2007 FIVE-YEAR

REVIEW FOR SITES 1, 2, AND 3

NWIRP BETHPAGE

Bethpage, New York

Naval Facilities Engineering Command
Mid-Atlantic

Contract No. N62472-03-D-0057
Contract Task Order 121

APRIL 2008

2007 FIVE-YEAR REVIEW

FOR SITES 1, 2, AND 3

NAVAL FACILITIES ENGINEERING COMMAND
MID-ATLANTIC

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command
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Contract No. N62472-03-D-0057
Contract Task Order 121

April 2008

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ACRONYMS

1,1,1-TCA	1,1,1-trichloroethane
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirements
AS/SVE	Air Sparging/Soil Vapor Extraction
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
COPCs	Chemicals of Potential Concern
CTO	Contract Task Order
FS	Feasibility Study
GOCO	Government-Owned Contractor-Operated
gpd/ft	gallons per day per foot
gpd/ft2	gallons per day per square foot
gpm	gallons per minute
HHRA	Human Health Risk Assessment
IAS	Initial Assessment Study
MCL	Maximum contaminant level
MSL	Mean sea level
mg/kg	Milligrams per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFEC	Naval Facilities Engineering Command
NWIRP	Naval Weapons Industrial Reserve Plant
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	Operations and Maintenance
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated biphenyls
PCE	Tetrachloroethene
ppm	Parts per million
PRGs	Preliminary Remedial Goals
RAB	Restoration Advisory Board
RBCs	Risk-Based Concentrations
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
SVOC	Semi volatile organic compounds
TAGM	Technical Assistance Guidance Memorandum
TAL	Target Analyte List
TBC	To Be Considered
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
µg/kg	Micrograms per kilogram
µg/l	Micrograms per liter
$\mu g/m^3$	Micrograms per cubic meter of air

ACRONYMS (continued)

USEPA	United States Environmental Protection Agency
VOCs	Volatile organic compounds

1.0 INTRODUCTION

This five-year review has been prepared for the Navy under Contract Task Order (CTO) No. 121 by the Naval Facilities Engineering Command (NFEC) Mid-Atlantic under the Comprehensive Long-Term Environmental Action Navy (CLEAN) contract number N62472-03-D-0057. This review was conducted for the following sites at Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, located in the Hamlet of Bethpage, Long Island, Nassau County, New York.

- Site 1 - Former Drum Marshalling Area
- Site 2 - Recharge Basin Area
- Site 3 - Salvage Storage Area

Site 4 - Former Underground Storage Tanks (also referred to as Area of Concern [AOC] 22) is also located at NWIRP Bethpage. Site 4 is still being investigated and a decision document has not been yet prepared. As a result, a five-year review was not conducted for that site. In addition, groundwater contamination at Site 4 and offsite areas is addressed in Operable Unit No. 2 Record of Decision (ROD) (NFEC, 2003).

The five-year review was conducted in accordance with Chief of Navy Operations Letter 5090 Ser N45C/N4U732361 of 21 May 2004 and United State Environmental Protection Agency's (USEPA) Comprehensive Five-Year Review Guidance (EPA 540R-01-007 dated June 2001).

1.1 PURPOSE

The purpose of the five-year review is to evaluate the implementation and performance of the remedies at the sites to determine whether the remedies are protective of human health and the environment. The methods, findings, and conclusions of the review are documented in this five-year review report. In addition, this report identifies deficiencies found during the review, if any, and provides recommendations to address them.

This five-year review is required by statute. The Navy must implement five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section §121(c), as amended, states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than

each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

The NCP Part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR) states:

> "If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."

This is the first five-year review of NWIRP Bethpage. Remedial actions were completed at Sites 2 and 3 in 2002. Remedial actions were initiated at Site 1 in 1998, but have not been completed. Since the 1995 ROD, the nature and extent of non-volatile organic soil contamination at Site 1 has been determined to be substantially different than anticipated in the ROD. As a result, the selected remedial action is being re-evaluated for these chemicals. Because hazardous substances remain at the facility above levels that allow for unrestricted use and unlimited exposure, subsequent five-year reviews are required.

As discussed in the USEPA Comprehensive Five-Year Review Guidance (USEPA, 2001), a five-year review determines whether the remedy at a site is protective of human health and the environment. When a remedial action is still under construction, a five-year review determines whether immediate threats have been addressed and whether the remedy is expected to be protective when all remedial actions are completed. In addition, a five-year review identifies any deficiencies and recommends steps to correct them. To do this, the technical assessment conducted during a five-year review examines the three questions shown below.

- Question A: Is the remedy functioning as intended by the decision documents?

- Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

These questions will be answered for the sites at NWIRP Bethpage where a remedy has been implemented or is currently being implemented in Sections 2.0 to 4.0. To answer these questions, this five-year review included several steps. The review included a review of documents, discussions with personnel associated with the sites, and a site inspection of NWIRP Bethpage. This report also includes

the findings of the review of newly promulgated standards, and changes in the standards that were identified as applicable or relevant and appropriate requirements (ARARs), to be considered (TBCs), and the factors used to develop site-specific, risk-based levels at the time the ROD was signed. This information was reviewed to determine if changes since the time of the ROD may call into question the protectiveness of the remedy. It was determined that recalculation of risk or a risk assessment was not necessary to determine whether a remedy protects human health and the environment, as will be discussed in later sections. Where applicable, monitoring and sampling data and the documentation of operation and maintenance (O&M) were also examined and the information is included in the subsequent site-specific sections.

1.2 FACILITY HISTORY

NWIRP Bethpage was established in 1933. 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. In 1998, manufacturing operations ended at the facilities.

Since 1998, activities occurring at the facility included facility 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 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. Even though ownership of this property will be retained by the Navy, the Navy is pursuing a lease of the 9-acre parcel to Nassau County.

1.3 FACILITY LOCATION

NWIRP Bethpage is located in east-central Nassau County, Long Island, New York, approximately 30 miles east of New York City, see Figure 1-1. The Navy’s property totaled approximately 109.5 acres and was formerly a Government-Owned Contractor-Operated (GOCO) facility that was operated by the Northrop Grumman Corporation until September 1998. In 2002, approximately four acres (Plant No. 20) was transferred to Nassau County and in April 2008, approximately 96-acres of property were transferred to Nassau County. NWIRP Bethpage is bordered on the north, west, and south by property owned or

formerly owned by Northrop Grumman Corporation that covered approximately 500 acres, and on the east by a residential neighborhood, see Figure 1-2.

1.4 SURFACE FEATURES

The NWIRP Bethpage is located on a relatively flat, featureless, glacial outwash plain. The site and nearby vicinity are highly urbanized. Because of this, most of the natural physical features have been reshaped or destroyed. The topography of the activity is relatively flat with a gentle slope toward the south. Elevations range from greater than 140 feet (above mean sea level, [MSL]) in the north to less than 110 feet (above MSL) at the southwest corner.

NWIRP Bethpage is currently about 105 acres in size. The dominant features at the activity are Plant No. 3 (the former manufacturing plant), North Warehouses, South Warehouses, and three groundwater recharge basins located at Site 2. The recharge basins are each approximately 1.5 to 2.5 acres in area and about 30 feet deep. Other notable features at the site are a former wastewater treatment plant at Site 2, see Figure 1-2.

1.5 GEOLOGY

The NWIRP is underlain by approximately 1,100 feet of unconsolidated sediments that 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, and the Lloyd Formation.

The Upper Glacial Formation, which is about 30 to 45 feet thick, consists chiefly of coarse sands and gravels. The upper Magothy Formation consists chiefly of coarse sands to a depth of about 100 feet, below which finer sands, silts, and clay predominate. The clay is fairly common but laterally discontinuous; no individual clay horizon of regional extent underlies the NWIRP.

The Raritan Clay underlies the Magothy Formation at a depth of about 700 feet beneath the NWIRP and is reportedly 100 to 150 feet thick. The underlying Lloyd Sand Formation is reportedly about 300 feet thick (Isbister, 1966).

1.6 HYDROGEOLOGY

The water table beneath the NWIRP occurs within the Magothy Formation. The geologic and hydrologic information obtained from this study indicate that the Upper Glacial and upper Magothy aquifers beneath the NWIRP are interconnected and may be considered a common aquifer. Groundwater in this aquifer

occurs under water-table or unconfined conditions. The number and thickness of clay lenses increase with depth within the Magothy, but the horizontally discontinuous nature of these units prevents any one of them from functioning as an aquitard or semi-confining unit.

Most of Long Island is bisected by an east-west trending, regional groundwater divide. The NWIRP lies to the south of this divide. Groundwater beneath the site flows in a generally southward direction, toward the Atlantic Ocean.

The groundwater beneath the NWIRP predominantly flows to the south south-east. Locally, the groundwater flow can be effected by recharge basins and production wells. The horizontal hydraulic gradient varies throughout the NWIRP due to the recharge basins and facility wells. The average hydraulic gradient calculated across the activity is about 5.3 feet/mile. The average linear velocity of the groundwater at the water table is estimated to range from 0.2 ft/day to 0.9 ft/day. The NWIRP occupies an area of recharge. Vertical hydraulic gradients are in a downward direction, but are very low.

Although not the primary service of potable water for the area, the Upper Glacial aquifer is an important source of potable water in Nassau County; well yields as high as 1,100 gallons per minute (gpm) have been reported. The glacial deposits are characterized by a high primary porosity and permeability; the porosity is reported to exceed 30 percent. The estimated average values of hydraulic conductivity and transmissivity for the outwash deposits in the Bethpage area are 2,000 gallons per day per square foot (gpd/ft2) and 100,000 gallons per day per foot (gpd/ft), respectively. Although the water table beneath the NWIRP lies below these deposits, the high permeability of the glacial deposits allows for the rapid recharge of precipitation to the underlying Magothy (Isbister, 1966; McClymonds and Franke, 1972).

The Magothy aquifer is the major source of public water in Nassau County. The most productive water-bearing zones are the discontinuous lenses of sand and gravel that occur within the siltier matrix. The major water-bearing zone is the basal gravel. The former NWIRP facility wells produce from the Magothy. These wells, which were between 357 and 560 feet below ground surface (bgs) each, had a capacity of 1,200 gpm. According to Northrop Grumman personnel, the wells often pumped near capacity. The production wells on the Navy's property have been abandoned. Northrop Grumman is continuing to operate production wells south of the property, as well as a groundwater containment system. The production wells and groundwater containment system operate with a combined flow rate of 3,800 gpm.

The average hydraulic conductivity of the Magothy aquifer decreases in a southeastward direction as it thickens and the coarser grained lenses become thinner and less persistent. The average transmissivity, however, tends to increase in this same direction due to the abrupt thickening of the aquifer. The estimated average values of hydraulic conductivity and transmissivity for the Magothy in the Bethpage

area are 420 gpd/ft2 and 250,000 gpd/ft, respectively (Isbister, 1966 and McClymonds and Franke, 1972).

1.7 FIVE-YEAR REVIEW PROCESS

The five-year review consisted of the following activities: a review of relevant documents, site inspections, and limited interviews. The final report will be placed in the Information Repositories and Administrative Record File for NWIRP Bethpage. Most project documentation can be found at the following Information Repository location:

Bethpage Public Library
47 Powel Road
Bethpage, New York 11714

Notice of the preparation of the Five-Year Review Report and a summary of the final Five-Year Review Report will be provided to the Restoration Advisory Board (RAB) at a future meeting (March 2008). A notice of availability of the final Five-Year Review report will be provided to the public in the Bethpage Tribune, a local newspaper. The notice will indicate that the Navy made available copies of the report in the Information Repository listed above.

1.8 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND SITE-SPECIFIC ACTION LEVEL CHANGES

The five-year review is being conducted for two purposes:

- To determine if the remedial actions are being implemented as specified in the RODs to protect human health and the environment.

- To determine if there have been changes in the ARARs or site-specific action levels that call into question the protectiveness of the remedy.

The chemical-specific ARARs that were identified in each of the RODs were reviewed, as were new federal and state regulations that have been promulgated. This section describes the overall impacts of the new or changed ARARs on the risk posed to human health or the environment. It was determined that recalculation of risk or risk assessments was not necessary to determine whether a remedy protects human health and the environment.

The human health risk assessments (HHRAs) for the sites were conducted primarily following the USEPA Human Health Evaluation Manual and supplemental documents (USEPA, 1989, 1991; 1992). Since the HHRAs were prepared USEPA has issued new guidance documents. The new guidance documents do not impact the conclusions of the original HHRAs. Future HHRAs and five-year reviews will consider the most recent USEPA guidance. If updated carcinogenicity risk assessments become available, the Navy and regulators will determine whether an evaluation should be conducted as part of a future five-year review to assess whether adjustments to the target cleanup levels for remedial actions are needed in order for the remedies to remain protective of human health. If it is concluded that there are unacceptable risks, the target cleanup levels will be adjusted to address the risks so that the remedial actions are protective of human health.

The benchmarks used to select chemicals of potential concern (COPCs) for direct contact with soil and sediment included USEPA Region III Risk-Based Concentrations (RBCs), Region IX Preliminary Remedial Goals (PRGs), and New York State Technical Assistance Guidance Memorandum (TAGM) 4046. In addition, USEPA Soil Screening Levels for the protection of migration from soil to groundwater. The USEPA Region III RBCs are usually updated twice a year and the USEPA Region IX PRGs are usually updated once a year. The New York TAGM 4046 was issued in 1994 (NYSDEC, 1994).

In October 2006, New York State Department of Health (NYSDOH) issued final “Guidance for Evaluating Soil Vapor Intrusion in the State of New York”. This guidance identifies procedures to evaluate soil vapor migration from contaminated soils and groundwater into occupied buildings. The Navy is conducting a soil vapor study along the fence line between Site 1 and residential housing to the east. The results of this investigation will be available in spring 2008.

1.9 REPORT ORGANIZATION

This report has been organized with the intent of meeting the general format requirements specified in the Comprehensive Five-Year Review Guidance document (USEPA, 2001), and summarizing the results of the five-year review for the three IRP sites in a cohesive and comprehensive manner. Section 1.0 gives an overview of NWIRP Bethpage and the five-year review process, as well as a discussion of changes in ARARs and site-specific action levels. Sections 2.0 through 5.0 summarize the five-year reviews conducted for each of the individual sites. Section 6.0 provides a general summary, conclusions, and protectiveness statement for NWIRP Bethpage. This section also identifies when the next five-year review is required and the other tasks that should be performed as part of that five-year review. Two appendices are included in this report. Appendix A contains photographs of the sites and Appendix B contains the five-year review inspection checklists.

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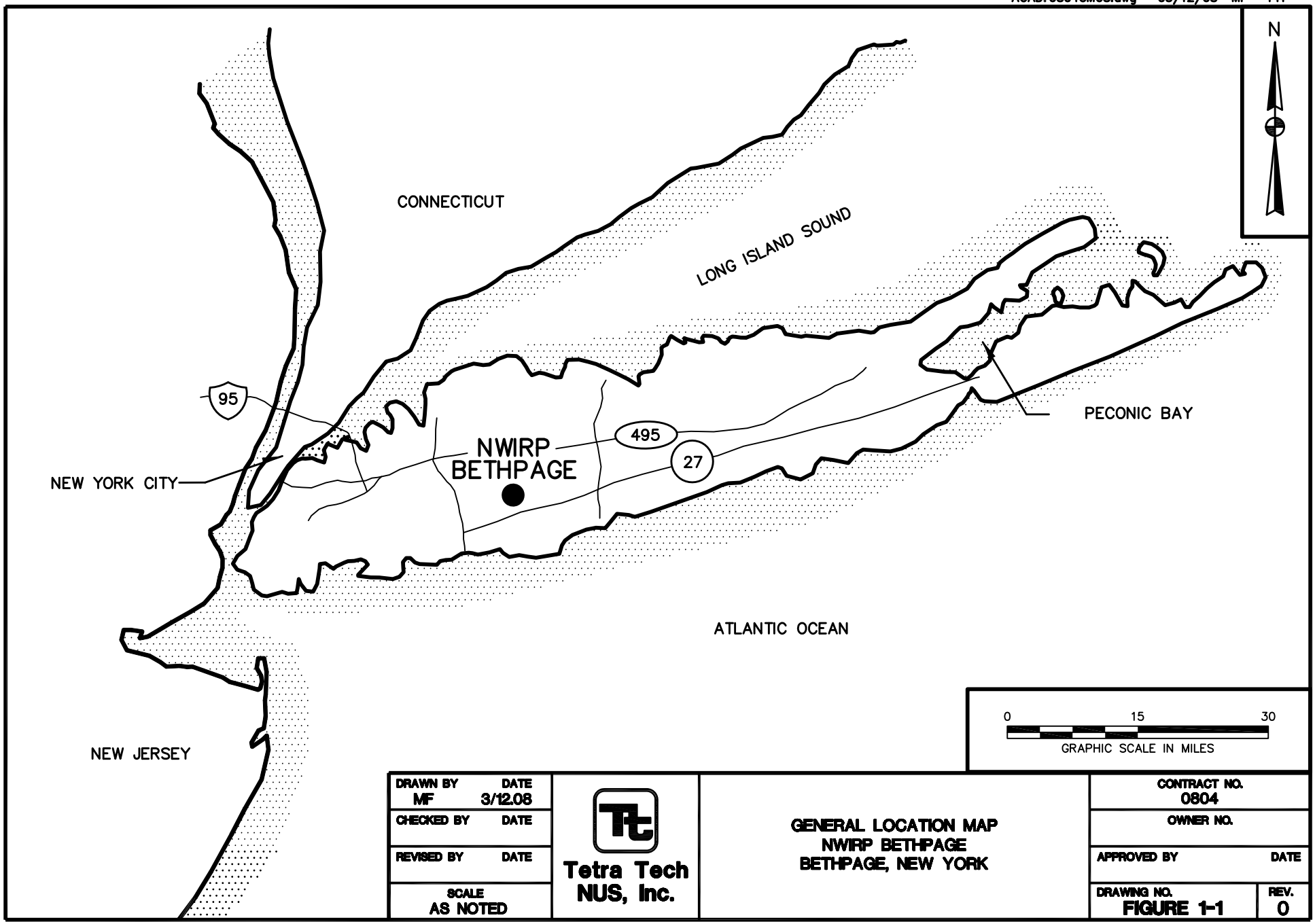

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REVISED BY DATE			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-1 REV. 0

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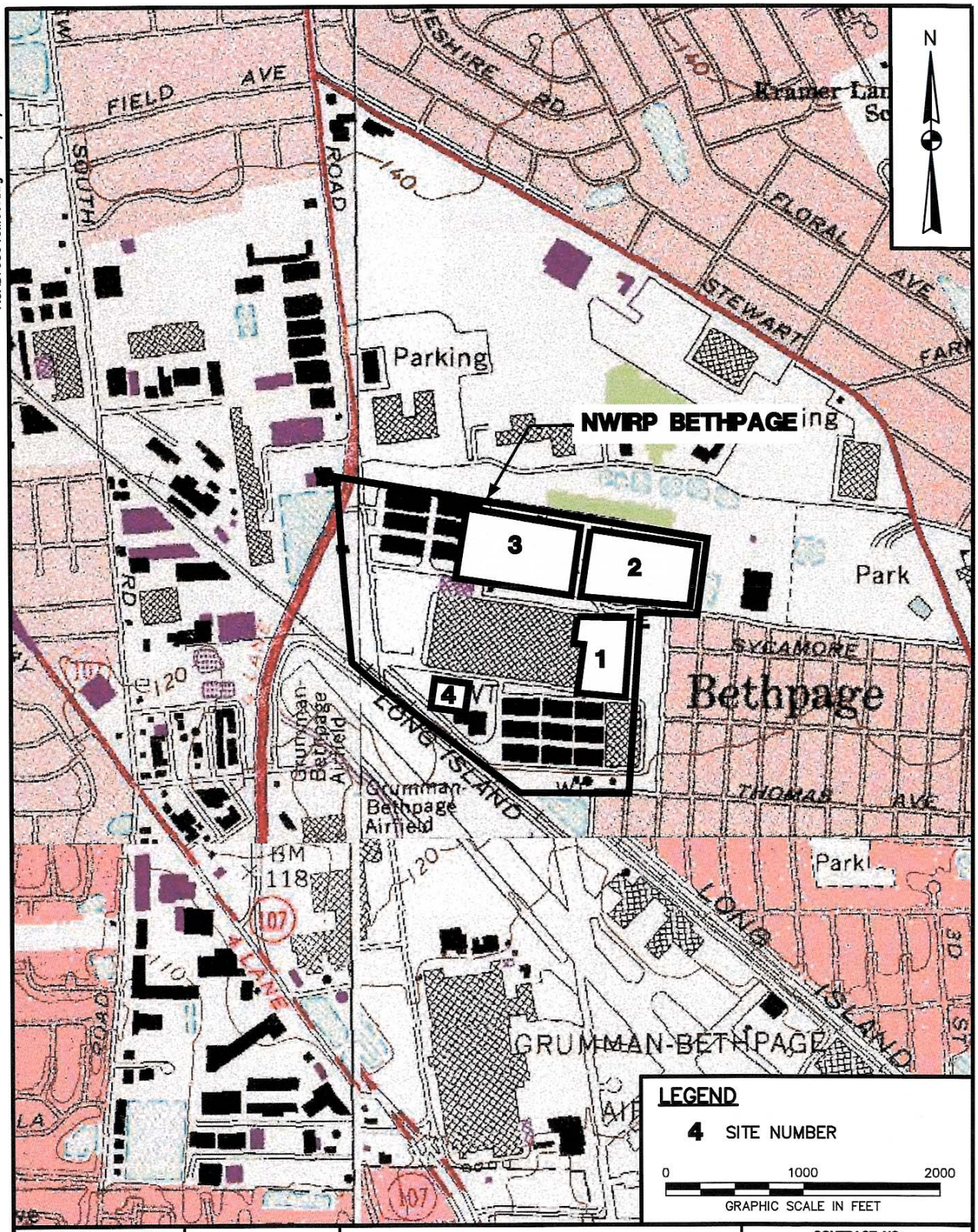

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Tetra Tech NUS, Inc.

SITE LOCATION MAP
SITE 1
NWIRP BETHPAGE
BETHPAGE, NEW YORK

CONTRACT NO. 0804	
OWNER NO.	
APPROVED BY	DATE
DRAWING NO. FIGURE 1-2	REV. 0

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

2.0 SITE 1 - FORMER DRUM MARSHALLING AREA

2.1 INTRODUCTION

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 Plant No. 3 and potentially other sources at the facility. The waste drums reportedly contained chlorinated and non-chlorinated solvents, and 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 extent of Site 1.

In 2005, because of proximity and similar nature of contamination, the definition of Site 1 was expanded to include adjacent areas of concern consisting of the following (see Figure 2-1).

- Drywell/AOC 34-07
- Drywell/AOC 20-08
- AOC 23 – Former Above Ground Storage Tanks
- AOC 30 – Storage Sheds
- AOC 35 – Former Sludge Drying Beds

Drywells/AOCs 34-07 and 20-08 were part of a storm water management system for this area. Polychlorinated biphenyl (PCB) fluids are suspected to have entered the system through floor drains in Plant No. 3 and then entered underlying soils through permeable drywell bottoms. Northrop Grumman conducted a soil removal action at these dry wells in 1998, but confirmation testing found that PCB-impacted soils remain at depth below the excavation and near and below the water table.

AOC 23 – Former ASTs, AOC 30 – Storage Sheds, and AOC 35 – Former Sludge Drying Beds are three related areas at the northern end of Site 1. AOCs 23 and 35 were used for sanitary waste treatment and included solids settling and dewatering activities, respectively. Sanitary wastewater from Plant No. 3 was discharged to AOC 23, which was used to separate solid and liquid wastes. The liquids from AOC 23 were discharged into a series of cesspools located throughout Site 1. The solids from AOC 23 were collected and dewatered at AOC 35. Based on the distribution of contamination throughout this area, non-sanitary wastes may have also entered these units. The exact use of AOC 30 - Storage Sheds is uncertain, but based on proximity and the type of contaminants found at the AOC, its use was likely

related to AOC 23 and 35 operations. Cadmium, chromium, polynuclear aromatic hydrocarbons (PAHs), and PCBs are present at concentrations greater than soil cleanup goals in this area.

2.2 SITE CHRONOLOGY

Site 1 was first identified as a potential source of contamination in the Initial Assessment Study (IAS) in 1986 and contamination was confirmed by a Remedial Investigation (RI) in the early 1990s. Details are presented in Section 2.3 and dates for major events at the site are presented as follows:

Activity	Date
IAS identifies Site 1 as potentially contaminated.	1986
Phase 1 RI - confines the presence of solvent, metal, and PCB contamination at Site 1.	1992
ROD for Operable Unit Number 1 (Soils ROD) signed.	May 1995
Additional pre-design delineation of contamination at the site.	1995 to 2001
AS/SVE System to address VOC contamination installed.	1998
AS/SVE System operation (seasonal).	1998 to 2002
AS/SVE System completion.	2002
Navy re-evaluates implementation requirements for Site 1 PCBs/metal remedy.	2006 to 2008
Navy conducts a soil gas investigation along the eastern boundary of Site. 1	January 2008

2.3 BACKGROUND

Site 1 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. The site is enclosed by a facility perimeter fence along the east and interior facility fences along the north, south, and west. The interior fence was installed in 1998 as an interim measure to restrict expose of facility personnel to areas with residual soil contamination. The area bounded by this fence is lightly vegetated soil and includes AOCs 23, 30, and 35. The remainder of Site 1 is covered with concrete or gravel. Dry Wells 20-08 and 34-07 are located outside of the fenced area, but are covered with gravel.

Current use of Site 1 is limited and consists of periodic mowing of vegetation within the fenced in portion of Site (two to three time per year) and perimeter fence maintenance (infrequent). Unfenced portions of Site 1 are used for vehicular traffic around Plant No. 3 and a security patrol of the facility. No resources are available at Site 1.

Initial Assessment Study: In 1986, an IAS conducted at the NWIRP Bethpage identified materials stored at the Former Drum Marshaling Area Site 1 to include waste halogenated and non-halogenated solvents (Rogers, Golden & Halpern, 1986). Such storage first took place on a cinder-covered surface over the cesspool field east of Plant No. 3. From the early 1950s through about 1978, drums containing liquid cadmium and chromium waste were stored here. In 1978, the collection and marshaling point was moved a few yards south of the original unpaved site, to an area on a 100- by 100-foot concrete pad. This pad had no cover, nor did it have berms for containment of spills. In 1982, drummed waste storage was transferred to the present Drum Marshaling facility, located in the Salvage Storage Area (Site 3). The IAS concluded that Site 1 posed a potential threat to human health and the environment.

Remedial Investigation (Phase 1): An initial RI was completed in 1992 (HNUS, 1992). The field investigation consisted of collecting 32 soil-gas samples at 16 locations, 7 surface soil samples, 18 subsurface soil samples at 10 locations, and 10 temporary monitoring well samples; installing 7 permanent monitoring wells at 3 locations; and sampling 8 permanent monitoring wells. All of the samples were analyzed for volatile organic constituents. The surface soil samples, shallow subsurface soil samples (less than 5 feet deep), surface water, and groundwater samples were analyzed for inorganic and semi-volatile organic constituents. The groundwater samples were also analyzed for soluble inorganic constituents (less than 0.45 microns) and hexavalent chromium. In addition, subsurface soils that were observed to be oil stained were analyzed for PCBs and pesticides. Select soil and groundwater samples were analyzed for engineering-type parameters.

Based on analytical results the soils at Site 1 contained sufficient residual volatile organic contamination to confirm the source of groundwater contamination as being near or at the former drum marshaling areas.

Phase 2 Remedial Investigation: A Phase 2 RI was conducted in 1993 (HNUS, 1993). The overall objective of the Phase 2 RI was to further characterize the nature and extent of environmental contamination and associated risks to human health and the environment at the NWIRP.

The Phase 2 soil testing program results indicated wide spread low-level PCB contamination of the surface soils at Site 1. The majority of the contaminated soils contained PCBs at a concentration of 10 milligrams per kilogram (mg/kg) or less. However, soils at two locations contained PCBs at concentrations greater than 10 mg/kg. One area was near the southwestern portion of Site 1 (30 mg/kg PCBs) and the other area is along the western edge of the fenced in area at Site 1 (1,470 mg/kg PCBs). Volatile organic compound (VOC) and inorganic contamination of the soils were also detected during the Phase 1 RI. As a result of the presence of PCBs in surface soils at a concentration significantly greater than 50 mg/kg, an interim action was taken to protect human health. This interim action reduced overall

risks to offsite residents and onsite workers by a factor of approximately 5 and 20, respectively. The current excess cancer risk to offsite residents and onsite workers, resulting from Site 1 soils, is less than 1 x 10^{-6} and approximately 1 x 10^{-5}, respectively.

The groundwater monitoring program results at Site 1 continued to indicate that this site is a significant source of volatile organic contamination. The two temporary monitoring wells installed during the Phase 2 investigation and placed immediately up-gradient and down-gradient of the northern (cinder-based) former pad appear to confirm that this location is a significant contributor to the contamination. There was sufficient information available to proceed with a FS for Site 1, However, additional PCB and arsenic testing of site soils was required as part of pre-design testing.

Feasibility Study/Record of Decision: A Feasibility Study (FS) was completed in 1994 that included Site 1 (Halliburton NUS, 1994). An alternative that included: fixation of metals, incineration of soils containing PCBs at concentrations greater than or equal to 500 parts per million (ppm), land filling of soils containing PCBs at concentrations between 10 and 500 ppm and In-Situ Vapor Extractions of VOCs was selected for the site. The selected remedy was documented in a ROD signed in May 1995 (NFEC, 1995).

Based on the RIs, actions required to protect human health and environment at Site 1 are as follows.

1. Direct contact (dermal and ingestion) between contaminants in soils at concentrations greater than cleanup goals and site workers and potential future residents. Primary site contaminants for direct contact are PCBs and PAHs.

2. Leaching of site contaminants from site soils to groundwater. Primary site contaminants were chlorinated solvents, tetrachloroethene (PCE), trichloroethene (TCE), 1,1,1-trichloroethane (1,1,1 TCA), degradation products and metals. During the preparation of the ROD, arsenic was the only metal that was identified as a potential threat to groundwater. Later testing concluded that the arsenic result was not representative of site contamination (i.e., only minimal quantities were present), but that more extensive cadmium and chromium contamination was present and represented a potential threat to groundwater. Groundwater at the site is not used for potable water.

2.4 REMEDIAL ACTIONS

Remedial Actions at Site 1 were identified in the 1995 Soils ROD. These actions consisted of the following components.

- 600 cubic yards of arsenic-contaminated soil to be treated and landfilled off site.
- 300 cubic yards of PCB-contaminated soil to be excavated and treated off site (PCB concentrations greater than 500 mg/kg).
- 1,100 cubic yards of PCB-contaminated soil to be excavated and landfilled off site (PCB concentrations greater than 10 mg/kg and less than 500 mg/kg).
- 87,000 cubic yards of VOC-contaminated soil to undergo insitu vapor extraction.
- 28,400 cubic yards of VOC-contaminated soil to undergo natural flushing.
- Permeable 6-inch cover over 1.5 acres of residual contaminated soils and corresponding deed restrictions. Residual soil contamination consists of metal, VOC, PAH, and PCB contamination at concentrations greater than TAGM 4046.

Pre-Design Testing: In 1995, prior to final design activities, additional soil characterization was conducted under Plant No. 3 to determine if VOC-contaminated soil was present at Site 1 to better define the extent of VOC-, PCB-, and arsenic-contaminated soil.

Samples were collected from 11 soil boring locations within Plant 3 and analyzed for VOC. Soil sampling from two borings contained chlorinated organics at concentrations above detection limits. Both samples were collected from the top interval just below the Plant Number 3 floor. However, the concentrations detected were below the Remedial Action Levels. As a result, it was determined that operation of the AS/SVE system under Plant No. 3 was not required.

At Site 1, 15 soil samples were collected from five soil borings and analyzed for VOCs. VOCs were detected at concentrations greater than remedial action levels in two of the five soil boring locations. During the RI investigation, one boring was found to contain elevated levels of volatile contamination. These boring locations constituted the areas of known VOC contamination at Site 1.

Additional soil samples were collected and analyzed for PCBs, arsenic, and Toxicity Characteristic Leaching Procedure (TCLP) arsenic, Target Compound List (TCL) Organics (volatiles, semi-volatiles and pesticides) and Target Analyte List (TAL) Metals. This testing confirmed the presence of PCBs, cadmium, and chromium at concentrations above action levels. In addition, the extent of PCB contamination was not bounded by the investigation. Arsenic was not detected at concentrations above action levels.

In 1996, additional soil testing was conducted at the site and included the collection and analysis of soil samples from previous soil boring locations, but at a greater depth, from new soil boring locations, from cesspool locations within the potential area of excavation, from leach pit locations outside the potential area of excavation, and from near the leach pit connector piping.

The soil boring and leach pit location samples were screened for total PCB concentrations on-site utilizing an immunoassay field screening methodology. In total, there were 331 soil samples analyzed for total PCBs using the on-site screening technology and 15 soil samples analyzed at the laboratory for PCBs. In addition, the laboratory analyzed 60 soil samples for TCLP constituents and Resource Conservation and Recovery Act (RCRA) parameters (pH, corrosivity, ignitability and reactivity), 215 soil samples for TAL metals, 3 soil samples for TCL volatile organics, and 2 soil samples for full TCL organics (volatiles, semi-volatiles and pesticides/PCBs) and TAL metals.

The data results for both the soil boring and leach pit soil samples analyzed for PCBs were compared to the soil level for excavation (10 mg/kg), and the TCLP results were reviewed against the regulatory TCLP maximum guidance concentrations. The results of the pre-excavation sampling at Site 1 indicated that the volume and depth of contaminated soil was significantly greater than the original estimate. In addition, cadmium and chromium were detected in several soil samples at concentrations greater than RCRA TCLP hazardous waste criteria.

Remedial Actions: In 1997, a pilot-scale (AS/SVE) Air Sparging/Soil Vapor Extraction System was installed at Site 1- Former Drum Marshalling Area, NWIRP Bethpage, NY to evaluate physical and chemical characteristics for a full scale system.

In 1998, a full-scale AS/SVE System was installed at the site. The system was operated for 6 months in 1998, 9 months in 1999, 9 months in 2000, 3 months in 2001, and 3 months in 2002. In total, the AS/SVE System removed approximately 4,520 pounds of VOCs. In March 2002, the AS/SVE system at the NWIRP Site 1 was shut down.

To determine the effectiveness of the AS/SVE treatment system on VOCs in the subsurface and to delineate the current levels of PCBs and metals in soil, a post operation soil boring program was conducted in March and April 2002. During the post-operational soil-boring program, 41 soil borings were advanced to the top of the water table which was approximately 65 feet bgs. The soil samples were analyzed for TCL VOCs, PCBs, and TAL metals. Analysis of the soil samples indicated that VOCs were not detected in the majority of soil boring locations. VOCs greater than the PRGs were present in six of the soil boring locations. These VOCs were present at depths ranging from 10 to 64 feet.

Dry Well 20-08 and 34-07: In 1998, Dry Wells 20-08 and 34-07 were identified as being contaminated during an investigation conducted under the Underground Injection Control program. These dry wells were excavated to a depth of 28 feet. During post excavation sampling, PCBs were detected in the

bottom of the excavation at concentrations greater than 10 mg/kg, the cleanup goal. Subsequent soil borings determined that the contamination extends to the water table.

2.5 PROGRESS SINCE LAST REVIEW

This five-year review is the first formal re-evaluation of site conditions since the Soils ROD. Since that time, the following activities occurred.

- An AS/SVE system was constructed, operated, and shut down. This system achieved the goal of reducing VOCs in soils to protect groundwater. Even though several individual soil samples exceeded cleanup goals after treatment, the exceedences were minor and the majority of the soils achieved the goal. The site is currently in the natural flushing stage of the remedy. In support of this conclusion, in March 2007 a monitoring well at the down gradient edge of the site (FW-3) only contained TCE (5.6 micrograms per liter [µg/l]) and PCE (19 µg/l) at concentrations greater than groundwater standards (5 µg/l each). Prior to remediation (1992), groundwater contamination at the downgradient edge of the site included TCE (1,100 µg/l), 1,1,1-TCA (10,000 µg/l, and PCE (430 µg/l). Groundwater monitoring at the site is continuing.

- As discussed in Section 2.4, supplemental soil investigations at the site determined that the extent of PCB-contaminated soils was much more extensive vertically that had been estimated in the ROD. In particular, the ROD has estimated that the vertical extent of PCB contamination was approximately 7 feet and that 1,400 cubic yards of soil would have to be addressed for PCB contamination. Subsequent testing determined that the vertical extent of PCB contamination is approximately 65 feet and extends into the groundwater. Based on current data, approximately 78,100 cubic yards of PCB-contaminated soils (greater than 10 mg/kg) are present and the Navy is evaluating other options for addressing the remaining soil contamination at Site 1. In addition to PCBs, the site also includes metals and PAHs at concentrations greater than potential cleanup goals.

- In 2006, the NYSDOH of Health finalized guidance that identified soil vapor migration from contaminated soils and groundwater to indoor air quality as a potential exposure route. The 1995 ROD did not identify this pathway as a potential concern. In January 2008, the Navy collected soil gas samples at the facility fence line, approximately 70 feet from residential housing. Samples were collected at depths of approximately 8, 20, and 45 feet below ground surface (bgs). Data is presented in a draft report (TtNUS, 2008) and documents findings of TCE at concentrations up to 19,000 micrograms per cubic meter of air (µg/m^3) at 7 feet bgs, 180,000 µg/m^3 at 20 feet bgs, and 150,000 µg/m^3 at 50 feet bgs. For comparison, NYSDOH Indoor Air

Quality Criteria for TCE is 5 µg/m^3 and sub slab guidance for action is 250 µg/m^3. Based on distance from the site to the residential housing, lower concentrations of TCE would be expected under the housing slabs. Other VOCs, including PCE and 1,1,1-TCA, were also detected at concentrations up to 90,000 µg/m^3 in the soil gas samples.

2.6 FIVE-YEAR REVIEW PROCESS

2.6.1 Document Review

Since the signing of the ROD, the following documents have been prepared and reviewed.

- Final Submission for Remedial Design Sites 1 and 2, Phase 1 Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York (HNUS, 1995).
- Draft Remedial Design, Phase II Pre-Design Investigation Letter Report for Site 1 Former Drum Marshaling Area NWIRP Bethpage, NY, (C.F. Braun, 1995a).
- Remedial Design, Phase II Pre-Design Investigation Supplemental Sampling Letter report Number 2 for Site 1 Former Drum Marshalling Area Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York (C.F. Braun, 1995b).
- Analytical Results from the Pre-excavation soil sampling and an estimate on excavation. The Naval Weapons Industrial Reserve Plant Bethpage, New York, December, (Foster Wheeler, 1995).
- Foster Wheeler Environmental Corp., 1996. Site 1 Pre-Excavation Sampling Results Draft Report. NWIRP Bethpage NY, (Foster Wheeler, 1996).
- Results Letter Report for Air Sparging/Soil Vapor Extraction System at Site 1-Former Drum Marshalling Area, NWIRP Bethpage NY, Volume 1, (C.F. Braun, 1997).
- Final Close-Out Report, Construction of a Soil Vapor extraction/Air Sparging System at The Naval Weapons Industrial Reserve Plant Bethpage, New York, (Foster Wheeler, 2001a).
- Pre-operational Groundwater Sampling and Analysis Results Final Letter Report. NWIRP, Bethpage, NY, September (Foster Wheeler, 2001b).
- Final Close-Out Report, Construction of a Soil Vapor Extraction/Air Sparging System at Naval Weapons Industrial Reserve Plant Bethpage, New York, (Foster Wheeler, 2003).
- Evaluation Report – Remediation of Former Drywells 20-08 and 34-07, NWIRP Bethpage, NY, Plant 3, October, (H2M, 2003).
- Draft Letter Data Report – Site 1 – Soil Vapor Intrusion Investigation, NWIRP Bethpage, New York, April (TtNUS, 2008).

2.6.2 Data Review and Evaluation

Since the 1995 ROD, new soil data has been collected. The data is detailed in the documents referenced in Section 2.6.1 and is summarized in Section 2.3.

2.6.3 Notification Of Potential Interested Parties Of Start Of Five-year Review

The five-year review was started in April 2007. The New York State Department of Environmental Conservation (NYSDEC) was notified verbally of the start of the Five-Year Review.

2.6.4 Community Notification

In 1998, a RAB was established for NWIRP Bethpage. The RAB represents the primary method of communicating information to the community. RAB meetings are advertised in a local newspaper (Bethpage Tribune) and held three times per year (April, August, and November). Community notification of the five-year review occurred during the August and November 2007 RABs.

2.6.5 Site Inspection and Interviews

A walk through was conducted in April 2007. Representatives of the facility management ECOR, Navy, and CLEAN contractor were present. The facility manager (Mr. Al Taormina) was interviewed at that time. The schedule for the walk through was communicated verbally to the NYSDEC representative, who was not able to attend. In November 2007, NYSDEC stated that the state had also conducted a walk through of the Site at that time, and a separate walk through was not required.

For the fenced in portion of Site 1, the vegetation within the fenced in portion of the site was mowed, with vegetation covering approximately 75 percent of the area; concrete pads and bare soil represented the balance of the site. During the inspection, there was no evidence of erosion or dust generation. The vegetated portion of the site is fenced in on all sides with a locked access from the west. Outside the fenced area, the surface consists of intact concrete, asphalt, or gravel and there was no evidence of potentially contaminated soil.

Operations at the site are currently limited to control of vegetation, fence repair, security patrols, and fire watch/suppression. Security is present at the facility during the week days and evenings. In 2006, there was one incident in which the fence on the east side of the site was cut and vandals entered the site, attempting to enter the rest of the facility. There was no evidence of vandalism within Site 1. There has been no evidence of fires at Site 1. Vegetation is mowed to control the buildup of combustible material.

2.7 TECHNICAL ASSESSMENT

Technical assessment of the site is addressed in this section.

Question A: Is the remedy functioning as intended by the decision documents?

Only the VOC portion of the remedy has been implemented to date. Operation of the AS/SVE system reduced VOC concentrations in groundwater by more than 99 percent and residual groundwater concentrations are in line with expected results (i.e., 1 to 4 times groundwater standards). The remaining VOCs in the soils are being addressed through natural attenuation processes that are expected to occur over a 30-year period. A down gradient groundwater extraction system is used to capture VOCs that leave the NWIRP Bethpage. Based on a review of Site 1 groundwater data from 2004 to 2007, there is no apparent decrease in VOC concentrations. However, the study period is short and long-term monitoring will be used to evaluate this process.

Since the ROD, a potential for VOC migration via soil vapor from Site 1 to the residential community located east of the Site was identified by the State. In response to this concern, the Navy conducted a soil gas investigation in January 2008. This data indicates a potential for soil vapor migration from Site 1 to the residential community.

The non-VOC portion of the remedy has not been implemented to date. Studies in 1995 to 2001 identified the presence of more extensive contamination at the site than had been identified in the ROD. The Navy is evaluating options for addressing this contamination. Primary concerns with these contaminants are direct contact with onsite personnel and migration with dust. Site 1 is lightly vegetated, which is consistent with natural vegetation in this part of Long Island. Dust generation is not apparent at the site, but will be monitored in the future. In addition, in 1995, soil sampling in the residential area to the east was conducted to determine whether dust migration from Site 1 to the residential area was a concern. This testing did not detect Site 1-related PCB contamination.

In addition, new soil data has identified PCB-contaminated soils are in contact with groundwater. Groundwater data collected at the down gradient edge of the site detected PCBs at a concentration up to 1.1 µg/l. The maximum contaminant level (MCL) for PCBs in groundwater is 0.5 µg/l. Groundwater in the area is not used as a potable water source and there is a downgradient groundwater extraction system that captures groundwater from this area. As a result there is no immediate threat to human health from this contamination.

In addition, even though the facility is not very active, Nassau County operates a vehicle impound on the facility. In 1998, the Navy installed an interior facility fence to further restrict general facility personnel from accessing the site, and in particular, portions of Site 1 that are not covered with concrete, asphalt, or gravel.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?

During preparation of the ROD, Site 1 was being used as an active storage area, with exposure assumptions similar to an industrial use scenario. Since 1998, Site 1 is not active and only rarely visited (once per month or less). As a result, current exposures are less than anticipated in the ROD. Future use of the site is identified as for vehicle parking, storage, or green space, which would be consistent with ROD exposure assumptions. Changes in toxicity data since the ROD would not effect ROD assumptions. Except for soil vapor intrusion concerns, cleanup levels are the same as during the ROD. Clean up levels for VOCs at the site have not been established.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy.

No new information that would affect the protectiveness of the remedy has become available.

Summary of Technical Assessment

With the possible exception of soil vapor migration, Site 1 does not present a current risk to human health or the environment. Access to the site is limited by security and fencing which adequately controls direct contact exposure. Also, migration of contamination via dust does not appear to be a concern, but should be further monitored in the future. The site is lightly vegetated and the surface soil is primarily coarse-grain sand which minimizes the potential for dust generation. In the past when higher concentrations of surficial contamination was present and potential dust forming operations were present (vehicular traffic), soil testing in offsite areas did not identify the presence of Site-related contamination.

PCBs, cadmium, and chromium were detected in groundwater at the downgradient edge of Site 1. PCBs were detected in two of the four Site groundwater wells at a concentration up to approximately twice the MCL. The metals were not detected at concentrations greater than MCLs. A down gradient containment system (for VOCs) would prevent the migration of this contamination to potable water supplies.

VOCs in site soils were treated via an AS/SVE system. This system reduced VOC concentrations in groundwater by more than 99 percent. Residual VOCs are in line with treatment goals and natural attenuation processes are being used to address residual site contamination. A down gradient groundwater containment system captures VOCs that leave Site 1.

Residual VOCs at the site have the potential to impact the residential community located east of Site 1. A soil vapor study conducted in January 2008 confirmed the presence of VOCs in the soil gas at the fence. Evaluation of this data will be required to determine whether there are risks to residents in adjacent housing.

2.8 ISSUES

The following issues were identified during this five-year review at Site 1.

1. Implementation of the final remedy for non-VOC contaminated soils at Site 1 has been delayed because of the finding of much higher volumes of impacted media than had been identified during the ROD. The Navy is evaluating options for addressing the non-VOC contaminated soil. This issue is not affecting the current protectiveness at the site, but future use of the site is limited until the residual contaminated soil can be addressed.

2. Potential migration of contaminated soil vapor from Site 1 to an adjacent residential area was identified as a potential concern by the State. A soil vapor study investigation conducted at the fence line indicated the potential for vapor migration to the residential housing.

3. PCBs have been identified in the groundwater at a concentration of up to approximately 2 times the MCL. Groundwater in the area is not being used as a potable water supply and a groundwater containment system is present between the site and potential downgradient receptors.

2.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The following recommendations and follow-up actions are proposed for the site.

1. Complete the re-evaluation of options for addressing soil contamination at Site 1.
2. Further evaluate the potential for VOC-contaminated soil vapor on the Navy property to impact off site residents.

3. Conduct additional groundwater investigation down gradient of Site 1 to determine whether PCBs are migrating with groundwater, and if they are migrating, the vertical and horizontal extent of migration.

2.10 PROTECTIVENESS STATEMENT

The remedy at the Site 1 - Former Drum Marshalling Area is currently protective of human health and the environment. Access to the site is currently restricted through fencing and security, contaminant migration via groundwater is being monitored and contained, and potential contaminant migration via soil gas will be evaluated in the near future. Implementation of a final remedy for the site will allow limited use of the site.

2.11 NEXT REVIEW

The next review of the site is scheduled to be completed in 2013.

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N

SITE 3

NAVY ACCESS EASEMENT

SITE 2

BUILDING

SETTLING TANK

DRY WELL 20-08

AOC 30

AOC 23

AOC 35

SYCAMORE AVENUE

SITE 1

PLANT NO. 3

METAL STORAGE BUILDINGS

SVPM11

SVPM11S

PAD

11TH STREET

FORMER METAL STORAGE BUILDINGS

NAVY PROPERTY TO BE RETAINED

DRY WELL 34-07

SVPM12S

SVPM12

SITE 4/AOC 22

MAPLE AVENUE

LEGEND:

- DRY WELL
- SOIL GAS SAMPLE LOCATION
- SOIL VAPOR PRESSURE MONITOR
- PROPERTY LINE
- FENCE LINE

0 100 200

GRAPHIC SCALE IN FEET

DRAWN BY MF	DATE 3-12-08	Tetra Tech NUS, Inc.	SITE 1 LAYOUT MAP NWIRP BETHPAGE BETHPAGE, NEW YORK
CHECKED BY	DATE		
REVISED BY	DATE		
SCALE AS NOTED			

CONTRACT NO. 0804

OWNER NO.

APPROVED BY DATE

DRAWING NO. FIGURE 2-1

REV. 0

FORM CADD NO. TTNUS-BV.DWG - REV 1 -9/11/98

3.0 SITE 2 – RECHARGE BASINS

3.1 INTRODUCTION

Site - 2 Recharge Basins consists of three recharge basins used to channel surface water back to groundwater. Prior to 1984, some Plant No. 3 production-line rinse waters were discharged to the recharge basins. The Environmental/Energy Survey of the activity, published in 1976, states that 1.85 million gallons per week were discharged to the recharge basins. These waters were directly exposed to chemicals used in industrial processes (involving the rinsing of manufactured parts). Reportedly, these discharges of dilute rinse waters did not contain chromates, based on the IAS. Since 1977, the discharge rate to the recharge basins was 14 million gallons per week of non-contact cooling water. The non-contact cooling water was obtained from the facility groundwater production wells. All contact wastewater discharged went to the Industrial Wastewater Treatment Plant.

3.2 SITE CHRONOLOGY

Site 2 was first identified as a potential source of contamination in the IAS in 1985 and based on the analytical results of a RI in the early 1990s Site 2 was not a likely source of onsite groundwater contamination. Details are presented in Section 3.3 and dates and major events at the site are presented as follows.

Activity	Date
IAS identifies Site 2 as potentially contaminated.	1985
Phase 1 RI– concluded that Site 2 was redistributing the contaminated groundwater and not contributing to the source.	1991
Phase 2 RI – concluded that PCBs were widely found in the surface soils at Site 2.	1993
ROD for excavation and disposal of contaminated soil and soil cover (Soils ROD) signed.	May 1995
Post Remedial Action Phase 1 – 7,239 tons of PCB contaminated soil was excavated.	1996
Surface Soil results revealed PCB contaminated soil.	2001
Construction completion of soil and gravel cover.	2002
Draft Environmental Evaluation of County Motor Vehicle Impound Lots investigation identified the presence of PAHs in basin sediments. PAHs are likely attributable to run off from asphalt parking lots or motor vehicles.	2008

3.3 BACKGROUND

Site 2 is relatively flat located in the northeast corner of the Navy's property and north of Site 1, see Figure 1-2. The site is enclosed by a facility perimeter fence along the north, east and south and an interior facility fence along the west, see Figure 3-1. It contains three recharge basins which currently receive non-contact cooling water. Historically, these basins also received rinse waters from Northrop Grumman's operations. Also located on this site are the former sludge drying beds which no longer exist and have been filled in. Sludge from the Plant 02 industrial waste treatment facility was dewatered in these beds before being disposed of off site.

Initial Assessment Study: In 1985, an IAS conducted at the NWIRP Bethpage, NY, identified contaminants of concern at site 2 to include hexavalent (and other valence) chromium, aluminum, nitric acid, and sulfuric acid materials (Rogers, Golden & Halpern, 1986). Direct evidence of past hazardous waste disposal was collected regarding the recharge basins at Site 2.

Surface water drainage on Long Island is, for the most part, locally controlled, with numerous recharge basins used to channel this resource back to the groundwater. Several such recharge basins are located at NWIRP Bethpage. Prior to 1984, some Plant No. 3 production-line rinse waters were discharged to the recharge basins. The Environmental/Energy Survey of the activity, published in 1976, states that 1.85 million gallons per week were discharged to the recharge basins. These waters were directly exposed to chemicals used in industrial processes (involving the rinsing of manufactured parts). Reportedly, these discharges of dilute rinse waters did not contain chromates, based on the IAS. Since 1977, the discharge rate to the recharge basins was 14 million gallons per week of non-contact cooling water. The non-contact cooling water was obtained from the facility groundwater production wells. All contact wastewater discharged went to the Industrial Wastewater Treatment Plant.

Adjacent to the recharge basins are the former sludge drying beds. Sludge from the Plant No. 2 industrial Waste Treatment Facility (south Northrop Grumman Complex) was dewatered in the drying beds before offsite disposal.

On at least one occasion, sampling performed by the Nassau County Department of Health detected levels of hexavalent chromium in excess of allowable limits. Northrop Grumman was notified of this non-compliance and was asked to perform remedial actions necessary to eliminate the problem. Reportedly, Northrop Grumman complied with the request. It was concluded that Site 2 posed a potential threat to human health and the environment.

Remedial Investigation (Phase 1): A Final RI was conducted in 1991 (HNUS, 1992). The field investigation consisted of collecting 48 soil-gas samples at 24 locations, 13 surface soil samples, 14 subsurface soil samples at 13 locations, 11 temporary monitoring well samples, 2 surface water samples, and 4 sediment samples; installing 3 permanent monitoring wells at 2 locations; and sampling 3 permanent monitoring wells. All of the samples were analyzed for VOC constituents. The surface soil samples, shallow subsurface soil samples (less than 5 feet deep), surface water, sediment, and groundwater samples were analyzed for inorganic and semi volatile organic compounds (SVOCs). The groundwater and surface water samples were also analyzed for soluble inorganic constituents (less 0.45 microns) and hexavalent chromium. In addition, surface and subsurface soils that were observed to be oil stained were analyzed for PCBs and pesticides. Select soil and groundwater samples were analyzed for engineering-type parameters.

Based on analytical results Site 2 is not a likely source of onsite groundwater contamination. Minimal VOC contamination in the soils or groundwater was present at Site 2. The surface water entering the recharge basins contained sufficient concentrations of VOCs to result in groundwater contamination. However, the concentrations were not high enough to account for the VOC concentrations detected at Site 1. Based on the relative concentration of VOCs found in the production wells, it was likely that the recharge basins were just redistributing the contaminated groundwater. Also, it should be noted that since the concentration of VOCs in the surface water were lower than in the production wells, the systems likely to result in partial treatment of the groundwater by volatilization. A Phase 2 RI and a FS was recommended to address soil and groundwater contamination. However, the findings of the Phase 2 RI were required to complete this study.

Phase 2 Remedial Investigation: A Phase 2 RI was conducted in 1992 (HNUS, 1993). The overall objective of the Phase 2 RI was to further characterize the nature and extent of environmental contamination and associated risks to human health and the environment at the NWIRP. Based on analytical results from the Phase 2 RI, PCBs were widely found in the surface soils at Site 2, with a maximum concentration of 7.4 mg/kg. Subsurface (3 to 5 feet deep) PCB soil contamination was likely limited to the southeast corner of Site 2 (6.8 mg/kg) and the northern edge of Site 2, near the former sludge drying beds (36.6 mg/kg). Limited PCB contamination of the basin sediments were also found. However, basin sediment was routinely removed by Northrop Grumman Corporation.

Based on the results of groundwater investigations and computer modeling, it was likely that the recharge basins at Site 2 acted as a secondary source of solvent contaminated groundwater. Contaminated water extracted from production wells at other areas of the NWIRP and Northrop Grumman Corporation were reintroduced into the groundwater at Site 2. Northrop Grumman pursued treatment of this water prior to re-injection. There was sufficient information available to proceed with a FS for Site 2.

Feasibility Study/Record of Decision: Following the Phase II RI, a FS was completed in 1994 that included Site 2 (HNUS, 1994). An alternative that included excavation of soils contaminated with PCBs between 10 and 500 mg/kg and disposal of the contaminated soil off-site, natural flushing to remove residual VOC contamination and covering the site and residual contaminated soil with 6 inches of permeable material (soil or gravel) was selected for the site. The selected remedy was documented in a ROD signed in May 1995 (NDNFEC/NYSDEC, 1995).

Based on the RIs, actions required to protect human health and environment at Site 2 are as follows:

1. Direct contact (dermal and ingestion) between contaminants in soils at concentrations greater than cleanup goals and site workers and potential future residents. Primary site contaminants for direct contact are PCBs and PAHs.

3.4 REMEDIAL ACTIONS

Remedial Actions at Site 2 were identified in the 1995 Soils ROD. These actions consisted of the following components:

- 2,600 cubic yards of PCB-contaminated soil to be excavated and land filled off site (PCB concentrations greater than 10 mg/kg and less than 500 mg/kg).
- 3,100 cubic yards of VOC-contaminated soil to undergo natural flushing.
- Permeable 6-inch cover over 8 acres of residual contaminated soils and corresponding deed restrictions. Residual soil contamination consists of metal, VOC, PAH, and PCB contamination at concentrations greater than TAGM 4046.

Pre-Excavation Testing: In 1995, a pre-excavation soil sampling and an estimate on excavation was conducted at Site 2 (Foster Wheeler, Corp., 1995). The pre-excavation field investigation conducted at the site included the collection and analysis of soil samples from across the site to determine the extent of contamination, especially in regard to PCBs and arsenic. All soil samples were analyzed for PCBs. Concentrations of PCBs were detected in the soil samples that exceeded the excavation soil comparison levels of 10 mg/kg.

Remedial Actions: In 1996, post remedial action was conducted at Site 2 (C.F. Braun, 1996). The purpose of the remedial action was to remove PCB contaminated soil that had concentrations in excess of 10 mg/kg. During the remedial action, a total of 7,239 tons of PCB contaminated soil was excavated and disposed of at the Grayback Mountain hazardous waste landfill located in Clive, Utah. Removal of all PCBs at concentrations in excess of 10 ppm were verified through field test kits and fixed based

laboratory analysis. Based on the remedial action and the confirmation sampling it can be concluded that all PCB contamination in excess of 10 mg/kg was removed from Site 2 and disposed of properly.

Soil and gravel cover was installed from October 31, 2001 through December 6, 2001. The construction activities completed in December 2001 at Site 2 completed the necessary fieldwork identified under the 1995 OU 1 ROD (TtNUS, 2002). A notification was entered into the Deed of Transfer to Nassau County, New York describing the location where residual compounds will remain and specified that written consultation with NYSDEC and appropriate precautions must be taken prior to disturbing soils at this site.

3.5 PROGRESS SINCE LAST REVIEW

This five-year review is the first formal re-evaluation of site conditions since the Soils ROD. Since that time, the following activities occurred.

- 1996 removal of 7,239 tons of PCB contaminated soil was excavated and disposed of at the Grayback Mountain hazardous waste landfill located in Clive, Utah.
- 2001 Soil and gravel cover was installed from October 31, 2001 through December 6, 2001.

3.6 FIVE YEAR REVIEW PROCESS

3.6.1 Document Review

Since the signing of the ROD, the following documents have been prepared and reviewed.

- Final Submission for Remedial Design Sites 1 and 2, Phase 1 Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York (HNUS, 1995) May.
- Analytical Results from the Pre-Excavation soil sampling and an estimate on excavation. Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York (Foster Wheeler, 1995) December.
- Post-Remedial Action Letter Report for Site 2, Phase 1. Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York (C.F. Braun, 1996) June.
- Letter Report. Naval Facilities Engineering Command (NFEC). Surface Soil Sampling Results. Site 2 and Site 3. (NFEC, 2001) June.
- Construction Completion Report for Site 2- Recharge Basin Area and Site 3-Salvage Storage Area. NWIRP Bethpage, NY (TtNUS, 2002). May.
- Draft Environmental Evaluation of County Motor Vehicle Impound Lots investigation (TtNUS, 2008)

3.6.2 Data Review and Evaluation

Since the 1995 ROD, new soil data has been collected. The data is detailed in the documents referenced in Section 3.6.1 and is summarized in section 3.3.

3.6.3 Notification of Potential Interested Parties of Start of Five-year-Review

The five-year review was started in April 2007. The NYSDEC was notified verbally of the start of the Five-Year Review.

3.6.4 Community Notification

In 1998, a RAB was established for NWIRP Bethpage. The RAB represents the primary method of communicating information to the community. RAB meetings are advertised in a local newspaper (Bethpage Tribune) and held three times per year (April, August, and November). Community notification of the five-year review occurred during the August and November 2007 RABs.

3.6.5 Site Inspection and Interviews

A site walk through was conducted in April 2007. Representatives of the facility management ECOR, Navy, and CLEAN contractor were present. The facility manager (Mr. Al Taormina) was interviewed at that time. The schedule for the walk through was communicated verbally to the NYSDEC representative, who was not able to attend. In November 2007, NYSDEC stated that the state had also conducted a walkthrough of the Site at that time, and a separate walk through was not required.

Site 2 is entirely fenced in. Site 2 contained high weeds with minimal erosion along the western edge of the site. The north recharge basin exhibited minor erosion of the steep bank in the southwest corner. The southeast recharge basin eastern inlet exhibited moderate level erosion running down along the bank. The northwest and northeast quadrants of Site 2 contain tall, dead vegetation sparsely scattered through the landscape. The southeast quadrant vegetation is reasonably well established covering approximately 90 percent of the ground surface. The southeast recharge basin intake structure located in the northwest corner exhibits moderate levels of erosion. The southeast recharge basin east intake structure exhibits significant erosion occurring approximately 70 percent up the bank.

3.7 TECHNICAL ASSESSMENT

Technical assessment of the site is addressed in this section.

Question A: Is the remedy functioning as intended by the decision documents?

During a removal action, the more contaminated soils were removed from the site. The concentration of PCBs and PAHs in remaining contaminated soils were low enough that incidental contact with the soils would not adversely effect human health. In addition, a cover was placed on those soils which contained contaminants greater than a residential use scenario. As a result, the remedy is continuing to function as intended in the decision documents. The soil cover remains intact and continues to act as a barrier to potential human contact to site contaminants.

Some erosion was noted within the recharge basins. At this time, the erosion has not extended to soil cover at the top of the basins. Continued monitoring, and if required repair, of the erosion needs to be conducted to ensure that contaminated soils do not become exposed.

The vegetation on the cover remains relatively sparse. However, the lack of vegetative cover has not affected the functioning of the remedy. The site is mostly level and the soils are coarse grained sands. These soils drain very well and precipitation infiltrates without any significant overland flow. This continuing flushing of the soil is beneficial to allow attenuation of residual VOCs in site soils. Likewise, the coarse grained soils do not become airborne and therefore are not subject to wind erosion.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?

During preparation of the ROD, Site 2 was being used to recharge storm water and non-contact cooling water, with exposure assumptions similar to an industrial use scenario. Since 1998, Site 2 has not been active and only rarely visited (once per month or less). As a result, current exposures are less than anticipated in the ROD. Future use of the site is identified for water recharge and green space, which would be consistent with ROD exposure assumptions. Changes in toxicity data since the ROD would not effect ROD assumptions. Cleanup levels are the same as during the ROD.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No new information that would effect the protectiveness of the remedy has become available. PAHs were identified in the basin sediments during the 2007 sediment investigation. Access to these basins is limited.

Summary of Technical Assessment

Site 2 does not present a current risk to human health or the environment. Access to the site is limited by security and fencing which adequately controls direct contact exposure.

3.8 ISSUES

The following issues were identified during this five-year review at Site 2.

1. Erosion of the recharge basin walls is continuing. The erosion has not affected the soil cover or reached a critical point that would require action.

2. Vegetation at the site remains sparse. Because of the coarse grained nature of the soil and the flat topography, water and wind erosion are not concerns.

3.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The following recommendations and follow-up actions are proposed for the site.

1. Continue to monitor the recharge basins for erosion. If the erosion reaches a point that a wall collapse is a concern or erosion of the soil cover occurs, repairs would be needed.

3.10 PROTECTIVENESS STATEMENT

The remedy at Site 2 – Recharge Basins is currently protective of human health and the environment. Access to the site is currently restricted through fencing and security

3.11 NEXT REVIEW

The next review of the site is scheduled to be completed in 2013.

ACAD: 0804CM11.dwg 03/12/08 MF PIT

PLANT 20
(GRUMMAN)

PLANT 24
(GRUMMAN)

FORMER SLUDGE
DRYING BEDS

RECHARGE
BASIN

RECHARGE
BASIN

FORMER SLUDGE
DRYING BED
LOCATION

ASPHALT PARKING LOT (COUNTY CARS)

IR SITE

N

LEGEND

- AREA TO APPLY DEED RESTRICTION
- AREAS COVERED WITH 6" SOIL
- AREAS COVERED WITH 6" GRAVEL

0 140 280
SCALE IN FEET

DRAWN BY MF	DATE 3/12/07
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

Tetra Tech NUS, Inc.

SITE LAYOUT
SITE 2 - RECHARGE BASIN AREA
NWIRP BETHPAGE, NEW YORK

CONTRACT NO. 0810	
OWNER NO. 0000	
APPROVED BY	DATE
DRAWING NO. FIGURE 3-1	REV. 0

4.0 SITE 3 – SALVAGE STORAGE AREA

4.1 INTRODUCTION

The NWIRP Bethpage Salvage Storage Area is located north of the Plant No. 3. Fixtures, tools, and metallic wastes were stored here from the early 1950s through 1969, prior to recycling. Stored materials included aluminum and titanium scraps and shavings. While in storage, cutting oils dripped from some of this metal. Site 3 - Salvage Storage Area consists of a parking area, salvage storage area, three warehouses and a small cemetery.

4.2 SITE CHRONOLOGY

Site 3 was first identified in an IAS conducted at the NWIRP Bethpage, NY, identifying potential contaminants of concern at Site 3 (from both drum marshaling and salvage storage) to include cutting oils, aluminum, titanium, and halogenated and non-halogenated solvents (Rogers, Golden & Halpern, 1986). Based on the analytical results of an RI in the early 1990s Site 3 was a likely source of onsite groundwater contamination. Details are presented in Section 4.3 and dates and major events at the site are presented as follows:

Activity	Date
IAS identifies Site 3 as posing a potential threat to human health and the environment.	1985
Phase 1 RI – concluded that Site 3 was a likely source of groundwater contamination.	1991
Phase 2 RI – concluded that PCBs were not a significant concern at the areas tested at Site 3.	1993
ROD for natural flushing and soil cover (Soils ROD) signed.	May 1995
A deed restriction was ordered.	2001
Construction completion of soil and gravel cover work performed in 1998.	2002
Nassau County uses site as a parking lot for impounded vehicles.	2003 to present
Draft Environmental Evaluation of County Motor Vehicle Impound Lots investigation identified the presence of PAHs in basin sediments. PAHs are likely attributable to run off from asphalt parking lots or motor vehicles.	2008

4.3 BACKGROUND

Site 3 is relatively flat located in the north-central portion of the Navy's property, north of Plant 3 and west of the recharge basin area, see Figure 1-2. A portion of this area is used to store fixtures, tools, and other metallic debris including old aircraft parts. Another portion of the site is the location of the current drum marshaling facility and a third section of this site is currently used as a parking lot.

Initial Assessment Study: In 1985, an IAS conducted at the NWIRP Bethpage, NY, identified potential contaminants of concern at Site 3 (from both drum marshaling and salvage storage areas) to include cutting oils, aluminum, titanium, and halogenated and non-halogenated solvents (Rogers, Golden & Halpern, 1986).

The NWIRP Bethpage Salvage Storage Area is located north of Plant No. 3. Fixtures, tools, and metallic wastes were stored here from the early 1950s through 1969, prior to recycling. Stored materials included aluminum and titanium scraps and shavings. While in storage, cutting oils dripped from some of this metal.

In 1985, IAS team members observed oil-stained ground at the site. However, soil tests performed by Northrop Grumman in 1984 revealed that oil stains were superficial; oil residues were not detected below the top several inches of soil material in the Salvage Storage Area at the locations tested. In about 1960, the Salvage Storage Area was reduced in size to accommodate parking. In about 1970, it was reduced again for the same reason. Consequently, storage facility locations at this site have been periodically moved to accommodate changes in storage area size.

In addition to salvage storage, a 100- by 100-foot area within the boundary of the Salvage Storage Area was used for the marshaling of drummed waste. This area was covered with coal ash cinders. Drum marshaling continued here from the early 1950s to 1969. Wastes marshaled throughout the area included waste oils as well as waste halogenated and non-halogenated solvents. The exact location of this former drum marshaling area was uncertain, however, it was suspected to be near the current drum marshaling area. It was concluded that Site 3 posed a potential threat to human health and the environment.

Remedial Investigation (Phase 1): A Final RI was conducted in 1991 (HNUS, 1992). The field investigation consisted of collecting 60 soil-gas samples at 30 locations, 8 surface soil samples, 14 subsurface soil samples at 9 locations, and 9 temporary monitoring well samples; installing 5 permanent monitoring wells at 2 locations; and sampling 5 permanent monitoring wells and four production wells. All of the samples were analyzed for VOC constituents. The surface soil samples, shallow subsurface soil samples (less than 5 feet deep), surface water, sediment, and groundwater samples were analyzed for

inorganics and SVOCs. The groundwater and production well samples were also analyzed for soluble inorganic constituents (less 0.45 microns) and hexavalent chromium. In addition, surface and subsurface soils that were observed to be oil stained were analyzed for PCBs and pesticides. Select soil and groundwater samples were analyzed for engineering-type parameters.

Based on analytical results, Site 3 was a likely source of onsite groundwater contamination. It was anticipated that the work associated with Site 1 would define the extent of this contamination. Only low concentrations of VOCs were detected in the soils at Site 3. Therefore, the source area of the VOC plume either was no longer present or was not found during the RI. The soils were determined to pose a risk to on-site workers. Based on the relative concentration of VOCs found in the production wells, the recharge basins are likely to be redistributing the contaminated groundwater. Also, it should be noted that since the concentration of VOCs in the surface water is lower than in the production wells, the system is likely to result in partial treatment of the groundwater by volatilization. A Phase 2 RI and an FS was recommended to address soil and groundwater contamination. The findings of the Phase 2 RI were required to complete this study.

Phase 2 Remedial Investigation; A Phase 2 RI was conducted in 1992 (HNUS, 1993). The overall objective of the Phase 2 RI was to further characterize the nature and extent of environmental contamination and associated risks to human health and the environment at the NWIRP. The Phase 1 and 2 RI data indicated that PCBs were not a significant concern at the areas tested at Site 3. The Phase 1 RI data did find VOC and inorganic soil and groundwater contamination at Site 3. There was sufficient information available to proceed with a FS for Site 3.

Feasibility Study/Record of Decision: Following the Phase 2 RI, a FS was completed in 1994 that included Site 3 (HNUS, 1994). An alternative that included natural flushing to remove residual VOC contamination and covering the site and residual contaminated soil with 6 inches of permeable material (soil or gravel) was selected for the site. The selected remedy was documented in a ROD signed in May 1995 (NDNFEC/NYSDEC, 1995).

Based on the RIs, actions required to protect human health and environment at Site 3 are as follows:

1. Direct contact (dermal and ingestion) between contaminants in soils at concentrations greater than cleanup goals and site workers and potential future residents. Primary site contaminants for direct contact are metals and PAHs.

4.4 REMEDIAL ACTIONS

Remedial Actions at Site 3 were identified in the 1995 Soils ROD. These actions consisted of the following components.

- 121,000 cubic yards of VOC-contaminated soil to undergo natural flushing.
- Permeable 6-inch cover over 1.5 acres of residual contaminated soils and corresponding deed restrictions. Residual soil contamination consists of metal, VOC, and PAH contamination at concentrations greater than TAGM 4046.

Remedial Actions: In 2001, ten surface soil samples were collected at Site 3 and analyzed for SVOCs, Pesticides, PCBs, and inorganic constituents (NFEC, 2001). Positive detections were noted in each of these groups of constituents. Most locations had at least one exceedance of NYSDEC TAGM 4046 and ROD PRGs, indicating that a deed restriction for future use of the site would be required.

However, exceedances were minor and noted for only two chemicals, benzo(a)pyrene and arsenic. Benzo(a)pyrene was detected in all ten samples at concentrations ranging from 130 micrograms per kilogram (µg/kg) to 660 µg/kg. The ROD PRG (330 µg/kg) and the U.S. EPA Region IX PRG (296 µg/kg) were similar for benzo(a)pyrene. The average benzo(a)pyrene concentration at the site was 316 µg/kg, which was less than the ROD PRG and was only slightly greater than the U.S. EPA Region IX PRG.

Arsenic was detected in all ten samples at concentrations ranging from 2.8 mg/kg to 10.4 mg/kg. The ROD PRG (5.4 mg/kg) and the U.S. EPA Region IX PRG (6.6 mg/kg) were similar for arsenic.

Based on the surface soil analytical data as well as historic subsurface soil analytical data, a deed restriction was recommended for all of Site 3. Even though individual minor exceedences of arsenic and benzo(a)pyrene, with conservative industrial use criteria were noted for Site 3, the average Site 3 concentrations were less than these criteria, indicating that a soil cover was not necessary. The scraping and removal of metal fragments from the soil and placement of 2 inches of cover soil in the late 1990s likely resulted in the noted decreases in site risks from those estimated in the ROD.

As part of the ROD issued in May 1995 selected remedies for Site 3 included natural flushing to remove residual VOC contamination and cover the site and residual contaminated soil with 6 inches of permeable material (soil or gravel) (NDNFEC/NYSDEC, 1995).

The test data from February 2001 confirmed that the 1998 scraping and covering conducted at Site 3, in combination with natural degradation completed the necessary field work identified under the 1995 OU 1 ROD (TtNUS, 2002). A notification was entered into the Deed of Transfer to Nassau County, New York

that described the location where residual compounds will remain and specified that written consultation with NYSDEC and appropriate precautions must be taken prior to disturbing soils at this site.

4.5 PROGRESS SINCE LAST REVIEW

This five-year review is the first formal re-evaluation of site conditions since the Soils ROD. Since that time, the following activities occurred.

- 1998 scraping and covering of contaminated surface soil.
- Post scraping soil sampling and confirmation of cleanup.
- 2007 soil, surface water, and sediment investigation.

4.6 FIVE YEAR REVIEW PROCESS

4.6.1 Document Review

Since the signing of the ROD, the following documents have been prepared and reviewed.

- Letter Report. Naval Facilities Engineering Command (NFEC). Surface Soil Sampling Results. Site 2 and Site 3. (NFEC, 2001) June.
- Construction Completion Report for Site 2- Recharge Basin Area and Site 3-Salvage Storage Area. NWIRP Bethpage, NY (TtNUS, 2002). May.
- Draft Environmental Evaluation of County Motor Vehicle Impound Lots investigation (TtNUS, 2008).

4.6.2 Data Review and Evaluation

Since the 1995 ROD, new soil data has been collected. The data is detailed in the documents referenced in Section 4.6.1 and is summarized in section 4.4.

4.6.3 Notification of Potential Interested Parties of Start of Five-year-Review

The five-year review was started in April 2007. The NYSDEC was notified verbally of the start of the Five-Year Review.

4.6.4 Community Notification

In 1998, a RAB was established for NWIRP Bethpage. The RAB represents the primary method of communicating information to the community. RAB meetings are advertised in a local newspaper (Bethpage Tribune) and held three times per year (April, August, and November). Community notification of the five-year review occurred during the August and November 2007 RABs.

4.6.5 Site Inspection and Interviews

A site walk through was conducted in April 2007. Representatives of the facility management ECOR, Navy, and CLEAN contractor were present. The facility manager (Mr. Al Taormina) was interviewed at that time. The schedule for the walk through was communicated verbally to the NYSDEC representative, who was not able to attend. In November 2007, NYSDEC stated that the state had also conducted a walkthrough of the Site at that time, and a separate walk through was not required.

Site 3 is fenced in on the northern and eastern sides. The vegetation at Site 3 is well established and frequently mowed. During inspection of the fence, a section in the northeast had apparently been repaired at the bottom.

4.7 TECHNICAL ASSESSMENT

Technical assessment of the site is addressed in this section.

Question A: Is the remedy functioning as intended by the decision documents?

During the site cleanup in 1998, the more contaminated soils were removed from the site. The concentration of PAHs in remaining contaminated soils were low enough that incidental contact with the soils would not adversely effect human health, even under a residential use scenario. As a result, the remedy is continuing to function as intended in the decision documents.

The site is mostly level and the surface is either coarse grained sands or asphalt. The soils drain very well and precipitation infiltrates without any significant overland flow. The asphalt directs most of the precipitation into storm drains that lead to recharge basins at Site 2. Continued flushing of the soil (even limited flushing of soils under the asphalt) is beneficial to allow attenuation of residual VOCs in site soils. Likewise, the coarse grained soils do not become airborne and therefore are not subject to wind erosion.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?

During preparation of the ROD, Site 3 was being used to store equipment and as a parking lot, with exposure assumptions similar to an industrial use scenario. Between 1998 and 2003, Site 3 was not active and only rarely visited (once per month or less). Since 2003, the Site is being used by Nassau County to store impounded vehicles. As a result, current exposures are similar to those anticipated in the ROD. Future use of the site is identified as for storage, parking, and green space, which would be consistent with ROD exposure assumptions. Changes in toxicity data since the ROD would not effect ROD assumptions. Cleanup levels are the same as during the ROD.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No new information that would affect the protectiveness of the remedy has become available.

Summary of Technical Assessment

Site 3 does not present a current risk to human health or the environment. Access to the site is limited by security and fencing which adequately controls direct contact exposure.

4.8 ISSUES

No issues were identified during this five-year review at Site 3.

4.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

No recommendations and follow-up actions are proposed for the site.

4.10 PROTECTIVENESS STATEMENT

The remedy at Site 3 – Salvage Storage Area is currently protective of human health and the environment. Access to the site is currently restricted through fencing and security

4.11 NEXT REVIEW

The next review of the site is scheduled to be completed in 2013.

ACAD: 0804CM12.dwg 03/12/08 MF PIT

FORMER SLUDGE DRYING BEDS

RECHARGE BASIN

RECHARGE BASIN

ASPHALT PARKING LOT (COUNTY CARS)

IR SITE 1

LEGEND

AREA TO APPLY DEED RESTRICTION

0 120 240

SCALE IN FEET

DRAWN BY MF	DATE 3/12/08
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

Tetra Tech NUS, Inc.

SITE LAYOUT
SITE 3 - SALVAGE YARD STORAGE
NWIRP BETHPAGE, NEW YORK

CONTRACT NO. 0804	
OWNER NO. 0000	
APPROVED BY	DATE
DRAWING NO. FIGURE 4-1	REV. 0

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

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C.F. Braun Engineering Corp., 1995a. Draft Remedial Design, Phase II Pre-Design Investigation Letter Report for Site 1 Former Drum Marshaling Area NWIRP Bethpage, NY. July.

C.F. Braun Engineering Corp., 1995b. Remedial Design, Phase II Pre-Design Investigation Supplemental Sampling Letter report Number 2 for Site 1 Former Drum Marshalling Area NWIRP Bethpage, New York. September.

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Foster Wheeler Environmental Corp., 1995. Analytical Results from the Pre-excavation soil sampling and an estimate on excavation. The Naval Weapons Industrial Reserve Plant Bethpage, New York. December.

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Northern Division Naval Facilities Engineering Command and New York State Department of Environmental Conservation (NDNFEC/NYSDEC), 1995. Record of Decision, Naval Weapons Industrial Reserve Plant, Bethpage, New York Sites 1,2,3 NYS Registry: 1-30-003B. May.

NYSDEC, 1994. New York State Department of Environmental Conservation (NYSDEC) TAGM 4046 Determination of Soil Clean-Up Objectives and Clean-Up Levels. January.
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USEPA, 2001. Comprehensive Five-Year Review Guidance. Office of Emergency and Remedial Response, OSWER No. 9355.7-03B-P, EPA 540R-01-007. June.

APPENDIX A

PHOTO LOG

Photo 1 – Site 1, metal buildings, southwest concrete pad situated in the southwestern portion of the Site, looking northeast.

Photo 2 – Site 1, southwest concrete pad situated in the southwestern portion of the site, looking north

Photo 3 – Site 1, northern portion of the Site, looking north.

Photo 4 – Site 1, central portion of the Site, looking south.

Photo 5 – Site 1, central portion of the Site, looking east.

Photo 6 –Site 1, former cesspool.

Photo 7 – Site 1, southwestern portion of the Site, looking northeast.

Photo 8 –Site 2, Southeast Recharge Basin, western portion of the basin looking east

Photo 9 – Site 2, Southwest Recharge Basin, eastern portion of the basin looking west.

Photo 10 –Site 2, storm water diverter situated in the southeast portion of the Site.

Photo 11 – Site 3, western portion of Impound Lot 1, looking south.

Photo 12 –Site 3, central portion of Impound Lot 1, looking north.

Photo 13 – Site 3, eastern portion of Impound Lot 1, looking south.

APPENDIX B

FIVE-YEAR REVIEW INSPECTION CHECKLISTS

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION

Site name: NWIRP Bethpage	**Date of inspection:** Apr. 1 2007
Location and Region: Bethpage NY, Reg 3	**EPA ID:** NYD002047976
Agency, office, or company leading the five-year review: Navy	**Weather/temperature:** Clear, cool

Remedy Includes: (Check all that apply)

- Landfill cover/containment ✓
- Access controls ✓
- Institutional controls ✓
- Groundwater pump and treatment ✓
- Surface water collection and treatment
- Other _____
- Monitored natural attenuation ✓
- Groundwater containment ✓
- Vertical barrier walls

Attachments: Inspection team roster attached (Site map attached)

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Al Taromina (Name) Facility Manager (Title) 4/25/2007 (Date)
   Interviewed at site (at office) by phone Phone no. 516-346-0344
   Problems, suggestions; Report attached NO

2. **O&M staff** N/A (Name) _____ (Title) _____ (Date)
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency NYSDEC
Contact Mr. Steve Scharf — Project Engineer — 4/08 — 518-402-9620
Name — Title — Date — Phone no.
Problems; suggestions; Report attached N/A

Agency _____
Contact _____ _____ _____ _____
Name — Title — Date — Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name — Title — Date — Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name — Title — Date — Phone no.
Problems; suggestions; Report attached _____

4. **Other interviews** (optional) Report attached.

N/A

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	**O&M Documents**			
	O&M manual	Readily available	Up to date	(N/A)
	As-built drawings	Readily available ✓	Up to date ✓	N/A
	Maintenance logs	Readily available	Up to date	(N/A)
	Remarks			
2.	**Site-Specific Health and Safety Plan**	Readily available	Up to date	(N/A)
	Contingency plan/emergency response plan	Readily available	Up to date	N/A
	Remarks			
3.	**O&M and OSHA Training Records**	Readily available	Up to date	(N/A)
	Remarks			
4.	**Permits and Service Agreements**			
	Air discharge permit	Readily available	Up to date	(N/A)
	Effluent discharge	Readily available	Up to date	N/A
	Waste disposal, POTW	Readily available	Up to date	N/A
	Other permits_____	Readily available	Up to date	N/A
	Remarks			
5.	**Gas Generation Records**	Readily available	Up to date	(N/A)
	Remarks			
6.	**Settlement Monument Records**	Readily available	Up to date	(N/A)
	Remarks			
7.	**Groundwater Monitoring Records**	Readily available	Up to date	(N/A)
	Remarks			
8.	**Leachate Extraction Records**	Readily available	Up to date	(N/A)
	Remarks			
9.	**Discharge Compliance Records**			
	Air	Readily available	Up to date	(N/A)
	Water (effluent)	Readily available	Up to date	N/A
	Remarks			
10.	**Daily Access/Security Logs**	Readily available	(Up to date)	N/A
	Remarks			

IV. O&M COSTS

1. **O&M Organization**

State in-house — Contractor for State
PRP in-house — Contractor for PRP
Federal Facility in-house — Contractor for Federal Facility (circled)
Other_____

2. **O&M Cost Records** NONE

Readily available — Up to date
Funding mechanism/agreement in place
Original O&M cost estimate_____ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ Breakdown attached
Date Date Total cost

From_____ To_____ _____ Breakdown attached
Date Date Total cost

From_____ To_____ _____ Breakdown attached
Date Date Total cost

From_____ To_____ _____ Breakdown attached
Date Date Total cost

From_____ To_____ _____ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS Applicable N/A

A. Fencing

1. **Fencing damaged** Location shown on site map ✓ Gates secured N/A
Remarks Repaired as needed.

B. Other Access Restrictions

1. **Signs and other security measures** Location shown on site map (N/A)
Remarks_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented — Yes (No) N/A
Site conditions imply ICs not being fully enforced — Yes (No) N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____
Frequency Daily
Responsible party/agency ECOR
Contact Al Taramino (Name) | Facility Manager (Title) | 4/25/2007 (Date) | _____ (Phone no.)

Reporting is up-to-date — (Yes) No N/A
Reports are verified by the lead agency — (Yes) No N/A

Specific requirements in deed or decision documents have been met — Yes No N/A
Violations have been reported — (Yes) No N/A
Other problems or suggestions: Report attached
Break-Ins on Sites 1 and 2

2. **Adequacy** (ICs are adequate) ICs are inadequate N/A
Remarks _____

D. General

1. **Vandalism/trespassing** Location shown on site map No vandalism evident
Remarks above, addressed through police action.

2. **Land use changes on site** N/A
Remarks Site 3 used by Nassaw police to store impounded vehicles.

3. **Land use changes off site** N/A NO
Remarks _____

VI. GENERAL SITE CONDITIONS

A. Roads Applicable N/A

1. **Roads damaged** NO Location shown on site map Roads adequate N/A
Remarks _____

B. Other Site Conditions

Remarks N/A

VII. LANDFILL COVERS Applicable N/A

A. Landfill Surface

1. **Settlement** (Low spots) N/A Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** N/A Location shown on site map Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent 20×40 Feet Depth 2 Feet
   Remarks Erosion noted on eastern wall of Southeastern basin. Erosion being monitored.

4. **Holes** N/A Location shown on site map Holes not evident
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** Grass Cover properly established No signs of stress
   Trees/Shrubs (indicate size and locations on a diagram)
   Remarks Cover is present, but sparse. Most of site is coarse-grained soil & Fill

6. **Alternative Cover (armored rock, concrete, etc.)** N/A ✓
   Remarks_____

7. **Bulges** N/A Location shown on site map Bulges not evident
   Areal extent_____ Height_____
   Remarks_____

8. **Wet Areas/Water Damage** — Wet areas/water damage not evident ✓
   - Wet areas — Location shown on site map — Areal extent_____
   - Ponding — Location shown on site map — Areal extent_____
   - Seeps — Location shown on site map — Areal extent_____
   - Soft subgrade — Location shown on site map — Areal extent_____

   Remarks_____

9. **Slope Instability** — Slides — Location shown on site map — No evidence of slope instability
   Areal extent 20x40 feet
   Remarks. Side walls of recharge basins exhibit some erosion due to broken inlet pipe.

B. Benches — Applicable — (N/A)

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** — Location shown on site map — (N/A) or okay
   Remarks_____

2. **Bench Breached** — Location shown on site map — (N/A) or okay
   Remarks_____

3. **Bench Overtopped** — Location shown on site map — (N/A) or okay
   Remarks_____

C. Letdown Channels — Applicable — N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** — Location shown on site map — No evidence of settlement ✓
   Areal extent_____ Depth_____
   Remarks_____

2. **Material Degradation** — Location shown on site map — No evidence of degradation ✓
   Material type_____ Areal extent_____
   Remarks_____

3. **Erosion** — Location shown on site map — No evidence of erosion ✓
   Areal extent_____ Depth_____
   Remarks_____

4. **Undercutting** N/A Location shown on site map No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** N/A Type_____ No obstructions
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
No evidence of excessive growth
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks Stream Channels

D. Cover Penetrations Applicable N/A

1. **Gas Vents** Active Passive
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance
N/A
Remarks_____

2. **Gas Monitoring Probes**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

4. **Leachate Extraction Wells**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

5. **Settlement Monuments** Located Routinely surveyed N/A
Remarks_____

E. Gas Collection and Treatment Applicable (N/A)

1. **Gas Treatment Facilities**
   Flaring Thermal destruction Collection for reuse
   Good condition Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   Good condition Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   Good condition Needs Maintenance N/A
   Remarks_____

F. Cover Drainage Layer Applicable (N/A)

1. **Outlet Pipes Inspected** Functioning N/A
   Remarks_____

2. **Outlet Rock Inspected** Functioning N/A
   Remarks_____

G. Detention/Sedimentation Ponds Applicable (N/A)

1. **Siltation** Areal extent_____ Depth_____ N/A
   Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   Erosion not evident
   Remarks_____

3. **Outlet Works** Functioning N/A
   Remarks_____

4. **Dam** Functioning N/A
   Remarks_____

H. Retaining Walls Applicable (N/A)

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge Applicable (N/A)

1. **Siltation** Location shown on site map Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** Location shown on site map N/A
   Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** Functioning N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS Applicable (N/A)

1. **Settlement** Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES Applicable (N/A)

A. Groundwater Extraction Wells, Pumps, and Pipelines Applicable N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   Good condition All required wells properly operating Needs Maintenance N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines Applicable N/A

1. **Collection Structures, Pumps, and Electrical**
   Good condition Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

C. Treatment System Applicable N/A

1. **Treatment Train** (Check components that apply)
   - Metals removal — Oil/water separation — Bioremediation
   - Air stripping — Carbon adsorbers
   - Filters_____
   - Additive (*e.g.*, chelation agent, flocculent)_____
   - Others_____
   - Good condition — Needs Maintenance
   - Sampling ports properly marked and functional
   - Sampling/maintenance log displayed and up to date
   - Equipment properly identified
   - Quantity of groundwater treated annually_____
   - Quantity of surface water treated annually_____

   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   N/A — Good condition — Needs Maintenance

   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   N/A — Good condition — Proper secondary containment — Needs Maintenance

   Remarks_____

4. **Discharge Structure and Appurtenances**
   N/A — Good condition — Needs Maintenance

   Remarks_____

5. **Treatment Building(s)**
   N/A — Good condition (esp. roof and doorways) — Needs repair
   Chemicals and equipment properly stored

   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   Properly secured/locked — Functioning — Routinely sampled — Good condition
   All required wells located — Needs Maintenance — N/A

   Remarks_____

D. Monitoring Data

1. Monitoring Data
   Is routinely submitted on time — Is of acceptable quality

2. Monitoring data suggests:
   Groundwater plume is effectively contained — Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

Properly secured/locked — Functioning — Routinely sampled ✓ — Good condition ✓
All required wells located — Needs Maintenance — N/A

Remarks _____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

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B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.