Lot #	Analysis	Bottle Lot #
VOH	nitrite				
O&G					
nitrate					

Clock Time 24hr	Water Depth below MP ft	Pump Dial 1	Purge Rate ml/min	Cum. Volume Purged liters	Temp °C	Spec. Cond. 2 uS/cm	pH	ORP/Eh3 mv	DO mg/L	Turbidity NTU	Comments
1520	6.37		375		15.7	2.3	5.9	26	1.6	29	
1525	6.33		100		15.4	2.8	6.0	-32	1.0	31	
1530	6.33		100		15.5	2.1	5.9	0	1.0	15	
1535	6.33		100		15.4	2.0	5.9	6	1.0	7.8	
1540	6.33		100		15.4	1.9	5.9	8	1.0	6.1	
1545	6.33		100		15.5	1.9	5.9	10	0.9	5.3	
1550	6.33		100		15.5	1.8	5.9	12	0.9	4.9	
1555			Parameters stable / sample collected								

1. Pump dial setting (for example: hertz, cycle/min, etc.)
2. Siemens per cm (same as umhos/cm) at 25 °C.
3. Oxidation reduction potential (stand in for Eh).

Tt NUS Form 0009

APPENDIX B

SOIL BORING LOGS

BORING LOG FOR: NEX-BRUNSWICK
PROJECT NO.: N4598-0515
LOGGED BY: JMD
DRILLED BY (Company/Driller): YES
GRD. SURFACE ELEVATION: —

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: S02-DB01
START DATE: 10-19-05
COMPLETION: DATE: 10-19-05
MON. WELL NO.: MW0B01
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
0										
8										
9		1/1	NEX-S02-DB01-0809 @1005				olive gray med-fine sand w/ mica moist			1584 ppm PID
12			No Sample							
13		1/1	NEX-S02-DB01 1213 @1010				medium olive grey and brown sand			115 ppm PID
							EOB			

TYPE OF DRILLING RIG: geo probe
METHOD OF ADVANCING BORING: direct push
METHOD OF SOIL SAMPLING: acetate sleeve
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS: —
OTHER OBSERVATIONS:

BORING NO.: DB01

Tetra Tech NUS, Inc.

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BORING LOG FOR: NEX - BRUNSWICK
PROJECT NO.: N4590-0516
LOGGED BY: J DRISCOLL
DRILLED BY (Company/Driller): YES
GRD. SURFACE ELEVATION: —

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: S02 - DB03 ~~S03~~
START DATE: 10/18/05
COMPLETION: DATE: 10/18/05
MON. WELL NO.: MWDB03
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
0			No Sample							
10										
11		1/1	NEX-~~DB03~~ S02-DB03 10-11 @ 1100				medium grey brown sand w/ contact on top of fine grey brown silt. ~~Slight odor~~		saturated, odor present	312 ppm PID
12										
13		1/1	NEX-S02 DB03-12-13 @ 1105				H brown sand (fine) w/ some silt, grades to grey silt w/ some clay contact w/ fine sand-grey sampled at contact 12-13' bgs		odor saturated	
			EOB							

TYPE OF DRILLING RIG: GEOPROBE
METHOD OF ADVANCING BORING: DP
METHOD OF SOIL SAMPLING: ACETATE SLEEVE
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS: —
OTHER OBSERVATIONS:

BORING NO.: DB03

Tetra Tech NUS, Inc.

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Ttnus Form 0018

BORING LOG FOR: NEX-BRUNSWICK
PROJECT NO.: N4570-0516
LOGGED BY: J DRISCOLL
DRILLED BY (Company/Driller): YES
GRD. SURFACE ELEVATION: —

TRANSCRIBED BY: _____
ELEVATION FROM: _____

BORING NO.: DB05-S02
START DATE: 10/18/05
COMPLETION: DATE: 10/18/05
MON. WELL NO.: MWDB05
CHECKED BY: _____

DEPTH (FEET) 0	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
			No Sample							
8										
		1.5/2	NEX-S02-DB05 0809 @1030				medium light brown sand w/ few silt saturated			20 ppm
9										
			NEX-S02-DB05 0910 @1035				light grey brown silt compacted and saturated. few fine sand.		NEX-S02-DUP01	20 ppm
10										
EOB										

TYPE OF DRILLING RIG: GEOPROBE
METHOD OF ADVANCING BORING: DIRECT PUSH
METHOD OF SOIL SAMPLING: ACETATE SLEEVE
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS: —
OTHER OBSERVATIONS:

BORING NO.: DB05

Tetra Tech NUS, Inc.

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Ttnus Form 0018

BORING LOG FOR: NEX - BRUNSWICK
PROJECT NO.: 4590-0516
LOGGED BY: J DRISCOLL
DRILLED BY (Company/Driller): YES
GRD. SURFACE ELEVATION: —

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: DB08-S02
START DATE: 10/18/05
COMPLETION: DATE: 10/18/05
MON. WELL NO.: NA MWDB08
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
0	N/A		No soil samples collected 0-8'							
8										
		12"/12"	@0915 NEX-S02-DB08-				med-fine green sand brown-red brown w/ black (10) 8.5-9 - compact			PID
9			0809				olive grey sand/silt. clay w/ some fine sand saturated			0.0ppm
							9-10' bg grey clay w/ silt			
10		24"/24"					10-11 olive grey/brown silt w/ some clay saturated			PID 0.0ppm
			@0925 NEXS02DB08 1011							
11										
EOB										

TYPE OF DRILLING RIG: GEOPROBE
METHOD OF ADVANCING BORING: DIRECT PUSH
METHOD OF SOIL SAMPLING: ACETATE SLEEVE
METHOD OF ROCK CORING: N/A
GROUNDWATER LEVELS: —
OTHER OBSERVATIONS:

BORING NO.: DB08

Tetra Tech NUS, Inc.

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BORING LOG FOR: NEX-BRUNSWICK
PROJECT NO.: N4590-0576
LOGGED BY: JMD
DRILLED BY (Company/Driller): YES
GRD. SURFACE ELEVATION: —

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: S02-DB09
START DATE: 10/19/05
COMPLETION: DATE: 10/19/05
MON. WELL NO.: MWDB09
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
0			No Sample							
8										
9		2.9/4	NEX ~~DB09~~ S02-DB09-0001 @0930				Olive gray med-fine sand w/ mdcm moist		DR 03 @0932	1397 ppm PID
11			No Sample							
12			NEX S02-DB09 1112 @0935				lt brown clay-compacted		LAB QC	420.3 ppm PID
EOB										

TYPE OF DRILLING RIG: GEOPROBE
METHOD OF ADVANCING BORING: DIRECT PUSH
METHOD OF SOIL SAMPLING: ACETATE SLEEVE
METHOD OF ROCK CORING: ~~NA~~
GROUNDWATER LEVELS: ~~NA~~
OTHER OBSERVATIONS:

BORING NO.: DB09

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BORING LOG FOR: NEX BRUNSWICK
PROJECT NO.: N4590-0576
LOGGED BY: J DRASLOVE
DRILLED BY (Company/Driller): YES
GRD. SURFACE ELEVATION: —

TRANSCRIBED BY: _____
ELEVATION FROM: _____

BORING NO.: DB10-SO2
START DATE: 10/18/05
COMPLETION: DATE: 10/18/05
MON. WELL NO.: MWDB10
CHECKED BY: —

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
0										
			no sample							
7										
			NEX-SO2 DB10-0708 @0950				medium grained grey brown sand well sorted + moist			0.0 ppm PID
8										
9										
		3/4	NEX-SO2 DB10-0910 @0955				med brown grey sand sheen viscous saturated		odor + sheen	1144ppm PID
10							sand gradesto H brown silt conglomerate			
11										
			NEX-SO2 DB10-1212 @1000				~~saturated~~ fine grey silt sample right at HP-121			1.2 ppm PID
12										
EOB										

TYPE OF DRILLING RIG: GEOPROBE
METHOD OF ADVANCING BORING: DIRECT PUSH
METHOD OF SOIL SAMPLING: ACETATE SLEEVE
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS: —
OTHER OBSERVATIONS:

BORING NO.: DB10

Tetra Tech NUS, Inc.

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BORING LOG FOR: NEX BRUNSWICK
PROJECT NO.: N4590-0516
LOGGED BY: J DRISCOLL
DRILLED BY (Company/Driller): YES
GRD. SURFACE ELEVATION:

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: DB12-S02
START DATE: 10/18/05
COMPLETION: DATE: 10/18/05
MON. WELL NO.: MWDB12
CHECKED BY:

DEPTH (FEET) D	BLOWS PER 6" NA	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
			no sample collected							
9										
		1/1	NEX-S02-DB12-0910 @ 0935				compacted fine sand brown sand w/ some silt to top 6" (9-9.5) loose			
10							very tip at 10' grey fine sand sharp contact			
EOB							saturated			

TYPE OF DRILLING RIG: GEOPROBE
METHOD OF ADVANCING BORING: DIRECT PUSH
METHOD OF SOIL SAMPLING: ACETATE SLEEVE
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS: —
OTHER OBSERVATIONS:

BORING NO.: DB12

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BORING LOG FOR: NEX-BRUNSWICK
PROJECT NO.: N4590-0576
LOGGED BY: J DRISCOLL
DRILLED BY (Company/Driller): YES
GRD. SURFACE ELEVATION: —

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SO DB-13
START DATE: 10/18/05
COMPLETION: DATE: 10/18/05
MON. WELL NO.: MWDB13
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
0			No Sample							
9										
10		1/1	NEX-S02-DB13 0910 @1310				medium olive grey sand well sorted black sand (fine) cut trp.		DUP 02 @1315 moist	54.6ppm PID
12			No Sample							
13		1/1	NEX-S02-DB13 1213 @1320				olive grey fine to med sand		~~[illegible]~~ moist	6.2ppm PID
EOB										

TYPE OF DRILLING RIG: GEOPROBE
METHOD OF ADVANCING BORING: DIRECT PUSH
METHOD OF SOIL SAMPLING: ACETATE SLEEVE
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS: —
OTHER OBSERVATIONS:

BORING NO.: DB13

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SOR

BORING LOG FOR:	NEX - BRUNSWICK	BORING NO.:	DB15
PROJECT NO.:	N4590-0576	START DATE:	10/18/05
LOGGED BY:	J MCDRISCOLL	COMPLETION: DATE:	10/18/05
DRILLED BY (Company/Driller):	YES	MON. WELL NO.:	MWDB15
GRD. SURFACE ELEVATION:	—	CHECKED BY:	

TRANSCRIBED BY: _____

ELEVATION FROM: _____

DEPTH (FEET) 0	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
			No Sample							
8										
			NEX-S02-DB15 0809 @1250				8-10 - med brown sand w/ some fine sand			1667
9		2/2					medium compaction			
			NEX-S02-DB15 1011 @1255							
10										
		1/1					10-11 SAO			1669
11										
EOB										

TYPE OF DRILLING RIG:	GEOPROBE
METHOD OF ADVANCING BORING:	DIRECT PUSH
METHOD OF SOIL SAMPLING:	ACETATE SLEEVE
METHOD OF ROCK CORING:	NA
GROUNDWATER LEVELS:	—
OTHER OBSERVATIONS:	

BORING NO.: DB15

Tetra Tech NUS, Inc.

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BORING LOG FOR: NEW BRUNSWICK
PROJECT NO.: N4590-0576
LOGGED BY: JMD
DRILLED BY (Company/Driller): YES
GRD. SURFACE ELEVATION: —

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: SO2-DB17
START DATE: 10/18/05
COMPLETION: DATE: 10/18/05
MON. WELL NO.: MWDB17
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
0			No Sample							
8										
9		1.7/2	NEX-SO2-DB17-0809 @1135				brown med-fine sand saturated		QC	
10			NEX-SO2 DB17-0910 @1140				Grey Sd/fine sand saturated			
EOB										

TYPE OF DRILLING RIG: GEOPROBE
METHOD OF ADVANCING BORING: DIRECT PUSH
METHOD OF SOIL SAMPLING: ACETATE SLEEVE
METHOD OF ROCK CORING: NO
GROUNDWATER LEVELS: —
OTHER OBSERVATIONS:

BORING NO.: DB17

Tetra Tech NUS, Inc.

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BORING LOG FOR: NEX-BRUNSWICK
PROJECT NO.: N4590-0516
LOGGED BY: JWD
DRILLED BY (Company/Driller): YES
GRD. SURFACE ELEVATION: —

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: S02-DB19
START DATE: 10/19/05
COMPLETION: DATE: 10/19/05
MON. WELL NO.: MWDB19
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
0										
			No Sample							
8										
		0.8/1	NEX-S02-DB19 0909 @ 0855				dk grey + black med-grained sand		green + V. strong odor	277 ppm over sample
9										1454 ppm over sp
			No Sample							
12										
		0.8/1	NEX-S02-DB19 1213 @ 0900				3 distinct colors - dk grey/black, lt. brown and orange. all med sand 2-inch lt brown EOB		Strong odor	1050 ppm over sp
13										

TYPE OF DRILLING RIG: GEOPROBE
METHOD OF ADVANCING BORING: DIRECT PUSH
METHOD OF SOIL SAMPLING: ACETATE SLEEVE
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS: —
OTHER OBSERVATIONS:

Tetra Tech NUS, Inc.

BORING NO.: DB19

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BORING LOG FOR: NEX-BRUNSWICK
PROJECT NO.: N4590-0576
LOGGED BY: J DRISCOLL
DRILLED BY (Company/Driller): YES
GRD. SURFACE ELEVATION: —

TRANSCRIBED BY: _____
ELEVATION FROM: _____

BORING NO.: S02 MW300
START DATE: 10/18/05
COMPLETION: DATE: 10/18/05
MON. WELL NO.: MW300
CHECKED BY: _____

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
0			No Sample							
8										
9		2/2	No Sample				brown med sand w/ dk brown silt med sorting ~~brown~~		Saturated	
10			NEX-S02-MW300-09/10 @1400				dk grey-brown w/sheen med sand w/ some coarse sand dark-lt layers (1 inch max) between 9-10 fog.			748 ppm PID
11		1.1/2	No Sample							
12			No Sample							
13		9	NEX-S02-MW300 1213 @1410				Coarse saturated sand. brown w/ quartz with olive grey 11-12.			108 ppm PID
14			NEX-S02-MW300-1414 @1420				coarse orange brown sand			2.4 ppm PID
15			NEX-S02 NW300-1515 @1425				fine lt brown grey sand w/ some silt EOB			0.0 ppm PID

TYPE OF DRILLING RIG: GEO PROBE
METHOD OF ADVANCING BORING: DIRECT PUSH
METHOD OF SOIL SAMPLING: ACETATE SLEEVE
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS: —
OTHER OBSERVATIONS:

BORING NO.: MW300

Tetra Tech NUS, Inc.

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BORING LOG FOR: NEW BRUNSWICK
PROJECT NO.: N4~~950~~590-0516
LOGGED BY: JMDRISCOLL
DRILLED BY (Company/Driller): YES
GRD. SURFACE ELEVATION: —

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: S02-MW301
START DATE: 10/18/05
COMPLETION: DATE: 10/18/05
MON. WELL NO.: MW301
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
0										
7										
8		22/3	NEX-S02 MW-301-0708 @1440				med grained lt brown Sand			0.0ppm PID
9										
10			NEX-S02 MW301-0910 @ 1445				Orange brown med to fine Sand moist			0.0ppm PID
							EOB			

TYPE OF DRILLING RIG: GEOPROBE
METHOD OF ADVANCING BORING: DIRECT PUSH
METHOD OF SOIL SAMPLING: ACETATE SLEEVE
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS: —
OTHER OBSERVATIONS:

BORING NO.: MW301

Tetra Tech NUS, Inc.

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BORING LOG FOR: NEX - BRUNSWICK
PROJECT NO.: N4590-0516
LOGGED BY: J DRISCOLL
DRILLED BY (Company/Driller): YES
GRD. SURFACE ELEVATION: —

TRANSCRIBED BY:
ELEVATION FROM:

BORING NO.: S02-MW302
START DATE: 10/18/05
COMPLETION: DATE: 10/18/05
MON. WELL NO.: MW302
CHECKED BY:

DEPTH (FEET)	BLOWS PER 6"	SAMP REC. / SAMP LENG.	SAMPLING TIME & SAMPLE NO. (QA/QC STATUS)	DEPTH MAT'L CHG./ WELL PROF'L	SOIL DENSITY/ CONSIS. or ROCK HARD.	CLR	MATERIAL CLASSIFICATION	USCS or ROCK BRKN	REMARKS (moisture condition; odors; geological classification; rock weathering; etc.)	FIELD SCREENING DATA METHOD = [FID, (PPM)]
0										
			No Sample							
3										
			NEX-S02 MW302-0304 @1455				Med-fine brown sand w/ mica 1 inch layer on top of lt brown silt 1-inch layer. ~~moist~~ Saturated			0.2 ppm PID
4		3/3								
			No Sample							
5										
			NEX-S02 MW302-0506 @1500				lt brown clay w/ fine sand contact to grey clay w/ fine sand ~~moist~~ saturated.			0.5 ppm PID.
6										
							EOB			

TYPE OF DRILLING RIG: ~~DPT~~ GEOPROBE
METHOD OF ADVANCING BORING: DIRECT PUSH
METHOD OF SOIL SAMPLING: ACETATE SLEEVE
METHOD OF ROCK CORING: NA
GROUNDWATER LEVELS: —
OTHER OBSERVATIONS:

BORING NO.: MW302

Tetra Tech NUS, Inc.

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