NOR-02699

May 25, 2021

Mr. Jason Pelton
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A, 12th Floor
625 Broadway
Albany, New York 12233-7015

Reference: CLEAN Contract No. N6247016D9008
Contract Task Order WE13

Subject: Final 2018-2020 On-Property Monitoring Well Installation Report
TT-MW202S, TT-MW202I, TT-MW203I,TT-MW204S and TT-MW204I
Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York

Dear Mr. Pelton:

On behalf of the Department of the Navy, Tetra Tech is providing the *Final 2018-2020 On-Property Monitoring Well Installation Report TT-MW202S, TT-MW202I, TT-MW203I,TT-MW204S and TT-MW204I, NWIRP Bethpage* to the New York State Department of Environmental Conservation (NYSDEC) for information. This report provides documentation for the installation of these groundwater monitoring wells. The Navy is issuing this document as a final. If no comments are received by June 24, 2021, the Navy will include this report as a final in the NWIRP Bethpage Administrative Record.

If you have any questions please contact Mr. James Watts-Gravette, NAVFAC MIDLANT, at james.gravette@navy.mil or (757) 341-0380.

Sincerely,

Ernie Wu
Project Manager

Enclosures: Final 2018-2020 On-Property Monitoring Well Installation Report
TT-MW202S, TT-MW202I, TT-MW203I,TT-MW204S and TT-MW204I
NWIRP Bethpage, New York

Distribution:
NYSDEC, Don Hesler
NAVFAC MIDLANT, James Watts-Gravette
Tetra Tech, David Brayack
Project File

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Naval Facilities Engineering Systems Command Mid-Atlantic
Norfolk, Virginia

**Final**

# 2018-2020 On-Property Monitoring Well Installation Report TT-MW202S, TT-MW202I, TT-MW203I, TT-MW204S andTT-MW204I

Naval Weapons Industrial Reserve Plant
Bethpage, New York

May 2021

**Approved for public release; distribution is unlimited.**

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**FINAL**

# 2018-2020 ON-PROPERTY MONITORING WELL INSTALLATION REPORT

## TT-MW202S, TT-MW202I, TT-MW203I, TT-MW204S ANDTT-MW204I

**NAVAL WEAPONS INDUSTRIAL RESERVE PLANT**

**COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:**
Department of the Navy
Naval Facilities Engineering Systems Command Mid-Atlantic
9324 Virginia Avenue
Norfolk, VA 23511-3095

**Submitted by:**
Tetra Tech
5700 Lake Wright Drive, Suite 102
Norfolk, Virginia 23502

**CONTRACT NUMBER N62470D9008**
**CONTRACT TASK ORDER WE13**

**MAY 2021**


**PREPARED UNDER THE DIRECTION OF:**

**ERNIE WU**
**PROJECT MANAGER**
**TETRA TECH**
**NORFOLK, VIRGINIA**

**APPROVED FOR SUBMISSION BY:**

**STEVEN H. RUFFING, P.E.**
**PROGRAM MANAGER**
**TETRA TECH, INC.**
**NORFOLK, VIRGINIA**

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## NEW YORK PROFESSIONAL GEOLOGIST SEAL

As a New York-licensed Professional Geologist, I have reviewed and approved the geological information and drawings in the 2018-2020 On-Property Monitoring Well Installation Report, TT-MW202S, TT-MW202I, TT-MW203I, TT-MW204S and TT-MW204I, Naval Weapons Industrial Reserve Plant, Bethpage and seal it in accordance with Article 145 Section 7209 of the New York State Education Laws. In sealing this document, I certify that 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 in anyway, unless he or she is acting under the direction of a NY-licensed Professional Geologist.

Name: Vincent J. Varricchio
NY PG License Number: 000095
State: New York

Signature: Vit Vlr

Date: 5/10/2021

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# Table of Contents

List of Tables ..... i
List of Figures ..... i
List of Appendices ..... i
Acronyms and Abbreviations ..... iii
1.0 Introduction ..... 1-1
1.1 Scope and Objectives ..... 1-1
1.2 Site History ..... 1-2
1.3 Geology and Hydrogeology ..... 1-2
2.0 Field Program ..... 2-1
2.1 Monitoring Well Installation ..... 2-1
2.1.1 Drilling and Well Construction ..... 2-1
2.1.2 Well Development ..... 2-2
2.2 Decontamination and Investigation Derived Waste (IDW) ..... 2-2
2.3 Surveying ..... 2-2
3.0 References ..... 3-1

# List of Tables

Table 1 Monitoring Well Construction Summary
Table 2 Monitoring Well Development Summary

# List of Figures

Figure 1 General Location Map
Figure 2 TT-MW202, TT-MW203 and TT-MW204 Location Map

# List of Appendices

Appendix A TT-MW202S, TT-MW202I, and TT -MW203I
Appendix B TT-MW204S and TT-MW204I
Appendix C Borbas Survey Data Report

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# Acronyms and Abbreviations

| | |
|---|---|
| AOC | Area of Concern |
| bgs | below ground surface |
| CLEAN | Comprehensive Long-Term Environmental Action Navy |
| COR | Continuously Operating Reference |
| ft | feet |
| GOCO | Government-Owned Contractor-Operated |
| GPS | Global Positioning System |
| HSA | hollow stem auger |
| IDW | Investigation Derived Waste |
| IR | Installation Restoration |
| MW | monitoring well |
| NAD | North American Datum |
| NAVD | North American Vertical Datum |
| NAVFAC | Naval Facilities Engineering Systems Command |
| NG | Northrop Grumman |
| NTU | nephlometric turbidity units |
| NWIRP | Naval Weapons Industrial Reserve Plant |
| NYSDEC | New York State Department of Environmental Conservation |
| OU | Operable Unit |
| PCBs | Polychlorinated Biphenyls |
| PFAS | Poly and Perfluoroalkyl Substances |
| POTW | Publicly Owned Treatment Works |
| PPE | Personal Protective Equipment |
| PVC | polyvinylchloride |
| ROD | Record of Decision |
| SAP | Sampling and Analysis Plan |
| SVOC | Semivolatile Organic Compounds |

| | |
|---|---|
| UFP | United Federal Programs |
| VOC | Volatile Organic Compounds |
| VPB | Vertical Profile Boring |

# 1.0 Introduction

Tetra Tech has prepared this Monitoring Well Installation Report for the Naval Facilities Engineering Systems Command (NAVFAC) Atlantic Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N6247016D9008 Task Order WE13, which is part of the Navy's ongoing Environmental Restoration Program for the Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage. As shown in Figure 1, NWIRP Bethpage is located in east-central Nassau County, Long Island, New York, approximately 30 miles east of New York City.

## 1.1 Scope and Objectives

This Monitoring Well Installation Report provides information on the installation and development of five monitoring wells (MW202S, MW202I, MW203I, MW204S, and MW204I) at three on-property locations (Figure 2). These wells were installed to assess the quality of groundwater flowing on to the NWIRP in the western portion on the property. Analytical data collected from these wells were used to support the Preliminary Assessment/Site Inspection for radiological, poly and perfluoroalkyl substances (PFAS), and 1,4-dioxane investigations. Groundwater sampling activities and discussion of groundwater analytical data collected from these wells are presented in separate reports.

Monitoring well installation field tasks were conducted in accordance with the United Federal Programs (UFP) Sampling and Analysis Plan (SAP) Tier II Sampling and Analysis Plan, (Field Sampling and Quality Assurance Project Plan) for Vertical Profile Boring and Monitoring Well Installation Program (Tetra Tech, 2019). The field investigation included the installation of five monitoring wells, geophysical logging, and surveying. In addition, the work adhered to the following Letter Work Plans: *December 2018 On-Property Letter Work Plan Vertical Profile Boring and Monitoring Well Installation Program* (Tetra Tech, 2018) and *February 2020 Letter Work Plan On-Property Monitoring Well Installation* (Tetra Tech, 2020).

Documentation of these activities is included in the appendices of this report. Appendix A contains the summary packet for monitoring wells MW202S, MW202I, and MW203I Appendix B contains the summary packet for monitoring wells MW204S and MW204I and Appendix C contains the survey report.

## 1.2 Site History

NWIRP Bethpage is 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 (GOCO) facility that was operated by Northrop Grumman (NG) 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 (IR) Site 1 – Former Drum Marshalling Area and Site 4 – Former Underground Storage Tanks (Area of Concern [AOC] 22). A parcel of land connecting the two sites was also retained. Currently, the 9-acre parcel of NWIRP is bordered on the east by a residential neighborhood and on the north, south, and west by Steel Equities; however, a small portion near Sites 2 and 3 is still owned by Nassau County. Access to the NWIRP is from South Oyster Bay Road.

## 1.3 Geology and Hydrogeology

Overburden at the site consists of approximately 1,100 feet (ft) of unconsolidated deposits overlying crystalline bedrock of the Hartland Formation. Overburden is divided into four geologic units in descending order: the Upper Glacial Formation, 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 crystalline bedrock consists primarily of metamorphic and igneous rocks.

The Upper Glacial Formation 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. 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 bgs, as observed at the former NWIRP and extending southeast to areas south of Southern State Parkway. Locally at VPB201, VPB202, and VPB203, the bottom of the Magothy (top of the Raritan Clay) is encountered at approximately 821, 823, and

835 feet bgs, respectively. 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 550 and 820 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.

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 15 to 60 ft bgs. The groundwater flow in the area is to the south- southeast.

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# 2.0 Field Program

Field investigation activities at MW202S, MW202I, MW203I, MW204S and MW204I consisted of drilling, geophysical logging, well installation, well development, 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 Monitoring Well Installation

Five monitoring wells were installed on-property between December 2018 and March 2020. Monitoring well screen depths were determined based on gamma log data collected during installation. Depths of monitoring wells ranged from 60 ft bgs to 152 ft bgs. Locations are shown on Figure 2.

### 2.1.1 Drilling and Well Construction

The wells were installed using hollow stem auger (HSA) drilling techniques. Well construction details are summarized in Table 1. The borings logs for MW202S, MW202I, MW203I are included in Appendix A and the boring logs for MW204S and MW204I are included in Appendix B.

The shallow wells, MW-202S, MW-203S, and MW-204S were screened across the water table, approximately 2 feet above the water table and 8 feet below the water table. Screen intervals for the intermediate depth wells, MW202I, MW203I, and MW204I were determined by evaluating geophysical and lithology data collected from each well's respective boring and screen intervals of nearby intermediate depth wells (e.g., MW-311I and HN-24I).

Wells were constructed of 2-inch diameter, Schedule 40, National Sanitation Foundation-approved polyvinylchloride (PVC) riser pipe and 0.010-slot well screen. Wells were completed at grade using a 12-inch diameter, locking curb box to protect them from vehicular traffic. A fine sand was installed above the top of the box to allow for drainage.

A 0.5-foot thick concrete apron measuring 2 feet by 2 feet square was installed around each well. The wells included a clean compression well cap. Well locks were used to secure the wells. Details monitoring well construction diagrams for MW202S, MW202I and MW203I are included in Appendix A. Monitoring well construction diagrams for MW204S, MW204I are included in Appendix B.

### 2.1.2 Well Development

Following installation, all monitoring wells were 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 at least 24 hours after well installation.

Monitoring well screens were developed by air lift technique or by pumping with a submersible pump. The following groundwater quality parameters were collected during development to determine stabilization: pH, specific conductivity, dissolved oxygen, turbidity, temperature and oxidation-reduction potential. In compliance with New York State Department of Environmental Conservation (NYSDEC) policy, wells were developed until turbidity was less than 50 nephlometric turbidity units (NTUs) if possible. Table 2 summarizes total pumped volume from well development and final turbidity. Well development logs for MW202S, MW202I and MW203I are included in Appendix A. Well development logs for MW204S, MW204I are included in Appendix B.

## 2.2 Decontamination and Investigation Derived Waste (IDW)

As part of the IDW management practices and in accordance with the SAP, the investigation waste (consisting of soil cuttings, IDW fluids, and personal protective equipment [PPE]) generated during the boring installation was containerized and staged at NWIRP Bethpage. IDW solids were characterized and disposed of properly at a permitted facility under requirements outlined in NYSDEC subpart 375-6.8(b) and CP-51. Representative samples of soil IDW were collected from roll off containers and submitted to Chemtech for analysis, which includes VOCs, semivolatile organic compounds (SVOC)s, Metals and polychlorinated biphenyls (PCB)s/Pesticides.

IDW water was containerized in frac tanks and stored at NWIRP Bethpage for characterization and ultimate disposal to the Publicly Owned Treatment Works (POTW), in accordance with the facility's existing discharge permit. A representative water sample was collected from each frac tank and submitted to Chemtech for analysis of VOCs via Method SW 624, pH via Method SW 9040B, PCBs via Method 8082 and Total Metals via Method SW 846. To the extent feasible, soil and water were not mixed.

All IDW generated during this investigation was characterized as non-hazardous.

## 2.3 Surveying

A survey of each monitoring well location was conducted at the end of the fieldwork by Borbas Surveying & Mapping, LLC, of Boonton, NJ, under the direct supervision of

Tetra Tech. The locations were tied into the existing base map developed for this investigation. The survey elevation is referenced to the North American Vertical Datum (NAVD) 1988 and has a vertical accuracy of 0.01 foot. Vertical control is based on observations of the National Geodetic Survey (NGS) Continuously Operating Reference (COR) Stations NYBR, NYCI, NYVH and SHK6. The horizontal location is referenced to the North American Datum (NAD) 1983 New York, Long Island State Plane Coordinate System and has an accuracy of 0.1 foot. Horizontal control is based on Global Positioning System (GPS) observations using the NGS COR Stations NYBR, NYCI, NYVH and SHK6.

A table of survey data (grade elevation, northing/easting and latitude/longitude) is included in Appendix C.

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# 3.0 References

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

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.

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Tetra Tech, 2020. *February 2020 Letter Work Plan On-Property Monitoring Well Installation, Naval Weapons Industrial Reserve Plant Bethpage, New York.* February.

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# TABLES

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**TABLE 1**
**MONITORING WELL CONSTRUCTION SUMMARY**
**2019-2020 MONITORING WELL INSTALLTION REPORT**
**NWIRP BETHPAGE, NEW YORK**

| 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) |
|---|---|---|---|---|---|---|---|---|
| TT-MW202S | 1/3/2019 | 126.8 | 126.36 | 64 | 54 | 54 - 64 | 64 - 65 | 65 |
| TT-MW202I | 12/20/2018 | 126.7 | 126.42 | 150 | 140 | 140 - 150 | 150 - 151.4 | 151.4 |
| TT-MW203I | 1/8/2019 | 127.6 | 127.04 | 146 | 136 | 136 - 146 | 146 - 151 | 159 |
| TT-MW204S | 3/17/2020 | 124.4 | 123.92 | 60 | 50 | 50 - 60 | 60 - 60.5 | 60.5 |
| TT-MW204I | 3/19/2020 | 124.4 | 124.01 | 152 | 142 | 142 - 152 | 152 - 152.5 | 152.5 |

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 | DATE | DEVELOPMENT METHOD | APPROX. TOTAL DEVELOPMENT VOLUME (GAL) | FINAL TURBIDITY (NTUs) |
|---|---|---|---|---|
| TT-MW202S | 1/10/2019 | Submersible Pump | 94 gallons | 20.30 |
| TT-MW202I | 1/14/2019 | Air Lift | 225 gallons | 8.70 |
| TT-MW203I | 1/14/2019 | Air Lift | 240 gallons | 11.60 |
| TT-MW204S | 3/18/2020 | Submersible Pump | 60 gallons | 10.90 |
| TT-MW204I | 3/20/2020 | Submersible Pump | 90 gallons | 7.23 |

NTUs - Nephelometric Turbidity Units

# FIGURES

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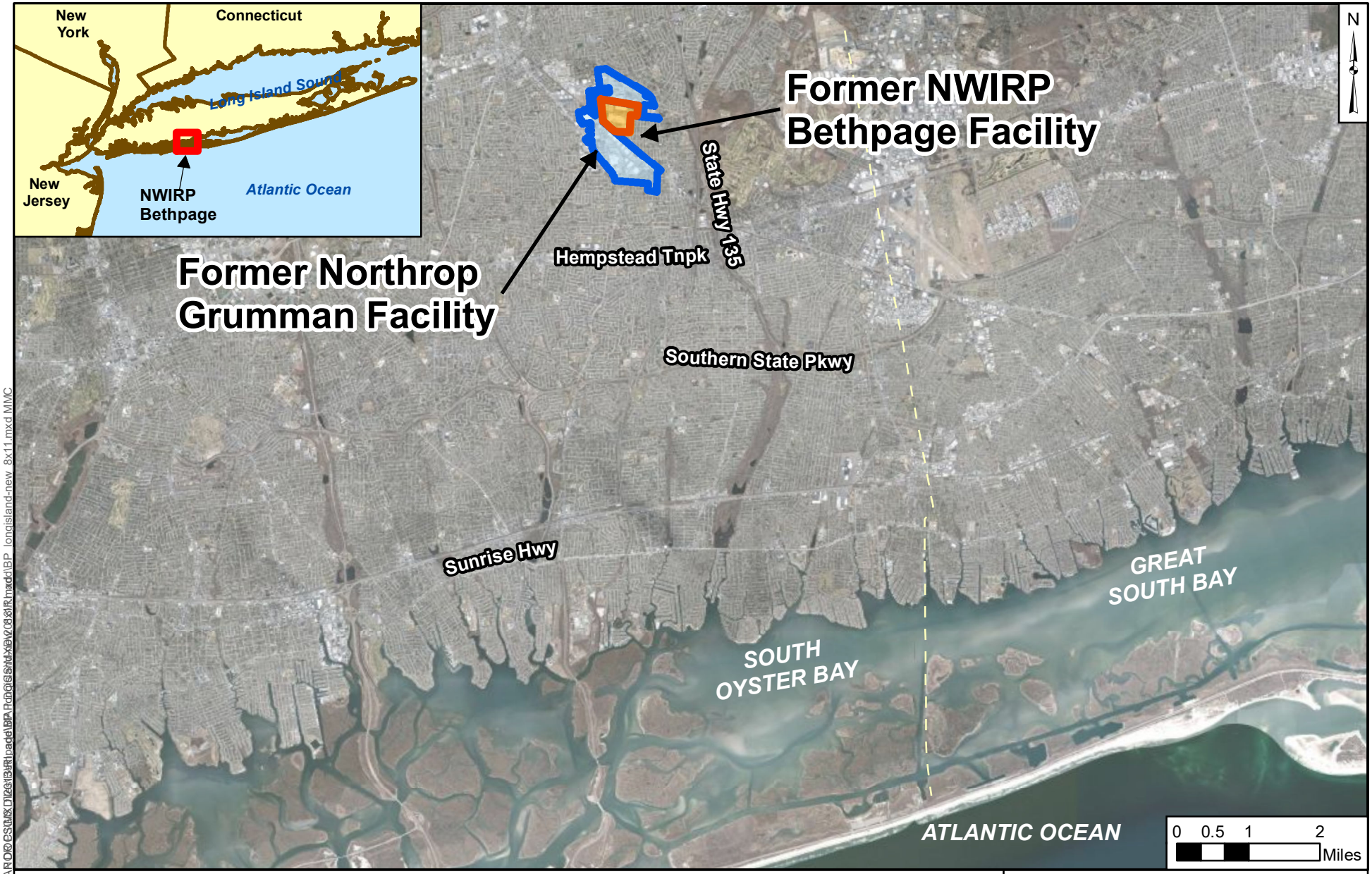


**GENERAL LOCATION MAP**
**NWIRP BETHPAGE, NEW YORK**

NAVFAC Naval Facilities Engineering Systems Command

| DRAWN BY | DATE | CTO |
|---|---|---|
| MS | 02/12/21 | 112G08005-WE16 |
| CHECKED BY | DATE | FIGURE NUMBER |
| EW | 05/17/21 | **1-1** |

NOR: P:\GIS files\Bethpage\MAP DOCS\MXD\2021\Final\added\BP_longislandnew_8x11.mxd MMC

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GROUNDWATER FLOW

N

TT-MW203I
VPB203
TT-MW203D
TT-MW203D1
TT-MW203D2

TT-MW202I
TT-MW202S
VPB202
BPS1-TT-MW202D1
BPS1-TT-MW202D

TT-MW204S
TT-MW204I

MW310S
MW311I
MW311S
MW312I
MW312S
MW309S
MW309I
MW309D
MW313S
MW308S
MW308I
MW308D
MW301D
MW301I
MW301S
MW314I
MW314S
HN-27S
HN-27I
MW03
MW04
MW09
HN-24IR
HN-24S
TT-MW201D
TT-MW201D1
VPB201
MW08
MW10
MW07
MW06
HN-29IR
HN-29D
FW-03
FW-02
FW-01
MW302I2
MW302S
MW302D
MW302I1
MW303D
MW303S
MW303I2
MW303I1
MW304S
MW304I1
MW304I2
MW304D
MW305S
MW305I
MW305D
MW306I
MW306S
MW306D
MW307I
MW307D
MW307S

AEROSPACE BOULEVARD
Enterprise Pl
Parking Lot
S Oyster Bay Rd
Plant 17 North
Site 3- Salvage Storage Area
SLUDGE DRYING BEDS
NORTHEAST RECHARGE BASIN
Site 2- Recharge Basin Area
SOUTHWEST RECHARGE BASIN
SOUTHEAST RECHARGE BASIN
Plant 3
Site 1- Former Drum Marshalling Area
Sycamore Ave
Site 4 Former UST Area
Plant 10
LONG ISLAND RAILROAD
Plant 17 South
Mulberry St
Madison Ave
Jerry Ln
Hazel St
Grumman Rd W
Maple Ave
Thomas Ave
10th St
9th St
8th St
11th St
N 7th St
N 6th St

0 300 600 Feet

## Legend

- Monitoring Well Location
- Vertical Profile Boring
- Site Boundaries
- 1997 NWIRP Bethpage Property

NYGIS March 2016 Aerial Photo

N:\R\GIS files\Bethpage\MAP DOCS\MXD\BP_OU2_2020\WP_MWBP_onsite_mwinstall.mxd KMB

# TT-MW202, TT-MW203 AND TT-MW204 LOCATION MAP BETHPAGE, NEW YORK

Naval Facilities Engineering Systems Command

| DRAWN BY | DATE | CTO |
|---|---|---|
| MS | 05/17/21 | 112G08005-WE13 |
| CHECKED BY | DATE | FIGURE NUMBER |
| EW | 05/17/21 | 2 |

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# APPENDIX A
## TT-MW202S, TT-MW202I, AND TT-MW203I

1. **BP-TT-MW202S, BP-TT-MW202I, AND BP-TT-MW203I Boring Logs**
2. **BP-TT-MW202I, AND BP-TT-MW203I Gamma Logs**
3. **BP-TT-MW202S, BP-TT-MW202I, AND BP-TT-MW203I Well Construction Logs**
4. **BP-TT-MW202S, BP-TT-MW202I, AND BP-TT-MW203I Well Development Logs**

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## 1. BP-TT-MW202S, BP-TT-MW202I, AND BP-TT-MW203I Boring Logs

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# WELL NUMBER TT-MW202S



**Tetra Tech**

**CLIENT** NAVFAC MIDLANT
**PROJECT NAME** NWIRP Bethpage OU2
**PROJECT NUMBER** 112G08005-WE13
**PROJECT LOCATION** BETHPAGE
**DATE STARTED** 1/2/19 **COMPLETED** 1/3/19
**GROUND ELEVATION** 126.8 **HOLE SIZE** 8.75 inches
**DRILLING CONTRACTOR** DELTA WELL & PUMP
**DRILLING METHOD** Hollow Stem Auger
**GROUND WATER LEVEL** ---
**LOGGED BY** Vince Shickora
**NORTHING** 215099.9 ft **EASTING** 1122993.3 ft **DATUM:** NVD 88
**NOTES**

| DEPTH (ft) | SAMPLE TYPE NUMBER | REMARKS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | | WELL DIAGRAM |
|---|---|---|---|---|---|---|---|
| 0 | | moist | ASPHALT | | 0.5 (ASPHALT) Hard, black | 126.3 | Casing Top Elev: 126.36 (ft)<br>Casing Type: PVC Sch. 40<br>top of riser pipe |
| | | | SP | | 1.0 Hard, gray concrete | 125.8 | |
| | | | SP | | 5.0 | 121.8 | |
| | | | | | 6.0 (SP) Medium dense, dark brown, F-M sand w/ some F-gravel, trace silt | 120.8 | |
| 10 | | | SW | | (SP) Medium dense, brown, F-M sand w/ some F-M gravel, trace silt<br>(SW) Medium dense, brown, F-C sand w/ some F-M gravel, trace silt | | |
| | | | | | 19.0 | 107.8 | Bentonite Cement Grout |
| 20 | | | SP | | 21.0 (SP) Medium dense, brown, F-M sand, trace C-sand and silt | 105.8 | |
| | | | SW | | (SW) Medium dense, brown, F-C sand w/ some F-M gravel | | |
| 30 | | | | | | | |
| | | | | | 39.0 | 87.8 | Bentonite Seal |
| 40 | | | SW | | (SW) Medium dense, brown, F-C sand w/ F-M gravel, trace silt | | Secondary Sand Pack #0 |
| 50 | | very moist<br>wet | | | 52.0 | 74.8 | Primary Sand Pack #1 |
| | | | SP | | (SP) Medium dense, light brown, F-M sand, little C-sand, trace F-gravel | | |
| 60 | | | | | | | 2" Diameter Schedule 40 PVC, 10 Slot Well Screen (54-64 ft bgs) |
| | | | | | 65.0 | 61.8 | Sand to Bottom |
| | | | | | Bottom of borehole at 65.0 feet. | | |

TT MW BORING-MW CONSTRUCTION - GINT STD US LAB.GDT - 7/24/20 14:53 - C:\GINT\BETHPAGE\BP_NIRIS.GPJ

# Tetra Tech

## WELL NUMBER TT-MW202I



**CLIENT** NAVFAC MIDLANT
**PROJECT NAME** NWIRP Bethpage OU2
**PROJECT NUMBER** 112G08005-WE13
**PROJECT LOCATION** BETHPAGE
**DATE STARTED** 12/18/19 **COMPLETED** 12/19/19
**GROUND ELEVATION** 126.7 **HOLE SIZE** 8.75 inches
**DRILLING CONTRACTOR** DELTA WELL & PUMP
**DRILLING METHOD** Hollow Stem Auger
**GROUND WATER LEVEL** ---
**LOGGED BY** Vince Shickora
**NORTHING** 215088.1 ft **EASTING** 1122994.8 ft **DATUM:** NVD 88
**NOTES**

| DEPTH (ft) | SAMPLE TYPE NUMBER | REMARKS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | | WELL DIAGRAM |
|---|---|---|---|---|---|---|---|
| 0 | | moist | ASPHALT | | 0.5 (ASPHALT) Hard, black | 126.2 | |
| | | | SP | | 1.0 Hard, gray, concrete | 125.7 | |
| | | | SP | | 6.0 (SP) Medium dense, dark brown, F-M sand, some F-gravel, trace silt | 120.7 | |
| 10 | | | SW | | 9.0 (SP) Medium dense, brown, sme F-M gravel, trace silt | 117.7 | |
| | | | | | (SW) Medium dense, brown, F-C sand, some F-M gravel, trace silt | | |
| 20 | | | SP | | 20.0 | 106.7 | |
| | | | | | 22.0 (SP) Medium dense, brown, F-M sand , trace C-sand and silt | 104.7 | |
| | | | SW | | (SW) Medium dense, brown, F-C sand with F-M gravel | | |
| 30 | | | | | | | |
| | | | | | 38.0 | 88.7 | |
| 40 | | very moist | SW | | 40.0 (SW) Medium dense, brown, F-C sand and F-M gravel, trace silt | 86.7 | |
| | | | SW | | (SW) Medium dense, brown, F-C sand with F-C gravel | | |
| 50 | | | | | 50.0 | 76.7 | |
| | | | SW | | 53.0 (SW) Medium dense, brown, F-C sand with F-M gravel | 73.7 | |
| | | wet | SP | | 57.0 (SP) Medium dense, light brown, F-M sand, some C-sand and F-gravel | 69.7 | |
| 60 | | | SP | | (SP) Medium dense, light brown, F-M sand, little C-sand and F-gravel | | Bentonite Cement Grout |
| | | | | | 68.0 | 58.7 | |
| 70 | | | SP | | (SP) Medium dense, brown, F-M sand, little C-sand, trace silt | | |
| | | wet slurry | | | 79.0 | 47.7 | |
| 80 | | | SP | | 83.0 (SP) Medium dense, light brown, F-sand, some M-sand, trace silt | 43.7 | |
| | | wet | | | (SP) Medium dense, light brown, F-M sand, some M-sand, trace silt | | |
| 90 | | wet slurry | SP | | | | |
| | | | | | 93.0 | 33.7 | |
| | | | SP | | (SP) Medium dense, brown, F-sand, little M-sand, trace silt | | |
| 100 | | | | | 100.0 | 26.7 | |

*(Continued Next Page)*

TT MW BORING-MW CONSTRUCTION - GINT STD US LAB.GDT - 5/6/21 16:24 - P:\GINT FILES\PROJECTS\BETHPAGE\BP_NIRIS.GPJ

# Tetra Tech

# WELL NUMBER TT-MW202I



**CLIENT** NAVFAC MIDLANT **PROJECT NAME** NWIRP Bethpage OU2

**PROJECT NUMBER** 112G08005-WE13 **PROJECT LOCATION** BETHPAGE

| DEPTH (ft) | SAMPLE TYPE NUMBER | REMARKS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | | WELL DIAGRAM |
|---|---|---|---|---|---|---|---|
| 100 | | | | | | | |
| | | wet | SP | | (SP) Medium dense, brown, F-sand, little M-sand, trace C-sand and silt | | |
| 110 | | | | | 112.0 | 14.7 | |
| | | | SP | | (SP) Medium dense, VF-F sand, little M-sand, trace silt and C-sand | | |
| 120 | | possible clay based on drilling wet | | | 123.0 | 3.7 | - Bentonite Seal |
| | | | SP | | 125.0 (SP) Dense, brown, VF-F sand, little M-sand, trace silt and C-sand | 1.7 | |
| | | | SP | | (SP) Medium dense, brown, VF-F sand, trace M-sand and silt | | - Secondary Sand Pack #0 |
| 130 | | | | | 137.0 | -10.3 | - Primary Sand Pack #1 |
| | | | SP | | (SP) Medium dense, brown, VF-F sand, little M-sand, trace silt | | |
| 140 | | | | | | | |
| | | | | | | | - 2" Diameter Schedule 40 PVC, 10 Slot Well Screen (140-150 ft bgs) |
| 150 | | | | | 151.0 | -24.3 | |
| | | | SP | | (SP) Medium dense, brown, VF-F sand, little M-sand, trace silt | | |
| 160 | | | | | 162.0 | -35.3 | - Formation Naturally Collapsed |
| | | possible clay based on drilling | CH | | 165.0 (CH) Dense, brown, Possible Clay Zone | -38.3 | |

Bottom of borehole at 165.0 feet.

TT MW BORING-MW CONSTRUCTION - GINT STD US LAB.GDT - 5/6/21 16:24 - P:\GINT FILES\PROJECTS\BETHPAGE\BP_NIRIS.GPJ

# WELL NUMBER TT-MW203I



**Tetra Tech**

**CLIENT** NAVFAC MIDLANT **PROJECT NAME** NWIRP Bethpage OU2

**PROJECT NUMBER** 112G08005-WE13 **PROJECT LOCATION** BETHPAGE

**DATE STARTED** 1/7/19 **COMPLETED** 1/8/19 **GROUND ELEVATION** 127.6 **HOLE SIZE** 8.75 inches

**DRILLING CONTRACTOR** DELTA WELL & PUMP **DRILLING METHOD** Hollow Stem Auger

**GROUND WATER LEVEL** --- **LOGGED BY** Vince Shickora

**NORTHING** 215525.6 ft **EASTING** 1123810 ft **DATUM:** NVD 88

**NOTES**

| DEPTH (ft) | SAMPLE TYPE NUMBER | REMARKS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | | WELL DIAGRAM |
|---|---|---|---|---|---|---|---|
| 0 | | very moist | ML | | 2.0 (ML) Soft, dark brown, sandy silt with F-gravel (grass/roots) | 125.6 | Casing Top Elev: 127.04 (ft)<br>Casing Type: PVC Sch. 40 |
| | | | SW | | 6.0 (SW) Soft, brown, F-C sand, some silt and F-gravel | 121.6 | |
| 10 | | wet<br>very moist<br>to wet | ML | | 11.0 (ML) Soft, dark brown, VF-sandy silt, some clay and F-C sand | 116.6 | |
| | | very moist | SW | | 15.0 (SW) Medium dense, brown, F-C sand with some silt and F-gravel | 112.6 | |
| 20 | | very moist<br>to wet,<br>dark brown<br>very moist | SM | | (SM) Medium dense, brown, silty F-C sand with F-M gravel | | |
| | | | | | 25.0 | 102.6 | |
| 30 | | very moist<br>to wet<br>wet, dark<br>brown | SW | | (SW) Medium dense, brown, F-C sand and F-M gravel, trace silt | | |
| 40 | | some<br>C-gravel | | | | | |
| 50 | | | | | 50.0 | 77.6 | |
| | | | SW | | 53.0 (SW) Medium dense, brown, F-C sand with F-C gravel, trace silt | 74.6 | |
| 60 | | | | | (SW) Medium dense, brown, F-C sand with F-M gravel, trace silt | | Bentonite Cement Grout |
| 70 | | | | | | | |
| 80 | | | SW | | | | |
| 90 | | | | | | | |
| | | | | | 97.0 | 30.6 | |
| 100 | | | SP | | 100.0 (SP) Medium dense, dark brown, F-M sand, little | 27.6 | |

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TT MW BORING-MW CONSTRUCTION - GINT STD US LAB.GDT - 7/24/20 14:53 - C:\GINT\BETHPAGE\BP_NIRIS.GPJ

# WELL NUMBER TT-MW203I



**Tetra Tech**

**CLIENT** NAVFAC MIDLANT **PROJECT NAME** NWIRP Bethpage OU2

**PROJECT NUMBER** 112G08005-WE13 **PROJECT LOCATION** BETHPAGE

| DEPTH (ft) | SAMPLE TYPE NUMBER | REMARKS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 100 | | | SW | | 102.0 silt, C-sand, and F-gravel 25.6 | |
| | | | | | (SW) Medium dense, dark brown, F-M sand, some C-sand, trace F-gravel and silt | |
| | | | SP | | (SP) Medium dense, brown, F-M sand, little silt, trace C-sand | |
| 110 | | | | | 112.0 15.6 | |
| | | | SP | | 115.0 (SP) Medium dense, brown, VF-F sand, little M-sand, trace silt 12.6 | |
| | | | SP | | (SP) Medium dense, light brown, VF-F sand, little M-sand, trace silt | Bentonite Seal |
| 120 | | | | | 125.0 2.6 | Secondary Sand Pack #0 |
| | | | SP | | (SP) Medium dense, light brown-orange, VF-F sand, little M-sand, trace silt | |
| 130 | | | | | 134.0 -6.4 | Primary Sand Pack #1 |
| | | | SP | | (SP) Medium dense, orange-brown, VF-F sand, little M-sand, trace silt | |
| 140 | | | | | 149.0 -21.4 | 2" Diameter Schedule 40 PVC, 10 Slot Well Screen (136-146 ft bgs) |
| 150 | | | SP | | (SP) Dense to medium dense, orange-brown, VF-F sand, little M-sand, trace silt 154.0 -26.4 | Sump |
| | | | SP | | (SP) Medium dense, orange-brown, VF-F sand, little M-sand, trace silt 158.0 -30.4 | Sand to Bottom |
| | | possible clay based on drilling | SP | | 159.0 -31.4 | |
| | | | SP | | 160.0 (SP) Medium dense, light brown, VF-F sand, little M-sand, trace silt -32.4 | |
| | | | | | (SP) Dense, light brown, VF-F sand, little M-sand, trace silt | |
| | | | | | Bottom of borehole at 159.0 feet. | |

TT MW BORING-MW CONSTRUCTION - GINT STD US LAB.GDT - 7/24/20 14:53 - C:\GINT\BETHPAGE\BP_NIRIS.GPJ

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## 2. BP-TT-MW202I, AND BP-TT-MW203I Gamma Logs

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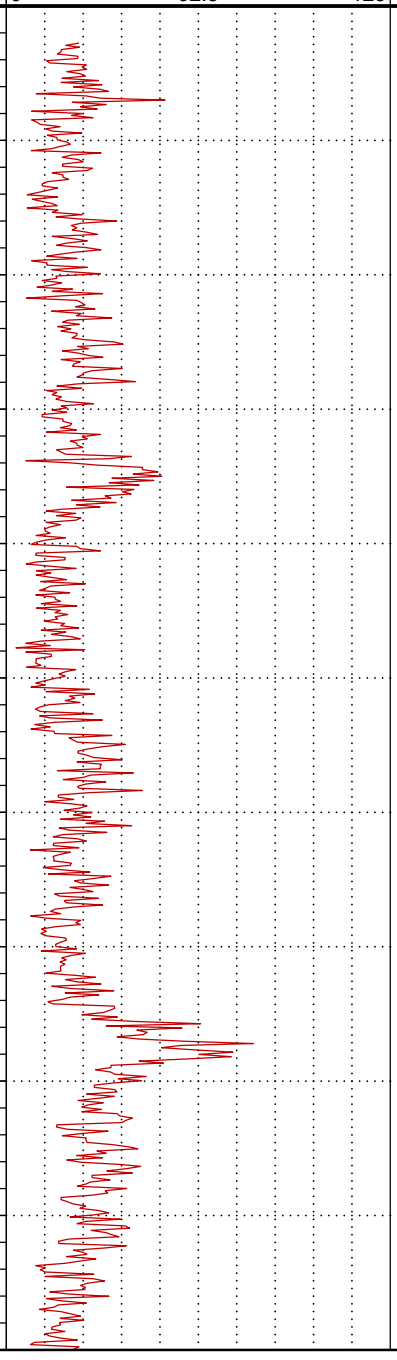
# BORING NUMBER TT-MW202I



**Tetra Tech**

**CLIENT** NAVFAC MIDLANT
**PROJECT NAME** NWIRP Bethpage OU2
**PROJECT NUMBER** 112G08005-WE13
**PROJECT LOCATION** BETHPAGE
**DATE STARTED** 12/18/19 **COMPLETED** 12/19/19
**TOTAL DEPTH (ft):** 165 **HOLE SIZE** 8.75 inches
**DRILLINGCONTRACTOR** DELTA WELL & PUMP
**LOGGED BY** Vince Shickora
**DRILLINGMETHOD** Hollow Stem Auger
**NORTHING** 215088.1 ft **EASTING** 1122994.8 ft
**GROUND ELEVATION** 126.7 ft NVD 88
**NOTES**




| ENVIRONMENTAL DATA (µg/L) | FORMATION | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | |
|---|---|---|---|---|---|
| | | ASPHALT | | 0.5 (ASPHALT) Hard, black | 126.2 |
| | | | | 1.0 Hard, gray, concrete | 125.7 |
| | | SP | | 6.0 (SP) Medium dense, dark brown, F-M sand, some F-gravel, trace silt | 120.7 |
| | | SP | | 9.0 (SP) Medium dense, brown, sme F-M gravel, trace silt | 117.7 |
| | | SW | | (SW) Medium dense, brown, F-C sand, some F-M gravel, trace silt | |
| | | | | 20.0 | 106.7 |
| | | SP | | 22.0 (SP) Medium dense, brown, F-M sand , trace C-sand and silt | 104.7 |
| | | SW | | (SW) Medium dense, brown, F-C sand with F-M gravel | |
| | | | | 38.0 | 88.7 |
| | | SW | | 40.0 (SW) Medium dense, brown, F-C sand and F-M gravel, trace silt | 86.7 |
| | | SW | | (SW) Medium dense, brown, F-C sand with F-C gravel | |
| | | | | 50.0 | 76.7 |
| | | SW | | 53.0 (SW) Medium dense, brown, F-C sand with F-M gravel | 73.7 |
| | | SP | | 57.0 (SP) Medium dense, light brown, F-M sand, some C-sand and F-gravel | 69.7 |
| | | SP | | (SP) Medium dense, light brown, F-M sand, little C-sand and F-gravel | |
| | | | | 68.0 | 58.7 |
| | | SP | | (SP) Medium dense, brown, F-M sand, little C-sand, trace silt | |
| | | | | 79.0 | 47.7 |
| | | SP | | 83.0 (SP) Medium dense, light brown, F-sand, some M-sand, trace silt | 43.7 |
| | | SP | | (SP) Medium dense, light brown, F-M sand, some M-sand, trace silt | |
| | | | | 93.0 | 33.7 |
| | | SP | | (SP) Medium dense, brown, F-sand, little M-sand, trace silt | |
| | | | | 100.0 | 26.7 |

VPB-GAMMA LOG - GINT STD US.GDT - 7/23/20 18:12 - C:\GINT\BETHPAGE\BP_NIRIS.GPJ

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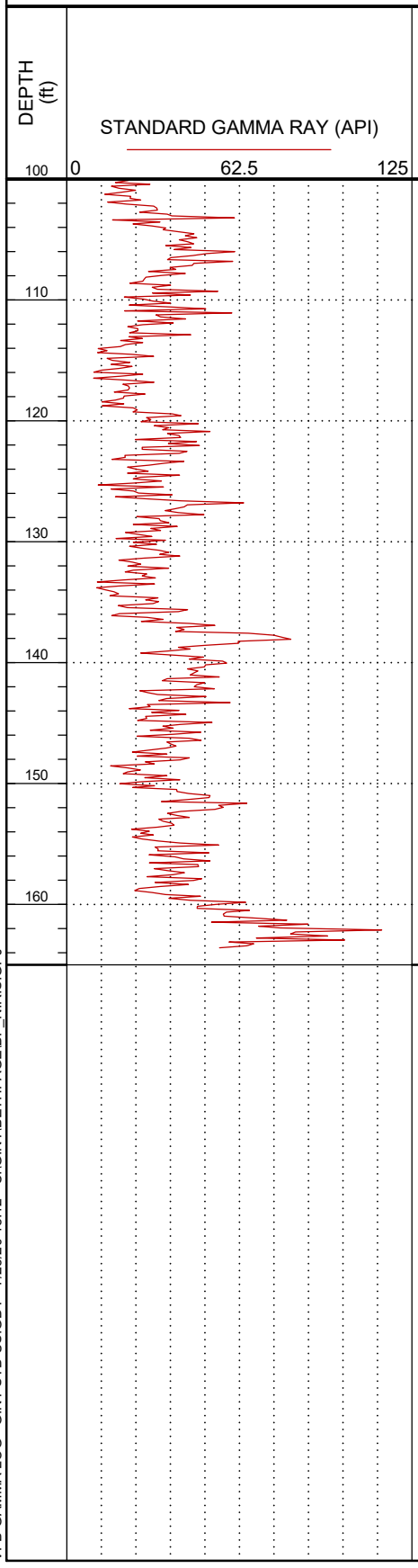
# BORING NUMBER TT-MW202I



**Tetra Tech**

**CLIENT** NAVFAC MIDLANT **PROJECT NAME** NWIRP Bethpage OU2

**PROJECT NUMBER** 112G08005-WE13 **PROJECT LOCATION** BETHPAGE




| ENVIRONMENTAL DATA (µg/L) | FORMATION | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | |
|---|---|---|---|---|---|
| | | SP | | (SP) Medium dense, brown, F-sand, little M-sand, trace C-sand and silt | |
| | | | | 112.0 | 14.7 |
| | | SP | | (SP) Medium dense, VF-F sand, little M-sand, trace silt and C-sand | |
| | | | | 123.0 | 3.7 |
| | | SP | | 125.0 (SP) Dense, brown, VF-F sand, little M-sand, trace silt and C-sand | 1.7 |
| | | SP | | (SP) Medium dense, brown, VF-F sand, trace M-sand and silt | |
| | | | | 137.0 | -10.3 |
| | | SP | | (SP) Medium dense, brown, VF-F sand, little M-sand, trace silt | |
| | | | | 165.0 | -38.3 |
| | | | | Bottom of borehole at 165.0 feet. | |

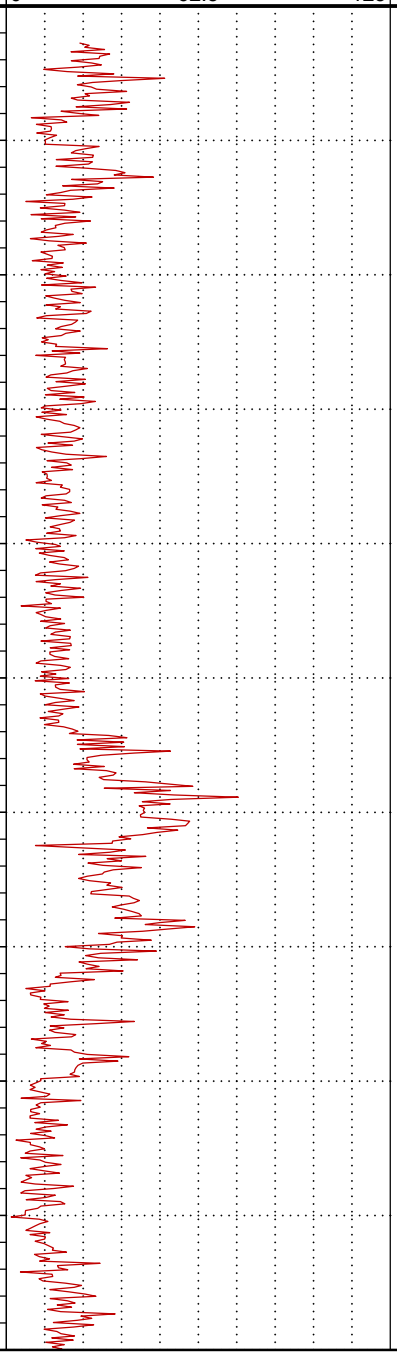
VPB-GAMMA LOG - GINT STD US.GDT - 7/23/20 18:12 - C:\GINT\BETHPAGE\BP_NIRIS.GPJ

# BORING NUMBER TT-MW203I



**Tetra Tech**

**CLIENT** NAVFAC MIDLANT
**PROJECT NAME** NWIRP Bethpage OU2
**PROJECT NUMBER** 112G08005-WE13
**PROJECT LOCATION** BETHPAGE
**DATE STARTED** 1/7/19 **COMPLETED** 1/8/19
**TOTAL DEPTH (ft):** 159 **HOLE SIZE** 8.75 inches
**DRILLINGCONTRACTOR** DELTA WELL & PUMP
**LOGGED BY** Vince Shickora
**DRILLINGMETHOD** Hollow Stem Auger
**NORTHING** 215525.6 ft **EASTING** 1123810 ft
**GROUND ELEVATION** 127.6 ft NVD 88
**NOTES**




| ENVIRONMENTAL DATA (µg/L) | FORMATION | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | |
|---|---|---|---|---|---|
| | | ML | | 2.0 (ML) Soft, dark brown, sandy silt with F-gravel (grass/roots) | 125.6 |
| | | SW | | 6.0 (SW) Soft, brown, F-C sand, some silt and F-gravel | 121.6 |
| | | ML | | 11.0 (ML) Soft, dark brown, VF-sandy silt, some clay and F-C sand | 116.6 |
| | | SW | | 15.0 (SW) Medium dense, brown, F-C sand with some silt and F-gravel | 112.6 |
| | | SM | | (SM) Medium dense, brown, silty F-C sand with F-M gravel | |
| | | | | 25.0 | 102.6 |
| | | SW | | (SW) Medium dense, brown, F-C sand and F-M gravel, trace silt | |
| | | | | 50.0 | 77.6 |
| | | SW | | 53.0 (SW) Medium dense, brown, F-C sand with F-C gravel, trace silt | 74.6 |
| | | SW | | (SW) Medium dense, brown, F-C sand with F-M gravel, trace silt | |
| | | | | 97.0 | 30.6 |
| | | SP | | 100.0 (SP) Medium dense, dark brown, F-M | 27.6 |

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VPB-GAMMA LOG - GINT STD US.GDT - 7/23/20 18:12 - C:\GINT\BETHPAGE\BP_NIRIS.GPJ

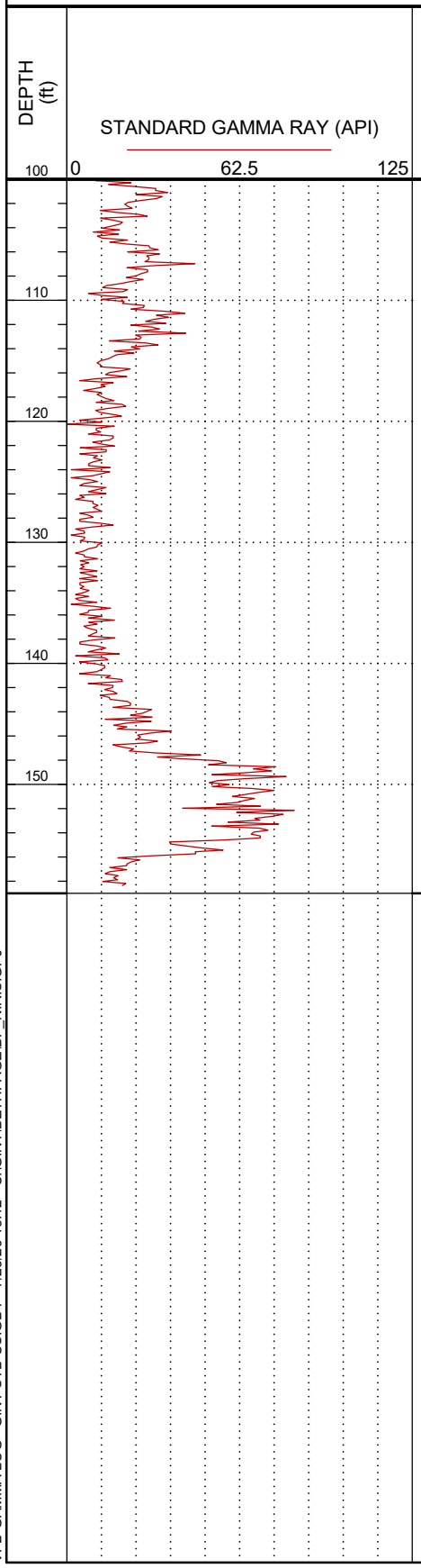
# BORING NUMBER TT-MW203I



**Tetra Tech**

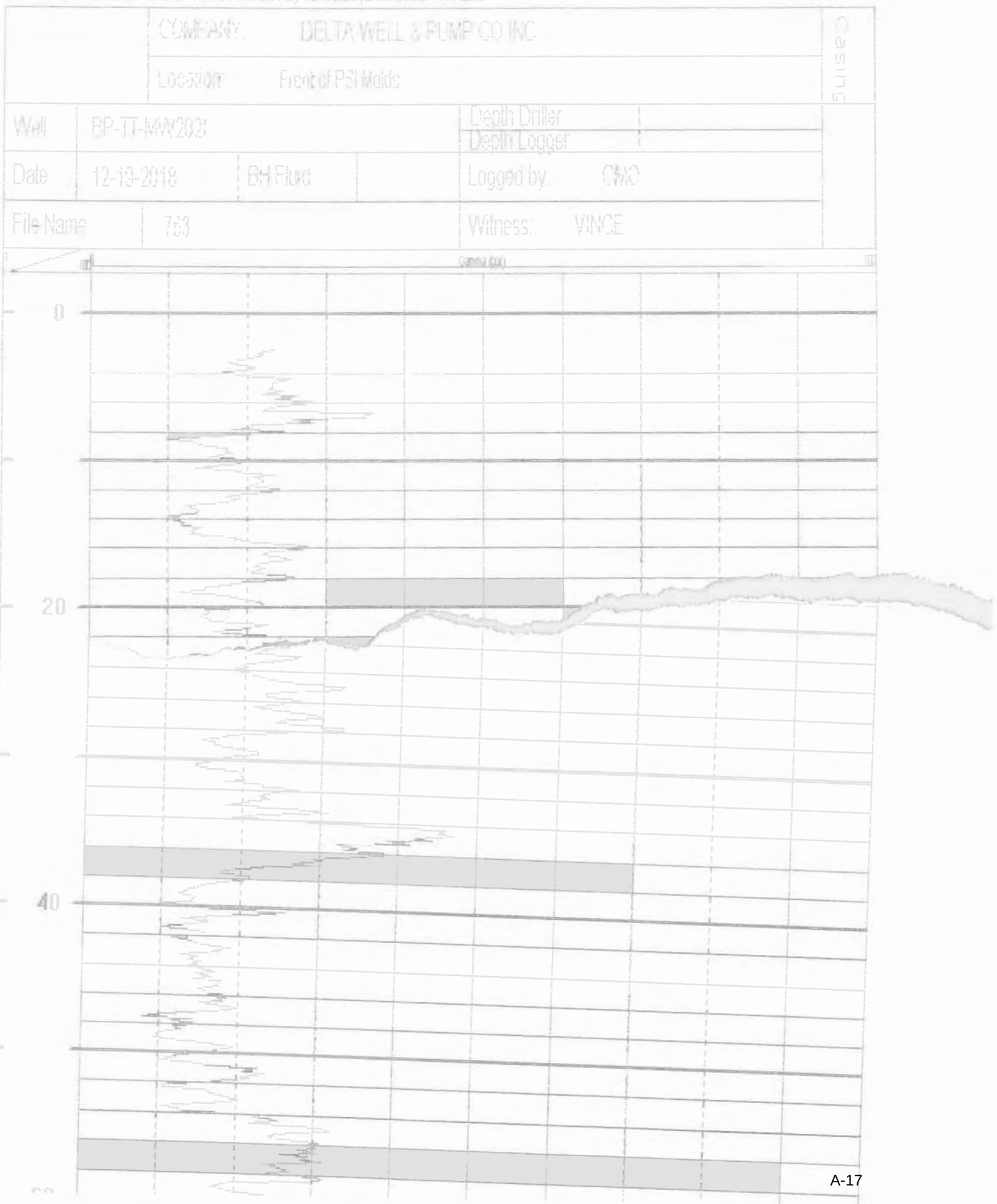
**CLIENT** NAVFAC MIDLANT **PROJECT NAME** NWIRP Bethpage OU2

**PROJECT NUMBER** 112G08005-WE13 **PROJECT LOCATION** BETHPAGE




| ENVIRONMENTAL DATA (µg/L) | FORMATION | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | |
|---|---|---|---|---|---|
| | | SW | | 102.0 sand, little silt, C-sand, and F-gravel | 25.6 |
| | | SP | | (SW) Medium dense, dark brown, F-M sand, some C-sand, trace F-gravel and silt | |
| | | | | (SP) Medium dense, brown, F-M sand, little silt, trace C-sand | |
| | | SP | | 112.0 | 15.6 |
| | | | | 115.0 (SP) Medium dense, brown, VF-F sand, little M-sand, trace silt | 12.6 |
| | | SP | | (SP) Medium dense, light brown, VF-F sand, little M-sand, trace silt | |
| | | | | 125.0 | 2.6 |
| | | SP | | (SP) Medium dense, light brown-orange, VF-F sand, little M-sand, trace silt | |
| | | | | 134.0 | -6.4 |
| | | SP | | (SP) Medium dense, orange-brown, VF-F sand, little M-sand, trace silt | |
| | | | | 149.0 | -21.4 |
| | | SP | | 154.0 (SP) Dense to medium dense, orange-brown, VF-F sand, little M-sand, trace silt | -26.4 |
| | | SP | | 158.0 (SP) Medium dense, orange-brown, VF-F sand, little M-sand, trace silt | -30.4 |
| | | SP | | 159.0 | -31.4 |
| | | SP | | 160.0 (SP) Medium dense, light brown, VF-F sand, little M-sand, trace silt | -32.4 |
| | | | | (SP) Dense, light brown, VF-F sand, little M-sand, trace silt | |
| | | | | Bottom of borehole at 159.0 feet. | |

VPB-GAMMA LOG - GINT STD US.GDT - 7/23/20 18:12 - C:\GINT\BETHPAGE\BP_NIRIS.GPJ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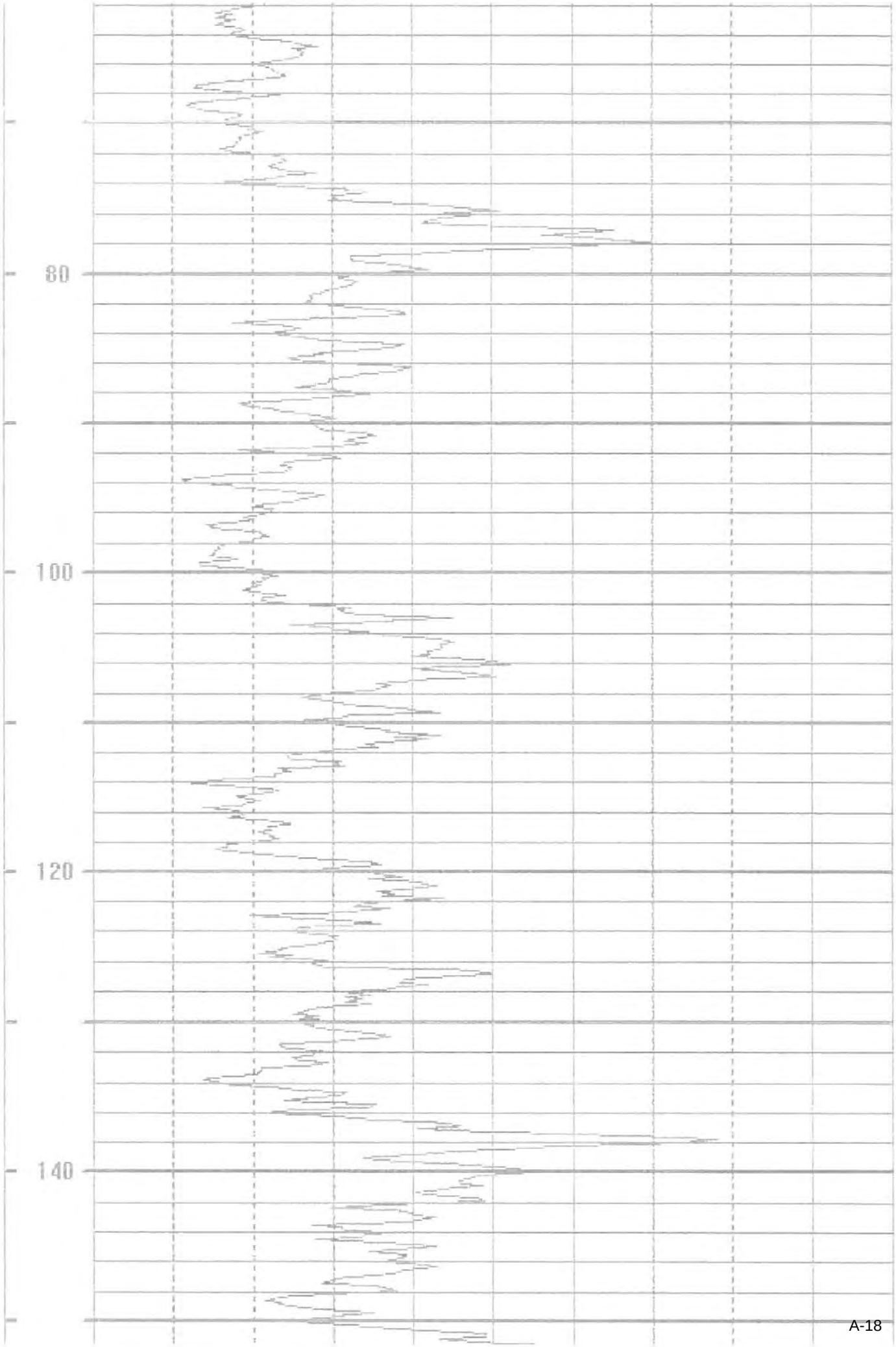
Location: Front of PSI Molds
Casing
Well: BP-TT-MW202
Depth Driller
Depth Logger
Date: 12-19-2018
BH Fluid
Logged by: CWC
File Name: 7&3
Witness: VINCE
0
20
40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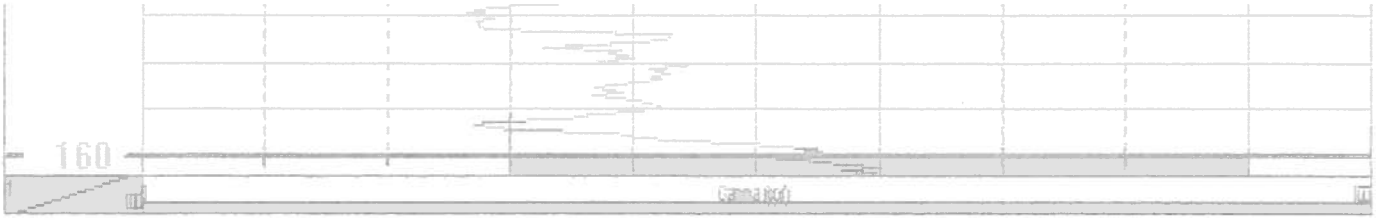
100
120
140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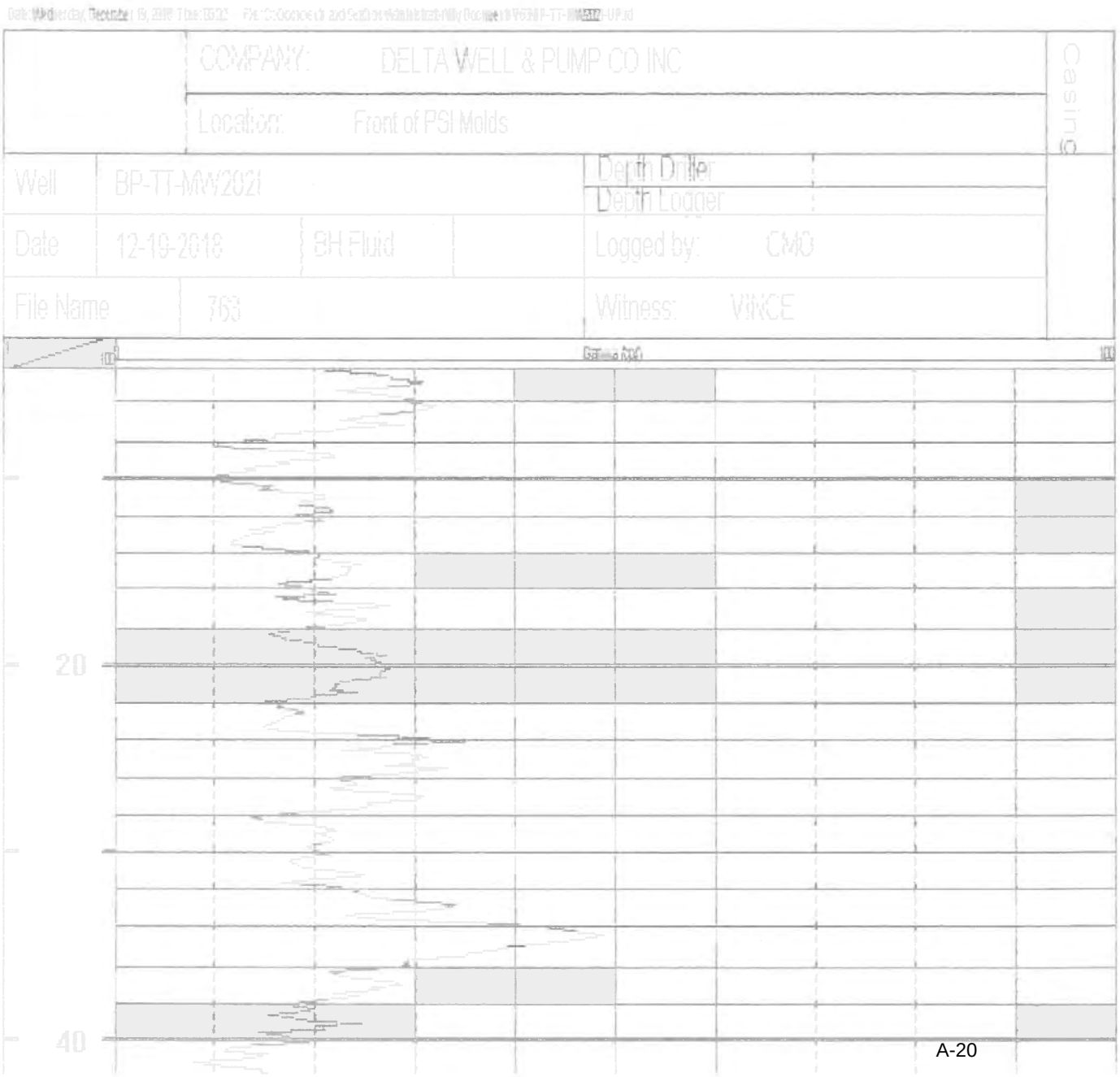
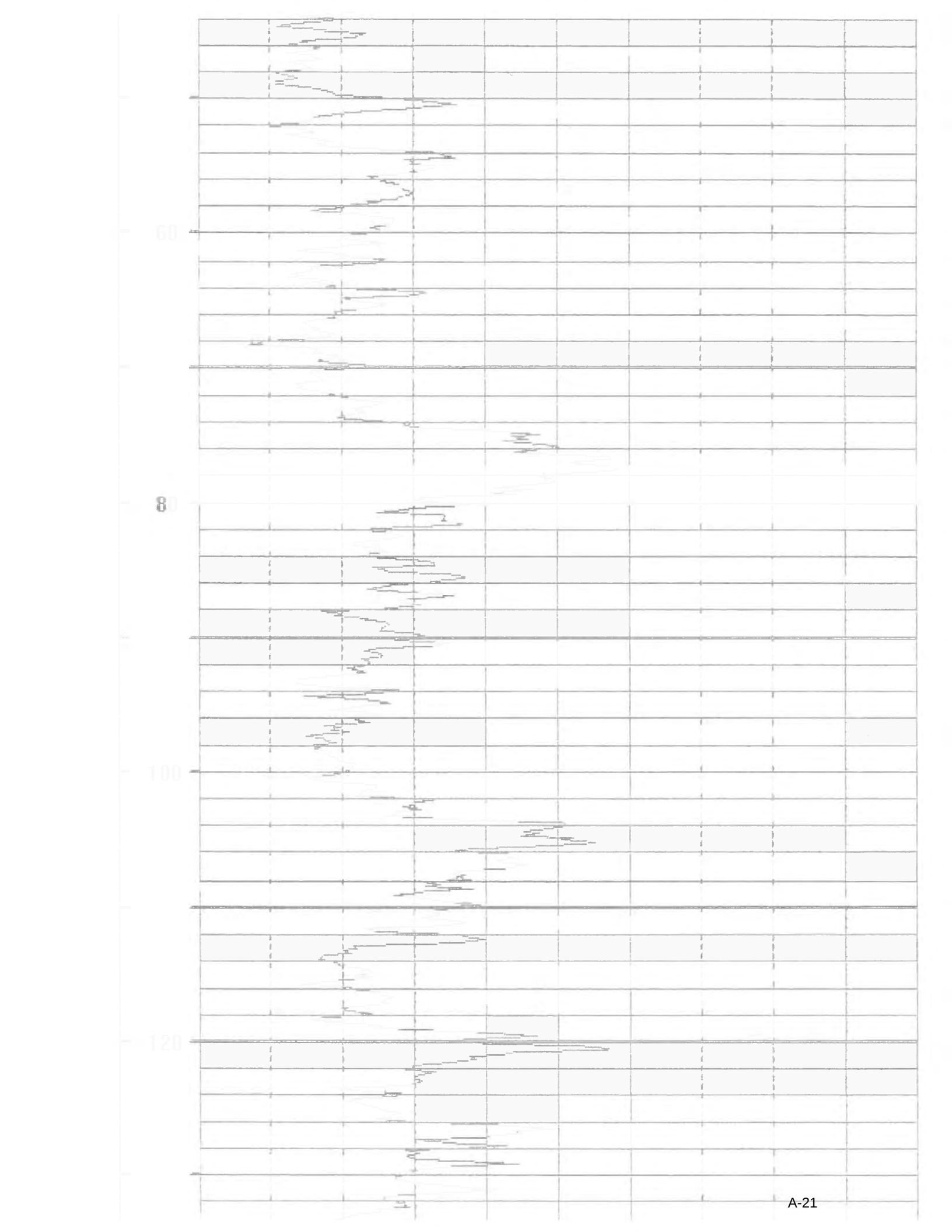

COMPANY: DELTA WELL & PUMP CO INC
Location: Front of PSI Molds
Casing
Well BP-TT-MW2021
Depth Driller
Depth Logger
Date 12-19-2018
BH Fluid
Logged by: CMO
File Name 763
Witness: VINCE
20
40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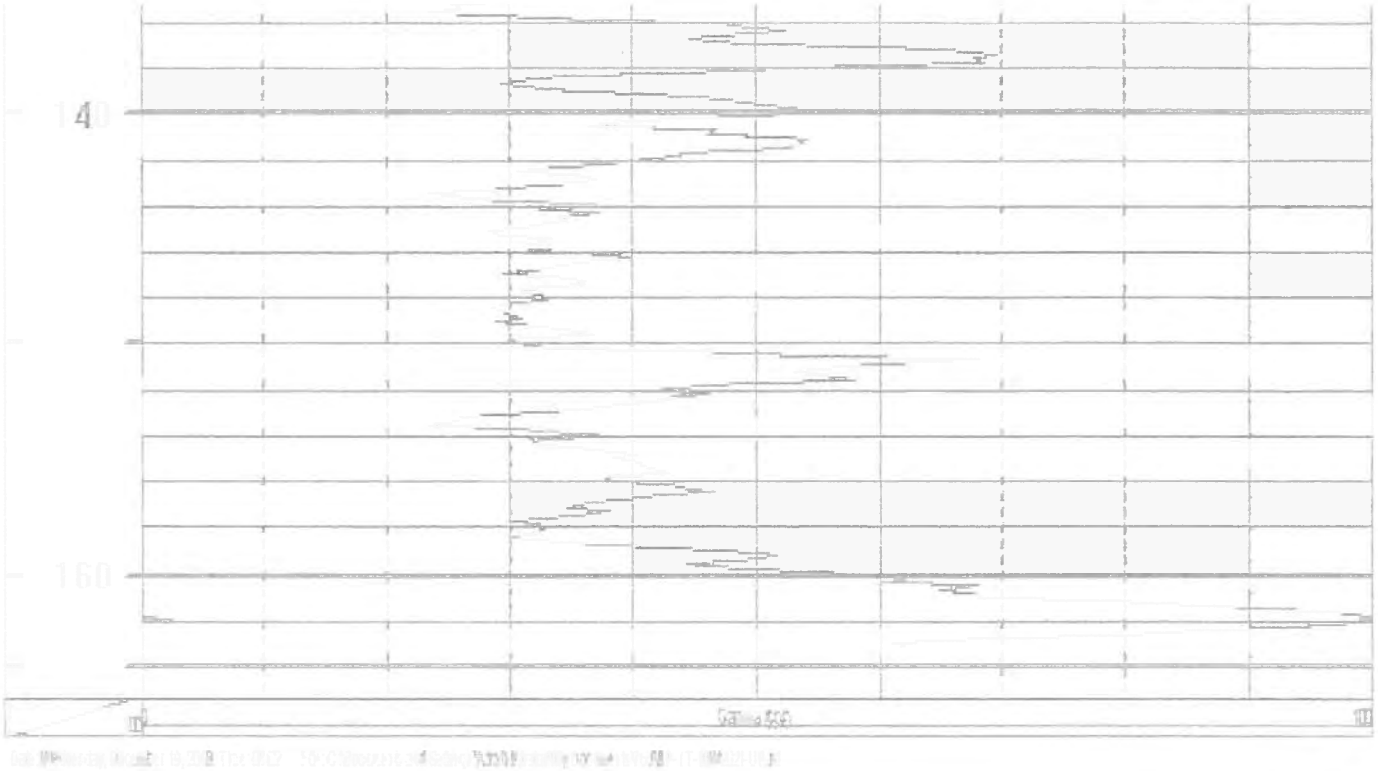
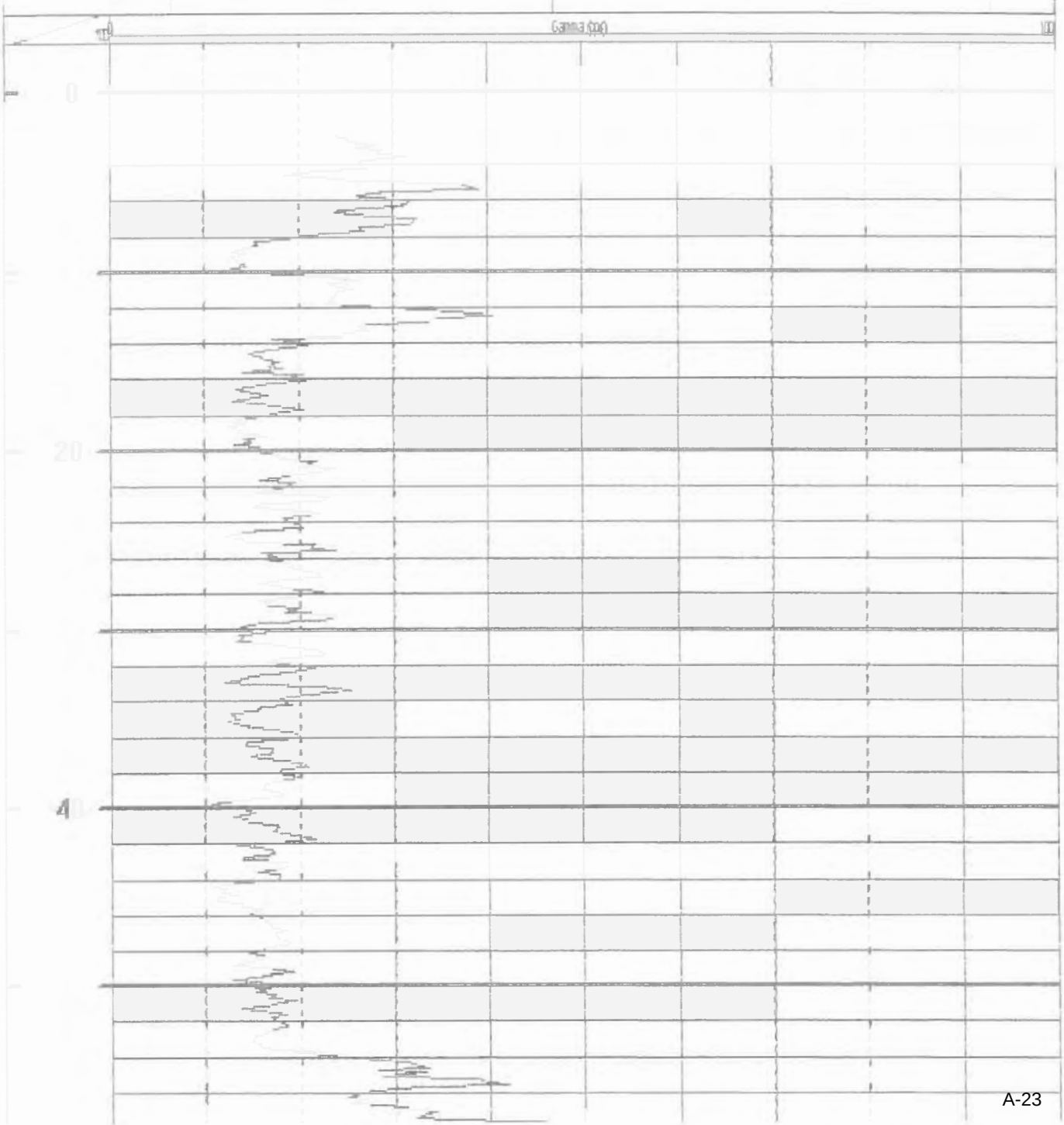
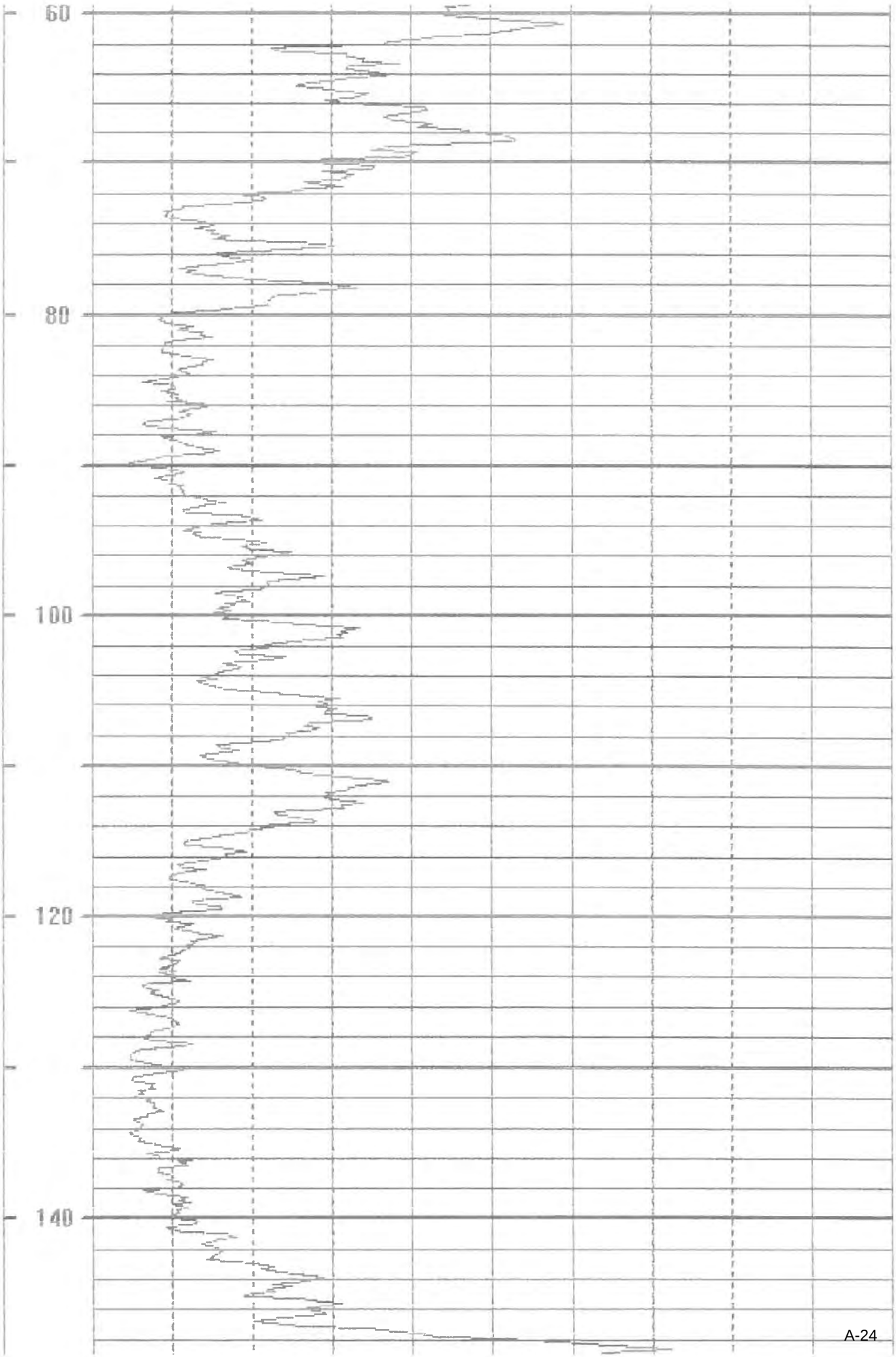


| | |
|---|---|
| COMPANY: | DELTA WELL & PUMP CO INC |
| Location: | Front of Convergent Tech |
| Well: | BP-TT-MW203I |
| Depth Driller: | |
| Depth Logger: | |
| Date: | 01-08-2019 |
| BH Fluid: | |
| Logged by: | CWC |
| File Name: | 763 |
| Witness: | VINCE |

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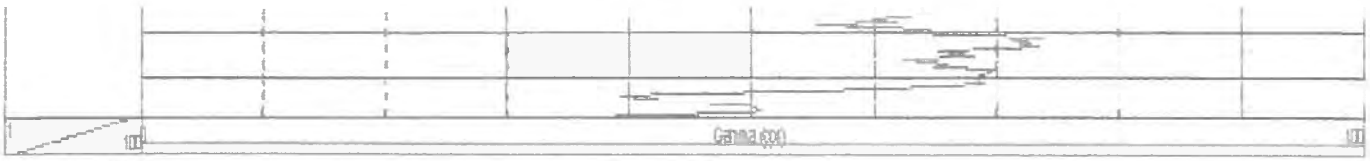
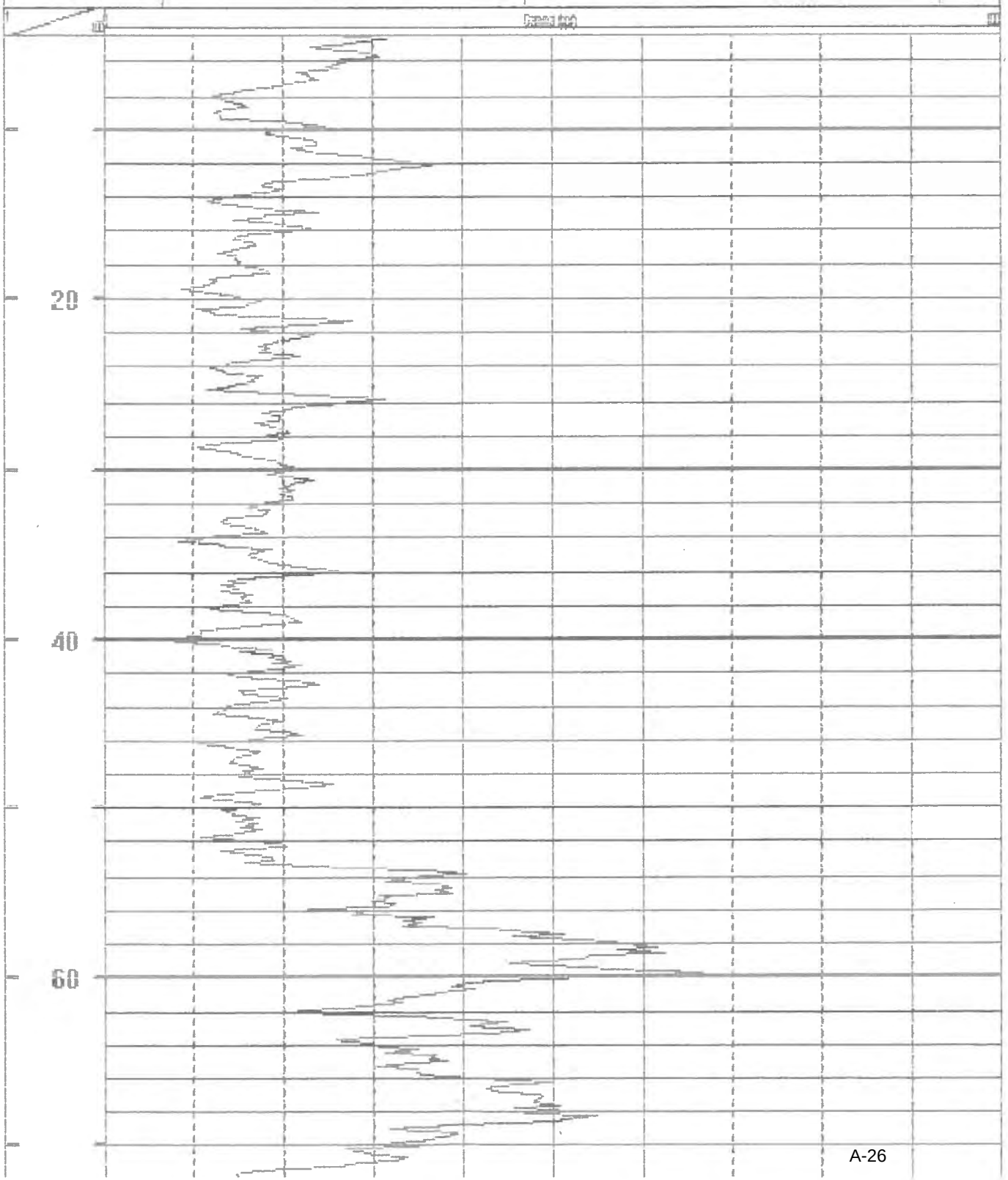
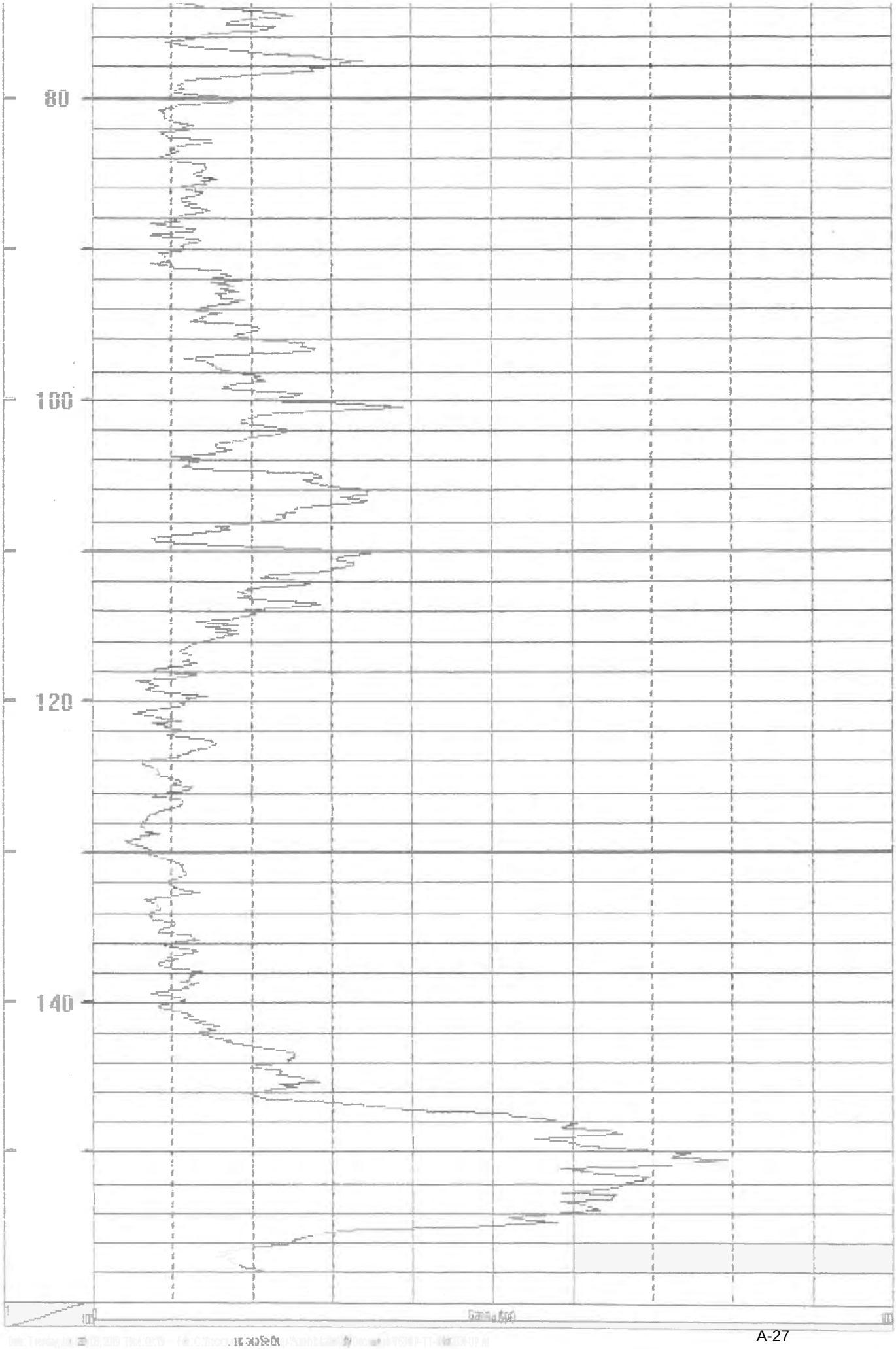
80
100
120
140



Date: Tuesday, January 08, 2019 Time: 09:12 File: C:\Documents and Settings\Administrator\My Documents\763\BP-TT-MW2031-UP.rd

| | | |
|---|---|---|
| | COMPANY: DELTA WELL & PUMP CO INC | Casing |
| | Location: Front of Convergent Tech | |
| Well: BP-TT-MW2031 | | Depth Driller: |
| | | Depth Logger: |
| Date: 01-08-2019 | SH Fluid: | Logged by: CMD |
| File Name: 763 | | Witness: VINCE |




80
100
120
140

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## 3. BP-TT-MW202S, BP-TT-MW202I, AND BP-TT-MW203I Well Construction Logs

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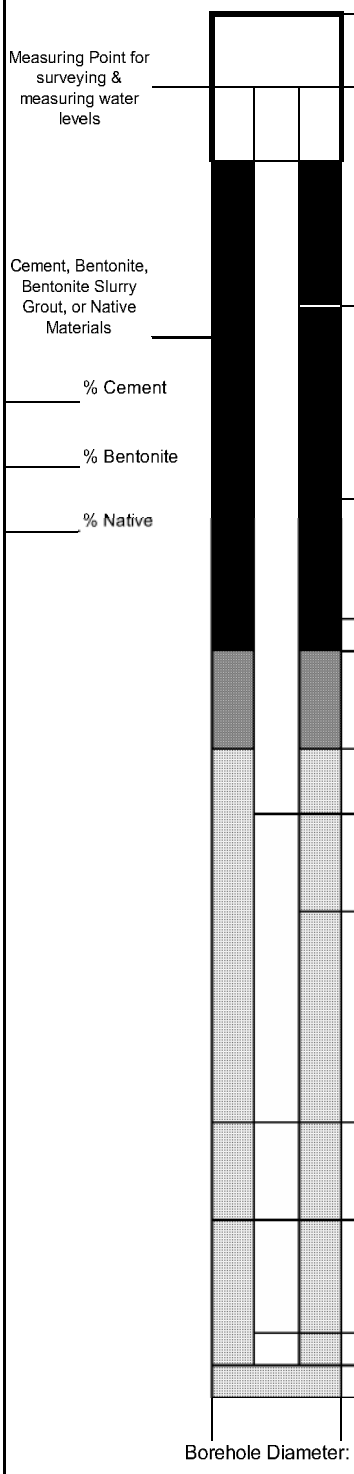
| | | |
|---|---|---|
| TETRA TECH | Client: NAVFAC Project Number: 112G08005-WE13 | **WELL ID: TT-MW202S** |
| | Site Location: NWIRP BETHPAGE, NY | |
| | Well Location: On-Site | Date Installed: 1/3/2019 |
| | Method: Hollow Stem Auger | Inspector: Vince Shickora |
| | Coordinates: Northing: 215099.9 Easting: 1122993.3 | Contractor: Delta Well & Pump |

# MONITORING WELL CONSTRUCTION DETAIL




| | Depth from G.S. (feet) | Elevation(feet) |
|---|---|---|
| Top of Flush Mount Well Cap | 0 | 126.8 |
| Top of Riser Pipe | 0.44 | 126.4 |
| Riser Pipe: | | |
| Length: 54.00 | | |
| Inside Diameter (ID): 2" | | |
| Type of Material: PVC Sch. 40 | | |
| Bottom of 10 inch diameter Steel Surface Casing | | |
| Top of Bentonie Seal | 35.0 | 91.8 |
| Top of Secondary Sand Pack #0 Sand | 40.0 | 86.8 |
| Top of Primary Sand Pack #1 Sand | 44.0 | 82.8 |
| Top of Screen | 54.00 | 72.8 |
| ▲ Stabilized Water Level | | |
| Screen: | | |
| Length: 10' | | |
| Inside Diameter (ID): 2" | | |
| Type of Material: PVC Sch. 40 | | |
| Bottom of Screen | 64.00 | 62.8 |
| Bottom of Sump | 65.00 | 61.8 |
| Bottom of Borehole | 65.00 | 61.8 |

Describe Measuring Point:

Ground Surface

Vince Shickora
Signature

1/3/2019
Date

| | | |
|---|---|---|
| TETRA TECH | Client: NAVFAC Project Number: 112G08005-WE13 | **WELL ID: TT-MW202I** |
| | Site Location: NWIRP BETHPAGE, NY | |
| | Well Location: On-Site | Date Installed: 12/20/2018 |
| | Method: Hollow Stem Auger | Inspector: Vince Shickora |
| | Coordinates: Northing: 215088.1 Easting: 1122994.8 | Contractor: Delta Well & Pump |

# MONITORING WELL CONSTRUCTION DETAIL

| | Depth from G.S. (feet) | Elevation(feet) |
|---|---|---|
| Top of Flush Mount Well Cap | 0 | 126.7 |
| Top of Riser Pipe | 0.28 | 126.4 |
| Riser Pipe: | | |
| Length 140.00 | | |
| Inside Diameter (ID) 2" | | |
| Type of Material PVC Sch. 40 | | |
| Bottom of 10 inch diameter Steel Surface Casing | | |
| Top of Bentonie Seal | 119.0 | 7.7 |
| Top of Secondary Sand Pack #0 Sand | 124.6 | 2.1 |
| Top of Primary Sand Pack #1 Sand | 129.5 | -2.8 |
| Top of Screen | 140.00 | -13.3 |
| ▲ Stabilized Water Level | | |
| Screen: | | |
| Length 10' | | |
| Inside Diameter (ID) 2" | | |
| Type of Material PVC Sch. 40 | | |
| Bottom of Screen | 150.0 | -23.3 |
| Bottom of Sump | 151.4 | -24.7 |
| Bottom of Borehole | 151.4 | -24.7 |

Describe Measuring Point:

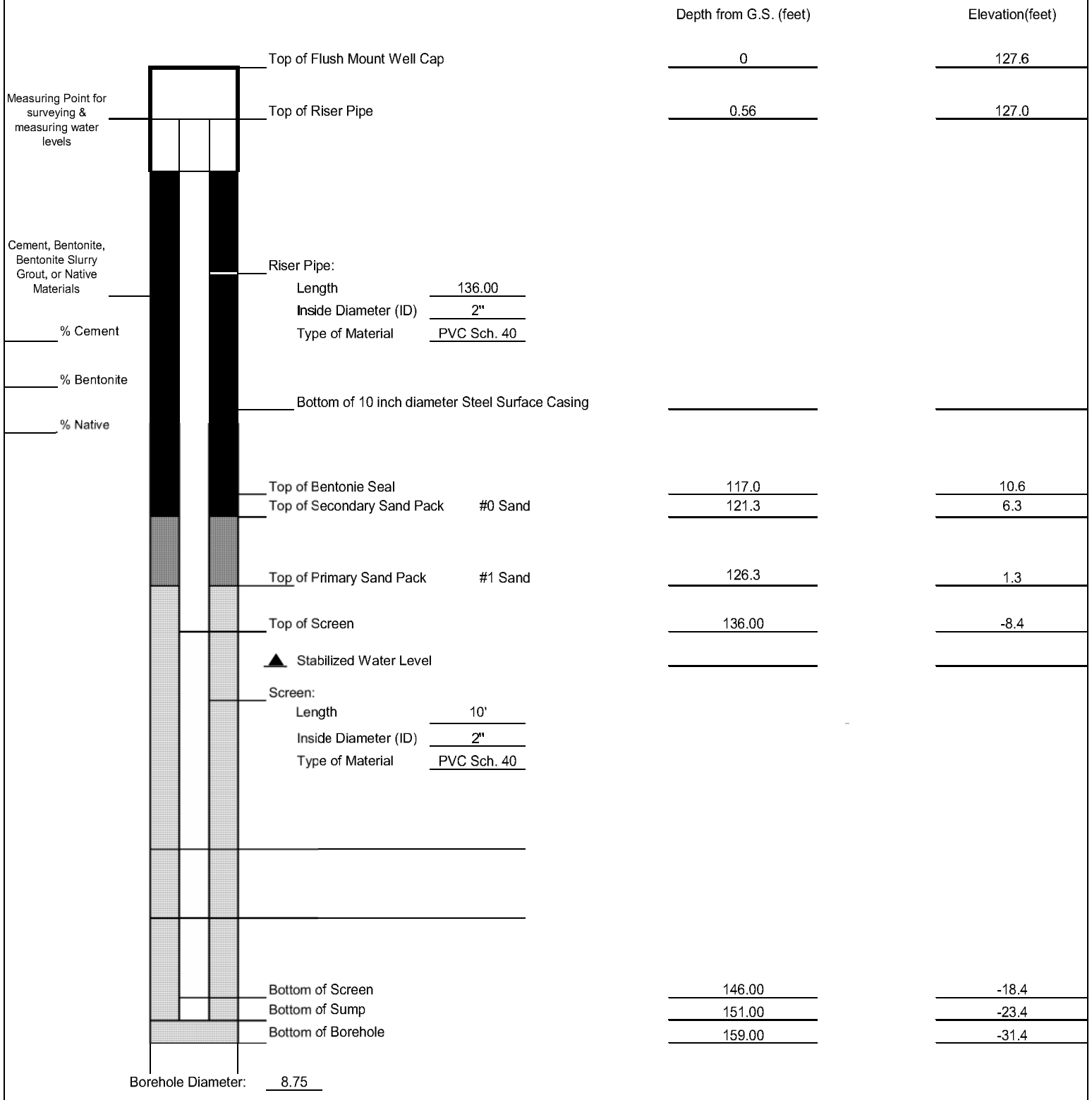
Ground Surface

Vince Shickora
Signature

12/20/2018
Date

| | | |
|---|---|---|
| TETRA TECH | Client: NAVFAC Project Number: 112G08005-WE13 | **WELL ID: TT-MW203I** |
| | Site Location: NWIRP BETHPAGE, NY | |
| | Well Location: On-Site | Date Installed: 1/8/2019 |
| | Method: Hollow Stem Auger | Inspector: Vince Shickora |
| | Coordinates: Northing:215525.6 Easting: 1123810.0 | Contractor: Delta Well & Pump |

# MONITORING WELL CONSTRUCTION DETAIL




| | Depth from G.S. (feet) | Elevation(feet) |
|---|---|---|
| Top of Flush Mount Well Cap | 0 | 127.6 |
| Top of Riser Pipe | 0.56 | 127.0 |
| Riser Pipe: Length 136.00; Inside Diameter (ID) 2"; Type of Material PVC Sch. 40 | | |
| Bottom of 10 inch diameter Steel Surface Casing | | |
| Top of Bentonie Seal | 117.0 | 10.6 |
| Top of Secondary Sand Pack #0 Sand | 121.3 | 6.3 |
| Top of Primary Sand Pack #1 Sand | 126.3 | 1.3 |
| Top of Screen | 136.00 | -8.4 |
| ▲ Stabilized Water Level | | |
| Screen: Length 10'; Inside Diameter (ID) 2"; Type of Material PVC Sch. 40 | | |
| Bottom of Screen | 146.00 | -18.4 |
| Bottom of Sump | 151.00 | -23.4 |
| Bottom of Borehole | 159.00 | -31.4 |

Describe Measuring Point:

Ground Surface

Vince Shickora
Signature

1/8/2019
Date

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## 4. BP-TT-MW202S, BP-TT-MW202I, AND BP-TT-MW203I Well Development Logs

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Tetra Tech

# MONITORING WELL DEVELOPMENT RECORD



Well: BP-TT-MW202S
Site: NWIRP Bethpage
Date Installed: 12-20-13 (SVE)
Date Developed: 1-10-14
Dev. Method: submersible pump
Pump Type: whale pump

Depth to Bottom (ft.): 63.70'
Static Water Level Before (ft.): 55.24'
Static Water Level After (ft.): 55.37'
Screen Length (ft.): 10 Feet
Specific Capacity:
Casing ID (in.): 2 inch

Responsible Personnel: Vince Shickora / Conrad Stebel
Drilling Co.: Delta
Project Name: NWIRP Bethpage
Project Number: 112G08005-WE13

| Time | Estimated Sediment Thickness (Ft.) | Cumulative Water Volume (Gal.) | Water Level Readings (Ft. below TOC) | Temperature (Degrees C) | pH | Specific Conductance (Units mS/cm) | Turbidity (NTU) | Remarks (odor, color, etc.) |
|---|---|---|---|---|---|---|---|---|
| 0938 | – | 0.5 | 55.24 | 17.32 | 6.02 | 0.686 | >999 | very cloudy - Brown, NO odors |
| 0950 | – | 7.5 | 59.31 | 16.08 | 6.70 | 0.903 | >999 | " " " " |
| 0955 | – | 12.0 | 59.70 | 16.25 | 7.16 | 0.682 | >999 | " " " surge well |
| 1005 | – | 20.0 | 59.74 | 15.62 | 7.04 | 0.930 | 922 | " " " surge well |
| 1015 | – | 27.0 | 59.81 | 15.79 | 7.14 | 0.842 | 926 | " " " surge well |
| 1025 | – | 33.0 | 59.89 | 16.03 | 7.15 | 0.866 | 580 | cloudy-brown surge well |
| 1035 | – | 39.0 | 59.94 | 16.22 | 7.14 | 0.868 | 521 | " " surge well |
| 1045 | – | 44.0 | 59.92 | 16.09 | 7.15 | 0.855 | 247 | Tinted - Gray surge well |
| 1055 | – | 49.0 | 59.90 | 15.97 | 7.14 | 0.863 | 202 | " " surge well |
| 1105 | – | 54.0 | 59.90 | 15.92 | 7.14 | 0.870 | 136 | " " |
| 1115 | – | 59.0 | 59.89 | 15.84 | 7.13 | 0.876 | 89.4 | slight gray tint surge well |
| 1125 | – | 64.0 | 59.89 | 15.86 | 7.14 | 0.881 | 80.3 | " " " NO odors |
| 1135 | – | 69.0 | 59.90 | 15.98 | 7.18 | 0.884 | 96.4 | " " " |
| 1145 | – | 74.0 | 59.89 | 15.95 | 7.19 | 0.886 | 79.8 | " " " |
| 1155 | – | 79.0 | 59.90 | 15.97 | 7.19 | 0.887 | 53.2 | " " " NO odors |
| 1205 | – | 84.0 | 59.91 | 15.99 | 7.18 | 0.889 | 49.6 | " " " |
| 1215 | – | 89.0 | 59.91 | 16.01 | 7.17 | 0.889 | 29.5 | End development. |
| 1225 | – | 94.0 | 59.90 | 16.03 | 7.16 | 0.890 | 20.3 | ↓ NO odors |

Tetra Tech

# MONITORING WELL DEVELOPMENT RECORD



Well: BP-TT-MW202I
Site: NWIRP Bethpage
Date Installed: 12-20-18
Date Developed: 1-14-19
Dev. Method: Air Development
Pump Type: N/A
Depth to Bottom (ft.): 150'
Static Water Level Before (ft.): 55.40'
Static Water Level After (ft.): 55.38'
Screen Length (ft.): 10 Feet
Specific Capacity:
Casing ID (in.): 2 inch
Responsible Personnel: Vinke Shickora
Drilling Co.: Delta
Project Name: NWIRP Bethpage
Project Number: 112G08005-WE13

| Time | Estimated Sediment Thickness (Ft.) | Cumulative Water Volume (Gal.) | Water Level Readings (Ft. below TOC) | Temperature (Degrees C) | pH | Specific Conductance (Units ms/cm) | Turbidity (NTU) | Remarks (odor, color, etc.) |
|---|---|---|---|---|---|---|---|---|
| 0835 | - | 2.0 | N/A | 13.12 | 6.51 | 0.309 | >999 | very cloudy (Gry-Brn) No odors |
| 0845 | - | 15 | N/A | 13.65 | 6.58 | 0.215 | >999 | " " " " " |
| 0855 | - | 28 | N/A | 13.92 | 6.69 | 0.188 | >999 | " " (Brown) " |
| 0905 | - | 45 | N/A | 14.12 | 6.76 | 0.186 | 579 | Tinted (Tan) " |
| 0915 | - | 68 | N/A | 14.29 | 6.69 | 0.185 | 326 | " " " |
| 0920 | - | 90 | N/A | 14.43 | 6.63 | 0.184 | 126 | slight Tint (Tan) " |
| 0925 | - | 110 | N/A | 14.69 | 6.56 | 0.184 | 84.2 | " " " " |
| 0930 | - | 135 | N/A | 14.75 | 6.50 | 0.184 | 56.3 | " " " " |
| 0935 | - | 150 | N/A | 14.90 | 6.48 | 0.184 | 43.2 | " " " " |
| 0940 | - | 175 | N/A | 15.02 | 6.46 | 0.185 | 31.5 | very slight Tan Tint " |
| 0950 | - | 200 | N/A | 15.09 | 6.45 | 0.185 | 19.0 | Clear " |
| 0955 | - | 225 | N/A | 15.11 | 6.43 | 0.184 | 8.7 | Clear - End Development |
| | | | | | | | | |
| | | | | | | | | |
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Tetra Tech

# MONITORING WELL DEVELOPMENT RECORD



Well: BP-TT-MW-203I
Site: NWIRP Bethpage
Date Installed: 1-8-19
Date Developed: 1-14-19
Dev. Method: Air development
Pump Type: N/A
Depth to Bottom (ft.): 146'
Static Water Level Before (ft.): 56.04'
Static Water Level After (ft.): 56.06'
Screen Length (ft.): 10 Feet
Specific Capacity:
Casing ID (in.): 2 inch
Responsible Personnel: Vince Shickora / Conrad Strobel
Drilling Co.: Delta
Project Name: NWIRP Bethpage
Project Number: 112603005-WE13

| Time | Estimated Sediment Thickness (Ft.) | Cumulative Water Volume (Gal.) | Water Level Readings (Ft. below TOC) | Temperature (Degrees C) | pH | Specific Conductance (Units ms/cm) | Turbidity (NTU) | Remarks (odor, color, etc.) |
|---|---|---|---|---|---|---|---|---|
| 1110 | - | 10.0 | N/A | 15.19 | 6.98 | 0.177 | >999 | Very cloudy (Brown) No odors |
| 1120 | - | 50 | N/A | 15.03 | 6.69 | 0.186 | >999 | " " " " |
| 1130 | - | 95 | N/A | 14.99 | 6.27 | 0.207 | 845 | cloudy (Brown) " |
| 1135 | - | 120 | N/A | 14.78 | 6.04 | 0.214 | 307 | Tinted (Tan) " |
| 1140 | - | 150 | N/A | 14.65 | 5.95 | 0.220 | 106 | " " " |
| 1145 | - | 180 | N/A | 14.60 | 5.92 | 0.222 | 51.5 | slight tan tint " |
| 1150 | - | 210 | N/A | 14.58 | 5.88 | 0.225 | 20.1 | clear " |
| 1155 | - | 240 | N/A | 14.56 | 5.87 | 0.227 | 11.6 | clear - End development. |
| | | | | | | | | |
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# APPENDIX B
## TT-MW204S AND BP-MW204I

1. **TT-MW204S AND TT-MW204I Boring Logs**
2. **TT-MW204I Gamma Log**
3. **TT-MW204S AND TT-MW204I Well Construction Logs**
4. **TT-MW204S AND TT-MW204I Well Development Logs**

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## 1. BP-TT-MW204S AND BP-TT-MW204I Boring Logs

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# WELL NUMBER TT-MW204S



**Tetra Tech**

**CLIENT** NAVFAC MIDLANT
**PROJECT NAME** NWIRP Bethpage OU2
**PROJECT NUMBER** 112G08005-WE13
**PROJECT LOCATION** BETHPAGE
**DATE STARTED** 3/16/20 **COMPLETED** 3/17/20
**GROUND ELEVATION** 124.4 **HOLE SIZE** 8 inches
**DRILLING CONTRACTOR** DELTA WELL & PUMP
**DRILLING METHOD** Hollow Stem Auger
**GROUND WATER LEVEL** ---
**LOGGED BY** Varricchio
**NORTHING** 214592.181952 ft **EASTING** 1123034.79783 ft **DATUM:** NVD 88
**NOTES**

| DEPTH (ft) | SAMPLE TYPE NUMBER | REMARKS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | | WELL DIAGRAM |
|---|---|---|---|---|---|---|---|
| 0 | | | | | | | Casing Top Elev: 123.92 (ft)<br>Casing Type: PVC Sch. 40 |
| | | moist | ASPHALT | | 1.0 (ASPHALT) Asphalt/RCA | 123.4 | |
| | | | SMSC | | 4.0 (SMSC) Black Clayey SILT, trace fine to coarse rounded gravel, moist | 120.4 | |
| | | dry | | | | | |
| 10 | | | SW | | (SW) Brown well graded fine to medium subrounded SAND, few fine subrounded Gravel, few silt, dry | | |
| | | | | | 15.0 | 109.4 | |
| | | dry | SW | | (SW) Brown well graded fine to medium subrounded SAND, few fine to coarse subrounded Gravel, trace cobbles, dry | | - Bentonite Cement Grout |
| 20 | | | | | 20.0 | 104.4 | |
| | | dry | | | (SWGW) Brown well graded fine to coarse subangular SAND with well graded fine to coarse subrounded Gravel, trace cobbles, dry | | |
| | | | SWGW | | | | |
| 30 | | | | | | | |
| | | | | | 35.0 | 89.4 | - Bentonite Seal |
| | | dry | SMSC | | (SMSC) Brown Silty well graded fine to coarse subangular SAND, few fine to coarse subrounded Gravel, dry | | - Secondary Sand Pack #0 |
| 40 | | | | | 40.0 | 84.4 | |
| | | moist | | | (SWGW) Light brown well graded fine to coarse subangular SAND with well graded fine to coarse subrounded Gravel, trace cobbles, moist | | - Primary Sand Pack #1 |
| | | | SWGW | | | | |
| 50 | | | | | | | |
| | | | | | | | - 2" Diameter Schedule 40 PVC, 10 Slot Well Screen (50-60 ft bgs) |
| 60 | | | | | 60.0 | 64.4 | Sand to Bottom |
| | | | | | Bottom of borehole at 60.5 feet. | | |

TT MW BORING-MW CONSTRUCTION - GINT STD US LAB.GDT - 7/24/20 14:53 - C:\GINT\BETHPAGE\BP_NIRIS.GPJ

# WELL NUMBER TT-MW204I



**Tetra Tech**

**CLIENT** NAVFAC MIDLANT
**PROJECT NAME** NWIRP Bethpage OU2
**PROJECT NUMBER** 112G08005-WE13
**PROJECT LOCATION** BETHPAGE
**DATE STARTED** 3/18/20 **COMPLETED** 3/19/20
**GROUND ELEVATION** 124.4 **HOLE SIZE** 8 inches
**DRILLING CONTRACTOR** DELTA WELL & PUMP
**DRILLING METHOD** Hollow Stem Auger
**GROUND WATER LEVEL** ---
**LOGGED BY** Varricchio
**NORTHING** 214590.42848 ft **EASTING** 1123023.60859 ft **DATUM:** NVD 88
**NOTES**

| DEPTH (ft) | SAMPLE TYPE NUMBER | REMARKS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | | WELL DIAGRAM |
|---|---|---|---|---|---|---|---|
| 0 | | | | | | | Casing Top Elev: 124.01 (ft)<br>Casing Type: PVC Sch. 40 |
| | | Wet | ASPHALT | | 1.0 (ASPHALT) Asphalt/RCA | 123.4 | |
| | | Wet | SMSC | | 4.0 (SMSC) Black Clayey SILT, trace fine to coarse rounded gravel, moist | 120.4 | |
| 10 | | | SW | | (SW) Brown well graded fine to medium subrounded SAND, few fine subrounded Gravel, few silt, dry | | |
| | | Wet | | | 15.0 | 109.4 | |
| 20 | | Wet | SW | | (SW) Brown well graded fine to medium subrounded SAND, few fine to coarse subrounded Gravel, trace cobbles, dry | | |
| | | | | | 20.0 | 104.4 | |
| 30 | | | SWGW | | (SWGW) Brown well graded fine to coarse subangular SAND with well graded fine to coarse subrounded Gravel, trace cobbles, dry | | |
| | | Wet | | | 35.0 | 89.4 | |
| 40 | | Wet | SMSC | | (SMSC) Brown Silty well graded fine to coarse subangular SAND, few fine to coarse subrounded Gravel, dry | | |
| | | | | | 40.0 | 84.4 | |
| 50 | | | SWGW | | (SWGW) Light brown well graded fine to coarse subangular SAND with well graded fine to coarse subrounded Gravel, trace cobbles, moist | | |
| 60 | | Wet | | | 60.0 | 64.4 | - Bentonite Cement Grout |
| 70 | | | SWSM | | (SWSM) Reddish brown well graded fine to medium subangular SAND, trace Silt and fine subrounded gravel, wet | | |
| 80 | | | | | | | |
| 90 | | | | | | | |
| 100 | | | | | | | |

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TT MW BORING-MW CONSTRUCTION - GINT STD US LAB.GDT - 7/24/20 14:53 - C:\GINT\BETHPAGE\BP_NIRIS.GPJ

# WELL NUMBER TT-MW204I



**Tetra Tech**

**CLIENT** NAVFAC MIDLANT **PROJECT NAME** NWIRP Bethpage OU2

**PROJECT NUMBER** 112G08005-WE13 **PROJECT LOCATION** BETHPAGE

| DEPTH (ft) | SAMPLE TYPE NUMBER | REMARKS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 100 | | | SWSM | | 105.0 19.4 | |
| | | Wet | | | | |
| | | | MLSP | | (MLSP) Reddish brown SILT, few poorly graded fine to medium subangular SAND, wet | |
| 110 | | Wet | | | 110.0 14.4 | |
| | | | | | (SMSC) Reddish brown Silty poorly graded fine to medium subangular SAND, wet | |
| 120 | | | | | | Bentonite Seal |
| | | | | | | Secondary Sand Pack #0 |
| 130 | | | SMSC | | | |
| | | | | | | Primary Sand Pack #1 |
| 140 | | | | | | |
| | | | | | | 2 Diameter Schedule 40 PVC, 10 Slot Well Screen (142-152 ft bgs) |
| 150 | | | | | 152.0 -27.6 | Sand to Bottom |
| | | | | | Bottom of borehole at 152.5 feet. | |

TT MW BORING-MW CONSTRUCTION - GINT STD US LAB.GDT - 7/24/20 14:53 - C:\GINT\BETHPAGE\BP_NIRIS.GPJ

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## 2. TT-MW204I Gamma Log

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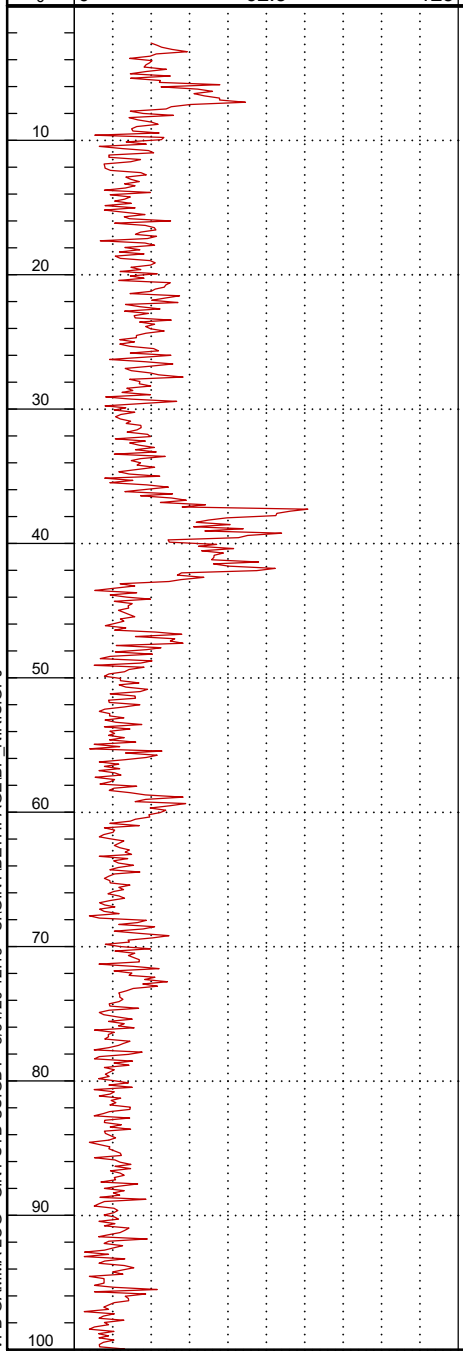
# BORING NUMBER TT-MW204I



**Tetra Tech**

**CLIENT** NAVFAC MIDLANT
**PROJECT NAME** NWIRP Bethpage OU2
**PROJECT NUMBER** 112G08005-WE13
**PROJECT LOCATION** BETHPAGE
**DATE STARTED** 3/18/20 **COMPLETED** 3/19/20
**TOTAL DEPTH (ft):** 152.5 **HOLE SIZE** 8 inches
**DRILLINGCONTRACTOR** DELTA WELL & PUMP
**LOGGED BY** Varricchio
**DRILLINGMETHOD** Hollow Stem Auger
**NORTHING** 214590.42848 ft **EASTING** 1123023.60859 ft
**GROUND ELEVATION** 124.4 ft NVD 88
**NOTES**




| ENVIRONMENTAL DATA (µg/L) | FORMATION | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | |
|---|---|---|---|---|---|
| | | ASPHALT | | 1.0 (ASPHALT) Asphalt/RCA | 123.4 |
| | | SMSC | | 4.0 (SMSC) Black Clayey SILT, trace fine to coarse rounded gravel, moist | 120.4 |
| | | SW | | (SW) Brown well graded fine to medium subrounded SAND, few fine subrounded Gravel, few silt, dry | |
| | | | | 15.0 | 109.4 |
| | | SW | | (SW) Brown well graded fine to medium subrounded SAND, few fine to coarse subrounded Gravel, trace cobbles, dry | |
| | | | | 20.0 | 104.4 |
| | | SWGW | | (SWGW) Brown well graded fine to coarse subangular SAND with well graded fine to coarse subrounded Gravel, trace cobbles, dry | |
| | | | | 35.0 | 89.4 |
| | | SMSC | | (SMSC) Brown Silty well graded fine to coarse subangular SAND, few fine to coarse subrounded Gravel, dry | |
| | | | | 40.0 | 84.4 |
| | | SWGW | | (SWGW) Light brown well graded fine to coarse subangular SAND with well graded fine to coarse subrounded Gravel, trace cobbles, moist | |
| | | | | 60.0 | 64.4 |
| | | SWSM | | (SWSM) Reddish brown well graded fine to medium subangular SAND, trace Silt and fine subrounded gravel, wet | |

VPB-GAMMA LOG - GINT STD US.GDT - 8/31/20 12:15 - C:\GINT\BETHPAGE\BP_NIRIS.GPJ

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# BORING NUMBER TT-MW204I



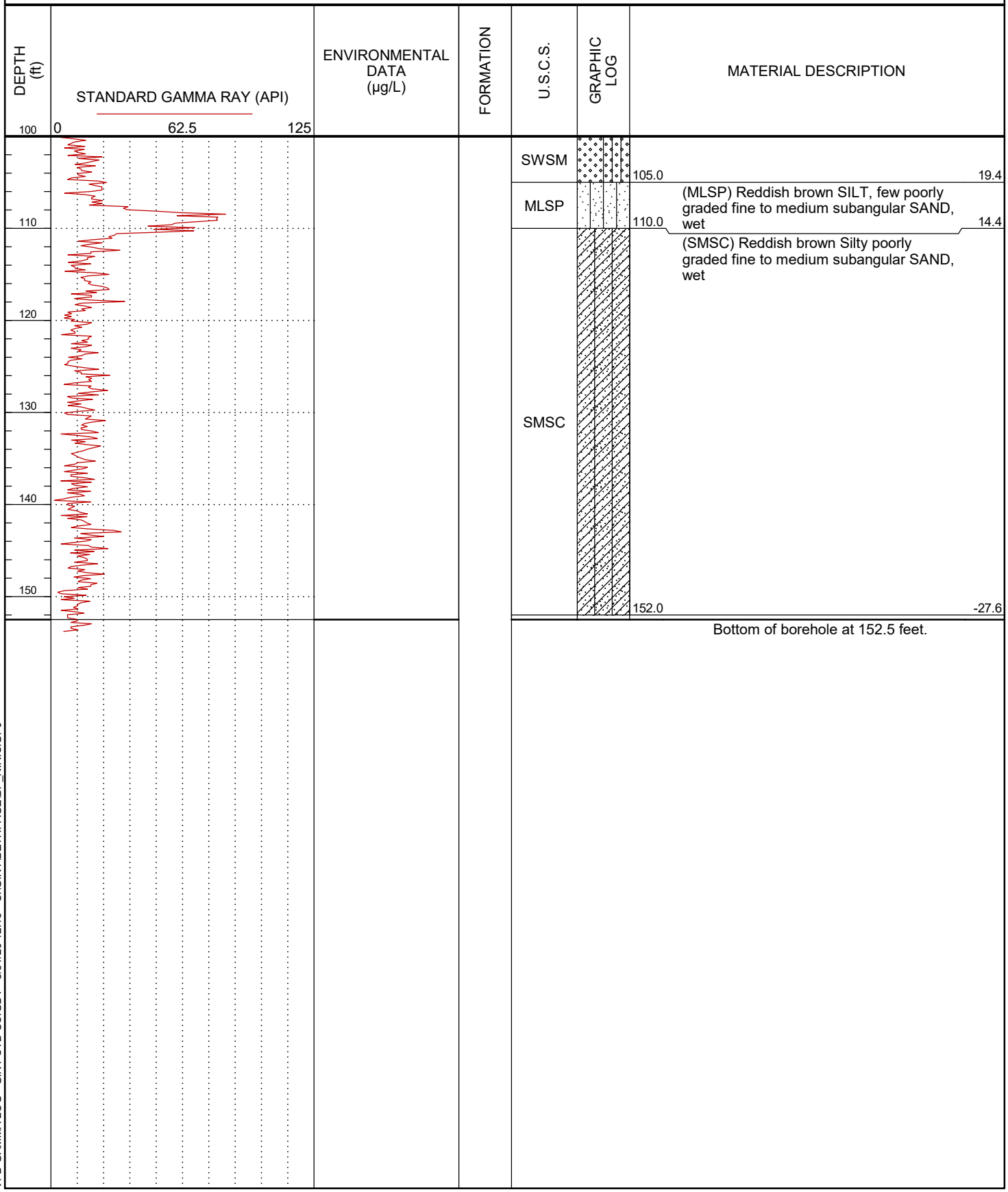
**Tetra Tech**

**CLIENT** NAVFAC MIDLANT

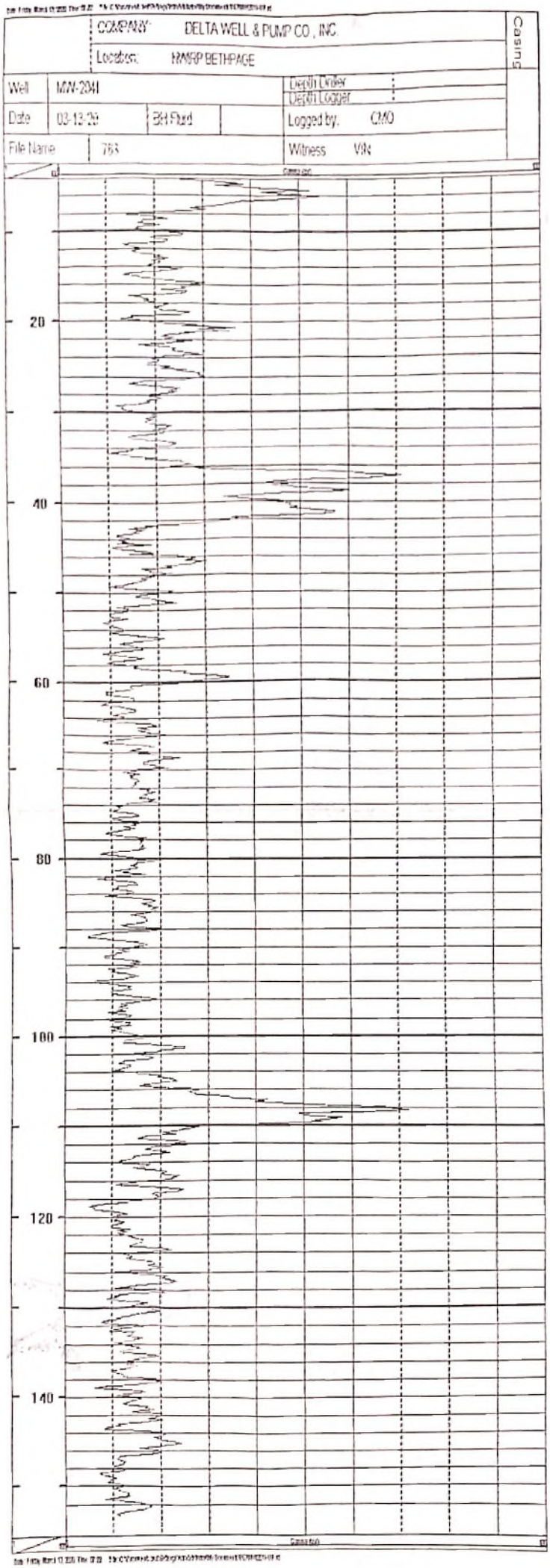
**PROJECT NAME** NWIRP Bethpage OU2

**PROJECT NUMBER** 112G08005-WE13

**PROJECT LOCATION** BETHPAGE




VPB-GAMMA LOG - GINT STD US.GDT - 8/31/20 12:15 - C:\GINT\BETHPAGE\BP_NIRIS.GPJ


COMPANY: DELTA WELL & PUMP CO., INC.
Location: MMSP BETHPAGE
Casing
Well: MW-204I
Depth Driller
Depth Logger
Date: 03-12-20
Bit Fluid
Logged by: CMO
File Name: 765
Witness: VN
20
40
60
80
100
120
140

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## 3. TT-MW204S AND TT-MW204I Well Construction Logs

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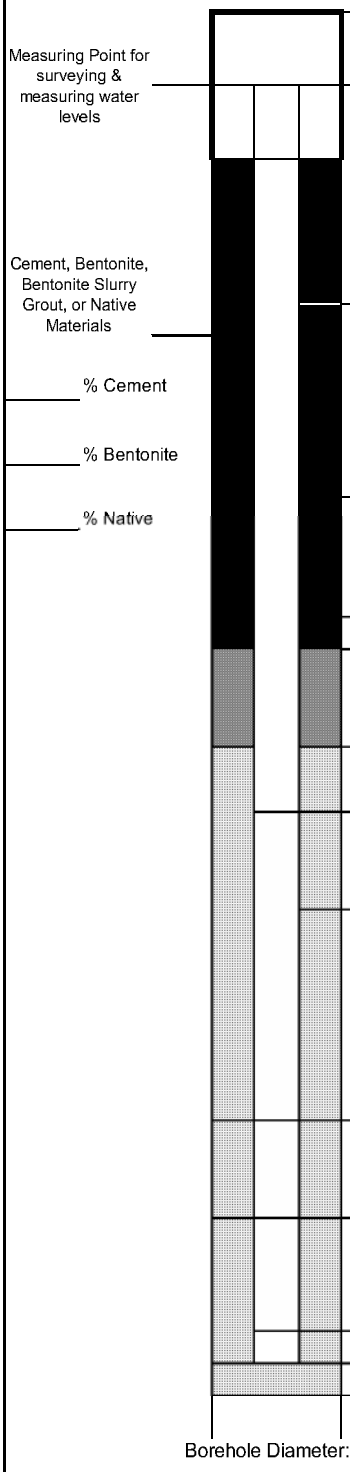
TETRA TECH

| | |
|---|---|
| Client: NAVFAC Project Number: 112G08005-WE13 | **WELL ID: TT-MW204S** |
| Site Location: NWIRP BETHPAGE, NY | |
| Well Location: On-Site | Date Installed: 3/17/2020 |
| Method: Hollow Stem Auger | Inspector: Vin Varricchio |
| Coordinates: Northing: 214592.18 Easting: 1123034.79 | Contractor: Delta Well & Pump |

# MONITORING WELL CONSTRUCTION DETAIL




| | Depth from G.S. (feet) | Elevation(feet) |
|---|---|---|
| Top of Flush Mount Well Cap | 0 | 124.4 |
| Top of Riser Pipe | 0.48 | 123.9 |
| Riser Pipe: | | |
| Length 50.00 | | |
| Inside Diameter (ID) 2" | | |
| Type of Material PVC Sch. 40 | | |
| Bottom of 10 inch diameter Steel Surface Casing | | |
| Top of Bentonie Seal | 31.0 | 93.4 |
| Top of Secondary Sand Pack #0 Sand | 35.0 | 89.4 |
| Top of Primary Sand Pack #1 Sand | 40.0 | 84.4 |
| Top of Screen | 50.00 | 74.4 |
| ▲ Stabilized Water Level | | |
| Screen: | | |
| Length 10' | | |
| Inside Diameter (ID) 2" | | |
| Type of Material PVC Sch. 40 | | |
| Bottom of Screen | 60.00 | 64.4 |
| Bottom of Sump | 60.50 | 63.9 |
| Bottom of Borehole | 60.50 | 63.9 |

Describe Measuring Point:

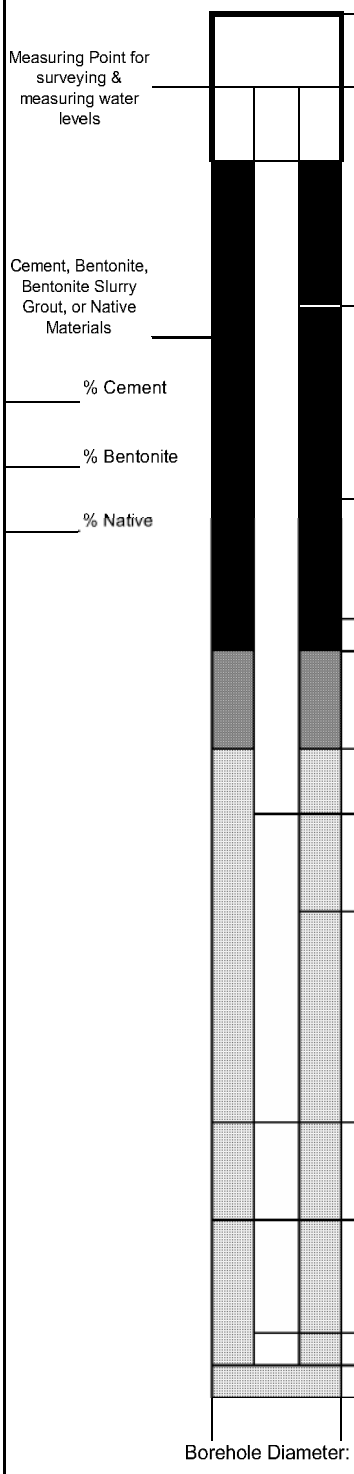
Ground Surface

Vin Varricchio
Signature

3/17/2020
Date

| | | |
|---|---|---|
| TETRA TECH | Client: NAVFAC Project Number: 112G08005-WE13 | **WELL ID: TT-MW204I** |
| | Site Location: NWIRP BETHPAGE, NY | |
| | Well Location: On-Site | Date Installed: 3/19/2020 |
| | Method: Hollow Stem Auger | Inspector: Vin Varricchio |
| | Coordinates: Northing: 215088.1 Easting: 1122994.8 | Contractor: Delta Well & Pump |

# MONITORING WELL CONSTRUCTION DETAIL




| | Depth from G.S. (feet) | Elevation(feet) |
|---|---|---|
| Top of Flush Mount Well Cap | 0 | 124.4 |
| Top of Riser Pipe | 0.39 | 124.0 |
| Riser Pipe: Length 142.00; Inside Diameter (ID) 2"; Type of Material PVC Sch. 40 | | |
| Bottom of 10 inch diameter Steel Surface Casing | | |
| Top of Bentonie Seal | 120.0 | 4.4 |
| Top of Secondary Sand Pack #0 Sand | 124.0 | 0.4 |
| Top of Primary Sand Pack #1 Sand | 129.5 | -5.1 |
| Top of Screen | 142.00 | -17.6 |
| ▲ Stabilized Water Level | | |
| Screen: Length 10'; Inside Diameter (ID) 2"; Type of Material PVC Sch. 40 | | |
| Bottom of Screen | 152.0 | -27.6 |
| Bottom of Sump | 152.5 | -28.1 |
| Bottom of Borehole | 152.5 | -28.1 |

Describe Measuring Point: Ground Surface

Vin Varricchio
Signature

3/19/2020
Date

## 4. BP-TT-MW204S AND BP-TT-MW204I Well Development Logs

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# MONITORING WELL DEVELOPMENT RECORD



**Event:** BPS1-TT-MW204S Well Development
**Project Site Name:** NWIRP Bethpage
**Project Number:** 112G08005-WE13

**WELL INFORMATION:**

| | | | |
|---|---|---|---|
| **Well No.:** | MW-204S | **Casing ID (in.):** | 2 |
| **Drilling Co.:** | Delta | **Depth to Bottom (ft.):** | 60 |
| **Date Installed:** | 3/17/2020 | **Static Water Level Before (ft.):** | 51.66 |
| **Date Developed:** | 3/18/2020 | **Static Water Level After (ft.):** | 51.65 |
| **Dev. Method:** | Pump | **Screen Length (ft.):** | 10 |
| **Pump Type:** | Whale - 2 GPM | **Specific Capacity:** | |
| **Developed By:** | Varricchio | | |

**DEVELOPMENT DATA:**

| Time | Estimated Sediment Thickness (ft.) | Cumulative Water Volume (Gal.) | Water Level (ft. below TOC) | Temp. (C°) | pH (S.U.) | SC (mS/cm) | Turbidity (NTU) | Remarks: (odor, color, etc.) |
|---|---|---|---|---|---|---|---|---|
| 8:45 | | | 51.66 | | | | | Start |
| 9:00 | | 30 | | 15.43 | 6.13 | 0.588 | 39 | |
| 9:15 | | 60 | | 15.39 | 6.53 | 0.643 | 10.9 | End |
| 9:20 | | | 51.65 | | | | | |
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# MONITORING WELL DEVELOPMENT RECORD



**Event:** BPS1-TT-MW204I Well Development
**Project Site Name:** NWIRP Bethpage
**Project Number:** 112G08005-WE13

**WELL INFORMATION:**

| | | | |
|---|---|---|---|
| **Well No.:** | MW-204I | **Casing ID (in.):** | 2 |
| **Drilling Co.:** | Delta | **Depth to Bottom (ft.):** | 152 |
| **Date Installed:** | 3/19/2020 | **Static Water Level Before (ft.):** | 52 |
| **Date Developed:** | 3/20/2020 | **Static Water Level After (ft.):** | 51.75 |
| **Dev. Method:** | Pump | **Screen Length (ft.):** | 10 |
| **Pump Type:** | Whale - 2 GPM | **Specific Capacity:** | |
| **Developed By:** | Varricchio | | |

**DEVELOPMENT DATA:**

| Time | Estimated Sediment Thickness (ft.) | Cumulative Water Volume (Gal.) | Water Level (ft. below TOC) | Temp. (C°) | pH (S.U.) | SC (mS/cm) | Turbidity (NTU) | Remarks: (odor, color, etc.) |
|---|---|---|---|---|---|---|---|---|
| 9:00 | | | 52 | | | | | Start |
| 9:15 | | 30 | | 14.68 | 6.29 | 0.333 | 745 | |
| 9:30 | | 60 | | 14.46 | 6.18 | 0.299 | 36.8 | |
| 9:45 | | 90 | 51.75 | 14.34 | 6.06 | 0.288 | 7.23 | End |
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# APPENDIX C
## BORBAS SURVEY DATA REPORT

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# Borbas Surveying & Mapping, LLC

402 Main Street, Boonton, New Jersey 07005 Phone (973) 316-8743 www.borbas.com

## MONITORING WELL CHART

Former Naval Weapons Industrial Reserve Plant (NWIRP)
999 S. Oyster Bay Road (Industrial Park)
Bethpage, New York, 11714
December 23, 2019

| Monitor Well ID | Grade Elev | Outer Casing | Inner Casing | Northing | Easting | Latitude North | Longitude West | Survey Date |
|---|---|---|---|---|---|---|---|---|
| MW201D | 121.7 | 121.68 | 120.92 | 214069.5 | 1123138.5 | 40°45'11.37" | 73°29'55.33" | 12/17/2019 |
| MW201D1 | 121.6 | 121.58 | 120.80 | 214055.8 | 1123155.3 | 40°45'11.23" | 73°29'55.11" | 12/18/2019 |
| MW202D | 126.5 | 126.51 | 125.95 | 215062.0 | 1122983.6 | 40°45'21.18" | 73°29'57.27" | 12/17/2019 |
| MW202D1 | 126.6 | 126.56 | 125.98 | 215078.6 | 1122982.4 | 40°45'21.34" | 73°29'57.28" | 12/17/2019 |
| MW202I | 126.7 | 126.70 | 126.42 | 215088.1 | 1122994.8 | 40°45'21.44" | 73°29'57.12" | 12/17/2019 |
| MW202S | 126.8 | 126.79 | 126.36 | 215099.9 | 1122993.3 | 40°45'21.56" | 73°29'57.14" | 12/17/2019 |
| MW203D | 127.5 | 127.51 | 127.15 | 215513.0 | 1123748.0 | 40°45'25.59" | 73°29'47.30" | 12/17/2019 |
| MW203D1 | 127.4 | 127.42 | 127.07 | 215510.7 | 1123763.1 | 40°45'25.57" | 73°29'47.11" | 12/17/2019 |
| MW203D2 | 127.3 | 127.35 | 127.02 | 215507.2 | 1123778.0 | 40°45'25.54" | 73°29'46.91" | 12/17/2019 |
| MW203I | 127.6 | 127.57 | 127.04 | 215525.6 | 1123810.0 | 40°45'25.71" | 73°29'46.50" | 12/17/2019 |
| MW308D | 128.4 | 128.38 | 127.75 | 214965.9 | 1124935.6 | 40°45'20.12" | 73°29'31.91" | 12/17/2019 |
| MW308I | 128.2 | 128.24 | 127.49 | 214972.2 | 1124923.7 | 40°45'20.18" | 73°29'32.07" | 12/17/2019 |
| MW308S | 128.4 | 128.40 | 127.87 | 214977.9 | 1124910.2 | 40°45'20.24" | 73°29'32.24" | 12/17/2019 |
| MW309D | 127.8 | 127.79 | 127.46 | 215208.1 | 1125028.4 | 40°45'22.51" | 73°29'30.69" | 12/17/2019 |
| MW309I | 128.2 | 128.24 | 127.89 | 215209.9 | 1125016.2 | 40°45'22.53" | 73°29'30.85" | 12/17/2019 |
| MW309S | 129.2 | 129.22 | 128.69 | 215211.8 | 1124998.0 | 40°45'22.55" | 73°29'31.08" | 12/17/2019 |
| MW310S | 124.9 | 124.91 | 124.37 | 215489.4 | 1124093.5 | 40°45'25.34" | 73°29'42.82" | 12/17/2019 |
| MW311I | 125.5 | 125.50 | 125.26 | 215422.2 | 1124599.1 | 40°45'24.65" | 73°29'36.25" | 12/17/2019 |
| MW311S | 125.5 | 125.47 | 125.26 | 215423.5 | 1124594.4 | 40°45'24.66" | 73°29'36.31" | 12/17/2019 |

Notes:

1. The horizontal datum is the New York, Long Island State Plane Coordinate System (NAD83) determined by differential GPS observations utilizing the NGS CORS System on December 17, 2019. Reference Stations: NYBR, NYCI, NYVH and SHK6
2. The vertical datum is the North American Vertical Datum of 1988 (NAVD88) GEOID12A, verified by differential GPS observations from the NGS CORS System on December 17, 2019. Benchmark Reference Stations: NYBR (orthometric height= 42.156'), NYCI (orthometric height= 56.453'), NYVH (orthometric height= 309.251') and SHK6 (orthometric height= 30.141').
3. All coordinates and elevations shown hereon are in U.S. Survey Feet.

J. Peter Borbas, P.L.S.
NY License # 050566-1
December 23, 2019

STATE OF NEW YORK
J. PETER BORBAS
License # 050566-1
LICENSED LAND SURVEYOR

P:\LP\2019\11\191103\Documents\191103_2019-12-23_Monitoring Well Chart

# Borbas Surveying & Mapping, LLC

402 Main Street, Boonton, New Jersey 07005 Phone (973) 316-8743 Fax (973) 402-6627 www.borbas.com

## SOIL BORING CHART

Former Naval Weapons Industrial Reserve Plant (NWIRP)
999 S. Oyster Bay Road (Industrial Park)
Bethpage, New York, 11714
December 23, 2019

| Soil Boring ID | Grade Elev | Northing | Easting | Latitude North | Longitude West | Survey Date |
|---|---|---|---|---|---|---|
| VPB201 | 121.6 | 214042.3 | 1123174.5 | 40°45'11.09" | 73°29'54.86" | 12/17/2019 |
| VPB202 | 126.5 | 215112.9 | 1122980.4 | 40°45'21.68" | 73°29'57.31" | 12/17/2019 |
| VPB203 | 127.2 | 215534.0 | 1123756.8 | 40°45'25.80" | 73°29'47.19" | 12/17/2019 |
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Notes:

1. The horizontal datum is the New York, Long Island State Plane Coordinate System NAD83, determined by differential GPS observations on December 17, 2019 using the NGS CORS System, Reference Station(s): NYBR, NYCI, NYVH and SHK6.
2. The vertical datum is the North American Vertical Datum of 1988 (NAVD88) GEOID12A verified by differential GPS observations from the NGS CORS system on December 17, 2019. Benchmark: Reference Station(s) NYBR (orthometric height = 42.156'), NYCI (orthometric height = 56.453'), NYVH (orthometric height = 309.251') and SHK6 (orthometric height = 30.141') .
3. All coordinates and elevations shown hereon are in U.S. Survey Feet.

J. Peter Borbas, P.L.S.
NY License # 050566-1
December 23, 2019

P:\LP\2019\11\191103\Documents\191103_2019-12-23_Soil Boring Chart

# Borbas Surveying & Mapping, LLC

402 Main Street, Boonton, New Jersey 07005 Phone (973) 316-8743 www.borbas.com

## MONITORING WELL CHART

Former Naval Weapons Industrial Reserve Plant (NWIRP)
999 S. Oyster Bay Road (Industrial Park)
Bethpage, New York, 11714
April 27, 2020

| Monitor Well ID | Grade Elev | Outer Casing | Inner Casing | Northing | Easting | Latitude North | Longitude West | Survey Date |
|---|---|---|---|---|---|---|---|---|
| FW-MW02 | 124.2 | 126.46 | 126.42 | 213967.1 | 1124866.7 | 40°45'10.25" | 73°29'32.88" | 4/20/2020 |
| FW-MW03 | 122.9 | 125.27 | 125.04 | 213978.5 | 1124733.1 | 40°45'10.38" | 73°29'34.62" | 4/20/2020 |
| HN-24IR | 122.1 | 122.14 | 121.67 | 214063.6 | 1123251.8 | 40°45'11.30" | 73°29'53.86" | 4/20/2020 |
| HN-24S | 122.0 | 122.05 | 121.58 | 214054.5 | 1123266.3 | 40°45'11.21" | 73°29'53.67" | 4/20/2020 |
| MW204I | 124.4 | 124.41 | 124.01 | 214590.5 | 1123023.7 | 40°45'16.52" | 73°29'56.78" | 4/20/2020 |
| MW204S | 124.4 | 124.45 | 123.92 | 214592.0 | 1123034.9 | 40°45'16.53" | 73°29'56.64" | 4/20/2020 |
| MW304D | 116.8 | 116.78 | 116.58 | 213692.1 | 1124994.9 | 40°45'07.53" | 73°29'31.24" | 4/20/2020 |
| MW304I1 | 116.8 | 116.83 | 116.56 | 213716.9 | 1124995.9 | 40°45'07.78" | 73°29'31.22" | 4/20/2020 |
| MW304I2 | 116.7 | 116.68 | 116.45 | 213705.3 | 1124990.1 | 40°45'07.66" | 73°29'31.30" | 4/20/2020 |
| MW304S | 116.6 | 116.61 | 116.38 | 213728.5 | 1124991.4 | 40°45'07.89" | 73°29'31.28" | 4/20/2020 |

Notes:

1. The horizontal datum is the New York, Long Island State Plane Coordinate System (NAD83) verified by differential GPS observations utilizing the NGS CORS System on April 20, 2020. Reference Station: NYCI
2. The vertical datum is the North American Vertical Datum of 1988 (NAVD88) GEOID12A, verified by differential GPS observations from the NGS CORS System on December 17, 2019. Benchmark Reference Stations: NYBR (orthometric height= 42.156'), NYCI (orthometric height= 56.453'), NYVH (orthometric height= 309.251') and SHK6 (orthometric height= 30.141').
3. All coordinates and elevations shown hereon are in U.S. Survey Feet.

John D. Beattie, P.L.S.
NY License # 050958-1
April 27, 2020

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