LETTER WORK PLAN
SITE 4 – SOIL DELINEATION AND BENCH-SCALE STUDY
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
BETHPAGE, NEW YORK

1.0 INTRODUCTION

This Work Plan has been prepared for the Mid-Atlantic Division of the Naval Facilities Engineering Command (NAVFAC) under Contract Task Order (CTO) WE06 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) contract number N62470-08-D-1001. This Work Plan outlines activities to be performed to delineate the vertical extent of polynuclear aromatic hydrocarbons (PAH)-contaminated soil and petroleum product and to evaluate potential remedial options for recovering the petroleum product at Site 4, NWIRP Bethpage, New York (Figure 1-1). This project is being conducted in accordance with the Navy Environmental Restoration (ER) Program and New York State Department of Environmental Conservation (NYSDEC) Resource Conservation and Recovery Act (RCRA) permit number NYD 002047967.

1.1 SCOPE AND OBJECTIVE

Site 4 was impacted by a release of No. 6 fuel oil that occurred between 1940s and 1982. The tanks were removed at some time before 1994. Petroleum-contaminated soil and semi-solid petroleum product are present near and below the groundwater table at a depth range of 50 – 71 ft below ground surface (bgs).

The objectives of this work plan are as follows:

- Characterize the nature of petroleum product near the water table in the source area, and in particular, determine if the residual petroleum material exists as a free product, is adsorbed onto soil, and/or is immobile.
- Complete the vertical delineation of petroleum-contaminated soil.
- Evaluate the feasibility of using thermal and solvent-based extraction to allow recovery of the petroleum product above and below the water table. Residual petroleum hydrocarbon concentrations of less than 0.1 to 1.0 percent are targeted.
- Evaluate biodegradation of the solvent-based extraction soil residues.

Previous soil testing at the site identified petroleum-contaminated soil at a depth of 71 feet bgs, which is approximately 10 to 20 feet below the water table. The total petroleum hydrocarbon (TPH) - diesel range organics (DRO) concentration in this sample was 5,100 milligrams per kilogram (mg/kg) (0.51 percent).

Samples were not collected below this depth and the vertical extent of the contamination has not been defined. The presence of this contamination below the water table indicates that some of the petroleum release has migrated below the current depth of the groundwater table (52 to 55 feet bgs). Since most petroleum product is lighter than water, it does not normally extent significantly below the water table. The mechanism for petroleum being present at the observed depths is uncertain.

One explanation is that historically the free product floated on the groundwater table, but that the groundwater table was approximately 16 to 19 feet lower than under current conditions. Water table measurements in the area for the 1940s through the 1990s are not available, so the potential for a 16 to 19 feet variation in the water table is uncertain.

A second explanation is that a portion of the No. 6 fuel oil was denser than the groundwater and that property would allow petroleum product to migrate downward below the water table. The reported specific gravity of No. 6 fuel oil ranges from 0.95 to 1.03.

Other potentially relevant properties of No. 6 Fuel Oil indicate that it is very viscous. In commercial and residential uses, No. 6 fuel oil is normally heated to 150^{o} Fahrenheit (F) to 250^{o} F to reduce the viscosity to allow it to flow; however its flash point is 150^{o} F, so caution must be used when heating it above 150^{o} F. No. 6 fuel oil is not very water soluble and is readily adsorbed to organic particles in soil and water. Diesel or No. 2 fuel oil is commonly mixed with No. 6 fuel oil to reduce its viscosity and make it more flowable. The diesel or No. 2 fuel oil (specific gravity of approximately 0.88) also reduces the specific gravity of the mixture.

2.0 SITE BACKGROUND

2.1 SITE HISTORY

NWIRP Bethpage is currently approximately 9 acres located on Long Island, New York. It is located on a relatively flat, featureless, glacial outwash plain. The topography at the facility is relatively flat with a gentle slope toward the south. Environmental concerns for this area are based on a 1997 Northrop Grumman investigation of underground storage tanks near Plant No. 3. The 1997 investigation found evidence of petroleum in the soils from near the bottom of the former USTs to depths near the water table (UST Nos. 03-01, -2, and -3). The USTs were reportedly removed sometime between 1980 and 1984.

2.2 SITE GEOLOGY

The Upper Glacial Formation (commonly referred to as glacial deposits) forms the surface deposits across the entire NWIRP Bethpage. The glacial deposits beneath the site consist of coarse sands and gravels. These deposits are generally about 30 to 45 feet thick; local variations in thickness are common due to the irregular and undulating contact of the glacial deposits with the underlying Magothy Formation. The contact between the two formations was defined in the field as the horizon where gravel becomes very rare to absent, and finer sands, silts, and clays predominate. The generally coarse nature of both formations near their contact, however, may make this differentiation either difficult or rather subjective. The results of the drilling program at location HN-24 (near AOC 22) and surrounding well locations appear to confirm the regional observation, that a singular extensive clay units beneath NWIRP Bethpage does not exist. Clay units encountered at any particular location do not persist along strike or in either direction of dip. The stratigraphic section at and below subsurface depths of about 100 feet may be considered “clay-prone” because the number of individual clay units significantly increases below this depth, but none of these clays are laterally persistent.

2.3 SITE HYDROGEOLOGY

The Upper Glacial Formation and the Magothy Formation comprise the aquifer of concern at NWIRP Bethpage. Regionally, these formations are generally considered to form a common, interconnected aquifer as the coarse nature of each unit near their contact and the lack of any regionally confirming clay unit allow for the unrestricted flow of groundwater between the formations.

Although the water table beneath NWIRP Bethpage occurs below the glacial deposits, they are hydrogeologically important because their high permeability allows for the rapid recharge of precipitation to the underlying Magothy Formation.

Water level data were gathered from each of the permanent groundwater monitoring wells to determine the preferred direction of shallow groundwater flow underlying the AOC 22. These data revealed the dominant direction of shallow groundwater flow to be towards the south and southwest. This is in agreement with shallow groundwater flow orientation determination made during previous investigations at NWIRP Bethpage.

2.4 PREVIOUS INVESTIGATIONS

In 1997, Northrop Grumman conducted a soil investigation at the former UST location (AOC 22). During this investigation soil borings were installed around and under the former tanks. Approximately 144 soil samples were collected in 8 areas from a depth of 8 to 65 feet bgs. This range represents soils from the bottom of the former USTs to the approximate water table. The samples were analyzed for petroleum-based volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) in accordance with the New York State Department of Environmental Conservation (NYSDEC) Spill Technology and Remediation Series (STARS) Memorandum No.1 - Petroleum-Contaminated Soil Guidance Policy (August 1992) and for TPH.

VOCs were detected infrequently in the soil samples, and none of the detected results exceeded STARS Memorandum Guidance Values (Table 2 of the guidance). SVOCs were detected more frequently and approximately 23% of the soil samples had one or more STARS Memorandum SVOC parameters (polycyclic aromatic hydrocarbons) at a concentration greater than the STARS Memorandum Guidance Values. STARS Memorandum Guidance Value exceedances were noted in all of the soil boring locations and for most sample depths from shallow soils (8 feet bgs) to deeper soils near the water table. However, the maximum SVOC concentration detected that exceeded a STARS Memorandum criteria was only 4.3 mg/kg, indicating that although petroleum hydrocarbons are wide spread, concentrations are relatively low.

A RCRA Facility Assessment field investigation was conducted in 1999 to define the nature and extent of contamination, determine the presence of free product, and evaluate whether groundwater had been impacted by site related contamination. This investigation found that the petroleum contamination at the site was predominately at a depth below the former USTs (10 to 20 feet) and extended to the water table at approximately 50 feet. The estimated areal extent of contamination was approximately 0.3 acres. The soil contaminants were PAHs, which are associated with heavy fuel oils. Several PAHs exceeded New York State cleanup objectives for unrestricted use of the site through direct human exposure and/or protection of groundwater through leaching. Floating fee product, at a maximum thickness of ¼ inch was observed in two wells underneath the former USTs. Surrounding wells did not contain free product. Based on field tests, it was concluded that free product recovery was not viable at the site. Factors limiting recovery were the relatively thin layer of product present (1/4 inch) and the relatively high viscosity of the material (No. 6 fuel oil) (TtNUS, 2002).

Between fall 2004 and spring 2006, a pilot-scale bioremediation study was conducted using an innovative technology that combined in-situ and ex-situ bioremediation, chemical oxidation (Fenton's Reagent), and soil washing. This technology is referred to as a Closed-Loop Bioreactor (CLB) System. The system features no discharge of soil vapors and adds pure oxygen for biodegradation. A September 2007 monitoring report presents the available data collected before, during, and after the CLB System operation. The majority of the soil data for evaluation of the pilot-scale study was collected by the CLB System vendor and was included as Attachment 1. During each sample round, twenty soil samples were collected and analyzed for TPH. These samples were collected from four borings at five depths ranging from 20 to 60 feet below ground surface (bgs). A post-operation soil sampling event in December 2006 and four rounds of groundwater sampling before, during, and after system operation were conducted to evaluate potential effects of the system operation on the groundwater (TtNUS, 2007).

The mean TPH concentration before the CLB study was implemented (August 2004) was 8,820 mg/kg. The mean TPH concentration after the system was complete (December 2006) was 7,350 mg/kg, which corresponds to a 16.6 percent overall reduction. The vertical extent of residual TPH contamination is mostly contained in the 50 and 60-foot depth intervals. The maximum soil TPH-DRO concentration in 2006 was 25,000 mg/kg at a depth of 61 ft bgs.

3.0 INVESTIGATION SUMMARY

Field activities are presented by task in the following paragraphs. All field activities will be conducted in accordance with procedures referenced in TtNUS Standard Operating Procedures (SOPS), and in accordance with the health and safety procedures established in the site Health and Safety Plan (HASP).

3.1 SOIL BORINGS/ANALYTICAL TESTING

Four soil borings will be installed using a rotasonic drilling technique in order to aid in the delineation of the vertical extent of petroleum product and provide material for bench-scale treatability studies (see Figure 3-1). The maximum depth of the borings is anticipated to be 100 feet. These borings will be installed to a depth at which soil is described in the field as being visually free of petroleum contamination (based on the absence of staining and photoionization detector (PID) readings less than 10 parts per million). Three soil samples from each boring will be selected for laboratory analysis as follows (see Table 3-1).

- Petroleum-contaminated soil/product from above the water table (more than 2 feet);
- Petroleum-contaminated soil/product from 0 to 10 feet below the water table; and
- Soil that is visibly free of petroleum contamination.

Samples will be submitted for laboratory analysis of TPH-DRO, TPH-gasoline range organics (GRO)/Motor Oil (MO) and PAHs.

Contaminated soil/product from the four borings will be composited in 5-gallon containers for use in the bench-scale studies described below.

3.1.1 Laboratory Sample Analysis

A Navy and National Environmental Laboratory Accreditation Program (NELAP) certified laboratory will be subcontracted by Tetra Tech to perform the chemical analyses for the environmental samples collected during this investigation. Parameters, analytical methods, anticipated containers, preservation, and holding times are presented in Table 3-1. All samples submitted will be reported on 14 day turn-around time basis.

3.1.2 Sample Identification

Each sample collected will be assigned a unique sample tracking number. The sample tracking number will consist of a four-segment, alphanumeric code that identifies the site, sample location, and sample round. Pertinent information regarding sample identification will be recorded in the field logbooks.

The appropriate alphanumeric sample identification code is explained as follows:

(Site Location) - (Site) - (Sample Number) – (Sample Depth)

Site Location: S4 (Site 4)

For vertical delineation samples:

Sample Number: Soil Boring Number (SB201 to SB204)

Sample Depth: Top and Bottom of Sample Interval in feet below ground surface

For example, a soil sample collected from soil boring SB201 at a depth of 48 to 50 feet below ground surface will be designated as S4-SB201-4850.

For bench scale samples:

Test Number: (TN2001 to TN2008)

Test Condition: Pre- (PRE) or post- (POST) treatment sample

Sample Depth Within Test Cylinder: Top and bottom of sample interval in inches below the top of the cylinder (e.g., 0004)

Sample Time: Days from the end of the test (e.g., 0DAY).

For example, the pretreatment sample collected for Test 2001 would be designated as S4-TN2001-PRE, see Table 3-1

3.1.3 Sample Packaging and Shipping

The field operations leader will be responsible for completion of the following forms:

- Sample labels
- Chain-of-custody forms
- Appropriate labels applied to shipping coolers
- Chain-of-custody seals
- Federal Express air bills

All samples will be packaged and shipped in accordance with TtNUS SOPs.

3.1.4 Sample Custody

Custody of samples must be maintained and documented at all times. Chain-of-custody begins with the collection of the samples in the field. TtNUS SOP SA-6.3 provides a description of the chain-of-custody procedures to be followed.

3.1.5 Quality Assurance/Quality Control (QA/QC)

QA/QC samples to be collected include matrix spike/matrix spike duplicates (MS/MSD) and field duplicates. MS/MSD samples will be collected at a rate of one sample per 20 environmental samples. Field duplicate samples will collected at a rate of one sample per 10 environmental samples. Field duplicate samples will be blind numbered.

3.1.6 General Field Operations

Procedures for the following topics; Site Management and Field Team Responsibilities, Mobilization/Demobilization, Decontamination, Field Changes and Corrective Action, and Investigation-Derived Waste Management are outlined in the Work Plan. All analytical results from this investigation will be validated.

3.2 BENCH-SCALE STUDIES

Bench-top studies will be conducted to determine the physical property changes in the product to be anticipated if thermal heating (steam), solvent extraction, or a combination of methods to initiate mobilization of the petroleum product and allow recovery. Prior to conducting the tests, samples containing visual evidence of petroleum contamination/product produce (staining) will be combined into three composite samples as follows.

- S4-TN2001-PRE – Petroleum-contaminated soil composite from more than two feet above the water table, obtained from borings SB201 to SB204.
- S4-TN2002-PRE – Petroleum-contaminated soil composite from 0 to 10 feet below the water table, obtained from borings SB201 to SB204.
- S4-TN2003-PRE – Petroleum-contaminated soil composite from more than 10 feet below the water table, obtained from borings SB201 to SB204.

Each of these samples will be analyzed for TPH-DRO/MO. These samples will be used to conduct testing described below.

3.2.1 Initial Testing (Test Nos. 2001 through 2003)

Test Nos. 2001 to 2003 will be used to identify basis properties of the product in the Site 4 soil at several temperatures, as follows.

- The ability of the petroleum to form a free flowing product.
- The density of the released petroleum relative to water.
- The potential for heated soil to develop explosive conditions.

For these tests, a 4-liter glass container will be filled approximately 1/4 full with water, covered (but not sealed), and heated. Each open 8-ounce glass jar will be placed in the container (see Figure 3-2), separately and a total of three tests will be performed.

- For Test No. 2001, approximately 8 ounces of soil from above the water table (S4-TN2001-PRE) will be placed in a jar and placed on a base (e.g., ceramic spacer or lead weights) to raise the jar off the bottom of the container above the water level.
- For Test No. 2002, approximately 8 ounces of soil from the water table (S4-TN2002-PRE) will be placed in a second jar placed on a base (e.g., ceramic spacer or lead weights) to raise the jar off the bottom of the container, just below the water level.
- For Test No. 2003, approximately 8 ounces of soils from below the water table (S4-TN2003-PRE) will be placed in a third jar and placed on a base (e.g., ceramic spacer or lead weights) to raise the jar off the bottom of the container, just below the water level.

During these tests water may be added to maintain the top of Test Nos. 2002 and 2003 jars below water.

The water temperature will be controlled to limit the temperature rise to less than one degree per minute. During the heating process, the temperature of the water and soil will be monitored. The heating process will be controlled to allow temperatures to stabilize at target temperatures of 100, 120, 140, and 160 F for a period of approximately 10 to 30 minutes each. Visual observations will be made, recording the products response to heating. Specific parameters to be evaluated are as follows.

- Migration of product to the bottom of the jar or the top of the water bath. The quantity of product that separates will be estimated, as practical.
- Lower explosion limit (LEL) concentrations above the water bath. If LEL conditions greater than 25 percent form, reduced heating and/or venting of the vapor within the container will be conducted to control the LEL.

Samples of the treatment residues will not be collected during these tests. Observations from this testing may be used to modify the test procedures identified below. In particular, test temperatures may be reduced if LEL conditions are encountered.

3.2.2 Thermal Testing (Test No. 2004)

A soil column study will be conducted to simulate the effect of heating the product in-situ. A 12-inch long stainless steel slotted screen with screened end caps (test cylinder) will be used for these tests (See Figure 3-3). The cylinder will be filled (from bottom up) with 4 inches of compacted soil from S4-TN2003-PRE, 4 inches of compacted soil from S4-TN2002-PRE, and 4 inches of compacted soil from S4-TN2001-PRE.

During the test, water will be added to the container until it reaches a static level in the middle of the screen and maintained at that level throughout the test. The water temperature will be controlled to limit the temperature rise to less than one degree per minute. During the heating process, the temperature of the water and soil will be monitored. The heating process will be controlled to allow temperatures to stabilize at target temperatures of 100, 120, 140, and 160 F for a period of approximately 10 to 30 minutes each. If petroleum seepage is noted, the temperatures may be maintained for more than 30 minutes at a given temperature. In addition, floating free product may be removed from the water bath. Visual observations will be made, recording the products response to heating. Specific parameters to be evaluated are as follows.

- Migration of product out of the cylinder and to the bottom or top of the water bath.
- LEL concentrations above the water bath. If LEL conditions are greater than 25 percent, venting of the vapor within the container and/or temperature control will be conducted to reduce the LEL.
- The relative quantity of petroleum migrating from the cylinder.

Following completion of the heating steps, free product will be removed from the water surface via skimming and the test cylinder will be removed from the water bath. Water and product will be allowed to drain from the test cylinder and allowed to cool. The soils will be removed from the cylinders as a core and examined for visual evidence of residual petroleum. Samples of the top four inches (S4-TN2004-0004), middle four inches (S4-TN2004-0408), and bottom four inches (S4-TN2004-0812) for each test will be collected and submitted for TPH-DRO analysis.

In addition, a composite of the soil will be set aside in an open pan and allowed to naturally aerate for a period of approximately 28 days and then sampled for TPH-DRO (S4-TN2004-0012-28day). This testing will be conducted to evaluate the potential for aerobic biodegradation. The sample should be maintained at a temperature of 50 to 70F.

3.2.3 Diesel Solvent Testing (Test No. 2005)

A soil column study will be conducted to simulate the effect of using diesel as a solvent to facilitate recovery of product in-situ. A 12-inch long stainless steel slotted screen with removable end caps (test cylinder) will be used for these tests (See Figure 3-3). The cylinder will be filled (from bottom up) with 4 inches of compacted soil from S4-TN2003-PRE, 4 inches of compacted soil from S4-TN2002-PRE, and 4 inches of compacted soil from S4-TN2001-PRE.

Initially, the cylinder will be completely submerged in a diesel bath for a period of 30 minutes and then allowed to drain for 30 minutes. This process will be repeated twice. The volume of diesel to be used for each rinse will be approximately twice the volume of the test cylinder. Fresh diesel will be used for each rinse. Following the final rinse, the cylinder will be allowed to drain. If drippage continues, the cylinder will be allowed to drain overnight. The temperature of the diesel and test cylinder should be maintained between 55 and 70 F.

Next the test cylinder will be placed into the water bath as described under Test No. 2004. During the test, water will be added to the container until it reaches a static level in the middle of the screen and maintained at that level throughout the test. The water temperature will be controlled to limit the temperature rise to less than one degree per minute. During the heating process, the temperature of the water and soil will be monitored. The heating process will be controlled to allow temperatures to stabilize at target temperatures of 60, 80, and 100 F for a period of approximately 10 to 30 minutes each. During these tests, the temperature of the soil and bath will be limited to 100 F, which is the flash point of diesel. Ice will be added if required to maintain the temperature at 60 F. If petroleum seepage is noted, the temperatures may be maintained for more than 30 minutes. Visual observations will be made, recording the products response to heating. Specific parameters to be evaluated are as follows.

- Migration of product out of the cylinder and to the bottom or top of the water bath.
- LEL concentrations above the water bath. If LEL conditions are greater than 25 percent, venting of the vapor within the container and/or temperature control will be conducted to reduce the LEL.
- The relative quantity of petroleum migrating from the cylinder.

Following completion of the heating steps, free product will be removed from the water surface via skimming and the test cylinder will be removed from the container. Water and product will be allowed to drain from the cylinder and the material will be permitted to cool. The soils will be removed from the cylinders as a core and examined for visual evidence of residual petroleum. Samples of the top four inches (S4-TN2005-0004-0DAY), middle four inches (S4-TN2005-0408-0DAY), and bottom four inches (S4-TN2005-0812-0DAY) for each test will be collected and submitted for TPH-DRO analysis.

In addition, a composite of the soil will be set aside in an open pan and allowed to naturally aerate for a period of approximately 28 days and then sampled for TPH-DRO (S4-TN2005-0012-28day). This testing will be conducted to evaluate the potential for aerobic biodegradation of the original product and residual diesel in the sample. The sample should be maintained at a temperature of 50 to 70F.

3.2.4 Soybean Oil-Based Solvent Testing (Test No. 2006)

A soil column study will be conducted to simulate the effect of using soybean-based solvent (methyl soyate) to facilitate recovery of product in-situ, (see Attachment 2). A 12-inch long stainless steel slotted screen with removable end caps (test cylinder) will be used for these tests (See Figure 3-3). The cylinder will be filled (from bottom up) with 4 inches of compacted soil from S4-TN2003-PRE, 4 inches of compacted soil from S4-TN2002-PRE, and 4 inches of compacted soil from S4-TN2001-PRE.

Initially, the cylinder will be completed submerged in a bio-based solvent bath for a period of 30 minutes and then allowed to drain for 30 minutes. This process will be repeated twice. The volume of solvent to be used for each rinse will be approximately twice the volume of the test cylinder. Fresh solvent will be used for each rinse. Following the final rinse, the cylinder will be allowed to drain. If drippage continues, the cylinder will be allowed to drain overnight. The temperature of the soybean-based solvent and test cylinder should be maintained between 55 and 70 F.

Next the test cylinder will be placed into the water bath as described under Test No. 2004. During the test, water will be added to the container until it reaches a static level in the middle of the screen and maintained at that level throughout the test. The water temperature will be controlled to limit the temperature rise to less than one degree per minute. During the heating process, the temperature of the water and soil will be monitored. The heating process will be controlled to allow temperatures to stabilize at target temperatures of 60, 100, 140, and 160 F for a period of approximately 10 to 30 minutes each. Ice will be added if required to maintain the temperature at 60 F. If petroleum seepage is noted, the temperatures may be maintained for more than 30 minutes. Visual observations will be made, recording the products response to heating. Specific parameters to be evaluated are as follows.

- Migration of product out of the cylinder and to the bottom or top of the water bath.
- LEL concentrations above the water bath. If LEL conditions greater than 25 percent, venting of the vapor within the container and/or temperature control will be conducted to reduce the LEL.
- The relative quantity of petroleum migrating from the cylinder.

Following completion of the heating steps, free product will be removed from the water surface via skimming and the test cylinder will be removed from the container. Water and product will be allowed to drain from the cylinder and the material will be permitted to cool. The soils will be removed from the cylinders as a core and examined for visual evidence of residual petroleum. Samples of the top four inches (S4-TN2006-0004-0DAY), middle four inches (S4-TN2006-0408-0DAY), and bottom four inches (S4-TN2006-0812-0DAY) for each test will be collected and submitted for TPH-DRO analysis.

In addition, a composite of the soil will be set aside in an open pan and allowed to naturally aerate for a period of approximately 28 days and then sampled for TPH-DRO (S4-TN2006-0012-28day). This testing will be conducted to evaluate the potential for aerobic biodegradation of the original product and residual solvent in the sample. The sample should be maintained at a temperature of 50 to 70F.

4.0 DATA EVALUATION

Following the completion of the borings and the bench-top studies, recommendations for a path forward for addressing the petroleum product will be made. Potential treatment options that will be considered are biodegradation, thermally-enhanced floating free product recovery, and solvent-enhanced free product recovery.

REFERENCES

Tetra Tech NUS, Inc. (TtNUS), 2002. RCRA Facility Assessment/Focused Feasibility Study for Former Underground Storage Tanks. Plant No. 3 Area of Concern (AOC) 22 (Tank Nos. 03-01-1, -2 and -3). Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York. February.

Tetra Tech NUS, Inc. (TtNUS), 2007. Soil and Groundwater Report in Support of Closed Loop Bioreactor Pilot-Scale Study, for AOC 22, Site 4, Former Underground Storage Tanks, Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York, September.

TABLES

TABLE 3-1
ANALYTICAL SUMMARY FOR SITE 4 – BENCH SCALE PILOT STUDY
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT, BETHPAGE NEW YORK

Sample ID	TPH-GRO	TPH-DRO/MO	PAH	Comment
S4-SB201-XXXX	x	x	x	Petroleum-contaminated soil, 2 to 10 feet above the water table.
S4-SB201-XXXX	x	x	x	Petroleum-contaminated soil, 0 to 10 feet below the water table
S4-SB201-XXXX	x	x	x	Clean soil below the water table based on visual absence of staining and PID readings less than 10 ppm.
S4-SB202-XXXX	x	x	x	Petroleum-contaminated soil, 2 to 10 feet above the water table.
S4-SB202-XXXX	x	x	x	Petroleum-contaminated soil, 0 to 10 feet below the water table
S4-SB202-XXXX	x	x	x	Clean soil below the water table based on visual absence of staining and PID readings less than 10 ppm.
S4-SB203-XXXX	x	x	x	Petroleum-contaminated soil, 2 to 10 feet above the water table.
S4-SB203-XXXX	x	x	x	Petroleum-contaminated soil, 0 to 10 feet below the water table
S4-SB203-XXXX	x	x	x	Clean soil below the water table based on visual absence of staining and PID readings less than 10 ppm.
S4-SB204-XXXX	x	x	x	Petroleum-contaminated soil, 2 to 10 feet above the water table.
S4-SB204-XXXX	x	x	x	Petroleum-contaminated soil, 0 to 10 feet below the water table
S4-SB204-XXXX	x	x	x	Clean soil below the water table based on visual absence of staining and PID readings less than 10 ppm.
SB-TN2001-PRE		x		Composite of soil containing petroleum product from more than 2 feet above the water table. Approximately 5 gallons required.
SB-TN2002-PRE		x		Composite of soil containing petroleum product from 0 to 10 feet below the water table. Approximately 5 gallons required.
SB-TN2003-PRE		x		Composite of soil containing petroleum product from more than 10 feet below the water table. Approximately 5 gallons required.
S4-TN2004-0004-0DAY		x		Thermal Testing post-treatment sample. Initial sample.
S4-TN2004-0408-0DAY		x		Thermal Testing post-treatment sample. Initial sample.
S4-TN2004-0812-0DAY		x		Thermal Testing post-treatment sample. Initial sample.
S4-TN2004-0004-28DAY		x		Thermal Testing post-treatment sample. 28-day sample.
S4-TN2004-0408-28DAY		x		Thermal Testing post-treatment sample. 28-day sample.
S4-TN2004-0812-28DAY		x		Thermal Testing post-treatment sample. 28-day sample.

TABLE 3-1
ANALYTICAL SUMMARY FOR SITE 4 – BENCH SCALE PILOT STUDY
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT, BETHPAGE NEW YORK

Sample ID	TPH-GRO	TPH-DRO/MO	PAH	Comment
S4-TN2005-0004-0DAY		x		Diesel Solvent Testing post-treatment sample. Initial sample.
S4-TN2005-0408-0DAY		x		Diesel Solvent Testing post-treatment sample. Initial sample.
S4-TN2005-0812-0DAY		x		Diesel Solvent Testing post-treatment sample. Initial sample.
S4-TN2005-0004-28DAY		x		Diesel Solvent Testing post-treatment sample. 28-day sample.
S4-TN2005-0408-28DAY		x		Diesel Solvent Testing post-treatment sample. 28-day sample.
S4-TN2005-0812-28DAY		x		Diesel Solvent Testing post-treatment sample. 28-day sample.
S4-TN2005-0004-0DAY		x		Diesel Solvent Testing post-treatment sample. Initial sample.
S4-TN2005-0408-0DAY		x		Diesel Solvent Testing post-treatment sample. Initial sample.
S4-TN2005-0812-0DAY		x		Diesel Solvent Testing post-treatment sample. Initial sample.
S4-TN2005-0004-28DAY		x		Diesel Solvent Testing post-treatment sample. 28-day sample.
S4-TN2005-0408-28DAY		x		Diesel Solvent Testing post-treatment sample. 28-day sample.
S4-TN2005-0812-28DAY		x		Diesel Solvent Testing post-treatment sample. 28-day sample.
S4-TN2006-0004-0DAY		x		Soybean-based Solvent Testing post-treatment sample. Initial sample.
S4-TN2006-0408-0DAY		x		Soybean-based Solvent Testing post-treatment sample. Initial sample.
S4-TN2006-0812-0DAY		x		Soybean-based Solvent Testing post-treatment sample. Initial sample.
S4-TN2006-0004-28DAY		x		Soybean-based Solvent Testing post-treatment sample. 28-day sample.
S4-TN2006-0408-28DAY		x		Soybean-based Solvent Testing post-treatment sample. 28-day sample.
S4-TN2006-0812-28DAY		x		Soybean-based Solvent Testing post-treatment sample. 28-day sample.

TPH – Total Petroleum Hydrocarbons.
GRO – Gasoline Range Organics.
DRO/MO – Diesel Range Organics/Motor Oil.
PAH – Polynuclear Aromatic Hydrocarbons.
XXXX – Top and bottom of sample in feet below ground surface.

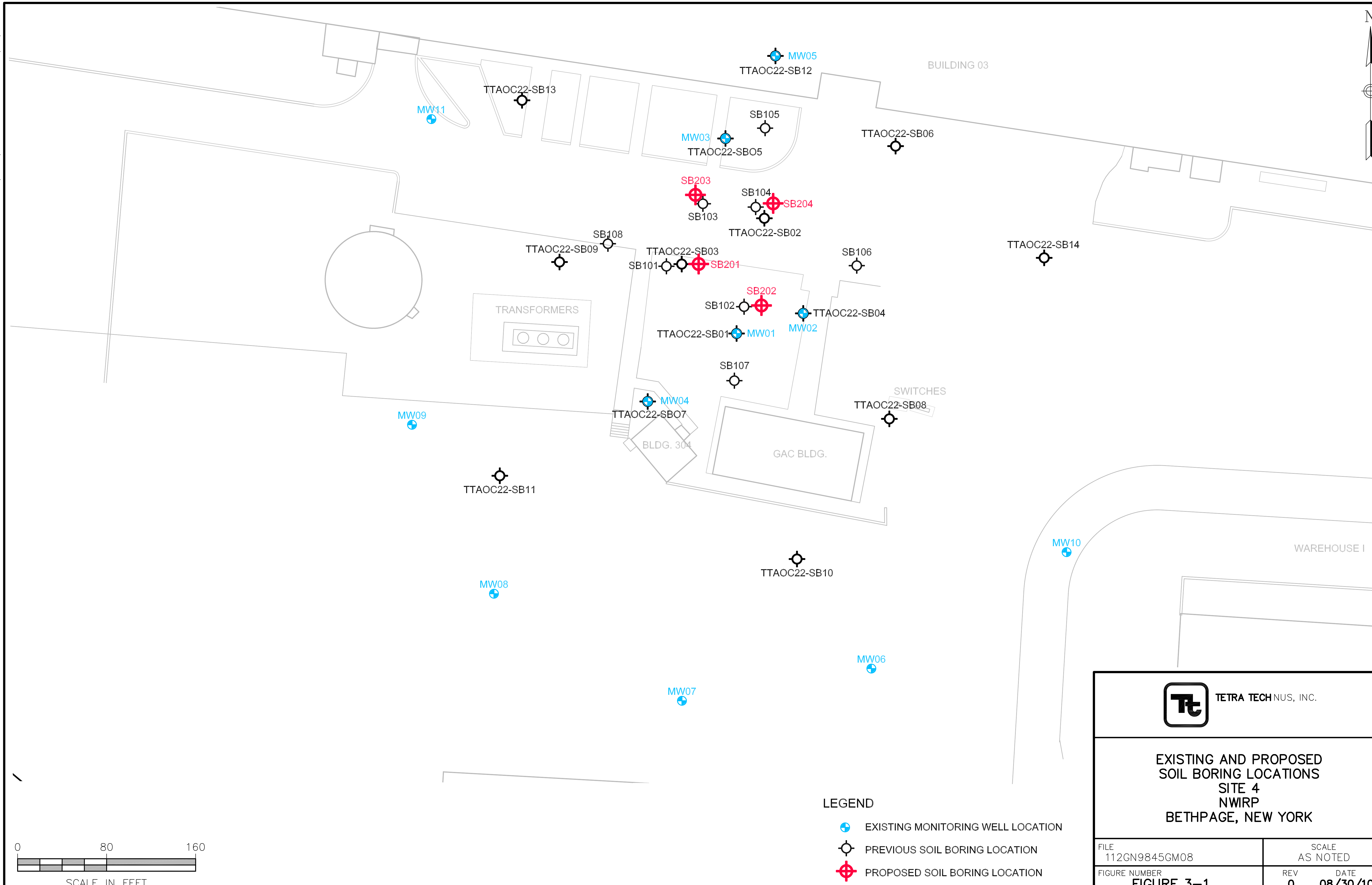
TABLE 3-2
ANALYTICAL SUMMARY FOR SITE 4 – BENCH SCALE PILOT STUDY
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT, BETHPAGE NEW YORK

Parameter	Number of Samples[1]	QA/QC Samples	Analytical Methods
Total Petroleum Hydrocarbons – Gasoline Range Organics	14	DU, MS/MSD	SW-846-8015
Total Petroleum Hydrocarbons – Diesel Range Organics/Motor Oil	43	DU, MS/MSD	SW-846-8015
Polynuclear Aromatic Hydrocarbons	14	DU, MS/MSD	SW-846-8270C

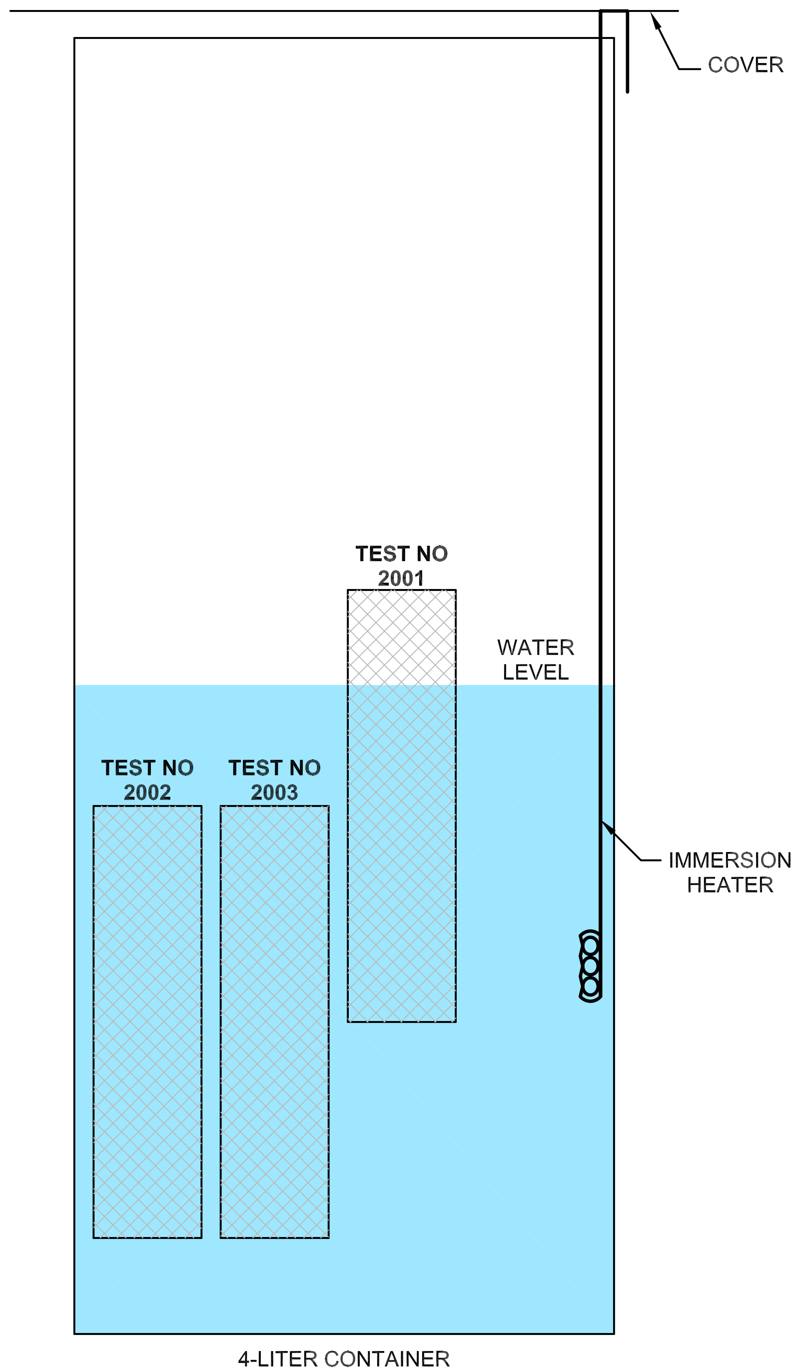
1. Number of samples includes duplicates.
DU – Duplicate, 1 in 10.
MS/MSD - Matrix spike/matrix spike duplicate, 1 in 20.

FIGURES

112GN9845\2210\112GN9845GM08.DWG 08/30/10 MKB



112GN9845\2210\112GN9845CM01-2.DWG 08/30/10 MKB

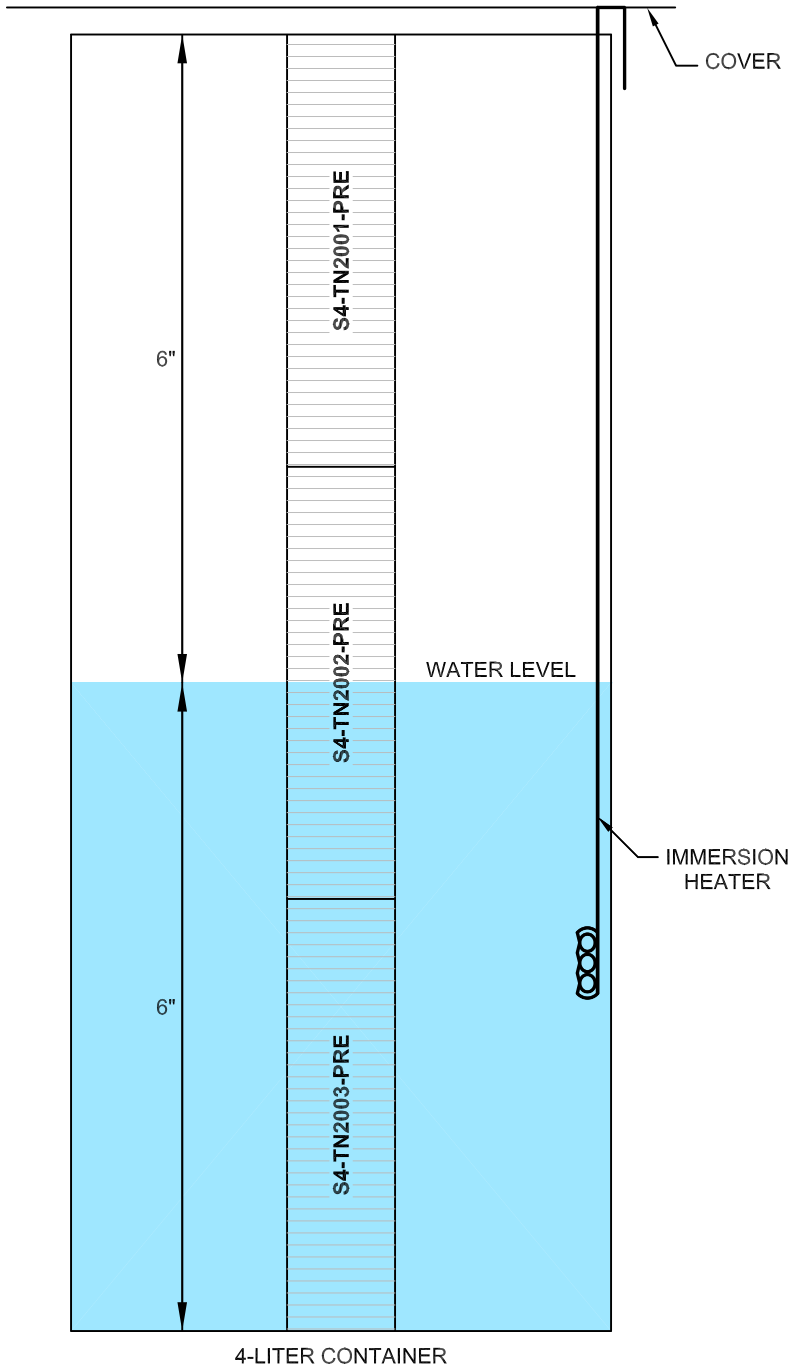


TETRA TECH NUS, INC.

BENCH-SCALE STUDY SETUP
TEST NOS. 2001 TO 2003
SITE 4
NWIRP
BETHPAGE, NEW YORK

SCALE	AS NOTED
FILE	112GN9845CM01-2
REV	0
DATE	08/30/10
FIGURE NUMBER	FIGURE 3-2

112GN9845\2210\112GN9845CM01-1.DWG 08/30/10 MKB



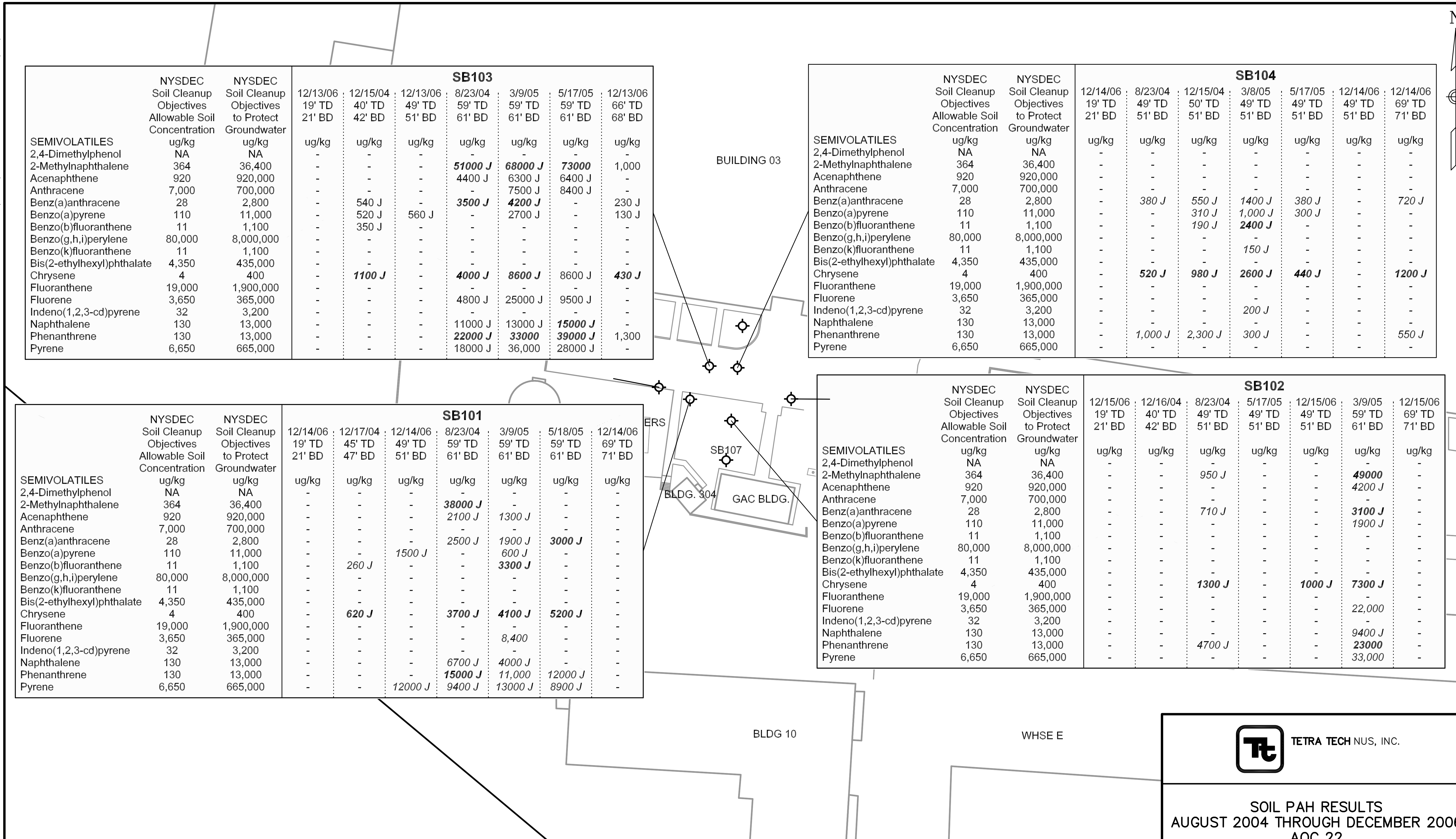
TETRA TECHNUS, INC.

BENCH-SCALE STUDY SETUP
TEST NOS. 2004 TO 2006
SITE 4
NWIRP
BETHPAGE, NEW YORK

SCALE	AS NOTED
FILE	112GN9845CM01-1
REV	0
DATE	08/30/10
FIGURE NUMBER	FIGURE 3-3

ATTACHMENT 1

112GN9845\2210\112GN9845GM02-4.DWG 03/20/07 MKB



SEMIVOLATILES	NYSDEC Soil Cleanup Objectives Allowable Soil Concentration	NYSDEC Soil Cleanup Objectives to Protect Groundwater	SB103 12/13/06 19' TD 21' BD	SB103 12/15/04 40' TD 42' BD	SB103 12/13/06 49' TD 51' BD	SB103 8/23/04 59' TD 61' BD	SB103 3/9/05 59' TD 61' BD	SB103 5/17/05 59' TD 61' BD	SB103 12/13/06 66' TD 68' BD
	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
2,4-Dimethylphenol	NA	NA	-	-	-	-	-	-	-
2-Methylnaphthalene	364	36,400	-	-	-	**51000 J**	**68000 J**	**73000**	1,000
Acenaphthene	920	920,000	-	-	-	4400 J	6300 J	6400 J	-
Anthracene	7,000	700,000	-	-	-	-	7500 J	8400 J	-
Benz(a)anthracene	28	2,800	-	540 J	-	**3500 J**	**4200 J**	-	230 J
Benzo(a)pyrene	110	11,000	-	520 J	560 J	-	2700 J	-	130 J
Benzo(b)fluoranthene	11	1,100	-	350 J	-	-	-	-	-
Benzo(g,h,i)perylene	80,000	8,000,000	-	-	-	-	-	-	-
Benzo(k)fluoranthene	11	1,100	-	-	-	-	-	-	-
Bis(2-ethylhexyl)phthalate	4,350	435,000	-	-	-	-	-	-	-
Chrysene	4	400	-	**1100 J**	-	**4000 J**	**8600 J**	8600 J	**430 J**
Fluoranthene	19,000	1,900,000	-	-	-	-	-	-	-
Fluorene	3,650	365,000	-	-	-	4800 J	25000 J	9500 J	-
Indeno(1,2,3-cd)pyrene	32	3,200	-	-	-	-	-	-	-
Naphthalene	130	13,000	-	-	-	11000 J	13000 J	**15000 J**	-
Phenanthrene	130	13,000	-	-	-	**22000 J**	**33000**	**39000 J**	1,300
Pyrene	6,650	665,000	-	-	-	18000 J	36,000	28000 J	-

SEMIVOLATILES	NYSDEC Soil Cleanup Objectives Allowable Soil Concentration	NYSDEC Soil Cleanup Objectives to Protect Groundwater	SB104 12/14/06 19' TD 21' BD	SB104 8/23/04 49' TD 51' BD	SB104 12/15/04 50' TD 51' BD	SB104 3/8/05 49' TD 51' BD	SB104 5/17/05 49' TD 51' BD	SB104 12/14/06 49' TD 51' BD	SB104 12/14/06 69' TD 71' BD
	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
2,4-Dimethylphenol	NA	NA	-	-	-	-	-	-	-
2-Methylnaphthalene	364	36,400	-	-	-	-	-	-	-
Acenaphthene	920	920,000	-	-	-	-	-	-	-
Anthracene	7,000	700,000	-	-	-	-	-	-	-
Benz(a)anthracene	28	2,800	-	380 J	550 J	1400 J	380 J	-	720 J
Benzo(a)pyrene	110	11,000	-	-	310 J	1,000 J	300 J	-	-
Benzo(b)fluoranthene	11	1,100	-	-	190 J	**2400 J**	-	-	-
Benzo(g,h,i)perylene	80,000	8,000,000	-	-	-	-	-	-	-
Benzo(k)fluoranthene	11	1,100	-	-	-	150 J	-	-	-
Bis(2-ethylhexyl)phthalate	4,350	435,000	-	-	-	-	-	-	-
Chrysene	4	400	-	**520 J**	**980 J**	**2600 J**	**440 J**	-	**1200 J**
Fluoranthene	19,000	1,900,000	-	-	-	-	-	-	-
Fluorene	3,650	365,000	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	32	3,200	-	-	-	200 J	-	-	-
Naphthalene	130	13,000	-	-	-	-	-	-	-
Phenanthrene	130	13,000	-	1,000 J	2,300 J	300 J	-	-	550 J
Pyrene	6,650	665,000	-	-	-	-	-	-	-

SEMIVOLATILES	NYSDEC Soil Cleanup Objectives Allowable Soil Concentration	NYSDEC Soil Cleanup Objectives to Protect Groundwater	SB101 12/14/06 19' TD 21' BD	SB101 12/17/04 45' TD 47' BD	SB101 12/14/06 49' TD 51' BD	SB101 8/23/04 59' TD 61' BD	SB101 3/9/05 59' TD 61' BD	SB101 5/18/05 59' TD 61' BD	SB101 12/14/06 69' TD 71' BD
	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
2,4-Dimethylphenol	NA	NA	-	-	-	-	-	-	-
2-Methylnaphthalene	364	36,400	-	-	-	**38000 J**	-	-	-
Acenaphthene	920	920,000	-	-	-	2100 J	1300 J	-	-
Anthracene	7,000	700,000	-	-	-	-	-	-	-
Benz(a)anthracene	28	2,800	-	-	-	2500 J	1900 J	**3000 J**	-
Benzo(a)pyrene	110	11,000	-	-	1500 J	-	600 J	-	-
Benzo(b)fluoranthene	11	1,100	-	260 J	-	-	**3300 J**	-	-
Benzo(g,h,i)perylene	80,000	8,000,000	-	-	-	-	-	-	-
Benzo(k)fluoranthene	11	1,100	-	-	-	-	-	-	-
Bis(2-ethylhexyl)phthalate	4,350	435,000	-	-	-	-	-	-	-
Chrysene	4	400	-	**620 J**	-	**3700 J**	**4100 J**	**5200 J**	-
Fluoranthene	19,000	1,900,000	-	-	-	-	-	-	-
Fluorene	3,650	365,000	-	-	-	-	8,400	-	-
Indeno(1,2,3-cd)pyrene	32	3,200	-	-	-	-	-	-	-
Naphthalene	130	13,000	-	-	-	6700 J	4000 J	-	-
Phenanthrene	130	13,000	-	-	-	**15000 J**	11,000	12000 J	-
Pyrene	6,650	665,000	-	-	12000 J	9400 J	13000 J	8900 J	-

SEMIVOLATILES	NYSDEC Soil Cleanup Objectives Allowable Soil Concentration	NYSDEC Soil Cleanup Objectives to Protect Groundwater	SB102 12/15/06 19' TD 21' BD	SB102 12/16/04 40' TD 42' BD	SB102 8/23/04 49' TD 51' BD	SB102 5/17/05 49' TD 51' BD	SB102 12/15/06 49' TD 51' BD	SB102 3/9/05 59' TD 61' BD	SB102 12/15/06 69' TD 71' BD
	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
2,4-Dimethylphenol	NA	NA	-	-	-	-	-	-	-
2-Methylnaphthalene	364	36,400	-	-	950 J	-	-	**49000**	-
Acenaphthene	920	920,000	-	-	-	-	-	4200 J	-
Anthracene	7,000	700,000	-	-	-	-	-	-	-
Benz(a)anthracene	28	2,800	-	-	710 J	-	-	**3100 J**	-
Benzo(a)pyrene	110	11,000	-	-	-	-	-	1900 J	-
Benzo(b)fluoranthene	11	1,100	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	80,000	8,000,000	-	-	-	-	-	-	-
Benzo(k)fluoranthene	11	1,100	-	-	-	-	-	-	-
Bis(2-ethylhexyl)phthalate	4,350	435,000	-	-	-	-	-	-	-
Chrysene	4	400	-	-	**1300 J**	-	**1000 J**	**7300 J**	-
Fluoranthene	19,000	1,900,000	-	-	-	-	-	-	-
Fluorene	3,650	365,000	-	-	-	-	-	22,000	-
Indeno(1,2,3-cd)pyrene	32	3,200	-	-	-	-	-	-	-
Naphthalene	130	13,000	-	-	-	-	-	9400 J	-
Phenanthrene	130	13,000	-	-	4700 J	-	-	**23000**	-
Pyrene	6,650	665,000	-	-	-	-	-	33,000	-

0 80 160

SCALE IN FEET

NOTES
1. ALL VALUES EXCEED SOIL CLEANUP OBJECTIVES ALLOWABLE SOIL CONCENTRATIONS.
2. BOLDED VALUES EXCEED BOTH THE ALLOWABLE SOIL CONCENTRATIONS AND OBJECTIVES TO PROTECT GROUNDWATER.

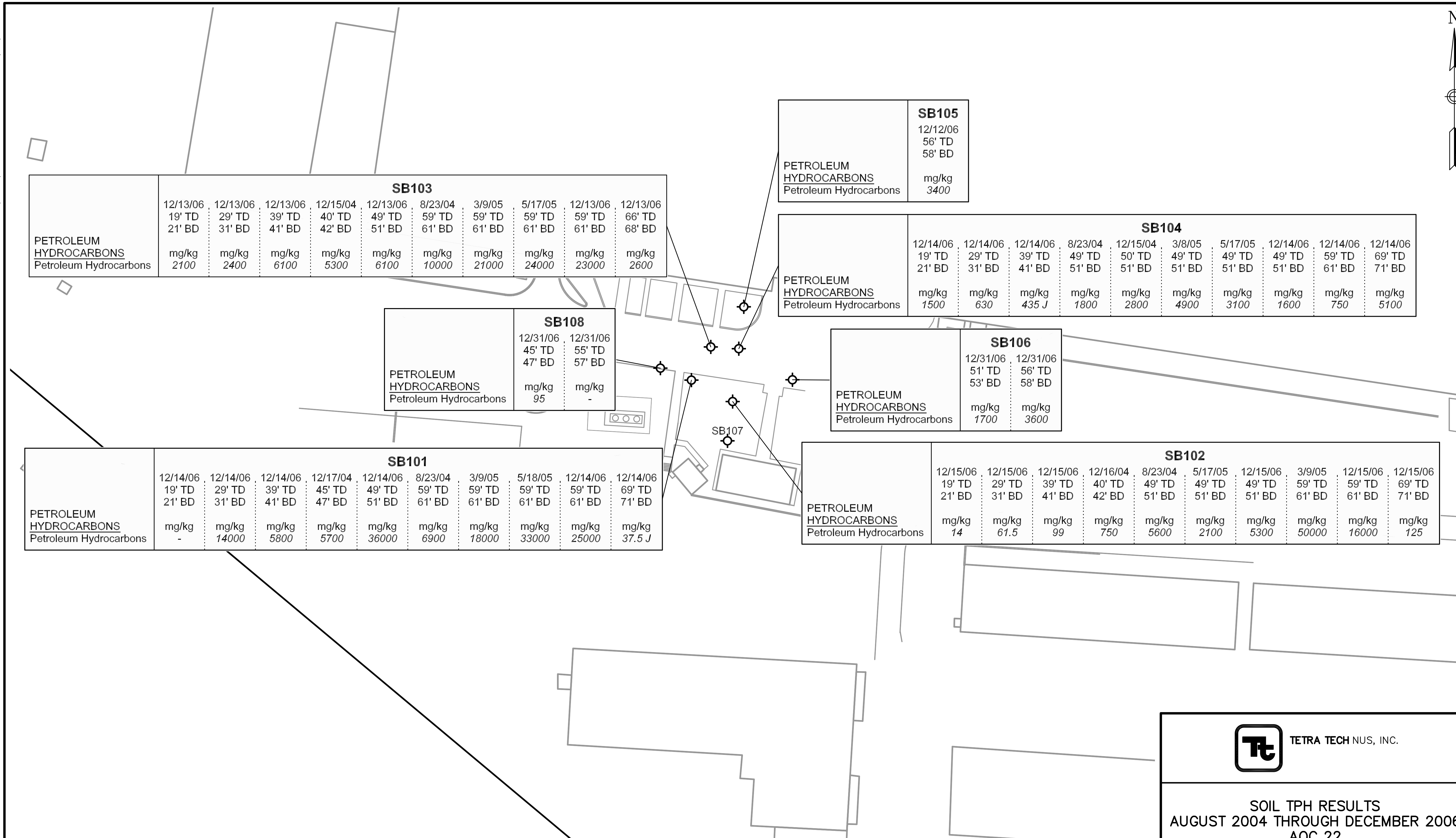
LEGEND
- ⌖ SOIL BORING LOCATION
- J VALUE IS CONSIDERED ESTIMATED

TETRA TECH NUS, INC.

SOIL PAH RESULTS
AUGUST 2004 THROUGH DECEMBER 2006
AOC 22
NWIRP
BETHPAGE, NEW YORK

FILE	SCALE
112GN9845GM02-4	AS NOTED
FIGURE NUMBER FIGURE 4-2	REV 0 DATE 06/29/07

112GN9845\2210\112GN9845GM02-5.DWG 07/10/07 MKB



SB103

	12/13/06	12/13/06	12/13/06	12/15/04	12/13/06	8/23/04	3/9/05	5/17/05	12/13/06	12/13/06
	19' TD	29' TD	39' TD	40' TD	49' TD	59' TD	59' TD	59' TD	59' TD	66' TD
	21' BD	31' BD	41' BD	42' BD	51' BD	61' BD	61' BD	61' BD	61' BD	68' BD
PETROLEUM HYDROCARBONS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Petroleum Hydrocarbons	*2100*	*2400*	*6100*	*5300*	*6100*	*10000*	*21000*	*24000*	*23000*	*2600*

SB105

	12/12/06
	56' TD
	58' BD
PETROLEUM HYDROCARBONS	mg/kg
Petroleum Hydrocarbons	*3400*

SB104

	12/14/06	12/14/06	12/14/06	8/23/04	12/15/04	3/8/05	5/17/05	12/14/06	12/14/06	12/14/06
	19' TD	29' TD	39' TD	49' TD	50' TD	49' TD	49' TD	49' TD	59' TD	69' TD
	21' BD	31' BD	41' BD	51' BD	51' BD	51' BD	51' BD	51' BD	61' BD	71' BD
PETROLEUM HYDROCARBONS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Petroleum Hydrocarbons	*1500*	*630*	*435 J*	*1800*	*2800*	*4900*	*3100*	*1600*	*750*	*5100*

SB108

	12/31/06	12/31/06
	45' TD	55' TD
	47' BD	57' BD
PETROLEUM HYDROCARBONS	mg/kg	mg/kg
Petroleum Hydrocarbons	*95*	-

SB106

	12/31/06	12/31/06
	51' TD	56' TD
	53' BD	58' BD
PETROLEUM HYDROCARBONS	mg/kg	mg/kg
Petroleum Hydrocarbons	*1700*	*3600*

SB101

	12/14/06	12/14/06	12/14/06	12/17/04	12/14/06	8/23/04	3/9/05	5/18/05	12/14/06	12/14/06
	19' TD	29' TD	39' TD	45' TD	49' TD	59' TD	59' TD	59' TD	59' TD	69' TD
	21' BD	31' BD	41' BD	47' BD	51' BD	61' BD	61' BD	61' BD	61' BD	71' BD
PETROLEUM HYDROCARBONS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Petroleum Hydrocarbons	-	*14000*	*5800*	*5700*	*36000*	*6900*	*18000*	*33000*	*25000*	*37.5 J*

SB102

	12/15/06	12/15/06	12/15/06	12/16/04	8/23/04	5/17/05	12/15/06	3/9/05	12/15/06	12/15/06
	19' TD	29' TD	39' TD	40' TD	49' TD	49' TD	49' TD	59' TD	59' TD	69' TD
	21' BD	31' BD	41' BD	42' BD	51' BD	51' BD	51' BD	61' BD	61' BD	71' BD
PETROLEUM HYDROCARBONS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Petroleum Hydrocarbons	*14*	*61.5*	*99*	*750*	*5600*	*2100*	*5300*	*50000*	*16000*	*125*

LEGEND

- ⌖ SOIL BORING LOCATION
- J VALUE IS CONSIDERED ESTIMATED
- \- TPH WAS NOT DETECTED

0 80 160

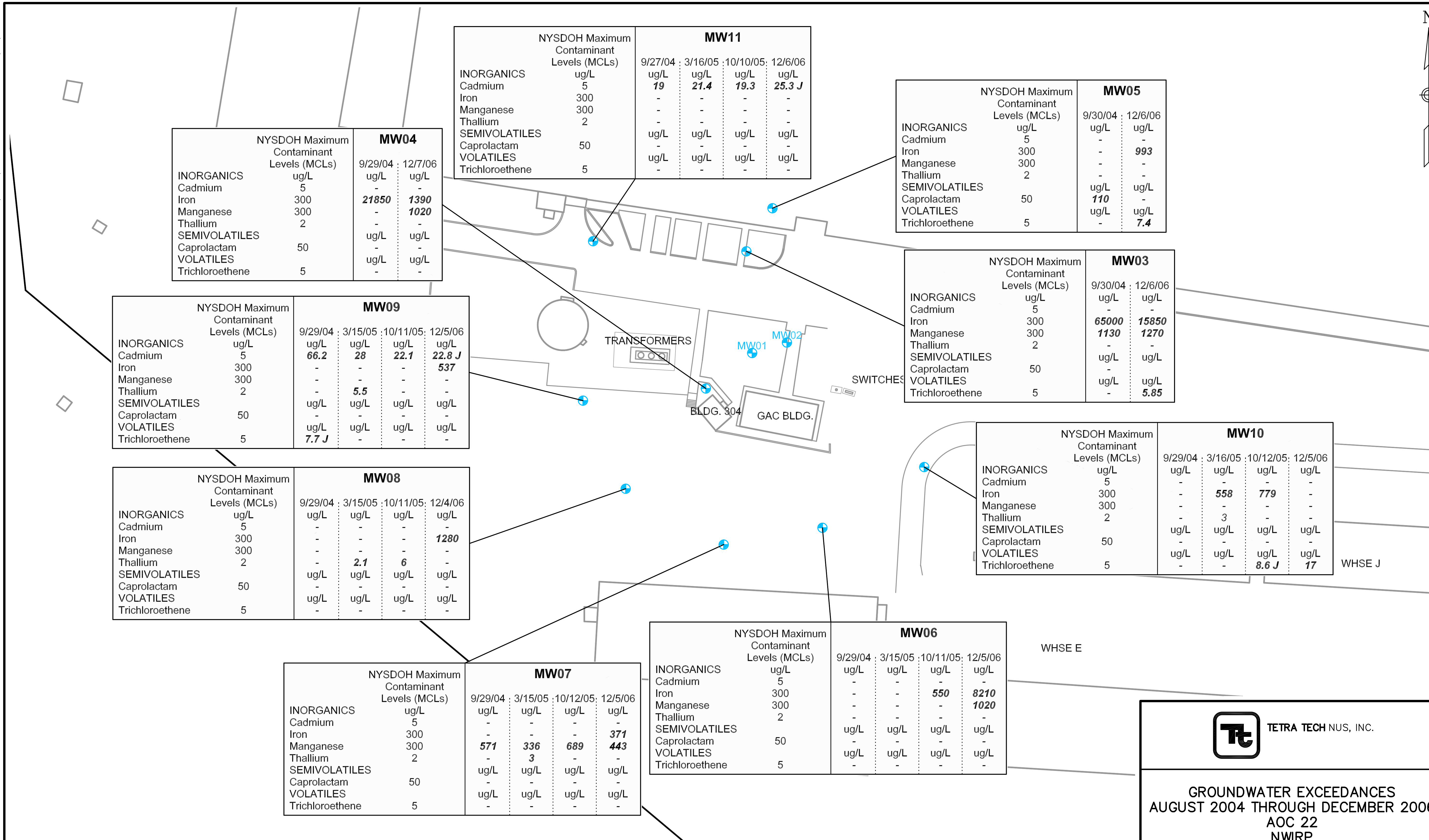
SCALE IN FEET

TETRA TECH NUS, INC.

SOIL TPH RESULTS
AUGUST 2004 THROUGH DECEMBER 2006
AOC 22
NWIRP
BETHPAGE, NEW YORK

FILE	SCALE
112GN9845GM02-5	AS NOTED

FIGURE NUMBER	REV	DATE
FIGURE 4-1	0	07/10/07



NYSDOH Maximum Contaminant Levels (MCLs)		MW11 9/27/04	MW11 3/16/05	MW11 10/10/05	MW11 12/6/06
INORGANICS	ug/L	ug/L	ug/L	ug/L	ug/L
Cadmium	5	**19**	**21.4**	**19.3**	**25.3 J**
Iron	300	-	-	-	-
Manganese	300	-	-	-	-
Thallium	2	-	-	-	-
SEMIVOLATILES		ug/L	ug/L	ug/L	ug/L
Caprolactam	50	-	-	-	-
VOLATILES		ug/L	ug/L	ug/L	ug/L
Trichloroethene	5	-	-	-	-

NYSDOH Maximum Contaminant Levels (MCLs)		MW04 9/29/04	MW04 12/7/06
INORGANICS	ug/L	ug/L	ug/L
Cadmium	5	-	-
Iron	300	**21850**	**1390**
Manganese	300	-	**1020**
Thallium	2	-	-
SEMIVOLATILES		ug/L	ug/L
Caprolactam	50	-	-
VOLATILES		ug/L	ug/L
Trichloroethene	5	-	-

NYSDOH Maximum Contaminant Levels (MCLs)		MW05 9/30/04	MW05 12/6/06
INORGANICS	ug/L	ug/L	ug/L
Cadmium	5	-	-
Iron	300	-	**993**
Manganese	300	-	-
Thallium	2	-	-
SEMIVOLATILES		ug/L	ug/L
Caprolactam	50	**110**	-
VOLATILES		ug/L	ug/L
Trichloroethene	5	-	**7.4**

NYSDOH Maximum Contaminant Levels (MCLs)		MW03 9/30/04	MW03 12/6/06
INORGANICS	ug/L	ug/L	ug/L
Cadmium	5	-	-
Iron	300	**65000**	**15850**
Manganese	300	**1130**	**1270**
Thallium	2	-	-
SEMIVOLATILES		ug/L	ug/L
Caprolactam	50	-	-
VOLATILES		ug/L	ug/L
Trichloroethene	5	-	**5.85**

NYSDOH Maximum Contaminant Levels (MCLs)		MW09 9/29/04	MW09 3/15/05	MW09 10/11/05	MW09 12/5/06
INORGANICS	ug/L	ug/L	ug/L	ug/L	ug/L
Cadmium	5	**66.2**	**28**	**22.1**	**22.8 J**
Iron	300	-	-	-	**537**
Manganese	300	-	-	-	-
Thallium	2	-	**5.5**	-	-
SEMIVOLATILES		ug/L	ug/L	ug/L	ug/L
Caprolactam	50	-	-	-	-
VOLATILES		ug/L	ug/L	ug/L	ug/L
Trichloroethene	5	**7.7 J**	-	-	-

NYSDOH Maximum Contaminant Levels (MCLs)		MW08 9/29/04	MW08 3/15/05	MW08 10/11/05	MW08 12/4/06
INORGANICS	ug/L	ug/L	ug/L	ug/L	ug/L
Cadmium	5	-	-	-	-
Iron	300	-	-	-	**1280**
Manganese	300	-	-	-	-
Thallium	2	-	**2.1**	**6**	-
SEMIVOLATILES		ug/L	ug/L	ug/L	ug/L
Caprolactam	50	-	-	-	-
VOLATILES		ug/L	ug/L	ug/L	ug/L
Trichloroethene	5	-	-	-	-

NYSDOH Maximum Contaminant Levels (MCLs)		MW10 9/29/04	MW10 3/16/05	MW10 10/12/05	MW10 12/5/06
INORGANICS	ug/L	ug/L	ug/L	ug/L	ug/L
Cadmium	5	-	-	-	-
Iron	300	-	**558**	**779**	-
Manganese	300	-	-	-	-
Thallium	2	-	**3**	-	-
SEMIVOLATILES		ug/L	ug/L	ug/L	ug/L
Caprolactam	50	-	-	-	-
VOLATILES		ug/L	ug/L	ug/L	ug/L
Trichloroethene	5	-	-	**8.6 J**	**17**

NYSDOH Maximum Contaminant Levels (MCLs)		MW07 9/29/04	MW07 3/15/05	MW07 10/12/05	MW07 12/5/06
INORGANICS	ug/L	ug/L	ug/L	ug/L	ug/L
Cadmium	5	-	-	-	-
Iron	300	-	-	-	**371**
Manganese	300	**571**	**336**	**689**	**443**
Thallium	2	-	**3**	-	-
SEMIVOLATILES		ug/L	ug/L	ug/L	ug/L
Caprolactam	50	-	-	-	-
VOLATILES		ug/L	ug/L	ug/L	ug/L
Trichloroethene	5	-	-	-	-

NYSDOH Maximum Contaminant Levels (MCLs)		MW06 9/29/04	MW06 3/15/05	MW06 10/11/05	MW06 12/5/06
INORGANICS	ug/L	ug/L	ug/L	ug/L	ug/L
Cadmium	5	-	-	-	-
Iron	300	-	-	**550**	**8210**
Manganese	300	-	-	-	**1020**
Thallium	2	-	-	-	-
SEMIVOLATILES		ug/L	ug/L	ug/L	ug/L
Caprolactam	50	-	-	-	-
VOLATILES		ug/L	ug/L	ug/L	ug/L
Trichloroethene	5	-	-	-	-

0 80 160
SCALE IN FEET

NOTE
1. ALL VALUES EXCEED THE NYSDEC GROUNDWATER QUALITY STANDARDS.

LEGEND
MONITORING WELL LOCATION
J VALUE IS CONSIDERED ESTIMATED

TETRA TECH NUS, INC.

GROUNDWATER EXCEEDANCES
AUGUST 2004 THROUGH DECEMBER 2006
AOC 22
NWIRP
BETHPAGE, NEW YORK

FILE	SCALE
112GN9845GM02-3	AS NOTED

FIGURE NUMBER	REV	DATE
FIGURE 4-4	0	08/21/07

112GN9845\2210\112GN9845GM02-3.DWG 08/21/07 MKB

ATTACHMENT 2

VertecBio Gold #4EG

Methyl Soyate

BioBased **Solvent**

Soybean Derived

VertecBio Gold EG (economy grade) has similar properties as Gold #4 but is less costly. Gold #4EG has a deep amber color and a slightly stronger vegetable oil odor then Gold #4. This grade of methyl soyate is ideal for formulating mastic and adhesive removers, asphalt release agents and industrial cleaners. This VertecBio Gold #4EG is 100% methyl soyate.

Flash point over 200 F, and less than 5% VOCs

- **Low Cost**
- **Ideal for Formulating Heavy Duty Cleaners, Asphalt Release Agents**
- **Low VOC**
- **Very Low Vapor Pressure**
- **100% Biodegradable**
- **Excellent Degreaser**
- **Flash Point Above 200^o F**
- **Safe, Non-Toxic, Non-Carcinogenic**
- **Sustainable Chemistry---Small Carbon Footprint**
- **93% Biobased Content, Made from Renewable Resources**
- **EPA Approved SNAP Solvent---No Ozone Depleting Chemicals**
- **No HAP's---No Hazardous Air Pollutants**
- **No Global Warming Compounds**
- **EPA Approved SNAP Solvent**
- **Non SARA 313 Reportable**
- **Non-Hazardous Under RCRA**

Design for the Environment U.S. EPA

Recognized as Environmentally Preferable Chemistry

TECHNICAL DATA

Flash Point..>200 F ASTM D93 closed cup
Vapor Pressure………....<1 mmHg @ 68 F
pH of Water Dispersion……………….4.3
Specific Gravity………………………0.88
Evaporation Rate……...……………..<0.1
Vapor Density…………………………..>4
Boiling Point…………...………..> 600 F
CAS No: …….........................67784-80-9

01/21/10

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