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Final Year 2013 Annual Groundwater Sampling Report

Bedford Village Wells
Hunting Ridge Mall
Site 3-60-009

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1.0 Introduction

At the request of the New York State Department of Environmental Conservation (NYSDEC), AECOM Technical Services, Northeast, Inc. (AECOM) has prepared this Annual Groundwater Sampling Report for the Bedford Village Wells – Hunting Ridge Mall Inactive Hazardous Waste Disposal Site #3-60-009 (the "Site") located in the Town of Bedford, Westchester County, New York (**Figure 1**).

The groundwater and field parameter results suggest that a majority of the permanganate injected in 2010 was spent on oxidizing naturally occurring metals and organics in the subsurface. This is the result typically observed following an initial injection. A drop in VOCs to concentration less than method detection limits (MDLs) was noted in the groundwater sample from MW-14 (10/2010), shortly after; the injection total VOC concentrations rebounded in subsequent samples. The fact that ORP did not increase in the monitoring wells and that permanganate was not observed in the wells indicates that a tighter spacing of injection points may be required during a second round of injections. A higher concentration of sodium permanganate may be required to overcome the natural oxidant demand.

The results of the post-injection groundwater sampling events indicated that chlorinated volatile organic compounds (CVOCs) were still present at levels greater than NYSDEC Ambient Water Quality Standards (AWQS) and Guidance Values (GV), however, they were no longer migrating down gradient. Although concentrations of CVOCs in the plume were succumbing to natural attenuation, the data suggests natural degradation was stalled at cis-1,2-dichloroethene (cis-1,2) and trichloroethene (TCE). The stall was most likely due to high dissolved oxygen (DO) levels (i.e., aerobic conditions) in the aquifer. CVOCs are more readily degraded in aquifers with lower dissolved DO levels (i.e., anaerobic conditions) and therefore, it was unlikely that the plume would degrade naturally under the current conditions.

As a result, a second round of sodium permanganate injections was Conducted in for the Site in November and December 2013 as outlined in the July 2012 Scope of Work (SOW) submitted to the NYSDEC under Work Assignment No. D007626-18. The post ISCO injection groundwater sampling events were collected in January 2013, May 2013, September 2013, and December 2013. The details of the second injection and the January 2013 groundwater sampling results were reported in the Supplemental Remedial Action Progress Report which was submitted to the NYSDEC in March 2013.
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2.0 Groundwater Monitoring

This report will discuss the groundwater sampling results collected May 2013, September 2013, and December 2013. Eight monitoring wells (MW-3MR, MW-5M, MW-6M, MW-12, MW-14, MW-15, MW-16, and MW-17) were sampled (**Figure 2**). Previous sampling events made an effort to sample MW-6S, but due to a blockage in the well, sampling of MW-6S has been removed from the list of wells to be sampled.

Groundwater samples were submitted to Test America of Amherst, New York for analysis. The groundwater samples were analyzed for VOCs via Environmental Protection Agency (EPA) method 8260B.

2.1 Methodology

The groundwater samples were collected using passive diffusion bags (PDBs). Depth-to-groundwater measurements were collected using an interface probe prior to retrieving the bags. The interface probe was decontaminated with a Liquinox® bath and rinsed with distilled water between each use. The PDBs were then retrieved and the samples were collected. Prior to setting a new PDB, a water quality meter (e.g., YSI or Horiba U-22) was used to collect field parameters. The water quality meters were calibrated before sampling commenced each day and were decontaminated as necessary. Turbidity, DO, oxidation reduction potential (ORP), conductivity, pH, temperature, color and odor of the groundwater were recorded in the project field book. A bailer was used at each location to collect a water sample for visual identification of the presence of permanganate (purple color).

All groundwater samples were collected in bottles provided by the laboratory, packed with ice, and shipped within applicable holding times (14 days) under chain-of-custody.

2.2 Well Conditions

In general the monitoring wells at the Site are in good condition. Several deficiencies or damages to the well network were addressed during recent site activities:

- Replacement of monitoring well MW-3M with a new well (MW-3MR) located within 4 feet of the existing well.
- Monitoring well MW-5M was resurveyed after the riser was cut down to address damage to the PVC casing.
- Monitoring well MW-16 was surveyed for location and casing elevation.
- Locking caps were placed on all the wells used for monitoring missing well caps.
- New monitoring wells MW-3MR and MW-17 were surveyed upon completion.

2.3 Groundwater Elevation and Flow

Depth-to-groundwater measurements were recorded and used to calculate groundwater elevation data during the December 2013 sampling event (**Table 1**). The results were constant with previous events demonstrating that there is a relatively flat groundwater gradient toward the southeast. The hydraulic gradient at the Site is approximately 0.007 ft/ft. There is little effect on groundwater seasonally at the Site with a slight increase in elevation in the spring and summer. In general groundwater is approximately 15 feet bgs. A groundwater isoelevation map is included as **Figure 3**. Historical data from well cluster MW-6M, screened in the subsurface soil, and MW-6D, screened in the bedrock, suggests that there is an upward gradient from the bedrock to the overlying aquifer. This upward gradient may prevent the contaminants from migrating into the bedrock.

2.4 VOCs

VOC concentrations from samples collected during the December 30, 2013 sampling event preceding the second round of injections in November and December 2012 and previous sample events are summarized in **Table 2**.

May, 2013 Results

The highest concentrations of CVOCs were historically detected in the samples from MW-3M; the monitoring well located along the north side of Old Post Road (**Figure 2**). Due to damage to MW-3M, a replacement monitoring well (MW-3MR) was installed within 4 feet of the existing well. The results from the sample take from MW-3MR were minimal, with no exceedances of AQWS and no detections of CVOCs. Compounds reported were Acetone (21 µg/L), 2-Butanone (3.2 µg/L), Chloroform (0.85 µg/L), and Cyclohexane (2.2 µg/L). The CVOC trends for monitoring well (s) MW-3M/3MR are include on **Table 3**.

The results of the groundwater sample collected form monitoring well MW-14, located adjacent to the sidewalk along the south-east side of the on-site building suggestes a decreasing trend in CVOC concentraions. During the January 2013 sampling event, results reported three compounds; cis-1,2 (31 µg/L), PCE (44 µg/L), and trichloroethene (TCE; 14 µg/L) with concentrations exceeding AWQS. During the May 2013 event, however, PCE was the only compound with a value exceeding AWQS. The CVOCs cis-1, 2-dichloroethene and Trichloroethene were still detected, but below AWQS.. The CVOC trends for well MW-14 are shown in **Table 4**.

The results of the groundwater sample collected from monitoring well MW-16, located to the southeast of MW-14 in the median of the main entranceway to the on-site building, reported three compounds none of which are CVOCs, 2-Butanone, Acetone, and Cyclohexane. All of these compounds were below AWQS standards. The sample from the January 2013 sampling event contained PCE exceeding the AWQS at 6.5 µg/L. The CVOC trends for well MW-16 are shown on **Table 5**.

MW-15 is located adjacent to the sidewalk at the eastern corner of the on-site building. Consistent with historical results, there were no VOC detections greater than MDLs during this sampling event. Acetone (8.3 µg/L), cyclohexane (0.43 µg/L), and trichloroethene (estimated concentration of 0.50 µg/L) were the only compounds detected.

Newly-installed MW-17 indicated the presence of two new compounds during this sampling event. In addition to Acetone (23 µg/L) and chloroform (0.39 µg/L), which were present during January 2013, 2-Butanone (6.7 µg/L) and Cyclohexane (1.7 µg/L) were also found. All of these compounds were

below AWQS. No CVOCs have been detected in samples collected from MW-17 since it's installation in November 2013.

Monitoring wells MW-5M, MW-6M and MW-12 are located in the wooded area to the southeast of Old Post Road (**Figure 2**). Only acetone was detected in the groundwater sample collected from MW-5M with an estimated concentration of 9.9 µg/L. Acetone and PCE were detected in the groundwater samples collected from MW-6M at 16 µg/L and 1.7 µg/L, respectively. Both concentrations are less than the AWQS for PCE (5 µg/L). MW-12 had four analytes positively identified, Acetone (9.2 µg/L), Cyclohexane (0.22 µg/L), PCE (2.0 µg/L), and TCE (0.56 µg/L). All of these values are below AWQS.

Acetone was detected in many of the groundwater samples at concentrations less than the NYSDEC GV (50 µg/L). However, the compound is a common laboratory contaminant and is not considered to be a constituent of concern for the Site. Methyl Chloride, also a known laboratory contaminant and is not a constituent of concern for the Site, has historically been detected in samples collected from Site. However, methyl chloride was not detected in any of the samples collected during the May 2013 event.

<u>September 2013 Results</u>

Results from the September sampling event indicated far less compounds than were present during the May 2013 event. The main compound found in every well was Acetone, but, as explained above, is a common laboratory contamination and is not to be considered a concern.

MW-14 was the only well to have CVOCs above AWQS. PCE was found in MW-14 at a concentration of 6 µg/L. Although this is still an exceedance, it is the lowest value for PCE Since monitoring began. Other compounds found in MW-14 include Acetone (11 µg/L) and TCE (0.82); both below the AWQS.

MW-6M, MW-12, and MW-17 showed a positive reading for PCE, but all were well below AQWS limits.

The only compound found in MW-15, other than Acetone, was Toluene (0.80 µg/L). This is well below the AQWS limit, but is the first time toluene has been found in MW-15.

<u>December 30, 2013 Results</u>

For the monitoring wells within the permanganate treatment area there were no detections of CVOCs in groundwater samples collected in December 2013. The only CVOC detection above the MDL was PCE at 1.8 µg/L in the sample collected from monitoring well MW-17. This is the only upward trend in CVOCs as previous results from MW-17 have been non-detect for PCE.

As for the monitoring wells located in the wooded area to the southeast of Old Post Road there continued to be no detections of CVOCs above the AWQS. The only detection of CVOCs for these wells was PCE at an estimated concentration of 0.97 µg/L.

Acetone was detected in many of the groundwater samples at concentrations less than the NYSDEC GV (50 µg/L). However, the compound is a common laboratory contaminant and is not considered to be a constituent of concern for the Site. Methyl Chloride, also a known laboratory contaminant and is not a constituent of concern for the Site, has historically been detected in samples collected from Site.

However, methyl chloride was not detected in any of the samples collected during the December 2013 event.

2.5 Field Parameters

Field parameters (i.e., turbidity and DO, ORP, conductivity, pH, temperature, color and odor) were collected during the sampling events at each monitoring well where a laboratory sample was collected. The field parameters are reported on **Table 6**. The primary indicators for the effectiveness and presence of sodium permanganate are ORP and color. Ideally following the injection of an oxidizer the ORP in the well will rise indicating the presence of an oxidizer (permanganate) in the aquifer. A purple color in the well would indicate that the permanganate has reached the well and is present in the aquifer.

Although field parameters tended to fluctuate, ORP values in the wells remained high, indicating the presence of permanganate. Sodium permanganate was visually observed in three (MW-3MR, MW-16, and MW-17) of the eight wells sampled during the sampling events. In December colorimetric testing for permanganate ranged from ~200 ppm, deep purple (MW-16 and MW-17) to ~50 ppm purple (MW-3M).

3.0 Conclusions and Recommendations

3.1 Conclusions

The post injection groundwater results suggest that the second injection has been effective at reducing disoved phase CVOCs in groundwater at the Site. There were no detections of CVOCs above the NYSDEC AGWQS in the most recent groundwater sampling event (December 2013). The reduction of the areal extent of the dissolved phase plume is demonstrated in **Figures 4 through 8** which show the extent of the plume from the December 2011 through December 2013. Field parameters and colormetric testing indicates that permanganate is persisting in the subsurface but the concentration is declining as expected. The lack of impacts in downgradient wells as demonstrated through long term monitoring indicates that the plume is stable and is restricted to the monitoring wells in the parking lot adjacent to the Hunting Ridge Mall.

3.2 Recommendations

Quarterly sampling should be continued for an additional year to confirm effectiveness of the permanganate injections. It's recommended that sampling of downgradient wells on the Old Post Holdings property be discontinued as data from the 2010 through 2013 indicates that these wells are not impacted with dissolved phase COVOCs.

Tables

Table 1
Monitoring Well Details and
Groundwater Elevations
Bedford Village Wells - Hunting Ridge Mall
NYSDEC Site No. 3-60-009

Well ID	Coordinates		Measuring Points (ft amsl)			Depth-to-Groundwater (below MP)	Groundwater Elevation (ft amsl)
	Easting	Northing	Ground	TOC	MP		
MW-1S	724759.0435	861813.3853	369.74	370.84	370.29	NA*	NA
MW-3S	724602.2454	861604.4331	372.95	373.13	372.99	NM	NA
MW-3M	724592.853	861584.2427	373.67	374.41	374.41	NA*	NA
MW-3MR	724590.568	861587.315	373.53	373.74	373.47	17.82	355.65
MW-5M	724506.728	861067.391	385.04	385.98	385.92	30.47	355.45
MW-6S	724902.6994	861516.5154	387.75	389.67	389.34	NM	NA
MW-6M	724906.0048	861511.2225	387.92	389	388.73	33.6	355.13
MW-6D	724889.3999	861537.9474	386.97	388.23	387.29	NM	NA
MW-8B	725167.1116	862065.3707	368.02	368.39	368.12	NM	NA
MW-8M	725104.678	862038.6379	367.52	367.6	367.38	NM	NA
MW-12 (Well-5)	724759.1962	861347.6484	387.12	389.48	389.09	33.86	355.23
MW-14	724538.7601	861717.307	371.95	371.95	371.77	15.78	355.99
MW-15	724618.5189	861837.6813	371.79	371.79	371.7	15.49	356.21
MW-16	NM	NM	NM	NM	NM	13.56	NA
MW-17	724552.52	861623.952	371.95	371.95	371.69	15.94	355.75
WELL-1	724848.2398	861525.584	387	NA	388.97	NM	NA
WELL-2	724852.689	861486.6684	388.25	390.3	390.21	NM	NA
WELL-3	724843.6387	861489.5558	388.34	390.12	390.03	NM	NA
WELL-4	724833.3219	861492.9435	388.32	389.84	389.53	NM	NA
WELL-6	724774.9959	861409.8663	386.75	NA	388.47	NM	NA
WELL-8	724828.6052	861342.8972	388.61	NA	391.23	NM	NA
WELL-9	724865.855	861232.4881	387.09	NA	388.61	NM	NA
WELL-?	724766.2157	861658.1598	377.95	NA	379.34	NM	NA

Notes:
Reference Elevation, from a survey completed by YEC Inc. January 12, 2009 (NAVD88)
ft amsl - feet above mean sea level
TOC - Top of Casing
MP - Measuring Point, top of well riser
NA - None applicable
NM - Not Measured
MW-? - unknown well identification
* - Decommissioned
** - Frozen

Table 2
Summary of Groundwater Sampling Results - VOCs
Bedford Village Wells - Hunting Ridge Mall
NYSDEC Site No. 3-60-009

Sample ID	GW Std.	MW-3M/3MR													MW-3S	MW-5M												MW-5S	MW-6D
Sample Date	**GV**	9/16/09	10/25/10	10/25/10	1/6/11	1/6/11	3/31/11	6/28/11	10/6/11	12/28/11	1/29/13	5/9/13	9/10/13	12/30/13	8/20/10	10/25/10	1/6/11	3/31/11	6/28/11	10/6/11	12/28/11	1/29/13	1/29/13	5/9/13	9/10/13	12/30/13	8/20/10	8/20/10
VOCs ug/l				Duplicate		Duplicate																	Duplicate						
Acetone	50	**14**	<10	<10	**15.3**	**47.6**	<10	**11**	**18**	**18**	**9 J**	**21**	**15**	**1100**	<10	<10	<10	**13**	**20**	**34**	**5.9 J**	**8.4 J**	**9.4 J**	**9.9 J**	**14**	**570**	<10	<10
cis-1,2-Dichloroethene	5	**19**	**26**	**26**	**48.1**	**44.5**	**40**	**41**	**38**	**34**	<0.81	0.85 J	<5	<5	<5	< 5	<5	<5	<5	<5	<5	<0.81	<0.81	<0.81	<0.81	<5	<5	<5
Methyl tert-butyl ether	10	<5	< 5	< 5	<5	<5	<5	<5	<5	<5	<0.16	<5	<5	<10	<5	< 5	<5	<5	<5	<5	<5	<0.16	<0.16	<0.16	<0.16	<10	<5	**13**
Methylene chloride	5	<5	< 5	< 5	<5	**8.6**	<5	<5	<5	<5	<0.44	<5	<5	<5	<5	< 5	**9.2**	<5	<5	<5	<5	<0.44	<0.44	<0.44	<0.44	<5	<5	<5
Tetrachloroethene	5	**120**	**120**	**120**	**96.3**	**90.7**	**93**	**89**	**73**	**76**	<0.36	<5	<5	<5	<5	< 5	<5	<5	<5	<5	<5	<0.36	<0.36	<0.36	<0.36	<5	<5	<5
Trichloroethene	5	**15**	**14**	**14**	**17.7**	**16.3**	**21**	**19**	**14**	**13**	<0.46	<5	<5	<5	<5	< 5	<5	<5	<5	<5	<5	<0.46	<0.46	<0.46	<0.46	<5	<5	<5
Total VOCs		168	160	160	177.4	207.7	154	160	143	141	9	21.85	15	1100	0	0	9.2	13	20	34	5.9	8.4	9.4	9.9	14	570	0	13
Total CVOCs		154	160	160	162.1	151.5	154	149	125	123	0	0.85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Sample ID	GW Std.	MW-6M												MW-6S								
Sample Date	**GV**	8/20/10	10/25/10	1/6/11	3/31/11	6/28/11	6/28/11	10/6/11	12/28/11	1/29/13	5/9/13	9/10/13	12/30/13	8/20/10	10/25/10	1/6/11	3/31/11	6/28/11	10/6/11	12/28/11	1/29/13
VOCs ug/l		Duplicate																			
Acetone	50	<10	<10	<10	**31**	**24**	**26**	**27**	**4.6 J**		**16**	**12**	**460**	<10	<10	<10	<10	**16**	**26**	**5.5 J**	**8.2 J**
cis-1,2-Dichloroethene	5	<5	< 5	<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	< 5	<5	<5	<5	<5	<5	<0.81
Methyl tert-butyl ether	10	<5	< 5	<5	<5	<5	<5	<5	<5	Not	<5	<5	<10	<5	< 5	<5	<5	<5	<5	<5	<0.16
Methylene chloride	5	<5	< 5	**8.5**	<5	<5	<5	<5	<5	Sampled	<5	<5	<5	<5	< 5	**9.0**	<5	<5	<5	<5	<0.44
Tetrachloroethene	5	<5	< 5	<5	<5	<5	<5	<5	**1.3**		**1.7**	**1.2**	**0.97 J**	<5	< 5	<5	<5	<5	<5	**1.7**	**0.86 J**
Trichloroethene	5	<5	< 5	<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	< 5	<5	<5	<5	<5	<5	<0.46
Total VOCs		0	0	8.5	31	24	26	27	5.9	NA	17.7	13.2	460.97	0	0	9	0	16	26	7.2	9.06
Total CVOCs		0	0	0	0	0	0	0	1.3	NA	1.7	1.2	0.97	0	0	0	0	0	0	1.7	0.86

Sample ID	GW Std.	MW-12											MW-14													
Sample Date	**GV**	8/20/10	10/25/10	1/6/11	3/31/11	6/28/11	10/6/11	12/28/11	1/29/13	5/9/13	9/10/13	12/30/13	9/16/09	9/16/09	8/19/10	10/25/10	1/6/11	3/31/11	3/31/11	6/28/11	10/6/11	12/28/11	1/29/13	5/9/13	9/10/13	12/30/13
VOCs ug/l														Duplicate					Duplicate							
Acetone	50	<10	<10	<10	**28**	**19**	**29**	**5.3 J**	**13**	**9.2 J**	**28**	**840**	**12**	<10	<10	<10	**11.8**	**13**	**13**	**19**	**27**	**5.4 J**	**13**	**6.8 J**	**11**	**950**
cis-1,2-Dichloroethene	5	<5	< 5	<5	<5	<5	<5	<5	<0.81	<0.81	<0.81	<5	<5	<5	<5	< 5	**15**	**22**	**23**	**12**	<5	**5.4**	**31**	**2.5**	<5	<5
Methyl tert-butyl ether	10	<5	< 5	<5	<5	<5	<5	<5	<0.16	<0.16	<0.16	<10	<5	<5	<5	< 5	<5	<5	<5	<5	<5	<5	<0.16	<5	<5	<5
Methylene chloride	5	<5	< 5	**9.5**	<5	<5	<5	<5	<0.44	<0.44	<0.44	<5	<5	<5	<5	< 5	<5	<5	<5	<5	<5	<5	<0.44	<5	<5	<5
Tetrachloroethene	5	<5	< 5	<5	<5	<5	<5	**2**	**3.8**	<5	<5	<5	**7.1**	**5.8**	**8.2**	< 5	**6.4**	**45**	**46**	**23**	**7**	**12**	**44**	**14**	**6**	**0.97 J**
Trichloroethene	5	<5	< 5	<5	<5	<5	<5	<5	<0.46	**0.56 J**	**0.58 J**	<5	<5	<5	<5	< 5	<5	**11**	**11**	**5.3**	<5	**3.2**	**14**	**2.5**	**0.82 J**	**0.60 J**
Total VOCs		0	0	9.5	28	19	29	7.3	16.8	9.76	28.58	840	19.1	5.8	8.2	0	33.2	91	93	59.3	34	26	102	25.8	17.82	951.57
Total CVOCs		0	0	0	0	0	0	2	3.8	0.56	0.58	0	7.1	5.8	8.2	0	21.4	78	80	40.3	7	20.6	89	19	6.82	1.57

Sample ID	GW Std.	MW-15												MW-16											MW-17			
Sample Date	**GV**	9/16/09	8/19/10	10/25/10	1/6/11	3/31/11	6/28/11	10/6/11	12/28/11	1/29/13	5/9/13	9/10/13	12/30/13	8/19/10	10/25/10	1/6/11	3/31/11	6/28/11	10/6/11	12/28/11	1/29/13	5/9/13	9/10/13	12/30/13	1/29/13	5/9/13	9/10/13	12/30/13
VOCs ug/l																											
Acetone	50	**14**	<10	<10	<10	**14**	**18**	**31**	**5.7 J**	**8.9 J**	**8.3 J**	**12**	**980**	<10	<10	**14**	**19**	**16**	**27**	**5.9 J**	**19**	**24**	**16**	**170**	**7.77 J**	**23**	**16**	**970**
cis-1,2-Dichloroethene	5	<5	<5	< 5	<5	<5	<5	<5	<5	<0.81	<5	<5	<5	**10**	**10**	**6.4**	**6.1**	**7.2**	<5	**5.4**	<0.81	<5	<5	<5	<0.81	<5	<5	<5
Methyl tert-butyl ether	10	<5	<5	< 5	<5	<5	<5	<5	<5	<0.16	<5	<5	<5	<5	< 5	<5	<5	<5	<5	<5	**0.47 J**	<10	<10	**0.32 J**	<0.16	<10	**2.5**	<10
Methylene chloride	5	<5	<5	< 5	<5	<5	<5	<5	<5	<0.44	<5	<5	<5	<5	< 5	<5	<5	<5	<5	<5	<0.44	<5	<5	<5	<0.44	<5	<5	<5
Tetrachloroethene	5	<5	<5	< 5	<5	<5	<5	<5	<5	<0.36	<5	<5	<5	**40**	**9.6**	**20.7**	**19**	**12**	**23**	**13**	**6.5**	<5	<5	<5	<0.36	<5	<5	**1.8**
Trichloroethene	5	<5	<5	< 5	<5	<5	<5	<5	<5	<0.46	**0.50 J**	<5	<5	<5	< 5	<5	<5	<5	<5	**2.3**	**2.7**	<5	<5	<5	<0.46	<5	<5	<5
Total VOCs		14	0	0	0	14	18	31	5.7	8.9	8.8	12	980	50	19.6	41.1	44.1	35.2	50	26.6	28.67	24	16	170.32	7.77	23	18.5	971.8
Total CVOCs		0	0	0	0	0	0	0	0	0	0.5	0	0	50	19.6	27.1	25.1	19.2	23	20.7	9.2	0	0	0	0	0	0	1.8

Notes:
GW Std: NYS Ambient Water Quality Standards and Guidance Values (TOGS 1.1.1, June 1998 with April 2000 and June 2004 Addendums) for groundwater (GA).
GV - designates a Guidance Value.
Bold font designates detected result.
Shaded cells indicate detections above the standard or guidance value.

Table 3
VOC Trends
MW-3M/MR

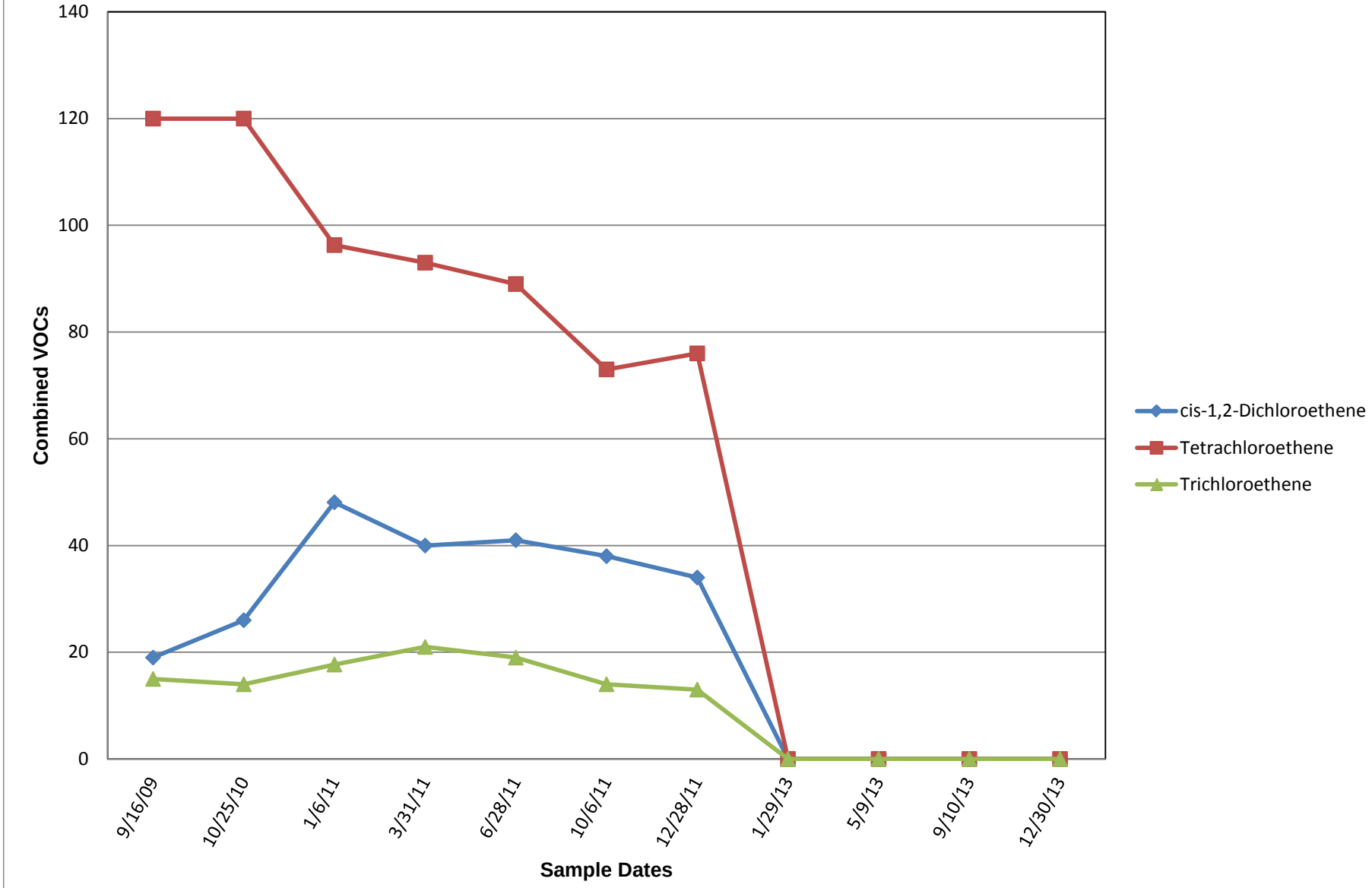


Table 4
VOC Trends
MW-14

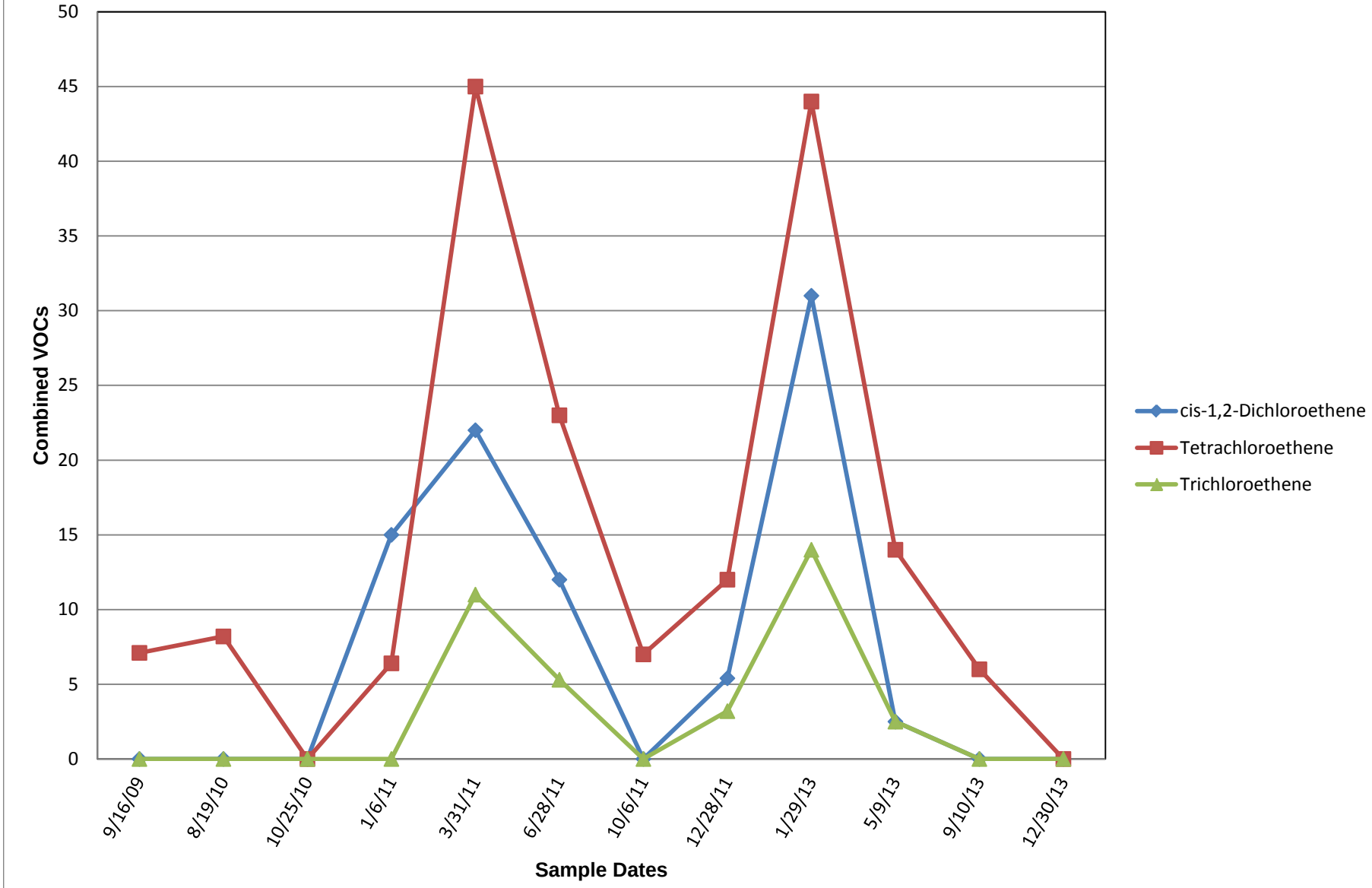
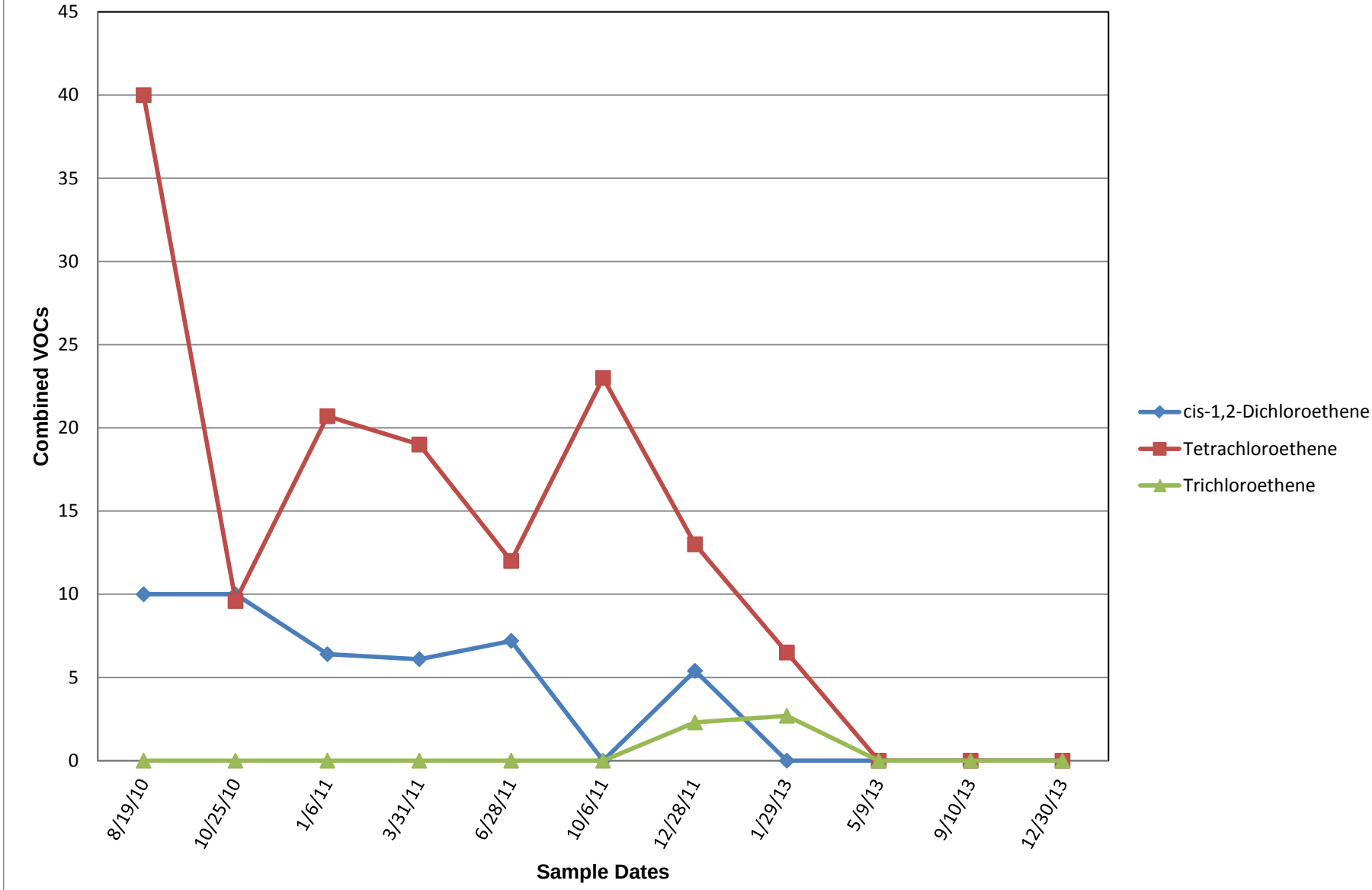


Table 5
VOC Trends
MW-16



December 2013 Field Parameters
Bedford Village Wells - Hunting Ridge Mall
NYDEC Site No. 3-60-009

Sample ID	GW Std.	MW-3M									MW-3MR		MW-3S	MW-5M										MW-5S	MW-6D				
Sample Date	**GV**	9/16/09	10/25/10	1/6/11	3/31/11	6/28/11	10/6/11	12/28/11	9/10/13	12/30/13	1/29/13	5/9/13	8/20/10	10/25/10	1/6/11	3/31/11	6/28/11	10/6/11	12/28/11	1/29/13	5/9/13	9/10/13	12/30/13	8/20/10	8/20/10	10/25/10	1/6/11	3/31/11	6/28/11
Field Parameters																													
Temperature	°C	15.55	14.24	14.3	14.07	16.48	13.94	13.89	14.80	13.86	12.84	14.24	14.29	No Readings	10.08	10.43	12.09	9.88	10.27	10.66	10.92	12.83	10.26	11.78	14.22	11.46	10.42	10.66	12.22
Conductivity	ms/cm[c]	0.504	0.452	0.607	0.658	0.343	0.53	0.532	2.149	0.239	11.76	2.144	2.25		0.966	0.819	0.588	0.872	0.557	0.763	0.513	0.513	0.513	0.334	0.572	0.963	0.444	0.490	0.272
Dissolved Oxygen	mg/L	0.59	171.2*	0.34	0.46	8.45	1.94	5.70	3.96	8.22	4.94	6.67	0.42		4.82	5.75	15.89	9.67	5.1	6.95	8.23	7.86	9.48	10.08	4.97	422.0*	5.18	3.59	10.31
Oxidation Reduction Potential	MeV	35.3	-123.6	-257.9	-210.4	4	-22.3	203.2	573.9	538.9	645.9	702.2	175		144.8	-180.1	160	48.3	70.7	45.67	105.2	219.5	79.9	106	-30	32.0	44.3	-264.8	117
pH	pH Unit	7.32	7.7	7.88	7.38	7.86	7.47	8.19	8.17	8.37	7.54	7.28	5.77		7.4	7.16	7.68	6.6	8.13	10.7	7.5	6.94	7.91	5.99	6.88	6.49	7.86	8.30	8.00

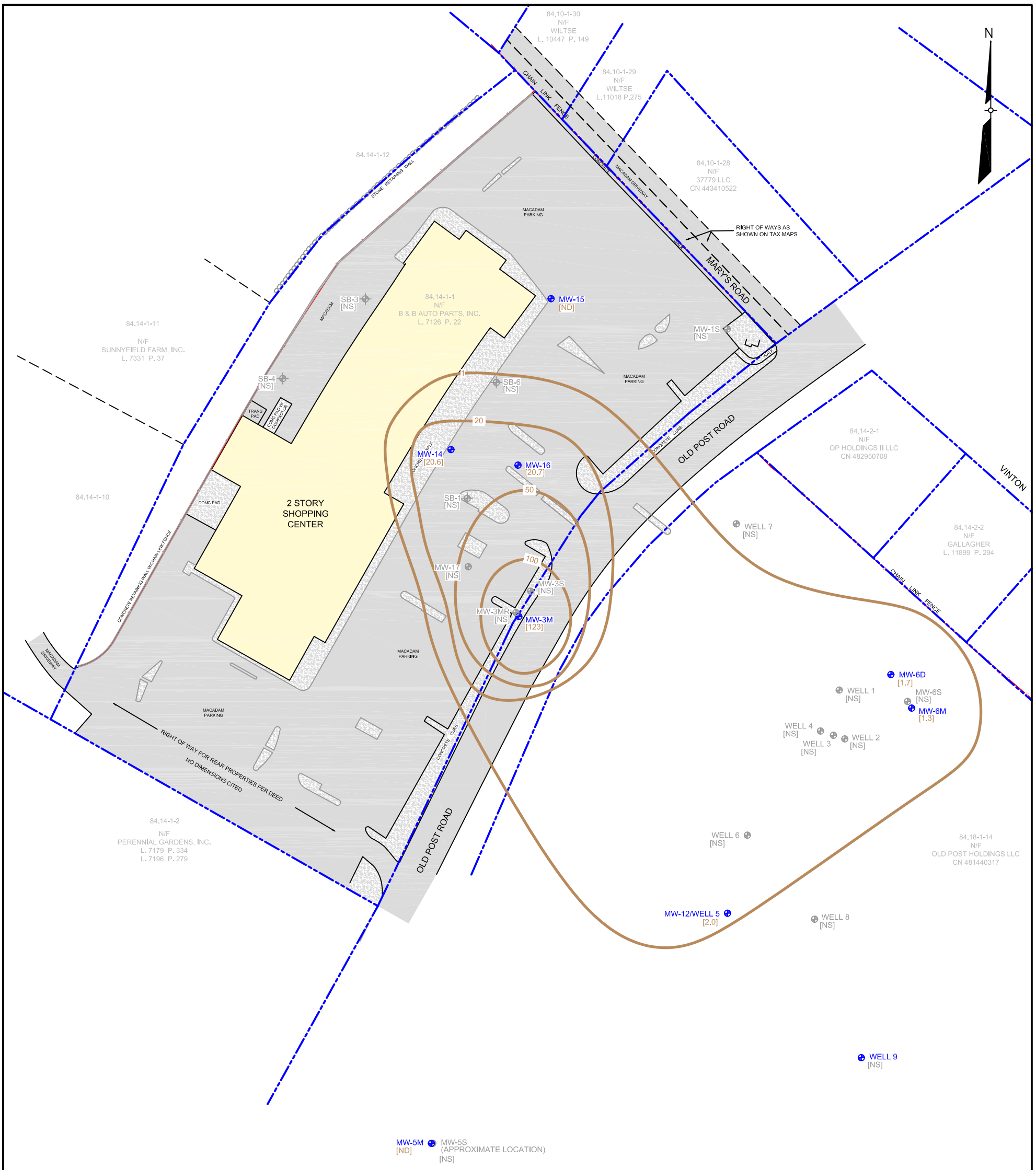
Sample ID	GW Std.	MW-6M											MW-6S									
Sample Date	**GV**	8/20/10	10/25/10	1/6/11	3/31/11	6/28/11	10/6/11	12/28/11	1/29/13	5/9/13	9/10/13	12/30/13	8/20/10	10/25/10	1/6/11	3/31/11	6/28/11	10/6/11	12/28/11	1/29/13	5/9/13
Field Parameters																					
Temperature	°C	17.55	11.58	10.72	10.65	12.98	10.98	11.32	No Readings	11.47	12.91	10.22	11.62	11.54	10.16	9.97	12.05	10.98	10.91	No Readings	No Readings
Conductivity	ms/cm[c]	0.999	0.978	0.989	1.226	0.706	1.014	1.009		0.905	0.696	0.606	0.923	1.244	1.232	0.011	0.444	0.784	0.002		
Dissolved Oxygen	mg/L	2.3	388.5*	1.98	8.98	13.06	5.98	4.24		7.07	4.55	4.77	1.57	976*	4.07	12.53	11.82	7.46	10.47		
Oxidation Reduction Potential	MeV	97	41.4	105.6	-206.0	88	50.2	49.5		204.8	110.4	121.1	81	112.3	48.3	-207.5	94	81.7	82.3		
pH	pH Unit	6.62	6.47	7.23	6.93	6.48	6.4	6.77		7.01	7.2	7.23	6.28	6.52	6.74	7.47	6.64	6.51	7.36		

Sample ID	GW Std.	MW-12											MW-14												
Sample Date	**GV**	8/20/10	10/25/10	1/6/11	3/31/11	6/28/11	10/6/11	12/28/11	1/29/13	5/9/13	9/10/13	12/30/13	9/16/09	9/16/09	8/19/10	10/25/10	1/6/11	3/31/11	6/28/11	10/6/11	12/28/11	1/29/13	5/9/13	9/10/13	12/30/13
Field Parameters																									
Temperature	°C	12.86	12.00	11.19	11.31	13.41	10.85	10.94	10.95	11.55	12.7	10.86	17.91	Duplicate Sample	17.12	17.58	16.66	14.34	16.98	17.13	16.37	14.87	15.79	17.8	15.63
Conductivity	ms/cm[c]	0.020	0.930	0.599	0.697	0.372	0.573	0.573	0.575	0.542	0.44	0.254	1.388		1.14	1.927	1.483	1.607	0.858	1.329	1.06	0.685	0.935	0.593	0.779
Dissolved Oxygen	mg/L	0	972.3*	3.46	2.48	10.29	7.27	3.22	8.57	7.49	3.78	6.26	2.58		2.01	134.2*	1.83	3.78	6.62	3.55	5.86	3.64	5.52	5.15	7.38
Oxidation Reduction Potential	MeV	28	203.1	160.1	-212.9	39	21	133.4	604.6	250.9	228.8	112.2	106.0		15.6	-96.7	77.1	-182.4	143	7.3	104.9	29.3	623.9	82.7	449.8
pH	pH Unit	7.72	6.49	7.54	7.42	7.31	6.84	7.45	7.39	7.28	6.87	7.19	5.98		6.3	6.71	6.99	6.42	6.46	3.52	6.73	6.82	7.3	7.3	7.33

Sample ID	GW Std.	MW-15												MW-16											MW-17			
Sample Date	**GV**	9/16/09	8/19/10	10/25/10	1/6/11	3/31/11	6/28/11	10/6/11	12/28/11	1/29/13	5/9/13	9/10/13	12/30/13	8/19/10	10/25/10	1/6/11	3/31/11	6/28/11	10/6/11	12/28/11	1/29/13	5/9/13	9/10/13	12/30/13	1/29/13	5/9/13	9/10/13	12/30/13
Field Parameters																												
Temperature	°C	15.78	16.54	18.64	15.86	13.04	15.30	10.3	16.74	15.28	13.20	14.99	14.69	15.34	17.44	13.93	13.57	16.31	14.34	15.74	12.3	14.16	17.75	14.88	13.99	14.42	16.13	14.4
Conductivity	ms/cm[c]	1.488	0	1.767	1.601	1.496	0.988	0.009	1.346	1.45	1.4	1.771	0.996	0.573	0.426	0.511	0.607	0.309	0.459	0.459	10.82	3.224	1.389	0.903	1.781	1.851	0.972	0.776
Dissolved Oxygen	mg/L	1.28	10.31	121.6*	2.26	0.75	8.86	9.94	1.31	2.44	4.06	3.45	5.04	3.51	117*	1.05	0.09	8.52	1.41	3.61	3.55	6.88	2.55	6.25	9.64	6.08	3.64	6.01
Oxidation Reduction Potential	MeV	-40.7	111	-185.0	-138.4	-212.8	-44	44.3	4.9	-143.25	35	-44.3	444.7	-8	-133.6	23.5	-229.5	-89	-66.3	1.8	620.9	665.5	579.8	745.6	555.9	644.4	555.1	531.4
pH	pH Unit	6.44	5	6.66	6.87	6.52	6.74	6.44	6.76	6.75	6.52	7.57	7.09	8.94	8.03	9.27	7.32	7.65	7.27	7.56	7.7	7.57	8.07	8.15	7.64	7.44	7.31	7.67

Notes:
* - Measurement unit is percentage.

Figure



LEGEND:

MW-16	MONITORING WELL LOCATION
SB-2	SOIL BORING LOCATION
50	CVOC CONCENTRATION CONTOUR LINE (DASHED WHERE INFERRED)
[2.0]	CHLORINATED VOLATILE ORGANIC COMPOUND (CVOC) CONCENTRATION
[ND]	NON DETECT
[NS]	NOT SAMPLED
	PROPERTY BOUNDARY
	BUILDING
	PAVED AREA
	CONCRETE AREA

NOTES:

1. MW-1S WAS REMOVED/ DESTROYED IN SPRING 2011. THIS WELL IS DECOMMISSIONED.
2. UNIT OF MEASURE IS MICROGRAMS PER LITER (µg/L).
3. CVOCs INCLUDE cis-1,2-DICHLOROETHENE, TETRACHLOROETHENE AND TRICHLOROETHENE.

0 40 80 160

SCALE IN FEET

SOURCE:
SURVEY COMPLETED BY YEC, INC. DATE OF FIELD SURVEY JANUARY 12, 2009. PROPERTY LINES SHOWN ARE APPROXIMATE ONLY FROM TAX MAP INFORMATION AND ARE NOT CERTIFIED. PROPERTY OWNERS NAMES AND DEED REFERENCES FROM TOWN OF BEDFORD TAX ASSESSMENT ROLES.

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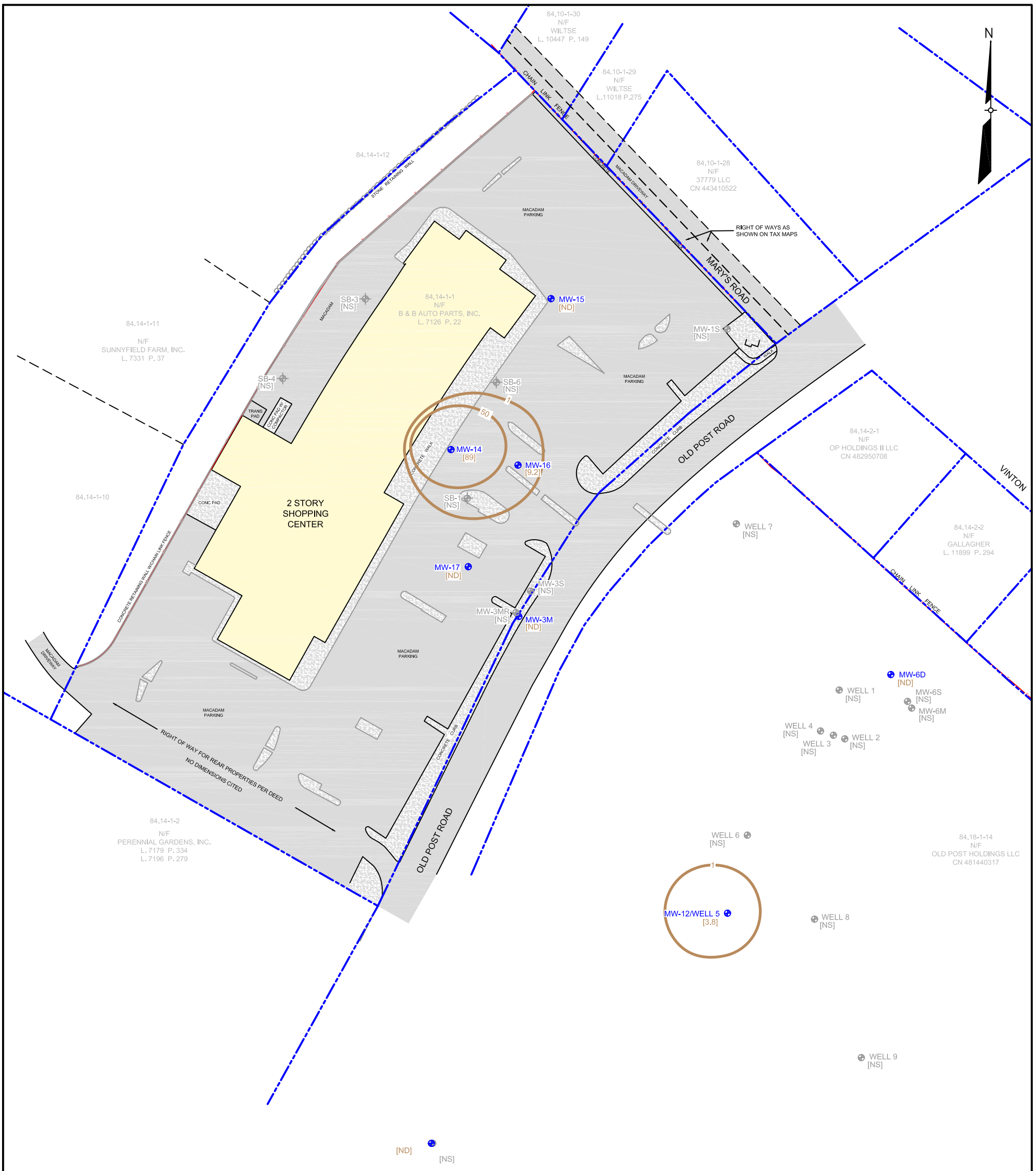
FIGURE 4
CVOCs PLUME MAP
DECEMBER 28, 2011

BEDFORD VILLAGE HUNTING RIDGE MALL
NYSDEC SITE NO. 3-60-009

MARCH 2014

60276051



LEGEND:

- MW-16 — MONITORING WELL LOCATION
- SB-2 — SOIL BORING LOCATION
- 1 — CVOC CONCENTRATION CONTOUR LINE (DASHED WHERE INFERRED)
- [3.8] — CHLORINATED VOLATILE ORGANIC COMPOUND (CVOC) CONCENTRATION
- [ND] — NON DETECT
- [NS] — NOT SAMPLED
- PROPERTY BOUNDARY
- BUILDING
- PAVED AREA
- CONCRETE AREA

NOTES:

1. MW-1S WAS REMOVED/ DESTROYED IN SPRING 2011. THIS WELL IS DECOMMISSIONED.
2. UNIT OF MEASURE IS MICROGRAMS PER LITER (µg/L).
3. CVOCs INCLUDE cis-1,2-DICHLOROETHENE, TETRACHLOROETHENE AND TRICHLOROETHENE.

0 40 80 160
SCALE IN FEET

SOURCE:
SURVEY COMPLETED BY YEC, INC. DATE OF FIELD SURVEY JANUARY 12, 2009. PROPERTY LINES SHOWN ARE APPROXIMATE ONLY FROM TAX MAP INFORMATION AND ARE NOT CERTIFIED. PROPERTY OWNERS NAMES AND DEED REFERENCES FROM TOWN OF BEDFORD TAX ASSESSMENT ROLES.

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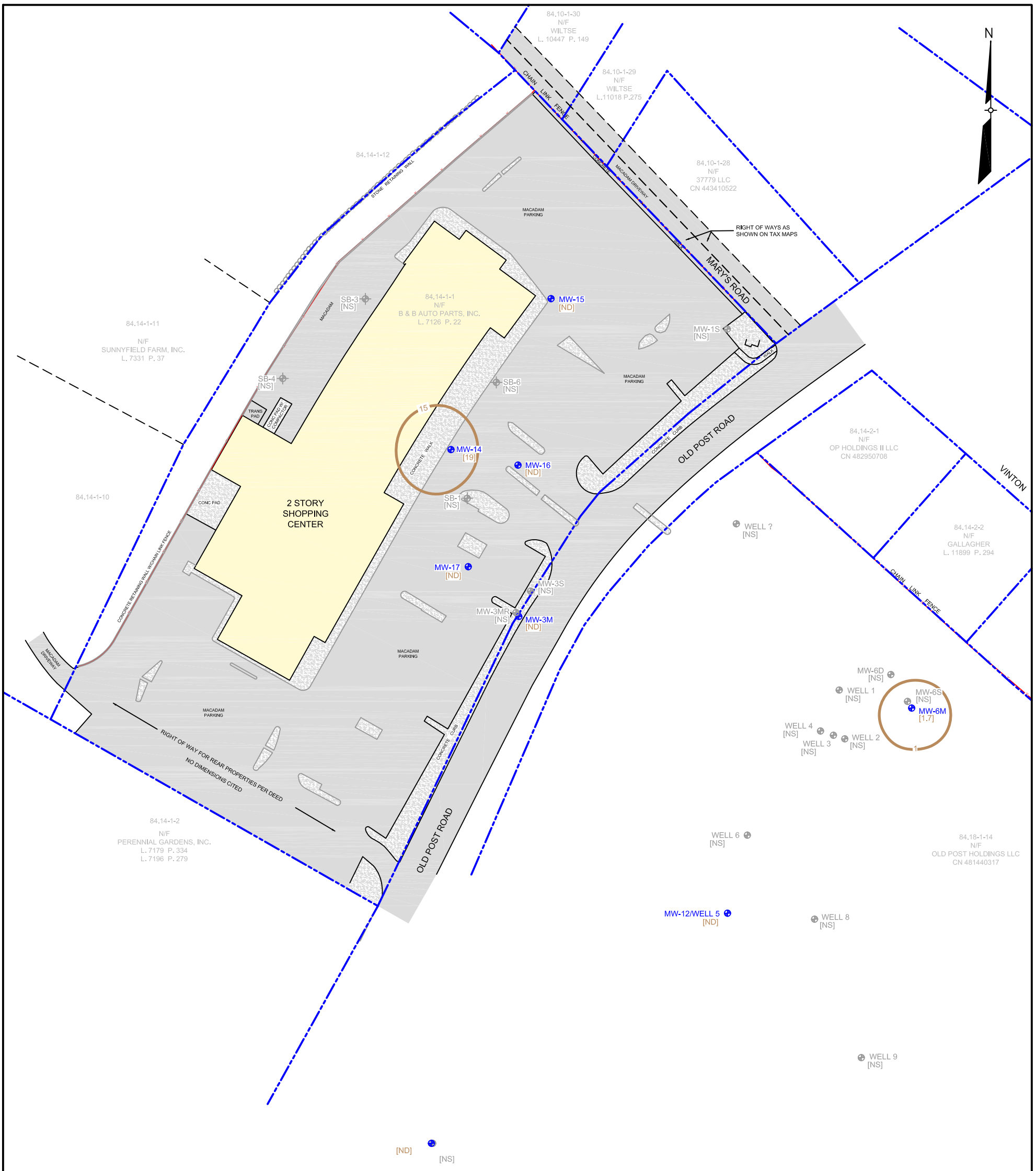
FIGURE 5
CVOCs PLUME MAP
JANUARY 29, 2013

BEDFORD VILLAGE HUNTING RIDGE MALL
NYSDEC SITE NO. 3-60-009

MARCH 2014 60276051



LEGEND:

MW-16	MONITORING WELL LOCATION
SB-2	SOIL BORING LOCATION
1	CVOC CONCENTRATION CONTOUR LINE (DASHED WHERE INFERRED)
[1.7]	CHLORINATED VOLATILE ORGANIC COMPOUND (CVOC) CONCENTRATION
[ND]	NON DETECT
[NS]	NOT SAMPLED
	PROPERTY BOUNDARY
	BUILDING
	PAVED AREA
	CONCRETE AREA

NOTES:

1. MW-1S WAS REMOVED/ DESTROYED IN SPRING 2011. THIS WELL IS DECOMMISSIONED.
2. UNIT OF MEASURE IS MICROGRAMS PER LITER (µg/L).
3. CVOCs INCLUDE cis-1,2-DICHLOROETHENE, TETRACHLOROETHENE AND TRICHLOROETHENE.

0 40 80 160

SCALE IN FEET

SOURCE:
SURVEY COMPLETED BY YEC, INC. DATE OF FIELD SURVEY JANUARY 12, 2009. PROPERTY LINES SHOWN ARE APPROXIMATE ONLY FROM TAX MAP INFORMATION AND ARE NOT CERTIFIED. PROPERTY OWNERS NAMES AND DEED REFERENCES FROM TOWN OF BEDFORD TAX ASSESSMENT ROLES.

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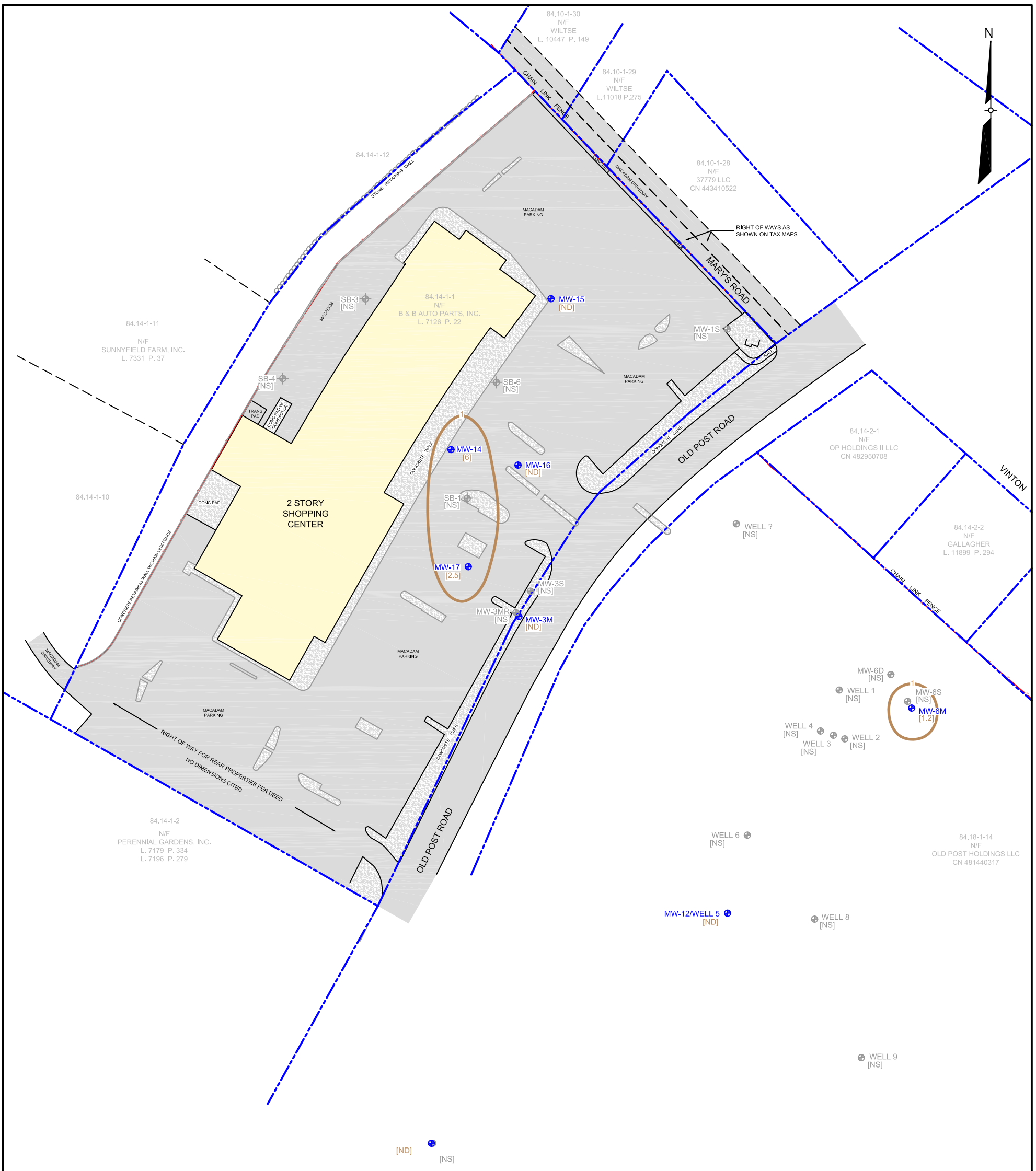
FIGURE 6
CVOCs PLUME MAP
MAY 9, 2013

BEDFORD VILLAGE HUNTING RIDGE MALL
NYSDEC SITE NO. 3-60-009

MARCH 2014 60276051



LEGEND:

MW-16	MONITORING WELL LOCATION
SB-2	SOIL BORING LOCATION
1	CVOC CONCENTRATION CONTOUR LINE (DASHED WHERE INFERRED)
[2.5]	CHLORINATED VOLATILE ORGANIC COMPOUND (CVOC) CONCENTRATION
[ND]	NON DETECT
[NS]	NOT SAMPLED
	PROPERTY BOUNDARY
	BUILDING
	PAVED AREA
	CONCRETE AREA

NOTES:

1. MW-1S WAS REMOVED/ DESTROYED IN SPRING 2011. THIS WELL IS DECOMMISSIONED.
2. UNIT OF MEASURE IS MICROGRAMS PER LITER (µg/L).
3. CVOCs INCLUDE cis-1,2-DICHLOROETHENE, TETRACHLOROETHENE AND TRICHLOROETHENE.

0 40 80 160

SCALE IN FEET

SOURCE:
SURVEY COMPLETED BY YEC, INC. DATE OF FIELD SURVEY JANUARY 12, 2009. PROPERTY LINES SHOWN ARE APPROXIMATE ONLY FROM TAX MAP INFORMATION AND ARE NOT CERTIFIED. PROPERTY OWNERS NAMES AND DEED REFERENCES FROM TOWN OF BEDFORD TAX ASSESSMENT ROLES.

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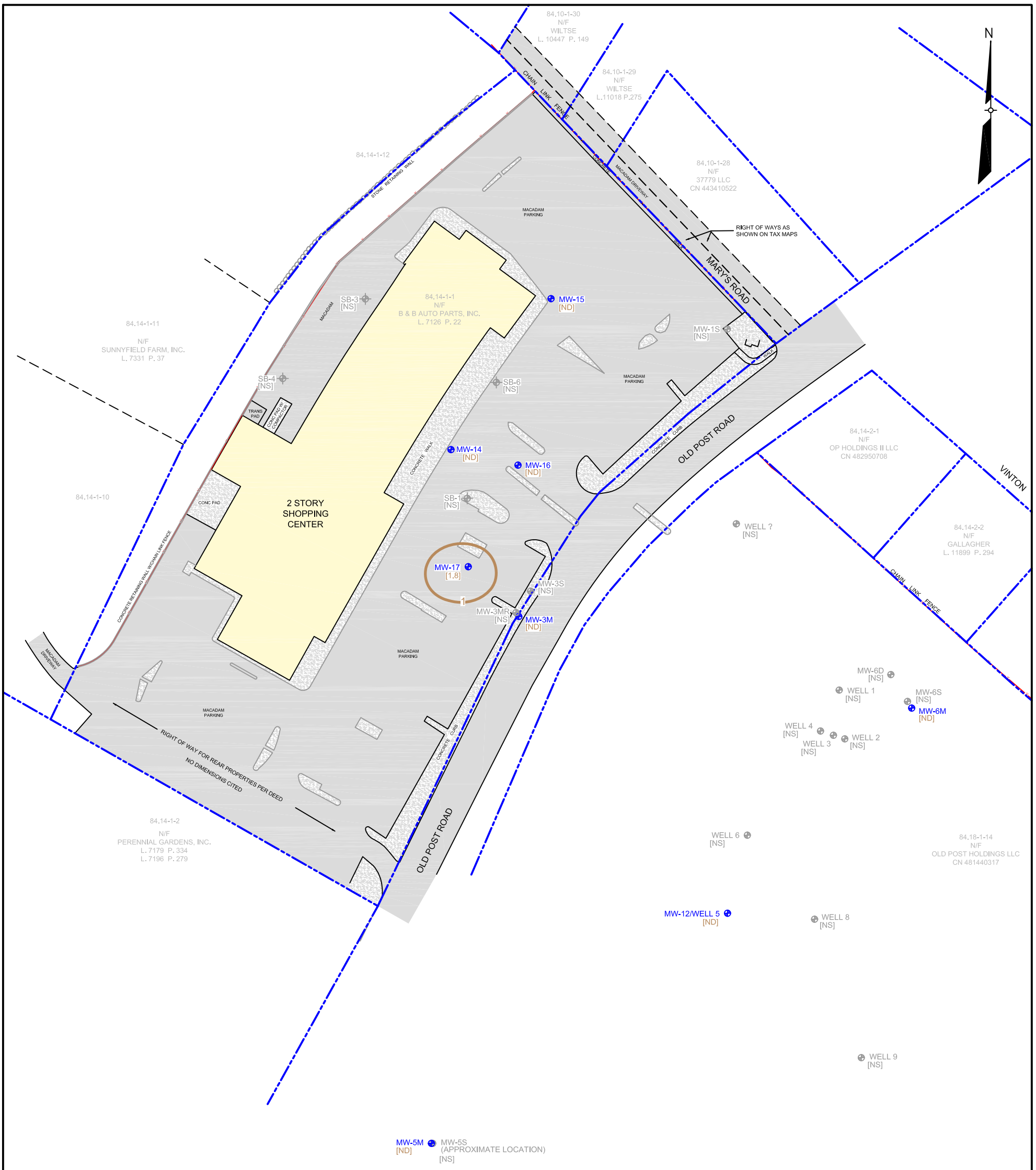
FIGURE 7
CVOCs PLUME MAP
SEPTEMBER 10, 2013

BEDFORD VILLAGE HUNTING RIDGE MALL
NYSDEC SITE NO. 3-60-009

MARCH 2014 60276051



LEGEND:

MW-16	MONITORING WELL LOCATION
SB-2	SOIL BORING LOCATION
1	CVOC CONCENTRATION CONTOUR LINE (DASHED WHERE INFERRED)
[2.5]	CHLORINATED VOLATILE ORGANIC COMPOUND (CVOC) CONCENTRATION
[ND]	NON DETECT
[NS]	NOT SAMPLED
	PROPERTY BOUNDARY
	BUILDING
	PAVED AREA
	CONCRETE AREA

NOTES:

1. MW-1S WAS REMOVED/ DESTROYED IN SPRING 2011. THIS WELL IS DECOMMISSIONED.
2. UNIT OF MEASURE IS MICROGRAMS PER LITER (µg/L).
3. CVOCs INCLUDE cis-1,2-DICHLOROETHENE, TETRACHLOROETHENE AND TRICHLOROETHENE.

0 40 80 160

SCALE IN FEET

SOURCE:
SURVEY COMPLETED BY YEC, INC. DATE OF FIELD SURVEY JANUARY 12, 2009. PROPERTY LINES SHOWN ARE APPROXIMATE ONLY FROM TAX MAP INFORMATION AND ARE NOT CERTIFIED. PROPERTY OWNERS NAMES AND DEED REFERENCES FROM TOWN OF BEDFORD TAX ASSESSMENT ROLES.

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FIGURE 8
CVOCs PLUME MAP
DECEMBER 30, 2013

BEDFORD VILLAGE HUNTING RIDGE MALL
NYSDEC SITE NO. 3-60-009

MARCH 2014 60276051