MEMORANDUM
Department of Transportation

E-Mailed TO: Gretchen Teal, Region 8. gteal@dot.state.ny.us

FROM: Mauricio Roma, Environmental Analysis Bureau, 4-1. mroma@dot.state.ny.us

SUBJECT: NYSDOT HARRISON SUBRESIDENCY, WESTCHESTER CO. NYSDEC REGISTRY # 360035, - SPILL # 94-07349. INTERPRETATION OF OCTOBER 2005 / MARCH 2006 GROUNDWATER CONTAMINANT CONCENTRATIONS AT THE PETROLEUM SPILL AREA

DATE: September 29, 2006

The following is a memorandum report pertaining to the groundwater sampling conducted in October 2005 and March 2006 at the subject site (petroleum spill area; Figure-1). We completed this sampling as component of the Site Management (Operation and Maintenance) phase of the remediation. We operated the remedial system (Air Sparge / Soil Vapor Extraction) from October, 2000 to October 2002.

The groundwater analytical results (Attachment-A) at the spill site suggest that petroleum contamination is located on the west side of the main building and is not migrating off-site (Figure-2). In addition, the results suggest that site microbes are degrading benzene, toluene, ethylbenzene, xylenes (BTEX) and, possibly, other petroleum compounds. The distribution of contaminant and other groundwater chemical constituents suggests that multiple electron-accepting processes including denitrification, iron (III) reduction, and perhaps (in some limited areas), sulfate reduction are occurring in the petroleum-contaminated aquifer, resulting in the natural attenuation of the contaminant plume (Figure-3). This interpretation is similar to other past interpretations.

Please note that sulfate reduction was the most important biodegradation process prior to starting the groundwater sparging-soil vapor extraction remedial action (mechanical remediation). We have defined the plume boundary as the 25 microgram / liter (ug/l) BTEX-MTBE (MTBE: Methyl Tertiary Butyl Ether) isopleth (Figure-2). Please also note that we have not observed any MTBE since 2003.

Discussion

The site upgradient area (well MW-1) is characterized by significantly higher concentrations of dissolved nitrate (NO3) and much lower concentrations of dissolved iron (Fe-II) than the aquifer area with BTEX contamination (Figure-3). BTEX contaminated wells have also lower levels of dissolved oxygen than the upgradient uncontaminated well (MW-1). This suggests that BTEX (electron donor) are primarily being biochemically degraded by denitrifying and probably by Fe-III reducing (Fe-II is produced) reactions. NO3 levels are significantly lower (or depleted) in plume wells, or other wells that are downgradient from the former leaking fuel tanks.

NOTE: *Because the water samples analyzed for Fe-II were filtered in the laboratory instead of the field, we are uncertain of the effect of possible changes of the oxidation-reduction potential on the original Fe-II concentration.*

The significantly lower concentration of sulfate in some of the contaminated wells (e.g., MW-5, -6, -8, and SP-3), as compared to background conditions (MW-1), suggests that sulfate reduction may also be a significant process in some areas of the plume. BTEX also appear to be somewhat degraded by aerobic processes. However, considering that the background dissolved oxygen (DO) concentration is low, I believe that this is not a dominant process.

Therefore, it appears that the anaerobic process of nitrate reduction is prevalent during the degradation of the petroleum product, probably followed by Fe-III and, in some areas, SO4 reduction. It is possible that aerobic respiration may also be degrading the BTEX mass to some extent.

The low levels of NO3 in well PC-1 (downgradient from the plume) may suggest that the clean water found at this well derives (at least in part) from the plume area. It appears that microbes in the plume area have used a significant amount of the nitrate during the hydrocarbon degradation process.

In addition to the above findings, we have observed the following:

1 - Mechanical remediation appears to have largely enhanced the naturally existing biodegradation because we achieved an approximately 90% reduction of BTEX-MTBE levels during the first year of the remedial system operation.

2 - Plume morphology has somewhat changed through time, but the plume has remained contained on site (Figures 4 and 5).

3 - Biodegradation processes have changed from sulfate reduction (the original most dominant anaerobic process) to denitrification and, probably, Fe-III reduction during and soon after the termination of the mechanical remediation in October 2002.

4 - It also appears that natural attenuation of the spill by sulfate reduction is increasing (after October 2002) at some areas of the plume.

In order to better delineate the plume, in February 2006 we installed a water table well (MW-11) following NYSDEC protocols. At that time, we also performed a sub-slab soil vapor investigation (SVI) at the building area closest to the spill. During the SVI, we detected non-site related volatile organic compounds (VOCs) at levels that do not represent an exposure concern given the current use of the building and site (e.g., large equipment storage, office space and restrooms).

Our consultant HDRLMS collected and analyzed the groundwater samples following the same (or similar) protocols as in past investigations. Attachment-B contains the well sampling logs. I understand that you will mail the CD containing all the analytical data and related information to all of the involved parties.

> ***NOTE:*** *As in previous investigations, the EH (or ORP; Oxidation Reduction Potential) was measured in the field. We understand that very small changes in DO, because of sampling activities, can quickly produce large changes in the EH. HDRLMS tried to be consistent in the sampling &, therefore, we can only use the EH as a "semi-qualitative" screening tool to obtain possible additional clues of biochemical processes in the plume.*

Attachment-C is our current site status report which provides additional site background information.

As we discussed, I have cc involved parties to simplify the distribution of the report.

If you have any questions, please let me know.

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FIGURE-1

Legend

Petroleum Spill

Landfill

0 37.5 75 150 225 300 Meters

N W E S

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Environmental Analysis Bureau
M.Roma, September 22, 2006

NYSDOT HARRISON SUBRESIDENCY, WESTCHESTER CO. SITE LOCATION

FIGURE-2

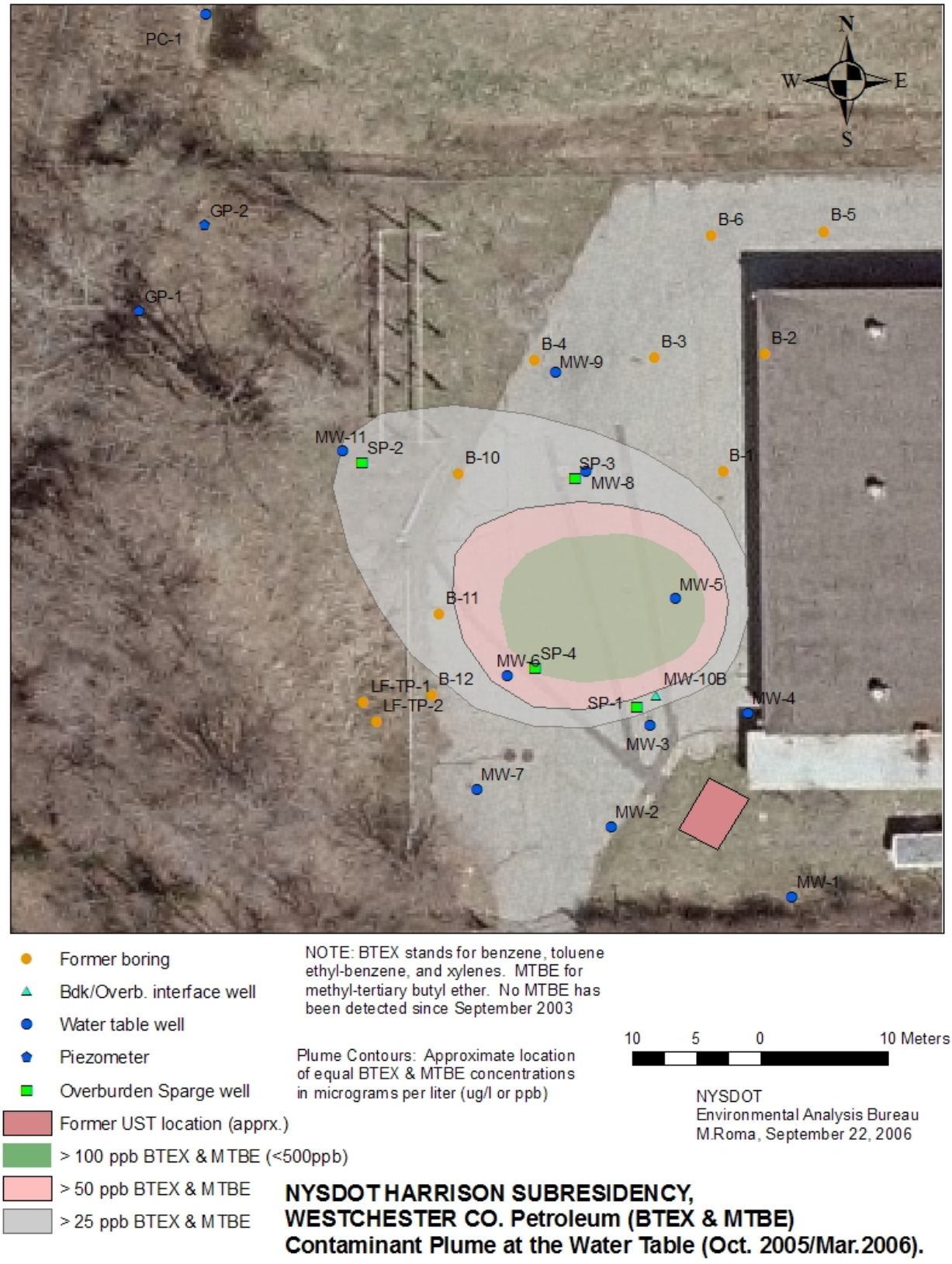
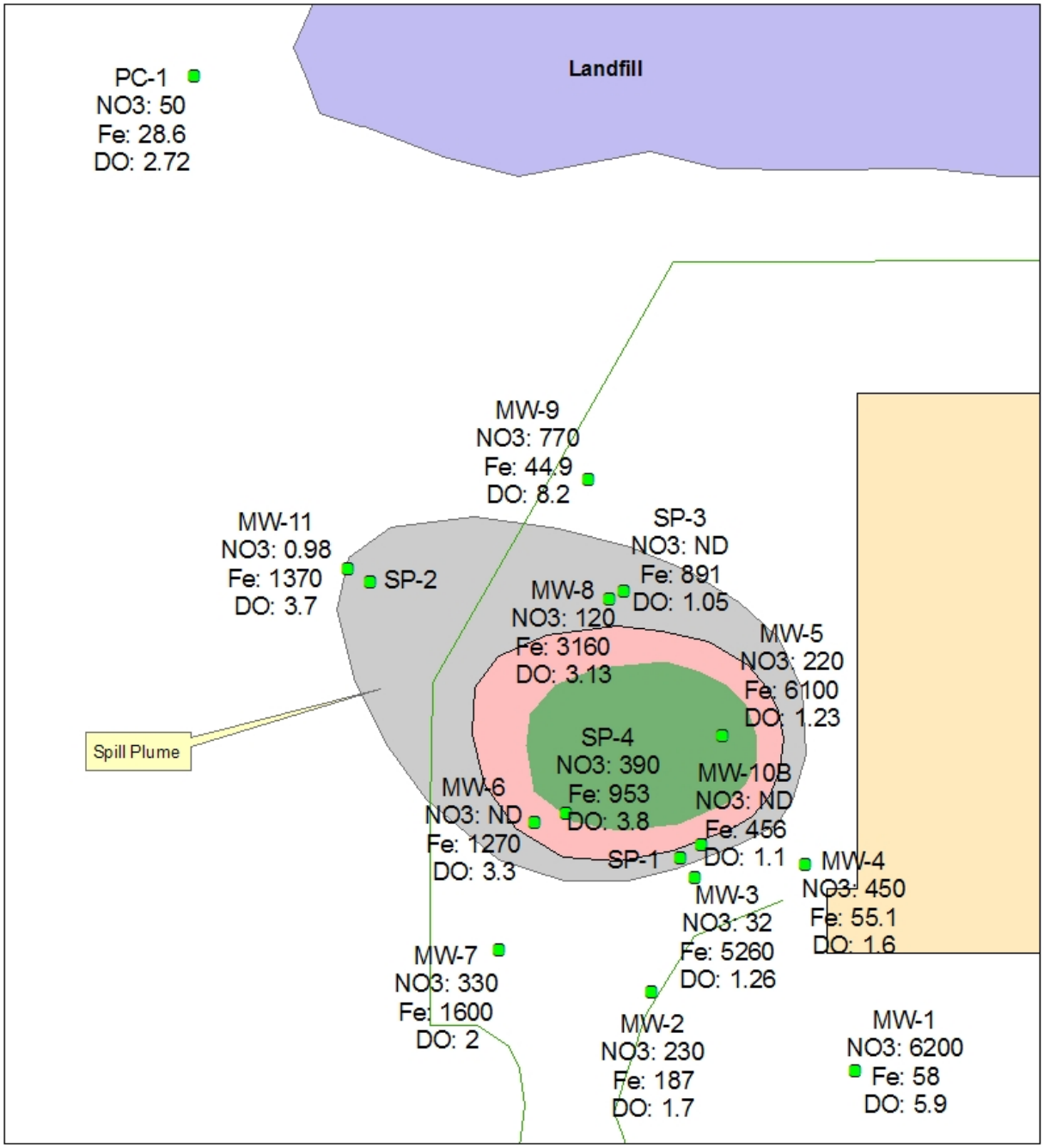

PC-1
N
W
E
S
GP-2
GP-1
B-6
B-5
B-4
B-3
B-2
MW-9
MW-11
SP-2
B-10
SP-3
MW-8
B-1
MW-5
B-11
SP-4
MW-6
B-12
LF-TP-1
LF-TP-2
MW-10B
SP-1
MW-4
MW-3
MW-7
MW-2
MW-1
Former boring
Bdk/Overb. interface well
Water table well
Piezometer
Overburden Sparge well
Former UST location (apprx.)
> 100 ppb BTEX & MTBE (<500ppb)
> 50 ppb BTEX & MTBE
> 25 ppb BTEX & MTBE
NOTE: BTEX stands for benzene, toluene ethyl-benzene, and xylenes. MTBE for methyl-tertiary butyl ether. No MTBE has been detected since September 2003
Plume Contours: Approximate location of equal BTEX & MTBE concentrations in micrograms per liter (ug/l or ppb)
10 5 0 10 Meters
NYSDOT
Environmental Analysis Bureau
M.Roma, September 22, 2006
NYSDOT HARRISON SUBRESIDENCY,
WESTCHESTER CO. Petroleum (BTEX & MTBE)
Contaminant Plume at the Water Table (Oct. 2005/Mar.2006).

FIGURE-3



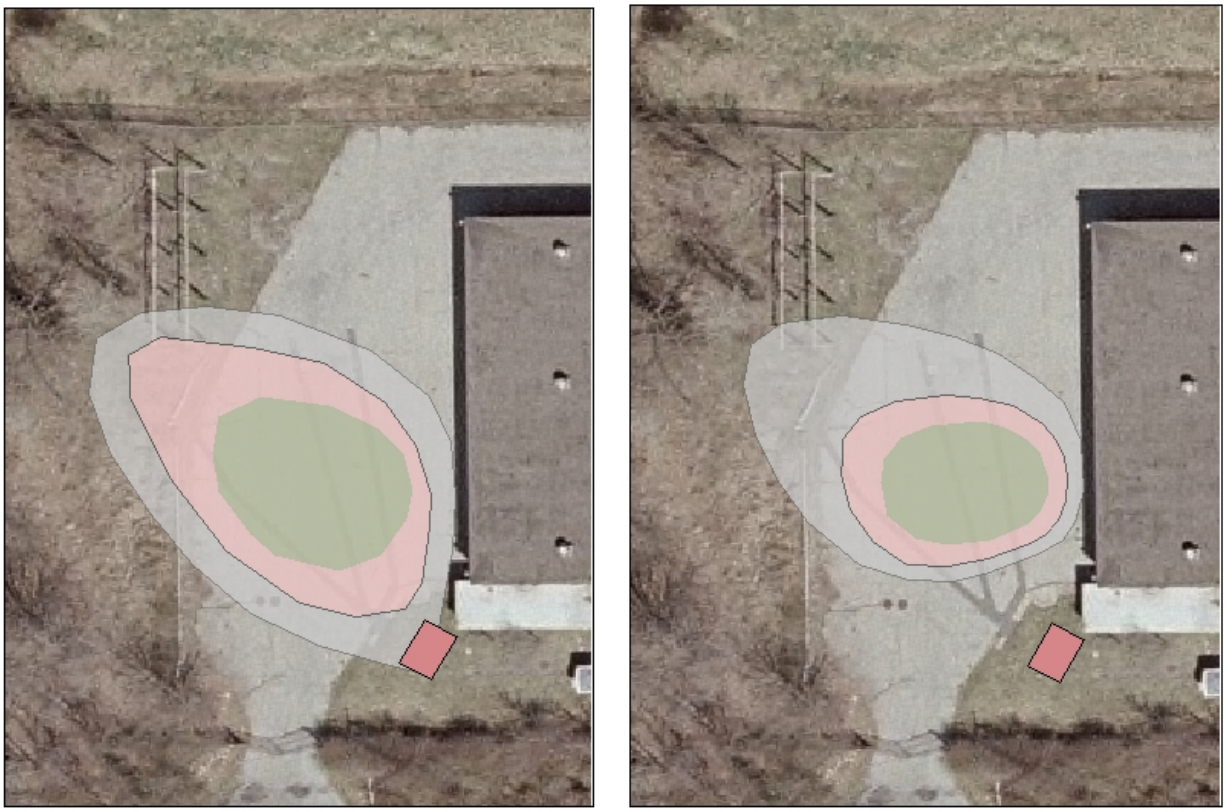
NO3: Nitrate (in ug/l; ppb)
Fe: Dissolved iron (Fe-II; in ug/l)
DO: Dissolved Oxygen (in mg/l; ppm)

N
W E
S

NYSDOT
Environmental Analysis Bureau
M.Roma, September 22, 2006

NYSDOT HARRISON SUBRESIDENCY, WESTCHESTER CO.
Bio-Indicators in groundwater (Oct. 2005/Mar.2006).

FIGURE-4



May 2004

October 2005 / March 2006

10 5 0 10 Meters

N
W E
S

Legend

- > 25 ppb BTEX & MTBE
- > 50 ppb BTEX & MTBE
- > 100 ppb BTEX & MTBE (<500ppb)
- Former UST location (apprx.)

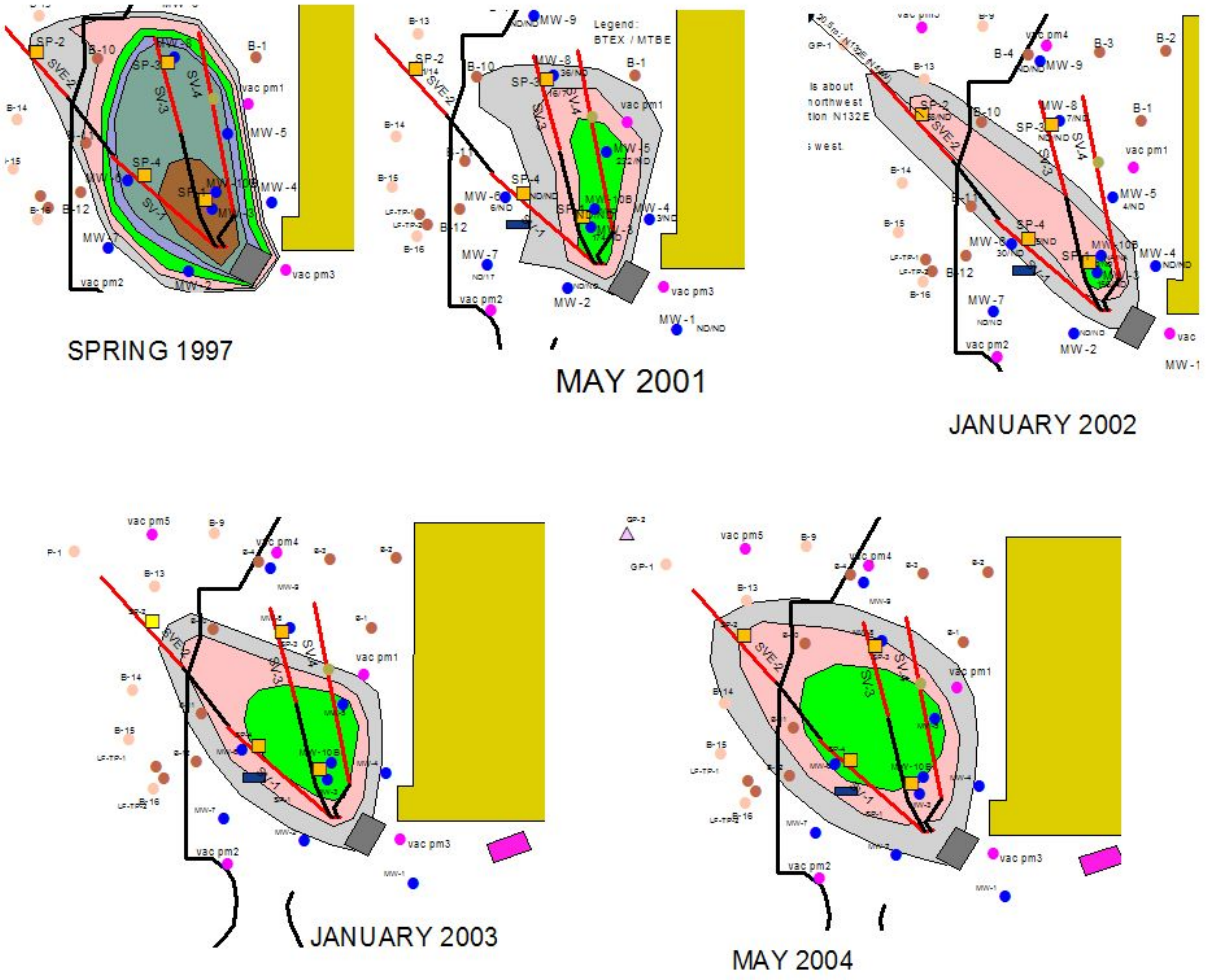
NOTE: BTEX stands for benzene, toluene ethyl-benzene, and xylenes. MTBE for methyl-tertiary butyl ether. No MTBE has been detected since September 2003

Plume Contours: Approximate location of equal BTEX & MTBE concentrations in micrograms per liter (ug/l or ppb)

NYSDOT
Environmental Analysis Bureau
M.Roma, September 22, 2006

NYSDOT HARRISON SUBRESIDENCY, WESTCHESTER CO.
Petroleum (BTEX & MTBE) Contaminant Plume at the Water Table (May 2004 & March 2006).

FIGURE-5



Harrison Subresidency, Westchester County. Petroleum (BTEX & MTBE) Contaminant Plume at the Water Table Wells, Borings, and Soil Vapor Extraction Lines

WELL ID: MW 1	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	ND	54	ND	ND	ND	ND	ND	ND	**50**
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	**-**
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	**-**
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	**-**
m,p-Xylene	ND	ND	-	-	ND	ND	ND	ND	**-**
O-Xylene	ND	ND	-	-	ND	ND	ND	ND	**-**
Xylenes (total)	ND	ND	ND	ND	ND	ND	ND	ND	**-**
TOTAL BTEX	ND	ND	ND	ND	ND	ND	ND	ND	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene			ND	♦	♦	♦	♦	♦	**50**
Napthalene			ND	♦	♦	♦	¨	¨	**25**
Metals (ug/L)									
Chloride	7,000	♦	♦	♦	♦	♦	♦	♦	**250,000**
Sodium	**27,000**	♦	♦	♦	♦	♦	♦	♦	**20,000**
Iron (total)	ND	♦	207	**3,760**	264	♦	♦	**5810**	**300**
Iron (dissolved)	ND	♦	ND	298	35	85.1 B	56.5 B	58 B	**300**
Lead	ND	♦	♦	♦	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	4,100	♦	**11,000**	3,000	7,700	6,200	6,800	6,200	**10,000**
Sulfate (ug/L)	15,000	♦	13,000	17,000	15,000	17,000	14,000	17,000	**250,000**
TOC (ug/L)	4,000	♦	9,000	8,000	ND	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	97,400	♦	59,000	42,000	30,000	16,000	45,000 H	56,000	**N/A**
Dissolved Oxygen (mg/L)	3.6	1.97	6.42	8.3	2.5	3.89	4.2	5.9	**N/A**

WELL ID: MW 2	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	5.5	15	ND	ND	ND	ND	ND	ND	**50**
Benzene	2.1	ND	ND	ND	ND	ND	ND	ND	**-**
Toluene	8.0	2	ND	ND	ND	ND	ND	ND	**-**
Ethylbenzene	2.7	ND	ND	ND	ND	ND	ND	ND	**-**
m,p-Xylene	ND	-	-	-	ND	ND	ND	ND	**-**
O-Xylene	3.8	-	-	-	ND	ND	ND	ND	**-**
Xylenes (total)	3.8	2	ND	ND	ND	ND	ND	ND	**-**
TOTAL BTEX	16.6	4	ND	ND	ND	ND	ND	ND	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene			ND	♦	♦	♦	♦	♦	**50**
Napthalene			ND	♦	♦	♦	♦	♦	**25**
Metals (ug/L)									
Chloride	10,000	♦	♦	♦	♦	♦	♦	♦	**250,000**
Sodium	**22,000**	♦	♦	♦	♦	♦	♦	♦	**20,000**
Iron (total)	♦	♦	**6,330**	**75,600**	**10,400**	♦	♦	**3780**	**300**
Iron (dissolved)	♦	♦	**646**	**4,240**	**2,770**	**5,860**	**6,780**	187	**300**
Lead	♦	♦	♦	♦	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	♦	♦	ND	ND *	81	58	70	230	**10,000**
Sulfate (ug/L)	♦	♦	14,000	150,000	25,000	15,000	15,000	26,000	**250,000**
TOC (ug/L)	♦	♦	17,000	18,000	ND	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	♦	♦	49,000	40,000	23,000	33,000	43,000 H	46,000	**N/A**
Dissolved Oxygen (mg/L)	2.6	3.08	4.23	3.6	1.5	1.07	1.3	1.7	**N/A**

WELL ID: MW 3	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	**50**	21	ND	ND	ND	ND	ND	ND	**50**
Benzene	64	ND	2	3	ND	ND	ND	ND	-
Toluene	21	ND	2	3	ND	ND	ND	ND	-
Ethylbenzene	350	ND	ND	40	82	120	61	ND	-
m,p-Xylene	460	-	-	-	44	56	15	20	-
O-Xylene	65	-	-	-	6	5	1 J	2J	-
Xylenes (total)	525	2	170	110	50	61	16	22	-
TOTAL BTEX	**960.0**	2	**174**	**156**	**132**	**181**	77	22	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene	♦		ND	♦	♦	♦	♦	♦	**50**
Napthalene	**160**		4 J	♦	♦	♦	♦	♦	**25**
Metals (ug/L)									
Chloride	24,000	♦	♦	♦	♦	♦	♦	♦	**250,000**
Sodium	**43,000**	♦	♦	♦	♦	♦	♦	♦	**20,000**
Iron (total)	**18,000**	♦	**8,880**	**35,100**	**14,400**	♦	♦	**20,800**	**300**
Iron (dissolved)	ND	♦	**2,410**	**4,000**	**7,250**	**6,870**	**7,030**	**5,260**	**300**
Lead	8	♦	♦	♦	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	ND	♦	ND	ND *	ND	ND	ND	32	**10,000**
Sulfate (ug/L)	ND	♦	18,000	24,000	27,000	6,500	7,300	14,000	**250,000**
TOC (ug/L)	10,000	♦	27,000	70,000	6,300	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	9,200	♦	♦	♦	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	105,000	♦	48,000	70,000	45,000	84,000	51,000 H	61,000	**N/A**
Dissolved Oxygen (mg/L)	2.1	2.93	1.89	3.0	1.1	1.36	1.04	1.26	**N/A**

WELL ID: MW 4	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	13	3	ND	ND	ND	ND	ND	ND	**50**
Benzene	4.4	ND	ND	ND	ND	ND	ND	ND	-
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	-
Ethylbenzene	22	2	2	ND	16	ND	1 J	2J	-
m,p-Xylene	♦	-	-	-	1	ND	ND	ND	-
O-Xylene	♦	-	-	-	ND	ND	ND	ND	-
Xylenes (total)	13	ND	1	ND	1	ND	ND	ND	-
TOTAL BTEX	39.4	2	3	ND	17	ND	1	2	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene			ND	♦	♦	♦	♦	♦	**50**
Napthalene			ND	♦	♦	♦	♦	♦	**25**
Metals (ug/L)									
Chloride	8,000	♦	♦	♦	♦	♦	♦	♦	**250,000**
Sodium	**22,000**	♦	♦	♦	♦	♦	♦	♦	**20,000**
Iron (total)	♦	♦	**1,360**	**1,330**	**3,480**	♦	♦	**307**	**300**
Iron (dissolved)	♦	♦	**1,010**	ND	**2,740**	61.0 B	**635**	55.1 B	**300**
Lead	♦	♦	♦	♦	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	♦	♦	ND	3,200	ND	2400	530	450	**10,000**
Sulfate (ug/L)	♦	♦	15,000	22,000	21,000	18,000	13,000	13,000	**250,000**
TOC (ug/L)	♦	♦	14,000	13,000	44,000	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	♦	♦	55,000	40,000	55,000	21,000	65,000 H	98,000	**N/A**
Dissolved Oxygen (mg/L)	3.5	2.35	4.29	3.9	0.82	1.42	2	1.6	**N/A**

WELL ID: MW 5	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	**150**	ND	ND	ND	ND	ND	ND	ND	**50**
Benzene	14	ND	1	ND	ND	ND	ND	ND	-
Toluene	32	2	2	ND	2	ND	ND	1J	-
Ethylbenzene	410	ND	ND	ND	150	ND	99	140	-
m,p-Xylene	♦	-	-	-	93	ND	42	46	-
O-Xylene	♦	-	-	-	5	ND	2 J	3J	-
Xylenes (total)	460	43	230	4	98	ND	44	49	-
TOTAL BTEX	**916**	45	**233**	4	**250**	ND	**143**	**190**	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene			10	♦	♦	♦	♦	♦	**50**
Napthalene			ND	♦	♦	♦	♦	♦	**25**
Metals (ug/L)									
Chloride	60,000	♦	♦	♦	♦	♦	♦	♦	**250,000**
Sodium	**32,000**	♦	♦	♦	♦	♦	♦	♦	**20,000**
Iron (total)	♦	♦	**9,630**	**3,910**	**4,500**	♦	♦	**9770**	**300**
Iron (dissolved)	♦	♦	**2,930**	**1,820**	**1,240**	**7,070**	**4,560**	**6,100**	**300**
Lead	♦	♦	♦	♦	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	♦	♦	ND	620	210	ND	ND	220	**10,000**
Sulfate (ug/L)	♦	♦	17,000	12,000	16,000	42,000	8,500	ND	**250,000**
TOC (ug/L)	♦	♦	23,000	14,000	12,000	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	♦	♦	68,000	12,000	28,000	100,000	73,000 H	74,000	**N/A**
Dissolved Oxygen (mg/L)	3.4	3.09	6.12	9.0	1.6	1.19	1.73	1.23	**N/A**

WELL ID: MW 6	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	**73**	20	ND	ND	ND	ND	ND	ND	**50**
Benzene	7.9	ND	ND	ND	ND	ND	ND	ND	-
Toluene	7	ND	ND	ND	ND	ND	ND	ND	-
Ethylbenzene	98	ND	ND	3	61	ND	88	16	-
m,p-Xylene	♦	-	-	-	30	14	37	27	-
O-Xylene	♦	-	-	-	2	1	3 J	4J	-
Xylenes (total)	112	21	6	27	33	16	40	31	-
TOTAL BTEX	**224.9**	21	6	30	94	16	**128**	47	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene			ND	♦	♦	♦	♦	♦	**50**
Napthalene			ND	♦	♦	♦	♦	♦	**25**
Metals (ug/L)									
Chloride	40,000	♦	♦	♦	♦	♦	♦	♦	**250,000**
Sodium	**33,000**	♦	♦	♦	♦	♦	♦	♦	**20,000**
Iron (total)	♦	♦	**1,720**	**2,410**	**2,750**	♦	♦	**4610**	**300**
Iron (dissolved)	♦	♦	**475**	**2,060**	**874**	**1,080**	**1,620**	**1,270**	**300**
Lead	♦	♦	♦	♦	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	♦	♦	ND	ND *	ND	ND	ND	ND	**10,000**
Sulfate (ug/L)	♦	♦	17,000	19,000	22,000	10,000	7,400	7,200	**250,000**
TOC (ug/L)	♦	♦	17,000	25,000	ND	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	♦	♦	60,000	32,000	27,000	33,000	48,000	45,000	**N/A**
Dissolved Oxygen (mg/L)	3.1	6.05	4.1	3.5	0.89	1.41	2.9	3.3	**N/A**

WELL ID: MW 7	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	16	38	17	ND	ND	ND	ND	ND	**50**
Benzene	3.4	ND	ND	ND	ND	ND	ND	ND	**-**
Toluene	4	ND	ND	ND	ND	ND	ND	ND	**-**
Ethylbenzene	5.7	ND	ND	ND	ND	ND	ND	ND	**-**
m,p-Xylene	♦	-	-	-	ND	ND	ND	ND	**-**
O-Xylene	♦	-	-	-	ND	ND	ND	ND	**-**
Xylenes (total)	4.8	ND	ND	ND	ND	ND	ND	ND	**-**
TOTAL BTEX	17.9	ND	ND	ND	ND	ND	ND	ND	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene			ND	♦	♦	♦	♦	♦	**50**
Napthalene			ND	♦	♦	♦	♦	♦	**25**
Metals (ug/L)									
Chloride	40,000	♦	♦	♦	♦	♦	♦	♦	**250,000**
Sodium	**35,000**	♦	♦	♦	♦	♦	♦	♦	**20,000**
Iron (total)	♦	♦	**2,700**	**30,000**	**3,080**	♦	♦	**3960**	**300**
Iron (dissolved)	♦	♦	**1,880**	**4,020**	**2,380**	**2,190**	**2,640**	**1,600**	**300**
Lead	♦	♦	♦	♦	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	♦	♦	ND	ND*	150	ND	160	330	**10,000**
Sulfate (ug/L)	♦	♦	15,000	38,000	20,000	8,200	13,000	11,000	**250,000**
TOC (ug/L)	♦	♦	16,000	21,000	11,000	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	♦	♦	78,000	35,000	37,000	27,000	42,000	63,000	**N/A**
Dissolved Oxygen (mg/L)	3.2	3.12	4.43	3.4	1.0	2.2	1.8	2.0	**N/A**

WELL ID: MW 8	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	**68**	6	ND	ND	ND	ND	ND	ND	**50**
Benzene	110	ND	ND	ND	ND	ND	ND	ND	**-**
Toluene	26	ND	2	ND	ND	ND	2 J	ND	**-**
Ethylbenzene	60	ND	ND	ND	2	1	41	2J	**-**
m,p-Xylene	160	-	-	-	1	ND	12	7	**-**
O-Xylene	40	-	-	-	ND	ND	2 J	2J	**-**
Xylenes (total)	200	ND	34	7	1	ND	14	9	**-**
TOTAL BTEX	**396**	ND	36	7	3	1	57	11	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene	♦		ND	♦	♦	♦	♦	♦	**50**
Napthalene	**34**		ND	♦	♦	♦	♦	♦	**25**
Metals (ug/L)									
Chloride	5,000	♦	♦	♦	♦	♦	♦	♦	**250,000**
Sodium	**63,000**	♦	♦	♦	♦	♦	♦	♦	**20,000**
Iron (total)	**8,600**	♦	**545**	**4,370**	**3,320**	♦	♦	**7160**	**300**
Iron (dissolved)	230	♦	ND	48.7 B	ND	**1,890**	**3,310**	**3,160**	**300**
Lead	ND	♦	♦	♦	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	33	♦	ND	ND *	190	ND	ND	120	**10,000**
Sulfate (ug/L)	ND	♦	31,000	ND	ND	ND	3,800	ND	**250,000**
TOC (ug/L)	12,000	♦	21,000	25,000	ND	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	7,600	♦	♦	♦	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	264,000	♦	37,000	22,000	19,000	30,000	56,000	55,000	**N/A**
Dissolved Oxygen (mg/L)	1.5	6.3	4.6	4.5	0.89	0.88	2.18	3.13	**N/A**

WELL ID: MW 9	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	ND	ND	ND	ND	ND	ND	ND	ND	**50**
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	**-**
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	**-**
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	**-**
m,p-Xylene	♦	-	-	-	ND	ND	ND	ND	**-**
O-Xylene	♦	-	-	-	ND	ND	ND	ND	**-**
Xylenes (total)	ND	ND	ND	ND	ND	ND	ND	ND	**-**
TOTAL BTEX	ND	ND	ND	ND	ND	ND	ND	ND	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene			2 J	♦	♦	♦	♦	♦	**50**
Napthalene			ND	♦	♦	♦	♦	♦	**25**
Metals (ug/L)									
Chloride	**260,000**	♦	♦	♦	♦	♦	♦	♦	**250,000**
Sodium	**160,000**	♦	♦	♦	♦	♦	♦	♦	**20,000**
Iron (total)	♦	♦	**4,570**	**7,870**	**12,600**	♦	♦	232	**300**
Iron (dissolved)	♦	♦	ND	ND	ND	32.2 B	ND	44.9 B	**300**
Lead	♦	♦	♦	♦	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	♦	♦	ND	690	340	730	870	770	**10,000**
Sulfate (ug/L)	♦	♦	21,000	23,000	19,000	12,000	12,000	17,000	**250,000**
TOC (ug/L)	♦	♦	18,000	15,000	9,000	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	♦	♦	ND	ND *	ND	ND	ND	ND	**N/A**
Dissolved Oxygen (mg/L)	3.3	7.5	5.49	12.3	6.30	3.65	7.60	8.20	**N/A**

WELL ID: MW 11								(Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE								ND	**50**
Benzene								ND	**-**
Toluene								1 J	**-**
Ethylbenzene								10	**-**
m,p-Xylene								7	**-**
O-Xylene								ND	**-**
Xylenes (total)								7	**-**
TOTAL BTEX								18	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene								♦	**50**
Napthalene								♦	**25**
Metals (ug/L)									
Chloride								♦	**250,000**
Sodium								♦	**20,000**
Iron (total)								**174,000**	**300**
Iron (dissolved)								**1370**	**300**
Lead								♦	**25**
Other									
Nitrogen, Nitrate (ug/L)								0.98	**10,000**
Sulfate (ug/L)								57,000	**250,000**
TOC (ug/L)								♦	**N/A**
Petroleum Hydrocarbons (ug/L)								♦	**N/A**
Carbon Dioxide (ug/L)								230,000	**N/A**
Dissolved Oxygen (mg/L)								3.70	**N/A**

WELL ID: SP 1	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	3.2	31	ND	ND	ND	-	-	-	**50**
Benzene	1.4	ND	ND	ND	ND	-	-	-	**-**
Toluene	3.7	ND	ND	ND	60	-	-	-	**-**
Ethylbenzene	4.0	ND	ND	2	22	-	-	-	**-**
m,p-Xylene	8.1	-	-	-	100	-	-	-	**-**
O-Xylene	2.9	-	-	-	42	-	-	-	**-**
Xylenes (total)	11.0	ND	ND	1	140	-	-	-	**-**
TOTAL BTEX	20.1	ND	ND	3	**222**	-	-	-	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene			ND	♦	♦	-	-	-	**50**
Napthalene			ND	♦	♦	-	-	-	**25**
Metals (ug/L)									
Chloride	16,000	♦	♦	♦	♦	-	-	-	**250,000**
Sodium	**45,000**	♦	♦	♦	♦	-	-	-	**20,000**
Iron (total)	♦	♦	**3,940**	**3,720**	NA	-	-	-	**300**
Iron (dissolved)	♦	♦	52.1 B	68.0 B	NA	-	-	-	**300**
Lead	♦	♦	♦	♦	♦	-	-	-	**25**
Other									
Nitrogen, Nitrate (ug/L)	♦	♦	ND*	160	NA	-	-	-	**10,000**
Sulfate (ug/L)	♦	♦	48,000	46,000	NA	-	-	-	**250,000**
TOC (ug/L)	♦	♦	25,000	17,000	ND	-	-	-	**N/A**
Petroleum Hydrocarbons (ug/L)	♦	♦	♦	♦	NA	-	-	-	**N/A**
Carbon Dioxide (ug/L)	♦	♦	18,000	19,000	NA	-	-	-	**N/A**
Dissolved Oxygen (mg/L)	4.6	9.66	4.6	2.3	NA	-	-	-	**N/A**

WELL ID: SP 1B	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	4.9	♦	ND	NA	ND	ND	ND	ND	**50**
Benzene	2.1	♦	ND	NA	ND	ND	ND	ND	**-**
Toluene	ND	♦	ND	NA	ND	ND	ND	ND	**-**
Ethylbenzene	ND	♦	1	NA	9	23	8	ND	**-**
m,p-Xylene	3.5	♦	-	NA	2	15	2 J	ND	**-**
O-Xylene	5.6	♦	-	NA	ND	ND	ND	ND	**-**
Xylenes (total)	9.1	♦	ND	NA	2	15	2 J	ND	**-**
TOTAL BTEX	11.2	♦	1	NA	11	38	10	ND	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene			ND	NA	♦	♦	♦	-	**50**
Napthalene			ND	NA	♦	♦	♦	-	**25**
								-	
Metals (ug/L)								-	
Chloride	34,000	♦	♦	NA	♦	♦	♦	-	**250,000**
Sodium	**27,000**	♦	♦	NA	♦	♦	♦	-	**20,000**
Iron (total)	♦	♦	**1,080**	NA	**1,190**	♦	♦	**1460**	**300**
Iron (dissolved)	♦	♦	32.8 B	NA	**462**	**644**	**592**	**456**	**300**
Lead	♦	♦	♦	NA	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	♦	♦	ND*	NA	ND	ND	120	ND	**10,000**
Sulfate (ug/L)	♦	♦	27,000	NA	19,000	9,000	12,000	12,000	**250,000**
TOC (ug/L)	♦	♦	14,000	NA	9,400	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	♦	♦	♦	NA	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	♦	♦	39,000	NA	39,000	25,000	32,000	25,000	**N/A**
Dissolved Oxygen (mg/L)	4.7		4.91	NA	2.0	2.9	2.4	1.1	**N/A**

WELL ID: SP 2	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	18	♦	14	ND	ND	ND	ND	♦	**50**
Benzene	19	♦	ND	7	7	5	2 J	♦	**-**
Toluene	25	♦	ND	6	2	2	4 J	♦	**-**
Ethylbenzene	110	♦	1	42	ND	5	42	♦	**-**
m,p-Xylene	52	♦	-	-	4	1	13	♦	**-**
O-Xylene	11	♦	-	-	2	ND	ND	♦	**-**
Xylenes (total)	63	♦	ND	3	6	1	13	♦	**-**
TOTAL BTEX	**217.0**	♦	**1**	58	15	13	61	♦	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene			ND	♦	♦	♦	♦	♦	**50**
Napthalene			ND	♦	♦	♦	♦	♦	**25**
Metals (ug/L)									
Chloride	36,000	♦	♦	♦	♦	♦	♦	♦	**250,000**
Sodium	**75,000**	♦	♦	♦	♦	♦	♦	♦	**20,000**
Iron (total)	♦	♦	**9,750**	**7,590**	**2,700**	♦	♦	♦	**300**
Iron (dissolved)	♦	♦	ND	126 B	ND	166 B	**2,120**	♦	**300**
Lead	♦	♦	♦	♦	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	♦	♦	ND*	100	ND	37	ND	♦	**10,000**
Sulfate (ug/L)	♦	♦	26,000	64,000	18,000	7,900	7,200	♦	**250,000**
TOC (ug/L)	♦	♦	17,000	29,000	14,000	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	♦	♦	36,000	42,000	38,000	37,000	58,000	♦	**N/A**
Dissolved Oxygen (mg/L)	2.5	♦	3.1	4.0	1.0	1.47	1.7	♦	**N/A**

WELL ID: SP 3	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	38	♦	7	ND	ND	ND	ND	ND	**50**
Benzene	110	♦	ND	ND	ND	ND	ND	ND	**-**
Toluene	39	♦	1	ND	ND	ND	ND	ND	**-**
Ethylbenzene	200	♦	ND	ND	ND	ND	ND	ND	**-**
m,p-Xylene	180	♦	-	-	ND	ND	ND	ND	**-**
O-Xylene	57	♦	-	-	ND	ND	ND	ND	**-**
Xylenes (total)	237	♦	15	ND	ND	ND	ND	ND	**-**
TOTAL BTEX	**586.0**	♦	16	ND	ND	ND	ND	ND	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene			ND	♦	♦	♦	♦	♦	**50**
Napthalene			ND	♦	♦	♦	♦	♦	**25**
Metals (ug/L)									
Chloride	6,000	♦	♦	♦	♦	♦	♦	♦	**250,000**
Sodium	**38,000**	♦	♦	♦	♦	♦	♦	♦	**20,000**
Iron (total)	♦	♦	**2,970**	**1,060**	133 B	♦	♦	**3380**	**300**
Iron (dissolved)	♦	♦	ND	ND	ND	116 B	**384**	**891**	**300**
Lead	♦	♦	♦	♦	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	♦	♦	ND*	100	ND	25	66	ND	**10,000**
Sulfate (ug/L)	♦	♦	56,000	16,000	19,000	5,900	22,000	ND	**250,000**
TOC (ug/L)	♦	♦	11,000	18,000	41,000	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	♦	♦	11,000	11,000	20,000	19,000	26,000	57,000	**N/A**
Dissolved Oxygen (mg/L)	3.4	♦	4.21	5.7	1.1	1.7	2.2	1.05	**N/A**

WELL ID: SP 4	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	24	♦	ND	ND	ND	ND	ND	ND	**50**
Benzene	24	♦	ND	ND	ND	ND	ND	ND	**-**
Toluene	3.8	♦	ND	ND	ND	ND	ND	ND	**-**
Ethylbenzene	35	♦	ND	3	26	ND	ND	ND	**-**
m,p-Xylene	9.5	♦	-	-	8	ND	ND	ND	**-**
O-Xylene	2.4	♦	-	-	ND	ND	ND	ND	**-**
Xylenes (total)	11.9	♦	ND	2	8	ND	ND	ND	**-**
TOTAL BTEX	**74.7**	♦	ND	5	34	ND	ND	ND	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene		♦	ND	♦	♦	♦	♦	♦	**50**
Napthalene		♦	ND	♦	♦	♦	♦	♦	**25**
Metals (ug/L)									
Chloride	16,000	♦	♦	♦	♦	♦	♦	♦	**250,000**
Sodium	**24,000**	♦	♦	♦	♦	♦	♦	♦	**20,000**
Iron (total)	♦	♦	**3,790**	**5,350**	**2,490**	♦	♦	**10,400**	**300**
Iron (dissolved)	♦	♦	**602**	**1,810**	**1,810**	**2,460**	44.5	**953**	**300**
Lead	♦	♦	♦	♦	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	♦	♦	ND*	ND*	ND	ND	150	200	**10,000**
Sulfate (ug/L)	♦	♦	34,000	22,000	37,000	26,000	8,400	24,000	**250,000**
TOC (ug/L)	♦	♦	14,000	24,000	11,000	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	♦	♦	39,000	24,000	31,000	26,000	23,000	39,000	**N/A**
Dissolved Oxygen (mg/L)	4.2	♦	6.89	4.2	2.4	6.2	3.4	3.8	**N/A**

WELL ID: GP 2	BASELINE (May 2000)	(Jan 2001)	(May 2001)	(Jan 2002)	(Jan 2003)	(Sept 2003)	(May 2004)	(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	♦	♦	♦	♦	3	ND	ND	♦	**50**
Benzene	♦	♦	♦	♦	ND	ND	ND	♦	**-**
Toluene	♦	♦	♦	♦	ND	ND	ND	♦	**-**
Ethylbenzene	♦	♦	♦	♦	ND	ND	ND	♦	**-**
m,p-Xylene	♦	♦	♦	♦	ND	ND	ND	♦	**-**
O-Xylene	♦	♦	♦	♦	ND	ND	ND	♦	**-**
Xylenes (total)	♦	♦	♦	♦	ND	ND	ND	♦	**-**
TOTAL BTEX	♦	♦	♦	♦	3	ND	ND	♦	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene	♦	♦	♦	♦	♦	♦	♦	♦	**50**
Napthalene	♦	♦	♦	♦	♦	♦	♦	♦	**25**
Metals (ug/L)									
Chloride	♦	♦	♦	♦	♦	♦	♦	♦	**250,000**
Sodium	♦	♦	♦	♦	♦	♦	♦	♦	**20,000**
Iron (total)	♦	♦	♦	♦	♦	♦	♦	♦	**300**
Iron (dissolved)	♦	♦	♦	♦	♦	♦	♦	♦	**300**
Lead	♦	♦	♦	♦	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**10,000**
Sulfate (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**250,000**
TOC (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Dissolved Oxygen (mg/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**

WELL ID: PC-1								(Oct 2005)/ (Mar 2006)	TARGET EFFLUENT CRITERIA
Volatile Organics (ug/L)									
MTBE	♦	♦	♦	♦	♦	♦	♦	ND	**50**
Benzene	♦	♦	♦	♦	♦	♦	♦	ND	**-**
Toluene	♦	♦	♦	♦	♦	♦	♦	ND	**-**
Ethylbenzene	♦	♦	♦	♦	♦	♦	♦	ND	**-**
m,p-Xylene	♦	♦	♦	♦	♦	♦	♦	ND	**-**
O-Xylene	♦	♦	♦	♦	♦	♦	♦	ND	**-**
Xylenes (total)	♦	♦	♦	♦	♦	♦	♦	ND	**-**
TOTAL BTEX	♦	♦	♦	♦	♦	♦	♦	ND	**100**
Semi-volatile Org.(ug/L)									
2-Methylnaphthalene	♦	♦	♦	♦	♦	♦	♦	♦	**50**
Napthalene	♦	♦	♦	♦	♦	♦	♦	♦	**25**
Metals (ug/L)									
Chloride	♦	♦	♦	♦	♦	♦	♦	♦	**250,000**
Sodium	♦	♦	♦	♦	♦	♦	♦	♦	**20,000**
Iron (total)	♦	♦	♦	♦	♦	♦	♦	**599**	**300**
Iron (dissolved)	♦	♦	♦	♦	♦	♦	♦	28.6 B	**300**
Lead	♦	♦	♦	♦	♦	♦	♦	♦	**25**
Other									
Nitrogen, Nitrate (ug/L)	♦	♦	♦	♦	♦	♦	♦	50	**10,000**
Sulfate (ug/L)	♦	♦	♦	♦	♦	♦	♦	5000	**250,000**
TOC (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Petroleum Hydrocarbons (ug/L)	♦	♦	♦	♦	♦	♦	♦	♦	**N/A**
Carbon Dioxide (ug/L)	♦	♦	♦	♦	♦	♦	♦	10,000	**N/A**
Dissolved Oxygen (mg/L)	♦	♦	♦	♦	♦	♦	♦	2.72	**N/A**

Notes:
ND = Non Detect
B = Concentration below the reporting limit equal to or above the detection limit.
J = Concentration below the reporting limit.
H = Analyzed outside of the holding time.

ATTACHMENT-B

LMS Well Sampling Log

Well ID No.: MW-1

Well Casing Type: 4" PVC
Well Depth:** 8.55'
Screened Interval: N/A
Well Elevation:** N/A
Ground Elevation: N/A
Well Condition:
Weather Conditions:

Start SWL: 1.38
Water Column Ht.: 7.17
Well Casing Volume (gallons): 19.1
SWL During Sampling:
Sample Time: 1450
Sample Method: Bailer
Sample Analyses:

Project: Harrison NYDOT Spill Site
Date: 10/27/2005
Crew: Mike Pantliano/Angela Martello/Melissa LaMacchia
Purge Method: Bailer
Meters Used:
PID Head Space (ppm):

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments
1116	0		5.89	0.129	26	7.51	13.8	0.06	-33.8		
1129	6		5.77	0.155	55	5.75	13.4	0.07	-39.3		
1141	13		5.66	0.189	133	4.9	14.0	0.14	-72.6		
1153	19		5.71	0.201	126	4.6	14.4	0.09	-71.1		
1450	s		5.48	0.172	23	6.62	13.4	0.08	55.4		

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

LMS Well Sampling Log

Well ID No.: MW-2

Well Casing Type: 4" PVC
Well Depth:** 10.82'
Screened Interval: N/A
Well Elevation:** N/A
Ground Elevation: N/A
Well Condition:
Weather Conditions:

Start SWL: 2.80
Water Column Ht.: 8.02
Well Casing Volume (gallons): 7
SWL During Sampling:
Sample Time: 1420
Sample Method: Bailer
Sample Analyses:

Project: Harrison NYDOT Spill Site
Date: 10/27/2005
Crew: Mike Pantliano/Angela Martello/Melissa LaMacchia
Purge Method: Bailer
Meters Used:
PID Head Space (ppm):

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments
	0										
	7										
	14		6.40	0.491	>1000	2.3	16.0	0.24	-76		
1046	21		6.45	0.477	249	1.37	16.0	0.23	-86		
1420	s		6.29	0.46	50	1.34	16.0	0.22	-32		

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

LMS Well Sampling Log

Well ID No.: MW-3

Well Casing Type: 4" PVC
Well Depth:** 10.72'
Screened Interval: N/A
Well Elevation:** N/A
Ground Elevation: N/A
Well Condition:
Weather Conditions:

Start SWL: 3.07
Water Column Ht.: 6.75
Well Casing Volume (gallons): 7
SWL During Sampling:
Sample Time: 1430
Sample Method: Bailer
Sample Analyses:

Project: Harrison NYDOT Spill Site
Date: 10/27/2005
Crew: Mike Pantliano/Angela Martello/Melissa LaMacchia
Purge Method: Bailer
Meters Used:
PID Head Space (ppm):

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments
1006	0		6.15	0.651	90	1.74	17.4	0.32	-112		
1017	7		5.79	0.634	>1000	0.79	18.1	0.64	-105		
1029	14		6.15	0.622	>1000	0.92	18.0	0.3	-113		
1044	21		6.29	0.612	>1000	1.42	17.4	0.3	-109		
1430	s		6.36	0.461	33	1.42	15.5	0.22	-47		

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

LMS Well Sampling Log

Well ID No.: MW-4

Well Casing Type: 4" PVC
Well Depth:** 11.9'
Screened Interval: N/A
Well Elevation:** N/A
Ground Elevation: N/A
Well Condition:
Weather Conditions:

Start SWL: 3.42
Water Column Ht.: 8.48
Well Casing Volume (gallons): 23
SWL During Sampling:
Sample Time: 1445
Sample Method: Bailer
Sample Analyses:

Project: Harrison NYDOT Spill Site
Date: 10/27/2005
Crew: Mike Pantliano/Angela Martello/Melissa LaMacchia
Purge Method: Bailer
Meters Used:
PID Head Space (ppm):

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments
1114	0		6.05	0.477	68	1.41	16.9	0.23	-16.2		
1124	7		6.23	0.504	9	2.55	17.0	0.25	7.7		
1136	15		6.04	0.47	5	1	17.5	0.23	62		
1147	23		6.04	0.417	3	1.51	17.5	0.2	83		
1445	s		6.07	0.387	13	1.56	16.9	0.19	16.4		

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

LMS Well Sampling Log

Well ID No.: MW-5

Well Casing Type: 4" PVC
Well Depth:** 10.95'
Screened Interval: N/A
Well Elevation:** N/A
Ground Elevation: N/A
Well Condition:
Weather Conditions:

Start SWL: 4.00
Water Column Ht.: 6.95
Well Casing Volume (gallons): 19
SWL During Sampling:
Sample Time: 1500
Sample Method: Bailer
Sample Analyses:

Project: Harrison NYDOT Spill Site
Date: 10/27/2005
Crew: Mike Pantliano/Angela Martello/Melissa LaMacchia
Purge Method: Bailer
Meters Used:
PID Head Space (ppm):

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments
1206	0		5.75	0.721	11	0.91	18.5	0.35	-112		
1217	6		6.09	0.708	5	1.07	19.2	0.35	-152		
1229	13		6.20	0.642	5	1.52	19.1	0.31	-139		
1242	19		6.25	0.612	20	1.42	18.6	0.3	-127		
1500	s		5.85	0.558	12	1.24	18.5	0.27	-87		

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

LMS Well Sampling Log

Well ID No.: MW-6

Well Casing Type: 4" PVC
Well Depth:** 14.65'
Screened Interval: N/A
Well Elevation:** N/A
Ground Elevation: N/A
Well Condition:
Weather Conditions:

Start SWL: 4.20
Water Column Ht.: 10.45
Well Casing Volume (gallons): 28.10
SWL During Sampling:
Sample Time: 1415
Sample Method: Bailer
Sample Analyses:

Project: Harrison NYDOT Spill Site
Date: 10/27/2005
Crew: Mike Pantliano/Angela Martello/Melissa LaMacchia
Purge Method: Bailer
Meters Used:
PID Head Space (ppm):

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments
0849	0		6.51	0.474	20	12.1	17.2	0.23	-20		
0856	5		6.24	0.528	11	1.84	17.6	0.26	-144		Slight petro odor
904	14		6.08	0.66	11	1.55	17.87	0.32	-133		Slight petro odor
0919	19		6.22	0.632	40	1.74	17.3	0.31	-121		Slight petro odor
0924	24		6.39	0.423	24	1.67	16.4	0.2	-83		Slight petro odor
0933	28		6.23	0.563	68	2.33	17.5	0.27	93		Slight petro odor
1415	s		6.26	0.58	51	1.57	17.3	0.28	-46		

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

LMS Well Sampling Log

Well ID No.: MW-7

Well Casing Type: 4" PVC
Well Depth:** 14.6'
Screened Interval: N/A
Well Elevation:** N/A
Ground Elevation: N/A
Well Condition:
Weather Conditions:

Start SWL: 2.54
Water Column Ht.: 12.06
Well Casing Volume (gallons): 32.4
SWL During Sampling: 1405
Sample Time: 1405
Sample Method: Bailer
Sample Analyses:

Project: Harrison NYDOT Spill Site
Date: 10/27/2005
Crew: Mike Pantliano/Angela Martello/Melissa LaMacchia
Purge Method: Bailer
Meters Used:
PID Head Space (ppm):

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments
0846	0		6.59	0.403	11	2.12	15.4	0.2	244		
0852	5		6.27	0.437	65	1.37	16.7	0.21	158		Petro odor
0902	12		0.43	0.458	48	2.29	16.3	0.22	14		Petro odor
0911	20		6.31	0.413	20	2.75	16.4	0.2	-102		Petro odor
0922	26		6.31	0.425	54	1.31	16.9	0.2	-89		Petro odor
0929	32		6.27	0.422	26	1.7	16.2	0.2	65		Petro odor
1405	s		6.73	0.424		2.28	16.4	0.2	-36		

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

LMS Well Sampling Log

Well ID No.: MW-8

Well Casing Type: 4" PVC
Well Depth:** 14.5'
Screened Interval: N/A
Well Elevation:** N/A
Ground Elevation: N/A
Well Condition:
Weather Conditions:

Start SWL: 5.99
Water Column Ht.: 8.51
Well Casing Volume (gallons): 22.9
SWL During Sampling:
Sample Time: 1510
Sample Method: Bailer
Sample Analyses:

Project: Harrison NYDOT Spill Site
Date: 10/27/2005
Crew: Mike Pantliano/Angela Martello/Melissa LaMacchia
Purge Method: Bailer
Meters Used:
PID Head Space (ppm):

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments
1211	0		6.29	0.512	88	9.7	19.1	0.25	-155		
1225	8		6.30	0.584	136	1.36	18.5	0.29	-152.4		
1237	15		6.32	0.618	20	1.58	19.0	0.3	-134		
1253	23		6.34	0.548	478	1.61	17.8	0.27	-123.6		
1510	s		6.40	0.498	85	1.44	18.8	0.24	-114.6		

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

LMS Well Sampling Log

Well ID No.: MW-9

Well Casing Type: 2" PVC
Well Depth:** 13.86'
Screened Interval: N/A
Well Elevation:** N/A
Ground Elevation: N/A
Well Condition:
Weather Conditions:

Start SWL: 3.72
Water Column Ht.: 10.14
Well Casing Volume (gallons): 17
SWL During Sampling:
Sample Time: 1515
Sample Method: Bailer
Sample Analyses:

Project: Harrison NYDOT Spill Site
Date: 10/27/2005
Crew: Mike Pantliano/Angela Martello/Melissa LaMacchia
Purge Method: Bailer
Meters Used:
PID Head Space (ppm):

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments
1412	0		7.05	0.836	130	11.17	17.5	0.41	-45.3		
1418	3	dry									
1515	s		6.99	1.283	30	5.3	17.6	0.64	-55.4		

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

LMS Well Sampling Log

Well ID No.: PC-1

Well Casing Type: 2" PVC Pezometer
Well Depth:** 16.93'
Screened Interval: N/A
Well Elevation:** N/A
Ground Elevation: N/A
Well Condition:
Weather Conditions:

Start SWL: 3.90
Water Column Ht.: 13.1
Well Casing Volume (gallons): 7
SWL During Sampling:
Sample Time: 1045
Sample Method: Bailer
Sample Analyses:

Project: Harrison NYDOT Spill Site
Date: 10/28/2005
Crew: Mike Pantliano/Angela Martello/Vincent Cangialosi
Purge Method: Bailer
Meters Used:
PID Head Space (ppm):

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments
	0		6.95	0.6		3.55	9.8	0.29	207		
	7		6.75	0.596	9.3	2.13	9.9	0.29	201		
	14		6.67	0.593	44	2.21	10.4	0.29	199		
	20		6.69	0.589	45	2.99	10.6	0.29	187		

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

LMS Well Sampling Log

Well ID No.: SP-1B (MW-10B)

Well Casing Type: 1.5" PVC
Well Depth:** 26.68'
Screened Interval: N/A
Well Elevation:** N/A
Ground Elevation: N/A
Well Condition:
Weather Conditions:

Start SWL:
Water Column Ht.:
Well Casing Volume (gallons):
SWL During Sampling:
Sample Time: 1300
Sample Method: Peri Pump
Sample Analyses:

Project: Harrison NYDOT Spill Site
Date: 10/27/2005
Crew: Mike Pantliano/Angela Martello/Melissa LaMacchia
Purge Method: Peri Pump
Meters Used:
PID Head Space (ppm):

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments
1218	0		6.50	0.501	32	0.95	15.2	0.24	-154.5		
1241	5		6.51	0.481	1.31	1.3	15.2	0.23	-103		

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

LMS Well Sampling Log

Well ID No.: SP-2

Well Casing Type:	1.5" PVC	**Start SWL:**		**Project:**	
Well Depth:**	18.42'	**Water Column Ht.:**		**Date:**	
Screened Interval:	N/A	**Well Casing Volume (gallons):**		**Crew:**	
Well Elevation:**	N/A	**SWL During Sampling:**		**Purge Method:**	
Ground Elevation:	N/A	**Sample Time:**		**Meters Used:**	
Well Condition:		**Sample Method:**	Peri Pump	**PID Head Space (ppm):**	
Weather Conditions:		**Sample Analyses:**			

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

LMS Well Sampling Log

Well ID No.: SP-3

Well Casing Type: 1.5" PVC
Well Depth:** 19.3'
Screened Interval: N/A
Well Elevation:** N/A
Ground Elevation: N/A
Well Condition:
Weather Conditions:

Start SWL:
Water Column Ht.:
Well Casing Volume (gallons):
SWL During Sampling:
Sample Time: 1030
Sample Method: Peri Pump
Sample Analyses:

Project: Harrison NYDOT Spill Site
Date: 10/27/2005
Crew: Mike Pantliano/Angela Martello/Melissa LaMacchia
Purge Method: Peri Pump
Meters Used:
PID Head Space (ppm):

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments
0918			6.23	0.476	33	1.05	16.8	0.23	-129		Dry at 1 gal

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

LMS Well Sampling Log

Well ID No.: SP-4

Well Casing Type: 1.5" PVC
Well Depth:** 21'
Screened Interval: N/A
Well Elevation:** N/A
Ground Elevation: N/A
Well Condition:
Weather Conditions:

Start SWL: 3.42
Water Column Ht.: 17.58
Well Casing Volume (gallons): 4
SWL During Sampling:
Sample Time: 1130
Sample Method: Peri Pump
Sample Analyses:

Project: Harrison NYDOT Spill Site
Date: 10/27/2005
Crew: Mike Pantliano/Angela Martello/Melissa LaMacchia
Purge Method: Peri Pump
Meters Used:
PID Head Space (ppm):

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments
0	2		6.50	0.41	13	3.8	16.5	0.2	-9.3		

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

LMS Well Sampling Log

Well ID No.: GP-2

Well Casing Type:	1.5" PVC	**Start SWL:**		**Project:**	
Well Depth:**	6.12	**Water Column Ht.:**		**Date:**	
Screened Interval:	N/A	**Well Casing Volume (gallons):**		**Crew:**	
Well Elevation:**	N/A	**SWL During Sampling:**		**Purge Method:**	
Ground Elevation:	N/A	**Sample Time:**		**Meters Used:**	
Well Condition:		**Sample Method:**	pump	**PID Head Space (ppm):**	
Weather Conditions:		**Sample Analyses:**			

Time	Est. Gal. Purged	Purge Rate (gpm)	pH	Cond.	Turbidity (NTU)	D.O. (mg/L)	Temp. (C^o)	Salinity (%)	ORP (mV)	Depth to Water*	Comments

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

HDR|LMS Well Sampling Log

Well ID No.: MW-11

Well Casing Type: 2" PVC
Well Depth:** 15 ft
Screened Interval: 5 to 15 ft
Well Elevation:** N/A
Ground Elevation: N/A
Well Condition: New
Weather Conditions: Sunny 45F

Start SWL: 9.84 ft
Water Column Ht.: 5.16 ft
Well Casing Volume (gallons): 3 gal, Purged 5 gal
SWL During Sampling: N/A
Sample Time: 1145
Sample Method: Teflon Bailer
Sample Analyses: See COC

Project: Harrison Spill Site
Date: 3/28/2006
Crew: MEL/PA
Purge Method: Hand Bailed
Meters Used: YSI 556-01, MiniRae 4547
PID Head Space (ppm): 0 ppm

Time	Est. Gal. Purged	Purge Rate (gpm)	Temp. (C^o)	Cond. (mS)	ORP (mV)	D.O. (mg/L)	pH	Salinity (ppth)	Turbidity (NTU)	Depth to Water*	Comments
1052	0	-	10.56	1.895	51.7	1.36	6.1	0.97	-	-	org Fe floc @ top, org tint, no odor or sheen
1057	2.5	-	10.02	1.942	42.7	1.86	6.0	0.99	-	-	no odor or sheen, brn color, very turbid
1103	4	-	10.15	1.943	22.4	3.17	6.2	0.99	-	-	no odor or sheen, brn color, very turbid
1111	5	-	10.56	1.946	22.2	5.39	6.3	1	-	DRY	no odor or sheen, brn color, very turbid
1145	sample	-	10.46	1.904	22	6.71	6.2	0.97	-	10.15	turbid, no odor or sheen

Comments: Mauricio Roma requested that we collect PID reading upwind of and inside the garage. Readings were collected during the purging of MW-11 and also at 1600, both times readings were background @ 0.0 to 0.2 ppm.

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

ATTACHMENT-C: HARRISON SUBRESIDENCY, WESTCHESTER COUNTY. STATUS REPORT. September 2006

Current Situation

The Harrison DOT Subresidency, a seasonal highway maintenance and salt storage facility, has two environmental concerns: 1) a 2.6 acre landfill, that was investigated, regraded and capped in accordance to New York State Department of Environmental Conservation (DEC) requirements, and 2) a petroleum spill which is being remediated (Figure-1). Results from extensive environmental monitoring (surface water, groundwater, sediment, landfill gas, petroleum-remediation gas emissions) indicate that these areas do not represent a significant threat to the environment, including the nearby Kensico Reservoir.

Background

This facility was built in 1967 to support the construction and operation of Interstate 684. Roadside and highway construction debris were disposed in a landfill between 1967 to approximately 1976. The area was fenced in 1972. In April 1993 a 55-gallon drum of road striping paint was removed from the landfill during a test pit excavation. Because the paint contained toluene (a solvent), the site was placed on the New York State Registry of Inactive Hazardous Waste Sites.

The DOT consulted with the DEC and the New York State Department of Health (DOH) and performed an expedited, comprehensive investigation (Preliminary Site Assessment; PSA) of the landfill and its vicinity in 1995. Several drums containing hazardous or suspected hazardous waste, mostly paint products, were encountered and removed from the landfill. The DOT also identified a petroleum spill at the vicinity of the fuel tank area. Based on investigation results, the DEC, DOH and DOT indicated that the landfill was not a significant threat to the reservoir. Petroleum spill monitoring results also suggested that the spill had not migrated off-site and was not a significant threat to the reservoir either. Figure-C1 shows the location of monitoring points.

After consulting with the DEC, DOH, and the New York City Department of Environmental Protection (DEP), the landfill was capped as per stringent DEC landfill closure requirements on August 31, 1999. The cap includes a durable polyethylene liner to prevent the infiltration of water and subsequent leaching of contaminants into the environment. A small stream that drains into the reservoir has been rerouted around the landfill (Figure-C1) so that it can not act as a collector trench for contaminants. The plastic liner extends beneath the repositioned stream, so that any leachate generated within the fill cannot discharge into surface water. Environmental monitoring results show no evidence of toxic contaminants from the landfill with the potential of reaching the reservoir.

The petroleum spill has affected groundwater and, with DEC approval, we removed three underground petroleum storage tanks, contaminated soil and water in August 1994. Using GIS, we (DOT & DEC) designed the remedial system. On October 31, 2000 we started operating air sparging wells and soil gas vapor extraction lines. Our system achieved about a 90% overall reduction of contaminants in less than a year due to volatilization and bioremediation of the petroleum product (Figure 5). Mapping of the well locations, using 2-3 ft. positional accuracy GPS, resulted in adequate mapping of the contaminant plume. This was critical for the successful design of the remedial system. We closed the system in October 2002. The spill is currently being degraded by bio-chemical processes (Figures 2-5).

The DOT periodically submits status reports to the DEC, DOH and DEP, and expects to do so for some years.

FIGURE-C1

NYSDOT
Environmental Analysis Bureau

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S

- Landfill Gas Monitoring
- Sediment-, Surface Water- Monitoring
- Wells and Borings
- Borings (Approximate Location)
- Relocated Stream
- Buildings
- Petroleum Spill
- Landfill

90 0 90 Meters

HARRISON SUBRESIDENCY, WESTCHESTER CO.
ENVIRONMENTAL MONITORING POINTS