

# **Action Memorandum**

## **Non-Time-Critical Removal Action for Soil Vapor Extraction Containment System**

### **Site 1**

### **Former Drum Marshalling Area**

### **Naval Weapons Industrial Reserve Plant Bethpage, New York**



**Mid-Atlantic Division  
Naval Facilities Engineering Command**

FEBRUARY 2010

## **ACTION MEMORANDUM**

**DATE:** February 9, 2010

**FROM:** Mr. William F. Cords

**SUBJECT:** Non-Time-Critical Removal Action – Soil Vapor Extraction Containment System  
Site 1- Former Drum Marshalling Area  
Naval Weapons Industrial Reserve Plant  
Bethpage, New York

### **1. PURPOSE**

The purpose of this Action Memorandum is to document the decision by the U.S. Navy (Navy) to conduct a non-time-critical removal action (NTCRA) to expedite and/or complete long-term risk mitigation for current and future residents potentially exposed to volatile organic compound (VOC)-impacted-soil vapor in off-facility residential houses adjacent to Site 1, Naval Weapons Industrial Reserve Plant (NWIRP), Bethpage, New York.

This NTCRA will reduce potential risks to the public health, welfare, or the environment posed by VOCs in the soil gas resulting from historic (pre-1984) handling of waste chlorinated and non-chlorinated solvents. Installation and operation of a Soil Vapor Extraction (SVE) Containment System at the site, along with continued operation of Air Purifying Units (APUs) and Sub-Slab Depressurization (SSD) Systems (initial interim actions) in residential homes, will reduce indoor air concentrations to acceptable New York State Department of Health (NYSDOH) guidance standards (NYSDOH, 2006). Operation of the SVE Containment System is expected to reduce and ultimately eliminate the need for the APUs and SSD Systems.

This action is being conducted by the Navy under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) framework with regulatory oversight by the New York State Department of Environmental Conservation (NYSDEC).

### **2. NWIRP BETHPAGE BACKGROUND**

NWIRP Bethpage was established in 1941 (Attachment A, Figure 1). Since its inception, the plant's primary mission has been 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 (Attachment A, Figure 2). In 1998, manufacturing operations ended at the facilities.

Since 1998, activities occurring at the facility included facility caretaker maintenance (security and mowing), storage of Nassau County impounded vehicles, and environmental investigations and/or remediation of soil, groundwater, and soil vapor (described below). In 2002, approximately 4 acres (Plant No. 20) of the facility were transferred to Nassau County. The majority of the remaining property (96 acres), including Installation Restoration (IR) Program Sites 2 and 3, was transferred to Nassau

County in early 2008. The balance of the property (9 acres) is being retained by the Navy pending completion of remedial activities at Sites 1 and 4.

### **3. SITE DESCRIPTION**

This section presents an assessment of the environmental conditions at the site. The site conditions have been evaluated through performance of several investigations conducted by the Navy.

#### **a. Background.**

Site 1 – Former Drum Marshalling Area is relatively flat with a 4-foot vegetated windrow located along the eastern end of the site, and is mounded on the north to partially bury the abandoned sanitary settling tank (Attachment A, Figure 3). Site 1 originally consisted of two former drum marshalling pads that were used to store drums containing waste materials from operations at Plant No. 3 and potentially other sources at the facility. The waste drums reportedly contained chlorinated and non-chlorinated solvents, liquid cadmium, and chromium wastes. In addition, underlying most of Site 1 is approximately 120 abandoned cesspools that were designed to discharge sanitary waste waters from Plant No. 3. These cesspools were approximately 10 feet in diameter and 16 feet deep. Based on field observations, the cesspools are currently filled with soil. It is possible that non-sanitary wastes may have been discharged through this system. The drum marshalling areas and extent of the leach field were the original boundary of Site 1.

#### **b. Removal Site Evaluation.**

During the Phase I Remedial Investigation (RI) in 1992, results of a soil-gas survey indicated that a source area of VOC contamination was present near the former drum marshalling area and extended to the south (Halliburton NUS [HNUS], 1992). The results of the soil boring program confirmed a source area of volatile organic contaminants near the former drum marshalling areas in the center of the site and a lesser source area near the southeast corner of the site. Tetrachloroethene (PCE) and trichloroethene (TCE) at levels up to 4,800 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) and 200  $\mu\text{g}/\text{kg}$ , respectively, were found in Site 1 subsurface soils. Levels of inorganic contamination were relatively low, when compared to the VOC contamination. Cadmium, chromium, arsenic, and several other metals were found at concentrations greater than background. In addition, polychlorinated biphenyls (PCBs) (7,900  $\mu\text{g}/\text{kg}$ ), pesticides (440  $\mu\text{g}/\text{kg}$ ), polycyclic aromatic hydrocarbons (PAHs) were detected in the soils at Site 1.

A monitoring well groundwater sampling program confirmed that Site 1 is an apparent source area of groundwater contamination starting near the former drum marshalling area in the center of the site and extending southwest (hydraulically down gradient). TCE, PCE, and 1,1,1-trichloroethane (TCA) were detected at maximum concentrations of 1,500 micrograms per liter ( $\mu\text{g}/\text{L}$ ); 7,700  $\mu\text{g}/\text{L}$ ; and 10,000  $\mu\text{g}/\text{L}$ ; respectively. Cadmium and chromium were found at concentrations greater than groundwater screening criteria.

During the Phase II RI in 1993, the soil testing program indicated low-level PCB contamination in the surface soils throughout Site 1 (HNUS, 1993). The majority of the contaminated soils contained PCBs at a concentration of 10 milligrams per kilogram ( $\text{mg}/\text{kg}$ ) or less. However, soils at two locations contained PCBs at concentrations greater than 10  $\text{mg}/\text{kg}$ : near the southwestern portion of Site 1 (30  $\text{mg}/\text{kg}$  PCBs) and along the western edge of Site 1 (1,470  $\text{mg}/\text{kg}$  PCBs). Subsequently, a soil cover was installed in 1993 as part of an interim action to reduce potential dust migration of PCB-contaminated soil and protect site workers. This interim action reduced overall risks to off-site residents and onsite workers by a factor of approximately 5 and 20, respectively.

Between 1995 and 2001, supplemental soil investigations at the site suggested that the vertical extent of PCB-contamination was much more extensive than was originally estimated in the 1995 Record of Decision (ROD) (Navy, 1995). The estimated extent of PCB contamination reported in the ROD was to 7 feet below ground surface (bgs), which corresponded to approximately 1,400 cubic yards of PCB-contaminated soil to be addressed. Subsequent testing has determined that the vertical extent of PCB contamination is approximately 65 feet bgs, extending below the water table, corresponding to approximately 38,000 cubic yards of PCB-contaminated soils (total PCBs greater than 1 mg/kg). The Navy is currently evaluating options for addressing the remaining PCB contamination at Site 1. In addition to PCBs, site contaminants also include metals and PAHs at concentrations greater than potential remediation goals.

In January 2008, the Navy collected soil gas samples at the site/facility fence line, located approximately 60 feet from residential housing (Attachment A, Figures 3 and 4). Soil gas samples were collected at depths of approximately 8, 20, and 45 feet bgs. PCE, TCE, and TCA were detected in the soil gas at the facility fence line. The highest soil gas TCE concentrations were detected in the southeast area of Site 1 as follows (Attachment A, Figure 4):

- 19,000 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) at 7 feet bgs
- 180,000  $\mu\text{g}/\text{m}^3$  at 20 feet bgs
- 150,000  $\mu\text{g}/\text{m}^3$  at 50 feet bgs

Since there is no established value for VOCs in soil gas, the Navy used NYSDOH (2006) "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York" to evaluate the data. The guidelines establish TCE values of 250  $\mu\text{g}/\text{m}^3$  for sub-slab soil vapor and 5  $\mu\text{g}/\text{m}^3$  for indoor air.

For protection of residents, screening values from the NYSDOH (2006) *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* for TCE are 250  $\mu\text{g}/\text{m}^3$  in sub-slab soil vapor (soil gas) and 5  $\mu\text{g}/\text{m}^3$  for indoor air.

Based on the results of the January 2008 investigation, a second soil gas investigation (Phase II) was conducted from October 2008 through January 2009 along rights-of-way in the residential neighborhood located to the east of Site 1, yielding the following results and conclusions (Tetra Tech, January 2009) (see Attachment A, Figures 4 and 5):

- TCE, PCE, and TCA represent the primary site soil gas chemicals of concern (COCs). Soil gas data from samples collected in January 2008 along the eastern border of Site 1 indicate maximum TCE, PCE, and TCA concentrations of 180,000  $\mu\text{g}/\text{m}^3$ ; 5,300  $\mu\text{g}/\text{m}^3$ ; and 90,000  $\mu\text{g}/\text{m}^3$ ; respectively. Off-site soil gas sample data indicate maximum concentrations of TCE at 89,000  $\mu\text{g}/\text{m}^3$ ; PCE at 5,000  $\mu\text{g}/\text{m}^3$ ; and TCA at 52,000  $\mu\text{g}/\text{m}^3$ .
- The analytical results from the off-site soil gas samples show a substantial decrease in soil vapor concentrations moving away from the site (i.e., as compared to on- and near-site soil gas results). Continual decreases in soil vapor concentrations were observed over distance away from Site 1.
- Exceedances of the respective NYSDOH (2006) sub-slab vapor guidance values for TCE, PCE, and TCA in shallow soil vapor are limited to the adjacent residential block, roughly bounded by Sycamore Avenue to the north, 10<sup>th</sup> Street to the east, and by Maple Avenue to the south.

Considering the VOC concentrations in shallow soil vapor in the adjacent residential neighborhood, follow-on indoor air and sub-slab soil vapor testing activities were conducted to determine if soil vapor intrusion is a concern in the residences. The follow-on sampling efforts identified several affected houses based on sub-slab and indoor air concentrations. Based on the sequentially-collected test results and access permission from potentially affected residents, sub-slab soil gas samples and both basement and first floor indoor air samples were collected from 18 residential homes between January and May 2009. Detected sub-slab soil gas TCE concentrations ranged from 0.35 to 15,000  $\mu\text{g}/\text{m}^3$ , with exceedances of the NYSDOH TCE guidance value (250  $\mu\text{g}/\text{m}^3$ ) at six homes. Indoor air TCE concentrations ranged from non-detect to 180  $\mu\text{g}/\text{m}^3$ , exceeding the NYSDOH TCE guidance value of 5  $\mu\text{g}/\text{m}^3$  in four homes. Based on the NYSDOH "matrix" evaluation of the sub-slab soil gas and indoor air concentrations, additional action (mitigation and/or monitoring) was required for 13 homes. Subsequently, the Navy performed a time-critical removal action (TCRA) from February through May 2009 to address the indoor vapor intrusion issues in affected residences (see *TCRA Action Memorandum for Site 1* [Navy, 2009]).

Exposure pathways to soil vapor were reduced by sealing sub-grade surfaces and openings (e.g., sump pump, pipes and electrical conduits, etc.). Air purifying units (APUs) were installed as an interim measure to address impacted-indoor air. APUs are a granular activated carbon-based filtration system that remove VOCs through recirculation of indoor air and chemical adsorption. Sub-slab depressurization systems (SSDs) were installed in several homes to minimize soil vapor intrusion potential (by lowering sub-slab air pressure relative to indoor air pressure).

Following the implementation of the TCRA, the Navy performed an EE/CA to determine an optimal NTCRA alternative to address long-term risk mitigation for off-site soil gas. The recommended removal alternative in the EE/CA (Tetra Tech, October 2009), Alternative 3 – SVE Containment System; Engineering Controls; and Operation, Maintenance, and Monitoring (OM&M), is the selected removal action documented in this Action Memorandum. This alternative consists of continued OM&M of the offsite engineering controls (APUs and SSDs), as well as installation and OM&M of an SVE Containment System at Site 1 (see Section 8). The EE/CA describes the nature and extent of the wastes identified through previous investigations at Site 1, the objectives of the NTCRA, and discusses and analyzes several removal action alternatives that were considered for the site. The EE/CA (Tetra Tech, 2009) was made available for public review and comment from October 9 to November 9, 2009 (see the public notice in Attachment B). No public comments were received.

**c. Release or Threatened Release into the Environment of a Hazardous Substance, or Pollutant or Contaminant.**

Chlorinated solvent-contaminated soil gas has migrated off-site and under the residential basement slabs. Under certain conditions, the impacted-soil gas can enter the homes through cracks and openings in the foundations and basement walls (termed soil vapor intrusion). The residents can then become exposed to the contaminants via inhalation of the impacted-indoor air. This exposure pathway is most significant in the winter months when natural ventilation is reduced and furnace operation creates a negative pressure within the homes. The chlorinated solvent, TCE, is driving the risk and the need for mitigation based on NYSDOH (2006) guidance. Sampling results from the soil gas testing are presented in the Site 1 Soil Vapor Investigation Report (Tetra Tech, April 2008) and the Site 1 Phase 2 Soil Vapor Testing Report (Tetra Tech, January 2009).

The data indicate TCE concentrations in onsite soil gas as high as 180,000  $\mu\text{g}/\text{m}^3$ ; indoor air samples as high as 180  $\mu\text{g}/\text{m}^3$ ; and sub-slab samples as high as 15,000  $\mu\text{g}/\text{m}^3$ . NYSDOH guidelines require mitigation of indoor air that is at or exceeds 5  $\mu\text{g}/\text{m}^3$  TCE or sub-slab soil vapor that exceeds 250  $\mu\text{g}/\text{m}^3$

TCE (NYSDOH, 2006). Mitigation may also be required at lower concentrations of TCE, based on a decision matrix that considers both the sub-slab soil gas concentration and the indoor air concentration.

Off-site TCE-contaminated soil gas (greater than  $5 \mu\text{g}/\text{m}^3$ ) extends to a maximum distance of approximately 400 feet and affects an area of approximately 6 acres. The area in which mitigation and/or monitoring is required (greater than  $250 \mu\text{g}/\text{m}^3$ ) extends a maximum distance of approximately 250 feet and affects an area of approximately 2.5 acres (Attachment A, Figure 5). The depth of the contaminated soil gas is limited by the water table at approximately 50 feet bgs. Based on sub-slab soil gas and indoor air TCE concentrations, 13 homes require mitigation and/or monitoring.

**d. National Priorities List (NPL) Status.**

NWIRP Bethpage is not a Federal NPL site.

**e. Maps, pictures, and other graphic representation.**

Figures 1, 2, 3, 4, and 5 in Attachment A depict the general location map, site location map, facility layout, soil gas sampling results, and soil gas TCE isoconcentration contours, respectively.

**4. OTHER ACTIONS TO DATE**

**a. Previous Actions.**

- In 1993, as an interim measure, a 6-inch soil cover was placed on PCB-contaminated surface soil at Site 1.
- In 1998, an air sparging/soil vapor extraction (AS/SVE) system was constructed to address VOC-contaminated soil and shallow groundwater at Site 1. At the time, soil vapor migration was not identified as a pathway. The site related volatile compounds of concern, based on distribution and maximum detected concentrations, included TCE; PCE; TCA; 1,2-dichloroethane (1,2-DCA); 1,2-dichloroethene (1,2-DCE); and 1,1-dichloroethene (1,1-DCE). The remediation goals were established in the 1995 ROD (Navy, 1995). The primary remediation goal was to control continuing releases of VOCs to groundwater. From August 1998 to March 2002, the AS/SVE system ran seasonally (non-winter operation). A total of approximately 4,500 pounds of VOCs were removed from the soils and shallow groundwater during the operation of the system.
- In the late 1990s, the Navy funded construction of a treatment system for VOC-contaminated groundwater impacting an off-site public water supply well.
- The Navy is currently conducting an ongoing groundwater investigation to delineate the off-site VOC-contaminated groundwater plume and assessing potential impacts to additional off-site public water supplies. In December 2009, the Navy finished construction and started operation of a treatment system to address an identified off-site VOC-contaminated groundwater hot spot.
- The Navy conducted a TCRA from February through May 2009 to address the indoor vapor intrusion issues in affected residences as determined by phased soil gas and indoor air investigations (Navy, 2009). The Navy sealed identified sub-grade surfaces and openings to minimize exposure pathways. Sixteen APUs were installed in 14 off-site residences as an interim measure to address impacted-indoor air. Most of the units were installed in the basements.

Because indoor air TCE concentrations were detected at elevated concentrations on the first floor in two homes, these two homes received an additional APU for use on the first floor. Based on subsequent OM&M data and discussions with residents, APUs were removed from 3 homes, leaving 13 units operating in 11 homes. The APUs are expected to operate for a maximum of 2 years. SSDs were installed in several homes to minimize soil vapor intrusion potential by lowering sub-slab air pressure relative to indoor air pressure. APUs and SSDs will be shut down and removed based on continued successful OM&M of the SVE Containment System in consideration of NYSDOH (2006) guidance.

- The Navy performed an EE/CA (Tetra Tech, 2009), which recommended continued OM&M of the offsite engineering controls (APUs and SSDs) and installation and OM&M of an SVE Containment System (see Section 8). The Navy also performed a design analysis to construct a full-scale SVE Containment System as described in the EE/CA along the Navy fence line (Tetra Tech, 2009). Startup of the full-scale system (described herein) occurred in December 2009.

**b. Investigations and Assessments:**

Several investigations have been conducted at the site and are described in the following reports:

*Initial Assessment Study of NWIRP Bethpage and NWIRP Calverton, New York, Naval Energy and Environmental Support Activity (NEESA) 13-100, Rogers, Golden, & Halpern, Philadelphia, PA. December 1986.*

*Remedial Investigation Report (Phase I), NWIRP Bethpage, NY. HNUS, May 1992.*

Phase II Remedial Investigation Report for NWIRP Bethpage, NY, HNUS, October 1993.

*Feasibility Study Report for Naval Weapons Industrial Reserve Plant, Bethpage, NY, HNUS, March 1994.*

*Proposed Remedial Action Plan for Operable Unit 1 Sites 1, 2, and 3, NWIRP Bethpage, NY, Naval Facilities Engineering Command (NAVFAC), October 1994.*

*Record of Decision for Sites 1, 2, and 3, NWIRP Bethpage, NY, NYS Registry: 1-30-003B, Engineering Field Activity, Northeast NAVFAC and, Navy, May 1995.*

*Existing Conditions Survey and Site Report for Remedial Design, Site 1, NWIRP Bethpage, NY, C.F. Braun Engineering Corp., June 1995.*

*Draft Remedial Design (Acting as Final), Phase II Pre-Design Investigation Letter Report for Site 1 – Former Drum Marshalling Area, NWIRP Bethpage, NY, C.F. Braun Engineering Corp., July 1995.*

*Remedial Design, Phase II Pre-Design Investigation Supplemental Sampling Letter Report No. 2, Site 1 – Former Drum Marshalling Area, NWIRP Bethpage, NY, C.F. Braun Engineering Corp., September 1995.*

*Analytical Results from the Pre-Excavation Soil Sampling and an Estimate on Excavation, NWIRP Bethpage, NY, Foster Wheeler Environmental Corp. (Foster Wheeler), December 1995.*

*Site 1 Pre-Excavation Sampling Results Draft Report (acting as Final), NWIRP Bethpage, NY, Foster Wheeler, July 1996.*

*Letter Report for Air Sparging/Soil Vapor Extraction System at Site 1 - Former Drum Marshalling Area, NWIRP Bethpage, NY, C.F. Braun Engineering Corp., October 1997.*

*Report for Additional Soil Investigation to Assess the Performance of the Soil Vapor Extraction/Air Sparging System at Site 1, NWIRP Bethpage, NY, Foster Wheeler, April 2000.*

*Final Environmental Impact Statement Transfer and Reuse of NWIRP Bethpage, NY, NAVFAC, November 2000.*

*Letter Report on the Pre-Operational Groundwater Sampling and Analysis Results, Site 1, NWIRP Bethpage, NY, Foster Wheeler, September 2001.*

*Final Close-Out Report, Construction of a Soil Vapor Extraction/Air Sparging System at NWIRP Bethpage, NY, Foster Wheeler, December 2003.*

*Groundwater Sampling Data Summary, Site 1 – Former Drum Marshalling Area, NWIRP, Bethpage, NY, Tetra Tech, January 2008.*

*Site 1 Soil Vapor Investigation, NWIRP Bethpage, NY, Tetra Tech, April 2008.*

*Technical Memorandum for Evaluating Soil Remediation Technologies for Site 1 - Former Drum Marshalling Area, NWIRP Bethpage, NY, Tetra Tech, September 2008.*

*Indoor Air Sampling Work Plan, NWIRP Bethpage, NY, Tetra Tech, November 2008.*

*Phase 1 Soil Vapor Testing Letter Report, Site 1, NWIRP Bethpage, NY, USEPA ID No. 002047967, Tetra Tech, January 2009.*

*Design Analysis Report for Soil Vapor Extraction Containment System at Site 1 – Former Drum Marshalling Area, NWIRP Bethpage, NY, Tetra Tech, April 2009.*

*Action Memorandum, Time-Critical Removal Action at Site 1 – Former Drum Marshalling Area, NWIRP Bethpage, NY, signed by Navy (Naval Air Systems Command [NAVAIR]) on June 18, 2009.*

*Phase II Soil Vapor Testing Letter Report, Site 1, NWIRP Bethpage, NY, Tetra Tech, June 2009.*

*Engineering Evaluation and Cost Analysis (EE/CA), Non-Time-Critical Removal Action for Soil Gas, Site 1 – Former Drum Marshalling Area, NWIRP Bethpage, New York, Tetra Tech, September 2009.*

**c. Current Actions.**

- OM&M of six APUs in six houses, and seven APUs and six SSDs in six houses, have continued since the TCRA implementation. APUs and SSD systems will be removed based on monitoring results. At the request of the resident, a SSD and APU were removed.
- Considering the recommended alternative in the EE/CA (Alternative 3 – SVE Containment System, Engineering Controls, and OM&M—the selected removal action documented in this

Action Memorandum) the Navy began construction of a full-scale SVE Containment System to prevent further off-site migration of VOC-contaminated soil vapor, and to the extent practical capture off-site contaminated soil vapors. The system started operation in December 2009, and the system is expected to operate for 4 years or more.

## **5. STATE AND LOCAL AUTHORITIES ROLE**

### **a. State and Local Actions to Date.**

The site is located on property held by the Navy, and as such the Navy holds responsibility for removal actions, risk reduction and remediation of the site as needed. The site was incorporated into the IR Program for NWIRP between 1986 and 1991. State and local authorities have not undertaken any removal actions at the site. NWIRP Bethpage is identified on the New York State List of Inactive Hazardous Waste Sites and is also regulated under a Resource Conservation and Recovery Act (RCRA) Permit (i.e., under corrective actions portions of the NYSDEC "373 permit"). NYSDOH and NYSDEC provide oversight of actions and review of documents for sites under the IR Program (including Site 1).

The local community provides input on the Navy's action through participation in the Restoration Advisory Board (RAB), which is a group of community members who meet with Navy representatives periodically to discuss progress and provide input on IR Program sites. The results of the soil gas investigation were presented at the April 2008, July 2008, November 2008, and March 2009 RAB meetings. In addition, poster sessions were held during October 2008 and March 2009 Informational Sessions to specifically address soil gas results and soil vapor intrusion. A status update was provided during the September 2009 RAB meeting.

The EE/CA (Tetra Tech, 2009) was made available for public review and comment from October 9 to November 9, 2009 (see the public notice in Attachment B). No public comments were received (thus, no responsiveness summary is provided).

### **b. Potential for Continued State and Local Response.**

NYSDEC will continue to oversee the investigations and removal actions. NYSDEC is supported by NYSDOH and Nassau County Department of Health. The local community will continue to provide input on actions conducted at the site through the RAB.

## **6. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES**

Potential threats to public health, welfare or the environment posed by site contaminants, and statutory and regulatory authorities that apply to the site are discussed in this section. Conditions at Site 1 present an endangerment to the public health at selected off-site residents located next to Site 1 and meet the conditions for a removal action as stated in the National Contingency Plan (NCP), Title 40 Code of Federal Regulations (CFR), Section 300.415 (b) (2) as follows:

### **a. Threats to Public Health or Welfare.**

TCE-impacted soil vapor is impacting indoor air in nearby residences at concentrations that exceed the U.S. Environmental Protection Agency (EPA) Residential Regional Screening Level ( $1.2 \mu\text{g}/\text{m}^3$ ) and the NYSDOH guidance value ( $5 \mu\text{g}/\text{m}^3$ ).

The primary source of off-site soil gas contamination was addressed through the operation of the 1998 to 2002 AS/SVE system. Based on current data, contaminated soil gas remains in the southeastern corner of Site 1.

**b. Threats to the Environment.**

A formal ecological risk assessment was not conducted for the site because sensitive ecological receptors are not present at NWIRP Bethpage.

**c. Regulatory Authorities.**

Site 1 is being addressed under the Navy's IR Program. NYSDEC provides regulatory oversight through the Corrective Action portion of the RCRA Permit (Section 373) and the State Superfund Program (Section 375). In addition, the EPA reviews site documents. Criteria and mitigation is based on the guidance values provided in NYSDOH (2006) *Guidance for Evaluation Soil Vapor Intrusion in the State of New York*.

**7. ENDANGERMENT DETERMINATION**

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Action Memorandum, would present an elevated risk to public health, welfare, or the environment. The Navy has determined that this threat can be eliminated by undertaking the removal action posed in this Action Memorandum.

**8. PROPOSED ACTIONS AND ESTIMATED COSTS**

This section describes the proposed removal action to mitigate the conditions cited in Section 6.

**a. Proposed Action.**

The proposed action consists of continued OM&M of up to 13 APU's in 11 homes (less than 6 months), long-term OM&M of 7 APUs in 7 homes (approximately 2 years), OM&M of 6 SSD systems in six homes (approximately 6 months to 2 years), and monitoring of sub-slab soil vapor and indoor air in 12 homes (approximately 2 years). An SVE Containment System will be installed at Site 1 to remove and contain impacted soil vapor. OM&M will be used to determine the protectiveness and effectiveness of the removal action, as well as when the engineering controls (APUs and SSDs) and SVE Containment System can be shut down and removed.

Installation of an onsite SVE Containment System is anticipated to be the final action at the site to address VOCs by removing chlorinated solvents in the soil gas in order to meet NYSDOH criteria. SVE involves the application of a vacuum through wells installed within unsaturated-zone soils (the vadose zone). Vacuum is applied to the subsurface using a vacuum blower with the inlet connected to the vapor extraction wells and the outlet connected to a treatment system or directed to the atmosphere. The application of vacuum to the subsurface results in the flow of soil vapor to the vapor extraction wells. SVE addresses impacted soil gas and contaminated soil not only by the removal of contaminated soil vapors, but also by enhanced volatilization from soil particles induced by lower subsurface pressure. Soil vapors from the extraction wells are conveyed through piping to the vacuum blower, and are then discharged to the atmosphere with or without treatment.

Six SVE well pairs (i.e., 12 SVE wells) will be located along the eastern boundary of Site 1 as shown in Attachment A, Figure 6. One SVE well pair (SVE-101-I and 101-D) was installed for the SVE pilot test at location SVE-101. Based on the pilot test results and depending on field conditions during installation, the SVE wells would be screened at depths of approximately 25 to 35 feet (intermediate-depth wells) and 40 to 60 feet (deep wells). Each SVE well will discharge to a flow monitoring station where flow, vacuum, and soil gas quality can be measured, and all flow will be combined and discharged to the treatment building. Within the treatment building, the extracted soil vapor will flow through a moisture separator to remove condensate. Two blowers (one operating and one auxiliary) will be used to convey the extracted soil vapor. The discharge from the blowers would be conveyed to a GAC unit to remove VOC prior to venting to the atmosphere via a discharge stack.

The installation of 16 APU units in 14 homes immediately reduced VOC concentrations by approximately 75 to 98 percent as a temporary measure. Based on evaluation of test data and discussions with the respective residents, three APU units were removed from three homes. The six SSD systems have been installed and are operating, but the effectiveness of the systems in reducing vapor intrusion (or effecting decreases in indoor air COC concentrations) has not yet been fully determined (OM&M is ongoing). Based on initial testing, three of the SSDs were upgraded with more powerful fans in November 2009. Pending additional test data (including additional sampling at locations outside the residences) and evaluation of the SSD systems, additional APUs may be removed. After the November 2009 sampling, at the request of a resident a SSD and APU were removed from the residence.

All system piping located outside the buildings will be buried below the frost line (approximately 4 feet bgs). The flow monitoring station will be constructed of a pre-fabricated metal shed with limited ventilation and located on a concrete slab and footer. If required during winter operation, a portable propane heater could be used to prevent condensate within the piping from freezing.

Up to 12 soil vapor pressure monitors (SVPs) will be used to monitor vacuums in the areas east of Site 1 and along the Site 1 fence line as shown in Attachment A, Figure 6. Seven were installed using direct push technology (DPT) for the SVE pilot test in January 2009. These SVPs will be re-developed and permanently completed (e.g., flush mount and concrete pad).

**b. Contribution to Remedial Performance.**

This action is anticipated to provide a final remedy to reduce VOC concentrations at the source area and in indoor air and sub-slab soil vapor to below NYSDOH guidance values.

**c. Alternative Actions Considered.**

The following three removal action alternatives were developed in the EE/CA:

- Alternative 1 – No Action
- Alternative 2 – Long-Term OM&M of Engineering Controls
- Alternative 3 – SVE Containment System, Engineering Controls, and OM&M

Alternative 2 consisted of indefinite OM&M of the APUs and SSDs in the residences.

**d. Engineering Evaluation/Cost Analysis (EE/CA)**

The EE/CA (Tetra Tech, October 2009) was performed in accordance with current EPA and Navy guidance documents for a NTCRA under the CERCLA framework. The objective of the EE/CA for Site 1 was to develop a NTCRA alternative to reduce the potential risk to human health, as well as to contain, control, and remove impacted soil vapor. Three alternatives were identified, evaluated, and ranked.

The comparative analysis included evaluating the effectiveness, implementability, and cost of each alternative. The evaluation of effectiveness included reviewing the protectiveness of the alternative; compliance with ARARs to the extent practicable; long-term effectiveness and permanence; reduction in toxicity, mobility, or volume; short-term effectiveness; and its ability to meet the removal action objectives. The evaluation of implementability included looking at the technical feasibility, availability, and administrative feasibility of the alternatives. The evaluation of cost included a review of capital and future costs.

Based on the comparative analysis of the alternatives completed in the EE/CA, the recommended removal action is Alternative 3 – SVE Containment System, Engineering Controls, and OM&M. This alternative meets the objective of the NTCRA and provides the best balance of trade-offs based on the evaluation criteria. Copies of the EE/CA were made available to the public for the required 30-day public comment period starting on October 9, 2009. An advertisement announcing the 30-day public comment period was placed in the *Bethpage Tribune* on October 9, 2009. The public comment period ended on November 9, 2009. No comments were received.

**e. Applicable or Relevant and Appropriate Requirements (ARARs)**

The NCP requires that removal actions attain Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) with limited exception, to the extent practicable. ARARs were identified and evaluated in the EE/CA. The removal action proposed in this Action Memorandum will comply with ARARs to the extent practicable.

**f. Project Schedule**

The APUs were installed in February and March 2009. The SSD systems were installed in May 2009. Operation and monitoring of the APUs and SSD systems are anticipated to continue through December 2011 considering the SVE Containment System installation and startup in December 2009. The SVE Containment System is expected to operate through December 2013.

**g. Estimated Costs**

The cost for the interim removal action is approximately \$2 million. Capital costs are estimated at 1.2 million, and OM&M costs through December 2014 (conservative 5 years) are estimated to total \$760,000 (Present Value).

**9. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN**

If the NTCRA is not conducted, the contaminant migration via soil vapor intrusion into the residential homes will continue and may migrate further posing an increased risk to residents. Exposure will only slowly decrease over time.

## 10. OUTSTANDING POLICY ISSUES

None identified at this time.

## 11. ENFORCEMENT

Regulatory agencies are anticipated to remain in an oversight role for the duration of the removal action, reviewing design documents, work plans and completion reports to assure compliance with regulations under the IR Program.

## 12. RECOMMENDATION

Conditions at the Site meet the removal action criteria in 40 CFR 300.415(b)(2). Therefore, the Navy recommends the implementation of the proposed action.

Approvals:



William F. Cords  
Director of Infrastructure Business Operations  
Naval Air Systems Command

Date: 2/9/10

## 13. REFERENCES

Also see Section 4(b).

NYSDOH (New York State Department of Health), 2006. *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. Center for Environmental Health, Bureau of Environmental Exposure Investigation. October.

## **Attachment A – Figures**

Figure 1 – General Location Map

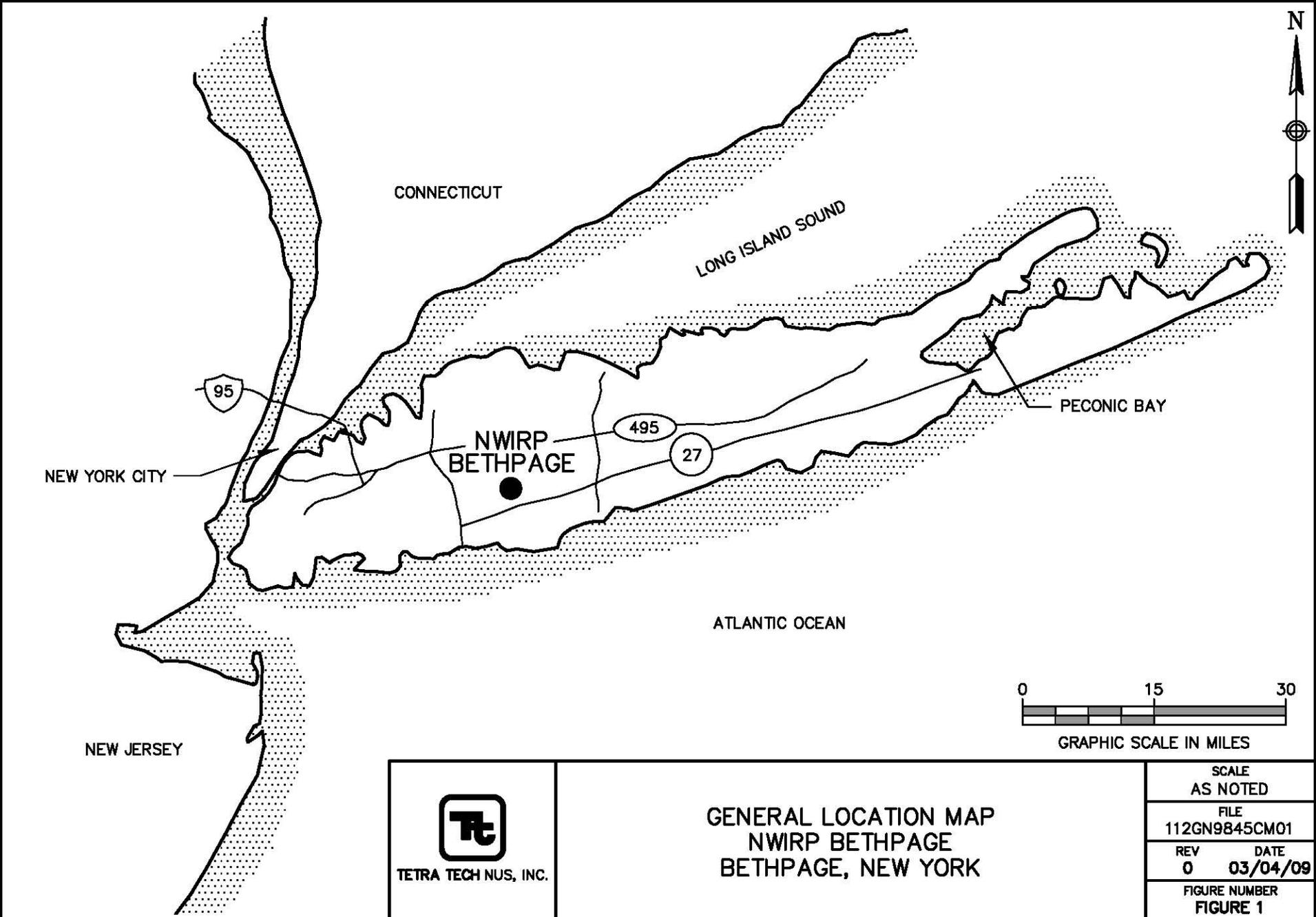
Figure 2 – Site Location Map

Figure 3 – Facility Layout

Figure 4 – Soil Gas Sampling Results, January 2008 to January 2009

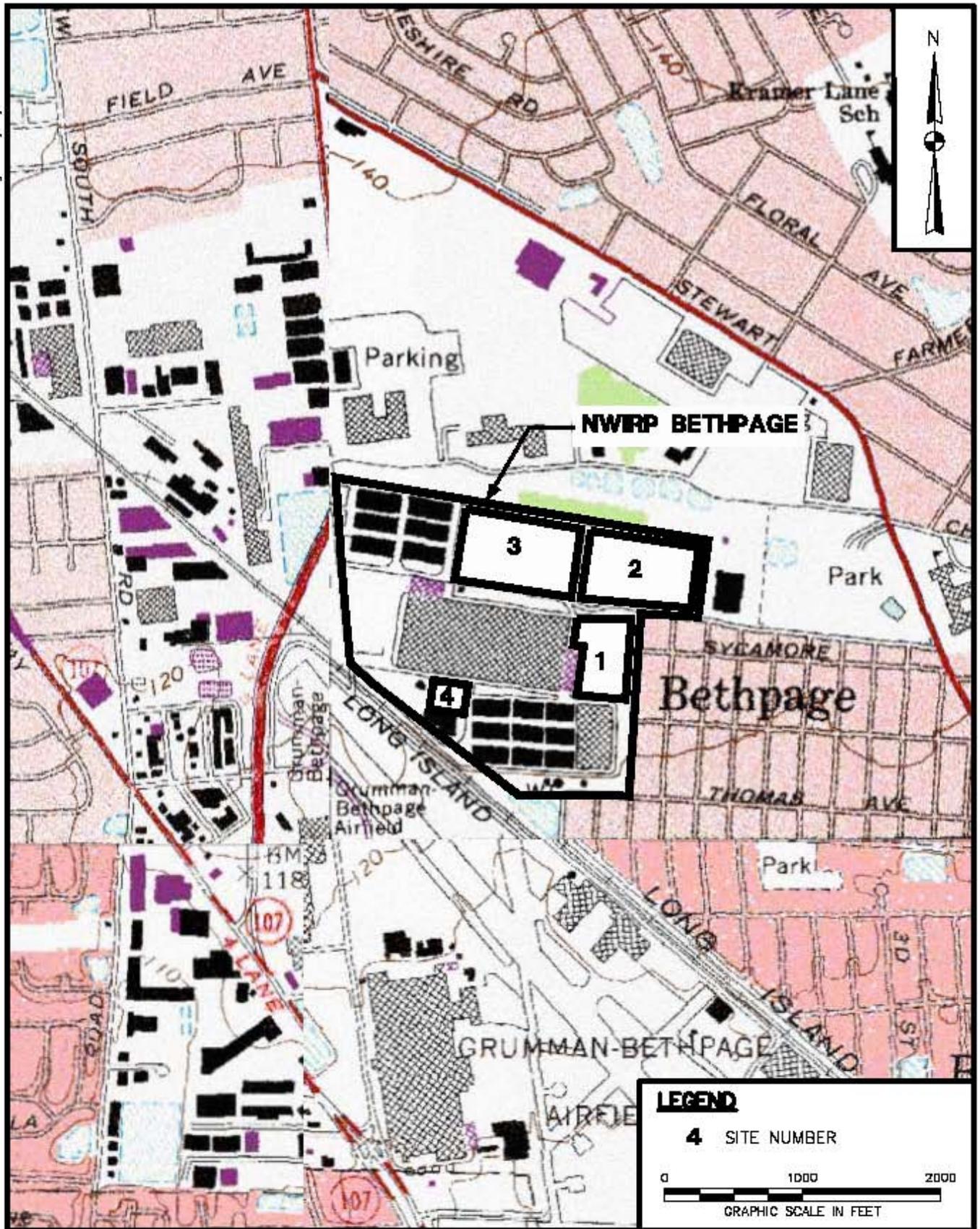
Figure 5 – TCE Isoconcentration Contours

Figure 6 – SVE Containment System Layout



**GENERAL LOCATION MAP  
NWIRP BETHPAGE  
BETHPAGE, NEW YORK**

SCALE AS NOTED	
FILE 112GN9845CM01	
REV 0	DATE 03/04/09
FIGURE NUMBER FIGURE 1	

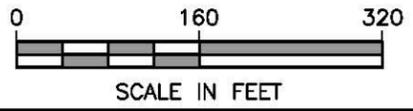
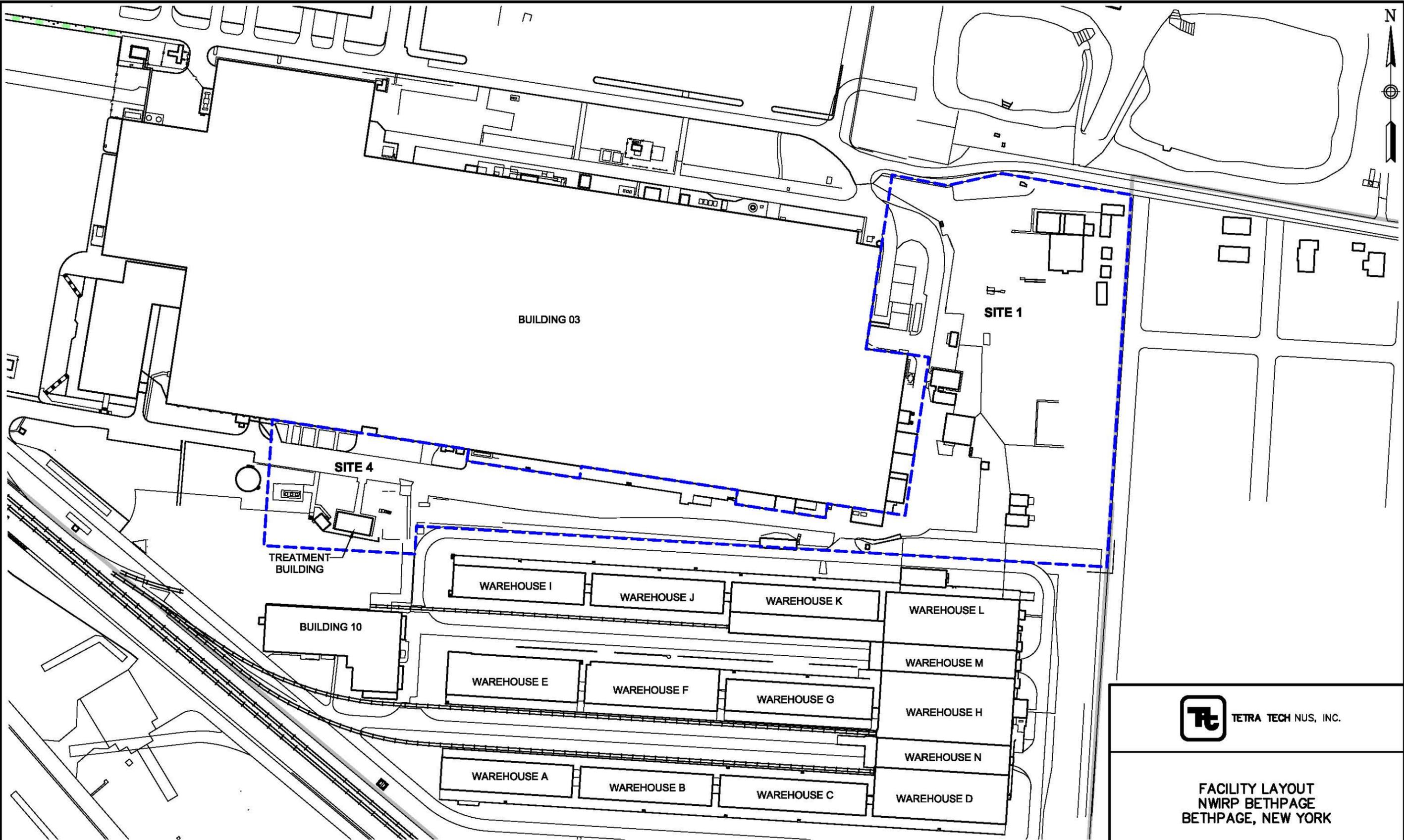


DRAWN BY MF	DATE 6/13/07
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	



**SITE LOCATION MAP  
SITE 1  
NWIRP BETHPAGE  
BETHPAGE, NEW YORK**

CONTRACT NO. 0804	
OWNER NO.	
APPROVED BY	DATE
DRAWING NO. <b>FIGURE 2</b>	REV. 0



**LEGEND**  
 ——— FORMER NWIRP BOUNDARY  
 - - - - - CURRENT NWIRP BOUNDARY

 <b>TETRA TECH NUS, INC.</b>	
<b>FACILITY LAYOUT NWIRP BETHPAGE BETHPAGE, NEW YORK</b>	
FILE 112GN9845GM03-1	SCALE AS NOTED
FIGURE NUMBER <b>FIGURE 3</b>	REV DATE 0 05/26/09



**BPSI-SG1005** 8 ft bgs 20 ft bgs 45 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	15	59	60
TCE	1.5	16	71
TCA	3.4	11	27

**BPSI-SG1004** 5.5 ft bgs 20 ft bgs 45 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	22	ND	78
TCE	5.2	ND	820
TCA	3.9	ND	430

**BPSI-SG1006** 7 ft bgs 20 ft bgs 45 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	19	28	44
TCE	1.2	2	2.1
TCA	ND	ND	0.95

**BPSI-SG2005** 8 ft bgs 20 ft bgs 49 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	16.0	9.7	3.8
TCE	0.62	0.8	1.0
TCA	3.2	3.2	3.2

**BPSI-SG2004** 8 ft bgs 20 ft bgs 49 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	1.8	1,000	580
TCE	1.0	550	600
TCA	1.4	480	480

**BPSI-SG1003** 5.5 ft bgs 20 ft bgs 45 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	540 E	1,300	250
TCE	110	590	750
TCA	440 E	790	780

**BPSI-SG1002** 8 ft bgs 20 ft bgs 45 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	1,700	960	20
TCE	3,300	4,400	320
TCA	740	1,900	550

**BPSI-SG2006** 8 ft bgs 20 ft bgs 49 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	14	29	11
TCE	32	71	61
TCA	12	22	35

**SVPM11** 49 ft bgs

Compound	ug/m
PCE	ND
TCE	0.29
TCA	ND

**SVPM11S** 24 ft bgs

Compound	ug/m <sup>3</sup>
PCE	5,300
TCE	7,200
TCA	ND

**BPSI-SG1001** 7 ft bgs 20 ft bgs 45 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	170	1,200	5.9
TCE	19,000	180,000	1,400
TCA	16,000	90,000	890

**BPSI-SG2001** 8 ft bgs 20 ft bgs 49 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	4,000	5,000	720
TCE	1,700	2,700	1,500
TCA	1,300	1,700	1,400

**BPSI-SG2011** 8 ft bgs 24 ft bgs 48 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	1.6	0.57	2.9
TCE	0.9	0.14	0.34
TCA	1.5	0.50	1.0

**SVPM12** 50 ft bgs

Compound	ug/m <sup>3</sup>
PCE	ND
TCE	150,000
TCA	75,000

**BPSI-SG2002** 8 ft bgs 20 ft bgs 44 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	420	740	48 J
TCE	34,000	89,000	26,000
TCA	21,000	52,000	27,000

**BPSI-SG2007** 8 ft bgs 20 ft bgs 49 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	13	25	5.3 J
TCE	29	87	400
TCA	150	260	870

**SVPM12S** 25 ft bgs

Compound	ug/m <sup>3</sup>
PCE	ND
TCE	73,000
TCA	36,000

**BPSI-SG2003** 8 ft bgs 20 ft bgs 49 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	19	14	8.9
TCE	20	82	710
TCA	66	170	720

**BPSI-SG2009** 8 ft bgs 20 ft bgs 49 ft bgs

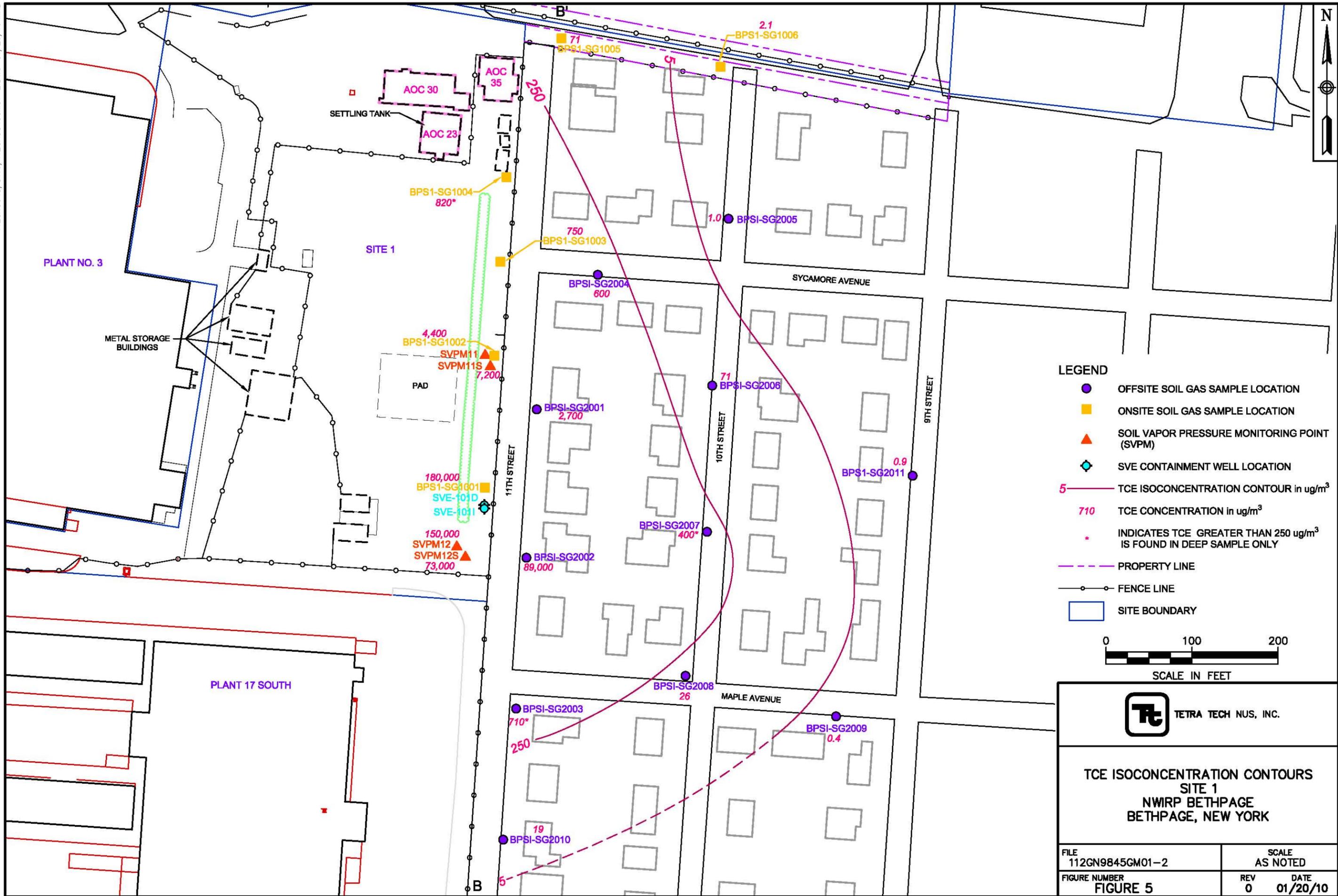
Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	4.8	3.2	2.0
TCE	0.2	0.23	0.4
TCA	1.1	1.6	1.1

**BPSI-SG2008** 8 ft bgs 20 ft bgs 48 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	12.0	2.1	7.4
TCE	4.7	6.8	26.0
TCA	52	80	130

**BPSI-SG2010** 8 ft bgs 24 ft bgs 49 ft bgs

Compound	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>
PCE	3.7	4.9	2.3
TCE	2.8	19	5.5
TCA	1.4	2.2	1.0



**LEGEND**

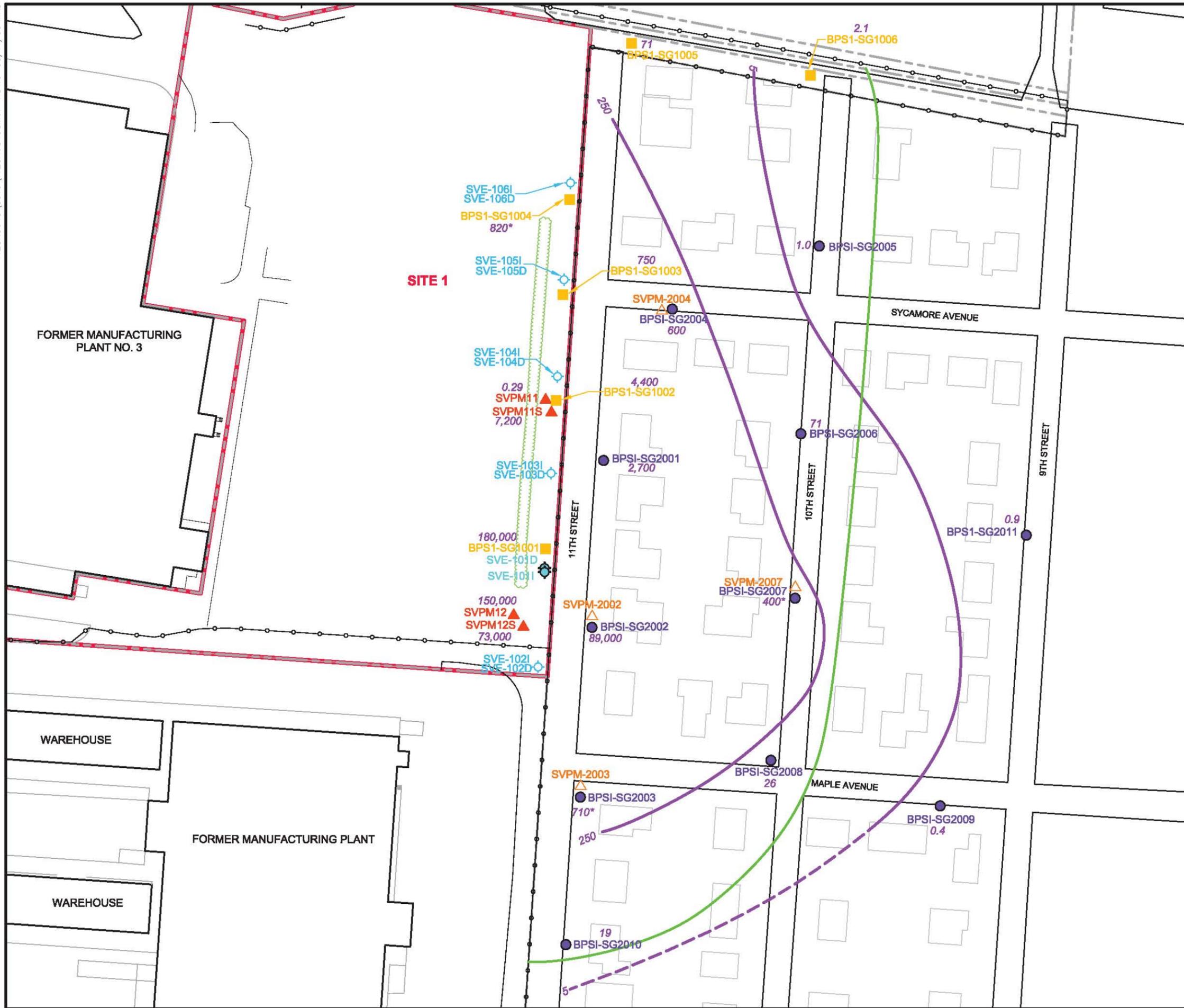
- OFFSITE SOIL GAS SAMPLE LOCATION
- ONSITE SOIL GAS SAMPLE LOCATION
- ▲ SOIL VAPOR PRESSURE MONITORING POINT (SVPM)
- ◆ SVE CONTAINMENT WELL LOCATION
- 5 TCE ISOCONCENTRATION CONTOUR in ug/m<sup>3</sup>
- 710 TCE CONCENTRATION in ug/m<sup>3</sup>
- \* INDICATES TCE GREATER THAN 250 ug/m<sup>3</sup> IS FOUND IN DEEP SAMPLE ONLY
- - - PROPERTY LINE
- FENCE LINE
- SITE BOUNDARY

0 100 200  
SCALE IN FEET

**Tt** TETRA TECH NUS, INC.

**TCE ISOCONCENTRATION CONTOURS  
SITE 1  
NWRP BETHPAGE  
BETHPAGE, NEW YORK**

FILE 112GN9845GM01-2	SCALE AS NOTED
FIGURE NUMBER <b>FIGURE 5</b>	REV DATE 0 01/20/10



**LEGEND**

- OFFSITE SOIL GAS SAMPLE LOCATION
- ONSITE SOIL GAS SAMPLE LOCATION
- ▲ SOIL VAPOR PRESSURE MONITORING POINT (SVPM)
- △ PROPOSED SOIL VAPOR PRESSURE MONITORING POINT (SVPM)
- ◆ PILOT TEST SVE CONTAINMENT WELL
- ◇ PROPOSED SVE CONTAINMENT WELL LOCATION
- ESTIMATED OFFSITE SVE CAPTURE ZONE
- 5 — ESTIMATED TCE SOIL GAS ISOCONCENTRATION CONTOUR ( $\mu\text{g}/\text{m}^3$ )
- 710 — MAXIMUM TCE SOIL GAS CONCENTRATION ( $\mu\text{g}/\text{m}^3$ )
- \* — INDICATES TCE SOIL GAS CONCENTRATION GREATER THAN  $250 \mu\text{g}/\text{m}^3$  IN DEEP SAMPLE ONLY
- $\mu\text{g}/\text{m}^3$  — MICROGRAM PER CUBIC METER
- PROPERTY LINE
- - - FENCE LINE
- SITE BOUNDARY

0 100 200  
SCALE IN FEET



**ALTERNATIVE 3  
CONCEPTUAL SVE CONTAINMENT SYSTEM  
AND VAPOR CAPTURE ZONE  
SITE 1 EE/CA  
NWRP BETHPAGE  
BETHPAGE, NEW YORK**

FILE 112GN9845GM01-2	SCALE AS NOTED
FIGURE NUMBER Figure 6	REV DATE 0 08/11/09



## **Attachment B – Public Notice and Responsiveness Summary**

Below is a copy of the public notice for the proposed NTCRA at NWIRP Bethpage Site 1. No substantive public comments were received and a public meeting was not requested. Subsequently, a responsiveness summary and meeting record are not provided.

**PUBLIC NOTICE**  
**NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NWIRP)**  
**BETHPAGE, NEW YORK**

**Announcing the start of a public comment period and the availability of the ENGINEERING EVALUATION/COST ANALYSIS for a NON TIME CRITICAL REMOVAL ACTION FOR SOIL GAS AT SITE 1 - FORMER DRUM MARSHALLING AREA**

This notice is being provided to inform interested parties that the Department of Navy (Navy) prepared an Engineering Evaluation/Cost Analysis (EE/CA) for a non-time critical removal action at the former Naval Weapons Industrial Reserve Plant (NWIRP) at Bethpage, New York. The action is an interim remedy to address contaminated soil vapors that may migrate off of the facility into off-base residential houses adjacent to Site 1 at NWIRP, Bethpage, New York.

Site 1 - Former Drum Marshalling Area originally consisted of two former drum marshalling pads that were used to store drums containing waste materials from operations at NWIRP Bethpage. Historic (pre-1984) handling of these waste resulted in contamination of soil and groundwater at Site 1. Between 1998 and 2002, the source of the solvent-contaminated soil and shallow groundwater was remediated. However, chlorinated solvent-contaminated soil gas remains and a portion of the soil gas has migrated off site and accumulated under residential basement slabs. The soil gas can then enter the homes through cracks and openings in the foundations and basement walls (soil vapor intrusion). Between February and May 2009, Air Purification Units (APUs) and Sub-Slab Depressurization (SSD) Systems were installed in several homes adjacent to Site 1 to reduce indoor air concentrations to acceptable New York State Department of Health (NYSDOH) criteria. These actions will reduce potential risks to the public health, welfare, or the environment posed by solvents in the soil gas. To develop options for addressing the remaining contaminated soil gas and provide a long-term remedy for migration and intrusion of contaminated soil gas, an EE/CA was prepared. The EE/CA evaluated two action alternatives, Alternative 2 - Long-Term Operation, Maintenance, and Monitoring of Engineering Controls (APUS and SSD systems), and Alternative 3 - Soil Vapor Extraction Containment System. The Navy is proposing to implement Alternative 3 that includes construction and operation of 12 soil vapor extraction wells along the edge of Site 1 and off gas treatment of the extracted soil vapors in accordance with state air regulations.

Copies of the EE/CA have been distributed to the New York State Department of Environmental Conservation (NYSDEC), NYSDOH, Nassau County Department of Health (NCDOH), and members of the Bethpage Restoration Advisory Board (RAB) who have all been informed of the proposed remedy selection and will also be reviewing these documents and providing comments. A copy of the document has been placed at the Reference Desk of the Bethpage Library, 47 Powell Avenue, Bethpage, New York, 11714. Hours of operation are Monday through Friday from 9:30 a.m. to 9:00 p.m.; Saturday from 9:30 a.m. to 5:00 p.m.; closed on Sundays. Please note that documents are for review only and may not be removed from the library.

A 30-day public comment period has been established for review of the administrative record starting **OCTOBER 9, 2009** and ending **NOVEMBER 9, 2009**.

All public comments must be returned to the address provided below on or before (postmark by) **NOVEMBER 9, 2009** to be considered, addressed, and documented in the administrative record. Parties interested in obtaining a copy this document can write to the address below or call the Public Affairs Officer at (757) 445-8732 x3096.

Public Affairs Officer, Code 09PA  
Commander, Naval Facilities Engineering Command, Atlantic  
6506 Hampton Boulevard, Lafayette River Complex  
Norfolk, Va. 23508-1278