



DEPARTMENT OF THE ARMY

OFFICE OF ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT
U.S. ARMY FORT MONMOUTH
P.O. 148
OCEANPORT, NEW JERSEY 07757

19 May 2017

Ms. Linda Range
New Jersey Department of Environmental Protection
Bureau of Case Management
401 East State Street
PO Box 420/Mail Code 401-05F
Trenton, NJ 08625-0028

**SUBJECT: Vapor Intrusion Risk Screening Evaluation at Building 114, Fort Monmouth,
New Jersey
PI G000000032**

Attachments:

Figure 1 – PCE Plume Layout

Figure 2 – PCE Plume on Geologic Cross Section A-A

*Figure 3 – FTMM-68 Cape May Unit 2 and Hornerstown Formation Shallow
Groundwater Contours – March 27, 2017*

Figure 4 – FTMM-68 Tinton Formation Deep Groundwater Contours – March 27, 2017

Table 1 – Detected Analytes in Select Groundwater Monitoring Wells, 2015 - 2017

Appendix A – MIP Logs (Locations FTMM68-MIP-7 and FTMM68-MIP-8)

Dear Ms. Range:

The Fort Monmouth Team reviewed the recent groundwater analytical data associated with Building 114 for the potential for a vapor intrusion (VI) exposure pathway. At this time we recommend vapor intrusion monitoring not be performed at Building 114 and that groundwater monitoring as part of the remedy for FTMM-68 be performed at wells near Building 114. This recommendation is based on the Conceptual Site Model (CSM) for the FTMM-68 Site, groundwater sampling results from the Building 114 area in 2015 and 2017, and applicable VI technical guidance (NJDEP, 2016).

Background

Building 114 was the former fitness center located on the Fort Monmouth (FTMM) Main Post. As shown on Figure 1, Building 114 is located east and hydraulically downgradient of Installation Restoration Program (IRP) Sites FTMM-68 and FTMM-53 (Building 700 Former Dry Cleaner Underground Storage Tank [UST] and Building 699 Gasoline USTs, respectively). As shown on Figure 2, Building 114 has a slab floor basement that extends to 6 feet above mean sea level (ft amsl), which is approximately the same elevation as the water table.

Building 700 at FTMM-68 is currently vacant and was previously used for office space. Former Building 565 was located on approximately the same footprint area as Building 700 and formerly

housed a dry cleaning facility that used chlorinated solvents (tetrachloroethene [PCE]/trichloroethene [TCE]). A 500-gallon solvent underground storage tank (UST) adjacent to the southwest corner of Building 700 was removed in 2011 and was observed to be heavily corroded and leaking in several places. The leaking UST impacted groundwater and soil with volatile organic compounds (VOCs). From September 2015 through April 2017 Remedial Investigation (RI) field studies were conducted at FTMM-68 to characterize the chemicals released to soil and groundwater and to establish a comprehensive groundwater monitoring well network. The RI characterized and mapped a VOC plume (composed predominantly of PCE) using temporary wells, vertical membrane interface probe (MIP) profiling, and permanent multi-depth monitor wells. Permanent groundwater monitor wells near Building 114 were sampled using low-flow purge and sampling techniques and selected wells were sampled from multiple discrete depths as required by the NJDEP Field Sampling Procedures Manual.

FTMM-53 includes Building 699 and was a former fueling station and repair facility for non-military vehicles. Six 10,000-gallon USTs that were used to store various grades of gasoline with two remote pumping islands were located at the site. Environmental impacts were initially reported in 1989 when approximately 11,000 gallons of gasoline were discovered to have been released into soil. From 2001 to 2013, a groundwater remediation system consisting of multiple groundwater recovery, air sparging, and soil vapor extraction wells, and a groundwater and vapor treatment system was operated to address the release of chemical constituents. In 2013 the groundwater remediation system was turned off with NJDEP approval as the treatment goals were achieved. In 2015, additional RI field work was conducted at FTMM-53.

Physical Site Characteristics

Building 114 is underlain by the Cape May Formation Unit 2, which is characterized by fine to coarse sand and silty fine to medium sand, with minor silt and trace clays. The Hornerstown Formation, which underlies the Cape May Formation Unit 2, is locally present in 3 subgroups (Figure 2), which are distinguished by varying proportions of glauconitic clay, silty clay, and minor sand. The Tinton Formation underlies the Hornerstown Formation, and consists of dense fine sand and trace silt, glauconite, and clay.

There are two distinct aquifers in the area: a shallow aquifer which includes the Cape May Formation Unit 2 and the Hornerstown Formation, and a deep aquifer located in the Tinton Formation. Based on water level data collected March 27, 2017, the groundwater elevation in wells screened in the unconfined shallow aquifer ranged between 7 to 13 ft amsl, with an eastward groundwater flow direction (Figure 3). The groundwater elevation in wells screened in the semi-confined deep aquifer ranged from 7 to 9 ft amsl, with an eastward groundwater flow direction (Figure 4). The water table near Building 114 ranges from 4 to 8 ft below ground surface (bgs).

VI Screening of Chemicals near Building 114

The PCE plume emanating from the FTMM-68 UST release is characterized as shown on Figures 1 and 2, which summarizes the CSM for FTMM-68. The results indicate that the PCE plume has migrated to the east of the release from the former UST. As the plume moved east, it

migrated downward through the surficial soils of the Cape May Formation and into the Hornerstown Formation, leaving a clean water lens without chlorinated organics above it.

The data used for the Building 114 VI screening included groundwater samples collected immediately adjacent to Building 114 (permanent wells FTMM-68-MW02, -MW03, -MW12, and -MW13, and temporary well FTMM68-GG8). VOCs detected from these select groundwater sample locations are provided in Table 1 and include PCE, TCE, 1,2-dichloroethane, acetone, methyl *tert*-butyl ether (MTBE), and *tert*-butyl alcohol (TBA). Of these compounds, only PCE and TCE have been detected in excess of NJDEP Ground Water Quality Criteria (GWQC) at the FTMM-68 source area near Building 700.

To evaluate the VI exposure pathway associated with the FTMM-68 plume near Building 114, the concentrations of VOCs detected in monitoring wells near Building 114 were compared to the NJ Generic VI Ground Water Screening Levels (GWSLs), as follows:

- PCE was detected in FTMM-68-MW12 at 25 µg/L (from 38.3 ft bgs) and 24 µg/L (43.3 ft bgs), which are both below the VI GWSL of 31 µg/L.
- TCE was detected in FTMM-68-MW12 at 3.4 µg/L (from 38.3 ft bgs) and 3.1 µg/L (43.3 ft bgs), which is above the VI GWSL of 2 µg/L.
- 1,2-dichloroethane, MTBE, TBA and acetone were also detected in FTMM-68-MW12 but at concentrations below their respective VI GWSLs (except for TBA which does not have a VI GWSL).
- Well FTMM-68-MW03 was sampled from 17.5 to 22.5 ft bgs, which is above the intervals sampled in well FTMM-68-MW12 (38.3 and 43.3 ft bgs); the only VOC detected was acetone (5.2 µg/L), which was less than the VI GWSL of 6,000 µg/L.
- Samples from well FTMM-68-MW02 (another shallow well located north of the well cluster of FTMM-68-MW03, -MW12, and -MW13) had detections of the fuel additives MTBE and TBA at levels less than applicable guidance criteria, but no detections of PCE or TCE.

In addition, a low-level MIP survey was conducted as part of the RI at locations FTMM68-MIP7 and MIP8, which corresponded to monitoring wells FTMM-68-MW02 and -MW03, respectively. FTMM-68-MIP7 recorded photoionization detector (PID) readings in the upper 12 ft of the log, indicating the possible presence of hydrocarbons in shallow groundwater. Groundwater analyses from FTMM-68-MW02 encountered detections of MTBE and TBA, which are typically associated with fuel hydrocarbon sites, although neither the GWQC or VI GWSL were exceeded. At FTMM-68-MIP8 no elevated PID readings were reported in the low-level MIP log (total depth 40 ft bgs). MIP logs are provided in Attachment A.

The results indicate that the PCE and TCE plume underlying Building 114 is overlain by an approximately 15 ft thick lens of uncontaminated groundwater. In addition, there is no exceedance of the VI GWSL for PCE in groundwater underlying Building 114, and the marginal exceedance of the TCE VI GWSL is located about 32 ft below the basement slab. As stated in the NJDEP VI guidance (Section 3.2.1.1), the presence of a "clean water lens" can act as a barrier to volatilization from deeper groundwater, and prevent vapor intrusion into overlying buildings. Further, as shown on Figure 2, since the Building 114 basement slab is located at

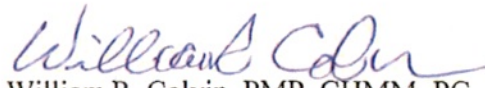
approximately the same elevation as the water table, there is generally no vadose zone thickness between the Building 114 basement slab and the shallow groundwater, and thus no potential for VOC mass storage in the vapor phase within the vadose zone. Therefore, based on these multiple lines of evidence there is no VI exposure pathway for PCE or TCE into Building 114.

Long-Term Monitoring and Remediation

Based on the above information, the vapor intrusion exposure pathway at Building 114 is incomplete and further groundwater monitoring will be performed in conjunction with our Building 700 work. Fort Monmouth is committed to long-term groundwater monitoring and implementation of remedial measures at FTMM-68, and wells FTMM-68-MW02 and MW03 will be included in the monitoring program.

The technical point of contact is Cris Grill who can be reached at 617-449-1583 or email at cris.grill@parsons.com. Should you have any questions or require additional information, please contact me at (732) 380-7064 or by email at william.r.colvin18.civ@mail.mil.

Sincerely,


William R. Colvin, PMP, CHMM, PG
BRAC Environmental Coordinator
OACSIM – U.S. Army Fort Monmouth

cc: Linda Range, NJDEP (e-mail and 2 hard copies)
Delight Balducci, HQDA ACSIM (e-mail)
Joseph Pearson, Calibre (e-mail)
James Moore, USACE (e-mail)
Jim Kelly, USACE (e-mail)
Cris Grill, Parsons (e-mail)

References Cited:

NJDEP. 2016. *Vapor Intrusion Technical Guidance*. Site Remediation and Waste Management Program. Version 4. August.



New Jersey Department of Environmental Protection
Site Remediation Program

Report Certifications for RCRA GPRA 2020, CERCLA, and Federal Facility Sites

These certifications are to be used for reports submitted for RCRA GPRA 2020, CERCLA, and Federal Facility Sites. The Department has developed guidance for report certifications for RCRA GPRA 2020, CERCLA, and Federal Facility Sites under traditional oversight. The "Person Responsible for Conducting the Remediation Information and Certification" is required to be submitted with each report. For those sites that are required or opt to use a Licensed Site Remediation Professional (LSRP) the report must also be certified by the LSRP using the "Licensed Site Remediation Professional Information and Statement". For additional guidance regarding the requirement for LSRPs at RCRA GPRA 2020, CERCLA and Federal Facility Sites see http://www.nj.gov/dep/srp/srra/training/matrix/quick_ref/rcra_cercla_fed_facility_sites.pdf.

Document: Vapor Intrusion Risk Screening Evaluation at Building 114, Fort Monmouth, New Jersey

PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: William R. Colvin

Representative First Name: William

Representative Last Name: Colvin

Title: BRAC Environmental Coordinator

Phone Number: (732) 380-7064

Ext:

Fax:

Mailing Address: P.O. Box 148

City/Town: Oceanport

State: NJ

Zip Code: 07757

Email Address: william.r.colvin18.civ@mail.mil

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature:

Date: 05/19/2017

Name/Title: William R. Colvin / BRAC Environmental Coordinator

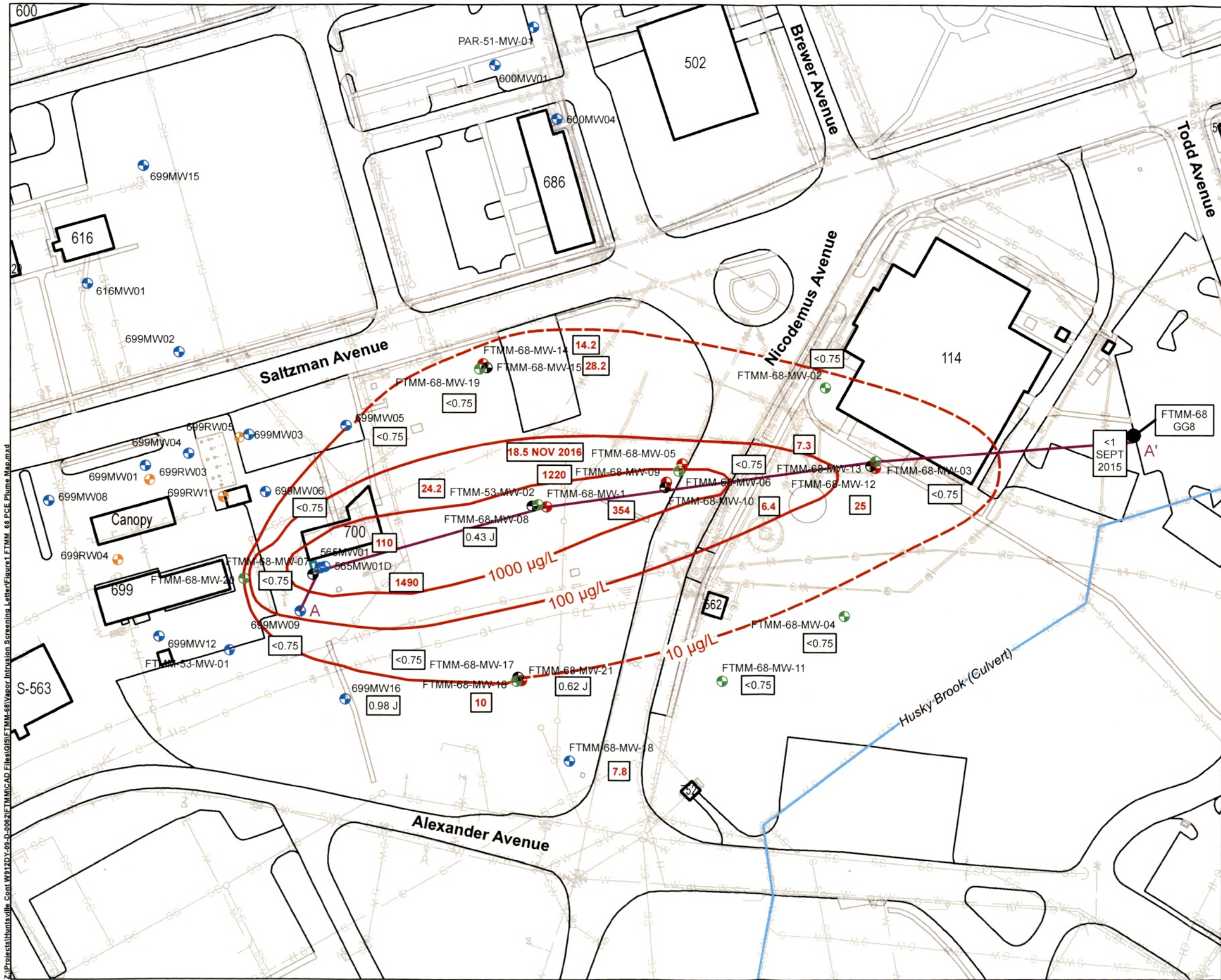
Figures

Figure 1 – PCE Plume Layout

Figure 2 – PCE Plume on Geologic Cross Section A-A'

*Figure 3 – FTMM-68 Cape May Unit 2 and Hornerstown Formation Shallow
Groundwater Contours – March 27, 2017*

*Figure 4 – FTMM-68 Tinton Formation Deep Groundwater Contours – March
27, 2017*



LEGEND:

- Monitoring Well Screened in QCM2
- Monitoring Well Screened across QCM2/Tht Contact
- Monitoring Well Screened in Kt
- Monitoring Well Screened in Tht
- Recovery Well
- W Water Line
- SS Sanitary Sewer Line
- SW Storm Sewer Line
- G Gas Line
- UST Excavation Footprint
- Cross Section A-A'
- PCE Isoconcentration Contour
- PCE Isoconcentration Contour Inferred
- Grab Groundwater Sample Location
- PCE Well Concentration, March/April 2017 - unless otherwise noted.

NOTES:

All results in micrograms per liter (µg/L).

Bold red indicates value exceeds NJ Ground Water Quality Criteria for PCE (1 µg/L).

QCM2 - Cape May Formation, Unit 2 (surficial deposits).

Tht - Hornerstown Formation.

Kt - Tinton Formation.

Maximum PCE concentration at each well cluster was used for contouring.

See Figure 2 for vertical plume distribution.

Source: FTMM Supplied CAD

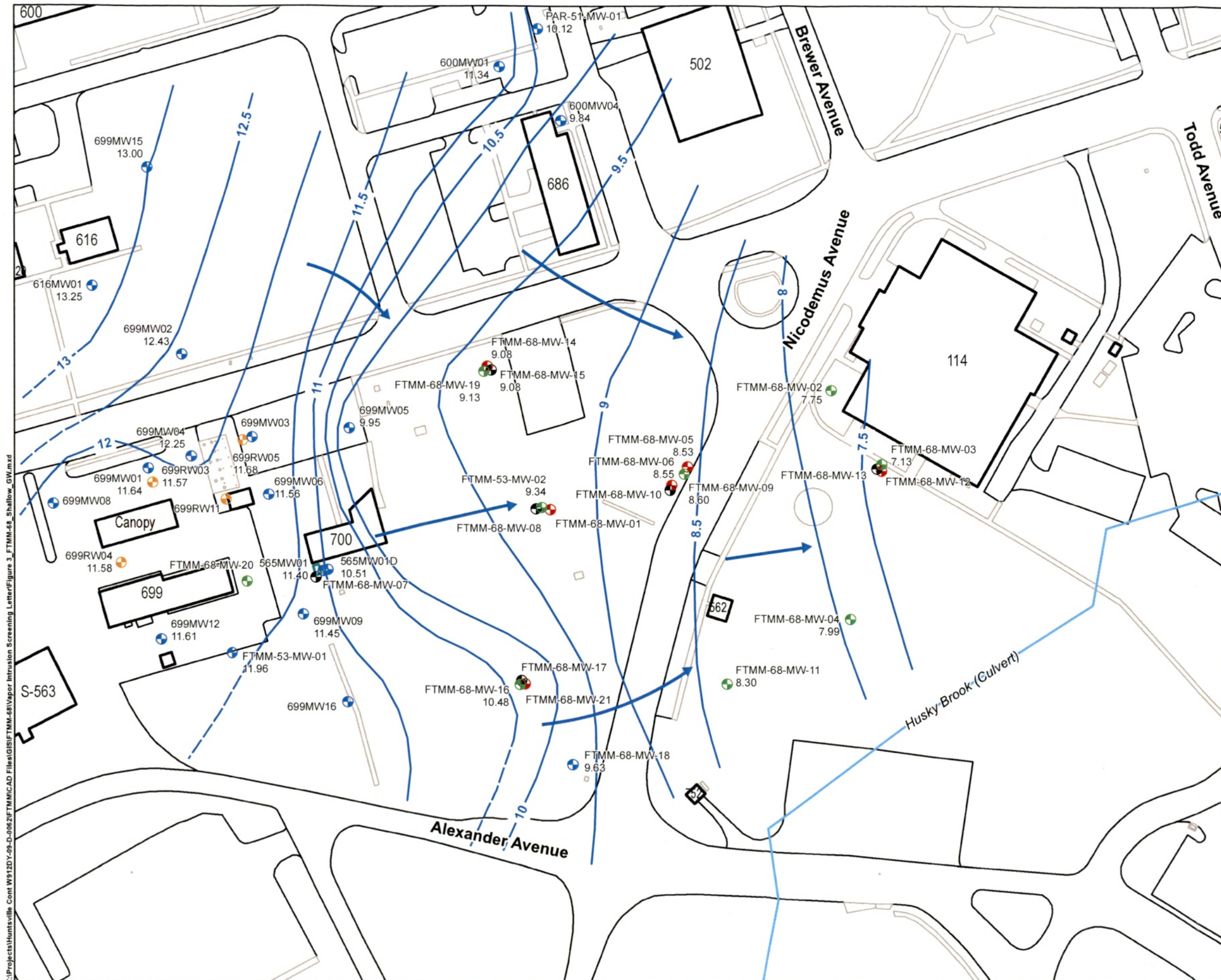
PARSONS
401 Diamond Drive NW,
Huntsville AL

Fort Monmouth
New Jersey

PCE Plume Layout

CREATED BY: AM
DATE: MAY. 2017
PROJECT NUMBER: 748810-02180

REVIEWED BY: KW
FIGURE NUMBER: FIGURE 1
FILE: Figure1 FTMM_68 PCE Plume Map.mxd



LEGEND:

- Monitoring Well Screened in QCM2
- Monitoring Well Screened across QCM2/Tht Contact
- Monitoring Well Screened in Kt
- Monitoring Well Screened in Tht
- Recovery Well
- W Water Line
- SS Sanitary Sewer Line
- SW Storm Sewer Line
- G Gas Line
- UST Excavation Footprint
- Groundwater Elevation Contour
- Inferred Groundwater Elevation Contour
- Inferred Groundwater Flow Direction

EXPLANATION:

616MW01 — Well ID
13.25 — Groundwater Elevation (FT.) (AMSL)

NOTES:

- QCM2 - Cape May Formation, Unit 2 (surficial deposits).
- Tht - Hornerstown Formation.
- Kt - Tinton Formation.

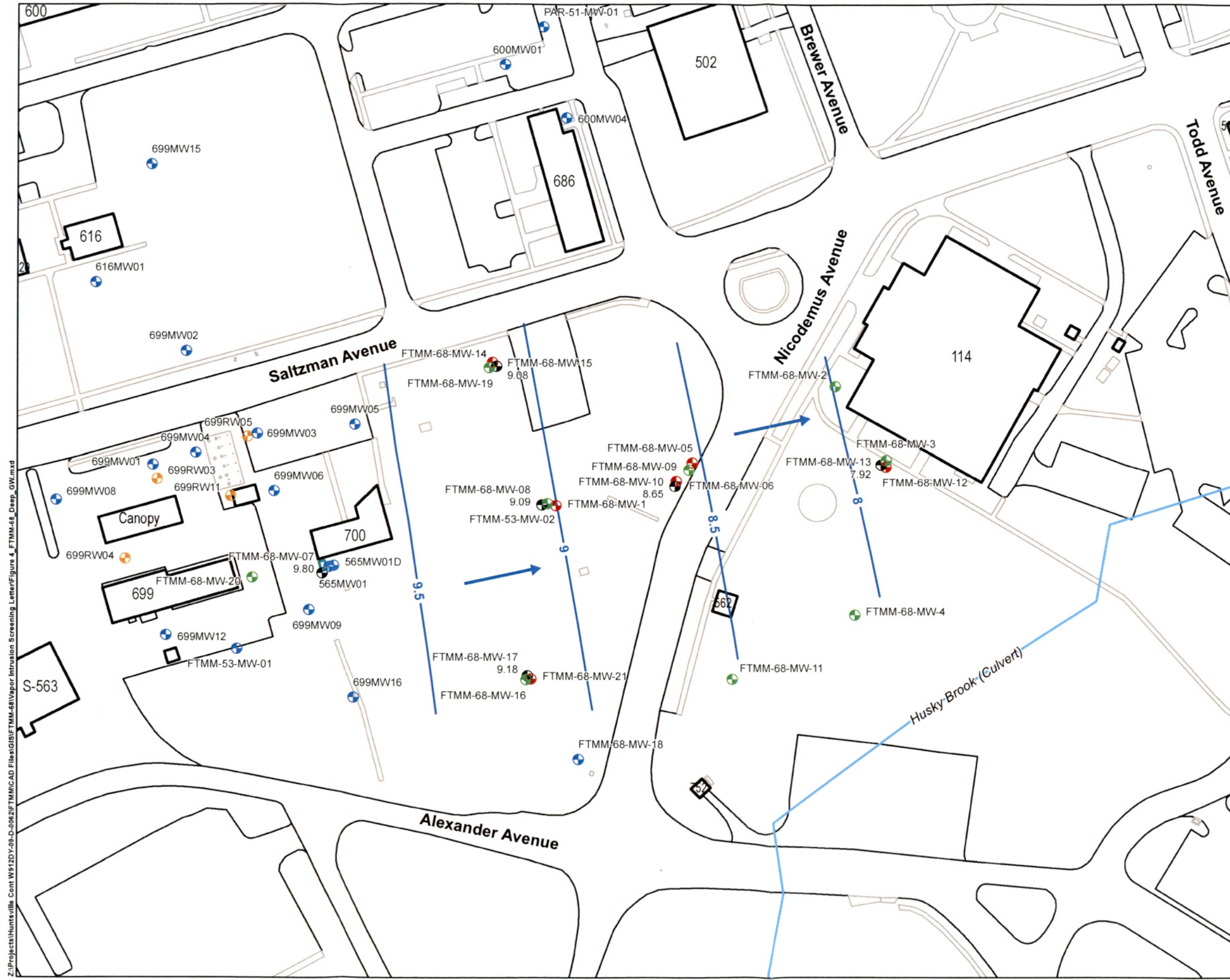
N

1 inch = 100 feet

0 50 100 200 Feet

PARSONS 401 Diamond Drive NW, Huntsville AL	Fort Monmouth New Jersey
FTMM-68 CAPE MAY UNIT 2 AND HORNERSTONE FORMATION SHALLOW GROUNDWATER CONTOURS - MARCH 27, 2017	
CREATED BY: RR	REVIEWED BY: ME
DATE: MAY. 2017	FIGURE NUMBER: FIGURE 3
PROJECT NUMBER: 748810-02180	FILE: Figure 3_FTMM-68_Shallow_GW.mxd

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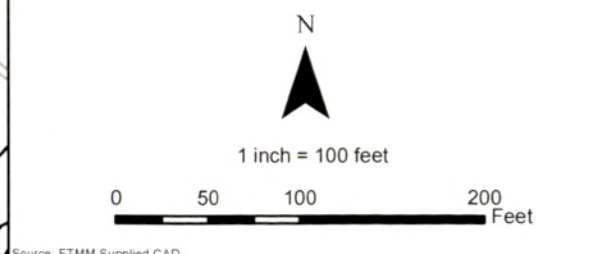
LEGEND:

- Monitoring Well Screened in QCM2
- Monitoring Well Screened across QCM2/Tht Contact
- Monitoring Well Screened in Kt
- Monitoring Well Screened in Tht
- Recovery Well
- W- Water Line
- SS- Sanitary Sewer Line
- SW- Storm Sewer Line
- G- Gas Line
- UST Excavation Footprint
- Groundwater Elevation Contour
- Inferred Groundwater Flow Direction

EXPLANATION:

FTMM-68-MW-13 — Well ID
7.92 — Groundwater Elevation (FT.) (AMSL)

- NOTES:**
- QCM2 - Cape May Formation, Unit 2 (surficial deposits).
 - Tht - Hornerstown Formation.
 - Kt - Tinton Formation.



Source: FTMM Supplied CAD	
PARSONS 401 Diamond Drive NW, Huntsville AL	Fort Monmouth New Jersey
FTMM-68 TINTON FORMATION DEEP GROUNDWATER CONTOURS - MARCH 27, 2017	
CREATED BY: RR	REVIEWED BY: ME
DATE: MAY. 2017	FIGURE NUMBER: FIGURE 4
PROJECT NUMBER: 748810-02180	FILE: Figure 4_FTMM-68_Deep_GW.mxd

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Tables

Table 1 – *Detected Analytes in Select Groundwater Monitoring Wells, 2015 - 2017*

TABLE 1
DETECTED ANALYTES IN SELECT GROUNDWATER MONITORING WELLS, 2015 - 2017
 SITE FTMM-68 Bldg. 700
 FORT MONMOUTH, NEW JERSEY

Location ID	NJ Ground Water Quality Criteria (µg/l)	2015-06 USEPA RSL Tap Water (HQ=0.1)	NJ Generic Vapor Intrusion - Ground Water Screening Levels (µg/l)	FTMM68-MW02			
Sample ID				FTMM-68-GW-MW02-17.5	FTMM-68-GW-MW02-22.5	FTMM-68-GW-MW102-17.5	FTMM-68-GW-MW02-23
Sample Depth (feet below ground surface)				17.5-17.5	22.5-22.5	17.5-17.5	23-23
Sample Date				11/17/2015	11/17/2015	11/17/2015	3/28/2017
Volatile Organic Compounds (µg/l)							
1,2-Dichloroethane	2	0.17	3	< 1	< 1	< 1	< 0.75
Acetone	6,000	1,400	21,000,000	< 5	< 5	< 5	< 3.8
Methyl Tertbutyl Ether	70	14	580	14	15	14	13.9
Tert Butyl Alcohol	100	NLE	NLE	28 J	28 J	26 J	49.3
Tetrachloroethene	1	4.1	31	< 1	< 1	< 1	< 0.75
Trichloroethene	1	0.28	2	< 1	< 1	< 1	< 0.75

Notes:

µg/L: micrograms per liter

J: estimated value

NLE : no limit exists

Red text values represent a result above the NJ Generic Vapor
Intrusion - Ground Water Screening Level

Green cell shade values represent a result that is above the NJ
Ground Water Quality Criteria

Yellow cell shade values represent a result that is above the
USEPA 2014-05 RSL Tap Water (HQ=0.1).

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TABLE 1
DETECTED ANALYTES IN SELECT GROUNDWATER MONITORIN
 SITE FTMM-68 Bldg. 700
 FORT MONMOUTH, NEW JERSEY

Location ID	NJ Ground Water Quality Criteria (µg/l)	2015-06 USEPA RSL Tap Water (HQ=0.1)	FTMM68-MW03			FTMM68-MW-12	
Sample ID			FTMM-68-GW-MW03-17.5	FTMM-68-GW-MW03-22.5	FTMM-68-GW-MW03-20	FTMM-68-GW-MW12-38.33	FTMM-68-GW-MW12-43.33
Sample Depth (feet below ground surface)			17.5-17.5	22.5-22.5	20-20	38.33-38.33	43.33-43.33
Sample Date			11/17/2015	11/17/2015	3/28/2017	3/29/2017	3/29/2017
Volatile Organic Compounds (µg/l)							
1,2-Dichloroethane	2	0.17	< 1	< 1	< 0.75	1.3	1.7
Acetone	6,000	1,400	< 5	< 5	5.2	6	4.3 J
Methyl Tertbutyl Ether	70	14	< 1	< 1	< 0.75	7.6	7
Tert Butyl Alcohol	100	NLE	< 20	< 20	< 12.5	119	166
Tetrachloroethene	1	4.1	< 1	< 1	< 0.75	25	24
Trichloroethene	1	0.28	< 1	< 1	< 0.75	3.4	3.1

Notes:

µg/L: micrograms per liter

J: estimated value

NLE : no limit exists

Red text values represent a result above the NJ Generic Vapor

Intrusion - Ground Water Screening Level

Green cell shade values represent a result that is above the NJ

Ground Water Quality Criteria

Yellow cell shade values represent a result that is above the

USEPA 2014-05 RSL Tap Water (HQ=0.1).

TABLE 1
DETECTED ANALYTES IN SELECT GROUNDWATER MONITORING
 SITE FTMM-68 Bldg. 700
 FORT MONMOUTH, NEW JERSEY

Location ID	NJ Ground Water Quality Criteria (µg/l)	2015-06 USEPA RSL Tap Water (HQ=0.1)	FTMM68-MW-13		GG-8
Sample ID			FTMM-68-GW-MW13-58.5	FTMM-68-GW-MW13-63.5	FTMM-68-GG8-21.0
Sample Depth (feet below ground surface)			58.5-58.5	63.5-63.5	21-21
Sample Date			3/30/2017	3/30/2017	9/28/2015
Volatile Organic Compounds (µg/l)					
1,2-Dichloroethane	2	0.17	< 0.75	< 0.75	< 1
Acetone	6,000	1,400	3.6 J	19.1	1.5 J
Methyl Tertbutyl Ether	70	14	< 0.75	< 0.75	< 1
Tert Butyl Alcohol	100	NLE	31.7	34.6	< 20
Tetrachloroethene	1	4.1	7.3	1	< 1
Trichloroethene	1	0.28	< 0.75	< 0.75	< 1

Notes:

µg/L: micrograms per liter

J: estimated value

NLE : no limit exists

Red text values represent a result above the NJ Generic Vapor

Intrusion - Ground Water Screening Level

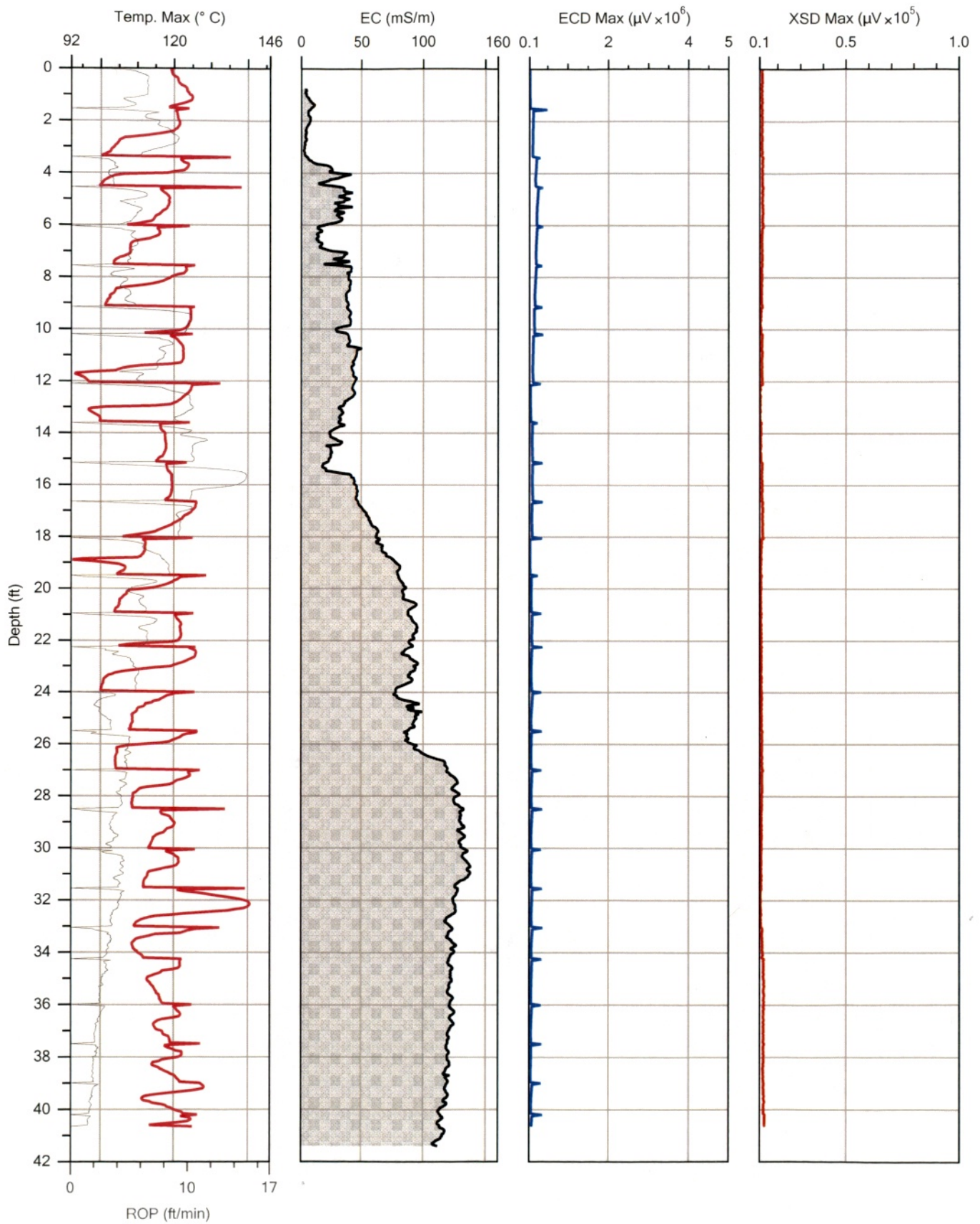
Green cell shade values represent a result that is above the NJ

Ground Water Quality Criteria

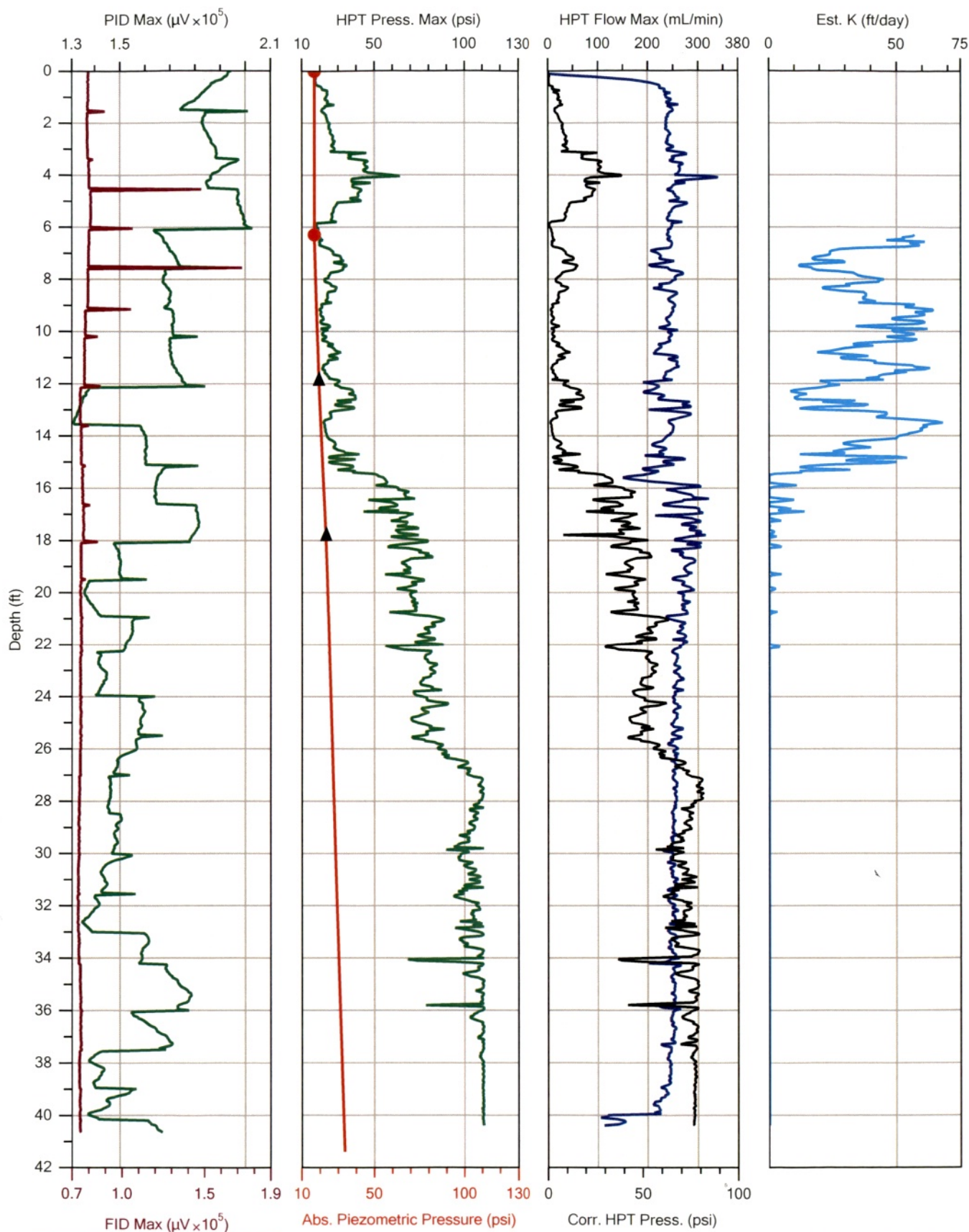
Yellow cell shade values represent a result that is above the

USEPA 2014-05 RSL Tap Water (HQ=0.1).

Appendix A – *MIP Logs (Locations FTMM68-MIP-7 and FTMM68-MIP-8)*



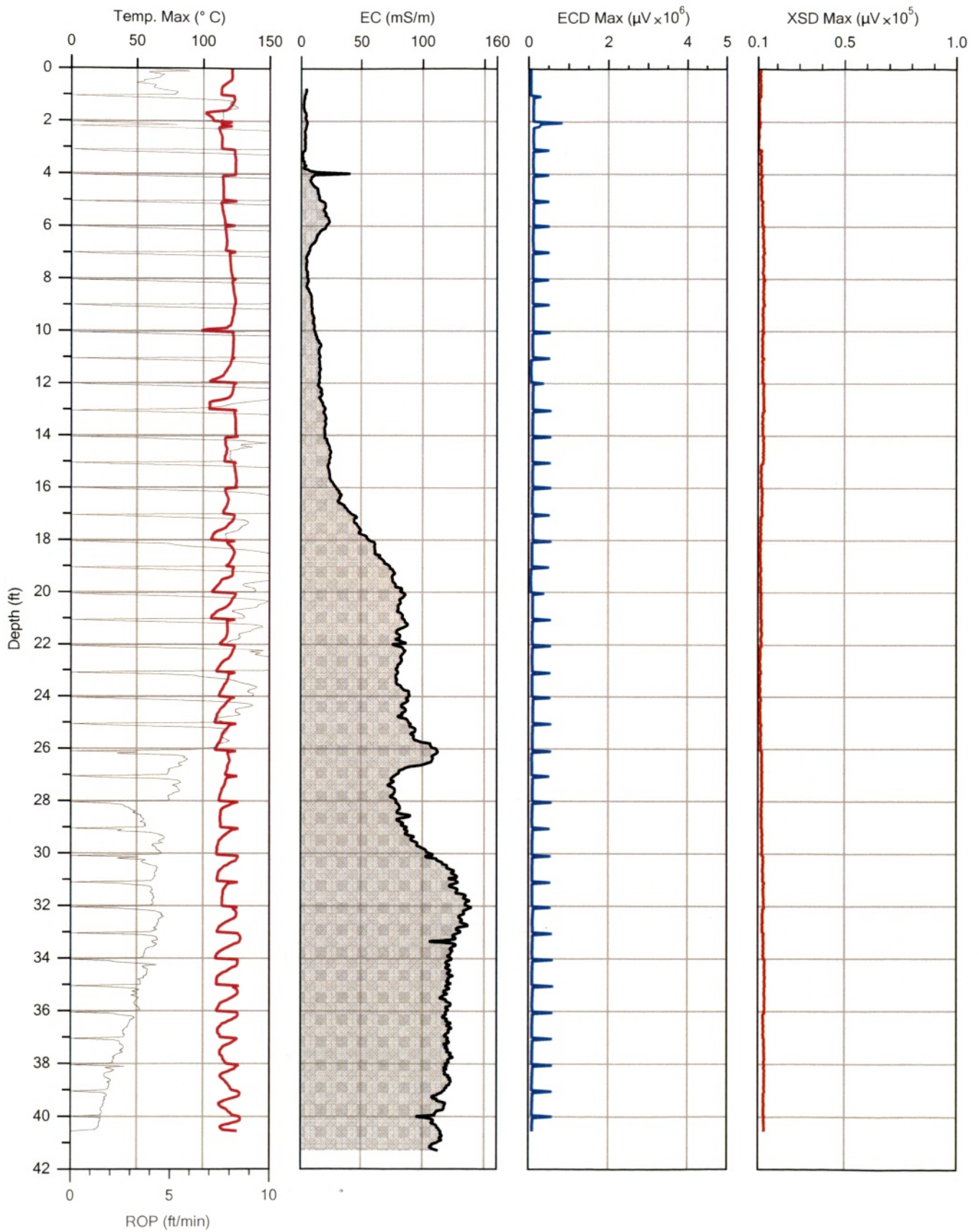
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Company: Cascade Technical Services
 Project ID: 202.16.9921

Operator: E Olson
 Client: Parsons

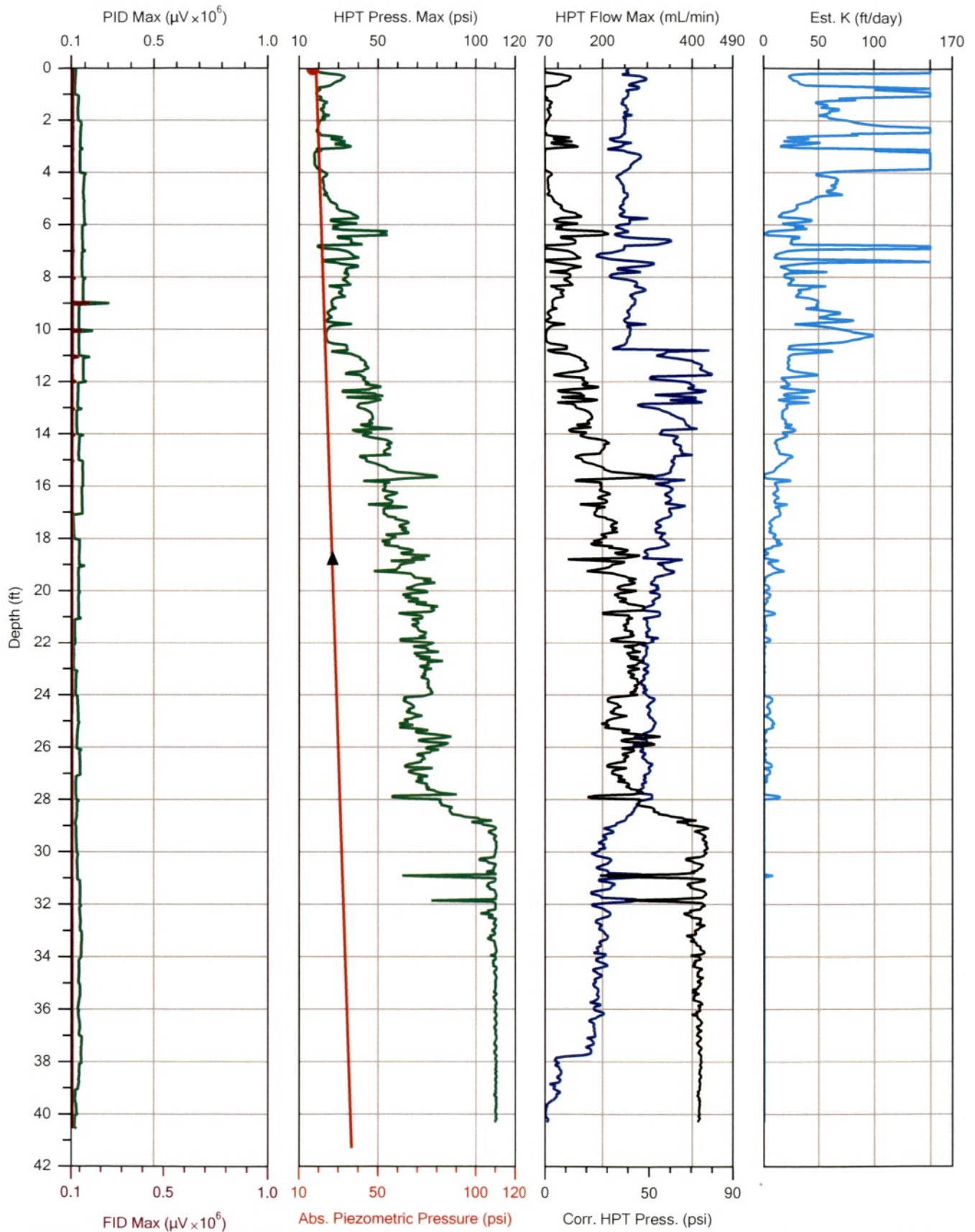
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E Olson
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Parsons

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Location:	



Company:
Cascade Technical Services
Project ID: 202.16.9921

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12/9/2016
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