Summary Report

For

2012 On-Site Vertical Profile Borings Pre-Design Field Investigation (VPB-134, -135, and -136)

Naval Weapons Industrial Reserve Plant

Bethpage, New York

Naval Facilities Engineering Command Mid-Atlantic

Contract Number N62470-08-D-1001
Contract Task Order WE62

November 2012

SUMMARY REPORT FOR
2012 ON-SITE VERTICAL PROFILE BORINGS
PRE-DESIGN FIELD INVESTIGATION
(VPB-134, -135, and 136)

NAVAL FACILITIES ENGINEERING COMMAND
MID-ATLANTIC

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command
Mid-Atlantic
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Contract No. N62470-08-D-1001

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ACRONYMS

AOC	area of concern
bgs	below ground surface
CLEAN	Comprehensive Long-Term Environmental Action Navy
CoC	chain of custody
CTO	contract task order
GOCO	government owned contractor-operated
IDW	investigation derived waste
ER	Environmental Restoration
NAVFAC	Naval Facilities Engineering Command
NWIRP	Naval Weapons Industrial Reserve Plant
NYSDEC	New York State Department of Environmental Conservation
OU-2	Operable Unit 2
Tetra Tech	Tetra Tech, Inc.
USGS	United States Geological Survey
VOCs	volatile organic compounds
VPB	vertical profile boring

1.0 INTRODUCTION

This report has been prepared by Tetra Tech NUS, Inc. (Tetra Tech) for the Naval Facilities Engineering Command Mid-Atlantic under Contract Task Orders (CTO) WE62 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) contract numbers N62470-08-D-1001. This investigation was conducted to evaluate the quality of groundwater at the southern (down-gradient) edge of the former Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, Long Island, New York (Figures 1 and 2).

The field investigation consisted of the installation of three vertical profile borings (VPBs) and collection of groundwater and soil samples. On-site field activities were conducted in accordance to the *Letter Work Plan for Pre-Design Field Investigation, OU-2 Offsite Groundwater Investigation, Naval Weapons Industrial Reserve Plant, Bethpage, New York. (Tetra Tech, 2010)* and *Letter Work Plan Addendum – May 2012, Vertical Profile Borings (VPB-134, VPB-135, and VPB-136) Pre-Design Investigation, OU-2 Groundwater, NWIRP Bethpage, New York (Tetra Tech, 2012).*

This report provides a summary of site history, geology, and field activities. Data and field documentation for each individual on-site VPB are provided in the following separate report volumes:

- Volume I – Overview of the 2012 on-site drilling program
- Volume II – VPB 134
- Volume III – VPB 135
- Volume IV – VPB 136

1.1 OBJECTIVE

The objective of the on-site VPBs was to determine the presence, depth, type, and concentration of solvent-contaminated groundwater.

1.2 SITE HISTORY

NWIRP Bethpage is located in east-central Nassau County, Long Island, New York, approximately 30 miles east of New York City (Figure 1). NWIRP Bethpage is in the Hamlet of Bethpage, Town of Oyster Bay, New York. Since its inception in 1943, the plant's primary mission was the research prototyping, testing, design engineering, fabrication, and primary assembly of military aircraft. The facilities at NWIRP included four plants used for assembly and prototype testing, a group of quality control laboratories, two warehouse complexes (north and south), a salvage storage area, water recharge basins, the Industrial Wastewater Treatment Plant, and several smaller support buildings.

The Navy's property originally totaled 109.5 acres and was formerly a Government-Owned Contractor-Operated (GOCO) facility that was operated by the Northrop Grumman Corporation (NGC) until September 1998. Prior to 2002, the NWIRP property was bordered on the north, west, and south by current or former Northrop Grumman facilities, and on the east by a residential neighborhood. By March 2008, approximately 100 acres of NWIRP property were transferred to Nassau County in three separate actions. The remaining 9 acres and access easements were retained by the Navy to continue remedial efforts at Environmental Restoration (ER) Site 1 – Former Drum Marshalling Area and Site 4 – Former Underground Storage Tanks (Area of Concern [AOC] 22). A parcel of land connecting the two sites was also retained. Currently, the 9-acre parcel of NWIRP is bordered on the east by the residential neighborhood and on the north, south, and west by Nassau County property. Access to the NWIRP is from South Oyster Bay Road to the west.

1.3 GEOLOGY

NWIRP Bethpage is underlain by approximately 1,100 feet of unconsolidated sediments that unconformably overlie crystalline bedrock. The unconsolidated sediments consist of four distinct geologic units that, in descending order, are the Upper Glacial Formation, the Magothy Formation, the Raritan Clay Member of the Raritan Formation, and the Lloyd Sand Member of the Raritan Formation. The crystalline bedrock consists primarily of metamorphic and igneous rocks. The regional dip of the bedrock is to the south and southeast. All of the geologic units dip in these directions, although to varying degrees.

The Upper Glacial, Magothy, and Raritan Formations were penetrated to some degree during the investigation at NWIRP. The Upper Glacial Formation, which is about 30 to 45 feet thick, consists mostly of coarse sand and gravels deposited during the Pleistocene ice ages. The Magothy Formation consists mostly of fine to coarse sands, with interbeds of clay of the Upper Cretaceous. The clay within the Magothy is fairly common, but laterally discontinuous. The lower portions of the Magothy Formation and upper portion of the Raritan Formation (at depths approximately 700 to 960 feet bgs) were investigated.

The lithology of the offsite borings installed during this investigation consisted of mostly sand, gravel and clay in varying amounts, with traces of lignite at various depths. The upper zone consisted of mostly sand and gravel material and is part of the upper glacial formation. Below the upper gravel and sand layer, lithology consisted of mainly a fine to medium sand with traces of clay of the Magothy Formation. Below the Magothy deposits is the Raritan Clay Unit, which is somewhat variable in depth and thickness.

2.0 FIELD ACTIVITIES

Field investigation activities consisted of the drilling three VPBs. Soil and groundwater samples were collected from each VBP. Drilling during this investigation was performed by Delta Well and Pump Co., Inc. of Ronkonkoma, New York. The following sections provide an overview of the field activity.

2.1 VERTICAL PROFILE BORINGS

Three VPBs (VPB-134 through VPB-136) were drilled during the on-site investigation. These VPBs were installed between July 2012 and September 2012. The locations of the VPBs are presented on Figure 2. A cross section depicting lithology and chemical data is presented in Figure K-K'. The VPBs ranged in depth from 853 feet below ground surface (bgs) to 923 feet bgs.

VPBs were installed by drilling an 8-inch diameter hole via a mud rotary drilling techniques. A steel surface casing was set at each VPB location to stabilize the borehole in the upper portions of the formation. The steel casing was installed to a depth of 56 feet bgs at each VPB. Split spoon samples were collected at varying depths from each VPB to confirm lithology. Split spoon samples were also collected at depths at approximately 800 bgs and below to determine the presence of the Raritan Clay Unit. Gamma ray logging was performed in each VPB to determine lithology. The gamma log was run both down and up the borehole. Boring log sheets and gamma log documentation is provided in each respective VPB summary.

Groundwater grab samples were collected from a hydropunch-type sampler during the installation of VPBs and analyzed for volatile organic compounds (VOCs). Groundwater grab samples were collected using the following sample collection intervals as a guideline:

- 50-Foot intervals from 50 to 200 feet bgs.
- 20-Foot intervals from 200 to greater than 800 feet bgs.

The actual depths for each groundwater grab samples were modified in the field based on drill cuttings, split spoon samples, drilling rod configuration and other field conditions that would suggest sand or gravel units. During the collection of groundwater grab samples, field parameters (pH, temperature, specific conductivity, and turbidity) were measured as recoverable sample volume permitted. Sampling information was recorded on sample log sheets and is provided in each respective VPB summary.

Groundwater and soils samples were analyzed by Chemtech of Mountainside, New Jersey. Chain of custody (CoC) forms documenting sample shipments, analytical results and data validation reports are provided in each respective VPB summary.

During drilling activities an air sample was collected at the VPB 136 location and analyzed for VOCs to evaluate potential emissions from the drilling operation. The air sample was collected from the VPB 136 location since it is located closest to residential property. Analytical results from the air samples are provided in the VPB 136 summary.

2.2 DECONTAMINATION AND INVESTIGATION DERIVED WASTE (IDW)

A decontamination pad was constructed at NWIRP Bethpage and was used for the collection of all decontamination-generated fluids. All decontamination fluids was containerized and managed as IDW.

IDW generated during this investigation consisted of soil cuttings, drilling mud, and IDW fluids (decontamination fluids). All IDW was containerized and staged at NWIRP Bethpage. IDW was characterized and disposed of properly.

2.3 SURVEYING

The location of each vertical profile boring was recorded with a Trimble® global positioning system device. The northing and easting coordinates (NAD 83 New York State Plane coordinate system) are provided in each respective VPB summary.

REFERENCES

Naval Facilities Engineering Command (NAVFAC), 2003. *Record of Decision Naval Weapons Industrial Reserve Plant Bethpage, New York, Operable Unit 2 – Groundwater, NYS Registry: I-30-003B*. April.

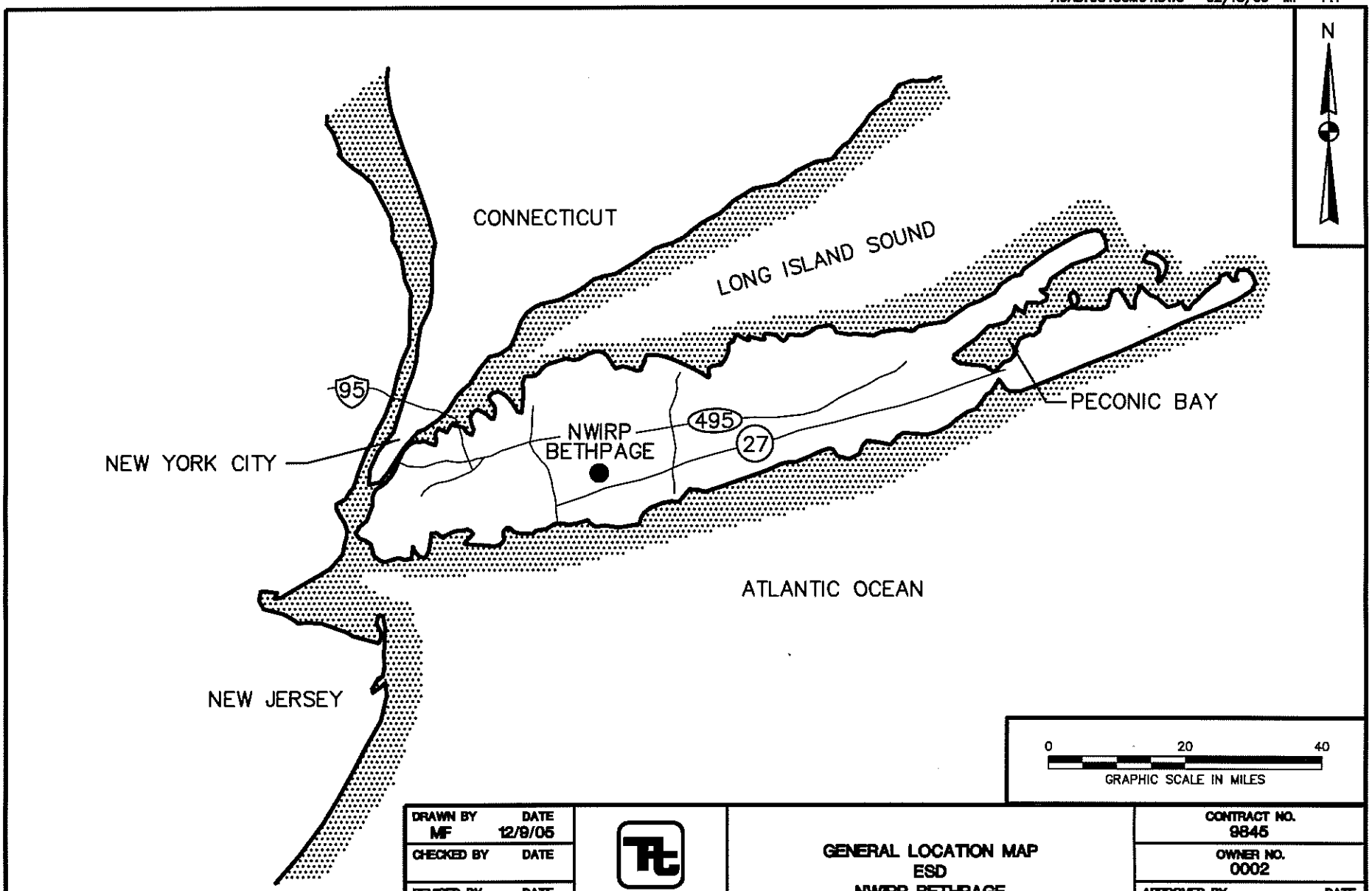
Tetra Tech, 2010. *Letter Work Plan Pre-Design Field Investigation, OU-2 Offsite Groundwater Investigation, Naval Weapons Industrial Reserve Plant, Bethpage, New York.* September.

Tetra Tech, 2010. *Letter Work Plan Addendum – May 2012, Vertical Profile Borings (VPB-134, VPB-135, and VPB-136) Pre-Design Investigation, OU-2 Groundwater, NWIRP Bethpage, New York.* May.

United States Geological Survey (USGS), 1995. *Groundwater Atlas of the United States, Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, HA 730-M.*

FIGURES

ACAD: 9845CM04.DWG 02/15/06 MF PIT



DRAWN BY MF DATE 12/9/05	Tetra Tech NUS, Inc.	GENERAL LOCATION MAP ESD NWIRP BETHPAGE BETHPAGE, NEW YORK	CONTRACT NO. 9845
CHECKED BY DATE			OWNER NO. 0002
REVISED BY DATE			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1 / REV. 0

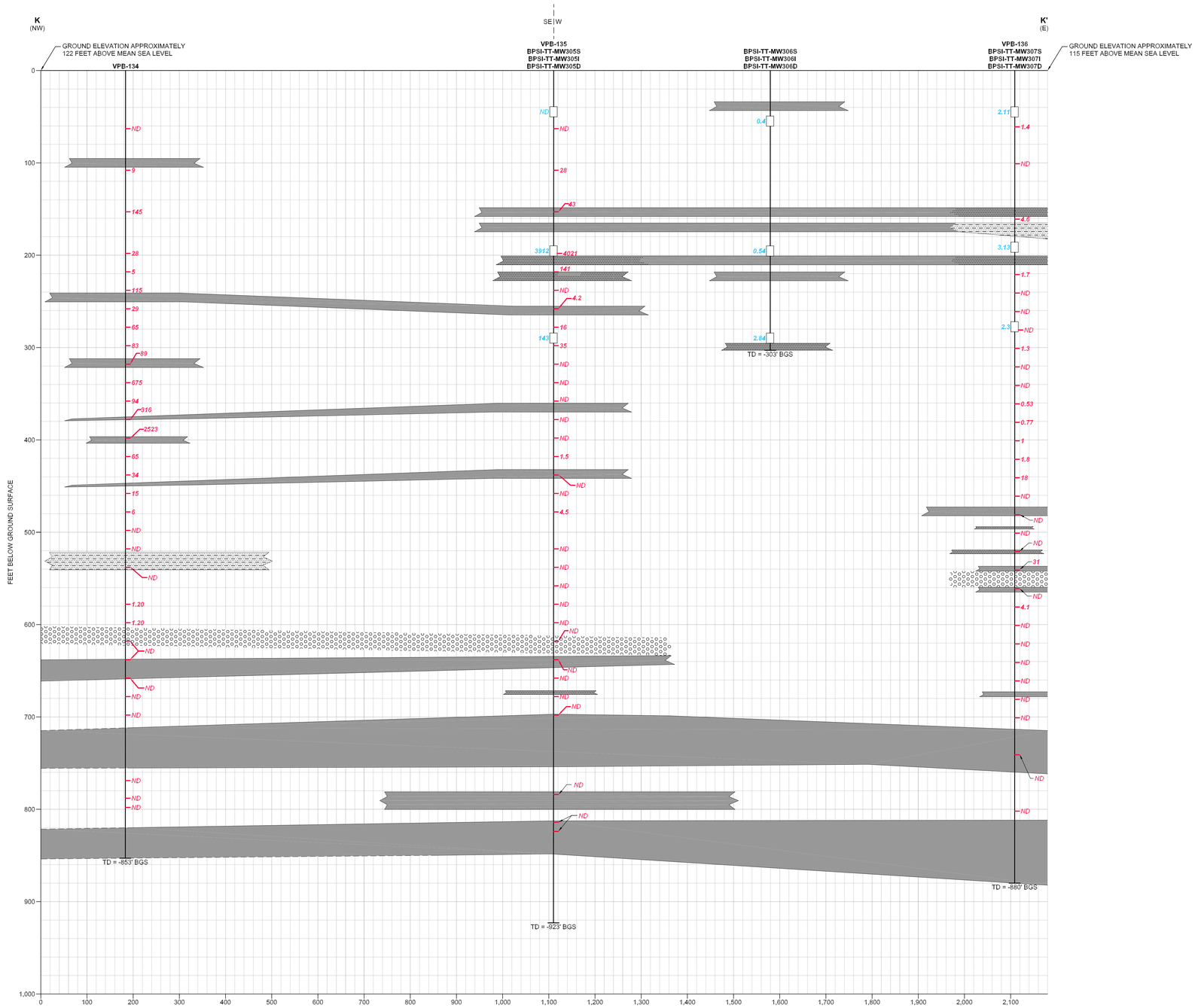
FORM CADD NO. TTNUS-AH.DWG - REV 1 -9/10/98

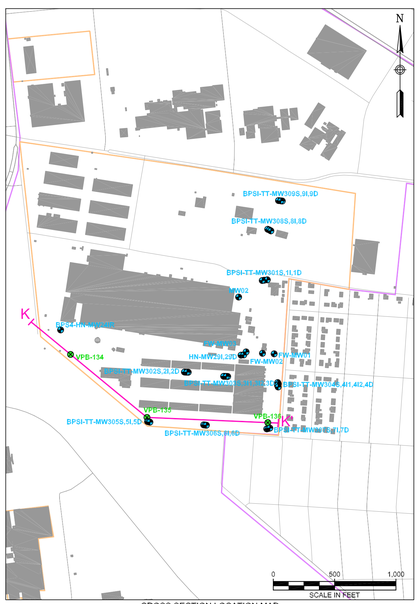
P:\GIS files\Bethpage\MAP DOCS\MXD\Bethpage Site1 pcb Bethpage map 042412.mxd mmc 11122012

TETRA TECH

VPB-134, 135, and 136
Cross Section and Location Map
Bethpage Groundwater Plume
NWIRP Bethpage
Bethpage,New York

FILE	SCALE AS NOTED
FIGURE NO. 2	REV / DATE 11/12/12





CROSS SECTION LOCATION MAP

NOTE: COMPOUNDS USED TO CALCULATE TOTAL VOCs IN MONITORING WELLS ARE DEFINED IN THE VALIDATED ANALYTICAL RESULTS TABLES FOR VPBs 134, 135, AND 136.

LEGEND

- SAND AND GRAVEL
- F-M SAND WITH VARYING AMOUNTS OF SILT, CLAY, AND C. SAND
- CONFINING UNITS
- INTERBEDDED CLAY AND SAND
- SANDY CLAY
- CLAY
- µg/L MICROGRAMS PER LITER
- ND NOT DETECTED

BPSI-TT-MW305S — MONITORING WELL ID
VPB-135 — VERTICAL PROFILE BORING
GROUND SURFACE
16 — VPB TVOC RESULT IN µg/L
CONFINING UNIT (DASHED WHERE INFERRED)
MONITORING WELL SCREEN
143 — JANUARY 2012 MW TVOC RESULT IN µg/L
TD = -853' BGS — TOTAL DEPTH FEET BELOW GROUND SURFACE (BGS)

100
50
0
VERTICAL SCALE IN FEET
0
100
200
HORIZONTAL SCALE IN FEET

TETRA TECH

CROSS SECTION K – K'
ONSITE VERTICAL PROFILE BORING
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
BETHPAGE, NEW YORK

FILE	SCALE
112G00622GS11	AS NOTED
FIGURE NUMBER: K – K'	REV: 0 — DATE: 11/12/12