

AECOM Environment

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September 14, 2009

Anthony Karziel
Bureau of Construction Services
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau C, 11th Floor
625 Broadway
Albany, NY 12233-7013

**Subject: NAPL Recovery Wells
Norwich Former MGP Site
Birdsall Road, Chenango County
Norwich, New York
Site #7-09-011**

Dear Mr. Karziel,

On behalf of New York State Electric & Gas (NYSEG), AECOM has prepared this report to summarize non-aqueous phase liquid (NAPL) recovery activities at the former Norwich Manufactured Gas Plant (MGP) site, located on Front Street in Norwich, New York. As required in the Record of Decision (March 2008), mobile NAPL must be collected from the off-site areas south of Front Street. The objective is to remove mobile NAPL in advance of in-situ chemical oxidation (ISCO) treatment.

Three NAPL recovery wells were installed between August 3 and August 5, 2009 to determine the feasibility of NAPL recovery. Since the installation of these wells, NAPL recovery has occurred weekly. Approximately 137.5 gallons of NAPL have been removed during five recovery events between August 14, 2009 and September 9, 2009. Provided below is a summary of field activities and observations through September 9, 2009.

NAPL Recovery Well Installation

In the area south of Front Street, PZ09 was the only piezometer with NAPL measured during the initial Remedial Investigation (Ish Inc., October 2009); up to 2 feet of NAPL had been measured in this 1 inch piezometer, PZ09. Based on this information, the area surrounding PZ09 was targeted for NAPL recovery well installation.

A total of six borings were installed between August 3 and 5, 2009. In all borings where NAPL was observed, impacts ended at the top of the clay layer. Boring SB01, located 7 ft north of well PZ09, contained NAPL blebs from 18 to 20 ft bgs and NAPL saturated soil from 20 to 23.5 ft bgs. SB02, located 16 ft west of SB01, contained NAPL saturated soil from 20 to 23.2 ft bgs. In addition, NAPL saturated soil was observed in SB03, located 22 ft north of PZ09, from 22 to 23.7 ft bgs with NAPL blebs from 16 to 18 ft bgs and 18.5 to 20 ft bgs and a hydrocarbon-like sheen from 18 to 20 ft bgs. Hydrocarbon-like sheen was observed from 16 to 21.4 ft bgs in boring SB04, located 8 ft south of PZ09. SB05, located 59 ft south of PZ09, contained no NAPL or hydrocarbon-like sheen though a moderate hydrocarbon-like odor was noted from 16 to 20 ft bgs. Boring SB06, located 15 ft east of SB01, contained NAPL blebs from 18 to 21.8 ft bgs. Soil boring logs are included in Attachment A.

Samples were also collected from these boring locations for bench-scale ISCO treatability studies at two laboratories, XDD LLC and VeruTek. A composite of heavily impacted soil (NAPL saturated, NAPL blebs) and of mildly impacted soil (hydrocarbon-like odor) were sent to XDD along with in-tact macrocores of heavily and mildly impacted soils, groundwater from RW09-02, and a sample of NAPL. A composite of heavily impacted soil, groundwater from RW09-02, and a sample of NAPL were sent to VeruTek.

NAPL recovery wells RW-09-01, RW-09-02, and RW-09-03 were installed in the locations of borings SB01, SB02, and SB03 respectively. Well locations and the top of the clay layer are presented in Figure 1. Well completion information is provided below.

Well	Ground Surface (ft, msl)	TOC Elevation (ft, msl)	Top of Clay (ft, bgs)	Top of Clay (ft msl)	Screen Interval (ft bgs)	Screen Elevation (ft, msl)
RW-09-01	1000.97	1000.25	23.8	977.17	14-24	986.25-976.25
RW-09-02	1000.72	1000.20	23.0	977.72	14-24	986.20-976.20
RW-09-03	1001.23	1000.64	23.8	977.43	15-25	985.64-975.64

NAPL Measurements and Recovery

NAPL has been recovered from the wells on a weekly basis, following the week the wells were installed. Each week, NAPL thickness is gauged by dropping a clean weighted string into each well and measuring the length of string covered with NAPL. Following NAPL gauging, a peristaltic pump is used to pump NAPL out of each well until no more NAPL is removed. Each well has a dedicated 3/8 inch diameter tube installed to the bottom of the well.

NAPL thicknesses (before purging) and recoveries each week are presented in Figures 2 and 3, respectively, and Table 1. Recovery quantities from the first five events are shown below. Well RW09-03 has never had its NAPL purged completely; NAPL recovery usually lasts for 2 to 3 hours at this well. On September 2, 2009, a whale pump was employed for RW09-03 in order to pump NAPL at a faster rate, however, even after 18 gallons of NAPL was removed, no water was removed from the well, only NAPL. To determine recovery limits for RW-09-03, an 8 hour pumping test was performed on September 9, 2009. During this pumping test, 40 gallons of NAPL were recovered with no observable change in NAPL consistency. The dedicated whale pump broke during the test, so the peristaltic pump was used during the remainder of the test. The pumping test was terminated because of time constraints; the well was continuing to produce NAPL when the test was terminated.

Recovery Well	Total Recovered Volume ¹ (gal)	Average Recovered Volume per Event ² (gal)
RW-09-01	21.5	4.3
RW-09-02	20	4.0
RW-09-03	96	19.2
Total	137.5	27.5

¹ Total Volume recovered until NAPL stops flowing (NAPL does not cease flowing from RW-09-03).

² Average volume is determined by dividing the total volume by the number of recovery events (in this case 5).

The NAPL appears to be in the top several feet of gravel/sand and vertically restricted by the confining clay layer. Migration of NAPL is therefore limited horizontally along the top of the clay unit. Reviewing the top of clay contours from the RI in conjunction with the results of the boring logs from this event shows that a top of clay low (i.e., less than elevation 978) exists south of Front Street and extends approximately 70 feet south. This low in the clay surface is where NAPL pools. Recovery well RW-09-03 is likely within this area and therefore has significantly higher amounts of recoverable NAPL. The other two wells are on the fringe of the collection area and see diminished returns to NAPL recovery.

Recommendations

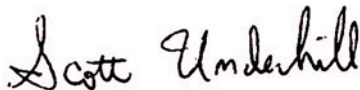
The NAPL yield capacity of RW-09-03 has not yet been quantified. A longer term recovery test (greater than 8 hours) will be required to determine this well's NAPL yield. In addition, the low in the confining clay layer may extend further to the north from RW-09-03. Four additional recovery wells should therefore be installed in the area between RW-09-03 and Front Street to determine if additional NAPL can be removed (Figure 4).

Based on the initial month of NAPL recovery, the following tasks are recommended:

- 1) Install four additional recovery wells as shown on Figure 4
- 2) Run a longer-term recovery test (i.e., 5 day) to determine the yield of RW-03-09 and the four newly installed wells
- 3) Continue to perform weekly recovery at the existing three recovery wells until the longer-term test is completed and NAPL recovery yields are determined for each well
- 4) Upon completion of and based on the results of the three items above, a long term NAPL recovery plan will be developed.

If you have any questions or concerns, please do not hesitate to contact Tracy Blazicek at (607) 762-9621 or me at (518) 396-7638.

Yours sincerely,



Scott Underhill, P.E.

Project Manager

scott.underhill@aecom.com

TABLE

Table 1
NAPL Thicknesses and Recovery Volumes
Norwich MGP Site

	RW-09-01		RW-09-02		RW-09-03		TOTAL
Date	NAPL Thickness (ft)	NAPL Purged (gal)	NAPL Thickness (ft)	NAPL Purged (gal)	NAPL Thickness (ft)	NAPL Purged (gal)	NAPL Purged (gal)
8/5/2009	18.4	0	18.65	0	20.7	0	0
8/14/2009	12.6	7	1	4	19.6	17.5	28.5
8/19/2009	3	4	0.2	3.5	6.9	10	17.5
8/27/2009	4.7	4	3.3	2.5	5.8	10	16.5
9/2/2009	4.6	3.5	6	6	5.5	18.5	28
9/9/2009	4.2	3	5	4	5.9	40	47
Total		21.5		20		96	137.5
Average/Event		4.3		4.0		19.2	27.5

FIGURES

Plotted By: MeisterK
Plot File Date Created: Sep/11/2009 4:28 PM
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Filename: L:\WORK\106404\CADD\REF\NORWICH-BASE.DWG

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30'

60'

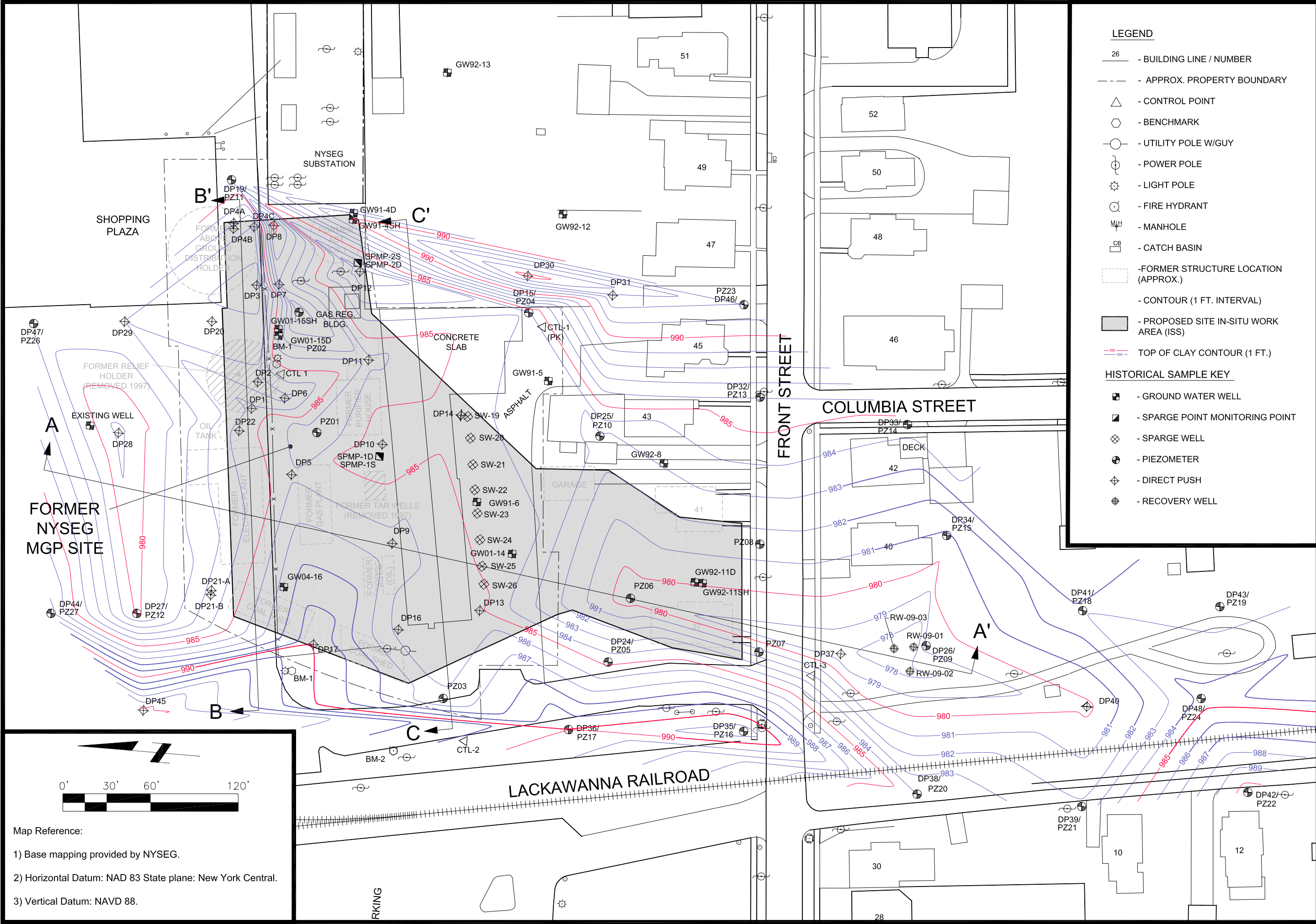
120'

Map Reference:

1) Base mapping provided by NYSEG.

2) Horizontal Datum: NAD 83 State plane: New York Central.

3) Vertical Datum: NAVD 88.



- LEGEND
- 26

- BUILDING LINE / NUMBER
- - APPROX. PROPERTY BOUNDARY
- △

- CONTROL POINT
- - BENCHMARK
- - UTILITY POLE W/GUY
- ⊙

- POWER POLE
- ⊙

- LIGHT POLE
- ⊙

- FIRE HYDRANT
- ⊙

- MANHOLE
- ⊙

- CATCH BASIN
- - FORMER STRUCTURE LOCATION (APPROX.)
- - CONTOUR (1 FT. INTERVAL)
- - PROPOSED SITE IN-SITU WORK AREA (ISS)
- - TOP OF CLAY CONTOUR (1 FT.)

- HISTORICAL SAMPLE KEY
- ⊙

- GROUND WATER WELL
- ⊙

- SPARGE POINT MONITORING POINT
- ⊙

- SPARGE WELL
- ⊙

- PIEZOMETER
- ⊙

- DIRECT PUSH
- ⊙

- RECOVERY WELL

VERIFY SCALE IF PLAN SHEET IS REDUCED

1-INCH

DRN BY: DES BY: CHK BY: APP BY: REV: DESCRIPTION

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NYSEG
FORMER NORWICH MGP SITE
NORWICH, NEW YORK

EXISTING RECOVERY WELL LOCATION PLAN

PROJECT START DATE (M / Y)
SEPTEMBER 2009

PROJECT NO.
106404

FILENAME
Norwich-Base.dwg

SHEET NO.
01

DRAWING NO.
01

Figure 2
NAPL Thickness
Norwich MGP Site

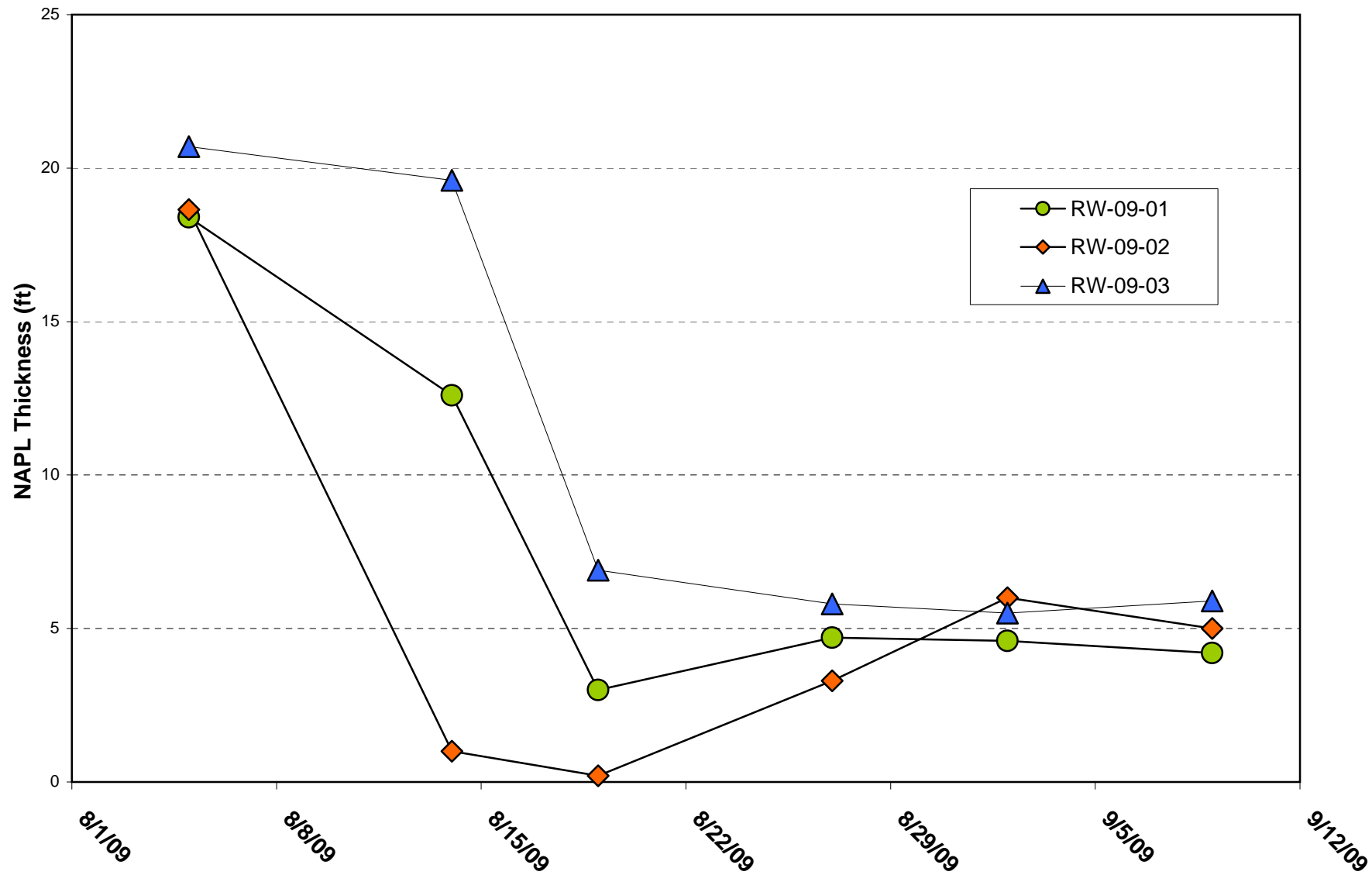
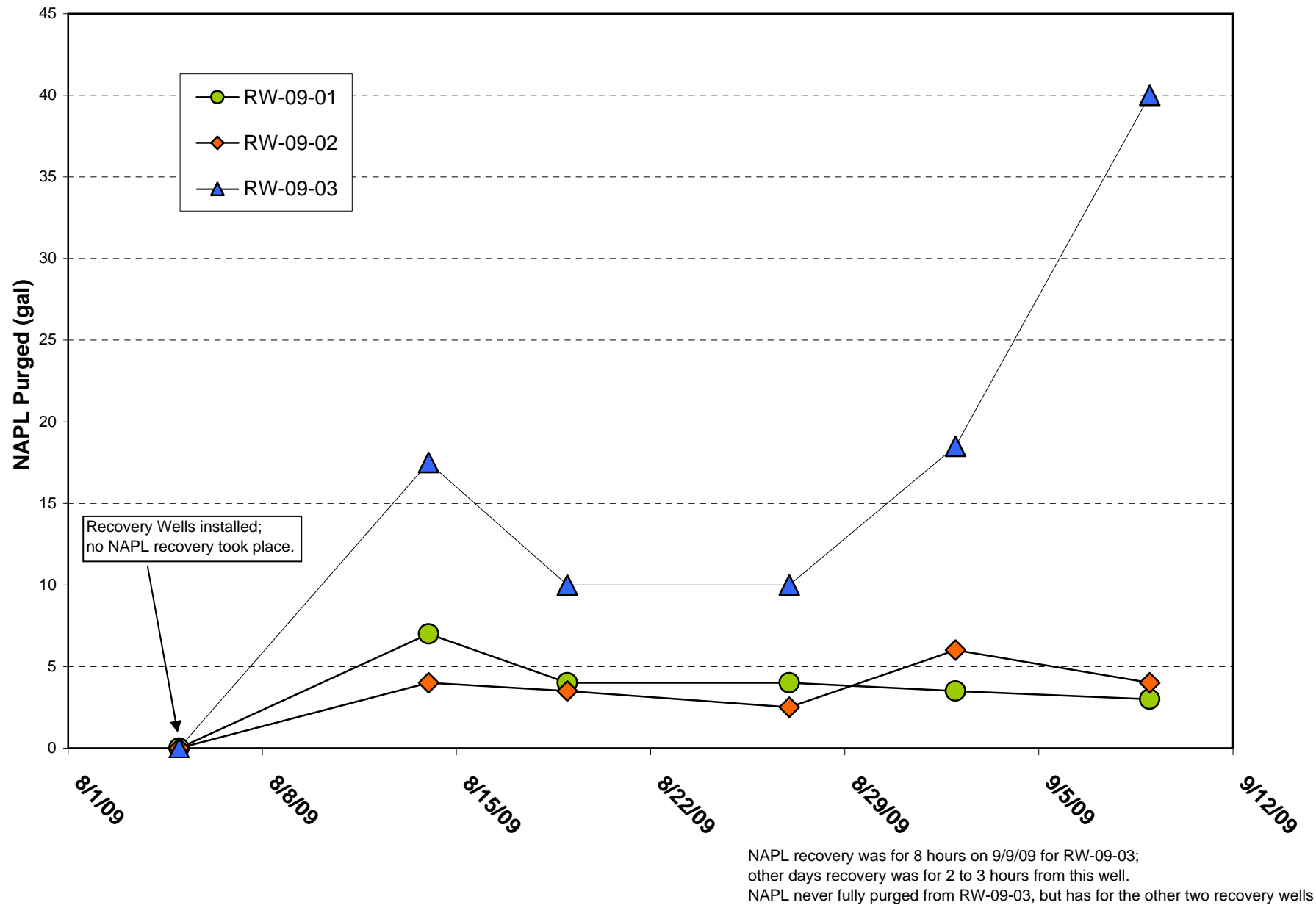


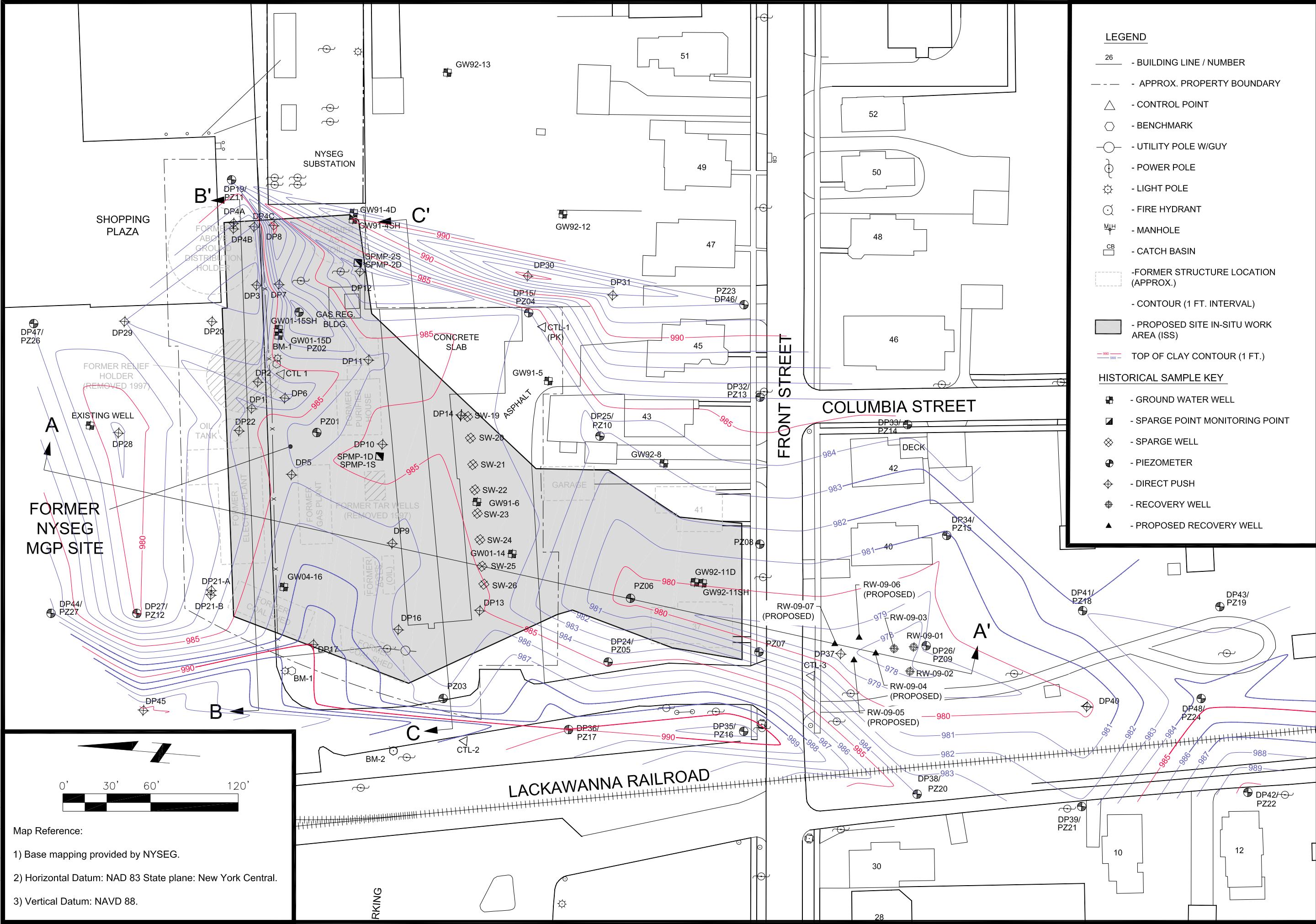
Figure 3
Purged NAPL Summary
Norwich MGP Site



Plotted By: MeisterK
Plot File Date Created: Sep/11/2009 4:25 PM
Layout-Sheet Name: PROPOSED-RW
Filename: L:\WORK\106404\CADD\REF\NORWICH-BASE.DWG

Map Reference:

- 1) Base mapping provided by NYSEG.
- 2) Horizontal Datum: NAD 83 State plane: New York Central.
- 3) Vertical Datum: NAVD 88.



LEGEND

- 26 - BUILDING LINE / NUMBER
- - - - - APPROX. PROPERTY BOUNDARY
- △ - CONTROL POINT
- - BENCHMARK
- - UTILITY POLE W/GUY
- ⊙ - POWER POLE
- ⊙ - LIGHT POLE
- ⊙ - FIRE HYDRANT
- ⊙ - MANHOLE
- ⊙ - CATCH BASIN
- - - - - FORMER STRUCTURE LOCATION (APPROX.)
- - - - - CONTOUR (1 FT. INTERVAL)
- - - - - PROPOSED SITE IN-SITU WORK AREA (ISS)
- - - - - TOP OF CLAY CONTOUR (1 FT.)

HISTORICAL SAMPLE KEY

- ⊙ - GROUND WATER WELL
- ⊙ - SPARGE POINT MONITORING POINT
- ⊙ - SPARGE WELL
- ⊙ - PIEZOMETER
- ⊙ - DIRECT PUSH
- ⊙ - RECOVERY WELL
- ▲ - PROPOSED RECOVERY WELL

NYSEG FORMER NORWICH MGP SITE NORWICH, NEW YORK

PROPOSED RECOVERY WELL LOCATION PLAN

PROJECT START DATE (M / Y)
SEPTEMBER 2009

PROJECT NO.
106404

FILENAME
Norwich-Base.dwg

SHEET NO.
02

DRAWING NO.
02

VERIFIED SCALE IF PLAN SHEET IS REDUCED

1-INCH

DRN BY: DES BY: CHK BY: APP BY: REV DESCRIPTION

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ATTACHMENT A
SOIL BORING AND WELL CONSTRUCTION LOGS

Project Name: Norwich MGP Site

NYSEG/Project Number: NYSEG/04964-031

Date Started/Date Completed: 8/3/09

Boring Location: 7 ft north of well PZ09

Drilling Company: Paragon Environmental Construction, Inc.

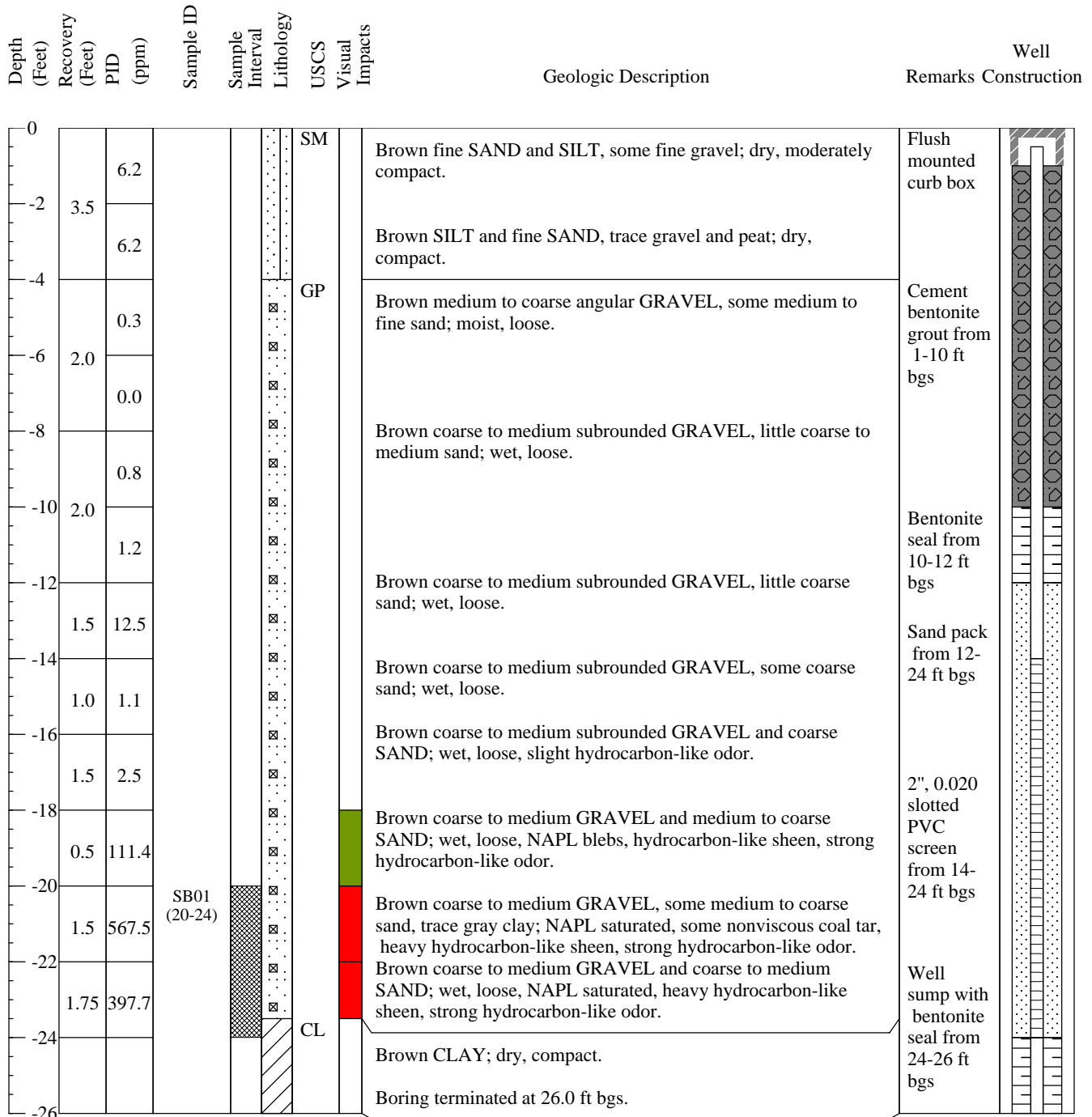
Sampling Method: Split spoon, macro-core

PVC Elevation (ft/msl, NAVD 88): NA

Ground Elevation (ft/msl, NAVD 88): NA

Total Depth: 26.0 ft bgs

Logged By: H. Jones



Coal Tar or Coal Tar NAPL Saturated Soil

Hydrocarbon Staining, Hydrocarbon Sheen or NAPL Blebs

Comments: Soil from 20 to 24 ft bgs was used in heavily impacted composite. Sample SB01(20-24) was sent to XDD.

Project Name: Norwich MGP Site

NYSEG/Project Number: NYSEG/04964-031

Date Started/Date Completed: 8/3/09

Boring Location: 16 ft west of well PZ09

Drilling Company: Paragon Environmental Construction, Inc.

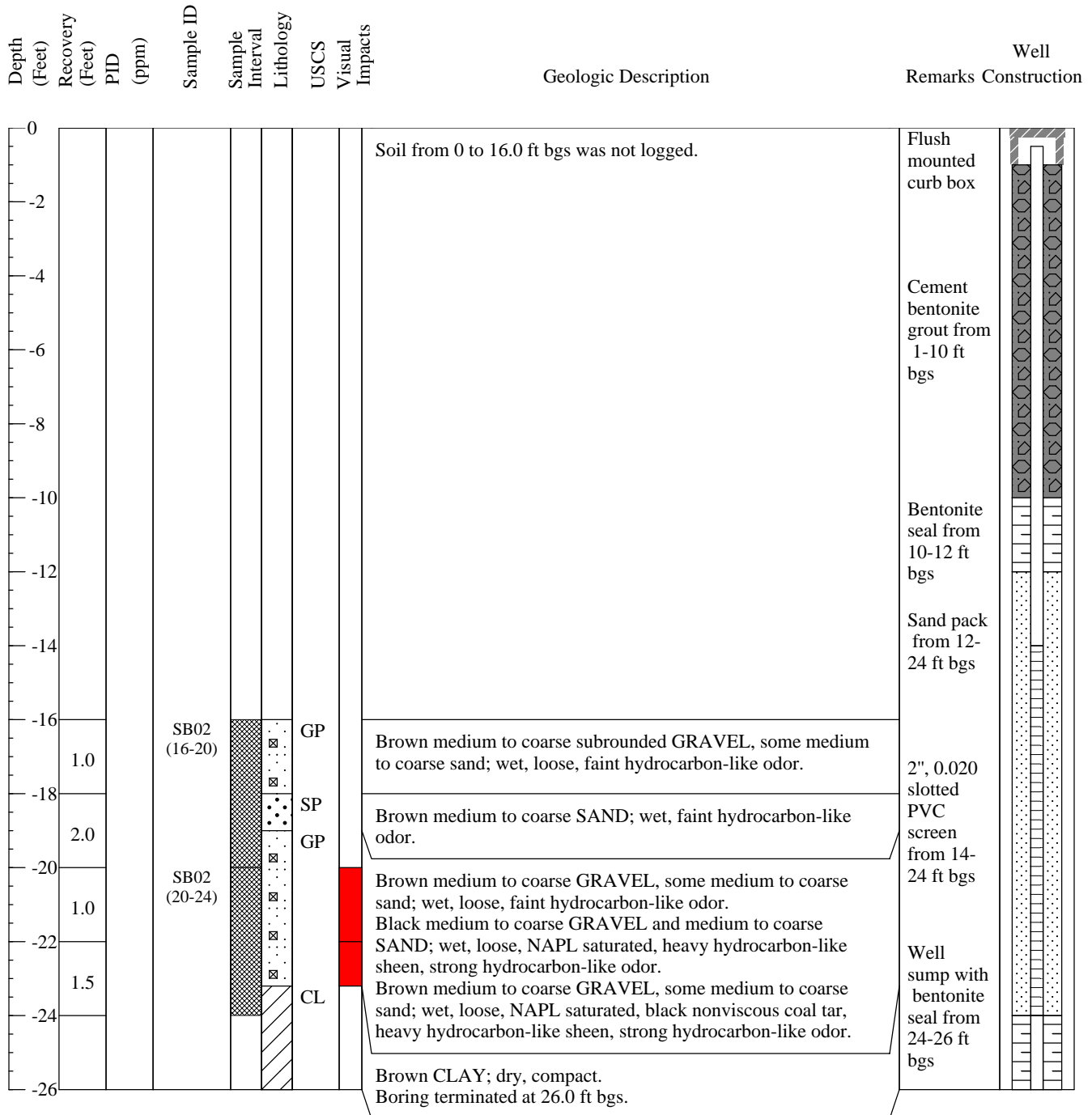
Sampling Method: Split spoon, macro-core

PVC Elevation (ft/msl, NAVD 88): NA

Ground Elevation (ft/msl, NAVD 88): NA

Total Depth: 26.0 ft bgs

Logged By: H. Jones



Coal Tar or Coal Tar NAPL Saturated Soil



Hydrocarbon Staining, Hydrocarbon Sheen or NAPL Blebs

Comments: Soil from 20 to 24 ft bgs was used in heavily impacted composite. Samples SB02(16-20) and SB02(20-24) sent to XDD.

Project Name: Norwich MGP Site

NYSEG/Project Number: NYSEG/04964-031

Date Started/Date Completed: 8/3/09

Boring Location: 16 ft west of well PZ09

Drilling Company: Paragon Environmental Construction, Inc.

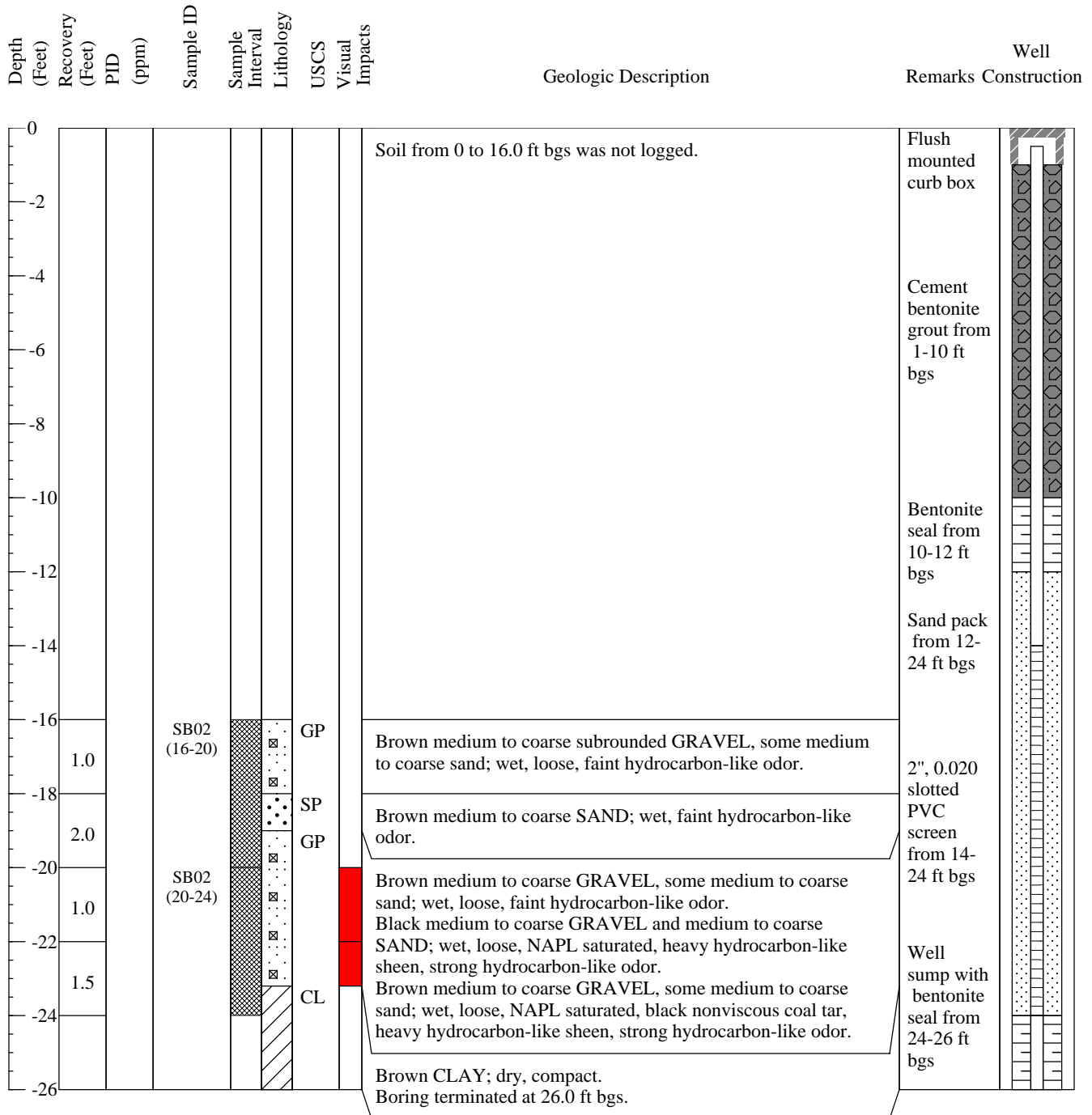
Sampling Method: Split spoon, macro-core

PVC Elevation (ft/msl, NAVD 88): NA

Ground Elevation (ft/msl, NAVD 88): NA

Total Depth: 26.0 ft bgs

Logged By: H. Jones



Coal Tar or Coal Tar NAPL Saturated Soil



Hydrocarbon Staining, Hydrocarbon Sheen or NAPL Blebs

Comments: Soil from 20 to 24 ft bgs was used in heavily impacted composite. Samples SB02(16-20) and SB02(20-24) sent to XDD.

Project Name: Norwich MGP Site

NYSEG/Project Number: NYSEG/04964-031

Date Started/Date Completed: 8/4/09

Boring Location: 8 ft south of well PZ09

Drilling Company: Paragon Environmental Construction, Inc.

Sampling Method: Split spoon, macro-core

Ground Elevation (ft/msl, NAVD 88): NA

Total Depth: 22.0 ft bgs

Logged By: H. Jones

Depth (Feet)	Recovery (Feet)	PID (ppm)	Sample ID	Sample Interval	Lithology	USCS	Visual Impacts	Geologic Description	Remarks
0								Soil from 0 to 16.0 ft bgs was not logged.	
-2									
-4									
-6									
-8									
-10									
-12									
-14									
-16	0.5					GP		Brown coarse to medium GRAVEL, some medium to coarse sand; wet, loose, trace hydrocarbon-like sheen, moderate hydrocarbon-like odor.	
-18	1.5					SP		Brown medium SAND; wet, moderate hydrocarbon-like sheen, moderate hydrocarbon-like odor.	
-20	1.5					GP		Brown medium to coarse GRAVEL; wet, loose, moderate hydrocarbon-like sheen, moderate hydrocarbon-like odor.	
-22						CL		Brown CLAY; dry, compact. Boring terminated at 22.0 ft bgs.	



Coal Tar or Coal Tar NAPL Saturated Soil



Hydrocarbon Staining, Hydrocarbon Sheen or NAPL Blebs

Comments: No samples were collected.

Project Name: Norwich MGP Site

NYSEG/Project Number: NYSEG/04964-031

Date Started/Date Completed: 8/4/09

Boring Location: 59 ft south of well PZ09

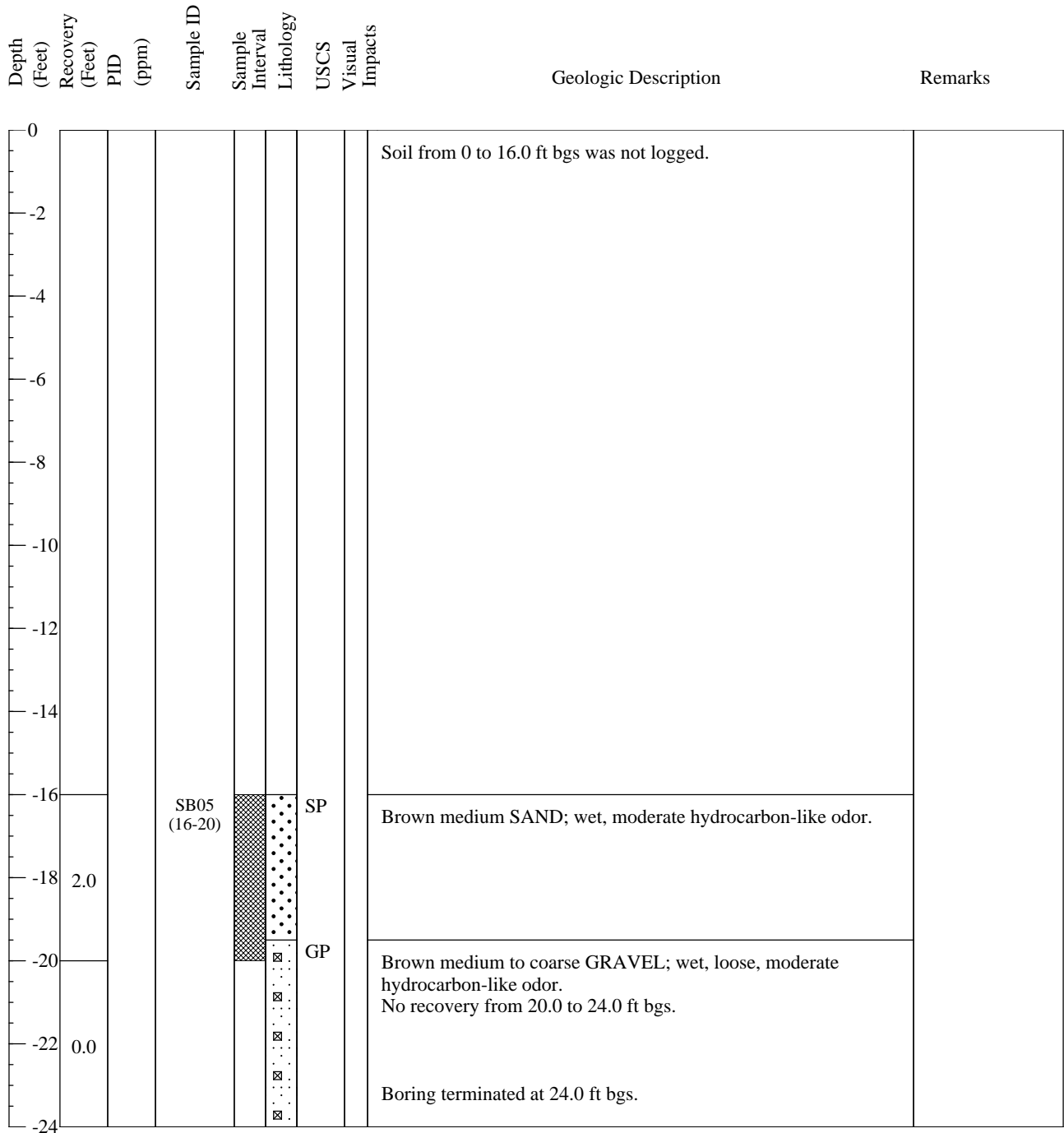
Drilling Company: Paragon Environmental Construction, Inc.

Sampling Method: Split spoon, macro-core

Ground Elevation (ft/msl, NAVD 88): NA

Total Depth: 24.0 ft bgs

Logged By: H. Jones



Coal Tar or Coal Tar NAPL Saturated Soil



Hydrocarbon Staining, Hydrocarbon Sheen or NAPL Blebs

Comments: Sample SB05(16-20) was sent to XDD.

Project Name: Norwich MGP Site

NYSEG/Project Number: NYSEG/04964-031

Date Started/Date Completed: 8/4/09

Boring Location: 15 ft east of well PZ09

Drilling Company: Paragon Environmental Construction, Inc.

Sampling Method: Split spoon, macro-core

Ground Elevation (ft/msl, NAVD 88): NA

Total Depth: 22.0 ft bgs

Logged By: H. Jones

Depth (Feet)	Recovery (Feet)	PID (ppm)	Sample ID	Sample Interval	Lithology	USCS	Visual Impacts	Geologic Description	Remarks
0								Soil from 0 to 16.0 ft bgs was not logged.	
-16	1.5					GP		Brown coarse to medium GRAVEL, some coarse to medium sand; wet, loose, slight hydrocarbon-like odor.	
-18	1.5					SP GP		Brown medium SAND; wet, some NAPL blebs, moderate hydrocarbon-like sheen, moderate hydrocarbon-like odor.	
-20	0.3							Brown coarse to medium GRAVEL; wet, loose, trace NAPL blebs, slight hydrocarbon-like odor. Brown coarse to medium GRAVEL; wet, loose, trace NAPL blebs.	
-22						CL		Brown CLAY; dry, compact. Boring terminated at 22.0 ft bgs.	



Coal Tar or Coal Tar NAPL Saturated Soil



Hydrocarbon Staining, Hydrocarbon Sheen or NAPL Blebs

Comments: No samples were collected.