FIREMEN'S TRAINING CENTER

NASSAU COUNTY
DEPARTMENT OF PUBLIC WORKS

BASELINE ENVIRONMENTAL MONITORING REPORT

JOHN M. WALTZ, P.E.
COMMISSIONER

June 1999

Fireman's Training Center
Baseline Environmental Monitoring Report
June 1999

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INTRODUCTION

1.0 Purpose

A comprehensive groundwater sampling round was conducted prior to the start of remedial operations at the Fireman's Training Center Site (FTC), located in Old Bethpage, New York. This work was done to establish a baseline condition for the aquifer which is necessary to evaluate the effectiveness, performance, and hydraulic control of the FTC remediation project.

The baseline monitoring program addresses the following elements:

On-Site Groundwater Monitoring.

- Groundwater samples were collected from 13 monitoring wells which were designated by the New York State Department of Environmental Conservation (NYSDEC) as the FTC on-site monitoring wells. The samples from these wells were analyzed for both organic and inorganic compounds, as required by the NYSDEC approved monitoring plan for the site's remedial action.

Off-Site Groundwater Monitoring

- Groundwater samples were collected from 11 monitoring wells which were designated by the NYSDEC as FTC off-site monitoring wells. The samples from these wells were analyzed for both organic and inorganic compounds, as required by the NYSDEC approved monitoring plan for the site's remedial action.

Floating Product Monitoring.

- FTC on-site monitoring wells were checked for the presence, and thickness of petroleum product. The petroleum product, if present would be floating on the surface of the groundwater, being that it is has a lower specific gravity than water.

Hydraulic Monitoring.

- Water levels in on-site and off-site monitoring wells were measured prior to the start of the FTC remediation program to establish baseline water levels and groundwater flow direction. This baseline water level information is necessary to establish and monitor the hydraulic effectiveness of the extraction system and it's ability to contain and recover the FTC groundwater contamination during the remediation.

Pre-Startup Monitoring.

- The recovery wells were tested during the final stages of construction. Water level and water quality measurements made during these tests have been included in this baseline report.

1.1 Site Description and History

The FTC is located on a 12-acre site on Winding Road near Round Swamp Road in Old Bethpage, New York. It is bordered on the north and west by the former Old Bethpage Landfill, and on the south and east by Bethpage State Park (Figure 1). The site has been used since 1960 to conduct advanced fire fighting training for volunteer firemen, and continues today to serve these activities. Training exercises occur in open burn areas and in mock-up buildings located across the site (Figure 2).

Between 1970 and 1980, waste solvents, in addition to fuel oil and gasoline, were accepted at the site for use in training exercises. This practice was discontinued in 1980 and, since then, training exercises have been performed using only fuel oil and gasoline to ignite wooden pallets and straw.

The site contamination occurred primarily in the open burn areas, where fuel was poured directly onto the ground, and in the mock-up fields. In the mock-up buildings, unburned fuel and solvents were washed out of the buildings into drywells after each training session. These unlined drywells inadvertently served as conduits, carrying contamination down to the groundwater and contaminating the soils beneath the site.

In 1984, site improvements were made by the Nassau County Department of Public Works (NCDPW) to cap the burn areas and seal the drainage system leading to the drywells. A new drainage system was installed, including an oil/water separator to treat training site runoff. The discharge of the oil/water separator is connected to the sanitary sewer system.

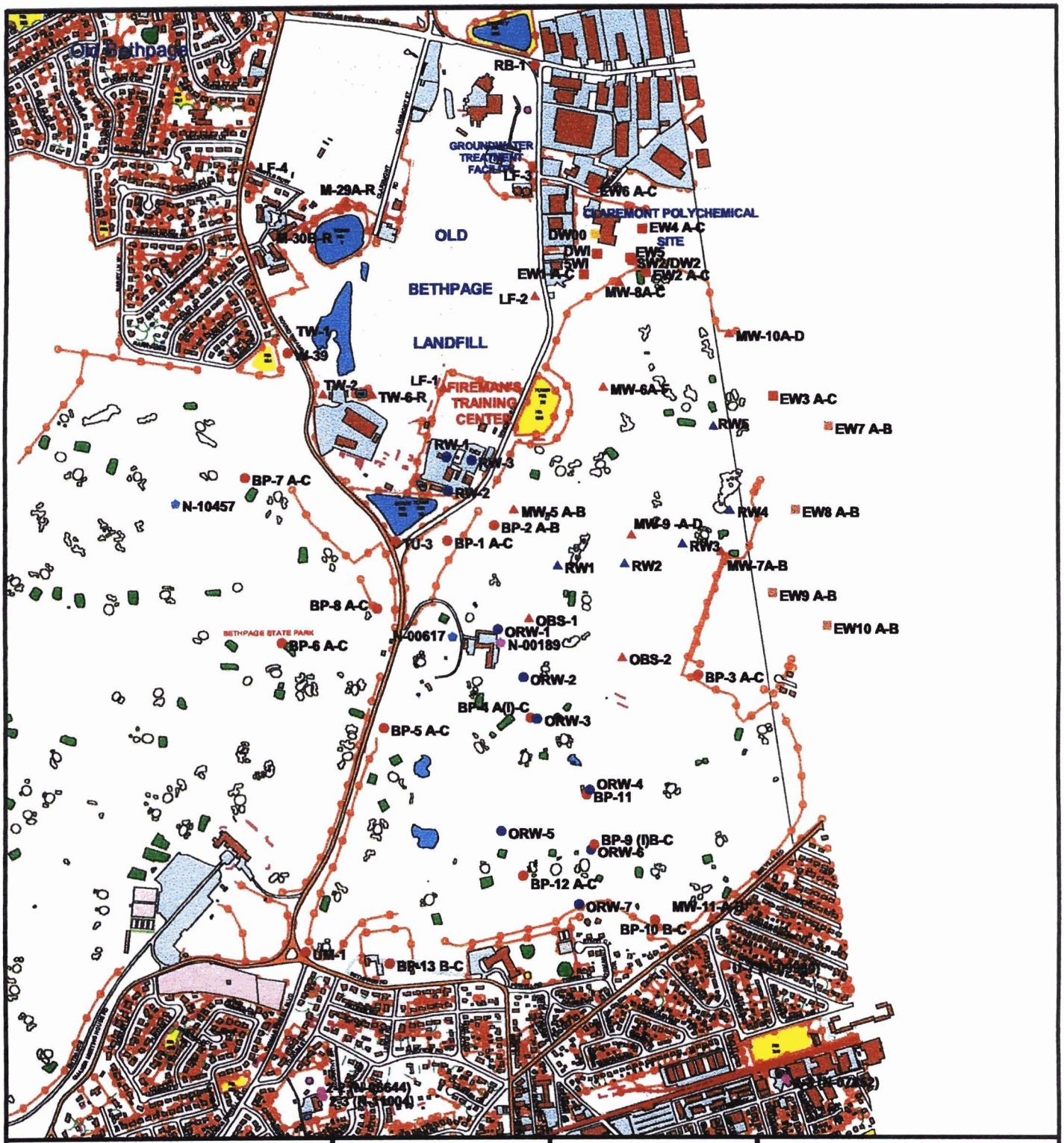


Figure 1

Legend

Fireman's Training Center Area Wells

- Bethpage State Park Inactive Well
- Bethpage State Park Irrigation Well
- Claremont Poly. Site Diffusion Well
- Claremont Poly. Site Monitoring Well or Well Cluster
- Claremont Poly. Site Proposed Monit. Well or Well Cluster
- Nassau County Injection Well
- Nassau County Monitoring Well or Well Cluster
- Nassau County Recovery Well
- Plainview WD Public Supply Well
- T. of Oyster Bay Monitoring Well or Well Cluster
- T. of Oyster Bay Recovery Well
- V. of Farmingdale Public Supply Well

Keymap

Fireman's Training Center Site Area With Well Locations

Prepared By: NCDPW Water Resources Unit

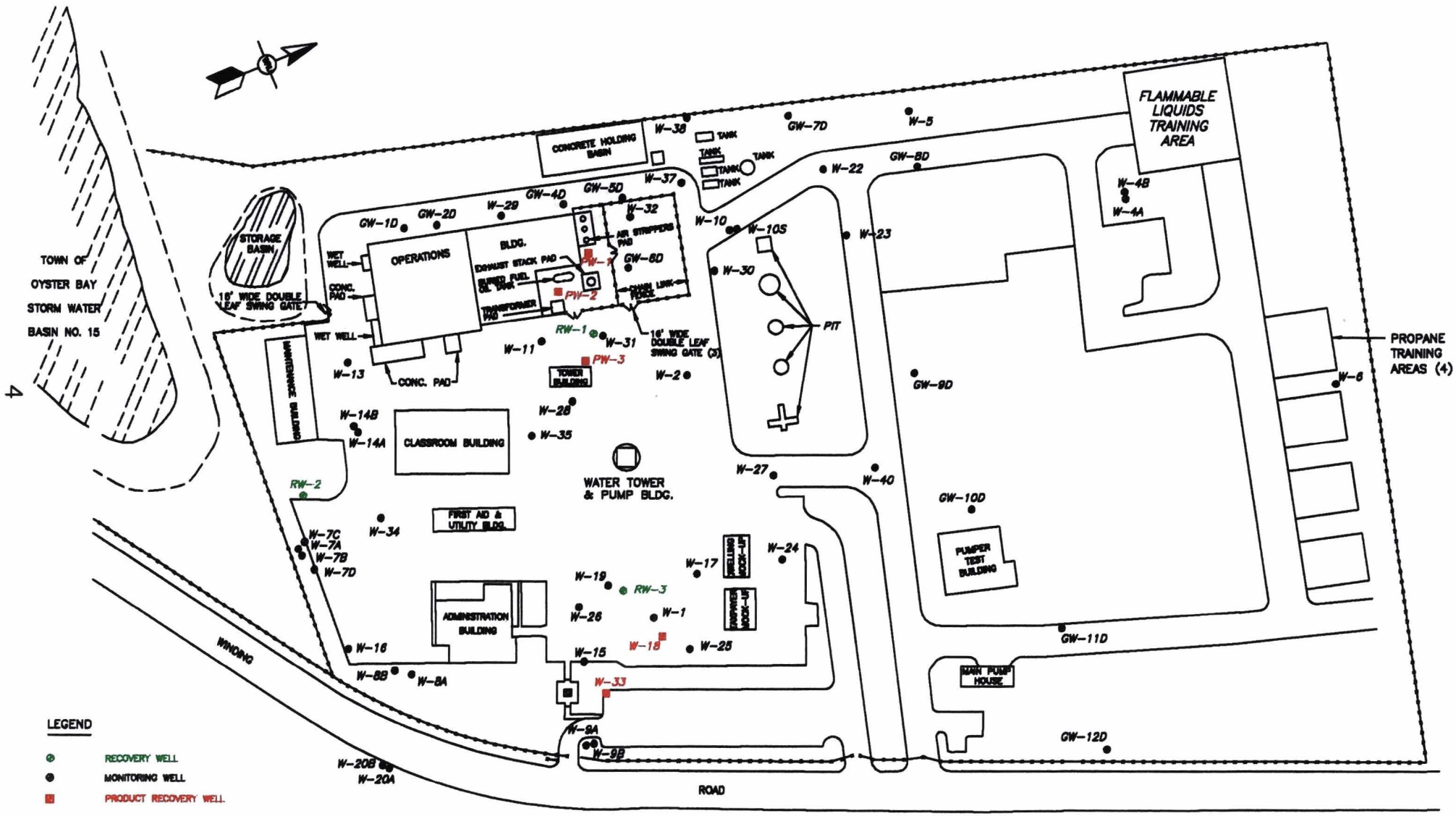
N

Scale: 1" = 1300'

NASSAU COUNTY

GEOGRAPHIC INFORMATION SYSTEM

October 24, 2000



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1	11-94 OPERATIONS BLDG. SITE PLAN (SHT. C-2)	1-98
0	ORIGINAL RELEASE	4-24-91

FILE NAME: \DWG\FTCST94C
CONTRACT NUMBER: 9810B0
SHEET NO. 1 OF 1
SCALE: NOT TO SCALE
DWG. NO. X
DRAWN BY: R.KOPCHINSKI
DATE 4/99
DESIGNED BY: R.KOPCHINSKI
DATE 4/99
CHECKED BY: MIKE FLAHERTY
DATE 4/99

COUNTY OF NASSAU
DEPARTMENT OF PUBLIC WORKS
SANITATION & WATER SUPPLY
WATER RESOURCES UNIT

SITE PLAN
OCTOBER, 1998
FIREMEN'S TRAINING CENTER
OLD BETHPAGE, N.Y.
FIGURE 2

Based on NCDPW investigations conducted at the site, the New York State Department of Environmental Conservation (NYSDEC) added the FTC site to the State's Registry of Inactive Hazardous Waste Disposal Sites in December 1987, and upgraded the site to Class 2 level, one that poses a significant threat to the public or the environment, in March 1988. An Order of Consent was signed by the County in February 1989, requiring a Remedial Investigation/Feasibility Study (RI/FS) to be performed. The RI/FS was completed in 1992.

A record of decision (ROD) that described the remedial program for the site was subsequently approved by the NYSDEC in February 1993. The ROD called for an asphalt/concrete cap with institutional controls for shallow soils, pumping and treating on-site groundwater using three extraction wells, and pumping and treating off-site groundwater using seven extraction wells.

1.2 Environmental Conditions

1.2.1 On-Site Geology and Hydrogeology

1.2.2 On-Site Geology

The on-site geology of the FTC was interpreted from the geologic and geophysical logs prepared for the Remedial Investigation (RI), and a review of both boring logs from previous work completed on the site and other geologic studies in the region. The FTC site is underlain by glacial outwash deposits of Pleistocene age, which are characterized by stratified beds of moderate to well sorted, fine to coarse sand and gravel. Thin beds of silt and clay are frequently interbedded with coarse grained deposits.

The Matawan Group-Magothy Formation, undifferentiated (Magothy Formation) underlies the glacial deposits. This unit is Upper Cretaceous in age, and typically consists of moderate to well sorted, very fine to medium sand, with varying amounts of silt and clay. Discontinuous lenses and layers of coarse sand and sandy and solid clay of varying thickness and areal extent are common in the Magothy Formation. In some places the upper part of the Magothy has been reworked by glacial meltwater streams during the Pleistocene Epoch, obscuring the contact with the glacial outwash deposits. In places where reworking has taken place, the contact between the glacial deposits and the Magothy Formation is difficult, and can be at times nearly impossible to identify.

Geologic and geophysical logs prepared from previous investigations indicate that the FTC is underlain by sand, gravel, and silt and clay in alternating and sometimes discontinuous layers. Fill material consisting of blacktop, concrete, and fine to coarse sand and gravel, is found on the surface at most locations. The fill is generally no more than two to three feet thick, with a maximum thickness of five feet. A layer of medium brown to orange brown, fine to coarse sand and gravel occurs below the fill at all locations. This poorly sorted layer has little silt or clay, and varies in thickness from seven feet to 13 feet.

Geologic logs of wells located in the northwestern part of the site show that a continuous, dense gray to brown clay layer occurs below this sand and gravel layer. The top of the clay is approximately 10 to 15 feet below grade and the clay extends to a depth of approximately 25 feet.

Information from the RI and previous studies on the FTC show that the clay layer exists above the water table and extends approximately 700 feet in the north-south direction and ranges from zero to 15 feet in thickness. The east-west dimension of the clay is not known as the unit extends onto the adjacent Town of Oyster Bay property. However, soil boring information provided from the Town's investigations indicate that the clay may pinch out about 200 feet west of the FTC site. On the FTC the clay pinches out 150 to 200 feet east of the western FTC boundary.

A fine to medium sand layer that generally contains little to trace amounts of silt and clay occurs below the clay unit (where found) and the fine to coarse sand and gravel unit (where the clay is missing). This sand has been found in a variety of colors including cream, orange, tan and brown. It may be the uppermost sediments of the Magothy Formation on the FTC. This unit is found at depths varying from ten feet below grade at W-40 to 25 feet below grade at W-37, and occurs continuously to the bottom of all the shallow borings, to a maximum depth of 55 feet below grade in W-40. In B7-P, the deepest boring on the FTC (240 feet below grade), the fine to medium sand extends throughout its depth. Below approximately 48 feet below grade, the geologic and geophysical logs of B7-P show alternating layers of generally cream to tan very fine to medium sand and silt or clay. None of the on-site borings fully penetrated the Magothy Formation, which is about 800 feet thick on the FTC.

1.2.3 On-Site Hydrogeology

Ground water on the FTC occurs in the basal part of the glacial deposits (Upper Glacial Aquifer) and in the Magothy Formation (Magothy Aquifer). The upper part of the saturated zone is a thick sequence of sand with varying amounts of gravel, silt, and clay. Locally, the numerous clay and silt layers, which are almost always of limited areal extent, impede vertical ground water movement, resulting in increasing confinement with increased depth. However, there is not a continuous confining unit separating the shallow saturated zone from the deeper portions of the ground water system. In the northwestern part of the site, a perched water body occurs above a clay layer. The perched water occurs approximately ten feet below land surface and extends vertically to the upper surface of the clay, approximately 10 to 15 feet below grade.

The hydrogeology on the FTC is characterized by information from other investigations, by the water level measurements collected in the monitoring wells, and by the pumping test conducted on well RW-1.

Synoptic water level measurements in monitoring wells on the FTC were collected monthly beginning in April, 1990, using an electronic water-level indicator.

Typical pre-remediation (November 1988) conditions and groundwater contours for the FTC site are shown in Figure 3. Natural groundwater movement on the FTC is predominantly to the south-southeast. Ground water enters the FTC from the north forming an arcuate pattern beneath the paved surface, moves south through the FTC and leaves the site at the southeastern property line and moves onto Bethpage State Park.

From historic data collected for the site, the horizontal hydraulic gradient is on the order of $1.1x10^{-3}$ feet/foot, indicating that ground water movement is relatively fast, at approximately one foot per day which is consistent with regional values.

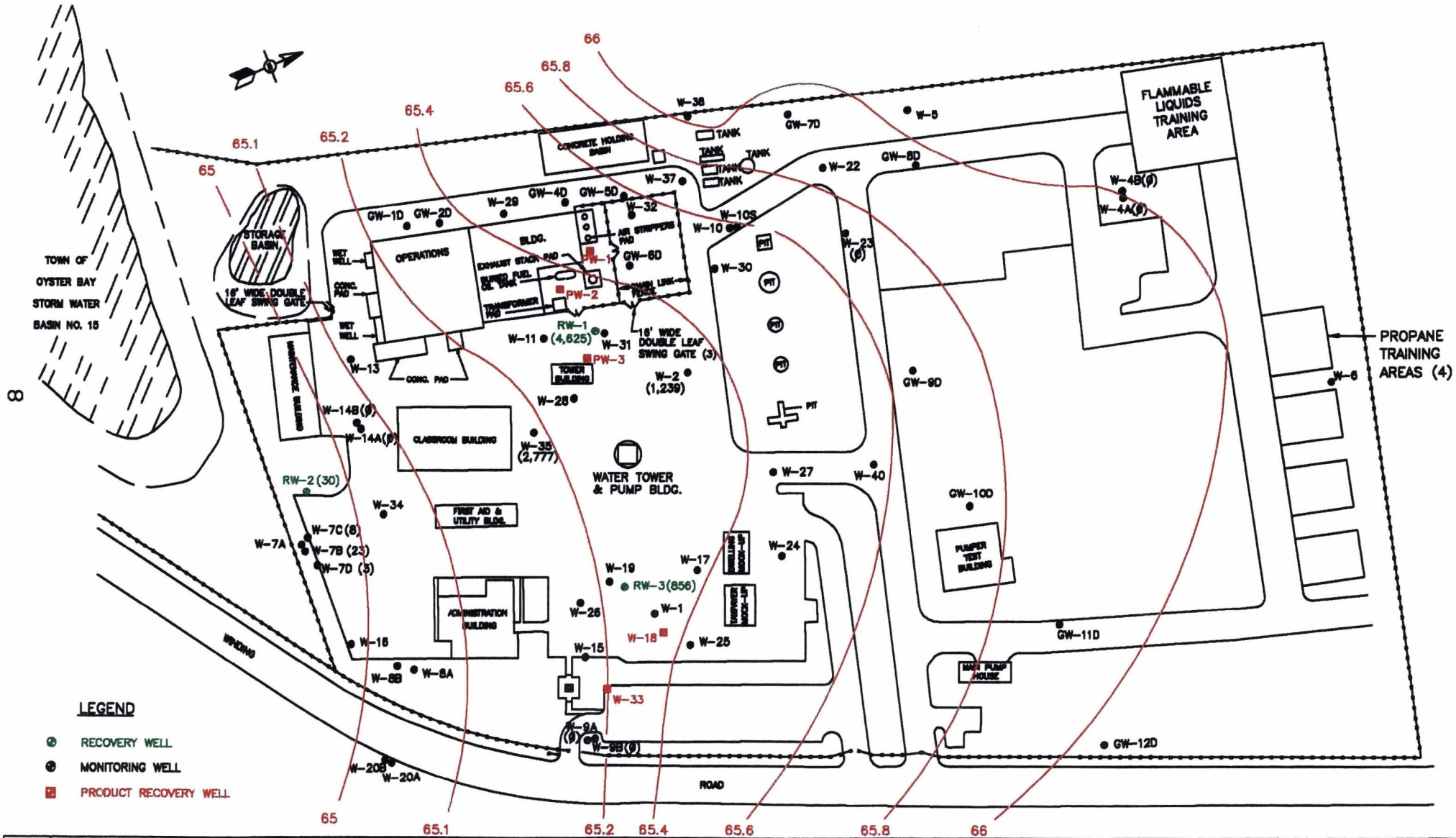
The potentiometric surface defined by measurements made in onsite wells screened approximately 80 to 100 feet below the ground surface indicates that east of the FTC water in this deeper zone is also generally moving to the south-southeast. Comparisons of water levels in the shallow and deeper zones indicate a general downward vertical hygraulic gradient.

1.2.4 Off-Site Geology and Hydrogeology

1.2.5 Off-Site Geology

Definition of the off-site geology, downgradient (south) of the FTC, is based on the interpretation of geologic logs and geophysical logs from boreholes drilled as part of the RI and data from previous studies in the region.

The geology beneath Bethpage State Park is similar to that found below the FTC. Bethpage State Park is underlain by glacial outwash, which was deposited by meltwater streams flowing generally southward from the retreating ice front during the latter part of the Pleistocene Epoch. These deposits are typically characterized by stratified beds of brown to tan, moderate to well sorted, fine to coarse sand and gravel. Thin beds of silt and clay are sometimes interbedded with the coarse grained deposits.



			FILE NAME: \DWG\FTCST94P		CONTRACT NUMBER: 891080	SHEET NO. 1 OF 1	COUNTY OF NASSAU DEPARTMENT OF PUBLIC WORKS SANITATION & WATER SUPPLY WATER RESOURCES UNIT	WATER LEVEL CONTOURS (PLANT OFF) NOVEMBER 30, 1998 FIREMEN'S TRAINING CENTER OLD BETHPAGE, N.Y. FIGURE 3
			SCALE: NOT TO SCALE	DWG. NO. X	DRAWN BY: R.RZEPCHINSKI	DATE 6/99		
1	11-94 OPERATIONS BLDG. SITE PLAN (SHT. C-2)	1-98	DESIGNED BY: R.RZEPCHINSKI	DATE 6/99	CHECKED BY: M.FLAHERTY	DATE 6/99		
0	ORIGINAL RELEASE	4-24-91						
NO.	REVISION DESCRIPTION	DATE						

The Matawan Group-Magothy Formation, undifferentiated (Magothy) underlies the glacial deposits. The Magothy is Upper Cretaceous in age, and typically consists of moderate to well sorted, very fine to medium sand with varying amounts of silt and clay. Discontinuous beds and layers of coarse sand, silty and solid clay of varying thickness and areal extent are common in the Magothy. Gravel beds frequently occur in the basal part of the formation. The color varies and is commonly gray, white, buff or red. The upper part of the Magothy was reworked during the Pleistocene Epoch by glacial meltwater streams. The overlying Pleistocene deposits in some places, therefore, may be composed partly of redeposited Magothy materials, which obscure the contact between the Magothy and the Pleistocene deposits. Under these conditions, the contact is difficult, and can be at times nearly impossible to identify. In other places, the contact between the Pleistocene deposits and the Magothy is characterized by an abrupt change from the coarse, generally clean sand and gravel of the Pleistocene to the fine sand, silty clay and solid clay of the Cretaceous. The Magothy surface has been extensively eroded so the contact can vary in elevation considerably, even within short distances. As much as 50 feet of relief has been identified in the vicinity of the FTC (Isbister, 1966).

Geophysical logs and geologic logs from previous studies on the FTC indicate that the region is underlain by sand, gravel, silt and clay occurring in alternating and usually discontinuous beds. The geology downgradient of the FTC has been developed from the pilot hole borings drilled for each monitoring well cluster. The pilot holes were drilled to characterize the lithology prior to installation of the wells.

The shallowest sediments are composed of a light to medium brown, fine to coarse sand and gravel, similar to that found in borings drilled on the FTC. This material extends to a depth of 18 feet below grade in BP/PH-3 and BP/PH-4, and to 57 feet below grade in BP/PH-7. The logs of BP/PH-3 show two deeper beds of sand and gravel occurring from 62 to 70, and 98 to 114 feet below grade. A light brown, fine to coarse sand occurs between the first two intervals of sand and gravel, and a layer of silty clay six feet thick, followed by a light brown, fine to medium sand which occurs between the second and third beds of clay.

Sand and gravel layers characteristic of the glacial outwash deposits were not encountered during the drilling of the boreholes for BP/PH-5, BP/PH-6 and BP/PH-8. At the locations of these three wells in Bethpage State Park, the geological logs and geophysical logs show alternating layers of sand, silt, clayey sand, sandy silt and clay to the bottom of each borehole.

Similarly, beneath the sand and gravel layers in BP/PH-3, BP/PH-4, and BP/PH-7, alternating layers of sand, silty and clayey sand, sandy silt and clay, and silt and clay occur to the bottom of each boring. The borings range in depth from 400 to 450 feet below grade. The fine grained sand deposits occurring below the upper sand and gravel unit, where it is present, and below a depth of 50 feet below grade in other borings, are characteristic of the Magothy. The sand is multicolored (tan, cream, brown, orange, black, gray and white) and is generally very fine to medium grained, with varying amounts of clay. Several discontinuous layers of silt and clay are found in borings drilled in Bethpage State Park. A dark gray clay layer occurs from 275 to 310 feet below grade in BP/PH-5, and extends to the northwest to BP/PH-6 where it is found from 275 to 317 feet below grade. Another dark gray clay layer, 20 feet thick, occurs deeper in BP/PH-6 from 365 to 386 feet below grade. Other thin (less than 10 feet thick) beds of silt and clay occur at various depths in all the boreholes drilled in Bethpage State Park.

The contact between the glacial deposits and the Magothy in Bethpage State Park is difficult to identify. The contact in BP/PH-3, BP/PH-4, and BP/PH-7 is defined by the bottom of the sand and gravel deposits at 114, 32, and 57 feet below grade, respectively. The contact in BP/PH-5, BP/PH-6, and BP/PH-8 is defined as the bottom of the coarse sand found in the upper part of each boring. None of the boreholes fully penetrated the Magothy, which extends to a depth of about 800 feet on Bethpage State Park (Smolensky, Baxtor, Shervoff, 1989).

Three cross sections illustrating geologic conditions on Bethpage State Park (Sections A-A^1, B-B^1, and C-C^1) are given in Figures 5 through 7. The locations of the sections are shown in Figure 4. Section A-A^1 (Figure 5) shows the glacial deposits to be relatively coarse (sand and gravel), compared to the underlying Magothy Formation which contains numerous discontinuous beds of silt, clay, sandy clay, and clayey sand. However, three of these beds are continuous throughout most of the section. One bed of clayey sand occurs at an elevation of -20 feet (MSL), is 25 feet thick in BP/PH-4 and thins to five feet to the north in W-7D. A clay bed is found at an elevation of -100 feet (MSL) and is approximately 40 feet thick in BP/BH-10 and 25 feet thick in N-07852. The third bed is a dark gray lignitic clay layer which extends from ORW-1 to N-07852. This clay is 44, 81, 48 and 126 feet thick, respectively, in BP/PH-4, BP/PH-9, BP/BH-10 and N-07852. The top of this bed occurs at approximately -160 feet (MSL) in ORW-1 and -210 feet (MSL) in N-07852. This unit may extend northward toward the FTC. However, none of the borings drilled north of ORW-1 were deep enough to reach this layer.

Cross section B-B^1 (Figure 6) is generally a west to east section. The section approximates geologic conditions at the southern limit of the volatile organic plume of contamination. Pilot hole information which was collected while drilling offsite Recovery wells ORW-5, 6 and 7, established lithologic conditions to a depth of over 350 feet. The materials encountered were similar to those previously described for section A-A^1.

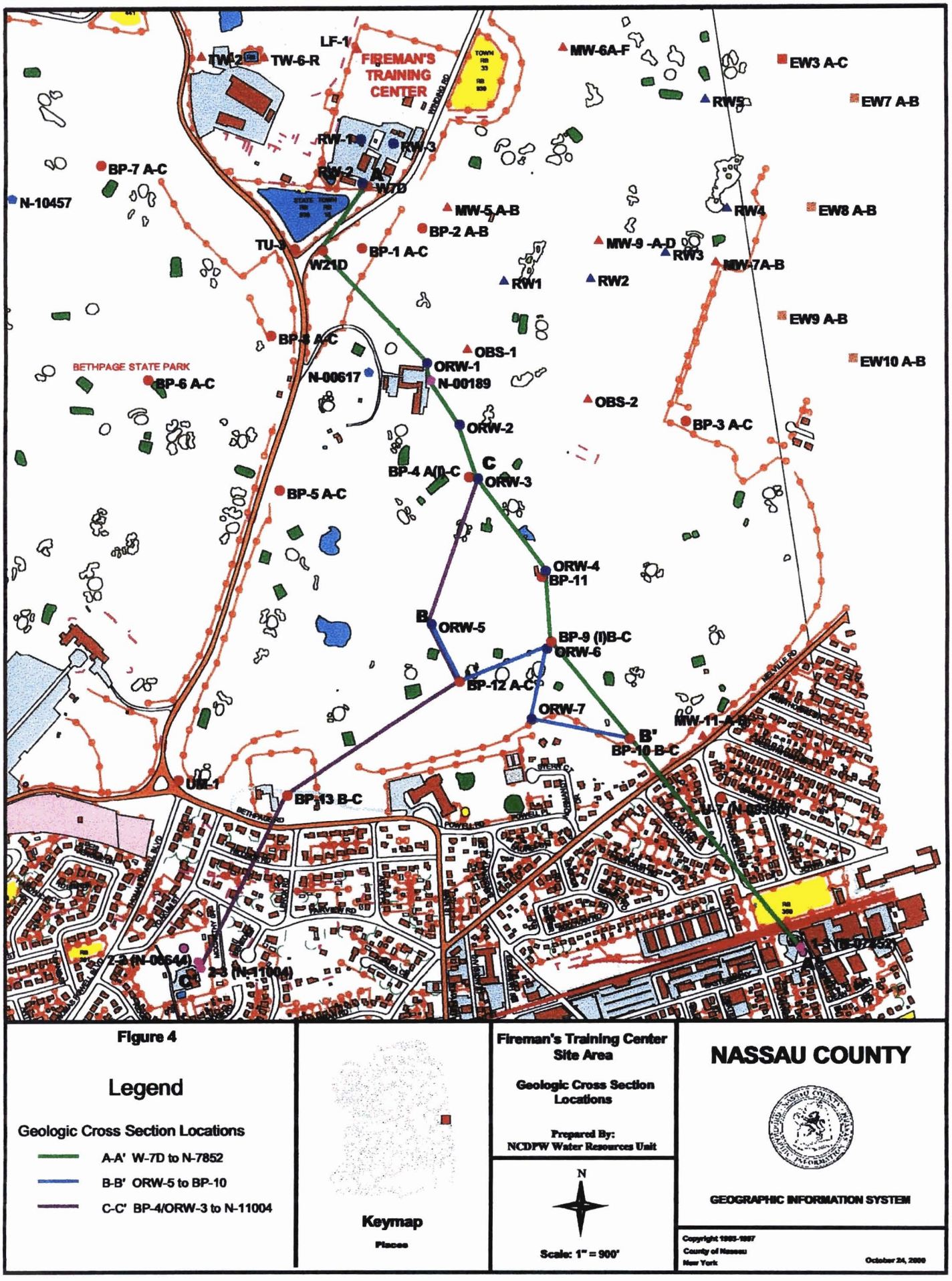


Figure 4

Legend

Geologic Cross Section Locations

- A-A' W-7D to N-7852
- B-B' ORW-5 to BP-10
- C-C' BP-4/ORW-3 to N-11004

Keymap

Places

Fireman's Training Center Site Area

Geologic Cross Section Locations

Prepared By:
NCDPW Water Resources Unit

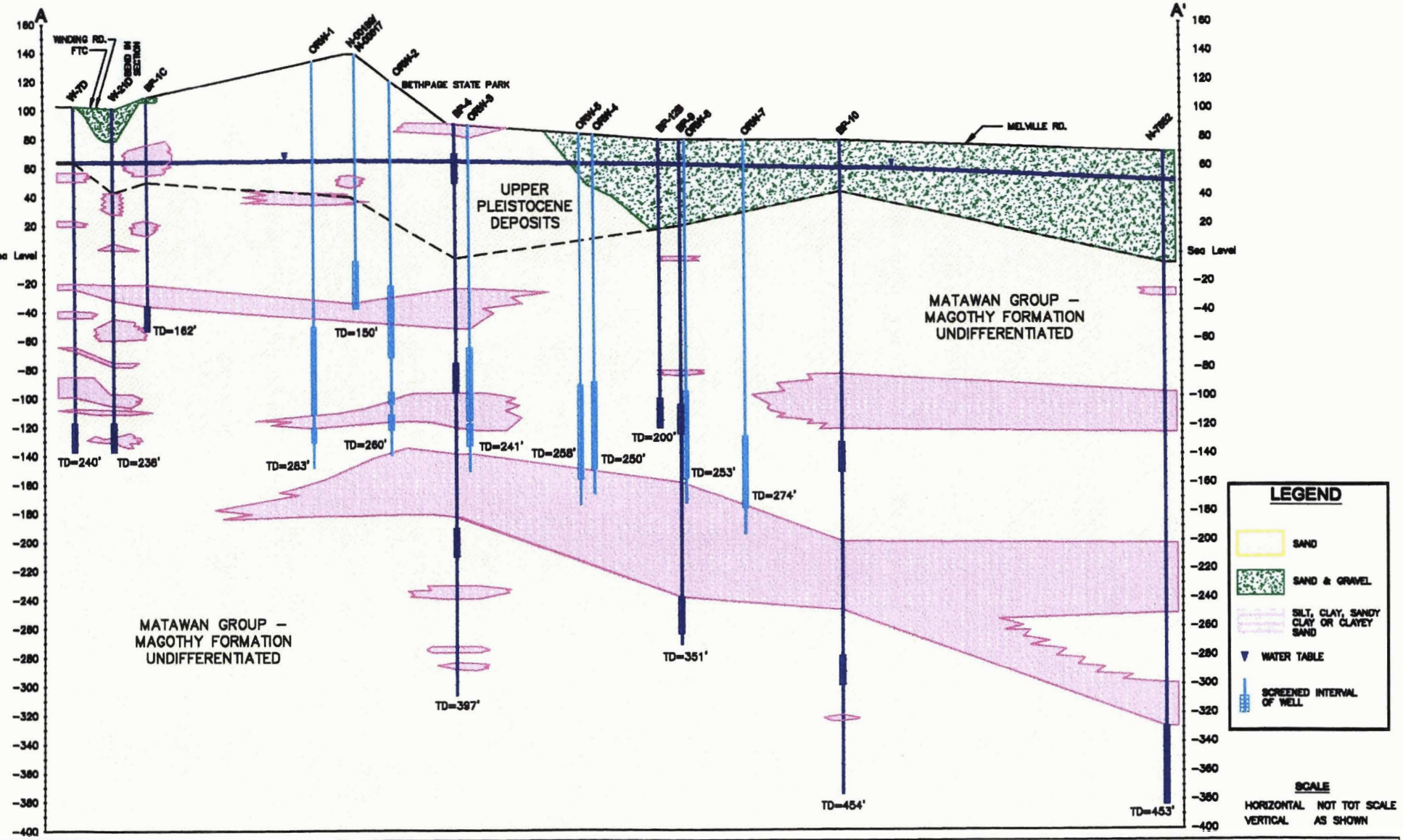
N

Scale: 1" = 900'

NASSAU COUNTY

GEOGRAPHIC INFORMATION SYSTEM

October 24, 2000



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			SCALE: AS SHOWN	DWG. NO. 001	DRAWN BY: J. KEISER	DATE 4/6/00	
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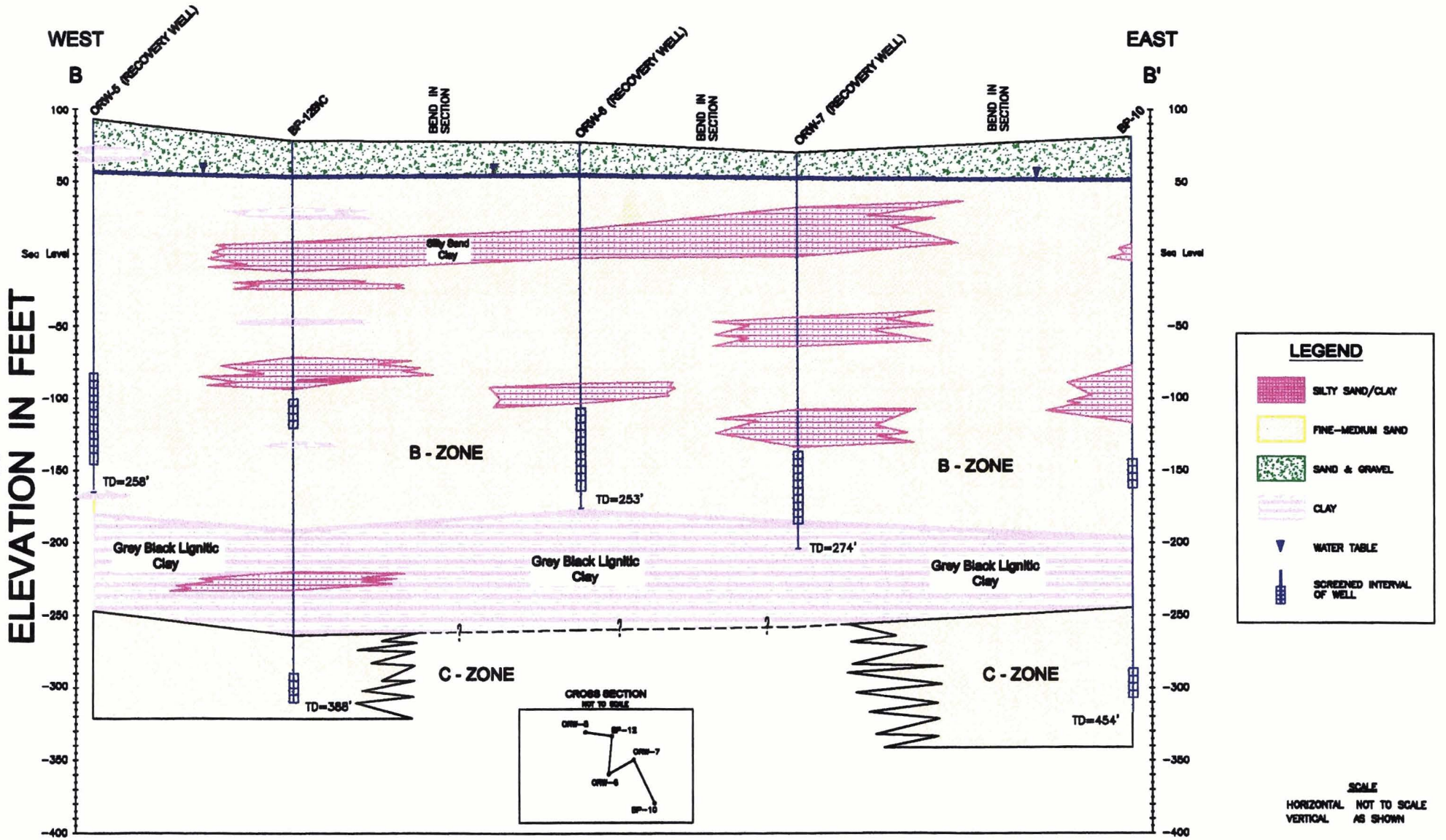
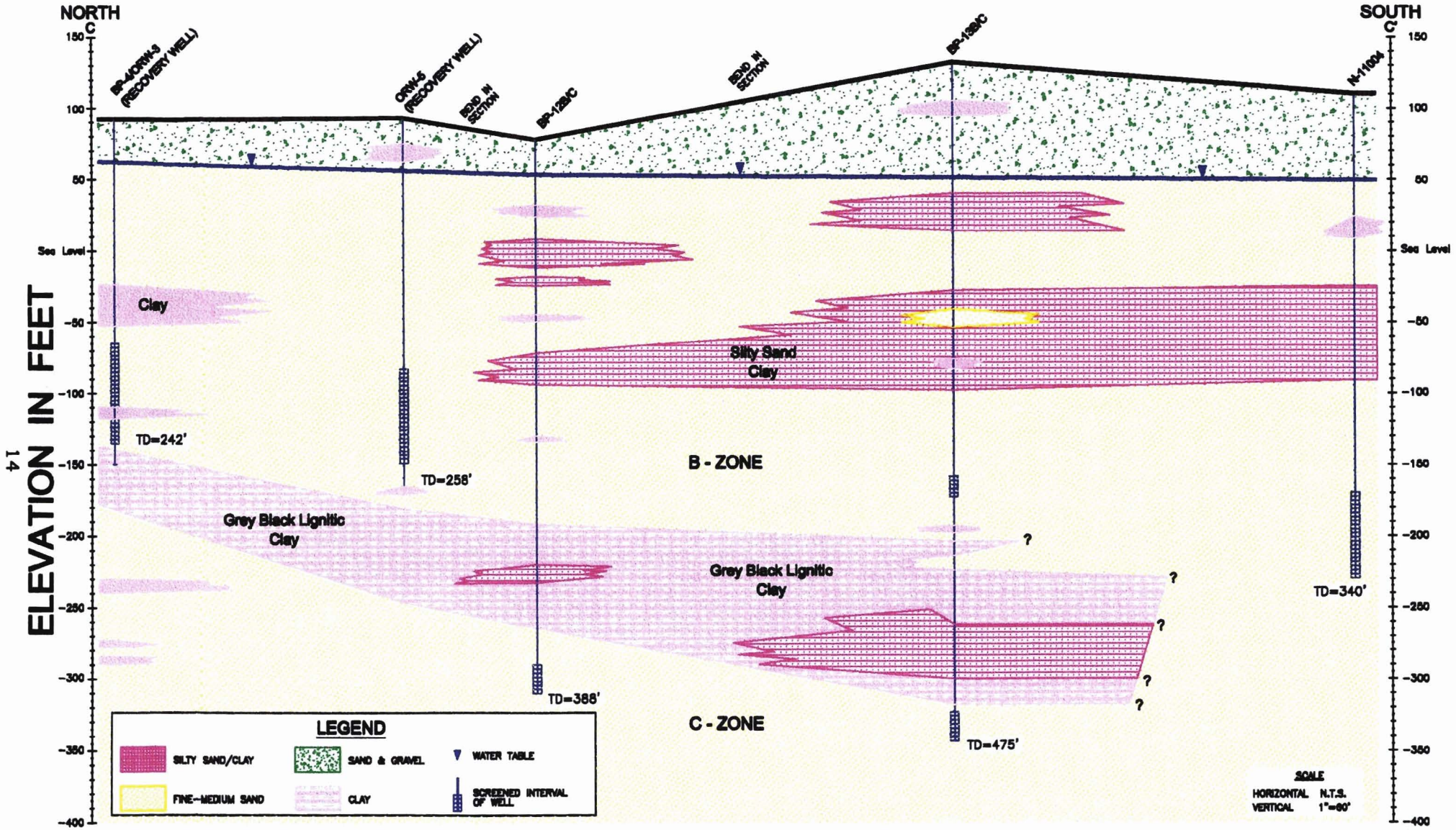


			FILE NAME: \DWG\FTCES001		CONTRACT NUMBER	SHEET NO. 1 OF 1	COUNTY OF NASSAU DEPARTMENT OF PUBLIC WORKS SANITATION & WATER SUPPLY WATER RESOURCES UNIT	GEOLOGIC CROSS SECTION (WEST-EAST) FTC/BETHPAGE STATE PARK BETHPAGE, NEW YORK FIGURE 6
			SCALE: AS SHOWN	DWG. NO. XXX	DRAWN BY: J. KEISER	DATE 2/23/00		
0	ORIGINAL RELEASE	XXX	DESIGNED BY: M. FLAHERTY	DATE 2/00	CHECKED BY: M. FLAHERTY	DATE 2/00		
NO.	REVISION DESCRIPTION	DATE						



			FILE NAME: \DWG\FTCEthp4		CONTRACT NUMBER	SHEET NO. 1 OF 1	COUNTY OF NASSAU DEPARTMENT OF PUBLIC WORKS SANITATION & WATER SUPPLY WATER RESOURCES UNIT	GEOLOGIC CROSS SECTION (NORTH-SOUTH) BP-4/ORW-3 THRU N-11004 (from N-6644) FTC/BETHPAGE STATE PARK BETHPAGE, NEW YORK FIGURE 7
			SCALE: AS SHOWN	DWG. NO. 001	DRAWN BY: J. KEISER	DATE 3/23/00		
0	ORIGINAL RELEASE	XXX	DESIGNED BY: M. FLAHERTY	DATE 3/00	CHECKED BY: M. FLAHERTY	DATE 4/00		
NO.	REVISION DESCRIPTION	DATE						

The Upper Glacial sediments in the area were comprised of mostly sand and gravel which ranged in thickness from approximately 20 feet to over 40 feet in the vicinity of ORW-5. As before, the Magothy sediments were characterized by fine-medium grained micaceous sands with discontinuous lenses of silty sand and clay.

Two significant low permeability confining units were mapped across the section. The first was a silty sand and clay which appears to be continuous between the BP-12 well cluster and ORW-7. The top of this unit occurs at an elevation of 32 feet above (msl) while it's lower limit is found at -12 feet below (msl). It varies in thickness from a minimum of 20 feet at ORW-6 to a maximum of over 35 feet at Recovery Well (ORW-7).

The second confining unit is composed of a dense, grey-black lignitic clay with occasional pyrite layers. This unit is continuous across the section and is present at all well locations. The top of this unit occurs at an elevation of -172 feet below msl. Its lower extent occurs at a minimum of -250 below msl. The grey-black clay varies in thickness from 45 feet to over 65 feet (ORW-6).

The presence of these two confining units has a number of effects on the local aquifer's properties. The lower clay unit separates the two major hydrogeologic zones described for off-site, the upper or "B" zone and the lower "C" zone. The upper clay reduces the overall thickness of the "B" zone. In general, the sediments across the section were also found to be finer grained and of lower permeability toward the east.

Cross section C-C^{1} (Figure 7) generally trends northeast to southwest. This section also includes monitoring well BP-12c and monitoring well cluster BP-13. All three wells were installed, in order to further delineate the lithologic characteristics of the "B" and "C" hydrogeologic zones.

The sediments described for the Upper Glacial and Magothy aquifers in this area are similar to those mapped in the previous two sections. The upper confining unit which is composed of silty sand and clay, extends from Village of Farmingdale supply well N-11004, north to monitoring well cluster BP-12. It varies in thickness from a maximum of 65 feet in the vicinity of the supply well to a minimum of 23 feet at the BP-12 cluster. The unit appears to dip to the north and pinches out entirely at offsite recovery well location, (ORW-5).

The dense grey-black lignitic clay which was identified by the previous section is also present. It extends from ORW-3 southwest to BP-13. The top of the unit occurs at an elevation of -137 feet below MSL in off-site recovery well no. 3 and it can be found at an elevation of -205 feet below MSL in monitoring well cluster BP-13. Although the clay reaches a total thickness of over 100 feet at the BP-13 cluster, the lignitic clay is replaced with a silty sand and clay from -260 below MSL to -300 below MSL. The southern extent of deep confining unit could not be determined from the well information obtained from the Village of Farmingdale.

1.2.6 Off-Site Hydrogeology

The saturated upper Pleistocene deposits are designated as the Upper Glacial Aquifer, and the total thickness of the Magothy comprises the Magothy Aquifer. In many parts of Nassau County, there is no confining layer separating these aquifers. Ground water in the vicinity of the FTC occurs in the basal part of the Upper Glacial Aquifer and in most places in the entire thickness of the Magothy Aquifer. The upper part of the saturated zone is a thick sequence of sand with varying amounts of gravel, silt, and clay. Locally, the numerous interbedded clay and silt layers, which are usually of limited areal extent, impede vertical ground water movement, resulting in increasingly confined conditions with increased depth. Horizontal movement of groundwater is generally faster than vertical movement because of the occurrence of interbedded fine grained layers and, typically, a lower vertical than horizontal hydraulic conductivity of the sediments (Soren, 1971).

Four zones; "A" - water table, "B" - approximately 180 to 200 feet below grade, "C" - approximately 280 to 300 feet below grade, and "D" - approximately 380 to 400 feet below grade) were previously delineated to establish the vertical component of ground water movement and to delineate the vertical extent of contaminant distribution. Monitoring wells have been installed at each cluster location tapping the "A", "B", and "C" Zones. These wells are listed in tables 1 through 3.

Water level contour maps based on synoptic water level measurements collected on May 4, 1999 have been prepared for the "B", and "C" Zones (Figures 8 and 9). These maps are consistent with previous measurements and show that ground water downgradient of the FTC at the water table moves to the south and southeast under an average hydraulic gradient of approximately 1.8×10^{-3} feet/foot. The 61, 60 and 59 foot elevation contours indicate a possible influence from the OBSWDC treatment system on ground water movement downgradient of the landfill. These contours bend to the southeast downgradient of areas influenced by the landfill. This effect diminishes in the deeper "C" zone.

Potentiometric elevations in the "B" Zone are shown in Figure 8. The horizontal component of ground water movement in this zone is predominantly south-southeast through the FTC and into Bethpage State Park, similar to the water table. The average hydraulic gradient in the "B" Zone is approximately 1.5×10^{-3} feet/foot.

The potentiometric surface in the "C" Zone is similar to the "B" Zone as shown in Figure 9. Ground water movement in the "C" Zone is to the south-southeast with a hydraulic gradient of approximately 1.8×10^{-3} feet/foot.

A comparison of elevations in each of the three zones shows a general downward vertical hydraulic gradient averaging 3.0×10^{-6} feet/foot and thus, a potential for a downward component of ground water movement.

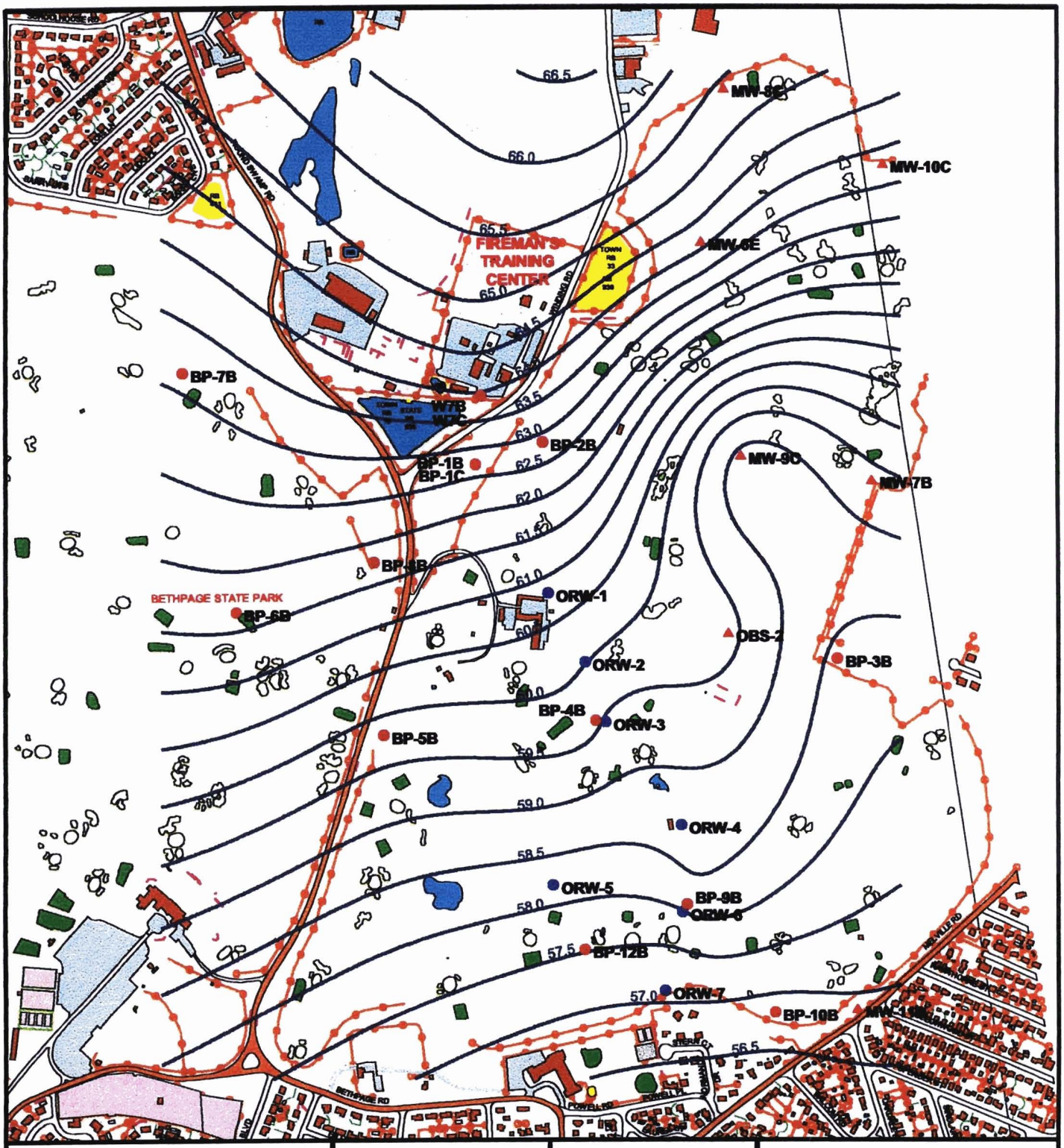


Figure 8

Legend

Location of Measured Well

- Nassau County Monitoring Well or Well Cluster
- Nassau County Recovery Well
- T. of Oyster Bay Monitoring Well or Well Cluster

60.0 Water Level Contours With Feet Above Mean Sea Level

Contours at 0.5 Foot Intervals Above Mean Sea Level

Keymap

Fireman's Training Center Site Area

B-Zone Water Level Contours May 4, 1999

Prepared By: NCDPW Water Resources Unit

N

Scale: 1" = 800'

NASSAU COUNTY

GEOGRAPHIC INFORMATION SYSTEM

October 20, 2000

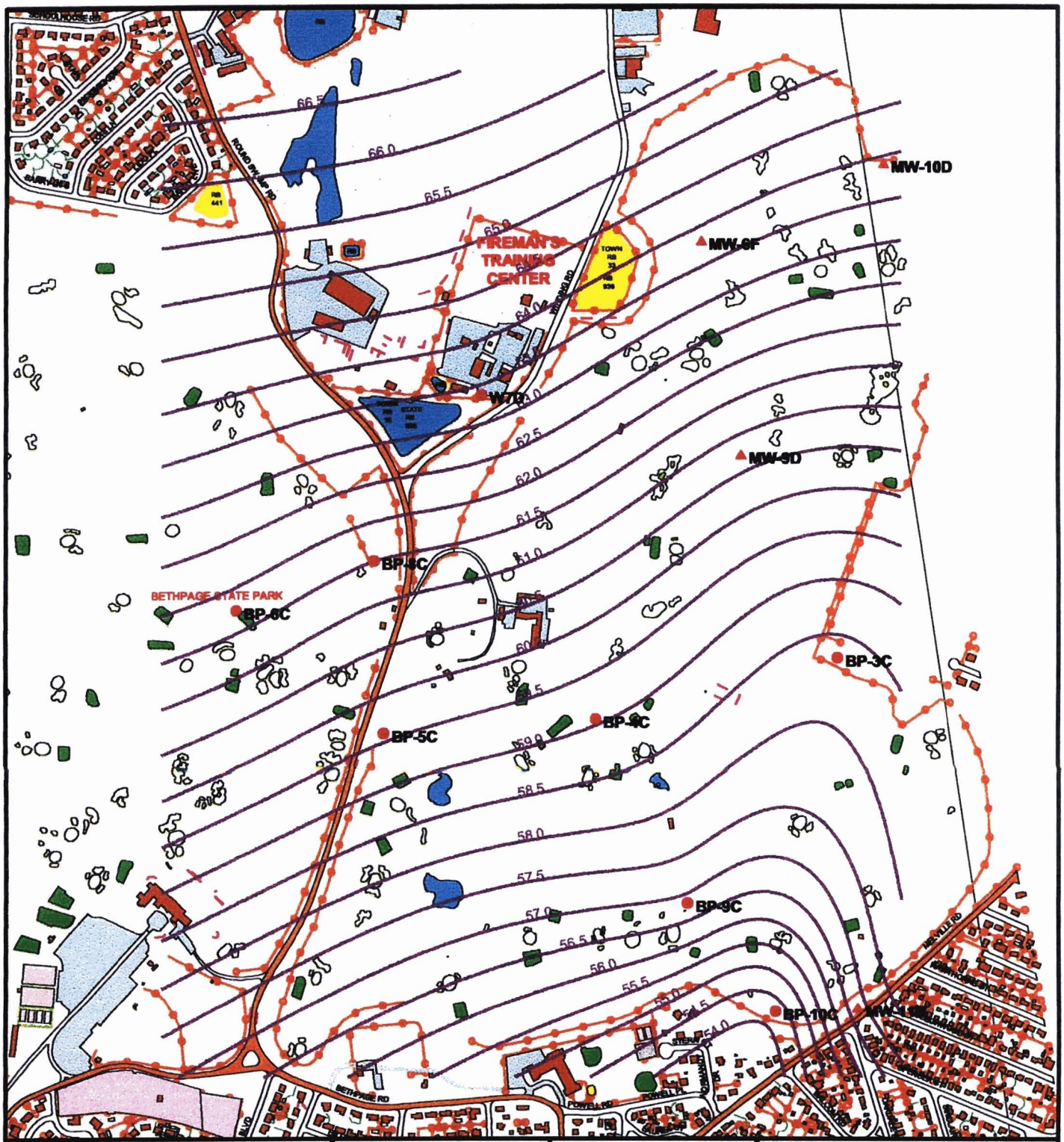


Figure 9

Legend

Location of Measured Well

- Nassau County Monitoring Well or Well Cluster
- T. of Oyster Bay Monitoring Well or Well Cluster

60.0 Water Level Contours With Feet Above Mean Sea Level

Contours at 0.5 Foot Intervals Above Mean Sea Level

Keymap

Fireman's Training Center Site Area

C-Zone Water Level Contours May 4, 1999

Prepared By: NCDPW Water Resources Unit

N

Scale: 1" = 900'

NASSAU COUNTY

GEOGRAPHIC INFORMATION SYSTEM

October 23, 2000

TABLE 1 HYDROGEOLOGIC INTERVALS ZONE A	
Well	**Screened Interval (Elevation in Feet)**
W-20A	+57 to +37
W-21A	+55 to +35
BP-1A	+55 to +35
BP-2A	+60 to +40
BP-3A	+71 to +51
BP-4A	+74 to +54
BP-5A	+67 to +47
BP-6A	+79 to +59
BP-7A	+73 to +53
BP-8A	+72 to +52
TU-3	+35 to +30
OSEB 1 (5A)	+52 to +47
OSEB 2 (6A)	+60 to +55
OSEB 3 (7A)	+73 to +58
OSEB 4 (8A)	+50 to +45
OSEB 5 (9A)	+75 to +60
OSEB 6 (10A)	+61 to +56

33+/0726-39-1111

TABLE 2 HYDROGEOLOGIC INTERVALS ZONE B	
Well	**Screened Interval (Elevation in Feet)**
BP-3B	-91 to -111
BP-4B	-78 to -98
BP-5B	-84 to -104
BP-6B	-77 to -97
BP-7B	-80 to -100
BP-8B	-39 to -59
BP-9B	-99 to -119
BP-10B	-129 to -149
W-7B	+25 to +5
W-7C	-45 to -65
W-20B	+20 to 0
W-20C	-42 to -62
W-21B	+9 to -11
W-21C	-38 to -58
BP-1B	+20 to 0
BP-1C	-23 to -53
BP-2B	+11 to -9
Melville Rd Site #7 (11A)	-55 to -60
OSEB 2 (6E)	-85 to -90
OSEB 3 (7B)	-82 to -87
OSEB 4 (8C)	-110 to -115
OSEB 5 (9C)	-67 to -72
OSEB 6 (10C)	-113 to -118
UM-1	-35 to -4
OBS-2	-64 to -84
N00189	-5 to -38
N00167	-4 to -34

TABLE 3
HYDROGEOLOGIC INTERVALS
ZONE C

Well	Screened Interval (Elevation in Feet)
BP-3C	-156 to -176
BP-4C	-188 to -208
BP-5C	-154 to 174
BP-6C	-154 to -174
BP-7D	-162 to -182
BP-8C	-169 to -189
BP-9C	-239 to -259
BP-10C	-276 to -296
Melville Rd. Site #7 (11B)	-150 to -155
W-20D	-106 to -126
W-21D	-119 to -139
W-7D	-116 to -136
OSEB 2 (6F)	-185 to -190
OSEB 5 (9D)	-158 to -163
OSEB 6 (10D)	-148 TO -153

Hydraulic head measurements show a decrease in potentiometric surface elevations downward and to the south-southeast. It also shows a fairly consistent horizontal hydraulic gradient of approximately $2x10^{-3}$ feet/foot.

This interpretation is consistent with the regional assessment made by the U.S. Geological Survey (Isbister, 1966). The vertical hydraulic gradient becomes smaller further downgradient and eventually changes to an upward gradient in the vicinity of the Southern State Parkway, about three miles south of the FTC. The hydraulic gradient can be affected and possibly reversed in close proximity to pumping wells.

1.3 Historic On-Site Groundwater Quality

There are two distinct plumes of volatile organic groundwater contamination beneath the FTC site. An isolated plume associated with the MUF drywell field extends approximately 300 feet downgradient of the mock-up buildings, in a southeast direction towards the site perimeter. This plume is approximately 150 feet wide and contains some dissolved BTEX, with historical concentrations ranging up to 63 micrograms per liter (ug/l).

A second plume originates in the BAF and CMB drywell fields (figure 10), and extends downgradient of the site. It was reported in the RI to be 780 feet long and 380 feet wide. The on-site portion of the plume is associated with the larger floating product area (gasoline) and historically showed BTEX concentrations up to 27,850 ug/l, methyl ethylketone (MEK) up to 1,200 ug/l, and acetone up to 6,050 ug/l. Another plume overlaps the larger plume, and contains dissolved chlorinated hydrocarbons with a historical maximum total concentration of 2,807 ug/l. The latter plume extends to the southern boundary of the site, and is estimated to be 480 feet long and 300 feet wide.

Semivolatile organic compounds (semi-VOCs) have been detected in both on-site groundwater plumes. Specifically, the following semi-VOCs were detected:

- phenanthrene
- fluorene
- naphthalene
- di-n-octyl-phthalate
- methylnaphthalene
- pyrene

The FTC site also contains groundwater contaminated by leachate from the Old Bethpage Landfill, which is located north and northwest of the FTC. Landfill indicator parameters detected at the FTC include elevated specific conductance, alkalinity, chlorides, hardness, ammonia, and some chlorinated organic compounds. Ammonia concentrations range from greater than 0.02 ug/l to 65 ug/l. Generally, the highest concentrations of these parameters were found in the northern part of the FTC site closer to the landfill. With the exception of chlorides, the landfill indicator parameters have been detected at concentrations above the landfill's action levels across a large portion of the FTC site, extending from the northwest to the southeast corner of the site.

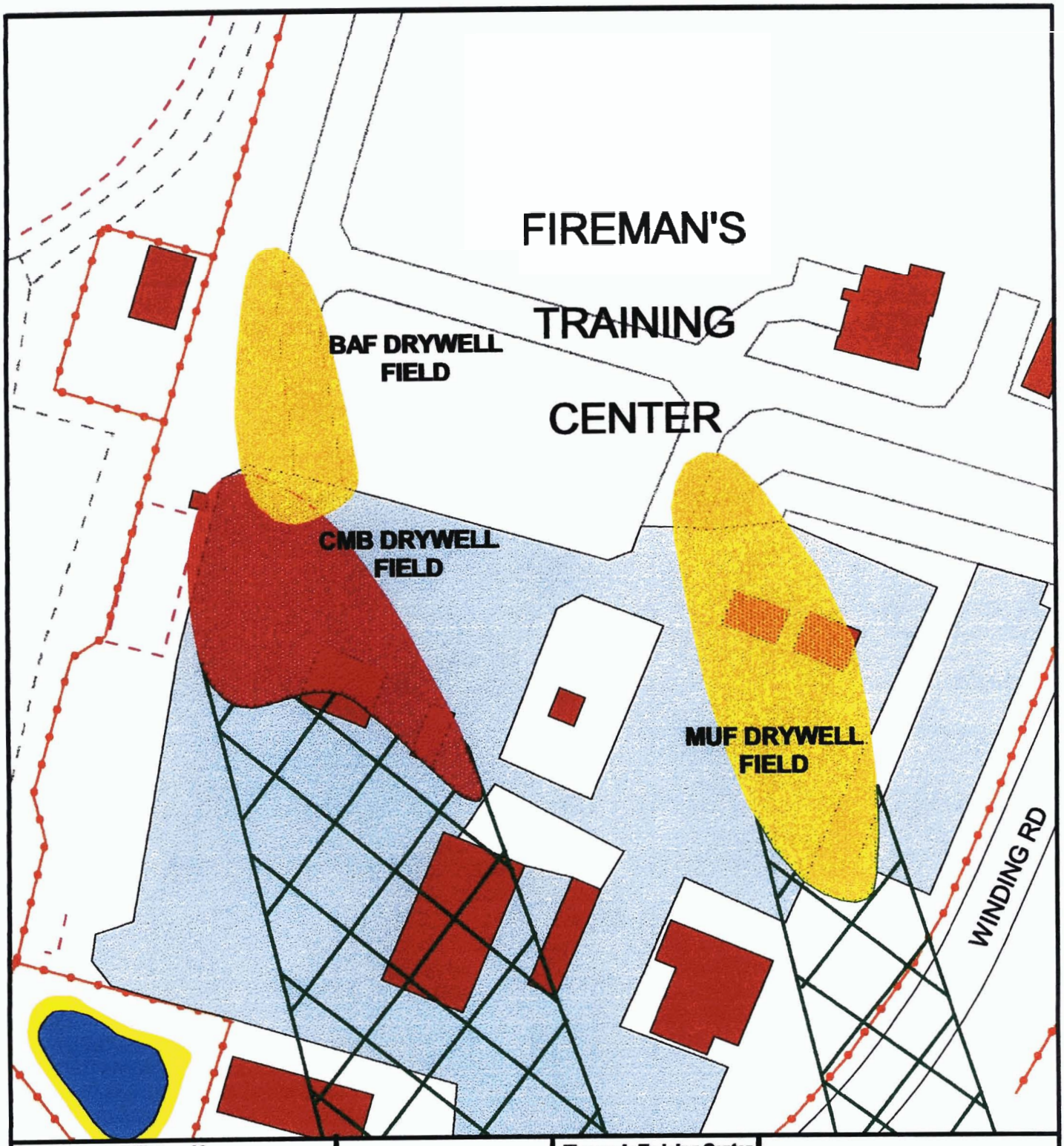


Figure 10

Legend

Floating Product (Approx. Areas)

Gasoline & Solvents

No. 2 Fuel Oil

Dissolved Organics (Approx. Areas)

Keymap

Places

Fireman's Training Center
Site Area

Approximate Areal Extent
of Floating Product
& Dissolved Organics

Prepared By:
NCDPW Water Resources Unit

N

Scale: 1" = 100'

NASSAU COUNTY

GEOGRAPHIC INFORMATION SYSTEM

October 27, 2000

The following metals, either associated with the landfill leachate plume or naturally occurring, were also detected in on-site groundwater:

- Aluminum
- Chromium
- Iron
- Manganese
- Nickel
- Arsenic
- Lead

1.3.1 Historic Off-Site Groundwater Quality

A plume of dissolved groundwater contamination has migrated beyond the southern boundary of the FTC site into the Bethpage State Park. The leading edge of the plume is reported to be approximately 4,000 feet downgradient of the site. Most of the plume extends from 40 feet above mean sea level (msl) to 180 feet below msl.

Only highly mobile compounds have migrated off-site. The highest measured concentrations of volatile organic compounds (VOCs) occur in the off-site plume south of two irrigation wells in Bethpage State Park, with concentrations of total VOCs measured at more than 1,500 ug/1. The major constituents of the off-site plume are:

- vinyl chloride
- tetrachloroethene
- 1,1-dichloroethene
- 1,2-dichloroethane
- 1,1,1-trichloroethane
- trichloroethene
- benzene
- xylene

1.3.2 Historic Floating Product Conditions

Historically, floating product has been detected in monitoring wells at three areas of the FTC site, as shown on Figure 11. This product, associated with the drywells, has contributed to soil and groundwater contamination at the site.

In the MUF, floating product was measured in wells near the mock-up buildings, primarily #2 fuel oil. In the BAF, floating product was found consisting of #2 fuel oil contaminated with solvents. In the CMB, the floating product was primarily gasoline.

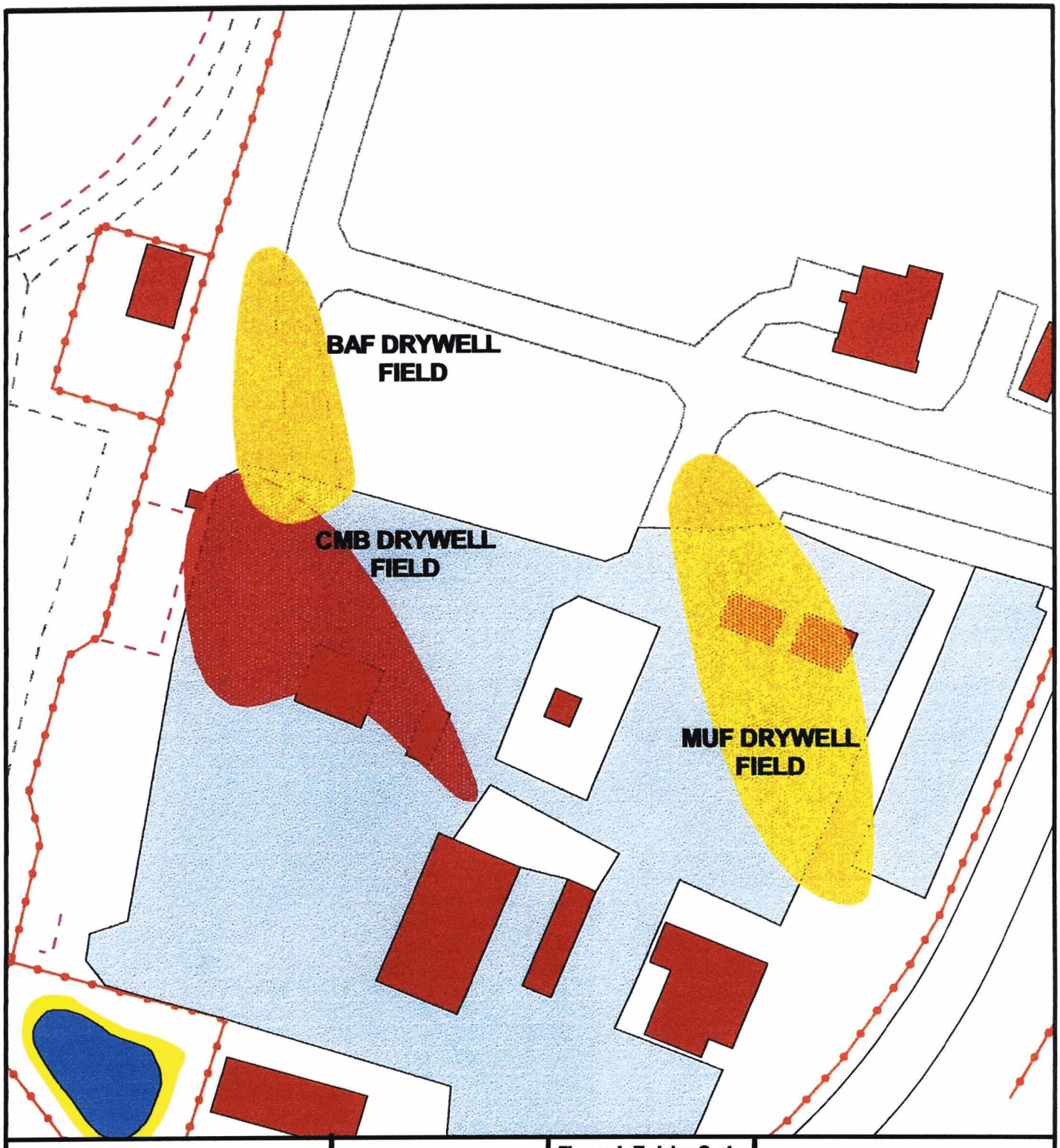


Figure 11

Legend

Floating Product (Approx. Areas)

- Gasoline & Solvents
- No. 2 Fuel Oil

Keymap

Fireman's Training Center Site Area

Approximate Areal Extent of Floating Product

Prepared By:
NCDPW Water Resources Unit

N

Scale: 1" = 100'

NASSAU COUNTY

GEOGRAPHIC INFORMATION SYSTEM

October 27, 2000

Due to a ten-foot rise in the water table between 1989 and 1992, the floating product was absent from the onsite monitoring wells. The product is presumed to have been trapped in the pore space of the now saturated soil, creating a smear zone of soil contamination located both above and below the present water table.

With the declines in the water table, floating product has reappeared in the MUF. The floating product in the CMB field has not reappeared, and may have been volatilized and extracted by the nearby methane extraction system for the adjacent landfill.

SECTION 2

BASELINE MONITORING NETWORK
and
SAMPLING PROCEDURES

2.0 Baseline Groundwater Monitoring Network

This section describes the groundwater monitoring network, sampling procedures and analytical methods used to establish the baseline groundwater conditions for the FTC remediation project.

2.1. Baseline Groundwater Monitoring Well Sampling Procedures

2.1.1. Sampling Equipment:

- Grundfos Redi-flo Variable Performance Pump installed in well.
- BMI/MP1 - 115V Converter with a motor lead extension cable.
- Generator or power source that provides 115 volts.
- Solinst water level meter
- Discharge hose stored in the port opening of the well cap
- Discharge hose stand
- Stop watch and a bucket with a known volume.
- Disposable latex or vinyl sampling gloves.
- Cooler with ice packs.
- Sample containers with labels.
- Field book and pen.

2.1.2. Sampling Procedures:

- Open the well cover, unscrew and remove the discharge hose from the port opening. Confirm the well number on the metal tag or label.
- Take the depth to water reading through the port opening. Measure from the top edge of the well cover. Use well records to obtain the total depth of the well and calculate the fluid volume in the casing.
- Start the generator and allow it to idle until it runs smoothly. Connect the converter to power source.
- Connect the converter to the well cover receptacle using the motor lead extension cable. Connect the discharge hose to the well cover and position it in the desired direction of flow using the discharge hose stand.
- Select RF2M with the mode selection knob on the converter. The frequency display should read 0.0 (zero). Set the VFD speed dial to the midpoint (12 o'clock position) or approximately 220 Hz.

- Start the pump by moving the start/stop switch to the start position.

- Adjust the flow rate by turning the speed dial until the desired performance is attained. (48 Hz for minimum pumping to 400 Hz for maximum pumping)

- Use a stop watch and a bucket of known volume to measure the rate of discharge in gallons per minute.

- Calculate the minimum pumping time by multiplying the fluid volume in the casing by three to obtain the volume to be purged and dividing by the flow rate. While purging continues measure the flow rate several times to insure the discharge rate is stable. All pertinent information must be recorded in the field book.

- Once the required volume is purged, label the sample containers. Decrease the flow rate to an appropriate sampling flow. Put on disposal latex or vinyl sampling gloves and fill the containers as per laboratory requirements. Place the samples in a cooler with ice packs.

- To stop the pump move the start/stop switch on the converter box to stop. Unplug all connections and then stop the generator. Return the discharge hose to the port, recap the connections and lock the well cover in place.

2.1.3. Baseline Analytical Tests and Methodologies

All laboratory analyses to establish the baseline groundwater conditions for the FTC remediation project were conducted at the Nassau County Department of Public Works, Special Projects Laboratory located at Cedar Creek Waste Water Treatment Facility in Wantagh, New York (NCDPW-Lab). The NCDPW-Lab is a New York State Department of Health, Environmental Laboratory Approval Program (ELAP) certified laboratory for all of the analytical tests performed for the baseline sampling program.

Analysis of collected groundwater samples for the baseline monitoring program included:

- VOCs (EPA 601/602)
- Semi-VOCs (625)
- Metals (EPA 200.7, 206.2, 239.2)
- Field parameters (pH, conductivity and temperature)
- Water quality parameters (alkalinity, biochemical oxygen demand [BOD], chemical oxygen demand [COD], hardness, nitrite, nitrate, phosphorus, sodium, total kjeldahl nitrogen [TKN], ammonia sulfate, chlorides, total organic carbon [TOC], total dissolved solids [TDS], and total suspended solids [TSS]).

2.2 Baseline Floating Product Wells and Monitoring Procedures

All groundwater monitoring wells which have historically been impacted by floating petroleum product (No. 2 fuel oil, gasoline) have been included in the baseline monitoring program. Product, if present, is measured in each well using the following procedures:

- Each well is located and identified on a site map.
- The well is opened at the surface and the self-sealing plug is removed.
- An electronic interface probe is introduced into the well and slowly lowered to the oil/water interface.
- Product is identified by an audible solid tone; the depth to product is then measured from the top of the casing to an accuracy of (+,-) .01 feet.
- The interface probe is then slowly lowered until an audible beeping tone is detected. The depth to water is then measured from the top of the casing to an accuracy of (+,-) .01 feet.
- The measurements are repeated to assure accuracy and the interface probe is removed.
- The self sealing cap is replaced and the well is closed.

2.3 Baseline Hydraulic Control Monitoring

In addition to the recovery of volatile organic contamination within the FTC plume, an equally important factor is the hydraulic containment of the site's plume. In order to monitor the hydraulic containment of the FTC plume, the measurement of baseline water levels are necessary to establish the pre-recovery system groundwater flow direction(s) and gradient(s). From this information, the future recovery system can be monitored to confirm the effectiveness of the hydraulic containment under various conditions and to adjust and modify the recovery well system pumping to maintain hydraulic plume containment until remediation termination criteria are met.

The baseline groundwater monitoring wells used to measure water levels are presented in Table 4. Water levels were measured using a steel tape and chalk or with an electronic water level meter. All water level measurements are referenced to mean sea level (msl), as an elevation in feet (ft). The water level elevations are plotted on a site base map, according to depth. Contour lines, indicating areas of equal elevation are then drawn, from which groundwater flow direction(s) and gradient(s) can be established.

Table 4

Wells Selected For Hydraulic Monitoring

Monitoring Well	Measuring Point Elevation	Monitoring Well	Measuring Point Elevation	Monitoring Well	Measuring Point Elevation
BP-1A	109.77	BP-8A	92.29	W-14A	103.50
BP-1B	109.53	BP-8B	91.43	W-14B	103.30
BP-1C	109.37	BP-8C	91.48	W-35	104.20
BP-2A	151.00	BP-9B	94.96	W-32	103.10
BP-2B	151.13	BP-9C	84.77	W-31	103.10
BP-3A	124.54	BP-10B	81.16	W-1	105.60
BP-3B	123.57	BP-10C	80.88	W-29	101.80
BP-3C	123.68	BP-11	81.76	W-37	102.90
BP-4A	92.69	BP-12A	78.21	U-6A	153.94
BP-4B	91.72	BP-12B	78.24	RB-1	135.02
BP-4C	91.57	UM-1	115.64	RW-1	98.44
BP-5A	96.34	W-7A	104.44	RW-2	97.98
BP-5B	96.48	W-7B	104.52	RW-3	99.79
BP-5C	96.28	W-7C	104.68	ORW-1	141.28
BP-6A	102.55	W-7D	104.58	ORW-2	91.88
BP-6B	102.58	W-9A	115.30	ORW-3	85.09
BP-6C	102.35	W-9B	115.20	ORW-4	82.68
BP-7A	147.54	W-13	102.80	ORW-5	93.18
BP-7B	148.76	W-4A	109.20	ORW-6	77.02
BP-7C	148.40	W-4B	109.70	ORW-7	69.84

TABLE4 FTC REPORT

SECTION 3

BASELINE GROUNDWATER MONITORING RESULTS

3.0 On-Site Baseline Monitoring Results

3.1. On-Site Baseline Monitoring Results

3.1.1. On-Site Baseline Volatile Organic Sampling Results

Groundwater samples were collected from 13 monitoring wells which were designated by the New York State Department of Environmental Conservation as the FTC on-site monitoring wells. These wells were analyzed for the list of Baseline compounds described in sections 2.1, 2.2 and 2.3. All samples were collected by NCDPW personnel between June 4 and June 10, 1999 prior to the startup of the remediation facility. The results of these analyses are presented in Table 5. Table 5 lists all compounds which were found to be above detectable limits.

Onsite groundwater monitoring wells sampled during this event include four clusters, W-4A, B, W-7A, B, C, D, W-9A, B, W-14A, B and single monitoring wells, W-23, W-31 and W-35. Onsite groundwater monitoring well FTC-W-32 was not sampled during this period due to failure of the dedicated Grundfos Redi-Flo-2 sampling pump.

Review of the data collected from these wells reveals a high degree of variability in total volatile organic concentrations across the site. Total volatile organic concentrations ranged from BDL (below detectable limits) at the W-9 and W-14 clusters to 2, 869 ppb in W-35. Both halogenated and non-halogenated compounds were detected onsite. The concentration(s) and types of organic compounds are clearly related to the method of training used by the Fire Service Academy (FSA) in each source area.

The highest total volatile organic concentrations were detected in shallow or water table wells which are in close proximity to the former flammable liquids area. This area was associated with the burning of gasoline and waste solvents. Historically, monitoring wells W-31 and W-32 have also contained floating product.

The lowest levels of total volatile organics were observed in monitoring wells W-9A, and W-9B. These wells are adjacent to the Mock up Field (MUF), floating product plume, which primarily consists of No. 2 fuel oil. This residual fuel remained unburned from the FSA training events and the Taxpayer Mock-up buildings. TVOC concentrations were below detectable limits for these wells.

ONSITE - BASELINE
GROUNDWATER SAMPLING RESULTS
TABLE 5A

	WELL		WELL		WELL		WELL		WELL		WELL		WELL		WELL	
	W-4A		W-4B		W-23		W-31		W-32		W-35					
	DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED	
	6/10/99		6/10/99		6/8/99		6/11/99				6/11/99					
VOLATILE ORGANICS COMPOUNDS																
Vinyl Chloride	BDL		BDL		BDL		BDL				BDL					
1,1-Dichloroethene	BDL		BDL		BDL		BDL				BDL					
1,1-Dichloroethane	BDL		BDL		BDL		BDL				BDL					
c-1,2-Dichloroethylene	BDL		BDL		BDL		BDL				BDL					
Benzene	BDL		BDL		BDL		BDL				BDL					
Toluene	BDL		BDL		BDL		BDL				392.0					
Tetrachloroethylene	BDL		BDL		BDL		BDL				BDL					
Chlorobenzene	BDL		1.8		BDL		BDL				BDL					
Ethyl Benzene	BDL		BDL		BDL		112.0				311.0					
m,p-Xylene	BDL		BDL		BDL		415.0				823.0					
o-Xylene	BDL		BDL		BDL		194.0				457.0					
Isopropylbenzene	BDL		BDL		BDL		23.1				BDL					
n-Propylbenzene	BDL		BDL		BDL		65.7				62.2					
1,3,5-Trimethylbenzene	BDL		BDL		BDL		169.0				126.0					
1,2,4-Trimethylbenzene	BDL		BDL		BDL		548.0				465.0					
sec-Butyl Benzene	BDL		BDL		BDL		BDL				BDL					
p-Isopropyltoluene	BDL		BDL		BDL		21.8				7.3					
1,4-Dichlorobenzene	BDL		7.2		BDL		BDL				BDL					
1,2-Dichlorobenzene	BDL		2.1		BDL		BDL				BDL					
Hexachlorobutadiene	BDL		BDL		BDL		BDL				BDL					
Naphthalene	BDL		BDL		BDL		106.0				140.0					
1,2,3-Trichlorobenzene	BDL		BDL		BDL		BDL				BDL					
Methyl t-Butylether (MTBE)	BDL		BDL		BDL		BDL				BDL					
Totals	0		11.1		0		1854.6				2783.5					
SEMI-VOLATILE ORGANIC COMPOUNDS																
1,2-Dichlorobenzene	BDL		2.3		BDL		BDL				BDL					
2,4-Dinitrotoluene	BDL		BDL		BDL		3.9				BDL					
Fluorene	BDL		BDL		BDL		2.0				BDL					
Naphthalene	BDL		BDL		BDL		61.8				85.8					
Totals	0		2.3		0		67.7				85.8					
INORGANIC PARAMETERS																
ph	6.73		7.02		6.99		6.48				5.83					
Specific Conductance	264		1460		832		632				260					
Alkalinity as Calcium Carbonate	BDL		414		182		71				56					
B.O.D.	BDL		3		BDL		7				6					
Chemical Oxygen Demand	BDL		60		BDL		36				BDL					
Hardness, Total	79.5		151		52.6		50.8				45					
Nitrate as N	18.48		1.02		4.07		BDL*				1.72					
Total Phosphorus as P	BDL		BDL		BDL		0.05				BDL					
Sodium, Total	14.5		142		106		80.5				16.4					
Total Kjeldahl	0.33		45.1		16.9		6.23				0.99					
Ammonia as N	BDL		35.3		16.9		6.24				0.76					
Sulfate	32.7		29.5		24.9		33.4				26					
Chloride	5		162		100		80				20					
Total Dissolved Solids	190		630		384		306				140					
Total Suspended Solids	BDL		5.5		1		40				8					
Iron, Total	0.052		2.4		0.013		24.3				20.4					
Manganese, Total	0.034		3.09		0.277		2.31				3.25					
Nickel, Total	0.01		0.022		0.014		0.006				0.008					
Chromium, Total	BDL		0.002		BDL		0.006				0.005					

Table 5A

LEGEND

BDL = Below Detection Limit

NA = Not Analyzed

ONSITE BASELINE
GROUNDWATER SAMPLING RESULTS
TABLE 5B

	WELL W-7A		WELL W-7B		WELL W-7C		WELL W-7D		WELL W-14A		WELL W-14B		WELL W-9A		WELL W-9B	
	DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED	
	6/10/99		6/10/99		6/8/99		6/8/99		6/10/99		6/10/99		6/10/99		6/10/99	
VOLATILE ORGANIC COMPOUNDS																
Vinyl Chloride	BDL		BDL		1.2		2.4		BDL		BDL		BDL		BDL	
1,1-Dichloroethene	BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL	
1,1-Dichloroethane	BDL		BDL		1.6		1.3		BDL		BDL		BDL		BDL	
c-1,2-Dichloroethylene	BDL		2.1		4.7		3.6		BDL		BDL		BDL		BDL	
Benzene	BDL		1.6		3.2		BDL		BDL		BDL		BDL		BDL	
Toluene	BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL	
Tetrachloroethylene	BDL		BDL		1.4		BDL		BDL		BDL		BDL		BDL	
Chlorobenzene	BDL		BDL		1.2		BDL		BDL		BDL		BDL		BDL	
Ethyl Benzene	BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL	
m,p-Xylene	BDL		6.6		BDL		BDL		BDL		BDL		BDL		BDL	
o-Xylene	BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL	
Isopropylbenzene	BDL		1.5		3.0		BDL		BDL		BDL		BDL		BDL	
n-Propylbenzene	BDL		1.4		BDL		BDL		BDL		BDL		BDL		BDL	
1,3,5-Trimethylbenzene	BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL	
1,2,4-Trimethylbenzene	BDL		2.7		BDL		BDL		BDL		BDL		BDL		BDL	
sec-Butyl Benzene	BDL		BDL		1.3		BDL		BDL		BDL		BDL		BDL	
p-Isopropyltoluene	BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL	
1,4-Dichlorobenzene	BDL		BDL		2.2		1.4		BDL		BDL		BDL		BDL	
1,2-Dichlorobenzene	BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL	
Hexachlorobutadiene	BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL	
Naphthalene	BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL	
1,2,3-Trichlorobenzene	BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL	
Methyl t-Butylether (MTBE)	36		BDL		5.7		BDL		BDL		BDL		BDL		BDL	
Totals	36		15.9		25.5		8.7		0		0		0		0	
SEMI-VOLATILE ORGANIC COMPOUNDS																
1,2-Dichlorobenzene	BDL		2.3		BDL		BDL				BDL					
2,4-Dinitrotoluene	BDL		BDL		BDL		3.9				BDL					
Fluorene	BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL	
Naphthalene	BDL		BDL		BDL		BDL		BDL		BDL		BDL		BDL	
Totals	0		0		0		0		0		0		0		0	
INORGANIC PARAMETERS																
ph	5.57		6.51		5.71		5.17		6.42		6.17		6.28		6.65	
Specific Conductance	263		698		781		486		158		568		324		564	
Alkalinity as Calcium Carbonate	16		158		59		14		46		60		88		40	
B.O.D.	BDL		3		2		2		BDL		BDL		BDL		BDL	
Chemical Oxygen Demand	BDL		45		BDL		BDL		BDL		BDL		BDL		BDL	
Hardness, Total	55.3		87.7		181		68.2		47.5		190		95.7		61.5	
Nitrate as N	1.69		BDL*		0.23		1.57		0.44		2.59		0.6		BDL*	
Total Phosphorus as P	BDL		0.09		BDL		BDL		0.07		BDL		0.05		BDL	
Sodium, Total	21.9		61.6		60.4		57.7		11.4		23.9		125		65.2	
Total Kjeldahl	0.21		8.84		5.86		1.15		0.4		0.42		0.62		4.74	
Ammonia as N	BDL		8.84		5.86		0.88		0.15		BDL		0.35		4.26	
Sulfate	29		31.5		185		49.4		7.28		158		24		25.1	
Chloride	37.5		95		70		80		7.5		20		22.5		120	
Total Dissolved Solids	137		310		425		248		92		347		164		264	
Total Suspended Solids	BDL		44		BDL		BDL		20		1		6		BDL	
Iron, Total	0.005		31.3		0.023		0.013		0.38		0.422		0.638		0.013	
Manganese, Total	0.003		3.1		4.46		0.104		0.59		4.37		0.565		2.84	
Nickel, Total	0.012		0.008		0.694		0.012		0.005		BDL		0.023		BDL	
Chromium, Total	BDL		0.009		BDL		BDL		0.008		0.002		BDL		BDL	

Table 5B Onsite

LEGEND

BDL = Below Detection Limit

NA = Not Analyzed

Upgradient groundwater conditions were examined at the W-4 cluster, where the shallow or water table well W-4A was free of organic compounds and the deeper well W-4B exhibited low levels of VOC's (13.4ppb). Monitoring well W-4B also contained elevated levels of inorganic leachate indicators. These indicators would point to the Town of Oyster Bay landfill as the possible source of these low level VOC's.

The last two onsite clusters, W-7 and W-14, were sampled to determine the presence of volatile organic compounds which might be leaving the FTC site boundary. These wells currently exhibit very low levels of volatile organics, with groundwater collected from both W-14A and W-14B below detectable limits and the W-7 cluster concentrations ranging from 8.7 ppb to 36 ppb for total volatile organics.

3.1.2. On-Site Baseline Inorganic Sampling Results

Inorganic parameters, including metals, were also examined as part of the onsite Baseline sampling. The results of the inorganic analysis can also be found in Table 5. The concentrations of various inorganic compounds detected in the onsite groundwater were compared to NYSDEC class GA standards, where applicable.

Onsite groundwater was found to have elevated concentrations of Sodium, Ammonia, Iron and Manganese. All four species are typical of landfill leachate. The concentrations of these compounds generally increased with depth and proximity to the landfill (Figure 1). The highest concentrations of Sodium (142 ppm) and Ammonia (35.3 ppm) were found in groundwater monitoring well W-4B. This well is located in the northwestern corner of the site at the base of the landfill. Groundwater collected from water table wells exhibited decreasing concentrations of some inorganic parameters with increasing distance from the landfill. Monitoring wells W-4B, W-23, W-31 and W-35 (Figure 2) all exhibited decreasing concentrations of Sodium and Ammonia with increasing linear distance from the fill.

3.1.3 Floating Product Monitoring and Recovery

Regular monitoring of floating petroleum product has been ongoing at the Fireman's Training Center site since the summer of 1992. During the course of several investigations, three bodies of floating petroleum product were mapped. Each floating product body was identified by it's proximity to a specific source area/drywell field. (Figure 11).

The Burn Area Drywell Field (BAF) is located to the east of Burn Area No. 2 (Pit Area). This plume is primarily comprised of No. 2 fuel oil. The second product body is associated with the former corrugated Metal Building drywell field (CMB). This body is adjacent to the former flammable liquids area and is primarily comprised of gasoline. The third area is known as the Mock up Field (MUF) due to it's close proximity to the taxpayer mock up. It is also composed of No. 2 fuel oil.

In order to better assess the potential recoverability of product from each of these areas, hydrographs have been prepared for selected wells from each area. Hydrographs show the rise and fall of the water table over time, which can be correlated to the increase and decrease of floating product thickness.

Monitoring well W-10 (Figure 12) was selected for the BAF field. Review of the hydrograph prepared for this well indicates that apparent product thicknesses have ranged from a maximum of 2.15 feet in 1995 to a non-measurable skim. Variations in thickness over the 8 year period of observation have occurred in response to periods of drought and heavy rain.

Periods of low recharge result in a falling water table. As the water table declines, the apparent thickness of product in each affected monitoring well increases. Groundwater and product thickness trends in W-18 (Figure 13) mirror those observed in W-10 and W-15 (Figure 14).

Groundwater and product levels were also plotted for monitoring well W-28 (Figure 15). This well was selected due to its proximity to the corrugated Metal Building (CMB) drywell field, which was adjacent to the former flammable liquids area. Historically, this well has contained measurable amounts of gasoline. Review of the hydrograph indicates that the last time gasoline was detected in this well was July, 1997 when .61 feet was measured.

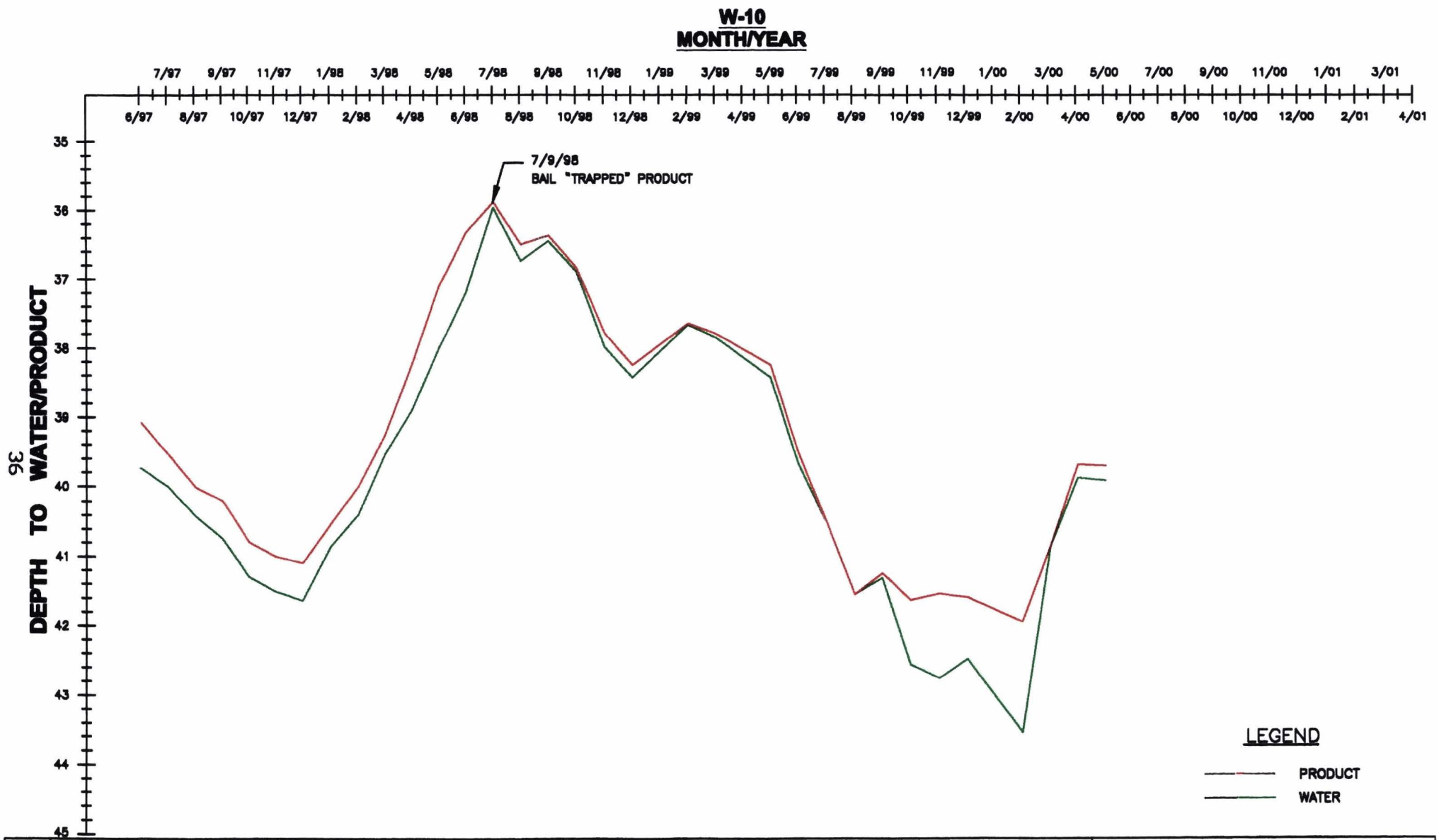
The absence of product in this and other wells in the flammable liquids plume, even during the summer of 1999 where product thicknesses increased in other site wells, may be the result of other factors. First, the volatility of the product. Gasoline has a lower Henry's Law Constant (<1) than No. 2 fuel oil and may be removed from the vadose zone by vapor extraction. Second, the Town of Oyster Bay (TOBAY) has operated a methane recovery system along the FTC's western boarder for over a decade. A byproduct of this system's operation may have been the removal of the gasoline during periods when the water table was low. Monitoring of this well and others in the flammable liquids plume will continue since the absence of product in these wells has been observed for less than three years. Product thickness may also be modified over time by the operation of Recovery well RW-1.

3.2 Off-site Baseline Monitoring Results

3.2.1 Off-Site Baseline Water Quality

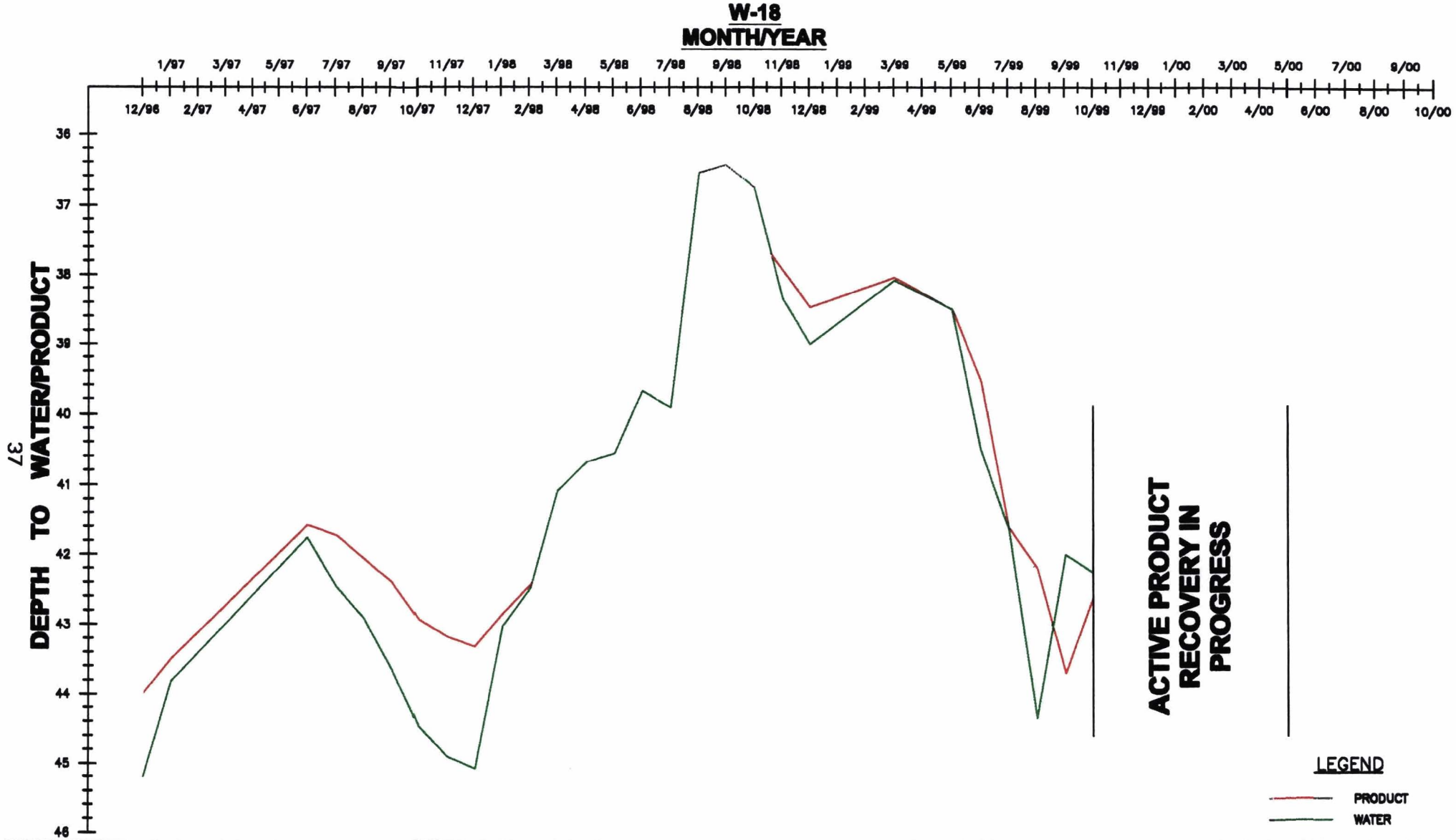
3.2.1.1. Off-Site Baseline Volatile Organic Sampling Results

Groundwater samples were collected from 11 monitoring wells which were designated by the NYSDEC as off-site monitoring wells. These wells were analyzed for the list of Baseline compounds described in sections 2.1, 2.2 and 2.3. All samples were collected by NCDPW personnel between June 4 and June 10, 1999.



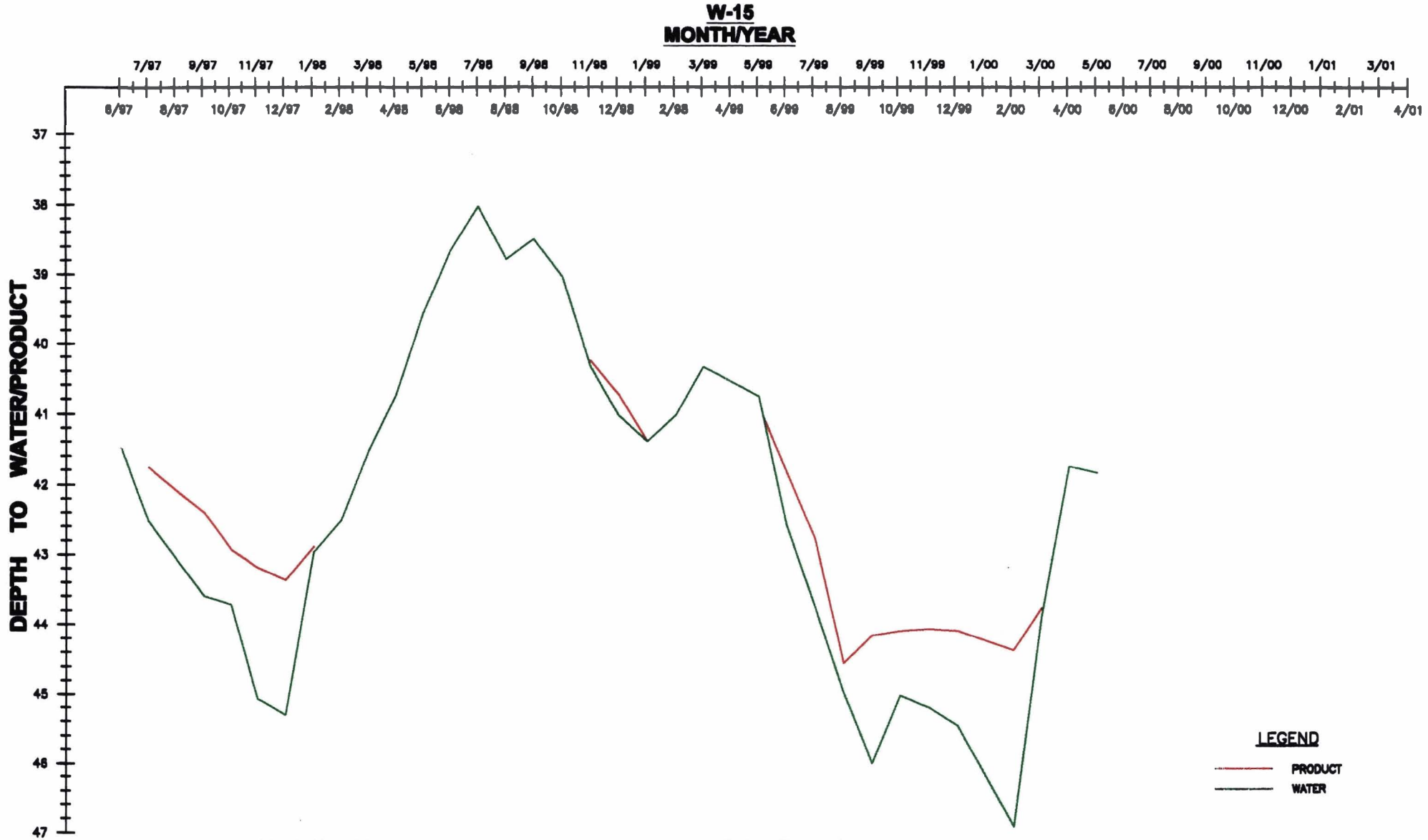
36

			FILE NAME: \DWG\FIGW-10A	CONTRACT NUMBER: XX		SHEET NO. 2 OF 2	COUNTY OF NASSAU DEPARTMENT OF PUBLIC WORKS SANITATION & WATER SUPPLY WATER RESOURCES UNIT	WELL #10 (W-10) WATER/PRODUCT LEVELS FIREMEN'S TRAINING CENTER OLD BETHPAGE, NEW YORK FIGURE 12
			SCALE: NONE	DWG. NO. XX	DRAWN BY: R.HOFCHENKE	DATE 6/99		
0	ORIGINAL RELEASE	XX	DESIGNED BY: R.HOFCHENKE	DATE 6/99	CHECKED BY: M.FLANERY	DATE 6/99		
NO.	REVISION DESCRIPTION	DATE						

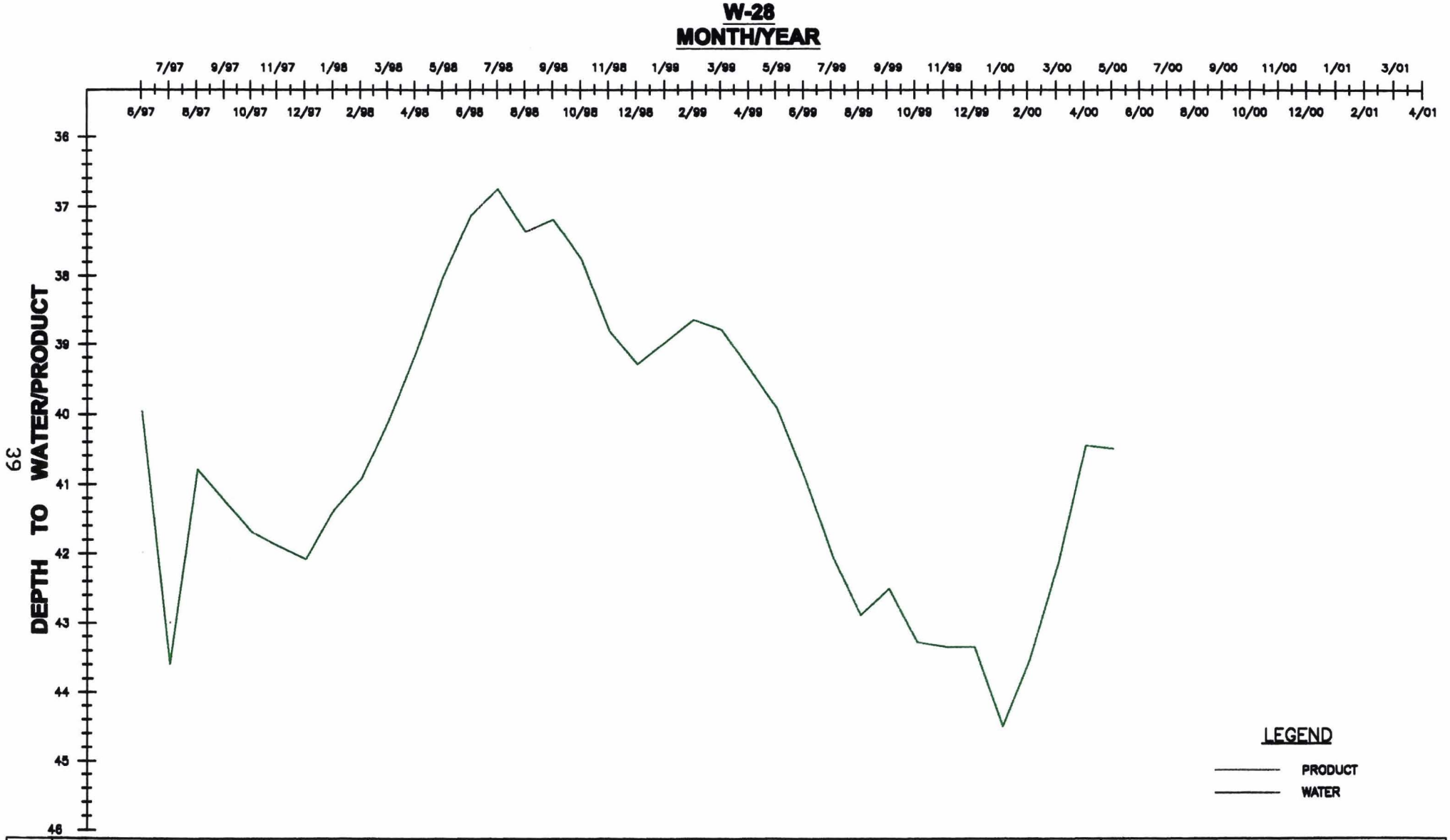


37

			FILE NAME: \DWG\PTCW-18A	CONTRACT NUMBER: XX		SHEET NO. 2 OF 2	COUNTY OF NASSAU DEPARTMENT OF PUBLIC WORKS SANITATION & WATER SUPPLY WATER RESOURCES UNIT	WELL #18 (W-18) WATER/PRODUCT LEVELS FIREMEN'S TRAINING CENTER OLD BETHPAGE, NEW YORK FIGURE 18
			SCALE: NONE	DWG. NO. XX	DRAWN BY: R.SZPCHINSKI	DATE 6/00		
			DESIGNED BY: R.SZPCHINSKI	DATE 6/00	CHECKED BY: M.FLAHERTY	DATE 6/00		
0	ORIGINAL RELEASE	XX						
NO.	REVISION DESCRIPTION	DATE						



			FILE NAME: \DWG\PTCW-16A	CONTRACT NUMBER: XX		SHEET NO. 2 OF 2	COUNTY OF NASSAU DEPARTMENT OF PUBLIC WORKS SANITATION & WATER SUPPLY WATER RESOURCES UNIT	WELL #16 (W-16) WATER/PRODUCT LEVELS FIREMEN'S TRAINING CENTER OLD BETHPAGE, NEW YORK FIGURE 14
			SCALE: NONE	DWG. NO. XX	DRAWN BY: R.KOPCHINSKI	DATE 6/00		
0	ORIGINAL RELEASE	XX	DESIGNED BY: R.KOPCHINSKI	DATE 6/00	CHECKED BY: M.FLANNERY	DATE 6/00		
NO.	REVISION DESCRIPTION	DATE						



			FILE NAME: \DWG\FTCW-28A	CONTRACT NUMBER: XX		SHEET NO. 2 OF 2	COUNTY OF NASSAU DEPARTMENT OF PUBLIC WORKS SANITATION & WATER SUPPLY WATER RESOURCES UNIT	WELL #28 (W-28) WATER/PRODUCT LEVELS FIREMEN'S TRAINING CENTER OLD BETHPAGE, NEW YORK FIGURE 15
			SCALE: NONE	DWG. NO. XX	DRAWN BY: R.HOPCHINSKI	DATE 6/00		
0	ORIGINAL RELEASE	XX	DESIGNED BY: R.HOPCHINSKI	DATE 6/00	CHECKED BY: M.FLANERTY	DATE 6/00		
NO.	REVISION DESCRIPTION	DATE						

The results of the off-site Baseline Sampling Round can be found in Table 6 . Review of this data indicates that the concentrations and type of compounds detected in off-site groundwater are consistent with those detected beneath the Fireman's Training Center site. Both halogenated and non-halogenated organic compounds were detected in monitoring wells down gradient of FTC.

The Halogenated organic compounds include: Tetrachloroethylene, Trichloroethylene, C-1, 2 Dichloroethylene, 1, 2 Dichloroethane, and Vinyl Chloride. The Non-Halogenated organic compounds include: Benzene, O-Xyene, Isopropylbenzene, and 1, 2, 4 Trimethlybenzene.

The total volatile organic concentrations (TVOC's) detected in offsite groundwater ranged from 66 ppb (ORW-5) to 1,033 ppb (BP-4B). The plume formed by these volatile organic compounds exists in groundwater between the elevations of 60 feet above mean sea level (msl) to -200 feet below mean sea level. The areal extent of the organic plume is shown in Figure 16. The plume reaches a maximum downgradient length of over 4,200 feet and a maximum width of 1,500 feet. Further examination of the volatile organic constituents within the plume reveals that the Non-Halogenated and Halogenated compounds are mixed throughout the majority of the plume, however, the Non-Halogenated compounds do not extend as far downgradient as the Halogenated compounds (Figure 16).

Benzene, O-xylene, 1, 2, 4 - Trimethylbenzene and Isopropylbenzene are present in samples collected from ORW-4 at concentrations of 59.3 ppb, 3.8 ppb, 2.3 ppb and 1.3 ppb, respectively. Benzene alone, is present in samples collected from ORW-5 at a concentration of 15 ppb. There are no other Non-Halogenated compounds detected in groundwater, beyond the boundary formed between ORW-4 and ORW-5.

The vertical extent of volatile organic contamination is summarized in Figure 17. Review of this hydrogeologic cross section A-A^{1}, with total volatile organic concentrations, indicates that the plume attains a maximum thickness of approximately 180 feet in the vicinity of ORW-3. The majority of the organic plume exists between elevations -60 - -200 feet (msl). This places the most contaminated portion of the aquifer in the project's designated "B" hydrogeologic zone. Groundwater monitoring wells BP-4B, BP-9B and BP-12B have TVOC's of 1,033 ppb, 239 ppb and 142 ppb, respectively.

In order to better define concentrations throughout the plume, well head samples were also collected from the offsite recovery wells during their shakedown period in the spring of 1999, as all seven wells are screened in the "B" zone. The TVOC concentrations for the offsite Recovery wells were:

OFFSITE - BASELINE
GROUNDWATER SAMPLING RESULTS
TABLE 6A

	WELL BP-2A		WELL BP-2B		WELL BP-4B		WELL BP-4C		WELL BP-9B		WELL BP-9C		WELL BP-10B		WELL BP-10C	
	DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED	
	6/8/99		6/8/99		6/8/99		6/8/99		6/4/99				6/4/99		6/4/99	
VOLATILE ORGANIC COMPOUNDS																
Vinyl Chloride	BDL		BDL		10.6		5.0		BDL				BDL		BDL	
1,1-Dichloroethene	BDL		BDL		4.4		4.0		3.6				BDL		BDL	
1,1-Dichloroethane	BDL		BDL		4.8		3.3		6.4				BDL		BDL	
c-1,2-Dichloroethylene	BDL		BDL		117.0		152.0		106.0				BDL		BDL	
1,1,1-Trichloromethane	BDL		BDL		8.5		9.0		9.6				BDL		BDL	
1,2-Dichloroethane	BDL		BDL		32.1		BDL		BDL				BDL		BDL	
Benzene	BDL		BDL		597.0		30.4		BDL				BDL		BDL	
Trichloroethylene	BDL		BDL		26.2		34.4		14.2				BDL		BDL	
Tetrachloroethylene	BDL		BDL		155.0		206.0		98.9				BDL		BDL	
1,2-Dibromoethane	BDL		BDL		4.6		BDL		BDL				BDL		BDL	
o-Xylene	BDL		BDL		37.3		1.4		BDL				BDL		BDL	
Isopropylbenzene	BDL		BDL		9.8		BDL		BDL				BDL		BDL	
Naphthalene	BDL		BDL		20.0		BDL		BDL				BDL		BDL	
Methyl t-Butylether (MTBE)	BDL		BDL		5.7		BDL		BDL				BDL		BDL	
Totals	0		0		1033		445.5		238.7				0		0	
SEMI-VOLATILE ORGANIC COMPOUNDS																
1,2-Dichlorobenzene	BDL		2.3		BDL		BDL		BDL				BDL		BDL	
2,4-Dinitrotoluene	BDL		BDL		BDL		3.9		BDL				BDL		BDL	
Totals	0		2.3		0		3.9		0				0		0	
INORGANIC PARAMETERS																
ph	6.32		6.68		4.96		5.08		4.97				5.21		5	
Specific Conductance	471		608		248		119		89.6				48.1		44.2	
Alkalinity as Calcium Carbonate	29		68		9		8		5				BDL		BDL	
Hardness, Total	30.9		37		49.8		24.1		16.2				8.8		6.7	
Nitrate as N	1.97		BDL*		0.53		2.3		3.62				1.73		1.8	
Sodium, Total	49.3		60.9		23.4		10.3		L/A				L/A		L/A	
Total Kjeldahl	7.58		16.1		0.16		BDL		0.13				BDL		BDL	
Ammonia as N	7.58		16.1		BDL		BDL		BDL				BDL		BDL	
Sulfate	15.8		15.8		40.8		5.06		BDL				BDL		BDL	
Chloride	90		110		30		15		12.5				7.5		7.5	
Total Dissolved Solids	196		237		132		64		48				25		16	
Total Suspended Solids	BDL		BDL		BDL		BDL		BDL				2.5		BDL	
Iron, Total	0.007		0.021		0.015		0.003		BDL				BDL		BDL	
Manganese, Total	0.275		0.846		0.13		0.005		0.003				0.001		0.001	
Nickel, Total	0.009		BDL		0.02		0.019		0.005				0.005		BDL	
Chromium, Total	BDL		BDL		BDL		BDL		BDL				BDL		BDL	

LEGEND

BDL = Below Detection Limit

NA = Not Analyzed

L/A = Lab Accident

Table 6A Offsite

OFFSITE - BASELINE
GROUNDWATER SAMPLING RESULTS
TABLE 6B

	WELL		WELL		WELL		WELL		WELL		WELL		WELL		WELL	
	BP-12A		BP-12B		U-6A		RB-1									
	DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED		DATE SAMPLED	
	6/4/99		6/4/99		6/8/99		6/8/99									
VOLATILE ORGANIC COMPOUNDS																
Vinyl Chloride	BDL		BDL		BDL		BDL									
1,1-Dichloroethene	BDL		BDL		BDL		BDL									
1,1-Dichloroethane	BDL		9.2		BDL		BDL									
c-1,2-Dichloroethylene	BDL		78.9		BDL		BDL									
1,1,1-Trichloromethane	BDL		3.3		BDL		BDL									
1,2-Dichloroethane	BDL		BDL		BDL		BDL									
Benzene	BDL		BDL		BDL		BDL									
Trichloroethylene	BDL		19.8		BDL		BDL									
Tetrachloroethylene	BDL		30.7		BDL		5.8									
1,2-Dibromoethane	BDL		BDL		BDL		BDL									
o-Xylene	BDL		BDL		BDL		BDL									
Isopropylbenzene	BDL		BDL		BDL		BDL									
Naphthalene	BDL		BDL		BDL		BDL									
Methyl t-Butylether (MTBE)	BDL		BDL		BDL		BDL									
Totals	0		141.9		0		5.8									
SEMI-VOLATILE ORGANIC COMPOUNDS																
1,2-Dichlorobenzene	BDL		BDL		BDL		BDL									
2,4-Dinitrotoluene	BDL		BDL		BDL		BDL									
Totals	0		0		0		0									
INORGANIC PARAMETERS																
ph	5.2		4.86		5.58		5.58									
Specific Conductance	89		454		450		5130									
Alkalinity as Calcium Carbonate	BDL		BDL		10		17									
Hardness, Total	15.8		41.2		64.3		423									
Nitrate as N	2.77		3.53		2.72		3.77									
Sodium, Total	L/A		L/A		NA		807									
Total Kjeldahl	BDL		BDL		NA		0.1									
Ammonia as N	BDL		BDL		NA		BDL									
Sulfate	6.1		23.2		5.41		BDL									
Chloride	15		95		120		1574									
Total Dissolved Solids	42		223		242		2888									
Total Suspended Solids	2		BDL		14.5		BDL									
Iron, Total	0.098		BDL		0.906		0.008									
Manganese, Total	0.063		0.015		0.06		0.04									
Nickel, Total	0.113		0.011		0.017		BDL									
Chromium, Total	0.006		BDL		0.002		BDL									

Table 6B Offsite

LEGEND

BDL = Below Detection Limit
NA = Not Analyzed
L/A =Lab Accident

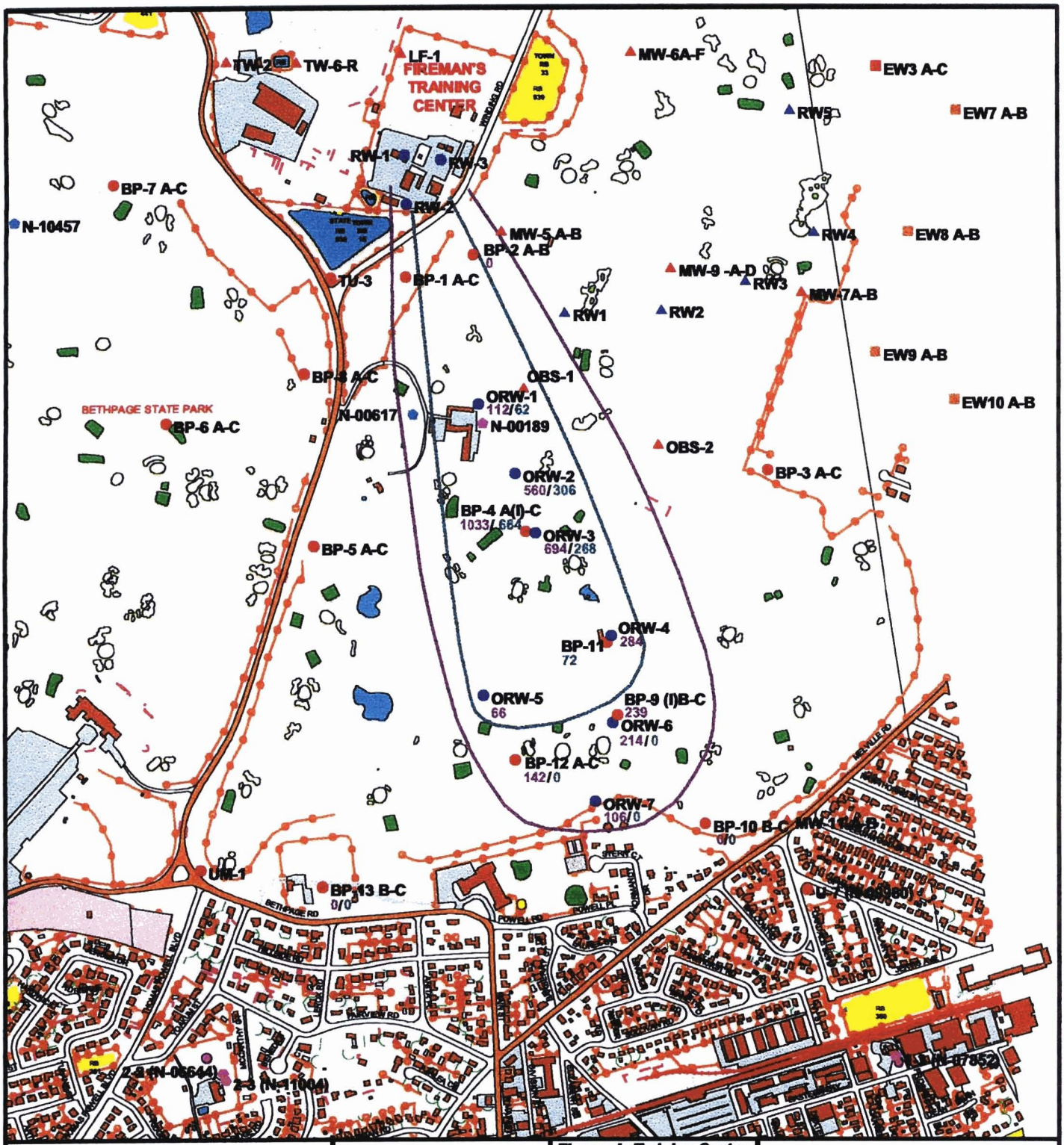
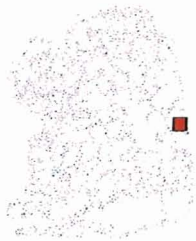


Figure 16

Legend

- Total VOC Contamination (Approx. Area)
- 112 Number Indicates Total VOC Concentration at Well (ppb)
- Aromatic Hydrocarbon Contamination (Approx. Area)
- 62 Number Indicates Aromatic Hydrocarbon Concentration at Well (ppb)



Keymap

Places

Fireman's Training Center Site Area

Approximate Areal Extent of Total VOC Contamination & Aromatic Contamination July 1999

Prepared By:
NCDPW Water Resources Unit

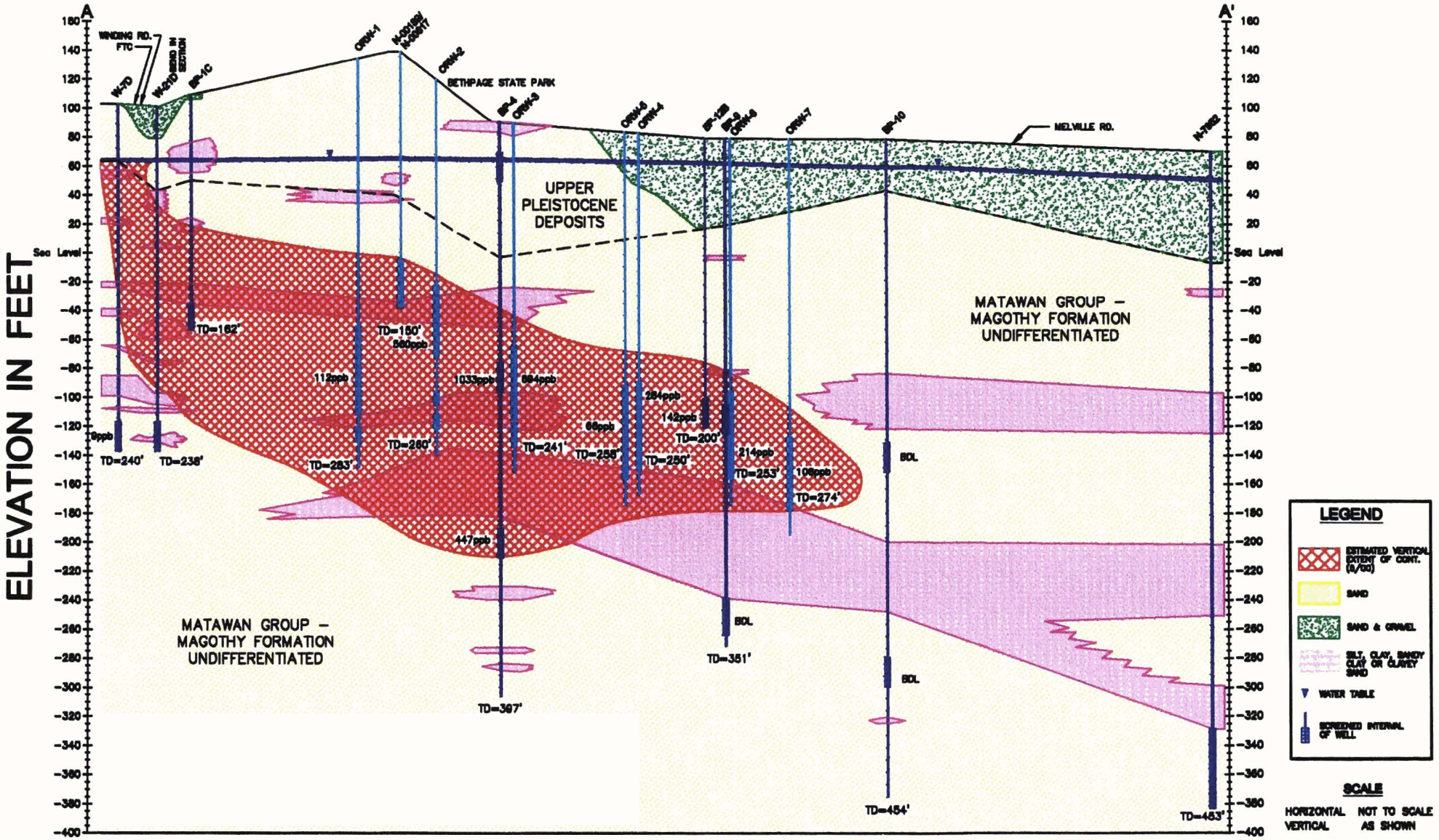
N

Scale: 1" = 900'

NASSAU COUNTY

GEOGRAPHIC INFORMATION SYSTEM

July 10, 2000



			FILE NAME: \DWG\FTCF10B-E		CONTRACT NUMBER XXX	SHEET NO. 1 OF 1	COUNTY OF NASSAU DEPARTMENT OF PUBLIC WORKS SANITATION & WATER SUPPLY WATER RESOURCES UNIT	ESTIMATED VERTICAL EXTENT OF VOLATILE ORGANIC CONTAMINATION FIREMEN'S TRAINING CENTER OLD BETHPAGE, NEW YORK FIGURE 17
			SCALE: AS SHOWN	DWG. NO. 001	DRAWN BY: J. KEISER	DATE 4/8/00		
1	AUTOCAD COMPUTERIZATION	4/00	DESIGNED BY: M. FLAHERTY	DATE 4/00	CHECKED BY: M. FLAHERTY	DATE 4/00		
0	ORIGINAL - LKB AERIAL PHOTOGRAPH 4/96	XXX						
NO.	REVISION DESCRIPTION	DATE						

WELL #	TVOC
ORW-1	112 ppb
ORW-2	560 ppb
ORW-3	694 ppb
ORW-4	284 ppb
ORW-5	66 ppb
ORW-6	214 ppb
ORW-7	106 ppb

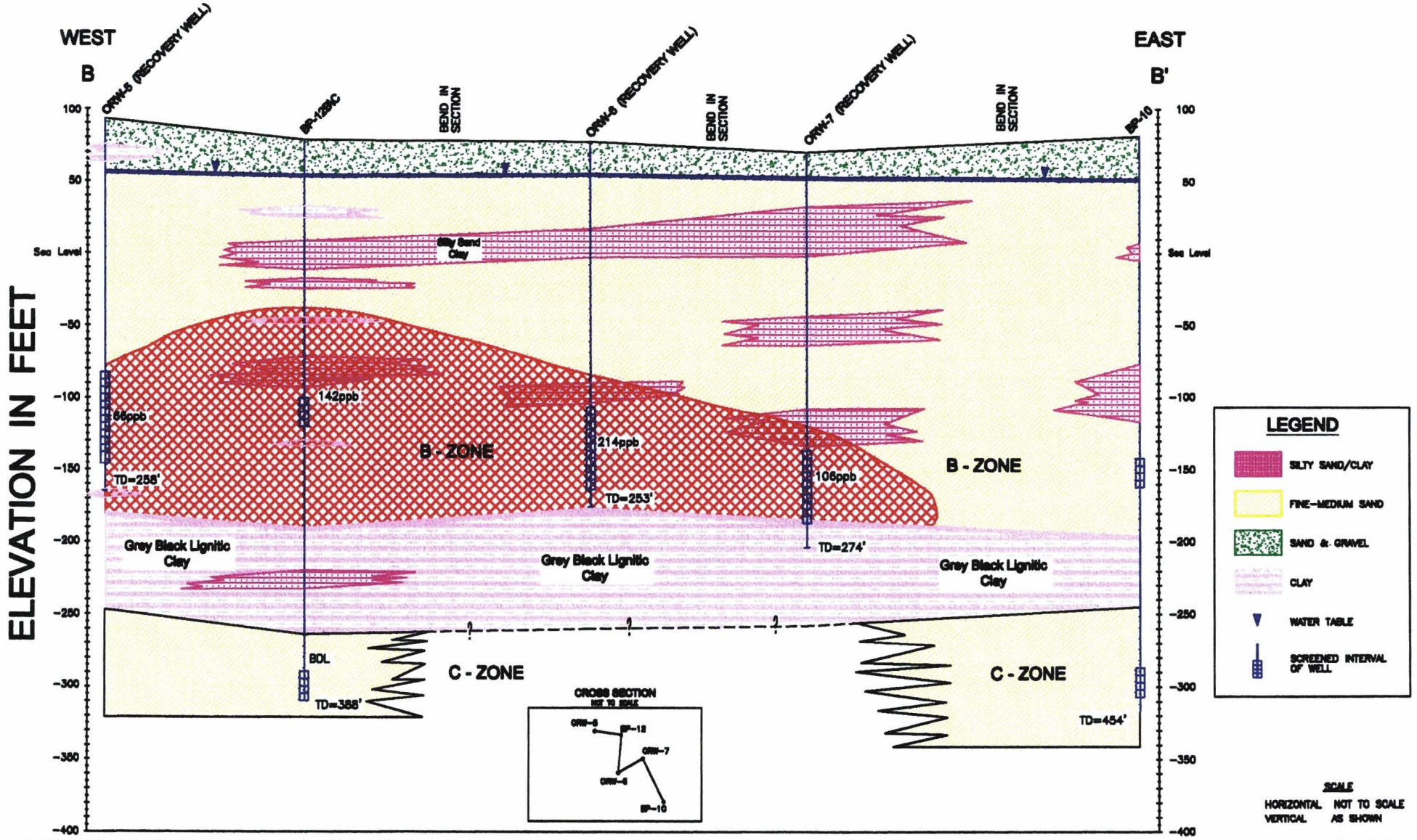
Although the offsite recovery well samples are useful in determining the overall extent of contamination, the organic values are more variable than the monitoring well values, due to higher pumping rates, length of well screen and duration of pumping prior to sampling.

Deeper contamination in the aquifer is limited to a single well location. Groundwater monitoring well BP-4C which is screened in the hydrogeologic "C" zone had a total volatile organic concentration of 447 ppb.

The extent of volatile organic contamination near the "lead" edge of the plume is shown in hydrogeologic cross-section B-B[1] (Figure 18). Total volatile organic compound concentrations are shown in the respective screen zones of each well. The overall thickness of the plume is less than 150 feet and appears to be less than 60 feet at its eastern edge. The bottom of the plume occurs at an elevation of approximately -200 feet MSL. TVOC concentrations in the "B" hydrogeologic zone range from 66 ppb (ORW-5) to 214 ppb (ORW-6).

3.2.1.2. Off-Site Baseline Inorganic Sampling Results

The inorganic groundwater sampling results presented in Table 6, have been reviewed for all offsite monitoring well locations. Seven of the eleven offsite groundwater monitoring wells sampled were below NYSDEC class GA standards for inorganics in groundwater. The three wells which exceeded class GA standards are located in close proximity to the TOBAY landfill. Groundwater monitoring wells BP-2A and 2B are located in a cluster, downgradient of the FTC site and the TOBAY landfill. These wells are screened at the water table and the top of the "B" hydrogeologic zone. Monitoring Well BP-2A and BP-2B exceeded class GA standards for sodium and ammonia as nitrogen. Monitoring Well BP-2B also exceeded standards for manganese. Groundwater monitoring Well RB-1, which is located near the northern limits of the Town's property, exceeded standards for sodium (807 mg/l), chloride (1,574 mg/l) and total dissolved solids (2,888 mg/l).



NO.	REVISION DESCRIPTION	DATE
0	ORIGINAL RELEASE	XXX

FILE NAME: \DWG\FTCES001		CONTRACT NUMBER	SHEET NO. 1 OF 1
SCALE: AS SHOWN	DWG. NO. XXX	DRAWN BY: J. KEIBER	DATE 2/23/00
DESIGNED BY: M. FLAHERTY	DATE 2/00	CHECKED BY: M. FLAHERTY	DATE 2/00

COUNTY OF NASSAU
DEPARTMENT OF PUBLIC WORKS
SANITATION & WATER SUPPLY
WATER RESOURCES UNIT

GEOLOGIC CROSS SECTION (WEST-EAST)
FTC/BETHPAGE STATE PARK
BETHPAGE, NEW YORK
FIGURE 18

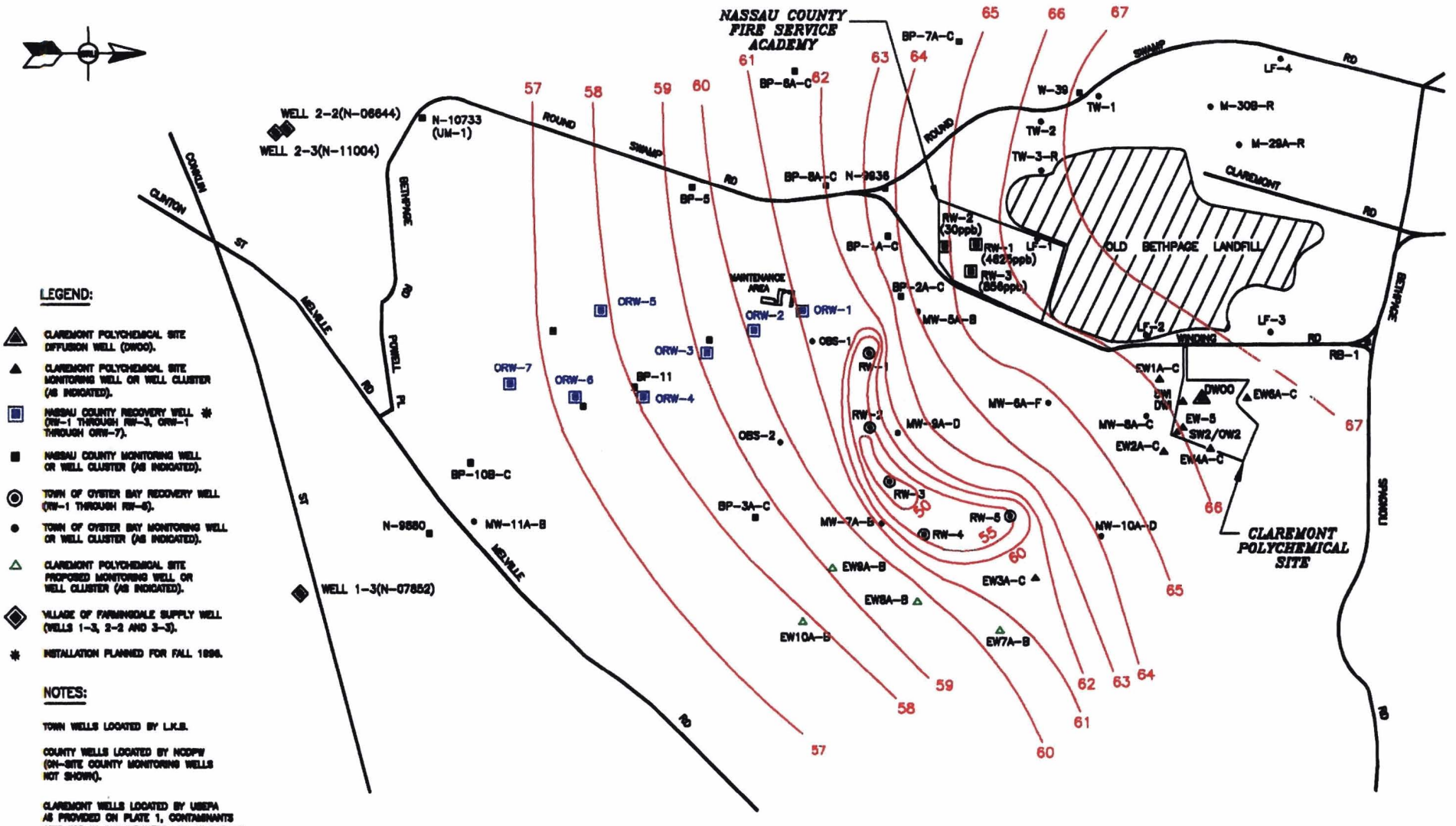
3.3. Baseline Hydraulic Monitoring Effects

Onsite hydraulic conditions were examined in the spring and early summer of 1999. Since onsite pumpage was the focus of initial treatment and monitoring, the offsite recovery wells were not pumped at a sufficient rate or duration to determine hydraulic influence during the baseline study. Offsite pumping conditions were examined during a comprehensive water level round which was coordinated with the Town of Oyster Bay. This synoptic round was completed on November 12, 1998. Water levels were collected from all NCDPW and TOBAY groundwater monitoring wells, during normal operation of the TOBAY GTF collection system. Water level contours produced from this survey are presented in Figure 19.

Examination of the potentiometric surface for the "B" hydrogeologic zone indicates that the overall flow direction is from the northwest to the southeast. Elevations range from 67 feet above msl to 57 feet above msl beneath Bethpage State Park. The regional groundwater contours are modified in the vicinity of the five TOBAY offsite recovery wells (RW-1 through RW-5), where a "kidney" shaped depression is formed from the wells. The combined flow rate of over 500 gpm, locally produces a minimum elevation of 50 feet above msl, which provides hydraulic control for the Town's plume.

The Town's recovery operation produces a small amount of hydraulic influence between NCDPW monitoring well clusters BP-2 and ORW-1. The 63 feet above msl and 62 feet above msl contour are slightly modified by the Tobay recovery system's effects. South of ORW-1, these effects are diminished and the normal regional north-northwest to south-southeast flow pattern is re-established.

The contours produced during this monitoring event will be used to evaluate future NCDPW pumpage effects following the operation of the full scale FTC remediation offsite recovery system.



LEGEND:

- CLAREMONT POLYCHEMICAL SITE DIFFUSION WELL (DWOO).
- CLAREMONT POLYCHEMICAL SITE MONITORING WELL OR WELL CLUSTER (AS INDICATED).
- NASSAU COUNTY RECOVERY WELL * (RW-1 THROUGH RW-3, ORW-1 THROUGH ORW-7).
- NASSAU COUNTY MONITORING WELL OR WELL CLUSTER (AS INDICATED).
- TOWN OF OYSTER BAY RECOVERY WELL (RW-1 THROUGH RW-5).
- TOWN OF OYSTER BAY MONITORING WELL OR WELL CLUSTER (AS INDICATED).
- CLAREMONT POLYCHEMICAL SITE PROPOSED MONITORING WELL OR WELL CLUSTER (AS INDICATED).
- VILLAGE OF FARMINGDALE SUPPLY WELL (WELLS 1-3, 2-2 AND 3-3).
- * INSTALLATION PLANNED FOR FALL 1996.

NOTES:

TOWN WELLS LOCATED BY L.K.S.

COUNTY WELLS LOCATED BY NCDPW (ON-SITE COUNTY MONITORING WELLS NOT SHOWN).

CLAREMONT WELLS LOCATED BY USEPA AS PROVIDED ON PLATE 1, CONTAMINANTS DETECTED IN GROUNDWATER AND PROPOSED MONITORING WELL LOCATIONS, EBASCO SERVICES, INC. 1/5/93.

NO.	REVISION DESCRIPTION	DATE
1	ADDED PROJECTED CONTAMINATION LEVELS	6/96
0	ORIG. RELEASE - FILE PRINT: \DWG\FTCRIFS-F1-A	11/27/90

FILE NAME: \DWG\FTCWELL04 | CONTRACT NUMBER: 81021 | SHEET NO. 1 OF 1

SCALE: NOT TO SCALE | DWG. NO. XX | DRAWN BY: R.ZDPCHINSKI | DATE 6/96

DESIGNED BY: R.ZDPCHINSKI | DATE 6/96 | CHECKED BY: M.FLAHERTY | DATE 6/96

COUNTY OF NASSAU
DEPARTMENT OF PUBLIC WORKS
SANITATION & WATER SUPPLY
WATER RESOURCES UNIT

COMPREHENSIVE WATER LEVEL ROUND
(COUNTY TREATMENT SYSTEM - OFF)
NOVEMBER 12, 1996
FIREMEN'S TRAINING CENTER
BETHPAGE STATE PARK
BETHPAGE, NEW YORK
FIGURE 19

SECTION 4

CONCLUSIONS AND RECOMMENDATIONS

Review of onsite environmental conditions at the Fireman's Training Center, following the Baseline Sampling event indicates that volatile organic concentrations in groundwater are somewhat lower than expected. The levels of both halogenated and non-halogenated organic compounds are well within the anticipated treatment capacities of the plant. The occurrence and thickness of floating petroleum product onsite, and the initial startup of the product recovery systems demonstrate that No. 2 fuel oil can be efficiently collected from RW-3, W-18 and W-33.

The direction of groundwater flow, depth and configuration of the offsite volatile organic plume and hydraulic effects of the TOBAY recovery operation were established during the Baseline sampling round. Inorganic contaminant concentrations were found to be elevated in well locations closest to the landfill. Initial concentrations of both halogenated and non-halogenated organic compounds were identified at both monitoring and recovery well locations.

The low levels of volatile organic compounds present at the perimeter of the FTC site, would suggest a reduced level of pumping from the onsite wells. It does not appear that pumping recovery well RW-2 would be necessary at this time. The concentrations of volatile organics in groundwater near the two source areas, CMB and MUF drywell fields, would suggest that full time pumping of both RW-1 and RW-3 may not be necessary. RW-3 could be pumped when product collection is viable and RW-1 could be pumped intermittently to reduce source area levels.