2019 OPERABLE UNIT 2 GROUNDWATER INVESTIGATION BPOW3-5 (VPB173) INSTALLATION REPORT

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
SITE 1 OPERABLE UNIT 2
BETHPAGE, NY

Prepared for:

Department of the Navy
Naval Facilities Engineering Command, Atlantic
9324 Virginia Avenue
Building Z-140
Norfolk, Virginia 23511

May 2021

2019 OPERABLE UNIT 2 GROUNDWATER INVESTIGATION
BPOW3-5 (VPB173)
INSTALLATION REPORT

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT BETHPAGE
SITE 1 OPERABLE UNIT 2
BETHPAGE, NY

Prepared for:

Naval Facilities Engineering Systems Command
NAVFAC MID-ATLANTIC

Department of the Navy
Naval Facilities Engineering Command, Atlantic
9324 Virginia Avenue
Building Z-140
Norfolk, Virginia 23511

Prepared by:

RESOLUTION CONSULTANTS

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Contract Number: N62470-11-D-8013
CONTRACT TASK ORDER WE15

May 2021

Brian Caldwell

Brian Caldwell
Contract Task Order Manager

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List of Acronyms and Abbreviations

bgs	below ground surface
EPA	Environmental Protection Agency, United States
ft	feet
IDW	Investigation Derived Waste
Katahdin	Katahdin Analytical Services
NWIRP	Naval Weapons Industrial Reserve Plant
NYSDEC	New York State Department of Environmental Conservation
OU	Operable Unit
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PVC	Polyvinylchloride
SAP	Sampling and Analysis Plan
TCE	Trichloroethene
TCL	Target Compound List
TOC	Total Organic Carbon
UFP	United Federal Programs
VOC	Volatile Organic Compounds
VPB	Vertical Profile Boring

1.0 PROJECT BACKGROUND

Resolution Consultants has prepared this Data Summary Report for the Naval Facilities Engineering Command, Mid-Atlantic under contract task order WE15 Contract N62470-11-D-8013. This report describes the installation of one monitoring well in 2019 for the Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage Operable Unit (OU) 2 Site 1 offsite plume. NWIRP Bethpage is located in east-central Nassau County, Long Island, New York, approximately 30 miles east of New York City (Figure 1).

1.1 Scope and Objectives

This report provides information on the installation of monitoring well BPOW3-5 associated with Vertical Profile Boring (VPB) 173. The purpose of this investigation was to ascertain contaminant levels and depths in the offsite plume south of Hempstead Turnpike and west of Hicksville Road. The location of well BPOW3-5, as well as other VPBs and monitoring well locations, is shown in Figure 2.

The field investigation included completing one monitoring well, well development, soil/groundwater analysis, groundwater samples, and surveying. Field tasks were conducted in 2019 in accordance with the *United Federal Programs Sampling and Analysis Plan (UFP SAP)*, Bethpage, New York (Resolution Consultants, 2013a). In addition, the work adhered to the following UFP SAP Addendums: *Groundwater Sampling Using Low Stress (Low Flow) Purging and Sampling Protocol* (Resolution Consultants, 2013b) and *Installation of Vertical Profile Borings and Monitoring Wells* (Resolution Consultants, 2013c).

Documentation of these activities is included in Appendix A of this report.

1.2 Site History

NWIRP Bethpage is located in the Hamlet of Bethpage, Town of Oyster Bay, New York. Since its inception in 1941, the plant's primary mission was the research, prototyping, testing, design, engineering, fabrication, and primary assembly of military aircraft. The facilities at NWIRP included four plants used for assembly and prototype testing, a group of quality control laboratories, two warehouse complexes (north and south), a salvage storage area, water recharge basins, the Industrial Wastewater Treatment Plant, and several smaller support buildings.

The Navy's property originally totaled 109.5 acres and was formerly a Government-Owned Contractor-Operated facility that was operated by Northrop Grumman until September 1998. Prior to 2002, the NWIRP property was bordered on the north, west, and south by current or former NG facilities, and on the east by a residential neighborhood. By March 2008, approximately 100 acres of

NWIRP property were transferred to Nassau County in three separate actions. The remaining 9 acres and access easements were retained by the Navy to continue remedial efforts at Installation Restoration Site 1 – Former Drum Marshalling Area and Site 4 – Former Underground Storage Tanks (Area of Concern 22). A parcel of land connecting the two sites was also retained. Currently, the 9-acre parcel of NWIRP is bordered on the east by the residential neighborhood and on the north, south, and west by Steel Equities; however, a small portion is still owned by Nassau County. Access to the NWIRP is from South Oyster Bay Road.

1.3 Geology and Hydrogeology

1.3.1 Depositional Environment

Previous sequence stratigraphic studies of the New Jersey and New York Coastal Plains have shown that facies successions in the region can largely be explained by global sea level oscillations and sediment supply. The Turonian age sea level changes resulted in several phases of seaward progradation and landward retrogradation that affected the deposition and preservation of lithologic sequences in the Magothy. Periods of elevated or low sea level have a distinct effect on shoreline position and the types of deltaic facies that are deposited on the coastal plain. During high sea level, marine to distal deltaic facies tend to form. In contrast, during periods of low relative sea level, marginal to nonmarine deltaic facies are deposited.

Changes in sediment supply resulting from the tectonic uplift and weathering of the ancestral Appalachians during the Albian stage (approximately 100 million years ago) also influenced depositional environments in the region. The large influx of coarse sediments is reflected in the rapid seaward progradation of the shoreline and extensive delta plain deposits (Magothy Formation) on the New Jersey Coastal Plain.

1.3.2 Stratigraphy

Overburden at the site consists of well over 1,000 feet (ft) of unconsolidated deposits overlying crystalline bedrock of the Hartland Formation. Overburden is divided into four geologic units in descending order: the upper Pleistocene deposits, the Magothy Formation, the clay member of the Raritan Formation ("Raritan Clay") and the Lloyd Sand member of the Raritan Formation ("Lloyd Sand") (Geraghty and Miller, 1994).

The upper Pleistocene consists of till and outwash deposits of medium to coarse sand and gravel with lenses of fine sand, silt and clay (Smolensky and Feldman, 1988); these deposits form the Upper Glacial Aquifer. The continental deposits are considerably thicker than previously thought, ranging from 50 to 300 ft. Directly underlying this unit is the Magothy Formation with a thickness of 650 to 900 ft that extends to a depth of 700 to 1,000 ft below ground surface (bgs), as observed at the

former NWIRP and extending southeast to areas south of Southern State Parkway. Locally at VPB173, the bottom of the Magothy (top of the Raritan Clay) is encountered at approximately 940 feet bgs. The Magothy is characterized by fine to medium sands and silts interbedded with zones of clays, silty sands and sandy clays. Sand and gravel lenses are found in some areas between depths of 600 and 880 ft bgs; these deposits form the main groundwater producing zones of the Magothy Aquifer.

Investigations performed by the Navy since 2012 indicate that the bottom of the Magothy (top of the Raritan Clay) can extend to depths of 700 to greater than 1,000 ft bgs. The top of the Raritan Clay deepens to the south-southeast, as evidenced by clay depths of 1,000 ft bgs (or more) in borings installed offsite. The Raritan Clay Unit is of continental origin and consists of clay, silty clay, clayey silt, and fine silty sand. This member acts as a confining layer over the Lloyd Sand Unit. The Lloyd Sand Unit is also of continental origin, having been deposited in a large fresh water lacustrine environment. The material consists of fine to coarse-grained sands, gravel, inter-bedded clay, and silty sand. These deposits form the Lloyd Aquifer.

1.3.3 Hydrogeology

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

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 zones are coarse sand and gravel lenses located in the lower portion of the Magothy. Because of the presence of intermittent clay layers and the depths, the Magothy Aquifer is commonly regarded to function overall as an unconfined aquifer at shallow depths and a confined aquifer at greater depths. The drilling program at the NWIRP has revealed that clay zones beneath the facility are common but laterally discontinuous. No confining clay units of facility-wide extent have been encountered.

Groundwater is encountered at an average depth of approximately 50 ft bgs at the facility. Historically, because of pumping and recharge at the facility, groundwater depths have been measured to range from 40 to 60 ft bgs. Depth to water in the vicinity of BPOW3-5 is approximately 24 feet bgs, based on measurements on July 31, 2019 prior to development. The groundwater flow in the area is to the south-southeast.

Considerable heterogeneity exists in the subsurface due to alternating depositional environments that resulted from changes in sea level and sediment supply. Laterally continuous fluvial sands and

distributary mouth bars are inferred to represent high permeability units and conduits for groundwater flow/contaminant transport, however the continuity of those units is variable. Fine grained muds deposited during maximum flooding appear to correlate to contamination data peaks, potentially acting as storage units by adsorption to fine-grained muds.

2.0 FIELD PROGRAM

One monitoring well (BPOW3-5) was installed in the vicinity of VPB173 between July 12, 2019 and July 29, 2019. Field investigation activities consisted of drilling, well installation, well development, sampling, soil/groundwater analysis, and surveying. Drilling during this investigation was performed by Delta Well and Pump Company of Ronkonkoma, New York. A description of these tasks is provided below.

2.1 Drilling and Well Construction

Monitoring well BPOW3-5 was installed using mud rotary drilling techniques. The depth of the monitoring well was 765 ft. Well construction details are summarized in Table 1. The boring log for BPOW3-5 with lithologic descriptions of the well screen interval is included in Appendix A. *2018 OU2 Groundwater Investigation Data Summary Report VPB173* (Resolution Consultants, 2020) documents the installation of VPB173 including detailed lithologic descriptions, continuous gamma plot and multiple Volatile Organic Compounds (VOC) sample results over the entire boring length.

The gamma and trichloroethene (TCE)/ tetrachloroethene (PCE) plot for VPB173, which also depicts the well screen interval at BPOW3-5, is included in Appendix A. Prior to installing the monitoring well, the screen interval was determined based on intervals with the highest VOC concentrations as measured in the VPB173 hydropunch grab samples and coincident intervals with the highest apparent permeability based on the VPB173 gamma logs and geologist logs.

During the monitoring well installation, two groundwater grab samples were collected at 652 and 665 feet bgs. Groundwater grab samples were collected with a hydropunch sampler and analyzed for VOCs using Environmental Protection Agency (EPA) Method 8260C. The groundwater grab samples were analyzed by Katahdin Analytical Services (Katahdin), a Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP), and New York State Department of Environmental Conservation (NYSDEC)-certified laboratory. During the collection of groundwater grab samples, field parameters were measured (pH, temperature, specific conductivity, oxidation reduction potential, dissolved oxygen, and turbidity). Data validation was performed by Resolution Consultants. Groundwater grab sample logs, data validation packages, and analytical data tables are included in Appendix A.

Split spoon samples were collected every 5 ft in the screen interval. Samples were logged by the field geologist and screened for VOCs utilizing a photoionization detector (PID). One soil sample per monitoring well was analyzed for Total Organic Carbon (TOC) via United States EPA series SW-846

method 9060A by Katahdin. Data validation of TOC data was performed by Resolution Consultants. Data validation packages and analytical data tables are included in Appendix A.

The well was constructed of 4-inch diameter, Schedule 80, National Sanitation Foundation-approved polyvinylchloride (PVC) riser pipe and 0.010-slot well screen. The well was completed at the surface with a 12-inch diameter steel curb box. The well riser was set below grade and fit with lockable J plugs. A detailed monitoring well construction diagram is included in Appendix A.

2.2 Well Development

Following installation, the well was developed to evacuate silts and other fine-grained materials and to establish the filter pack to promote a hydraulic connection between the well and the surrounding aquifer. Well development was not initiated until 24 hours after well installation.

The well screen was developed on July 30, 2019 and July 31, 2019 using a combination of air lifting, manual surging, and pumping with a submersible pump. Turbidity was monitored during development to determine stabilization. In compliance with NYSDEC policy, the well was developed until turbidity was less than 50 nephelometric turbidity units if possible. Table 2 summarizes total pumped volume from air and pump development and final turbidity.

2.3 Sampling

BPOW3-5 was sampled by Tetra Tech during quarterly monitoring on September 18, 2019 as part of the Navy's ongoing Environmental Restoration Program. Samples were analyzed for VOCs via method 8260C and 1,4-dioxane via Method 8270D SIM. Results of the sampling are included in Table 3. Documentation of these sampling activities including purging and sampling procedures and data validation are provided in the relevant 2019 third quarter sampling submittal by Tetra Tech.

2.4 Decontamination and Investigation Derived Waste

Resolution Consultants utilized dedicated and disposable sampling equipment when possible to avoid the potential for cross-contamination of samples. The sampling equipment included dedicated plastic scoops, disposable polyethylene tubing, disposable gloves, and laboratory supplied sample bottles. Hand held equipment and split spoons were decontaminated using Luminox and water wash, a potable water rinse, followed by a distilled water rinse. Water was collected in 5-gallon pails or 55-gallon drums. Non dedicated sampling equipment was decontaminated as outlined in the UFP SAP Addendum - *Groundwater Sampling Using Low Stress (Low Flow) Purging and Sampling Protocol* (Resolution Consultants, 2013b).

As part of the Investigation Derived Waste (IDW) management practices and in accordance with the SAP, the investigation waste (consisting of soil cuttings, drilling muds, IDW fluids, and personal protective equipment) generated during the groundwater monitoring well installation and sampling was containerized and staged at NWIRP Bethpage.

IDW solids were containerized in roll offs. Representative samples from each roll off were submitted to Katahdin for analysis of:

- Target Compound List (TCL) VOCs
- TCL Semi-volatile Organic Compounds
- Toxicity Characteristic Leaching Procedure Metals
- Polychlorinated Biphenyls (PCBs)
- Total petroleum hydrocarbons
- Corrosivity
- Ignitability
- Reactive Cyanide
- Reactive Sulfide
- Paint Filter

IDW fluid generated during well development and purging was containerized in frac tanks and stored at NWIRP Bethpage for characterization and ultimate disposal to the Publicly Owned Treatment Works, in accordance with the facilities existing discharge permit. A representative water sample was collected from each frac tank and submitted to Katahdin for analysis of VOCs via Method SW 624, pH via Method SW 9040B, PCBs via Method 8082 and Total Metals via Method SW 846. All acceptance criteria were met for disposal of IDW water.

2.5 Surveying

A survey of the monitoring well location was conducted at the end of fieldwork by C. T. Male, Inc., of Latham, NY, under the direct supervision of Resolution Consultants. The locations were tied into the existing base map developed for this investigation. The survey elevation is referenced to the North American Vertical Datum 1988 and has a vertical accuracy of 0.01 foot. Vertical control is based on observations of the Continuously Operating Reference Stations Queens and Central Islip. The horizontal location is referenced to the North American Datum 1983 (2011) NY. Long Island Zone

3104 and has an accuracy of 0.1 foot. Local horizontal and vertical control is based on Global Positioning System observations using the New York State Net Real Time Network.

A table of survey data (latitude/longitude, northing/easting, elevations of ground, rim and PVC) and a survey map is included in Appendix A.

3.0 REFERENCES

Geraghty and Miller, Inc., 1994. *Remedial Investigation Report, Grumman Aerospace Corporation, Bethpage, New York*. Revised September 1994.

Resolution Consultants, 2013a. *United Federal Programs Sampling and Analysis Plan*, *Site OU-2 Offsite Trichloroethene (TCE) Groundwater Plume Investigation, Bethpage, New York*. April 2013.

Resolution Consultants, 2013b. UFP SAP Addendum, *Groundwater Sampling Using Low Stress (Low Flow) Purging and Sampling Protocol*. November 2013.

Resolution Consultants, 2013c. UFP SAP Addendum*, Installation of Vertical Profile Borings and Monitoring Wells.* December 2013.

Resolution Consultants, (in prep). *2018 OU2 Groundwater Investigation Data Summary Report VPB173, Bethpage, NY.* 2020.

Smolensky, D., and Feldman, S., 1988. *Geohydrology of the Bethpage-Hicksville-Levittown Area, Long Island, New York, U.S*. Geological Survey Water-Resourced Investigations Report 88-4135, 25 pp.

NEW YORK PROFESSIONAL GEOLOGIST SEAL

As a New York-licensed Professional Geologist, I have reviewed and approve this Well Installation Data Summary Report for Monitoring Well BPOW 3-5 - Groundwater Investigation at Naval Industrial Reserve Plant Bethpage Operable Unit 2, Site 1, and seal it in accordance with Article 145 Section 7209 of the New York State Education Laws. In sealing this document, I certify it was prepared under my direction, the geological information contained in it is true to the best of my knowledge and the geological methods and procedures included herein are consistent with currently accepted geological practices.

It is a violation of this law for any person to alter the contained drawings or the report in any way, unless he or she is acting under the direction of a NY-licensed Professional Geologist.

Name:	Brian E. Caldwell
NY PG License Number:	000511
State:	New York

Brian E Caldwell

Signature:

April 27 2021

Date:

Tables

TABLE 1
MONITORING WELL CONSTRUCTION SUMMARY
2019 OU2 GROUNDWATER INVESTIGATION
NWIRP BETHPAGE, NY

MONITORING WELL	WELL COMPLETION DATE	GROUND ELEVATION (MSL)	PVC ELEVATION (INNER CASING) (MSL)	WELL DEPTH (ft bgs)	CASING DEPTH (ft bgs)	SCREEN INTERVAL (ft bgs)	SUMP DEPTH INTERVAL (ft bgs)	BORING DEPTH (ft bgs)
BPOW3-5	7/29/2019	61.90	61.65	765	53.5	740-760	760-765	772

MSL - mean sea level

ft bgs - feet below ground surface

TABLE 2
MONITORING WELL DEVELOPMENT SUMMARY
2019 OU2 GROUNDWATER INVESTIGATION
NWIRP BETHPAGE, NY

MONITORING WELL	AIR DEVELOPMENT		PUMP DEVELOPMENT			APPROX. TOTAL DEVELOPMENT VOLUME (GAL)	FINAL TURBIDITY (NTUs)
	DATE	APPROX. VOLUME (GAL)	DATE	FINAL PUMP DEPTH (FT BGS)	APPROX. VOLUME (GAL)		
BPOW3-5	7/30/2019	6,500	7/31/2019	740-762	3,500	10000	10.75

GAL - gallon
FT BGS - feet below ground surface
NTUs - Nephelometric Turbidity Units

TABLE 3
ANALYTICAL DATA SUMMARY
2019 OU2 GROUNDWATER INVESTIGATION

			Hydropunch samples		Quarterly groundwater sample
Location		NYSDEC Groundwater Guidance or Standard Value (Note 1)	BPOW3-5	BPOW3-5	BPOW3-5
Sample Date			7/22/2019	7/22/2019	9/18/2019
Sample ID			BPOW3-5-GW-072219-652-654	BPOW3-5-GW-072219-665-667	RE139D2-20190918 (Note 2)
Sample type code			N	N	N
Units ug/L	**Method**				
1,1,1-TRICHLOROETHANE	8260 C	5	<0.5 U	<0.5 U	<0.75 U
1,1,2,2-TETRACHLOROETHANE	8260 C	5	<0.5 U	<0.5 U	<0.5 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	8260 C	5	<0.5 U	<0.5 U	**1.6 J**
1,1,2-TRICHLOROETHANE	8260 C	1	<0.5 U	<0.5 U	**0.65 J**
1,1-DICHLOROETHANE	8260 C	5	<0.5 U	<0.5 U	<0.5 U
1,1-DICHLOROETHENE	8260 C	5	<0.5 U	<0.5 U	**1.5 J**
1,2,4-TRICHLOROBENZENE	8260 C	5	<0.5 U	<0.5 U	~
1,2-DIBROMO-3-CHLOROPROPANE	8260 C	0.04	***<0.75 U***	***<0.75 U***	~
1,2-DIBROMOETHANE	8260 C	NL	<0.5 U	<0.5 U	~
1,2-DICHLOROBENZENE	8260 C	3	<0.5 U	<0.5 U	<0.5 U
1,2-DICHLOROETHANE	8260 C	5	<0.5 U	<0.5 U	<0.75 U
1,2-DICHLOROETHENE, TOTAL	8260 C	5	<1.0 U	<1.0 U	~
1,2-DICHLOROPROPANE	8260 C	1	<0.5 U	<0.5 U	<0.5 U
1,3-DICHLOROBENZENE	8260 C	3	<0.5 U	<0.5 U	<0.5 U
1,4-DICHLOROBENZENE	8260 C	3	<0.5 U	<0.5 U	<0.5 U
2-BUTANONE	8260 C	50	<2.5 U	**3 J**	<2.5 U
2-HEXANONE	8260 C	50	<2.5 U	<2.5 U	<3.8 UJ
4-METHYL-2-PENTANONE	8260 C	NL	<2.5 U	<2.5 U	<2.5 U
ACETONE	8260 C	50	**71**	**19**	<2.5 U
BENZENE	8260 C	1	**20**	<0.5 U	<0.5 U
BROMODICHLOROMETHANE	8260 C	50	<0.5 U	<0.5 U	<0.5 U
BROMOFORM	8260 C	50	<0.5 U	<0.5 U	<0.5 U
BROMOMETHANE	8260 C	5	<1.0 UJ	<1.0 UJ	<0.5 U
CARBON DISULFIDE	8260 C	60	<0.5 UJ	<0.5 UJ	<0.5 UJ
CARBON TETRACHLORIDE	8260 C	5	<0.5 U	<0.5 U	**1.5 J**
CHLOROBENZENE	8260 C	5	<0.5 U	<0.5 U	<0.5 U
CHLOROETHANE	8260 C	5	<1.0 U	<1.0 U	<0.5 U
CHLOROFORM	8260 C	7	<0.5 U	<0.5 U	**0.43 J**
CHLOROMETHANE	8260 C	5	<1.0 U	<1.0 U	<0.5 U
CIS-1,2-DICHLOROETHENE	8260 C	5	<0.5 U	<0.5 U	**1.4 J**
CIS-1,3-DICHLOROPROPENE	8260 C	0.4	***<0.5 U***	***<0.5 U***	***<0.5 U***
CYCLOHEXANE	8260 C	NL	**57 J**	<0.5 UJ	~
DIBROMOCHLOROMETHANE	8260 C	5	<0.5 U	<0.5 U	<0.5 U
DICHLORODIFLUOROMETHANE	8260 C	5	<1.0 U	<1.0 U	~
ETHYLBENZENE	8260 C	5	**7.6**	<0.5 U	<0.5 U
ISOPROPYLBENZENE	8260 C	5	**3.1**	<0.5 U	<0.5 U
M- AND P-XYLENE	8260 C	NL	**42**	<1.0 U	<1.0 U
METHYL ACETATE	8260 C	NL	<0.75 U	<0.75 U	~
METHYL CYCLOHEXANE	8260 C	NL	**86**	<0.5 U	<0.5 U
METHYL TERT-BUTYL ETHER	8260 C	10	<0.5 UJ	<0.5 UJ	<0.5 U
METHYLENE CHLORIDE	8260 C	5	<2.5 U	<2.5 U	<0.5 U
O-XYLENE	8260 C	NL	**20**	<0.5 U	<0.5 U
STYRENE	8260 C	5	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	8260 C	5	<0.5 U	<0.5 U	<0.5 U
TOLUENE	8260 C	5	**32**	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	8260 C	5	<0.5 U	<0.5 U	<0.5 U
TRANS-1,3-DICHLOROPROPENE	8260 C	0.4	***<0.5 U***	***<0.5 U***	***<0.5 U***
TRICHLOROETHENE	8260 C	5	<0.5 U	**0.75 J**	**140**
TRICHLOROFLUOROMETHANE	8260 C	5	<1.0 U	<1.0 U	<0.5 U
VINYL CHLORIDE	8260 C	2	<1.0 U	<1.0 U	<0.5 U
XYLENES, TOTAL	8260 C	5	**62**	<1.5 U	~
1,4-DIOXANE	8270C	NL	~	~	**0.57**

Notes:

1 New York State Department of Environmental Conservation Division of Water Technical and Operation Guidance series (6 NYCRR 700-706, Part 703.5 summarized in TOGS 1.1.1)
Ambient water quality standards and groundwater effluent limitations, class GA; NL = Not Listed

2 Quarterly groundwater sample collected by Tetra Tech. Sample was collected from BPOW3-5 even though sample id references RE139D2.

~ = not analyzed

Bold = Detected; ***Bold and Italics*** =Not detected exceeds NYS Groundwater Standards or guidance value

Yellow highlighted values exceed Groundwater Standards or guidance value

Sample type codes: N - normal environmental sample, FD - field duplicate

U = The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

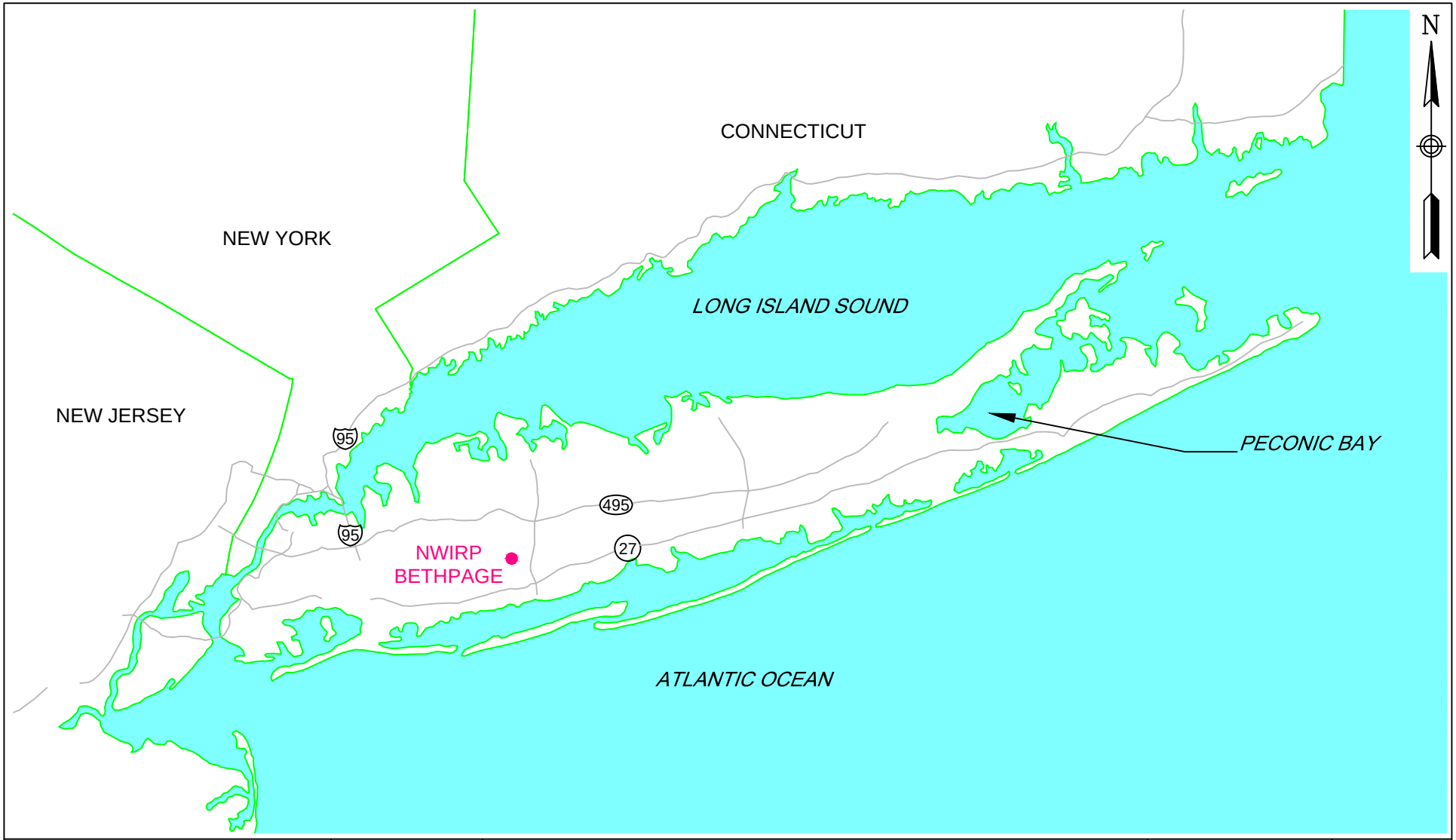
UJ = The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.

J = The reported result was an estimated value with an unknown bias.

LOD = limit of detection.

Figures

112G00622\0510\112G00622CM01.DWG 08/02/10 MKB



0 15 30

SCALE IN MILES

NAVFAC

GENERAL LOCATION MAP
NWIRP BETHPAGE
BETHPAGE, NEW YORK

CONTRACT NUMBER	CTO NUMBER
N62470-11-D-8013	WE15
APPROVED BY --	DATE --
APPROVED BY --	DATE --
FIGURE NO. 1	REV 0

C:\Users\hunte\Desktop\tmp1\BP\Location Maps\New folder\F2 BPW3-5 2019 10 27 R1.mxd

Former Naval Weapons Industrial Reserve Plant

Former Northrop Grumman Site

Inset: BPOW3-5 Locations

BPOW3-5

VPB50
VPB128
BPOW3-3
BPOW3-4
VPB126
BPOW3-1
BPOW3-2
BPOW3-5
RE139D1
VPB125
VPB173
ANY-8480
ANY-9338
RE118D1
BPOW5-5
0 375 750 Feet

BPOW3-5

Legend

- Monitoring Well
- Vertical Profile Boring
- Vertical Profile Boring - Proposed
- Water Supply Well
- Extraction Well

BPOW3-5 LOCATION MAP
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
BETHPAGE, NEW YORK

CONTRACT NUMBER	CTO NUMBER
N62470-11-D8013	WE15
APPROVED BY: PS	DATE: 4/10/2020
APPROVED BY: —	DATE: —
FIGURE NO.: 2	REV: 0

Appendices

Appendix A

BPOW3-5

Section 1

Boring Log

Resolution Consultants

Boring Log

BORING #: BPOW3-5
Sheet 1 of 2

Client: Department of the Navy, Naval Facilities Engineering Command, Mid-Atlantic		**Logged By:** V. Thayer
Location: Red Maple Drive, Town of Levittown, NY		**Drilling Company:** Delta Well & Pump
Project #: 60266526	**Ground Elevation (msl):** 61.90	**Well Screen Interval (ft):** 740-760
Start Date: 7/12/2019	**Drilling Method:** Auger (0-50' bgs) Mud Rotary (>50' bgs)	**Water Level (ft):** 24 ft bgs
Finish Date: 7/26/2019	**Northing:** 198600.08 **Easting:** 1124864.9	**Total Depth (ft):** 772.0

Casing installed with auger rig: 7/3/2019 and 7/8/2019.

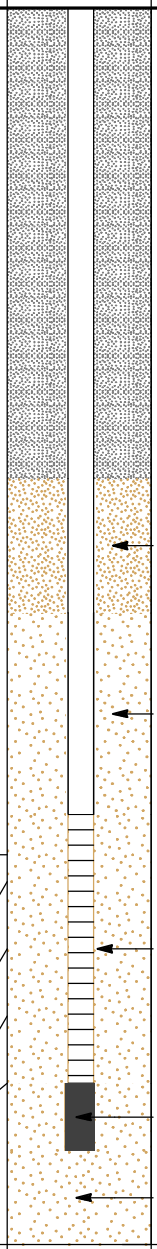
DEPTH (ft)	PID (ppm)	Formation	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	Well Completion	Well Construction
0					0-742 ft bgs: See VPB173 for Descriptions		10" Diameter Steel Casing
50							
100							
150							Bentonite Grout
200							
250							
300							
350							
400							
450							
500							4" Diameter Schedule 80 PVC Riser
550							
600							
650							

Resolution Consultants

Boring Log

BORING #: BPOW3-5
Sheet 2 of 2

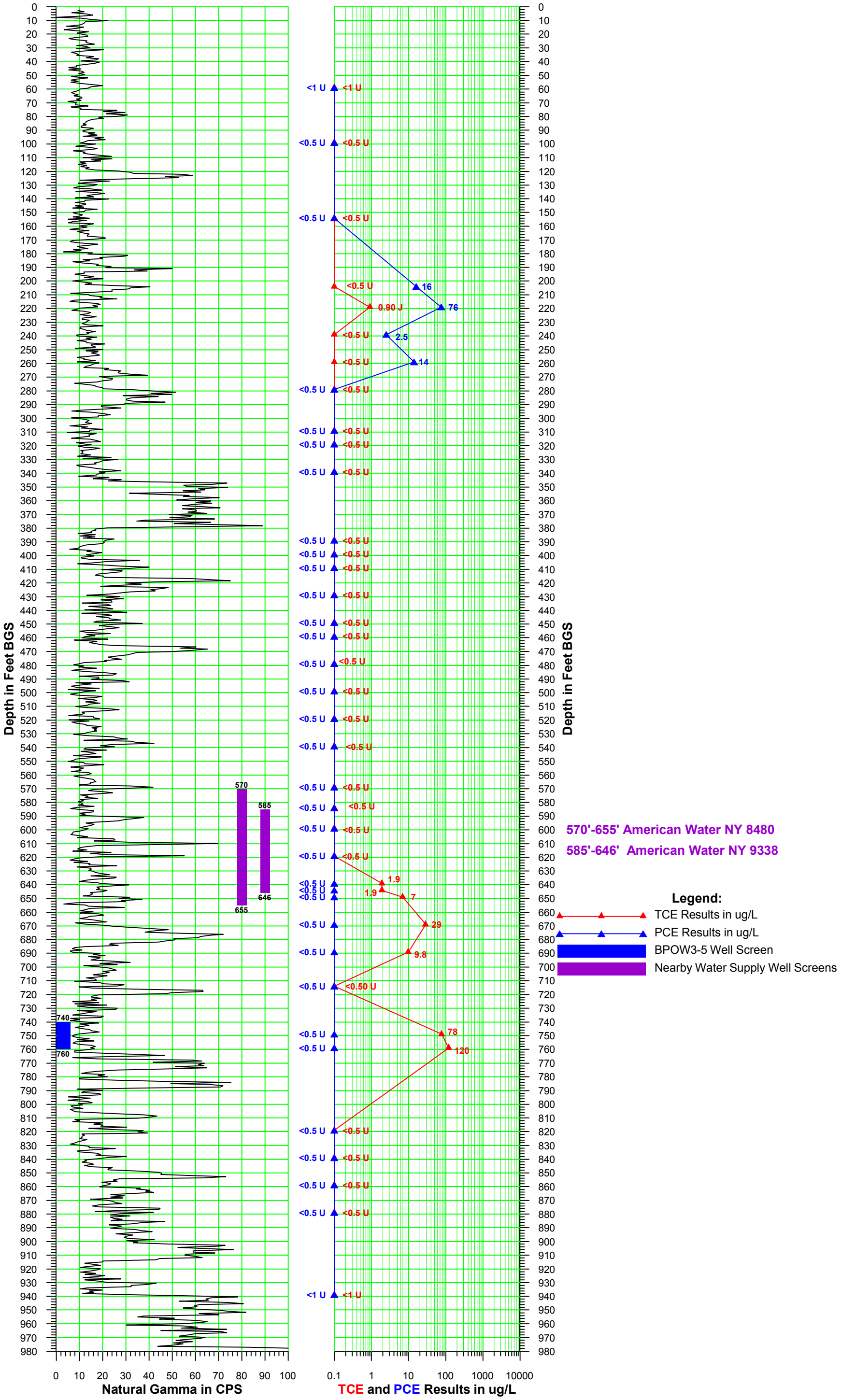
Client: Department of the Navy, Naval Facilities Engineering Command, Mid-Atlantic		**Logged By:** V. Thayer
Location: Red Maple Drive, Town of Levittown, NY		**Drilling Company:** Delta Well & Pump
Project #: 60266526	**Ground Elevation (msl):** 61.90	**Well Screen Interval (ft):** 740-760
Start Date: 7/12/2019	**Drilling Method:** Auger (0-50' bgs) Mud Rotary (>50' bgs)	**Water Level (ft):** 24 ft bgs
Finish Date: 7/26/2019	**Northing:** 198600.08 **Easting:** 1124864.9	**Total Depth (ft):** 772.0

DEPTH (ft)	PID (ppm)	Formation	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	Well Completion	Well Construction
680					0-742 ft bgs: See VPB173 for Descriptions *(continued)*		4" Diameter Schedule 80 PVC Riser *(continued)*
682							
684							
686							
688							
690							
692							
694							
696							
698							
700							
702							
704							
706							
708							
710							
712							
714							
716							
718							
720							#0 Filter Sand
722							
724							
726							
728							
730							
732							#1 Filter Sand
734							
736							
738							
740							
742							
744	0.0		SW-SC		Widely graded SAND with silty Clay and Gravel; fine to coarse subangular sand, little subrounded fine to coarse gravel, few silty clay.		
746							
748					Very pale brown (10YR 7/3) poorly graded SAND with silty Clay, medium sand, few coarse sand, trace subrounded fine to coarse gravel, few silty clay.		
750	0.0		SP-SC				4" Diameter Schedule 80 PVC, 10 Slot Well Screen (740-760 ft bgs)
752							
754	0.0		SM		Light gray (10YR 7/2) silty SAND, subrounded to subangular medium to coarse Sand, few fine sand, little silty clay, few fine to coarse gravel.		
756							
758					White (10YR 8/1) poorly graded SAND with silty fine Sand, few silt (15%).		
760	0.0		SP-SM				
762							Sump
764							
766							
768							#1 Sand to bottom
770							
772					End of boring at 772.0 ft. bgs.		

Section 2

VPB173 Gamma and TCE/PCE Plot

Vertical Profile Boring VPB-173
Downward Run - December 10, 2018
Validated Analytical Data



Section 3

Monitoring Well Construction Log

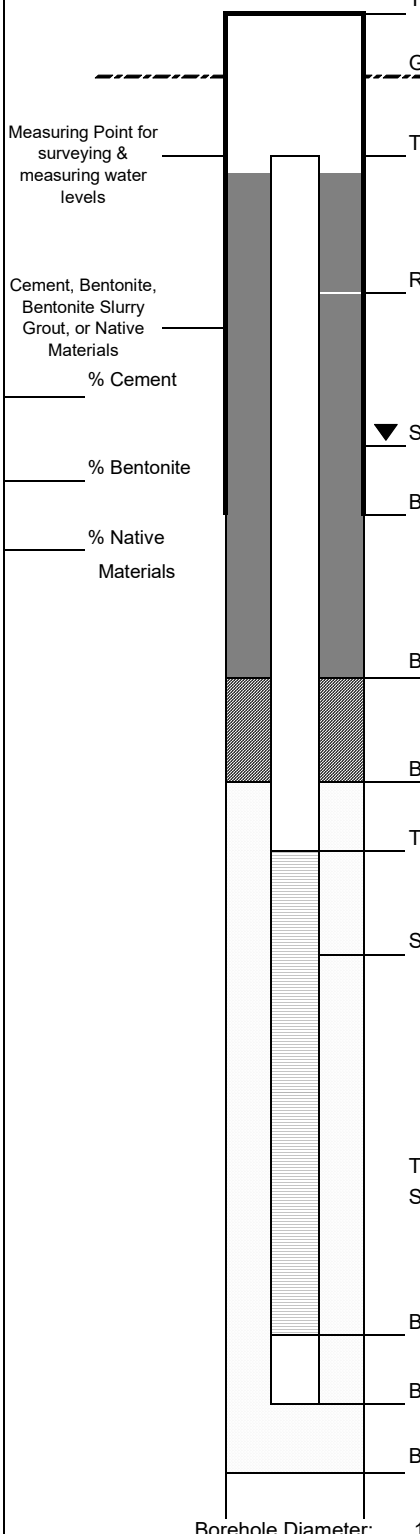
RESOLUTION CONSULTANTS

Client: NAVFAC	Project Number: 60266526	**WELL ID: BPOW3-5**	
Site Location: NWIRP BETHPAGE, NY			
Well Location: RED MAPLE DRIVE, T.O. LEVITTOWN, NY		Date Installed:	7/24/2019 - 7/29/2019
Method: MUD ROTARY		Inspector:	V.THAYER
Coords: Northing: 198600.08	Easting: 1124864.90	Contractor:	DELTA WELL & PUMP

MONITORING WELL CONSTRUCTION DETAIL

(schematic diagram, not to scale)

* Casing installed with Auger rig 7/3/2019 & 7/8/2019



	Depth from G.S. (feet)	Elevation(feet) Datum
Top of 12 inch diameter Steel Curb Box		61.91
Ground Surface (G.S.)	0.00	61.91
Top of Riser Pipe fit with locking j-plug	0.25	61.66
Riser Pipe:		
Length: 740 feet		
Inside Diameter (ID): 4 inch		
Type of Material: PVC		
▼ Stabilized Water Level	24.0	37.9
Bottom of Steel Surface Casing	53.5	8.4
Bottom of Bentonite	715	-653.1
Bottom of 0 Filter Sand/Top of #1 Filter Sand	725	-663.1
Top of Screen	740	-678.1
Screen:		
Length: 20 feet		
Inside Diameter (ID): 4 inch		
Slot Size: 10		
Type of Material: PVC		
Type/Size of Sand: #1		
Sand Pack Thickness: 47 feet		
Bottom of Screen	760	-698.1
Bottom of Tail Pipe:	765	-703.1
Bottom of Borehole	772	-710.1

Borehole Diameter: 10 inch

Approved:

Describe Measuring Point:

Ground Surface

Signature

Date

Section 4

Groundwater Sampling Log Sheets

Hydropunch Sample

Client: NWIRP - Bethpage
Project No: 60266526
Site Location: BPOW3-5
Weather Conds: warm

Date: 7/22/2019
VPB: VPB173
Collector(s): VTHAYER

Sample Date	Time	Temp (°C)	pH	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Starting depth(ft)	Ending depth(ft)	Color
7/22/2019	12:00	19.8	6.93	100.7	2.98	56.8	1013	652	654	pale brown
7/22/2019	14:25	—	not enough recovery for YSI —					665	667	Brown

Section 5

Analytical Data Validation

The following soil sample was collected for total organic carbon analysis:

BPOW3-5 from 748 – 750 ft bgs on 7/23/2019

The following hydropunch groundwater samples were collected VOCs :

BPOW3-5 from 652 – 654 ft bgs on 7/22/2019

BPOW3-5 from 665 – 667 ft bgs on 7/22/2019

DATA VALIDATION REPORT

Project:	Regional Groundwater Investigation — Naval Weapons Industrial Reserve Plant Bethpage
Laboratory:	Katahdin Analytical
Sample Delivery Group:	SM7680
Analyses/Method:	Volatile Organic Compounds by United States Environmental Protection Agency (U.S. EPA) SW-846 Method 8260C, and Total Organic Carbon (TOC) by U.S. EPA SW-846 Method 9060A
Validation Level:	Stage 3 Validation Electronic and Manual
Project Number:	0888812477.SA.DV
Prepared by:	Dana Miller/Resolution Consultants

SUMMARY

This report summarizes data review findings for samples collected on July 22-23, 2019, (samples listed below) by Resolution Consultants from the Regional Groundwater Investigation — Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage Site in accordance with the following Uniform Federal Policy (UFP) Sampling and Analysis Plans:

- *Sampling and Analysis Plan, Bethpage, New York.* (Resolution Consultants April 2013).
- *UFP SAP Addendum, Installation of Vertical Profile Borings and Monitoring Wells, Operable Unit 2, NWIRP Bethpage, New York.* (Resolution Consultants November 2013).
- *UFP SAP Addendum, Inclusion of Additional Target Analytes for Volatile Organics Analyses, NWIRP Bethpage OU2, Bethpage, New York*. (Resolution Consultants August 2014).

Sample Identification	Matrix/Sample Type	Analysis
BPOW3-5-TB01-072219	Trip blank	8260C
BPOW3-5-GW-072219-652-654	Groundwater	8260C
BPOW3-5-GW-072219-665-667	Groundwater	8260C
BPOW3-5-ERB-072319-748-750	Soil	9060A
BPOW3-5-SO-FD-072319	Soil	9060A
BPOW3-5-SO-072319-748-750	Soil	9060A

Data validation activities were conducted using the following guidance documents: *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846, specifically Method 8260C, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846, specifically Method 9060A, Total Organic Carbon* (U.S. EPA, 1996), *Method SM5310B, Total Organic Carbon by High-Temperature*

Combustion, National Functional Guidelines for Superfund Organic Methods Data Review (U.S. EPA January 2017), *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (U.S. EPA January 2009), *Department of Defense (DoD) General Data Validation Guidelines (DoD February 2018), and DoD Quality Systems Manual for Environmental Laboratories*, Version 4.2 (DoD October 2010). In the absence of method-specific information, laboratory quality control (QC) limits, project-specific requirements, and/or professional judgment were used as appropriate.

REVIEW ELEMENTS

The data were evaluated based on the following parameters (where applicable to the method):

- ✓ Data completeness (chain-of-custody)/sample integrity
- ✓ Holding times and sample preservation
- ✓ Gas chromatography/Mass spectrometer performance checks
- ✓ Initial calibration
- ✗ Initial calibration verification
- ✓ Continuing calibration verification
- ✓ Laboratory blanks/field blanks/trip blanks
- ✓ Surrogate spike recovery
- ✓ Matrix spike and/or matrix spike duplicate result
- ✓ Laboratory control sample /laboratory control sample duplicate result
- ✓ Field duplicate
- ✓ Internal standard
- ✓ Sample results/reporting issues

The symbol (✓) indicates that no validation qualifiers were applied based on this parameter. Acceptable data parameters for which all criteria were met, no qualification was performed, and/or non-conformance or other issues that were noted during validation but did not result in qualification of data are not discussed further. The symbol (✗) indicates that a QC non-conformance resulted in the qualification of data. Any QC non-conformance that resulted in the qualification of data is discussed below.

RESULTS

Initial Calibration Verification

The ICAL is evaluated to ensure that the instrument was capable of producing acceptable qualitative and quantitative data prior to the analysis of samples. The ICV is evaluated to assess the accuracy of ICAL standards. The CCV is evaluated to determine whether the instrument was within acceptable calibration throughout the period in which the samples were analyzed. Failure of the CCV indicates that the ICAL is no longer valid and should trigger recalibration and reanalysis of the associated samples in the analytical sequence. The ICAL and CCV calibration criteria were meet. Data qualification to the analytes associated with the specific ICV was as follows:

Initial Calibration Verification Recovery Non-Conformance:

Criteria	Actions	
	Detected Results	Non-Detected Results
Recovery >120%	J	UJ
Recovery < 80%	J	UJ

Notes:
J = Estimated value UJ = Undetected and estimated

ICV non-conformances are summarized in Attachment A in Tables A-1.

Qualification Actions

The data were reviewed independently from the laboratory to assess data quality. TOC was detected in the equipment blank but professional judgement was used not to qualify the associated sample as undetected. All compounds detected at concentrations less than the limit of quantitation but greater than the method detection limit were qualified by the laboratory as estimated (J). This "J" qualifier was retained during data validation. Any sample that was analyzed at a dilution because of high concentrations of target or non-target analytes was checked to confirm that the results and/or sample-specific limit of quantitation and limit of detections were adjusted accordingly by the laboratory.

No results were rejected; therefore, analytical completeness was calculated to be 100 percent. Data not qualified during data review are considered usable by the project. The remaining results qualified as estimated may be high or low, but the data are usable for their intended purpose, according to U.S. EPA and Department of Defense guidelines. Attachment B provides a summary of all qualified results during this data review.

ATTACHMENTS

Attachment A: Non-Conformance Summary Table

Attachment B: Qualified Results Summary after Data Review

Attachemnt C: Analytical Data Results

Attachment A
Non-Conformance Summary Table

Table A-1 Initial Calibration Verification Non-Conformance							
SDG	**Method**	**Analyte**	**ICV ID**	**%R**	**%R Limit**	**Associated Samples**	**Qualifiers**
SM7680	8260C	Bromomethane	S3096A	**123.54***	80-120	BPOW3-5-TB01-072219 BPOW3-5-GW-072219-652-654 BPOW3-5-GW-072219-665-667	Detects: J Non-detects: UJ
SM7680	8260C	Carbon Disulfide	S3096A	**139.45***	80-120	BPOW3-5-TB01-072219 BPOW3-5-GW-072219-652-654 BPOW3-5-GW-072219-665-667	Detects: J Non-detects: UJ
SM7680	8260C	MTBE	S3096A	**120.64***	80-120	BPOW3-5-TB01-072219 BPOW3-5-GW-072219-652-654 BPOW3-5-GW-072219-665-667	Detects: J Non-detects: UJ
SM7680	8260C	Cyclohexane	S3096A	**131.25***	80-120	BPOW3-5-TB01-072219 BPOW3-5-GW-072219-652-654 BPOW3-5-GW-072219-665-667	Detects: J Non-detects: UJ

Notes:

SDG = Sample delivery group
ICV = Initial calibration verification
ID = Identification
%R = Percent recovery
Bold* **=** Outside %R acceptance limits.
J = Estimated value; calibration was outside control limits.
UJ = Undetected and estimated; calibration was outside control limits

Attachment B
Qualified Results Summary after Data Review

Table B-1 Qualified Summary Results after Data Review											
SDG	**Sample ID**	**Lab ID**	**Sample Date**	**DF**	**Analyte**	**Result**	**Units**	**Lab Qualifier**	**Validator Qualifier**	**Final Qualifier**	**RC**
SM7680	BPOW3-5-GW-072219-652-654	SM7680-2	7/22/2019	1	CARBON DISULFIDE	0.5	UG_L	U	J	UJ	c
SM7680	BPOW3-5-GW-072219-652-654	SM7680-2	7/22/2019	1	BROMOMETHANE	1.0	UG_L	U	J	UJ	c
SM7680	BPOW3-5-GW-072219-652-654	SM7680-2	7/22/2019	1	METHYL TERT-BUTYL ETHER	0.5	UG_L	U	J	UJ	c
SM7680	BPOW3-5-GW-072219-652-654	SM7680-2	7/22/2019	1	CYCLOHEXANE	57	UG_L		J	J	c
SM7680	BPOW3-5-GW-072219-665-667	SM7680-3	7/22/2019	1	CARBON DISULFIDE	0.5	UG_L	U	J	UJ	c
SM7680	BPOW3-5-GW-072219-665-667	SM7680-3	7/22/2019	1	BROMOMETHANE	1.0	UG_L	U	J	UJ	c
SM7680	BPOW3-5-GW-072219-665-667	SM7680-3	7/22/2019	1	METHYL TERT-BUTYL ETHER	0.5	UG_L	U	J	UJ	c
SM7680	BPOW3-5-GW-072219-665-667	SM7680-3	7/22/2019	1	CYCLOHEXANE	0.5	UG_L	U	J	UJ	c
SM7680	BPOW3-5-TB01-072219	SM7680-1	7/22/2019	1	CARBON DISULFIDE	0.5	UG_L	U	J	UJ	c
SM7680	BPOW3-5-TB01-072219	SM7680-1	7/22/2019	1	BROMOMETHANE	1.0	UG_L	U	J	UJ	c
SM7680	BPOW3-5-TB01-072219	SM7680-1	7/22/2019	1	METHYL TERT-BUTYL ETHER	0.5	UG_L	U	J	UJ	c
SM7680	BPOW3-5-TB01-072219	SM7680-1	7/22/2019	1	CYCLOHEXANE	0.5	UG_L	U	J	UJ	c

Notes:
SDG = Sample delivery group
ID = Identification
DF = Dilution factor
RC = Reason code
UG_L = Micrograms per liter
U = ***Undetected*** — The analyte was analyzed but undetected at the listed limit of quantitation or was qualified as undetected during data review due to blank artifacts.
J = ***Estimated Value*** — One or more quality control parameters were outside control limits or the analyte concentration was less than the limit of quantitation.
UJ = ***Undetected*** **and estimated**— The analyte was analyzed but undetected at the listed limit of quantitation; one or more quality control parameters were outside control limits.

Qualification Reason Code:
c = Initial calibration verification outside control limits

Attachment C
Analytical Data Results

		Sample Delivery Group		SM7680		
		Lab Identification		SM7680-1		
		Sample Identification		BPOW3-5-TB01-072219		
		Sample Date		7/22/2019		
		Sample Type		Trip Blank		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.5	U	
8260C	2-HEXANONE	591-78-6	UG_L	2.5	U	
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	2.5	U	
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	UJ	c
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	UJ	c
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	U	
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	U	
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	UJ	c
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	U	
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	UJ	c
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	U	
8260C	TOLUENE	108-88-3	UG_L	0.5	U	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	0.5	U	
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	

Notes:

UG_L = Micrograms per liter
Qual = Final qualifiers
RC = Reason codes
U = Undetected
J = Estimated value
UJ = Undetected and estimated
c = Initial calibration verification outside limits

		Sample Delivery Group		SM7680		
		Lab Identification		SM7680-2		
		Sample Identification		BPOW3-5-GW-072219-652-654		
		Sample Date		7/22/2019		
		Sample Type		Groundwater		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	2.5	U	
8260C	2-HEXANONE	591-78-6	UG_L	2.5	U	
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	71		
8260C	BENZENE	71-43-2	UG_L	20		
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	UJ	c
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	UJ	c
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	U	
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	U	
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	57	J	c
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	U	
8260C	ETHYLBENZENE	100-41-4	UG_L	7.6		
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	3.1		
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	42		
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	86		
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	UJ	c
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	20		
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	U	
8260C	TOLUENE	108-88-3	UG_L	32		
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	0.5	U	
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	62		

Notes:

UG_L = Micrograms per liter
Qual = Final qualifiers
RC = Reason codes
U = Undetected
J = Estimated value
UJ = Undetected and estimated
c = Initial calibration verification outside limits

		Sample Delivery Group		SM7680		
		Lab Identification		SM7680-3		
		Sample Identification		BPOW3-5-GW-072219-665-667		
		Sample Date		7/22/2019		
		Sample Type		Groundwater		
Method	Analyte	CAS No	Units	Result	Qual	RC
8260C	1,1,1-TRICHLOROETHANE	71-55-6	UG_L	0.5	U	
8260C	1,1,2,2-TETRACHLOROETHANE	79-34-5	UG_L	0.5	U	
8260C	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	UG_L	0.5	U	
8260C	1,1,2-TRICHLOROETHANE	79-00-5	UG_L	0.5	U	
8260C	1,1-DICHLOROETHANE	75-34-3	UG_L	0.5	U	
8260C	1,1-DICHLOROETHENE	75-35-4	UG_L	0.5	U	
8260C	1,2,4-TRICHLOROBENZENE	120-82-1	UG_L	0.5	U	
8260C	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	UG_L	0.75	U	
8260C	1,2-DIBROMOETHANE	106-93-4	UG_L	0.5	U	
8260C	1,2-DICHLOROBENZENE	95-50-1	UG_L	0.5	U	
8260C	1,2-DICHLOROETHANE	107-06-2	UG_L	0.5	U	
8260C	1,2-DICHLOROETHENE, TOTAL	540-59-0	UG_L	1	U	
8260C	1,2-DICHLOROPROPANE	78-87-5	UG_L	0.5	U	
8260C	1,3-DICHLOROBENZENE	541-73-1	UG_L	0.5	U	
8260C	1,4-DICHLOROBENZENE	106-46-7	UG_L	0.5	U	
8260C	2-BUTANONE	78-93-3	UG_L	3	J	
8260C	2-HEXANONE	591-78-6	UG_L	2.5	U	
8260C	4-METHYL-2-PENTANONE	108-10-1	UG_L	2.5	U	
8260C	ACETONE	67-64-1	UG_L	19		
8260C	BENZENE	71-43-2	UG_L	0.5	U	
8260C	BROMODICHLOROMETHANE	75-27-4	UG_L	0.5	U	
8260C	BROMOFORM	75-25-2	UG_L	0.5	U	
8260C	BROMOMETHANE	74-83-9	UG_L	1	UJ	c
8260C	CARBON DISULFIDE	75-15-0	UG_L	0.5	UJ	c
8260C	CARBON TETRACHLORIDE	56-23-5	UG_L	0.5	U	
8260C	CHLOROBENZENE	108-90-7	UG_L	0.5	U	
8260C	CHLOROETHANE	75-00-3	UG_L	1	U	
8260C	CHLOROFORM	67-66-3	UG_L	0.5	U	
8260C	CHLOROMETHANE	74-87-3	UG_L	1	U	
8260C	CIS-1,2-DICHLOROETHENE	156-59-2	UG_L	0.5	U	
8260C	CIS-1,3-DICHLOROPROPENE	10061-01-5	UG_L	0.5	U	
8260C	CYCLOHEXANE	110-82-7	UG_L	0.5	UJ	c
8260C	DIBROMOCHLOROMETHANE	124-48-1	UG_L	0.5	U	
8260C	DICHLORODIFLUOROMETHANE	75-71-8	UG_L	1	U	
8260C	ETHYLBENZENE	100-41-4	UG_L	0.5	U	
8260C	ISOPROPYLBENZENE	98-82-8	UG_L	0.5	U	
8260C	M- AND P-XYLENE	108-38-3/106-42	UG_L	1	U	
8260C	METHYL ACETATE	79-20-9	UG_L	0.75	U	
8260C	METHYL CYCLOHEXANE	108-87-2	UG_L	0.5	U	
8260C	METHYL TERT-BUTYL ETHER	1634-04-4	UG_L	0.5	UJ	c
8260C	METHYLENE CHLORIDE	75-09-2	UG_L	2.5	U	
8260C	O-XYLENE	95-47-6	UG_L	0.5	U	
8260C	STYRENE	100-42-5	UG_L	0.5	U	
8260C	TETRACHLOROETHENE	127-18-4	UG_L	0.5	U	
8260C	TOLUENE	108-88-3	UG_L	0.5	U	
8260C	TRANS-1,2-DICHLOROETHENE	156-60-5	UG_L	0.5	U	
8260C	TRANS-1,3-DICHLOROPROPENE	10061-02-6	UG_L	0.5	U	
8260C	TRICHLOROETHENE	79-01-6	UG_L	0.75	J	
8260C	TRICHLOROFLUOROMETHANE	75-69-4	UG_L	1	U	
8260C	VINYL CHLORIDE	75-01-4	UG_L	1	U	
8260C	XYLENES, TOTAL	1330-20-7	UG_L	1.5	U	

Notes:

UG_L = Micrograms per liter
Qual = Final qualifiers
RC = Reason codes
U = Undetected
J = Estimated value
UJ = Undetected and estimated
c = Initial calibration verification outside limits

			Sample Delivery Group	SM7680			SM7680			SM7680		
			Lab Identification	SM7680-4			SM7680-5			SM7680-6		
			Sample Identification	BPOW3-5-ERB-072319-748-750			BPOW3-5-SO-FD-072319			BPOW3-5-SO-072319-748-750		
			Sample Date	7/23/2019			7/23/2019			7/23/2019		
			Sample Type	Equipment Blank			Field Duplicate			Soil		
Method	Analyte	CAS No	Units	Result	Qual	RC	Result	Qual	RC	Result	Qual	RC
3540C	TOTAL SOLIDS	-29	PCT	NA			88			86		
9060A	TOTAL ORGANIC CARBON	-28	MG_L	2.3			NA			NA		
9060A	TOTAL ORGANIC CARBON	-28	UG_G	NA			670	J		630	J	

Notes:

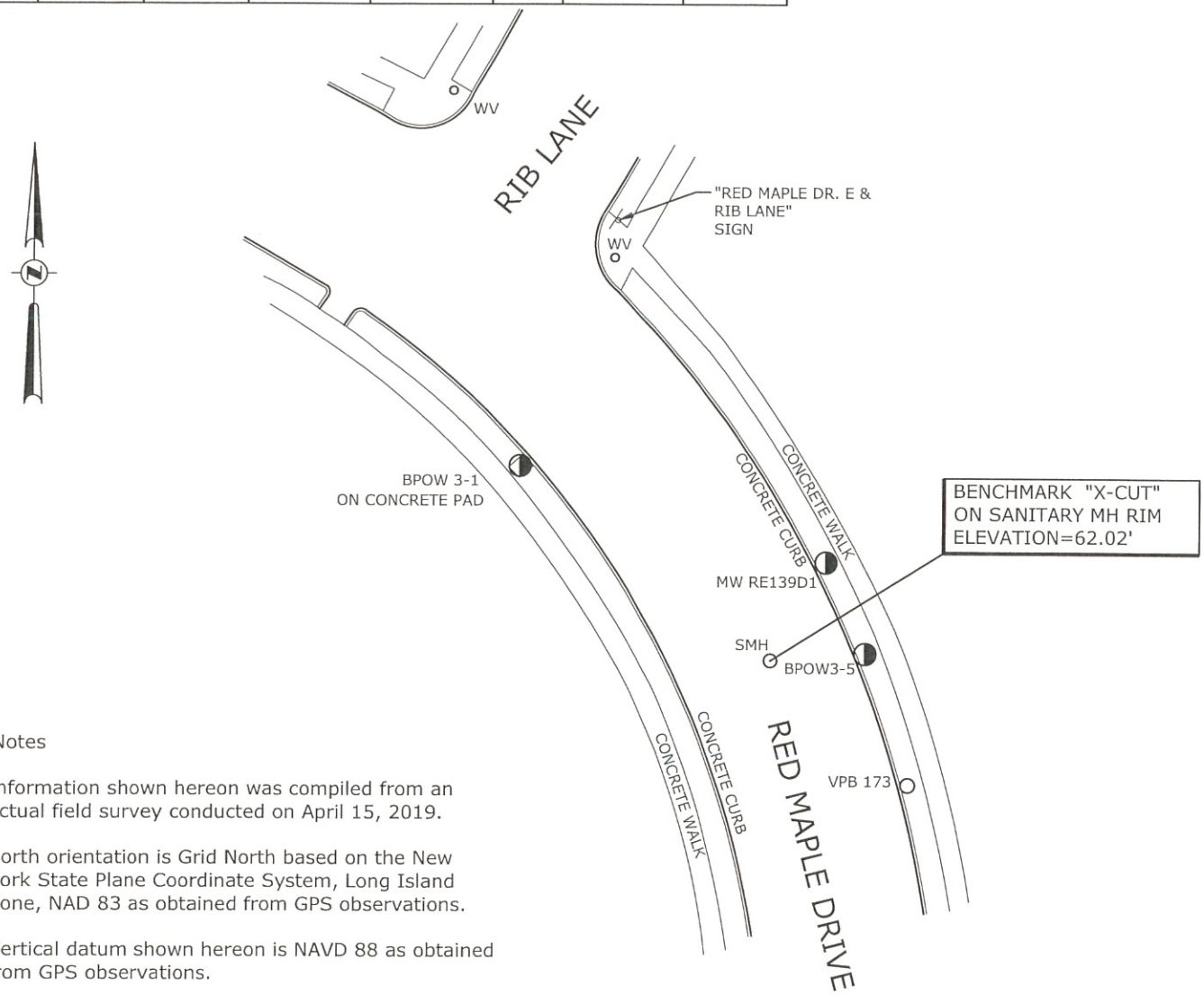
PCT	= Percent
MG_L	= Milligrams per liter
UG_G	= Micrograms per gram
NA	= Not analyzed
Qual	= Final qualifiers
RC	= Reason codes
J	= Estimated value

Section 6

Survey

NONE :XREFS

Description	Northing	Easting	Latitude	Longitude	Ground	Top of Casing	Top of PVC
VPB 173	198577.38	1124872.35	N40-42-38.19	W73-29-33.97	61.19'	61.19'	N/A
MW RE139D1	198615.87	1124858.07	N40-42-38.57	W73-29-34.15	62.00'	62.10'	61.60'
BPOW3-5	198600.08	1124864.90	N40-42-38.41	W73-29-34.06	61.90'	61.91'	61.65'



Map Notes

1. Information shown hereon was compiled from an actual field survey conducted on April 15, 2019.
2. North orientation is Grid North based on the New York State Plane Coordinate System, Long Island Zone, NAD 83 as obtained from GPS observations.
3. Vertical datum shown hereon is NAVD 88 as obtained from GPS observations.

Legend

○ VPB 173	VERTICAL PROFILE BORING
○ SMH	SANITARY MANHOLE
o WV	WATER VALVE
◑ MW RE139D1	MONITOR WELL

BAR SCALE

30 0 15 30 60

1 inch = 30 ft.

DWG NO. 19-282

Date	RECORD OF WORK	Appr.
10/10/19	UPDATED TO SHOW ADDITIONAL MW'S AND FIELD LOCATIONS	

STATE OF NEW YORK WILLIAM J. NEVELETON LICENSED LAND SURVEYOR 049513

Drafter: MDD Checker: WJN

Appr. by: WJN Proj. No. 14.4121

VERTICAL PROFILE BORING 173 SURVEY LOCATION
RED MAPLE DRIVE

TOWN OF LEVITTOWN | NASSAU COUNTY, NEW YORK

C.T. MALE ASSOCIATES
Engineering, Surveying, Architecture & Landscape Architecture, D.P.C.
50 CENTURY HILL DRIVE, LATHAM, NY 12110
518.786.7400 * FAX 518.786.7299

SCALE: 1"=30' | DATE:APRIL 15, 2019

CAD DWG. FILE NAME: K:\Projects\144121\Survey\Drawings and Maps\2019 DRAWINGS\2019 VPB 173 RED MAPLE DR.dwg