CORRECTIVE MEASURES STUDY (CMS) REPORT

Former Norton/Nashua Tape Products Facility
2600 Seventh Avenue, Watervliet, New York
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CERTIFICATION

I, Ravi Kumar Korlipara, certify that I am currently a NYS registered professional engineer and that this Revised Corrective Measures Study (CMS) report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10).

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SECTION 1.0

INTRODUCTION

In December 2007, Forensic Environmental Services, Inc. (FES), on behalf of Saint-Gobain Corporation (SGC), finalized an RCRA Facility Investigation (RFI) Report for the former Norton Company/Nashua Tape Products manufacturing facility (Former Norton/Nashua site) located at 2600 Seventh Avenue in Watervliet, New York (see Site Location Map, Figure 1-1). Generalized Area and Site Layout Maps are provided as Figures 1-2 & 1-3, respectively.

The RFI report included a Preliminary Corrective Measures Study (CMS) and Remedial Action Technology Screening (see Section 10.0 of the December 2007 report), which: 1) proposed clean-up objectives and remediation performance goals; 2) evaluated, preliminarily ranked, and identified various potential Corrective Measures; and 3) outlined pilot testing activities needed for a final CMS. The conclusions of the December 2007 Preliminary CMS are summarized in Section 5.0 of this report.

Following approval of the RFI Report by the New York State Department of Environmental Conservation (NYSDEC), additional details on proposed pilot testing activities were provided to the NYSDEC in the December 2008 CMS Workplan. The Workplan proposed: 1) collection of soil and groundwater samples to evaluate the cost-effectiveness, disposal options, and practicability of mass removal via soil excavation, and/or enhanced bioremediation in the Former Tank Farm solid waste management unit (SWMU); 2) field testing of enhanced bioremediation, in-situ chemical oxidation (ISCO) and enhanced fluid recovery (EFR) as possible remedial technologies in, or adjacent to, the Building Subslab Area of Concern (AOC); 3) collection of sub-slab vapor samples and indoor/outdoor air samples from the office area of the Facility; and 4) removal of sewer sediment via EFR with follow-up sampling and monitoring.

Subsequent to the completion of the initial sampling and pilot testing activities in 2009 and 2010, a meeting was held between the NYSDEC, SGC, FES, and the New York State Department of Health (NYSDOH) on June 23, 2010 to discuss the preliminary sampling and pilot testing results, as well as future remedial activities for the Site. At the June 2010 meeting, all parties concluded that based on the results of the sampling and pilot testing, source removal of the most impacted soils would be conducted as a presumptive remedy in the Former Tank Farm Area SWMU. Following approval of the Source Removal Activities (SRA) Workplan, excavation activities were initiated in November 2010 and completed in July 2011 as documented in the January 2012 SRA Report.

All parties at the June 2010 meeting also concluded that EFR appeared to be the most viable remedy for the Building Subslab AOC, but that additional pilot testing was required. A draft CMS Workplan – Pilot Testing Extension, which proposed the installation of additional EFR extraction points and future EFR pilot testing, was submitted in July 2010 and subsequently approved in November 2010. One year of EFR pilot testing (six events) was conducted from May 2011 through May 2012, and with NYSDEC approval, a one-year pilot testing extension was completed in June 2013. The pilot testing activities results are summarized in this report (see Section 4.0).

Finally, it was further discussed and agreed at the June 23, 2010 meeting, that protocols for continuing on-site and off-site groundwater monitoring activities would be modified (rather than following the original Interim Groundwater Monitoring Plan [IGWMP] submitted as part of the December 2007 RFI Report). The revised on-site and off-site groundwater sampling schedules/protocols were included in the November 2010 CMS Workplan – Pilot Testing Extension (onsite) and the December 2010 SRA Workplan (offsite). Results of the on-site and off-site groundwater sampling programs are discussed in this report (see Section 3.2).

On October 21, 2013 the draft CMS report was submitted to the NYSDEC. NYSDEC provided comments in correspondence dated December 23, 2013, and an email dated January 31, 2014. A conference call was held on February 7, 2014 to discuss the comments and a follow-up meeting held on February 20, 2014 was attended by representatives of the NYSDEC, FES, and Korlipara Engineering (Korlipara). At the meeting, it was determined that: 1) NYSDEC would provide additional comments on the draft CMS Report; 2) Korlipara would prepare, certify, and submit the modified CMS Report on behalf of Saint-Gobain; and 3) additional EFR events would be conducted at the Facility until the Statement of Basis is finalized. The NYSDEC provided additional comments in correspondence dated April 8, 2014, and in an email dated April 11, 2014. This revised CMS Report has been prepared in response to the December 2013, and January, February, and April 2014 comments.

The site history and current facility conditions are reviewed in Sections 2.0 & 3.0, respectively, of this report. Previous investigations and Interim Corrective Measures (ICMs; i.e., the 2010-11 excavation activities and the storm sewer EFRs) are discussed in Section 4.0. Remedial goals and targets, including the conclusions of the 2007 Preliminary CMS, which have been updated to summarize current risks associated with the Facility, are summarized in Section 5.0. CMS pilot testing results are provided in Section 6.0.

Alternative corrective measures are briefly described in Section 7.0 and evaluated with respect to: 1) maintaining source control; 2) protecting human health and the environment; and 3) attaining cleanup standards. Section 8.0 further evaluates each alternative corrective measure regarding: 1) long-term reliability and effectiveness; 2) reduction of toxicity, mobility, and/or volume of waste; 3) short-term effectiveness; 4) implementability; 5) remedy cost; 6) community acceptance; and 7) consistency with “green” remediation practices. Section 9.0 identifies and provides justification for SGC’s recommended corrective measure(s). Interim EFR events and the on-site and off-site groundwater sampling programs are reviewed in Section 10.0, the project schedule is summarized in Section 11.0, and report references are provided in Section 12.0.

SECTION 2.0

SITE DESCRIPTION

2.1 Site Description

The former Norton Company/Nashua Tape Products manufacturing facility is located approximately 0.5 miles east of the Hudson River at 2600 Seventh Avenue in Watervliet, NY (see Figure 1-1). The 22-acre property is bordered to the west by other commercial/industrial facilities, to the north by the Delaware & Hudson Railroad, to the east by an open field and residential areas along 3rd Avenue (see Figure 1-2), and to the south by additional residential areas. The original SWMUs and AOCs associated with the Site (see Figure 2-1) are located in: 1) the northeastern facility buildings (i.e., Buildings #58, #59 & #61); 2) the adjacent property margins, which contain several Quonset huts and the former tank farm; and 3) an off-site residential area ("Maplewood") along Alden Street north of the railroad (see Figure 1-2).

The on-site property is almost completely covered by a series of interconnected buildings (see Figure 1-3) with floor elevations approximately 37 feet above mean sea level (msl). Remaining on-site areas, which are paved with asphalt, are fairly level with a slight slope towards the east (and the Hudson River). Outdoor surface elevations range from approximately 36 feet in the southwest and northwest corners of the property to 35.5 feet near on-site well DGC-9 (northeast), 35 feet near on-site well DGC-2 (southeast), and 30 feet near off-site well DGC-10 (located in the open field east of the facility; see Figure 1-3).

The off-site area to the north is also fairly level with a slight slope towards the east (and the Hudson River) and the north. Surface elevations range from 36 feet along the western portion of Alden Street (near well MP-21; see Figure 1-3) to 35.5 feet in the eastern portion of Alden Street (near well MP-15) and 34.3 feet to the north along Craig Street (near well MP-22).

2.2 Site History

The Troy Malleable Iron Works operated at the Former Norton/Nashua site in the 1930s (and possibly earlier) and 1940s. These operations may be the source of the abundant cinders, coal, brick, railroad ties, and other industrial fill materials present at the Site.

From the 1950s until 1974, Norton manufactured adhesive tape at the Site using toluene and tolusol (a mixture of toluene and heptane) as solvents in the production process. Norton sold the tape plant facility to Nashua in 1974; however, Norton continued to lease a portion of the plant (the northern half of Building #61; see Figure 1-3) and continued some manufacturing operations at the Site until December 1989. Norton was subsequently acquired by Saint-Gobain in 1990.

Nashua continued to use toluene and manufacture adhesive tape after acquiring the facility from Norton in 1974. The Kendall Company (Kendall) purchased the facility from Nashua in April 17, 1996 and terminated manufacturing operations before selling the facility to Tyco Corporation International, Inc. (Tyco). The Site is currently used for commercial warehousing by Stone Management (Stone).

Subsurface solvent lines were historically used by Norton to transport tolusol and toluene between the tank farm and stub-ups in the northern portion of Building #58 (see Figure 1-3). Following the discovery of a leak in 1969, the solvent lines were taken out of service and a test pit was installed in Building #61 in 1969 to recover free-phase product (see Rust Environment & Infrastructure [Rust], 1996). This release is the focus and reason for the cleanup at the site.

2.3 Site Geology and Hydrogeology

The Former Norton/Nashua site is located in the Hudson-Mohawk Lowlands physiographic province (or alternatively, the Hudson Valley section of the Valley & Ridge physiographic province). The Lowlands, which are generally 15 to 20 miles wide, are characterized by smooth hills and gentle slopes formed on bedrock that is less resistant to erosion than the surrounding uplands (Plesch, 1994). Along the Hudson River between Newburgh and Troy, there is a narrow inner valley with a conspicuous terrace at an elevation of 100 to 200 feet (NYSDOT, 2013). The western bedrock terrace, which has a local elevation of approximately 200 to 235 feet, is located approximately 0.5 miles west of the Site and a similar bedrock terrace is found east of the Site and the Hudson River near Troy.

Surficial deposits at the Former Norton/Nashua site consist of 0 to 5 feet of fill materials that include broken glass, cinders, coal, bricks, and railroad ties. In some portions of the Site, the fill extends to a depth of almost 10 feet below surface grade (bsg). Shallow native materials include gravels, pebbles, and silty clays and sands associated with glacial till deposits. Discontinuous dense clays (possible remnants of lacustrine sediments from glacial Lake Albany) are also present at a depth of 5 to 10 feet bsg or greater. Finer-grained materials generally become less common with depth at the Site, and coarse sands and gravels associated with Hudson River alluvium are the predominant lithology at depths greater than 10 feet; however, there are significant portions where clays and silty clays extend beneath the water table.

Cross-sections A-A' (Figure 2-2) and B-B' (Figure 2-3), which are oriented west to east and south to north across the Site, respectively, provide a generalized depiction of subsurface materials at the Facility and in the off-site area to the north. A cross-section location map is included as Figure 2-4.

Depth to bedrock at the Former Norton/Nashua site generally ranges from 14 to 20 feet; drilling refusal at shallower depths often occurs due to large bricks, cobbles, or other coarse fill material. Many soil borings did not extend to the top of bedrock because volatile organic compound (VOC) impact, as measured by field photoionization detector (PID) readings, decreased at the bottom of the boring (generally 15 feet below grade). The maximum depth to bedrock at the Site (22.5 feet) was recorded at MW-11, located in Building #61 near manhole (MH) #12 (see Figure 1-3).

Bedrock stratigraphy in the vicinity of the Site is complicated by a high degree of structural deformation; local rocks have been characterized as "indescribably folded, tilted and crushed" (Ruedemann, 1901). Bedrock at the Former Norton/Nashua site was originally mapped as the Snake Hill Shale (Late Middle Ordovician), a dark gray to black argillaceous shale and subgreywacke (Ruedemann, 1938). More recent work by Kidd et al. (1995) and Plesch (1994) classified local bedrock as shales, siltstones, and thin greywackes of the Waterford Flysch Zone of the Cohoes Melange lithostratigraphic unit, but this mapping nomenclature has not been widely accepted. English et al. (2006) noted that due to a predominance of shale and near absence of sandstone, local bedrock "should not be included in the Snake Hill Formation", and refer to the "moderately folded, poorly fossiliferous, unbioturbated black shale with millimeter-scale, fine-grained sand laminae" as the "Green Island-type facies", a transitional lithology between the Snake Hill Formation and the deeper water Dolgeville Formation to the west.

The average depth to water at the Former Norton/Nashua site is 8.4 feet (outside building footprint) to 9.4 feet (inside building footprint) with a range of 6.8 feet to 11.3 feet. Gauging data from the 2007 RFI (see Section 4.1) and other investigations indicate the predominant on-site and off-site groundwater flow direction is east towards the Hudson River, i.e. there is no flow component off-site to the north. Typical groundwater flow maps (June 2004 & November 2012) are included as Figures 2-5 & 2-6.

A 2004 geophysical survey conducted in conjunction with the RFI did not find evidence for a preferred pathway between the former Norton/Nashua facility and Alden Street via manmade conduits, fill or lithological change, bedrock surface channeling, or shallow bedrock fractures. As noted in the 2007 RFI Report, any residual toluene present along Alden Street is most likely due to the historical dewatering activities performed in the early 1970s in conjunction with the installation of the Dry River Interceptor storm sewer that runs slightly south of, and parallel to, Alden Street (see Figure 1-2). Toluene odors and the presence of free-phase product (FPP) toluene were noted during the dewatering activities, which likely pulled impacted groundwater and FPP north from the Former Norton/Nashua site towards Alden Street. (It is also purported that the recovered water was discharged without treatment and allowed to infiltrate in the general area where toluene has historically been detected offsite.)

2.4 Compounds of Concern (COCs) - SWMU/AOC Summary

The December 2007 RFI report discussed the four SWMUs and nine AOCs that were investigated at the Former Norton/Nashua site (see Section 4.1 for additional details on the RFI). Original and final SWMU/AOC locations are depicted on Figures 2-1 & 2-7, respectively. In conjunction with the RFI, soil and groundwater samples were collected from each SWMU/AOC (sediment and sewer water from the Sewer SWMUs) and analyzed for potential compounds of concern (COCs) including VOCs and semi-volatile organic compounds (SVOCs).

A water sample from one of the former floor cutouts in the Building #58 AOC (see Figure 1-3) was also analyzed for total petroleum hydrocarbons – diesel-range organics (TPH-DRO), and demonstrated a concentration of 50.8 milligrams per liter (mg/L), but SVOC analytes were not elevated in surrounding soil samples. Based on these results, and subsequent discussions with the NYSDEC Project Engineer, the cutouts were not considered an item of environmental concern and were subsequently filled with cement by the current property owner.

Other substances, such as metals and polychlorinated biphenyls (PCBs), were not considered potential COCs or further evaluated during the initial RFI because they were not associated with known historical manufacturing processes at the former Norton/Nashua facility. However, five soil samples were analyzed for 14 selected metals for waste characterization purposes in conjunction with 2011 excavation activities (see Section 4.2.1). Eight metal analytes were detected in the 2011 soil samples (arsenic, barium, beryllium, chromium, lead, nickel, vanadium, and zinc), but all detected metal concentrations were below the 6 NYCRR (NYSDEC, 2006) Part 375 Unrestricted Use Soil Clean-Up Objectives (SCOs) except for a slight exceedance of nickel in one sample. Because the average nickel concentration was below the Unrestricted Use SCO (and all nickel concentrations were well below Residential and Restricted Commercial Use SCOs), there was no further investigation of metals at the Former Norton/Nashua site.

Similarly, PCBs were also sampled in conjunction with the 2010-2011 excavation activities (see Section 4.2.1). All detected concentrations were below the Unrestricted Use SCO (see the 2012 SRA Report). PCBs were also sampled in conjunction with Storm Sewer SWMU SRA. Additional details are provided in Section 4.2.2.

2.4.1 VOCs in Soil

A total of 133 soil samples (not counting duplicates or replicates) were analyzed for VOCs during the RFI. A total of 11 VOC analytes were detected in the samples. VOC tentatively identified compounds (TICs) were also detected in many of the soil samples.

Toluene was detected in 44 of the 133 RFI soil samples. Toluene concentrations exceeded the Unrestricted Use SCO in 13 samples; 2 were off-site samples, one in the residential area along Alden Street, and one on the railroad property next to the Former Tank Farm SWMU (see Figure 1-3 for off-site areas). Toluene concentrations in 5 samples also exceeded the Commercial Use SCO in the on-site Beneath Building AOC (see Figure 2-7 for AOC location).

Heptane was detected in 17 of the 133 soil samples. The only off-site detection was co-located with the toluene exceedance on the off-site railroad property next to the Former Tank Farm SWMU (see Figure 2-1). The heptane concentration at this location exceeded the Unrestricted Use SCO, but was below the Commercial Use SCO. Heptane exceeded the Unrestricted Use SCO in 9 on-site samples (7 were co-located with toluene exceedances); 2 samples in the Building #58 AOC (see Figure 2-1) also exceeded the Commercial Use SCO.

Xylenes were detected in 16 of the 133 soil samples, but there were no off-site xylene detections. Xylenes exceeded the Unrestricted and Commercial Use SCO in 2 samples; both samples were co-located with toluene exceedances in the on-site Former Solvent Line AOC (see Figure 2-1).

Although acetone and methylene chloride were detected in many RFI soil samples, the majority of these detections were "B-qualified" indicating these compounds were also detected in the laboratory method blanks, and the reported presence of these compounds was attributed to laboratory contamination. Benzene was detected in 5 soil samples (including one off-site sample), but all concentrations were below the Unrestricted Use SCO. Detections of four other VOC analytes: 2-butanone (methyl ethyl ketone; MEK), chloroform, cis-1,2,-dichloroethene (cis-1,2-DCE), and trichloroethene (TCE), were limited to one on-site sample each at a concentration at least an order of magnitude below the Unrestricted Use SCO. Therefore, the above VOC analytes were not retained as COCs for the Former Norton/Nashua site.

In summary, based on the RFI sampling results, toluene, heptane, and xylenes were retained as soil COCs for the on-site Beneath Building AOC and Former Tank Farm Area SWMU (see the summary tables in Section 2.4.7). Toluene and heptane were retained as soil COCs for the Off-Site AOC (see the summary tables in Section 2.4.7).

2.4.2 SVOCs in Soil

A total of 113 soil samples (not counting duplicates or replicates) were analyzed for SVOCs during the RFI. A total of 26 SVOC analytes were detected in the samples. SVOC TICs were also detected in many of the soil samples.

Although bis(2-ethyl-hexyl)phthalate (BEHP) was detected in many RFI soil samples (and was the only SVOC analyte detected in the Off-Site AOC), the majority of these detections were "B-qualified" indicating this compound was also detected in the laboratory method blanks (and BEHP was also detected in two field blank samples). The reported presence of BEHP was attributed to laboratory (and/or field sampling) contamination and BEHP was not retained as a COC for the Former Norton/Nashua site.

Naphthalenes were detected in 10 RFI soil samples, but all concentrations were below the Unrestricted Use SCO. Ten other SVOC analytes (carbazole, di-n-butyl-phthalate [DBP], 1,4-dichlorobenzene, phenol, 1,2,4-trichlorobenzene, and five polyaromatic hydrocarbons [PAHs]) were detected in fewer than 10 soil samples at concentrations below the Unrestricted Use SCO. Therefore, these SVOC analytes were not retained as COCs for the Former Norton/Nashua site.

A group of 12 PAHs was more frequently detected (present in 20 to 27 soil samples) at the Former Norton/Nashua site. These PAHs were clearly associated with the asphalt, cinder, and coal present in the historical fill materials. All detected concentrations of five of these PAHs (anthracene, benzo[g,h,i,]perylene, fluoranthene, fluorene, phenanthrene, and pyrene) were below the Unrestricted Use SCO. However, concentrations of one or more of the following seven PAHs: benzo(a)anthracene (BaA), benzo(b)fluoranthene (BbF), benzo(k)fluoranthene (BkF), benzo(a)pyrene (BaP), chrysene, dibenzo(a,h)anthracene (DBahA), and indeno(1,2,3-cd)pyrene (IcdP) exceeded the Unrestricted Use SCO in 9 samples; the Commercial Use SCO was also exceeded in 6 of these samples for BaP and 2 of these samples for DBahA. All Unrestricted Use SCO (and Commercial Use SCO) exceedances were in the on-site Beneath Building AOC.

Finally, methylphenols (creosols) were detected in 5 of the 113 RFI soil samples; 4-methylphenol exceeded the Unrestricted Use SCO in one sample, and 2-methylphenol exceeded the Unrestricted Use SCO in two samples. Both soil samples were in the on-site Beneath Building AOC (see Figure 2-7). The April 1996 Rust Report speculated that the source for the creosols could be the coal and cinders that were used as fill at the Site.

There is limited risk of exposure to the above SVOCs because the soils in question are beneath thick concrete building floors and are generally found in the historical fill at a depth of five to seven feet or more. Therefore, the 2007 RFI Report concluded that the above soil SVOCs, including PAHs and creosols (see the summary tables in Section 2.4.7), would not be further investigated or addressed as COCs at the Former Norton/Nashua site.

2.4.3 VOCs in Groundwater

During the RFI, six VOC analytes were detected in Geoprobe groundwater samples: toluene, heptane, acetone, chloroform, methylene chloride, and xylenes. Off-site detections were limited to toluene, heptane, and xylenes (the latter two analytes were detected at one location adjacent to the railroad tracks). VOC TICs were also reported present in multiple samples.

Similar to the soil analytical data, acetone and methylene chloride were detected in multiple RFI groundwater samples, but the majority of these detections were "B-qualified" and the reported presence of these compounds was attributed to laboratory contamination. Other detected VOC analytes were compared to their respective New York Ambient Water Quality Standard (AWQS; see NYSDEC, 1999). Maximum reported groundwater concentrations for chloroform and xylenes were below their respective AWQS, but toluene detections above AWQS were confirmed at multiple on-site and off-site well locations, and heptane detections above AWQS were confirmed at 3 on-site wells. Therefore, toluene and heptane were retained as COCs in groundwater at the Former Norton/Nashua site (see the summary tables in Section 2.4.7).

Subsequent monitoring well sampling has detected additional VOC analytes (see Table 2-1); however, confirmed detections above AWQS have been limited to benzene (7 on-site wells), cyclohexane (CH; 1 on-site and 1 off-site well), ethylbenzene (3 on-site wells), methylcyclohexane (MCH; 10 on-site and 3 off-site wells), and xylenes (4 on-site wells). (Note: due to elevated toluene concentrations, detection limits for other analytes may have exceeded their respective groundwater standards at selected sampling locations.) The source(s) of the cyclohexane and methylcyclohexane is unknown but could be related to toluene use at the Site. The above VOCs have been retained as COCs in groundwater at the Former Norton/Nashua site (see the summary tables in Section 2.4.7); however, they will be addressed by Corrective Measures (see Section 9.0) that are directed towards the dissolved toluene plume.

2.4.4 SVOCs in Groundwater

During the RFI, BEHP (all detections "B-qualified"), creosols, DBP, pyrene, and SVOC TICs were detected in the on-site groundwater samples collected via Geoprobe sampler. Only the creosol concentrations exceeded their respective AWQS. Five PAHs and DBP ("B-qualified") were detected in a groundwater sample collected via Geoprobe sampler on the railroad property near the Former Tank Farm SWMU. Three of the PAH concentrations exceeded their respective AWQS. SVOC TICs and "B-qualified" BEHP detections were reported at additional off-site locations.

Groundwater samples were subsequently collected from 28 on-site and off-site monitoring points/wells in February 2004 for SVOC analysis. SVOC detections were limited to creosols (also detected in the field blank sample), naphthalenes, phthalates, and SVOC TICs, and nine PAHs (at well MW-16 only); however, only creosols (and BEHP and PAHs at well MW-16) exceeded their respective AWQS. Well MW-16 was resampled in June 2004 and BEHP and PAHs were not detected (ND).

SVOCs with only "B-qualified" detections or without confirmed detections above their respective AWQS were not retained as COCs in groundwater. The creosol AWQS exceedances were restricted to sampling locations in the Former Tank Farm Area SWMU and the Beneath Buildings AOC (see Figure 2-7), which also had toluene AWQS exceedances. Therefore, they will be addressed along with the Corrective Measures (see Section 7.0) that are directed towards the dissolved toluene plume.

2.4.5 Sanitary and Storm Sewer Samples - VOCs

Historical sewer sampling data (2001) indicated that, under prevailing conditions, there was no significant occurrence of VOCs in the storm and sanitary sewer systems. Except for chlorobenzene at upstream sanitary sewer location MH-FC (see Figure 1-3 for manhole locations), VOC concentrations in all sewer sediment samples were below sediment screening criteria (SSC; see NYSDEC Technical Guidance for Screening Contaminated Sediments, 1999). Further, detected VOCs in the storm and sanitary sewer sediment samples demonstrated lower concentrations as compared with historical sampling events suggesting that the source of the previously detected VOCs was reduced or removed.

Similarly, VOC detections in 2004 sanitary and storm sewer water samples were limited to VOC TICs and "B-qualified" results. Therefore, VOCs were not retained as COCs in the Sewer SWMUs.

2.4.6 Sanitary and Storm Sewer Samples - SVOCs

Numerous SVOC analytes and TICs were present in 2001 sanitary sewer sediment samples. However, except for a slight BaP exceedance at MH-FC (the BaP concentration in the duplicate sample was below the SCC), all SVOC concentrations were below their respective SCC in the sanitary sewer sediment samples.

Five to seven SVOC analytes exceeded the SCC in the 2004 storm sewer sediment samples from MH-2.5, MH-3.5 & MH-14 (see Figure 1-3), BaP exceeded the SCC in all 2004 storm sewer sediment samples, and SVOCs TICs were detected in all 2004 storm sewer sediment samples. SVOC concentrations were highest in 2004 upstream storm sediment sample MH-3.5 and lowest in 2004 storm sediment sample MH-13 (see Figure 1-3).

In contrast, the 2001 & 2004 sampling data demonstrated there was no significant occurrence of SVOCs in sewer water. Although SVOC TICs were detected in all storm sewer water samples and 19 SVOC analytes were detected at upstream storm sewer water sampling locations MH-13 & MH-14 (see Figure 1-3), exceedances of NYSDEC Class C surface water (6 NYCRR Part 703; NYSDEC, 1999 and TOGS 1.1.1; NYSDEC, 1998) standards in 2004 were limited to BEHP at upstream locations MH-13 & MH-14. No SVOC analytes were detected in the 2004 sewer water samples collected from the three downstream storm sewer manholes: MH-1, MH-5 & MH-12 (see Figure 1-3).

A total of 12 SVOC analytes were detected in downstream sanitary sewer water sample MH-1[San] (see Figure 1-3), but exceedances of NYSDEC Class C surface water (6 NYCRR Part 703) standards in the 2004 samples were limited to 4-methylphenol and BEHP. BEHP was also detected above standards in off-site sanitary sewer Alden-4 (see Figure 1-3 for location). Because there were no SVOC sediment SCC exceedances and the sanitary sewer water is treated downstream, SVOCs were not retained as COCs in the Sanitary Sewer SWMU.

The December 2007 RFI Report concluded that the storm sewer sediment SVOC PAH concentrations were generally several orders of magnitude higher than SVOC concentrations detected in adjacent soil boring samples, which suggested a historical/ongoing surface source (e.g., parking lot and/or roof runoff) rather than a subsurface sediment source.

The RFI report also concluded that potential off-site risk of exposure to SVOCs in storm sewer water was unlikely given: 1) low SVOC soil (sediment) to water partitioning coefficients;

and 2) the absence of detectable SVOCs in downstream storm sewer water samples. However, SVOCs in sediment were retained as COCs for the Storm Water SWMU (see the summary tables in Section 2.4.7).

The Preliminary Corrective Measure Evaluation of the RFI Report proposed that accessible SVOC sediments would be removed from the storm sewer system (via vactruck) in an attempt to determine whether their source was from: 1) historical site activities; and/or 2) run-off from asphalt covered areas of the roof (recently resealed/repaired) and the parking lot. If SVOC sediments returned after the vactruck removal event, they would be attributable to a current run-off from asphalt covered areas of the roof (recently resealed/repaired) and the parking lot. This source would not be not related to historical operations at the Former Norton/Nashua site.

If SVOC sediments did not return after the vactruck removal event, the removal of the existing storm sewer sediments would eliminate the potential off-site migration of any sediments remaining in the storm sewers from historical operations at the facility. Additional details on the Storm Sewer SWMU SRA are provided in Section 4.2.2.

2.4.7 SWMU/AOC COC Summary Tables

The tables on the following pages summarize COCs in each contaminated media (if any) and current conditions at each SWMU/AOC at the Former Norton/Nashua site. Additional details on current conditions at the Site are provided in Section 3.0.

SWMU/AOC SUMMARIES (see Figures 2-1 & 2-7 for SWMU/AOC locations):

	Potential COCs		
ON-SITE SWMUs/AOCs	**Soil**	**Groundwater****	**Current Conditions (see Section 3.0)**
Quonset Hut B AOC	*PAHs, SVOC TICs*	none	No further investigation or remedial action proposed
Quonset Hut C AOC	none	none	No further investigation or remedial action proposed
Filter Room AOC	*VOC/SVOC TICs*	none	No further investigation or remedial action proposed
Solvent Recovery Room AOC	*toluene, VOC/SVOC TICs*	none	No further investigation or remedial action proposed
Former Tank Farm Area SWMU	**toluene**, **heptane**, *SVOCs*, *PCBs*, *metals*, *VOC/SVOC TICs*	**toluene**, **BEX**, **CH**, **MCH**, **creosols**, other SVOCs, *VOC/SVOC TICs*	SRA addressed soil (see Section 4.2.1); GW will be addressed
Former Test Pit AOC*	<u>**toluene**</u>, <u>**PAHs**</u>, **heptane**, **creosols**, *other VOCs*, *VOC/SVOC TICs*	**toluene**, **heptane**, **MCH**, **creosols**, *VOC/SVOC TICs*	* Soil and Groundwater will be addressed
Former Solvent Line AOC*	<u>**toluene**</u>, **heptane**, **xylenes**, **IcdP, creosols**, *other VOCs/SVOCs*, *VOC/SVOC TICs*	**toluene**, **heptane**, **BEX**, **MCH**, **creosols**, *VOC/SVOC TICs*	* Soil and Groundwater will be addressed
"Beartex" Sump Pit SWMU*/ Building #61 Doorway AOC*	<u>**PAHs**</u>, **toluene**, *heptane*, *other VOCs*, *VOC/SVOC TICs*	**toluene**	* Soil and Groundwater will be addressed
Building #58 AOC*	<u>**toluene**</u>, <u>**heptane**</u>, <u>**PAHs**</u>, *other VOCs/SVOCs*, *VOC/SVOC TICs*	**toluene**, **heptane**, **benzene**, **MCH**, **creosols**, *VOC/SVOC TICs*	* Soil and Groundwater will be addressed

* included in the Beneath Buildings AOC ** confirmed monitoring well/point detections

BEX = benzene, ethylbenzene, and xylenes; CH = cyclohexane; IcdP = indeno(1,2,3cd)pyrene; MCH = methylcyclohexane; PAHs = polyaromatic hydrocarbons.

italicized = detected concentration below standard; **bold** = exceeds Unrestricted Use SCO or GW Standard; <u>**underlined**</u> = exceeds Restricted Commercial Use SCO.

SWMU/AOC SUMMARIES continued (see Figures 2-1 & 2-7 for SWMU/AOC locations):

	Potential COCs		
ON-SITE SEWER SWMUs	**Sediment**	**Sewer Water**	**Current Conditions (see Section 4.0)**
Storm Sewer SWMU	**PAHs**, **PCBs,** *chlorobenzene*, *toluene*, *BEHP*, *carbazole*, *VOC/SVOC TICs*	**BEHP**, **PCBs*,** *PAHs*, *other phthalates*, *VOC/SVOC TICs*	SRA addressed water and sediment (see Section 4.2.2); No further investigation or remedial action
Sanitary Sewer SWMU	**BaP, chlorobenzene**, *BEX*, *toluene,* *BEHP*, *other SVOCs*, *VOC/SVOC TICs*	**BEHP**, *PAHs*, *other phthalates*, *VOC/SVOC TICs*	No further investigation or remedial action

* = results were not confirmed by subsequent sampling

BaP = benzo(a)pyrene; BEHP = bis(2-ethylhexyl)phthalate; BEX = benzene, ethylbenzene, and xylenes; PAHs = polyaromatic hydrocarbons.

italicized = detected concentration below SCC/standard; **bold** = detected concentration exceeds SCC or Surface Water Standard.

	Potential COCs		
OFF-SITE AOC	**Soil**	**Groundwater***	**Current Conditions (see Section 3.0)**
Alden St. (Residential) Properties	<u>**toluene**</u>	**toluene**, **MCH**, *cyclohexane*, *VOC TICs*	Soil and Groundwater will be addressed
Railroad (Commercial) Property	**toluene**, **heptane**, *benzene,* *VOC TICs*	**toluene**, **MCH**, **PAHs**, *cyclohexane*, *VOC/SVOC TICs*	Soil and Groundwater will be addressed

* confirmed monitoring well/point detections

italicized = detected concentration below standard; **bold** = detected concentration exceeds Unrestricted Use SCO or GW Standard; <u>**underlined**</u> = detected concentration exceeds Restricted Residential or Commercial Use SCO.

SECTION 3.0

CURRENT SITE CONDITIONS

This section reviews current conditions at the Former Norton/Nashua Site including the extent of free-phase product (FPP), and the extent and magnitude of VOCs in groundwater, soil, and vapor. This section also discusses current risks associated with the Site including the potential for off-site groundwater migration, direct contact to impacted soil and/or groundwater for on-site workers and off-site residents, the use of drinking water, and the potential for vapor intrusion.

3.1 Free-Phase Product (FPP)

Except for transient detections of FPP toluene in one well (MP-25) in the 2009 ISCO pilot testing treatment area (see Figure 3-1 for on-site well locations), FPP has not been detected at the Former Norton/Nashua site since December 2006. FPP was observed at well MP-25 during the June 2009 ISCO pilot testing and reached a maximum apparent product thickness (APT) of 0.08 feet on August 24, 2009 prior to manual bailing. On September 16, 2009, the APT at well MP-25 was 0.02 feet. The well was again manually bailed and a petrophilic sock was installed.

The FPP detected at MP-25 was likely associated with a small pocket of residual FPP, which was mobilized during the ISCO pilot testing. (Following the November 2012 ISCO pilot test, dissolved toluene concentrations increased at this well, but FPP toluene was not detected.) There have been no subsequent detections of FPP at MP-25 or any other wells at the Former Norton/Nashua site.

3.2 Groundwater

Following NYSDEC approval of the RFI Report in March 2008, groundwater was monitored at the Site as outlined in the December 2007 IGWMP, which was later replaced by the November 2010 CMS Workplan – Pilot Testing Extension (onsite) and the December 2010 SRA Workplan (offsite). Additional groundwater samples were collected in association with SRA and pilot testing activities (see Sections 4.2.1 & 6.0, respectively). Historical groundwater sampling results are summarized in Table 2-1. As discussed elsewhere (see Section 2.4), the primary on-site and off-site COC is toluene. The occurrence of other groundwater COCs (see Section 2.4.7) is limited and co-located with toluene. Therefore, the investigation and remediation of these groundwater COCs is addressed by the toluene study and remedy.

The following table summarizes maximum toluene concentrations during the two most recent groundwater sampling events at each on-site sampling location (see Figures 1-3 & 3-1 for on-site sampling locations and Figure 3-2 for recent on-site toluene concentrations):

TOLUENE CONCENTRATION in MICROGRAMS PER LITER (µg/L)	**ON-SITE MONITORING POINTS/WELLS**
Less than 5 µg/L (groundwater standard)	DGC-1, DGC-2, DGC-5*, DGC-9, DGC-10, MW-23, MW-25, MP-8**, MP-10, MP-12, MP-31, MP-32, MP-34, MP-36, MP-40**, IS-1
5 µg/L to 1,000 µg/L (proposed remedy performance goal; see text)	DGC-3*, DGC-4, DGC-6, DGC-7, MW-11, MW-12, MW-13, MW-15, MW-16, MW-17, MP-2, MP-9, MP-24, MP-28, MP-33, MP-38**
1,000 µg/L to 10,000 µg/L	MW-14*, MW-20, MW-21, MW-24**, MW-26, MW-37R, MP-1, MP-4*/**, MP-11, MP-23, MP-30, MP-35, MP-39**, IS-2
Greater than 10,000 µg/L	DGC-8*, MW-22, MW-27, MP-3*, MP-25, MP-26, MP-27, MP-29, MP-37

* well abandoned or destroyed
** well only sampled once

The above table indicates toluene concentrations met the groundwater standard of 5 micrograms per liter (µg/L) at 16 on-site monitoring points/wells during the two most recent sampling events at that location. (Toluene was ND at 6 additional locations the last two times these locations were sampled, but the laboratory detection limit of 10 µg/L did not meet the groundwater standard). Further, toluene concentrations met the proposed short-term remedy performance goal (RPG) of 1,000 µg/L (see Section 5.2) at 16 additional on-site monitoring points/wells during the two most recent sampling events.

Therefore, future remedial efforts will be focused at the remaining 19 extant on-site monitoring points/wells, which are associated with: 1) the Former Tank Farm Area SWMU; and 2) the AOCs and SWMU forming the Beneath Buildings AOC (see Figure 2-7) where toluene concentrations exceed the proposed RPG. However, as further discussed in Section 5.6, recent toluene concentrations demonstrate an overall decreasing trend at many of these 19 locations.

The following table summarizes maximum toluene concentrations during the two most recent groundwater sampling events at each off-site sampling location (see Figure 3-3 for off-site sampling locations and Figure 3-4 for recent off-site toluene concentrations):

TOLUENE CONCENTRATION (µg/L)	**OFF-SITE MONITORING POINTS/WELLS** (date last exceeded 5 µg/L)
Less than 5 µg/L (groundwater standard)	MW-18 (May-11), MW-19 (Dec-08), MP-16 (Aug-08), MP-17 (Nov-09), MP-18 (Aug-08), MP-22 (Dec-08)
5 µg/L to 1,000 µg/L	MP-5, MP-6, MP-7*, MP-13, MP-14, MP-15, MP-19, MP-20*/**, MP-21*/**
Greater than 1,000 µg/L	none

* with NYSDEC approval, well abandoned in 2008
** well only sampled once

The above table indicates toluene concentrations met the groundwater standard of 5 µg/L at 6 of the 15 off-site monitoring points/wells during the two most recent sampling events at these locations. Further, toluene concentrations have met the groundwater standard at all 6 of these off-site monitoring points/wells since May 2011 (or longer).

Of the 9 off-site monitoring locations where the groundwater standard of 5 µg/L was not met the last two times these locations were sampled, elevated detection limits (generally 10 µg/L) were present at 8 of the locations (and toluene has never been detected at concentrations above 5 µg/L at 6 of these 8 locations). At the remaining location, MP-14, toluene concentrations decreased from 180 µg/L in April 2013 to 23/21 µg/L in June 2013 and 8 µg/L in December 2013 (see Table 2-1 & Figure 3-4). Toluene concentrations last exceeded 1,000 µg/L (the proposed short-term RPG) at MP-14 in March 2008.

3.3 Soil

As discussed in Section 2.4, potential soil COCs detected at concentrations below Unrestricted Use SCOs during the RFI were not retained as COCs at the Former Norton/Nashua site. Toluene, heptane, and xylenes were retained as soil COCs for the On-Site SWMU/ACO, and toluene and heptane were retained as soil COCs for the Off-Site AOC. The occurrence of heptane and xylenes is limited and co-located with toluene. Therefore, the investigation and remediation of heptane and xylenes is addressed by the toluene study and remedy.

In addition to the above VOCs, selected PAHs and creosols were retained as soil COCs for the Beneath Building AOC (see Section 2.4.2). However, these COCs were not further investigated because: 1) their distribution is limited and generally co-located with toluene; and 2) there is a limited risk of exposure to these on-site COCs because they are generally found in the historical fill at a depth of seven feet or more below the thick concrete building floors.

Soil samples collected after the RFI at the Former Norton/Nashua site include: 1) prior to, and following, 2011 SRA activities (for additional details, see Section 4.2.1, the December 2010 SRA Workplan, and the January 2012 SRA Report); and 2) prior to 2009 and 2012 ISCO pilot testing activities (see Section 6.2).

In order to determine if the soil proposed for 2011 SRA excavation was characteristically hazardous or non-hazardous, pre-excavation waste characterization samples were collected. A total of six Geoprobe soil borings (B-1 through B-6; see Figure 4-1) were advanced on November 18, 2010. Three soil samples were collected from each boring: shallow (4 to 7 feet), just above the water table (7 to 9 feet), and below the water table (11 to 12 feet). Samples were submitted for analysis of VOCs including TICs and heptane via EPA Method 8260.

Toluene was detected in all 19 pre-excavation soil samples (see Table 4-1) at concentrations ranging from 5.9 J micrograms per kilogram (µg/kg) to 7,900,000 µg/kg. Maximum reported VOC concentrations were generally detected in soil samples collected just above the water table (sample depth 7 to 9 feet). Toluene concentrations in 12 pre-excavation soil samples exceeded the Unrestricted Use SCO of 700 µg/kg; five soil samples also exceeded the Restricted Use (Residential) SCO of 100,000 µg/kg, and three soil samples SB-3 (depth 8 feet), SB-4 (9 feet), and SB-6 (7 feet) exceeded the Restricted Use (Commercial) SCO of 500,000 µg/kg.

As discussed in Section 2.4, five pre-excavation soil samples were analyzed for 14 selected metals and PCBs, and two samples were analyzed for SVOCs, for waste characterization and disposal purposes in conjunction with the 2011 excavation activities (see Table 4-2 and Section 4.2.1). Except for a slight exceedance of nickel in one soil sample (B11-15), exceedances of creosols in one soil sample (B11-2), and slight exceedances of nitrobenzene in two soil samples (B11-2 & B11-4), all analyte concentrations were below Unrestricted Use SCOs (and Restricted Commercial Use SCOs).

Following the completion of the March 2011 excavation activities, per NYSDEC DER-10 (NYSDEC, 2010), one confirmation post-excavation soil sample was collected for every 30 feet of sidewall (2 samples on the east and west excavation sidewalls, and 3 samples on the north and south excavation sidewalls; see Figure 4-2 for sample locations) at the screening locations exhibiting the highest field PID readings. Soil samples were submitted for analysis of VOCs via EPA Method 8260 plus heptane and TICs, SVOCs and TICs via EPA Method 8270, and PCBs via EPA Method 8082. Toluene, cyclohexane, heptane, methylcyclohexane, SVOCs, and VOC/SVOCs TICs were detected in the post-excavation soil samples, but PCBs were ND in the samples.

All detected VOC/SVOC concentrations in the confirmatory soil samples (see Table 4-2) were below the Restricted Use (Commercial) SCOs, which were the target SCOs identified in the approved December 2010 SRA Workplan, except toluene in sample SW-N-3 (680,000 µg/kg vs. SCO of 500,000 µg/kg). However, toluene also exceeded the Unrestricted Use SCO in sample SW-S-2 (120,000 µg/kg) and heptane exceeded the Unrestricted Use SCO in sample SW-N-3 (170,000 µg/kg).

Additional soil excavation could not be conducted in the vicinity of sample SW-N-3 due to the presence of the on-site facility property boundary and active railroad tracks to the north (see Figure 4-2). Additional soil excavation could not be conducted in the vicinity of sample SW-S-2 due to the presence of underground utilities (i.e., storm sewer; see Figure 4-2).

Following post-excavation ISCO treatment (see Section 4.2.1), soil samples were collected from the bottom of three well borings (MW-25, MW-26 & MW-27; see Figure 4-3 for well locations) in May 2011. An additional soil boring (boring designation “Post-Ex”) was installed adjacent to the location of SW-N-3, and sampled at depths of 6.5 to 7 feet and 8.5 to 9 feet. (Note: additional soil samples were not collected near sample SW-S-2 because COC concentrations met the target SCOs in effect at the time of the excavation activities.)

Heptane was detected in one soil sample (MW-27; 13.5 to 14 feet) collected from the well borings (i.e., beneath the bottom of the excavation) at an estimated concentration of 6.8 J µg/kg (see Table 4-3). Toluene concentrations in soil samples ranged from 4.7 J µg/kg (MW-26; 13.5 to 14 feet) to 770 J µg/kg (MW-25; 12.5 to 13 feet); the latter concentration exceeds the Unrestricted Use SCO. The detected heptane and toluene soil concentrations were well below Restricted Use (Commercial) SCOs. Similarly, toluene concentrations in soil samples collected from the Post-Ex boring (installed near sample SW-N-3), 11 µg/kg (depth 6.5 to 7 feet) and 21,000 µg/kg (depth 8.5 to 9 feet), were well below the Restricted Use (Commercial) SCO; however, the deeper sample concentration exceeds the Unrestricted Use SCO.

Based on the post-excavation/ISCO treatment soil sampling results, impacted soils in the Former Tank Farm Area SWMU were effectively removed and/or treated in place. Further soil remediation activities are not necessary to meet Restricted (Commercial) Use SCOs; however, post-treatment soil concentrations remain above Unrestricted Use SCOs in portions of this area.

An ISCO pilot test event was conducted in November 2012 (see Section 6.2 for additional details) in the area between the 2011 excavation and Building #61 (see Figure 4-2). Immediately prior to the ISCO event, three shallow (above the water table) and three deep (below the water table) soil samples were collected to characterize "pre-test" soil conditions (see Figure 6-3 for sample locations). Toluene concentrations (see Table 6-2) ranged from 26 µg/kg (FES1112-1S) to 250 µg/kg (FES1112-2S) in the shallow soil samples, and from 17 µg/kg (FES1112-2D) to 220,000 µg/kg (FES1112-1D-DUP) in the deep soil samples. All toluene concentrations in the November 2012 soil samples were below the NYSDEC (NYSDEC, 2006) Restricted Use (Commercial) SCO of 500,000 µg/kg, which was the target SCO in effect at that time. Therefore, post-treatment soil samples were not collected.

3.4 Vapor

Per the direction of NYSDEC & NYSDOH, indoor air samples were collected from the office area of the facility in March 2009 & February 2010. Results are discussed below. Previously, on-site vapor samples were collected from (see Figure 1-3 for on-site sample locations): 1) three sewer bedding wells in the warehouse area of Building #61 in February 2004; and 2) ambient air locations in Buildings #58 & #61 in December 2004. Previously, off-site vapor samples were collected (see Figure 3-3 for off-site sample locations) from: 1) two vapor points in Alden Street in September 2004; and 2) residential locations in the Off-Site AOC (subsurface vapor sampling and concurrent indoor/outdoor ambient air sampling) in February 2006. Vapor sampling details and results were presented in the December 2007 RFI Report.

Vapor-phase toluene concentrations in the three 2004 sewer bedding wells were 4 micrograms per cubic meter ($\mu g/m^3$) at MW-13, 8 $\mu g/m^3$ at MW-12, and 83 $\mu g/m^3$ at MW-11 (see Table 3-1). Except for the latter sample, the vapor-phase toluene concentrations were within the background residential concentration range of 4.2 to 25 $\mu g/m^3$ (see page 31; NYSDOH, 2005).

Similar toluene concentrations were detected in the December 2003 ambient air sampling results (see Table 3-2) from Buildings #58 & #61 (19 $\mu g/m^3$ & 26 $\mu g/m^3$, respectively) where ongoing warehousing operations included the extensive use of propane-fueled forklifts.

Toluene was detected in the 2004 off-site Alden Street VMP-1 (shallow), VMP-2 (deep), and ambient air samples at concentrations of 90 $\mu g/m^3$, 8 $\mu g/m^3$, and 4 $\mu g/m^3$, respectively (see Table 3-3). The toluene detected in VMP-1 was attributed, at least in part, to an adjacent surface fuel spill(s) because potential fuel VOCs unrelated to the Off-Site AOC were also detected in the sample, including methyl tertiary butyl ether (MTBE; concentration 397 $\mu g/m^3$), benzene (3 $\mu g/m^3$), ethylbenzene (30 $\mu g/m^3$), xylenes (108 $\mu g/m^3$), and other fuel components.

Toluene concentrations in the February 2006 Off-Site AOC residential ambient indoor air samples (see Table 3-4) ranged from 1.8 J μg/m^3 (basement sample at 23 Alden Street) to 11 μg/m^3 (first floor sample at 23 Alden Street). The February 2006 residential sampling data indicate that toluene concentrations in all ambient indoor air samples were within or below the background residential levels of 4.2 μg/m^3 to 25 μg/m^3 (see page 31; NYSDOH, 2005).

Toluene concentrations in the February 2006 Off-Site AOC residential sub-slab/soil vapor samples (see Table 3-4) ranged from 7.7 μg/m^3 at VMP-1 (25 Alden Street) to 22 μg/m^3 at MSVP-1 (21 Alden Street). The toluene concentrations in the February 2006 Off-Site AOC sub-slab/soil vapor samples were also within or below background residential indoor air levels.[1]

A sub-slab vapor monitoring point (VMP-2) was installed adjacent to the office area of the former Norton/Nashua facility (see Figure 1-3) on March 23, 2009. Sub-slab vapor and indoor air samples were collected from the office area on March 26, 2009 per the December 2008 CMS Workplan. However, the laboratory did not analyze the full VOC target compound list for the March 2009 samples and painting activities were conducted in the facility on the day of sampling. Other field and laboratory QA/QC issues were not noted during the March 2009 sampling event. After further review of the sampling event and data, the NYSDEC and NYSDOH jointly determined that the March 2009 sub-slab vapor/indoor air data should be used for "screening purposes" only.

A second set of sub-slab vapor and indoor air samples was collected during the following heating season on February 18, 2010. The toluene concentration was 3.7 μg/m^3 in the February 2010 on-site office area sub-slab vapor sample collected at VMP-2 (vs. 39.0 μg/m^3 in the March 2009 screening purposes only sample), and 14/13 μg/m^3 in the February 2010 indoor air samples collected from the office area (vs. 44/42 μg/m^3 in the March 2009 screening purposes only

[1] Note: Although these types of samples (sub-slab vapor and ambient indoor air) are not directly comparable, contemporaneous sub-slab/soil vapor concentrations are assumed to be higher ("worst-case") than indoor air levels at adjacent structures (unless there is an indoor source for the same compounds).

samples). Results are summarized on Table 3-5. The VMP-2 sub-slab vapor and office indoor air samples also contained many VOCs analytes that are not COCs for the Former Norton/Nashua site such as acetone, ethanol, and isopropyl alcohol.

The toluene concentrations in the February 2010 on-site ambient indoor air samples were within or below NYSDOH background residential levels (see page 31; NYSDOH, 2005). The toluene concentration in the February 2010 sub-slab/soil vapor sample was also within or below NYSDOH background residential levels (it is again noted that although these types of samples are not directly comparable, contemporaneous sub-slab/soil vapor concentrations are assumed to be higher than indoor air levels unless there is an indoor source for the same compounds). Based upon subsequent review of the vapor data by NYSDEC & NYSDOH, additional indoor air and subslab vapor sampling were not required at the Former Norton/Nashua site.

3.5 Current Site Risk

Hypothetical exposure pathways associated with the On-Site SWMU/AOC include: 1) toluene migration via groundwater to off-site areas; 2) on-site worker exposure to toluene (and potentially other COCs) through direct contact with groundwater and affected soils at and below the water table; and 3) vapor intrusion (VI). Hypothetical exposure pathways associated with the Off-Site AOC include: 1) residential and/or off-site worker exposure to toluene through direct contact with groundwater and affected soils at and below the water table; 2) residential exposure to toluene via drinking water; and 3) vapor intrusion.

3.5.1 Groundwater Migration

Based on current data, there is little to no risk of off-site toluene migration via groundwater. Toluene has consistently been absent or present at minimal levels in groundwater samples collected from downgradient on-site monitoring wells/points. With one exception (MP-

14; see Section 3.2), toluene concentrations in all off-site monitoring points/wells have met the groundwater standard since May 2011 (or longer) indicating there is no current toluene migration via groundwater.

The toluene/heptane release occurred more than 35 years ago, and there have been no documented releases/spills at the Site for over 20 years. FPP has not been detected at the Former Norton/Nashua site since 2009. Empirical data collected during the RFI and subsequent groundwater monitoring demonstrate that the remaining VOC mass (dissolved and sorbed) is in equilibrium with the groundwater, and natural attenuation is actively removing VOCs within and at the margins of the current plume (see Section 6.6). Further, the presence of an asphalt/building cover restricts precipitation infiltration and remobilization of VOCs in the On-Site SWMU/AOC.

Dissolved toluene concentrations are currently above the groundwater standard in over 30 on-site monitoring wells/points, but only one off-site monitoring point. Although dissolved toluene concentrations exceeded the groundwater standard at multiple on-site and off-site sampling locations both before and after ISCO and EFR pilot testing was performed (see Section 4.2); toluene concentrations at the Former Norton/Nashua site exhibit an overall decreasing trend (see Section 6.6). The dissolved toluene plume is contracting onsite and is not expanding offsite. Therefore, no further Corrective Measures are proposed to address potential off-site toluene migration via groundwater.

3.5.2 Direct Contact Soil/Groundwater

Based on the results of the excavation SRA and ISCO pilot testing (see the December 2010 SRA Report, Sections 4.2.1 & 6.2, Tables 4-1 through 4-3 & 6-1, and Figures 4-1 through 4-3 and 6-1 through 6-3 of this report), soil concentrations in the Former Tank Farm Area SWMU meet the NYSDEC Restricted Use (Commercial) SCO; however, soil concentrations at some locations in the Former Tank Farm Area SWMU do meet the Unrestricted Use SCO. There are no recent soil sampling data available for the Beneath Buildings AOC, and some RFI soil concentrations in this AOC previously exceeded the Restricted Use (Commercial) and Unrestricted Use SCOs. Further, dissolved toluene concentrations exceed the groundwater standard beneath portions of the On-Site SWMU/AOC.

The current property owner has indicated there are no current/future excavation activities planned for the Former Tank Farm Area SWMU, which is covered by asphalt, or the Beneath Buildings AOC, which is located beneath the facility buildings and covered by a thick concrete slab. Further, impacted soil and groundwater, where present, are at depths of at least seven to eight feet (i.e., near or below the water table), which is well below the depth of any utilities or building infrastructure.

However, there are no institutional controls currently in place to specifically prohibit excavation activities in these areas. To minimize this possible exposure pathway, Saint-Gobain will develop appropriate plans to manage soils and limit exposure, i.e., a Soil Management Plan (SMP) and a Community Air Monitoring Plan (CAMP). These plans will include requirements to provide notice before any excavation work is performed and limiting the property to commercial use only (i.e., non-residential). Upon approval of the Remedial Design Work Plan, the NYSDEC, Saint-Gobain, and the property owner will work out the details of an environmental easement for the site. . The environmental easement will incorporate the institutional and engineering controls outlined in the approved SMP.

Based on recent groundwater sampling data (see Table 2-1), current dissolved toluene (and methylcyclohexane) concentrations in the vicinity of the off-site residences are below the NYSDEC groundwater standard of 5 µg/L except for one location (MP-14; see Section 3.2). The following discussion relates to possible risks in the Off-Site AOC where the dissolved toluene concentration (or dissolved PAH concentrations near the railroad tracks) exceeds groundwater standards or soil COC concentrations exceed the Unrestricted SCO.

RFI soil sampling data from Alden Street and the vicinity of the off-site residences indicate that toluene concentrations exceeding the NYSDEC Unrestricted Use SCO of 700 µg/kg (and the Restricted-Residential Use SCO of 100,000 µg/kg) were limited to one sample collected at the water table (sample SB-191 collected in December 2005; depth 9 to 9.5 feet; toluene concentration 230,000 µg/kg). Toluene and heptane also exceeded the Unrestricted Use SCOs in one water table sample (depth 8 to 9 feet) collected on the railroad property adjacent to the on-site Former Tank Farm Area SWMU (sample SB-129 collected in December 2003; toluene concentration 120,000 µg/kg, heptane concentration 39,000 µg/kg), but both concentrations were below the Restricted Use (Commercial) SCO.

Based on the NYSDEC regulations because one sample of toluene and heptane in the 2003 and 2005 soil data exceeded the NYSDEC Unrestricted Use SCO (although concentrations were below the Restricted Use SCO) we cannot rule out that there will not be a potential exposure via soil excavation for off-site workers to impacted soil (and groundwater). However, exposure via this pathway is unlikely because the excavation must extend to groundwater (depth 8 to 10 feet in this area). This is much deeper than typical excavations for utilities and landscaping, and building construction typically does not extend to the water table. Moreover, the exceedance was between 11 and 9 years ago.

There are no local ordinances prohibiting or requiring a permit for deep excavation in the Town of Colonie. Saint-Gobain will determine if it is necessary to request that the Town provide notice of any building, utility, or road opening permits or other indications of potential excavation work are proposed in this area, in the event plans to manage soil/groundwater and limit potential exposure (i.e., SMP and CAMP) are required.

Soil samples have not been collected in the Off-Site AOC since 2005, but there has been subsequent degradation of toluene in soil and groundwater. Saint-Gobain proposes to collect several soil samples in the vicinity of the off-site toluene impact (i.e., near sample SB-191) to determine if the current soil quality exceeds Unrestricted Use SCOs. SCO).

3.5.3 Drinking Water

Institutional controls (a Town of Colonie ordinance) prohibit the installation of private supply wells at locations served by municipal water. All residential locations in the Off-Site AOC are currently served by municipal water eliminating drinking water as an exposure pathway.

Although local ordinances do not specifically prohibit the installation of private "garden" wells for irrigation purposes (and one currently exists at Craig Street), the Town requires all wells to be permitted by the Albany County Health Department (ACHD). Therefore, Saint-Gobain will request via certified letter that the ACHD provide notification to Saint-Gobain if any private well permit applications are requested for the Maplewood Neighborhood, so it can be determined if groundwater testing is necessary.

The private "garden" well at 32 Craig Street was sampled during the Off-Site RFI and toluene was not detected. The owner of the private well did not accept a previous offer from Saint-Gobain to abandon the private "garden" well.

3.5.4 Vapor Intrusion (VI)

As discussed in Section 3.4, based on vapor samples collected from: 1) three sewer bedding wells in the warehouse area of Building #61; 2) ambient air locations in Buildings #58 & #61; and 3) sub-slab vapor and indoor air samples in the vicinity of the office area, detected toluene concentrations (see Tables 3-1, 3-2 & 3-4 and Figure 1-3) were generally below background residential concentrations (again noting that although sub-slab/soil vapor samples are not directly comparable, sub-slab/soil vapor concentrations are assumed to be higher than contemporaneous indoor air levels). Therefore, there is currently no unacceptable exposure via VOC volatilization from groundwater to the warehouse buildings/offices and on-site workers.

Future on-site groundwater monitoring plans will include contingencies to reevaluate the VI pathway if there is a change in groundwater conditions that indicate a degradation of groundwater (see Section 10.1). Further, the site-specific environmental easement will provide for the evaluation of soil vapor intrusion for any on-site newly constructed or occupied buildings, or structural changes to the existing buildings (or conversely, the installation of a sub-slab depressurization system.)

Similarly, based on vapor samples collected from: 1) two vapor points in Alden Street; and 2) multiple sub-slab vapor and indoor air sampling locations in the Off-Site AOC (see Tables 3-3 for sampling data, and Figures 1-3 & 3-3 for sampling locations), the RFI determined there is no current unacceptable exposure to residential structures via toluene volatilization. Future Off-Site AOC groundwater monitoring plans will include contingencies to reevaluate the VI pathway if there is a degradation in groundwater conditions (see Section 10.2).

The RFI and subsequent CMS pilot testing and monitoring data demonstrate that: 1) the distribution of free-phase, residual (in soil), and dissolved-phase toluene at the Former Norton/Nashua site is stable and there is no ongoing off-site migration via groundwater (or the sewer systems); 2) on-site and off-site dissolved-phase toluene concentrations are stable or decreasing; 3) there is no current toluene exposure for on-site workers; and 4) there is no current toluene exposure for off-site residents or workers.

The results of the qualitative human health exposure assessment as reviewed above are summarized in Table 3-6. Remaining potential exposure scenarios include: 1) on-site workers to impacted soils/groundwater during excavation at or near the water table beneath the buildings; 2) off-site residents or workers to impacted soils/groundwater during excavation at or near the water table; 3) off-site residents to drinking water via "garden" wells or newly installed potable wells; 4) on-site workers to shallow soils (if the buildings are demolished); and 5) on-site workers and off-site residents to vapors. The potential for exposure via these pathways will be reduced via: 1) the proposed remedy; 2) the previously discussed on-site environmental easement and other proposed institutional controls; and 3) contingent monitoring (and response actions) if site conditions change.

SECTION 4.0

PREVIOUS INVESTIGATIONS AND INTERIM CORRECTIVE MEASURES (ICMs)

4.1 Previous Investigations

FPP toluene was encountered during the 1988 installation of a geotechnical boring near the former tank farm (see Figure 1-3). On August 31, 1989, the EPA issued notices pursuant to CERCLA advising Nashua and Norton that they could be potentially responsible parties. Subsequently, a series of site investigations were conducted by Nashua in 1989 & 1990 (see ERM, 1989; Dunn Geoscience Corporation, 1989 & 1990). Reviews of site conditions were prepared in 1993 by TRC Environmental Corporation, and in 1994 & 1996 by Rust.

Following NYSDEC approval of the workplan, sampling associated with a RCRA Facility Assessment ("Enhanced RFA") was conducted by Saint-Gobain in November 2001, and Saint-Gobain entered into an agreement with the NYSDEC to further investigate the Site in 2002. Based on the previous environmental studies, data summarized in the 2002 RCRA Facility Assessment (Enhanced RFA) Sampling Results Report, and meetings and discussions with the NYSDEC, 12 areas at the Former Norton/Nashua site were identified for further investigation in the 2003 RFI Workplan: four SWMUs (see Figure 2-1): 1) Former Tank Farm SWMU; 2) Storm Sewer SWMU; 3) Sanitary Sewer SWMU; and 4) Former "Beartex' Sump Pit SWMU; and eight AOCs: 1) Former Solvent Line AOC; 2) Former Test Pit AOC; 3) Building #58 AOC; 4) Solvent Recovery Room (adjacent to Building #59) AOC; 5) Building #61 Doorway Spill AOC; 6) Filter Room (adjacent to Building #59) AOC; 7) Quonset Hut C (adjacent to Buildings #59 & #60) AOC; and 8) Quonset Hut B (adjacent to Building #61) AOC. A ninth AOC, the Off-Site AOC, was identified during the course of the RFI activities.

The RFI Workplan prepared by FES was finalized in July 2003, field activities were initiated shortly thereafter, and the RFI Report was finalized in December 2007. Soil, groundwater, and sewer sediment and water sampling data, and the current status of the SWMUs and AOCs were previously summarized in Section 2.4 of this report. The December 2007 RFI Report concluded that further investigation and/or remedial action was only required for: 1) the Former Tank Farm Area SWMU; 2) the Beneath Buildings AOC (which overlaps the Former Solvent Line AOC, Former Test Pit AOC, and a portion of the Building #58 AOC); 3) the Off-Site AOC; and 4) the Storm and Sanitary Sewer SWMUs.

4.2 Interim Corrective Measures (ICMs)

Interim Corrective Measures (ICMs) to address imminent hazards to human health or the environment were not necessary at the time of the 2007 Preliminary CMS (and are not necessary now). However, Saint-Gobain, NYSDEC, and NYSDOH jointly concluded that source removal of the most impacted soils would be conducted as a presumptive remedy (i.e., an ICM) in the Former Tank Farm Area SWMU. A second ICM, which was proposed in the Preliminary Corrective Measure Evaluation included in the 2007 RFI Report, involved the removal of accessible storm sewer sediments from the Storm Sewer SWMU to attempt to determine whether their source was from: 1) historical site activities; and/or 2) current run-off from asphalt covered areas of the roof and the parking lot. Additional details are provided below.

4.2.1 Former Tank Farm Area SWMU SRA Results

The following conclusions were reached with respect to the 2010-2011 CMS source removal activities at the former Norton/Nashua facility (see the January 2012 SRA Report for additional details):

- Pre-excavation waste characterization soil sampling results indicated that the soils in the Former Tank Farm Area SWMU targeted for removal were characteristically non-hazardous (see Table 4-1 and Figure 4-1).

- The final soil excavation area measured approximately 110 feet long by 45 feet wide by 12 feet deep (see Figure 4-2). A total of 1,413 tons of soil (including soil and other materials previously stockpiled on the surface of the Former Tank Farm SWMU) were removed from the site for proper disposal/treatment.

- Additional soil removal to the north and south of the excavation area could not be conducted due to the presence of railroad tracks and the site property boundary to the north, and water and storm sewer utility lines to the south. However, with one exception (see next item), all samples along the excavation sidewalls were below NYSDEC Restricted Use (Commercial) SCOs, and with two exceptions all samples along the excavation sidewalls were below Unrestricted Use SCOs.

- Detected VOC concentrations in all post-excavation sidewall confirmatory samples were well below NYSDEC Restricted Use (Commercial) SCOs except for toluene in the northeast sidewall soil sample (SW-N-3; depth 8.5 to 9 feet; see Table 4-2 for sampling results and Figure 4-2 for sampling locations). Detected VOC concentrations in all post-excavation sidewall confirmatory samples were below NYSDEC Unrestricted Use SCOs except for toluene in sample SW-S-2 (120,000 µg/kg; depth 8.5 to 9 feet) and heptane in sample SW-N-3 (170,000 µg/kg).

- Subsequent to soil excavation, the chemical oxidation contingency treatment was conducted and included the placement of approximately 4,700 gallons of persulfate, 4,700 gallons of hydrogen peroxide, and 4,700 gallons of catalyst in the open excavation.

- Detected VOC concentrations in post-treatment (chem-ox) soil samples collected from native soil below the excavation at monitoring well locations (see Table 4-3 for sampling results and Figure 4-3 for post-treatment sampling locations), as well as post-treatment soil samples collected adjacent to post-excavation soil sample SW-N-3 (samples Post Ex 1 & 2), were all below NYSDEC Restricted Use (Commercial) SCOs. However, toluene concentrations in post-treatment (chem-ox) soil samples MW-25 (770 J µg/kg; depth 12.5 to 13 feet) and Post Ex 2 (21,000 µg/kg; depth 8.5 to 9 feet) exceeded the Unrestricted Use SCO.

- Based on the post-excavation/ISCO treatment soil sampling results, impacted soils in the Former Tank Farm SWMU were effectively removed and/or treated in place and further soil remediation activities are not necessary to meet Restricted Use (Commercial) SCOs; however, post-treatment soil concentrations in portions of this area remain above Unrestricted Use SCOs.

- Post-treatment (excavation and chem-ox) groundwater sampling activities indicated that toluene concentrations in source area monitoring well MP-2 significantly decreased compared to historical maximums. Toluene concentrations in three monitoring wells (see Table 2-1 for sampling data and Figure 4-3 for well locations) installed after the completion of excavation and chem-ox activities ranged from ND at MW-25 (western side of excavation) to 260,000 µg/L at MW-27 (eastern side of excavation).

4.2.2 Storm Sewer SWMU ICM

Per the December 2008 CMS Workplan, visible sediment and standing water was removed from all accessible on-site storm sewer manholes (see Figure 4-4) via vacuum truck in June 2009 and sent offsite for proper disposal. If PAH-impacted sediments previously detected in the storm sewers were associated with historical site activities, there would be no subsequent accumulation of PAH-impacted sediment, and the removal event would eliminate the potential migration of PAH-impacted sediment from the Site via the storm sewer system. If PAH-impacted sediments returned, the source would more likely be ongoing surface run-off to the storm sewer system, and thus, unrelated to activities associated with NYSDEC Order on Consent Index No. CO: 4-20001205-3375. In the latter case, further Corrective Measures would not be proposed.

A storm sewer inspection and sampling event was performed on September 13, 2010. The original workplan called for the collection of sewer sediment samples from five storm sewer manholes (MH-2, MH-3, MH-6, MH-12 & MH-14; see Figure 4-4 for storm sewer manhole locations), but in September 2010 sediment was only present at two of these manholes: MH-2 & MH-6.

Because no sediment was present at sewer manholes MH-3 and MH-12, alternate locations upstream along these sewer lines were assessed for possible substitution (note: there are no manhole locations upstream from MH-14). Sewer sediment sampling proceeded upstream to avoid agitation of bottom sediments at succeeding sediment sample locations. A sediment sample from manhole MH-3.5 was obtained to substitute for manhole MH-3, but the only manhole upstream from MH-12 (MH-13) was not accessible in September 2010. Storm sewer sediment samples were analyzed for SVOCs via EPA Method 8270 plus TICs, and, per discussions at the June 2010 meeting between NYSDEC, NYSDOH, and SGC, PCBs via EPA Method 8082.

Regardless of whether or not sewer sediment was present, sewer water samples were to be collected from storm sewer manholes MH-2, MH-3, MH-6, MH-12 & MH-14. However, water (standing) was only present at manhole MH-12 in September 2010. Alternate sampling locations upstream along the same sewer lines (see Figure 4-4 for storm sewer manhole and line locations) were inspected, but were either dry or inaccessible in September 2010. Storm sewer water samples were analyzed for SVOCs via EPA Method 8270 plus TICs, and, per discussions at the June 2010 meeting between NYSDEC, NYSDOH, and SGC, PCBs via EPA Method 8082.

Storm sewer sediment and sewer water sampling results are summarized in Tables 4-4 & 4-5, respectively. The September 2010 sampling results from previously sampled manholes (MH-3.5 & MH-6) exhibited storm sewer sediment SVOC detections at concentrations that were consistently lower than samples collected prior to the sewer sediment/water removal activities conducted in 2009. However, selected PAHs (BaA, BaP & fluorene) exceeded Sediment Screening Criteria (SSC; NYSDEC, 1999) in the September 2010 samples.

In contrast, the September 2010 sampling results from manhole MH-12 exhibited storm sewer water SVOC detections at concentrations that were consistently higher than the previous sample collected at this location; however, concentrations were within an order of magnitude of previous Site sewer water maximums. Seven PAHs and BEHP exceeded the NYSDEC Surface-Water Class C standards (6 NYCRR Part 703), primarily fish propagation (see Table 4-5), but four PAHs also exceeded the fish survival limit, and BaP exceeded the fish consumption limit.

Accumulated sediments that may have been related to historical activities at the Facility were removed from the storm sewers in June 2009. Although lesser storm sewer sediment volumes were present during the September 2010 storm sewer inspection, and the concentrations of many SVOCs decreased, SVOC SSC (and one Surface Water standard) exceedances were detected in the September 2010 storm sewer samples.

The PAHs with sediment exceedances (BaA, BaP & fluorene) are commonly found in asphalt and roofing materials (see USGS, 1998; Mahler, 2006; Rowe & O'Connor, 2011) currently in use at the site. These same PAHs (plus several others and BEHP, which is found in PVC and plastic sampling equipment) were also present in the standing sewer water sample collected from manhole MH-12.

Therefore, the source of the sediments detected in the September 20120 samples would most likely be ongoing surface run-off unrelated to activities associated with NYSDEC Order on Consent Index No. CO: 4-20001205-3375. Further Corrective Measures regarding SVOCs in the storm sewer system at the Former Norton/Nashua site are not proposed.

The September 2010 storm sewer sediment samples also detected total PCB aroclors at concentrations (57 µg/kg to 900 µg/kg; see Table 4-6) that were below the wildlife accumulation SCC of 1,400 µg/kg, but greater than the Human Health Bioaccumulation SCC of 0.8 µg/kg. Total PCB aroclors in the September 2010 storm water sample (concentration 0.393 µg/L; see Table 4-6) also exceeded the Class C Surface Water standard of 0.12 µg/L.

The NYSDEC collected storm sewer water samples for PCB analysis from four locations at the Facility: MH-2, MH-3, MH-5 & MH-14 (see Figure 4-4 for storm sewer manhole locations) on September 21, 2011 (insufficient water was present on that date to sample a fifth location, manhole MH-4). All results were ND. Therefore, there is no confirmed off-site pathway for PCBs via the storm water system from the Former Norton/Nashua site. No further action regarding PCBs in the storm sewer system was required at the Former Norton/Nashua site.

SECTION 5.0

REMEDIAL OBJECTIVES AND GOALS/TARGETS

The Preliminary CMS in the December 2007 RFI Report included: 1) a statement of Corrective Measures Objectives (CMOs) and remedial action performance goals (RPGs); 2) identification of potential treatment areas; 3) identification, and preliminary screening/evaluation of potential treatment technologies; and 4) proposed feasibility testing necessary for the final CMS. This information is summarized and updated below.

5.1 Corrective Measures Objectives

To the extent applicable, the CMOs for the Former Norton/Nashua site will be the Generic Remedial Action Objectives (RAOs) outlined as part of the NYSDEC Technical Guidance for Site Investigation and Remediation (DER-10; 2010). These are as follows:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection

- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.
- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

As summarized in Section 3.0, under current site conditions, the RAOs for Public Health Protection are met; i.e., there is no current exposure to local residents or workers via: 1) ingestion of groundwater or soil; 2) direct contact with groundwater or soil; or 3) inhalation of volatiles from soils or groundwater. However, additional remedial actions and/or institutional controls (see Section 3.5) are necessary to eliminate any potential for future exposure via these pathways and achieve the Public Health Protection RAOs for the Former Norton/Nashua site.

Regarding Environmental Protection RAOs, there is currently (see Section 3.5): 1) no discharge of contaminants to surface water; 2) no impact to biota from ingestion/direct contact with soil; and 3) limited migration of contaminants from soil to groundwater (due to limited infiltration through the vadose zone at the Facility). To the extent practicable, remedial efforts will focus on: 1) removing the residual source of groundwater contamination; and 2) restoring the groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.

Additional, site-specific CMOs for the Former Norton/Nashua site identified in the December 2007 Preliminary CMS were, to the extent practicable,: 1) remove mobile FPP; 2) prevent future off-site movement of dissolved-phase toluene; 3) reduce residual toluene source mass present in the on-site SWMU/AOC; and 4) reduce dissolved-phase toluene concentration beneath the on-site buildings. It was noted in the December 2007 Preliminary CMS that except for transient detections of FPP in one well in the 2009 ISCO pilot testing treatment area (maximum APT 0.08 feet), FPP had not been detected at the Former Norton/Nashua site since December 2006. Further, there was no evidence of off-site migration of the toluene plume (see Section 3.5.1), so site-specific CMOs #1 & #2 above had generally been achieved.

Although dissolved toluene concentrations are generally declining onsite (and offsite), based on current site conditions, and preliminary technology screening and pilot testing, any short-term remedial action is unlikely to fully remove all (or even the majority of) residual source mass. Therefore, the December 2007 Preliminary CMS concluded that monitored natural attenuation (MNA) would be an integral component of the site remedy provided the MNA program ensures there would be no adverse risk to human health, safety, public welfare, and the environment. This CMS Report evaluates the use of active remedial technologies to address localized areas of residual toluene source mass in the overburden (primarily in the saturated zone, but also in the vadose zone). These actions would likely reduce, but not eliminate residual source mass, with the intent of accelerating the time period required to achieve RAOs through natural attenuation.

5.2 Corrective Measures Target Concentrations and Remedial Performance Goals

The statutory or regulatory remedial action goals will be undertaken pursuant to DER-10, as identified in Section 1.2. The final Corrective Measures Target Concentrations (CM Targets) at the Former Norton/Nashua site for all on-site and off-site SWMUs and AOCs are the following NYSDEC/NYSDOH soil, groundwater, and vapor objectives/standards/guidelines: 1) For on-site soils - 6 NYCRR Part 375 Unrestricted Use (Protection of Groundwater) and Restricted (Commercial) Use SCOs[2]; 2) For off-site soils - 6 NYCRR Part 375 Unrestricted Use SCOs; 3) For on-site and off-site groundwater - 6 NYCRR Part 703 (NYSDEC, 1999 and TOGS 1.1.1; NYSDEC, 1998); and 4) For on-site and off-site vapor and indoor air, concentration limits as determined by the NYSDOH. It is proposed that CM Targets will be met through a combination of focused active remediation and long-term monitoring (see Section 9.0).

The primary on-site COC, and the only off-site COC, is toluene. Selected remedial actions for toluene should also be effective at addressing minor concentrations of the other COCs present at the Site; however, the focus of the Corrective Measures is toluene, and CM Targets and short-term remedial performance goals (RPGs) are based on toluene. The Unrestricted and Restricted (Commercial) Use SCO concentrations for toluene are 700 µg/kg and 500,000 µg/kg, respectively. The NYSDEC AWQS for toluene is 5 µg/L.

The 2007 Preliminary CMS concluded that insufficient data were available to establish numerical performance goals because pilot and/or bench-scale testing was needed. Based on the results of the recently completed pilot testing (see Section 6.0), short-term remedial actions such as EFRs or ISCO appear to be capable of reducing on-site residual dissolved toluene to concentrations ranging from 1,000 µg/L to 10,000 µg/L.

Thus, the proposed short-term RPGs are: 1) a maximum on-site dissolved toluene concentration of 1,000 µg/L to 10,000 µg/L; and 2) a maximum off-site dissolved toluene concentration of 1,000 µg/L. Following achievement of the short-term RPGs (based on recent sampling data, this has already been achieved for the Off-Site AOC), this CMS Report proposes the implementation of long-term groundwater monitoring with a target toluene cleanup concentration of 5 µg/L (i.e., the NYSDEC groundwater standard).

5.3 Eliminating Exposure during Corrective Measures

Eliminating potential exposure pathways during the implementation of the Corrective Measures will be achieved, in part, through the use of institutional controls. Some local institutional controls are already in place.

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[2] Although the 6 NYCRR Part 375 Restricted (Commercial) Use SCOs were previously used as the CM Targets for on-site soils, the NYSDEC has requested that this CMS Report also consider the 6 NYCRR Part 375 Unrestricted Use SCOs as the CM Targets for on-site soils.

For example, a Town of Colonie ordinance prohibits the use of a potable well at a property that is connected to municipal water. As discussed in Section 3.5.3, although local ordinances do not specifically prohibit the installation of private "garden" wells for irrigation purposes, Saint-Gobain will submit a request that the ACHD provide notification to Saint-Gobain if any private well permit applications are requested for the Maplewood Neighborhood, so it can be determined if groundwater testing is necessary.

As discussed in Section 3.5.2, there is no protocol currently in place to specifically prohibit "deep" (i.e., to the water table) excavation activities in the on-site or off-site areas where elevated dissolved-phase toluene concentrations may be present. Saint-Gobain will formally request via certified letter that the Town of Colonie provide prior notification of any proposed excavation work on these properties, such as a building permit or a road opening permit, in the event plans to manage soil/groundwater and limit potential exposure (i.e., SMP and CAMP) are required.

Sub-slab vapor and indoor air sampling data (see Section 3.4) indicate there is currently no significant exposure to toluene for on-site workers or off-site residents at the Former Norton/Nashua site. Future On-Site SWMU/AOC and Off-Site AOC groundwater monitoring plans will include contingencies to reevaluate this pathway if there is a degradation in groundwater conditions (see Sections 10.1 & 10.2).

5.4 Target Treatment Areas

Based on toluene impact (distribution and magnitude), the 2003-2004 RFI identified two general target treatment areas at the Former Norton/Nashua site (see Figure 2-7): 1) the Former Tank Farm Area SWMU; and 2) beneath the floor of the main on-site buildings in the Building Subslab AOC (i.e., Building #61 and the northern portions of Buildings #58 & #59). Completed ICMs at the Former Tank Farm Area SWMU include soil removal and ISCO treatment (see

Section 4.2.1), and additional ISCO pilot testing activities have been conducted at the Former Tank Farm Area SWMU (see Section 6.2). Pilot testing activities conducted in the Building Subslab AOC include EFR events (see Section 6.3) and enhanced bioremediation via oxygen, ozone, and peroxide delivery and nutrient supplementation (see Section 6.4).

Over 150 soil borings were installed during the 2003-2004 RFI. Due to the large number of borings, soils samples were not submitted from every boring for laboratory analysis. Instead, field PID readings were used for screening purposes to determine the extent of toluene impact to soils. Field PID readings exceeding 100 parts per million by volume (ppmv) were considered evidence of residual soil impact because, with few exceptions, confirmatory laboratory samples collected from these borings also exceeded toluene SCOs. Conversely, soil borings with PID readings less than 100 ppmv served as delineation locations because, with few exceptions, confirmatory laboratory samples (all delineation borings were sampled) collected from these borings also met toluene SCOs.

Elevated PID readings (and toluene concentrations) were most often associated with finer-grained sediments such as clays and silty clays (vs. sands and gravels). However, although finer-grained materials generally become less common with depth at the Site (see Section 2.3), there are significant areas where clays and silty clays extend beneath the water table (see cross-sections A-A' and B-B'; Figures 2-2 & 2-3).

Soil and groundwater data collected during the RFI and subsequent investigations indicate that toluene impact at the Site is greatest from the “smear zone” just above the water table (approximate depth eight to ten feet) to four to five feet below the water table (total depth approximately 15 feet). Evidence of shallow soil impact (i.e., soils above the water table and PID readings greater than 100 ppmv) was limited to selected borings (see green labels and dots on Figure 5-1 for areas of shallow soil impact): 1) south and east of the former tank farm; 2) immediately adjacent to, and east of, the former Solvent Lines; 3) near storm sewer lines east of the North Cut-Out in Building #61; and 4) west and north of the former East Cut-Out in Building #58. Shallow soil samples submitted for laboratory analysis from the last two areas did not exceed toluene SCOs (see Figure 5-1).

In contrast, deeper soil impact (i.e., soils below the water table and PID readings greater than 100 ppmv) was found (see red labels and dots on Figure 5-1 for areas of deeper soil impact) in borings: 1) throughout the former tank farm area; 2) west and east of the former Solvent Lines; 3) across the northern half of Building #58; and 4) in the northwest corner of Building #59. Deeper soil samples submitted for laboratory analysis from each of these areas exceeded toluene SCOs (see Figure 5-1).

SECTION 6.0

CMS PILOT TESTING RESULTS

6.1 Selected Corrective Measure Alternatives for Pilot Testing

The 2007 Preliminary CMS proposed MNA as the primary Corrective Measure for the Off-Site AOC with a contingency that if future off-site monitoring data indicated toluene concentrations were increasing (or did not demonstrate continued decreasing trends) it would be necessary to evaluate active technologies such as enhanced bioremediation or ISCO for use in the Off-Site AOC. Data collected during subsequent monitoring demonstrate off-site toluene concentrations (see Table 2-1 & Section 6.6.2) have: 1) not exceeded 1,000 µg/L since 2009; and 2) are generally decreasing. Therefore, it is proposed that: 1) long-term groundwater monitoring will be the final Corrective Measure for the Off-Site AOC; and 2) active technologies such as enhanced bioremediation or ISCO will not be evaluated for use in the Off-Site AOC at this time.

The 2007 Preliminary CMS identified the following Corrective Measures alternatives as feasible for primary treatment via the Technology Screening Matrix presented in the December 2007 RFI Report: 1) in the Former Tank Farm Area SWMU: enhanced bioremediation, soil excavation, ISCO; and 2) in the Building Subslab AOC: passive FPP recovery (via petrophilic socks), enhanced bioremediation, MNA, ISCO or chemical oxidation (chem-ox), and EFR. The Corrective Measures alternative(s) identified for each AOC are summarized in Table 6-1.

Passive FPP recovery was selected as the interim FPP removal technology for the Former Tank Farm Area SWMU while the CMS was being finalized. However, except for transient detections of FPP during the 2009 ISCO pilot testing treatment area (see Section 6.2), FPP has not been detected at the Former Norton/Nashua site since December 2006. The FPP detected in 2009 was successfully removed by manual bailing and the deployment of petrophilic socks.

The primary remedial action alternative selected for the two on-site target areas was enhanced bioremediation, but pilot testing was required to determine the effectiveness of this technology and to establish remedial performance goals and target concentrations. Treatment via ISCO was also selected as a potential remedial technology, and EFR was to be evaluated as an alternative primary or secondary remedial technology, for areas of dissolved toluene under the building (i.e., Building Subslab AOC).

The 2007 Preliminary CMS rated soil excavation as a feasible technology for the Former Tank Farm Area SWMU, but additional logistical details (disposal options, etc.) were needed to fully evaluate this technology. After this information was obtained, which confirmed that soil excavation would be a cost-effective remedial strategy in this SWMU, Saint-Gobain, NYSDEC, and NYSDOH concluded that source removal of the most impacted soils would be conducted as a presumptive remedy in the Former Tank Farm Area SWMU (see Section 4.2.1).

Following approval of the December 2010 SRA Workplan, which also included ISCO treatment of the open excavation, soil excavation and ISCO treatment was initiated and completed by July 2011 as documented in the January 2012 SRA Report. The 2010 SRA Workplan also included contingencies for: 1) additional ISCO treatment if any post-treatment soil samples exceeded proposed soil target levels, which, at that time, were the Restricted (Commercial) Use SCOs; and 2) EFR pilot testing if any post-treatment groundwater samples exceeded groundwater standards.

Although no post-treatment soil samples in the Former Tank Farm Area SWMU exceeded the Restricted (Commercial) Use SCOs (see Section 4.2.1), contingent ISCO injection treatment was conducted in May 2012 in the area where a post-excavation (but pre-ISCO excavation treatment) soil sample exceeded the Commercial SCOs (see same section). Due to the high cost of ISCO mobilization, ISCO pilot testing was also conducted between the former excavation area and Building #61 at the same time (see Figure 4-2 & Section 6.2).

The EFR pilot testing contingency was initiated in 2011 in the Former Tank Farm Area SWMU following the detection of toluene concentrations above the groundwater standard in two post-excavation wells. EFR pilot testing was also concurrently conducted in the Building Subslab AOC. EFR pilot testing continued in 2012 & 2013 (see Section 6.3)

Bioremediation pilot testing was conducted in the Building Subslab AOC in 2009 and 2010. Because dissolved oxygen appears to be the key limiting factor for biodegradation at the Former Norton/Nashua site, two oxygen delivery systems were tested: 1) the C-Sparge/Perozone system (Kerfoot Technologies, Inc. of Mashpee, MA), which uses a propriety well (C-Sparger) to introduce microbubbles of ozone with a “coating” of hydrogen peroxide (H_2O_2) into the groundwater; and 2) the in-situ submerged oxygen curtain (iSOC) system (inVentures Technologies, Inc. of Fredericton, New Brunswick), which uses microporous fibers to produce microbubbles of oxygen within the well borehole. As reviewed at the June 2010 joint meeting, the operation of these two systems (details are provided in Section 6.4) resulted in limited improvement (magnitude and areal extent) of groundwater quality, and these two technologies were dropped from further consideration.

Subsequent bioremediation pilot testing in the Building Subslab AOC included the direct application of dilute (nitrogen and phosphate) nutrients to the groundwater via monitoring wells in the vicinity of key monitoring wells/points. Results are discussed in Section 6.4.3.

6.2 ISCO Pilot Testing

Pre-treatment soil samples associated with the ISCO pilot testing (see Figure 6-1 for soil sampling locations) were collected in March 2009 as outlined in the December 2008 CMS Workplan. The soils samples were submitted to Adirondack Environmental Services, Inc. (Adirondack) for VOC laboratory analysis, and to the selected chemical oxidation vendor, In-Situ Oxidative Technologies, Inc. (ISOTEC) of West Windsor, New Jersey, for bench testing.

The soil sampling results indicated significant residual toluene impact was present in the proposed pilot testing area (see Table 6-2). A copy of the ISOTEC bench testing report is included in Appendix A.

Based on the bench testing results, ISOTEC proposed target chem-ox treatment volumes of 100 gallons of 12.5% sodium persulfate, 100 gallons of 12.5% H_2O_2, and 50 gallons of proprietary catalyst for each of the 16 shallow (depth 6 to 12 feet) and 16 deep (depth 12 to 20 feet) ISCO injection locations between the Former Tank Farm Area SWMU and Building #61. ISCO injection locations are provided on Figure 6-2.

Chem-ox pilot testing was initiated on June 8, 2009 and completed on June 11, 2009. The total target treatment volume of 250 gallons was successfully injected at each location. Several feet of groundwater mounding was observed in the treatment area, but there was limited short-circuiting of injection fluids to the surface. On the third day of chem-ox injections, FPP was noted at one monitoring location (MP-25); however, FPP was not present in this well at the end of the ISCO testing.

Vapor samples collected at VMPs in the treatment area and inside adjacent Building #61 exhibited temporary increases in PID and lower explosive limit (LEL) readings. A grab vapor sample indicated elevated levels of vapor-phase toluene and VOC TICs were present in well MP-27 (see Table 6-3); however, PID and LEL readings remained at background levels at the sub-slab VMP in the building.

Groundwater temperatures temporarily increased by several degrees during ISCO pilot testing. Groundwater pH, specific conductivity, oxidation-reduction potential (ORP), and total iron were also monitored during the test (see Table 6-4), and a complete round of post-treatment data was collected at all monitoring points. Field measurements obtained on August 24, 2009 indicated groundwater parameters were generally at or near pre-test conditions in the pilot testing area, but decreased ORP remained present in some ISCO pilot testing wells.

Post-treatment soil samples were collected in August 2009 (see Figure 6-1 for sample locations). The laboratory results (see Table 6-2) demonstrated significant reductions of residual toluene mass in the soil to concentrations below the NYSDEC Restricted (Commercial) Use SCO of 500,000 μg/kg.

A second ISCO pilot test event was conducted during the week of November 12, 2012 to evaluate the influence of subsequent EFR events on injected ISCO fluids. Immediately prior to the 2012 ISCO event, three shallow (above the water table) and three deep (below the water table) soil samples were collected to characterize "pre-test" soil conditions (see Figure 6-1 for soil sample locations). The pre-test soil sampling results (see Table 6-2) indicated all toluene concentrations were below the NYSDEC Restricted (Commercial) Use SCO, and therefore, post-treatment soil samples were not collected.

During the week of November 5, 2012, ISOTEC injected a total of 8,000 gallons of fluids (3,200 gallons of 10% hydrogen peroxide; 3,200 gallons of 10% sodium persulfate; and 1,600 gallons of catalyst/stabilizer) at 32 locations/zones: four shallow points (depth 6.5 to 11.5 feet) and 14 shallow/deep points (depths 6.5 to 11.5 feet and 9 to 14 feet). Injection points were primarily located between the main building and the 2010 excavation area (see Figure 6-3), but several injection points were located near excavation well MW-27.

Representatives of FES were onsite to complete concurrent groundwater and vapor monitoring during the ISCO testing. Results, summarized in the ISOTEC report provided in Appendix A, were similar to the 2009 ISCO pilot testing. During the 2012 ISCO pilot testing, groundwater temperature, conductivity, and ORP readings increased and pH readings decreased, but within 60 to 90 days, most groundwater monitoring parameters were at or near pre-test conditions in the pilot testing area (except ORP, which was generally lower).

Groundwater sampling results (see Table 2-1) indicated dissolved toluene concentrations decreased in the western half of the treatment area and near well MW-27 (see Figure 6-3). However, toluene concentrations increased at well MP-25 (where a transient detection of FPP was noted in 2009) and at well MP-29. These two wells are located along the northern wall of Building #61 (see Figure 6-3). The spatially discrete increase in toluene concentrations in this area was attributed to a small, isolated pocket of residual toluene because similarly elevated dissolved toluene concentrations are not present in other nearby wells such as MP-24, MP-26 & MP-28 (see Figure 6-3).

6.3 EFR Pilot Testing

EFR pilot testing was initially conducted at well MP-11 (see Figure 6-4) on June 9, 2009. First, the vacuum truck's "stinger" (drop tube) was used to remove groundwater from MP-11 for approximately 40 minutes at an applied vacuum (measured at the vacuum truck) of 10 to 19 inches of mercury (inHg). The well was dewatered, but continued to recharge during pilot testing.

During the second phase of the June 2009 EFR pilot test, a vacuum truck hose was used to apply whole-well extraction on well MP-11 at an applied vacuum of approximately 50 inches of water (inH_2O) for three hours. Vacuum influence could not be measured at adjacent VMPs due to a vacuum gauge malfunction and difficulty sealing the VMPs, but there was audible air movement at well MP-32, located approximately 10 feet from MP-11 (see Figure 6-4).

A total of approximately 335 gallons of water was removed from MP-11 during the June 2009 EFR pilot test. Water level changes were noted at all designated monitoring points during the test, including MW-28, MP-29 & MP-30, which are located approximately 50 feet or more from MP-11 (see Table 6-5 & Figure 6-4). Toluene concentrations at extraction well MP-11 decreased after the EFR test (see Table 2-1) from 100,000 µg/L to 27,000 µg/L.

Based on the results of the initial test, additional EFR pilot tests were conducted in May, July, October & December 2011 and February & May 2012 per the November 2010 CMS Workplan – Pilot Testing Extension. Vacuum was applied at two to six EFR extraction wells (including MW-20, MW-21, MW-22, MW-23, MW-26, MW-27, MP-11, MP-25, MP-26, MP-30 & MP-37; see Figure 3-1 for well locations) for approximately one and a half to four hours at each well. EFR extraction wells were rotated to avoid potentially inducing movement of the toluene plume to less impacted areas of the Site. EFR extraction wells were dropped from the pilot testing rotation if toluene concentrations decreased below 10,000 μg/L.

Newly installed post-excavation wells were equipped with vacuum seals prior to the October 2011 EFR pilot test event. Depth to water measurements collected during the October 2011 EFR "stinger" pilot test at extraction well MW-27 (see Figure 3-1 for well locations) indicated an induced drawdown of 0.17 feet was present at well MW-26. When whole-well vacuum extraction was conducted at well MW-27 (applied vacuum 4.0 inH_2O), induced vacuum influence was also present at VMPs MW-26 (0.36 inH_2O) & MW-25 (0.28 inH_2O).

A comparison of pre- and post-test toluene concentrations at EFR extraction wells in most areas of the Former Norton/Nashua site exhibited decreasing toluene concentrations after EFR pilot testing (see Table 2-1 & graphs provided in Appendix B). However, as of May 2012, it was unclear if areas of the Site with elevated dissolved toluene concentrations (e.g., MW-27 & MP-37; see Table 2-1 & Figure 3-1) were responding to EFR pilot testing. Therefore, a pilot testing extension was requested and subsequently approved by the NYSDEC on June 15, 2012.

Pursuant to the approved pilot test extension, EFR events were conducted in July & November 2012 and February, April & June 2013. Vacuum was applied at three to six EFR extraction wells (MW-22, MW-27, MP-11, MP-25, MP-26, MP-27, MP-30, MP-37 & MW-37R; see Figure 3-1 for well locations) for two to four hours each during each pilot test.

In addition, brief EFR events (less than one hour each) were conducted in November 2012 at MP-26, MP-27, MP-28, MP-29 & MP-31 (see Figure 3-1) in an attempt to mobilize residual sodium persulfate from the recently completed ISCO event (see next section) under the building slab (but subsequent sampling results suggest wells MP-26 & MP-27 may have also mobilized toluene-impacted groundwater from the vicinity of well MP-25).

EFR extraction wells were rotated during each pilot testing event to avoid potentially inducing movement of the toluene plume to less impacted areas of the Site (but see above). EFR extraction wells were dropped from the pilot testing rotation if toluene concentrations decreased below 10,000 µg/L (and at well MW-21, where toluene concentrations increased; see below).

A comparison of pre- and post-test toluene concentrations at EFR extraction wells in most areas of the Former Norton/Nashua site exhibited decreased toluene concentrations after EFR pilot testing (see Table 2-1). Graphs depicting toluene concentration over time at 13 wells used at least once as EFR extraction points (MW-20, MW-22, MW-26, MW-27, MW-37R, MP-11, MP-25, MP-26, MP-27, MP-28, MP-29, MP-30 & MP-37) are provided in Appendix B. (Note: graphs are not provided for: 1) EFR extraction well MW-21, where the toluene concentration increased from 520 µg/L to 4,300 µg/L after the initial EFR event in June 2011; and 2) EFR extraction wells MW-23 & MP-31, where toluene concentrations remained ND after EFR events in June 2011 & November 2012, respectively).

The graphs indicate toluene concentrations have significantly decreased at seven EFR extraction wells (MW-20, MW-22, MW-26, MW-27, MP-11, MP-28 & MP-37), and fluctuating, but overall decreasing concentrations are present at three EFR extraction wells: MP-26, MP-27 & MP-30. Increasing toluene concentrations are present at three EFR extraction wells: MP-25, MP-29 & MW-37R. The graphs confirm that the overall effect of the EFR pilot testing was a significant decrease in toluene concentrations in the On-Site SWMU/AOC.

The increase in toluene concentrations in monitoring points MP-25 (where FPP was transiently detected in 2009) & MP-29, which are located along the northern wall of Building #61 (see Figure 3-1), is attributed to a small pocket of residual toluene in this area because similarly elevated toluene concentrations are not present in other nearby wells such as MP-24, MP-26 & MP-28 (see Figure 3-1). The increase in toluene concentrations in monitoring well MW-37R, which is located adjacent to the MP-37 "hot spot", is attributed to a small pocket of residual toluene in this area because similarly elevated toluene concentrations are not present in other nearby wells such as MP-34, MP-35 & MP-38 (see Figure 3-1). The boring log for MW-37R (see Appendix D) also indicates the presence of fill (bricks, wood) and low conductivity sediments (clay) in this area. Toluene concentrations in these two areas would be expected to decline with time (or additional EFR and/or ISCO treatments).

6.4 Bioremediation Pilot Testing

Pilot testing of the iSOC oxygen and C-Sparger ozone delivery technologies was initiated on November 4, 2009 with the installation of testing equipment in wells installed to the manufacturers' pilot testing specifications. According to the iSOC manufacturer, the iSOC (in-situ submerged oxygen curtain) units installed in wells IS-1 & IS-2 (see Figure 6-5) would supply infused oxygen (supplied by a compressed oxygen tank) into the groundwater via microporous fibers. The C-Sparger generated ozone via an oxygen concentrator, and according to the manufacturer (Kerfoot), injected microbubbles of ozone encapsulated with a 10% solution of H_2O_2 into the groundwater via the dedicated sparging well (CS-1; see Figure 6-5).

Pilot testing of the iSOC oxygen and C-Sparger ozone delivery technologies continued through January 2010. Fifteen on-site wells were sampled in February 2010 in association with the iSOC and C-Sparger pilot testing. Additional details are provided below.

6.4.1 iSOC Pilot Test

Both iSOC units appeared to be functioning properly after installation on November 4, 2009. The iSOC units increased dissolved oxygen (DO) concentrations in iSOC wells IS-1 & IS-2, which generally ranged between 20 and 30 mg/L from December 2009 until June 2010 (see Table 6-6). DO concentrations also increased in surrounding monitoring points (MP-11, MP-31, MP-32 & MP-33) located less than 20 feet downgradient from the iSOC wells (see Figure 6-5), but excluding anomalous November 2009 measurements, the average DO concentration in the iSOC pilot testing monitoring points was generally less than 1.0 mg/L above the baseline average of 1.0 mg/L.

During the February 2010 groundwater sampling event (see Table 2-1), a decrease in toluene concentration was noted at iSOC test well MP-11, but the toluene concentration increased at IS-2. Given the inconclusive sampling results, and the limited extent and magnitude of dissolved oxygen influence, the pilot test was terminated when the compressed oxygen cylinder was depleted in August 2010.

6.4.2 C-Sparger Pilot Test

Based on previous field experience, the C-Sparger manufacturer (Kerfoot) recommended using pulsed ozone injections for field testing (vs. continuous operation), so the C-Sparger was pre-programmed to cycle on and off on an hourly basis during the pilot test. Despite repeated equipment and power supply troubleshooting, the C-Sparger did not cycle or operate properly following its activation on November 4, 2009, and was subsequently deactivated on November 24, 2009 pending additional evaluation and repairs, which were made by Kerfoot on December 3, 2009.

Internal system controls deactivated the C-Sparger prior to a site visit on December 11, 2009. The C-Sparger was reactivated on December 14, 2009, but again found to be deactivated during a December 18, 2009 site visit. Following additional repairs on December 28, 2009, the C-Sparger operated continuously and injected approximately 35 to 40 gallons of 10% H_2O_2 before its deactivation on February 1, 2010.

DO concentrations in nine monitoring points surrounding the C-Sparger (see Figure 6-5) increased from a baseline average of 0.6 mg/L to between 5.0 mg/L and 6.0 mg/L when the C-Sparger system was activated (see Table 6-6). Average DO concentrations in the adjacent monitoring points quickly decreased to 3.0 mg/L following C-Sparger deactivation, but there was some residual effect, and average DO concentrations in the adjacent monitoring points ranged between 1.0 mg/L and 2.1 mg/L from February through early June 2010.

Given the operational difficulties (and high equipment rental costs), the C-Sparger pilot test was terminated in early February 2010. Following operation of the C-Sparger, significant decreases in post-test toluene concentrations were observed at wells MP-25 and MP-27 (which were also influenced by the June 2009 ISCO pilot testing), but post-test toluene concentrations increased (or were similar) at C-Sparger monitoring points MP-24, MP-26, MP-28, MP-29 & MP-30 indicating a limited radius of effective treatment (i.e., less than 15 feet).

6.4.3 Biochemical Nutrient Analysis and Supplementation

Three sets of groundwater samples were collected in June 2009 for analysis of natural bioattenuation parameters to determine the extent of intrinsic biodegradation occurring at the Site. Well MP-27 (see Figure 3-1 for well locations) was severely impacted (toluene concentration 130,000 µg/L), well MP-23 was moderately impacted (toluene concentration 3,700 µg/L), and there was little to no VOC impact at well MP-31 (toluene concentration ND).

Bioattenuation parameter data, summarized in Table 6-7, indicate DO concentrations, which ranged from 0.49 mg/L in well MP-23 to 1.17 mg/L at well MP-31, were low and probably rate limiting with respect to toluene degradation. The lowest sulfate concentration, and highest chemical oxygen demand (COD) and methane concentrations, were detected at well MP-27 indicating anaerobic conditions were likely present. Well MP-27 also had the highest alkalinity concentration, a negative ORP, and the lowest pH (but higher ferrous iron and total iron concentrations were present at well MP-23).

Potential toluene-degrading bacteria were present in the MP-23 & MP-27 samples, supporting the occurrence of active toluene degradation, but the ratios of these bacteria to total heterotrophic bacteria were low, possibly a result of the low DO and high dissolved-toluene concentrations. Nitrate/nitrite was ND in all three sample points, and may be a rate limiting nutrient, but well MP-27 had the highest total phosphate concentration.

Bench testing of soil and groundwater samples from the Former Norton/Nashua site was conducted by Bioscience, Inc. (Bioscience) of Allentown, Pennsylvania in Third and Fourth Quarters 2009. The reports are attached as Appendix C. Bioscience concluded that sufficient toluene degraders were present to perform complete bioremediation of toluene, but the groundwater was nutrient deficient with nitrogen being the limiting factor. Bioscience recommended the addition of low concentrations of ammonium nitrogen, phosphate, and trace minerals to enhance biodegradation.

Prior to 2013 EFR testing (see Section 6.3), nitrate and phosphate levels were field measured at EFR extraction wells and surrounding monitoring wells/points (see Figure 6-6). A dilute nitrate-phosphate solution was added to the surrounding wells/points, and following the completion of the EFR pilot tests, nitrate and phosphate levels were rechecked to determine if the EFR events redistributed the nutrient supplement.

Based on the three 2013 testing events, the effects of the nutrient supplementation were inconclusive. Surrounding wells were generally deficient in nitrogen during each testing round, but phosphate remained elevated in the surrounding wells after initial supplement dosing. After each EFR event, field detectable concentrations of nitrogen and phosphate generally remained deficient in EFR extraction wells indicating the nutrients were not physically drawn to the extractions wells from the surrounding supplementation wells (or were too diluted for field detection) during the extraction events.

6.5 Groundwater Delineation Activities

A number of monitoring wells/points have been installed at the Site since the submittal of the 2007 RFI Report. At the request of the NYSDEC, boring logs and well construction diagrams for monitoring wells/points installed since 2007 were submitted with the August 2012 monthly update report and are included here as Appendix D. Boring logs and well construction diagrams for post-excavation wells MW-25 through MW-27 were previously submitted with the January 2012 SRA Report.

Based on review of the on-site groundwater sampling data, the November 2010 CMS Workplan – Pilot Testing Extension proposed the installation of three additional monitoring wells/points to complete the delineation of the toluene plume in the Building Subslab AOC (see Figure 3-1): 1) MW-24; along the north wall of Building #61, east of existing well MP-29; 2) MP-34; in the northwest corner of Building #59; and 3) MP-35; in Building #61, south of existing well DGC-6 and west of the former solvent lines. These three monitoring wells/points were installed in January 2011.

Sampling results at MP-34 were ND in May & July 2011 (see Table 2-1), but elevated toluene concentrations were detected in May 2011 at MP-35 (7,400 µg/L, but decreased to 4.2 J µg/L in July 2011) and MW-24 (2,200 µg/L), so four additional delineation points were proposed: 1) MP-36; west of MP-35; 2) MP-37, south of MP-35; 3) MP-38, southwest of MP-35; and 4) MP-39, east of MW-24 (see Figure 3-1). These four monitoring points were installed in July 2011 and sampled in October 2011. Toluene was ND at well MP-36 (confirmed in February 2012), but was present at concentrations of 190,000 µg/L at MP-37, 500 µg/L at MP-38, and 1,700 µg/L at MP-39 (see Table 2-1). On the basis of the October 2011 results, delineation point MP-40 was installed in the northeast corner of the warehouse building in May 2012 (see Figure 3-1). The toluene concentration at well MP-40 was ND in July 2012.

6.6 Continued Groundwater Monitoring

After RFI sampling activities were completed in August 2006, groundwater monitoring continued at the Former Norton/Nashua site per the IGWMP submitted as part of the December 2007 RFI Report. Revised on-site and off-site groundwater sampling schedules/protocols were included in the November 2010 CMS Workplan – Pilot Testing Extension (onsite) and the December 2010 SRA Workplan (offsite). Continued groundwater monitoring schedules/protocols are further discussed in Section 10.0 of this report.

6.6.1 On-Site Monitoring Wells/Points

A total of 186 groundwater samples (not including duplicate samples) have been collected from 41 monitoring well/points (see Table 2-1; see Figure 3-1 for sampling locations) in the On-Site SWMU/AOC since RFI activities were completed (i.e., after August 2006). The majority of these groundwater samples were collected in conjunction with ISCO pilot testing (see Section 6.2) and EFR pilot testing (see Section 6.3).

Toluene concentrations were ND or less than 5 µg/L (the groundwater standard) in 45 samples collected from 17 monitoring wells/points. A total of 141 groundwater samples collected from 31 on-site monitoring well/points have exhibited toluene concentrations greater than 5 µg/L since the RFI; 111 of these samples had toluene concentrations greater than 1,000 µg/L (the proposed short-term RPG and long-term groundwater monitoring implementation level), 77 samples had toluene concentrations greater than 10,000 µg/L, and 18 samples (6 locations) had toluene concentrations of 100,000 µg/L or more.

Because most recent samples (2011-2013) were associated with EFR or ISCO pilot testing activities that were conducted in the areas of highest dissolved toluene impact (versus long-term site monitoring), recent toluene sampling results are biased high. However, as noted in Section 2.5.2, based on results from the two most recent events at a given sampling location, 15 extant on-site monitoring points/wells meet the groundwater standard and 15 additional extant on-site monitoring points/wells meet the proposed short-term RPG of 1,000 µg/L.

Graphs depicting toluene concentration over time for the 14 on-site monitoring points/wells where toluene concentrations exceeded 1,000 µg/L during the two most recent sampling events (five other wells with toluene concentrations exceeding 1,000 µg/L have only been sampled once or twice), plus three additional locations where toluene concentrations previously exceeded 1,000 µg/L (MP-2, MP-24 & MP-28), are provided in Appendix A. Many of these locations have also been utilized as EFR extraction wells (see Section 6.3).

The graphs indicate dissolved toluene has significantly decreased at 10 wells: MW-20, MW-22, MW-26, MW-27, MP-1, MP-2, MP-11, MP-24, MP-28 & MP-37. Fluctuating, but overall decreasing, toluene concentrations are present at four wells: MP-23, MP-26, MP-27 & MP-30. Increasing toluene concentrations are present at three wells MP-25, MP-29 & MW-37R. The graphs confirm that the overall effect of EFR/ISCO pilot testing (and natural attenuation) has been a significant decrease in toluene concentrations in the On-Site SWMU/AOC.

The recent increase in toluene concentrations in wells MP-25 & MP-29, which are located along the northern wall of Building #61 (see Figure 3-1), is attributed to residual toluene in this area that was mobilized during the recent EFR and ISCO pilot testing (FPP toluene was transiently detected in this area during 2009 ISCO pilot testing). Because similarly elevated toluene concentrations are not present in other nearby monitoring points such as MP-24, MP-26 & MP-28 (see Figure 3-1); the area of residual toluene adjacent to wells MP-25 & MP-29 is of limited size.

Similarly, the recent increase in toluene concentrations in well MW-37R is attributed to a small pocket of residual toluene in the vicinity of the MP-37 “hot spot” because similarly elevated toluene concentrations are not present in other nearby wells such as MP-34, MP-35 & MP-38 (see Figure 3-1). The boring log for MW-37R (see Appendix D) also indicates the presence of fill (bricks, wood) and low conductivity sediments (clay) in this area. Dissolved toluene concentrations in the above two areas would be expected to decline with time (and additional mass removal via EFR and/or ISCO treatments would accelerate the rate of decline).

A series of toluene isoconcentration plots from 2004 through 2013 provided as Figures 6-7 through 6-13 also demonstrates the overall contraction of the dissolved toluene plume with time at the Former Norton/Nashua site. The decrease is especially evident in monitoring wells/points along the margins of the plume, suggesting active biodegradation.

The isoconcentration plots show that areas where recent toluene concentrations exceeded 100,000 µg/L are limited to: 1) the northern wall of Building #61, near monitoring point MP-25; 2) the northwestern corner of Building #58, near monitoring point MP-37; and 3) the northeast corner of the 2011 excavation, near monitoring well MW-27. As discussed above, residual toluene concentrations in these areas would be expected to decline with time (and additional EFR and/or ISCO treatments would accelerate the rate of decline).

6.6.2 Off-Site Monitoring Wells/Points

A total of 121 groundwater samples (not including duplicate samples) have been collected from 10 monitoring well/points (see Table 2-1; see Figure 3-3 for sampling locations) in the Off-Site AOC since the completion of RFI activities (i.e., after August 2006). Toluene concentrations were ND or less than 5 µg/L (the groundwater standard) in 91 samples collected from 10 off-site monitoring wells/points.

Of the 30 groundwater samples collected in the Off-Site AOC since August 2006 with toluene concentrations greater than 5 µg/L (the groundwater standard), most were collected five or more years ago. Twenty-two samples exceeding the groundwater standard for toluene were collected in 2006-2008 from six off-site monitoring wells/points, 4 samples were collected in 2009 from three off-site monitoring points: MP-6, MP-14 (two samples) & MP-17, 2 samples were collected in 2011 from two off-site monitoring wells/points: MW-18 & MP-14, and 2 samples were collected in 2013 from monitoring point MP-14. Toluene concentrations at off-site monitoring point MP-14 have fluctuated but exhibit an overall decrease (see graph in Appendix A), and are expected to continue to stabilize and decrease with time.

Similarly, of the 8 groundwater samples collected in the Off-Site AOC since the RFI with toluene concentrations greater than 1,000 µg/L (the proposed short-term RPG and long-term groundwater monitoring implementation level), most were collected five or more years ago. Seven groundwater samples with toluene concentrations greater than 1,000 µg/L were collected in 2007-2008 from four off-site monitoring wells/points: MW-18 (two samples), MP-6 (two samples), MP-14 (two samples) & MP-17, and one sample was collected in 2009 (MP-6). No off-site groundwater samples have exhibited a toluene concentration greater than 1,000 µg/L since 2009.

These above results demonstrate: 1) there is no indication of dissolved toluene migration from on-site areas of the Former Norton/Nashua site to the Off-Site AOC; 2) the number of off-site monitoring wells/points exceeding the groundwater standard and the proposed RPG has steadily decreased with time; 3) off-site toluene concentrations have generally exhibited increasing stability with time; and 4) dissolved toluene concentrations have demonstrated an overall decreasing trend in the Off-Site AOC.

Dissolved toluene concentrations in the Off-Site AOC are expected to continue to decrease with time and ultimately decline below the groundwater standard in all monitoring wells/points. Although dissolved toluene concentrations in selected off-site wells such as MP-14 have been variable, regression analysis indicates toluene concentrations in the Off-Site AOC will reach the groundwater standard of 5 µg/L in five to ten years.

SECTION 7.0

IDENTIFICATION AND SCREENING OF ALTERNATIVE CORRECTIVE MEASURES

Previous groundwater, soil, and vapor sampling performed in association with the RFI (see Section 2.4), and subsequent sampling conducted as part of the presumptive remedy (SRA; see Section 4.2), CMS pilot testing (see Section 6.0), and ongoing groundwater monitoring (see Section 6.6) demonstrates that: 1) the distribution of free-phase, residual soil, vapor, and dissolved-phase toluene is stable and there is no ongoing off-site migration via groundwater (or the sewer systems); 2) on-site and off-site residual dissolved toluene concentrations are stable or decreasing; 3) there is no current toluene exposure for on-site workers; and 4) there is no current toluene exposure for off-site residents. Therefore, the current risk to human health and the environment from the Former Norton/Nashua site is minimal and the focus of the final Corrective Measures is the long-term achievement of the CMOs outlined in Section 5.1.

The following technologies were selected for initial screening and evaluation in the 2007 Preliminary CMS:

1. <u>Groundwater Extraction (GWE)</u>
   Also known as "pump-and-treat", groundwater extraction as a stand-alone technology can reduce source mass via removal of dissolved- and liquid-phase (FPP) components. GWE is frequently used in conjunction with SVE (#2) to enhance vapor recovery, or vapor extraction may be used to enhance GWE (DPVE; #3).

2. <u>Soil Vapor Extraction (SVE)</u>
   SVE utilizes vapor flow to remove source mass via direct volatilization and indirectly via increased rates of biodegradation. Vapor extraction is accomplished via horizontal or vertical wells placed within the vadose zone.

3. <u>Dual-Phase Vapor Extraction (DPVE)</u>
   The concurrent removal of groundwater and vapors from extraction wells is known as DPVE. Vapor recovery is enhanced by depressing the water table and exposing more soil column, and groundwater well yields are increased (at least temporarily) by applying a vacuum to the well.

4. In-Situ Air Sparging (IAS)
   IAS utilizes the injection of air into the groundwater to stimulate direct volatilization (and associated biodegradation). Without concurrent SVE or DPVE, IAS has the potentially negative effect of inducing vapor migration in the subsurface, and IAS may also cause localized groundwater mounding.

5. Excavation and Off-Site Treatment or Disposal
   Direct excavation is used to remove soils with elevated COC concentrations for on-site treatment, off-site treatment, or disposal at an approved facility.

6. Passive FPP Recovery
   Passive FPP recovery devices (e.g.; absorbent "socks") are deployed in recovery wells to selectively remove mobile-phase FPP in the immediate location of the wells.

7. Enhanced Fluid Removal (EFR)
   This technique is essentially a portable version of DPVE (see #3), and uses application of a high vacuum to extract groundwater via vacuum truck.

8. In-Situ Chemical Oxidation (ISCO)
   ISCO or chem-ox technology utilizes injection points to introduce chemicals to the subsurface to oxidize (mineralize) COCs.

9. Enhanced Bioremediation
   This alternative attempts to accelerate intrinsic biodegradation (see #10) by adding: 1) concentrated cultures of microbes cultured ex situ; 2) oxygen via H_2O_2, ozone, proprietary products such as oxygen release compound (ORC), sparging, or diffusion; and/or 3) potential growth-limiting nutrients (e.g., nitrogen, phosphorus).

10. Monitored Natural Attenuation (Intrinsic Remediation)
    Naturally occurring processes such as volatilization, dispersion, adsorption, chemical degradation, and biodegradation act to reduce contaminant concentrations in groundwater. When implemented as a remedial alternative, MNA is not a "no action" response; monitoring and continuous evaluation are required for a prolonged period. Natural attenuation has proven to be a dynamic process ultimately contracting dissolved-phase plumes.

The preliminary remedial alternatives were reviewed using a Technology Screening Matrix patterned after a U.S. EPA model (USEPA, 1989), which was modified to include an evaluation of potential risks and certainty of outcome. Each remedial alternative was evaluated for its potential use at the Site using the following formula: Rating = A x R x P x (C + T), where:

A = Applicability/Effectiveness - the overall ability to reduce toluene concentrations;

R = Reliability/Risks - the potential risk and the degree of certainty a Permanent Remedy will be achieved;

P = Ease of Implementation/Permissibility - the ease of implementation (excluding financial concerns) and potential access, permitting, and/or approval problems;

C = Costs - including design, installation, operation, and environmental restoration; and

T = Treatment Time - anticipated length of time to meet remediation goals and potential operational impact to business or residences.

The facility is a working warehouse and there is a limited footprint available for the installation and operation of remediation equipment. Further, the thick concrete floors (four to six inches) present in Buildings #58, #59 & #61 make trenching (for a piping network) extremely difficult/expensive (and there are similar constraints/concerns regarding the use of overhead piping). Because technologies #1 through #4 above require extensive system infrastructure (piping/trenching network) and capital equipment, they received low ratings for permissibility and cost in the 2007 Preliminary CMS, and were considered potentially unfeasible for implementation at the Former Norton Nashua Site.

Soil Excavation (technology #5) was previously conducted as a presumptive remedy (see Section 4.2.1) in the Former Tank Farm Area SWMU. The 2011 excavation could not be expanded due to: 1) the presence of railroad tracks and the site property boundary to the north; 2) water and storm sewer utility lines to the south. However, with one exception (which was subsequently addressed by ISCO treatment), all confirmation soil samples along the sidewalls of the excavation met NYSDEC Restricted (Commercial) Use SCOs.

The NYSDEC has subsequently requested (correspondence dated April 8, 2014) the reevaluation of soil excavation for use in the remainder of the Former Tank Farm Area SWMU by temporarily relocating (and then replacing) the water and storm sewer utility lines. The NYSDEC also subsequently requested (April 11, 2014 email correspondence) the reevaluation of Unrestricted Use SCOs as potential CM Targets in this area.

Based on active warehouse operations, the presence of the thick concrete floor, and building structural concerns, soil excavation was determined to be impracticable in the Building Subslab AOC in the 2007 Preliminary CMS (subject to reevaluation if the property owner elected to remove Buildings #58, #59 and/or #61 in the future). However, the NYSDEC has subsequently requested (April 8, 2014) the reevaluation of soil excavation for potential use in the Building Subslab AOC. The NYSDEC also subsequently requested (April 11, 2014) the reevaluation of Unrestricted Use SCOs as potential CM Targets in this area.

Passive FPP recovery devices (technology #6) were previously deployed at the Site; however, FPP has not been present at the Former Norton Nashua site since 2009. Therefore, passive FPP recovery devices will not be given further consideration as a remedial alternative for the Site, but will be retained as a contingency measure only. CMS pilot testing was conducted for Technologies #6 through #10 above (see Section 6.0), which are further evaluated below.

7.1 CMS Alternative Corrective Measures

The following remedial alternatives were retained for further consideration at the Former Norton/Nashua site as part of the current CMS: Alternative #1: no action; Alternative #2: long-term groundwater monitoring only; Alternative #3A: excavation (Former Tank Farm Area SWMU); Alternative #3B: excavation (Beneath Buildings ACO); Alternative #4: Enhanced Bioremediation; Alternative #5: EFR/Selective ISCO; Alternative #6 - active remediation systems such as GWE and/or SVE. Additional details, including preliminary cost estimates, are provided below.

<u>Alternative #1 (No Action)</u> - This "no action" alternative does not include any additional remediation activities.

<u>Alternative #2 (Long-Term Groundwater Monitoring only)</u> - This alternative does not include any active remediation. However, on-site and off-site monitoring wells/points would continue to be monitored to ensure: 1) there is no off-site toluene migration; and 2) the current trend of decreasing toluene concentration continues.

All groundwater monitoring would be conducted in accordance with DER-10, Section 6.2.2.(c)(4). Proposed activities would include semi-annual monitoring of selected on-site plume and "sentinel" monitoring wells/points and annual monitoring of selected off-site monitoring wells/points with a contingency for increased monitoring frequency if there is a significant change in groundwater conditions (i.e., toluene is detected at confirmed concentrations above the proposed RPG of 1,000 µg/L at any "sentinel" monitoring well/point or any off-site monitoring location). If on-site toluene concentrations stabilize and decrease and remain below the proposed RPG range of 1,000 µg/L to 10,000 µg/L, this alternative will also have contingencies to reduce the frequency of groundwater monitoring.

Based on current site conditions, and previous regression analysis, which determined the minimum toluene decay rate constant was approximately 0.001 (see Appendix E; December 2007 RFI Report), it is projected that on-site toluene concentrations will reach the proposed RPG (1,000 µg/L) in 8 to 12 years and the groundwater standard (5 µg/L) in 15 to 25 years. The preliminary estimated cost for Alternative #2 in current dollars is $175,000 to $275,000.

<u>Alternative #3A (Excavation - Former Tank Farm Area SWMU)</u> - Proposed activities would expand the original excavation (see Figure 4-2) south to the main Facility building. A five-foot buffer "cone" of soil would be left in place next to building wall footers to avoid structural integrity concerns. The proposed excavation footprint would require the temporary relocation of storm sewer (24-inch diameter) and water (6-inch diameter?) lines and their replacement after the completion of soil removal. The excavation would extended to a depth similar to the 2011 excavation (i.e., maximum twelve feet), so dewatering would not be required; however, contingent groundwater treatment via Alternative #4, #5, or #6 would also likely be required after excavation completion to reach the groundwater RPG. The preliminary estimated cost for Alternative #3A (shallow soils only) in current dollars is $600,000 to $750,000.

<u>Alternative #3B (Excavation - Beneath Building ACO)</u> - Proposed activities would include excavation inside the building along the former solvent lines extending to other areas of impacted soil (see Figures 2-7 & 5-1). Based on 2003-04 RFI data (see Section 5.4), the indoor excavation would likely extend across significant portions of Buildings #58 & #61, and the northwest corner of Building #59. There is currently a four to six-inch thick concrete slab in these areas, which would have to be removed (and later replaced).

In an indoor environment with restricted air movement, toluene vapor concentrations could reach concentrations exceeding health and/or explosive limits. To address these concerns, excavation personnel would need to use upgraded personal protection equipment (PPE). A temporary vapor-barrier "house" would be installed around the active portion of the excavation. A ventilation system would force fresh air into the house, and exhaust it to the exterior after treatment. The open excavation would also be treated with vapor-suppressing foam as needed to eliminate the risk of combustion. These activities would necessitate the temporary relocation of warehouse "product" stored in these areas and greatly restrict any business operations in these buildings for the duration of excavation.

A five-foot buffer "cone" of soil would be left in place next to footers for building walls and structural I-beams to avoid building integrity concerns. The proposed excavation footprint would require the temporary relocation of several storm sewers (24-inch diameter) in Building #61 and potentially a portion of the sanitary sewer system in Building #58, and their replacement after the completion of soil removal.

Based on RFI boring data, shallow soils will likely include coarse fill materials such as concrete, brick, cobbles, and railroad ties. These coarse materials will need to be physically sorted from any soil sent for disposal/recycling. Soil removal would be extended to a depth similar to the 2011 excavation (i.e., maximum twelve feet), so dewatering would not be required. (The increased technical challenges and costs associated with extensive dewatering make this contingency less feasible for use at the Former Norton/Nashua site.) However, contingent groundwater treatment via Alternative #4, #5, or #6 would also be required after the completion of excavation activities to reach the groundwater RPG. The preliminary estimated cost for Alternative #3B in current dollars (shallow soils only) is $4,850,000 to $6,000,000.

<u>Alternative #4A (Enhanced/Augmented Bioremediation - iSOC)</u> - Proposed activities include the installation of iSOC units at wells exceeding the RPG by utilizing 10 to 15 oxygen cylinders. The performance of the iSOC units would initially be checked on a weekly basis for one to two months, followed by twice-monthly O&M. After baseline sampling, treatment wells would be monitored on a quarterly basis to confirm system effectiveness, followed by semi-annual monitoring of on-site plume and "sentinel" monitoring wells/points (and continued annual monitoring of selected off-site monitoring wells/points). Once toluene concentrations decrease to, and remain below, the proposed toluene RPG range of 1,000 µg/L to 10,000 µg/L (estimated 6 to 10 years), this alternative will convert to reduced frequency long-term groundwater monitoring. The preliminary estimated cost for Alternative #4A in current dollars is $325,000 to $550,000.

<u>Alternative #4B (Enhanced/Augmented Bioremediation - C-Sparge)</u> - Proposed activities include the installation of three C-Sparge wells near monitoring wells/points exceeding the RPG. C-Sparge base units will initially be checked on a weekly basis for one to two months followed by twice-monthly O&M. After baseline sampling, wells would be monitored on a quarterly basis to confirm system effectiveness, followed by semi-annual monitoring of on-site plume and "sentinel" monitoring wells/points (and continued annual monitoring of selected off-site monitoring wells/points). Once toluene concentrations decrease to, and remain below, the proposed toluene RPG range of 1,000 µg/L to 10,000 µg/L (estimated 4 to 6 years), this alternative will convert to reduced frequency long-term groundwater monitoring. The preliminary estimated cost for Alternative #4B in current dollars is $400,000 to $550,000.

Note: Although the results of bioremediation supplement addition (i.e., nitrogen and phosphate) pilot testing were inconclusive (see Section 6.4.3), continued pilot testing of this technology can be continued in conjunction with all of the above alternatives. The cost of the supplements and associated field testing materials is only a few hundred dollars annually and there are no serious deleterious effects associated with nutrient supplementation.

<u>Alternative #5 (EFR/Selective ISCO)</u> - Proposed activities would include continued EFR events at wells exceeding the RPG. EFRs would be conducted at four to six wells approximately every other month for one to two years. After baseline sampling, treatment wells would be monitored before each EFR event to confirm technology effectiveness. EFR extraction wells would be rotated to utilize the most impacted locations. Once toluene concentrations at a given extraction well decrease to, and remain below, the proposed toluene RPG range of 1,000 µg/L to 10,000 µg/L, that extraction well will be dropped from the rotation. Once toluene concentrations at all wells decrease to, and remain below, the proposed toluene RPG range of 1,000 µg/L to 10,000 µg/L, this alternative will convert to reduced frequency long-term groundwater monitoring.

In addition, ISCO is proposed for the limited areas where there are recalcitrant dissolved toluene concentrations. These areas include: 1) along the outside north wall of Building #61; and 2) the immediate area surrounding excavation well MW-27. Although toluene concentrations in soil in these areas currently meet remediation objectives, the residual mass present continues to impact groundwater. Previous ISCO pilot test injections in these areas were partially effective with respect to source mass destruction. Therefore, additional limited treatment with a contingency for a final round of ISCO is proposed under this alternative.

Full-scale ISCO was not pilot tested inside the facility due to: 1) the presence of a thick concrete slab that hampers the installation of injection points; 2) ongoing warehousing operations; and 3) potential oxidation reaction/vapor migration concerns. However, a limited-scale ISCO event utilizing: 1) existing monitoring wells/points as ISCO injection points (e.g., MW-37R for MP-37; see Figure 3-1); and 2) reduced concentrations of oxidants (and subsequent EFRs at the extraction wells) could potentially mitigate these concerns. One to two limited-scale ISCO events are proposed for the vicinity of wells MP-37, MW-22, and MP-27 to help accelerate the reduction of toluene concentrations in these areas (although ISCO application via existing monitoring wells/points will not treat any residual toluene present in the vadose zone). The estimated cost of the this alternative (including two years of EFR events and two rounds of limited outdoor and indoor ISCO) in current dollars is $350,000 to $475,000.

Alternative #6 (Active Remediation Systems) - Proposed activities would include the installation of: 1) a GWE system; 2) an SVE system; 3) a combined GWE/SVE (i.e., DPVE); or 4) an IAS/SVE system in the area north of Building #61. None of these technologies have been pilot tested at the Former Norton/Nashua site. Discharge of treated groundwater and/or vapors would also require appropriate permitting.

Based on observed flows during groundwater sampling and measured drawdowns during EFR pilot testing, it is estimated that wells beneath the building would yield only a few gallons per minute and would have a radius of influence (ROI) of less than 15 to 20 feet. Similarly, based on vacuum influence observed during EFR pilot testing, SVE well ROIs would likely be less than 25 feet. Therefore, treatment of the remaining areas of elevated dissolved toluene would require (see Figure 5-1): 1) two to three extraction wells along the north wall of Building #61; 2) one to two extraction wells in the vicinity of MP-11 & MP-30; 3) one to two extraction wells in the vicinity of MP-37 & MW-22; and 4) one to two extraction wells near MW-27 (where the groundwater yield will be significantly higher due to the excavation backfill). The optional use of IAS would require the installation of several IAS wells screened beneath the water table.

The operation of any of the above-noted remediation systems under Alternative #6 would initially require weekly O&M for at least two to three months, followed by twice-monthly O&M. After baseline sampling, the system and treatment wells would be monitored on a quarterly basis to confirm system effectiveness, followed by semi-annual monitoring of on-site plume and "sentinel" monitoring wells/points (and continued annual monitoring of selected off-site monitoring wells/points). Once toluene concentrations decrease to the proposed toluene RPG range of 1,000 µg/L to 10,000 µg/L (estimated treatment time one to three years), this alternative will convert to reduced frequency long-term groundwater monitoring. The estimated cost of a five to nine well system in current dollars ranges from $425,000 to $650,000 (IAS/SVE with additional IAS wells).

7.2 Ability of CMS Alternatives to Meet Performance Standards

For further consideration, all CMS remedial alternatives must meet the following three performance standards: 1) maintain source control; 2) protect human health and the environment; and 3) attain cleanup standards. Based on current conditions at the Former Norton/Nashua site, each of the proposed alternatives is evaluated with respect to these three performance standards.

7.2.1 Maintain Source Control

Toluene concentrations are stable onsite (and offsite) at the Former Norton/Nashua site, and there is no evidence of ongoing off-site migration of dissolved toluene. Therefore, all of the alternatives, including "no action" Alternative #1, will maintain source control.

7.2.2 Protect Human Health and the Environment

As discussed in Section 3.5, RFI and subsequent CMS pilot testing and monitoring data demonstrate there is no current toluene exposure for on-site workers or off-site residents, and the institutional controls and other actions proposed in Section 4.3 will generally maintain these conditions during the CMS. Therefore, based on current conditions at the Former Norton/Nashua site, and the implementation of the actions proposed in Section 4.3, "no action" Alternative #1 and Alternative #2 are protective of human health and the environment.

During outdoor excavation activities (Alternative #3A), there is potential exposure via vapor or dust to off-site residents and/or on-site workers. This potential exposure to off-site residents and/or on-site workers from outdoor excavation activities can be limited through the implementation of similar safeguards (i.e., monitoring, dust/vapor suppression; temporarily cease work, etc.) to those employed during the 2010-11 SRA (see Section 4.2.1).

Limiting potential exposure to on-site workers during indoor excavation activities (Alternative #3B) is more problematic. Potential exposure will be reduced by temporary relocation, deployment of vapor isolation barriers, and use of PPE (for construction workers).

Active remediation involves the use of chemicals and equipment, which are potentially dangerous to on-site workers under several scenarios: Alternative #4A (oxygen cylinders); Alternative #4B (ozone, H_2O_2), and Alternative #5 (ISCO oxidizers). Active remediation may also result in the induced migration or discharge of toluene, which is potentially dangerous to human health or the environment: Alternative #5 (ISCO vapors, chem-ox "rebound" effect) and Alternative #6 (treated groundwater and vapor discharges, IAS vapors).

However, the potential negative effects associated with active remediation are effectively mitigated by proper application of these technologies and environmental/safety monitoring. Therefore, based on current conditions at the Former Norton/Nashua site, and the proper application of remedial technologies and environmental/safety monitoring, Alternatives #3 through #6 are protective of human health and the environment.

7.2.3 Attain Cleanup Standards - Groundwater

Toluene concentrations exhibit an overall decreasing trend onsite (and offsite) at the Former Norton/Nashua site, but currently exceed the proposed toluene RPG and groundwater standard. Therefore, Alternative #1 ("no action") does not meet this performance standard. Alternative #2 (long-term groundwater monitoring) is projected to reach the proposed groundwater RPG (1,000 µg/L) in 10 to 12 years, and the groundwater standard (5 µg/L) in 15 to 25 years.

The implementation of active remediation is currently estimated to reduce the time to reach the RPG as follows: Alternative #3 (1 to 2 years)[3], Alternative #4A (6 to 10 years), Alternative #4B (4 to 6 years), Alternative #5 (2 to 3 years), and/or Alternative #6 (2 to 3 years). Each of these alternatives will also require an additional 6 to 12 years of long-term groundwater monitoring to attain the groundwater standard: total treatment times: Alternative #3, total treatment time 8 to 15 years[4]; Alternative #4A, total treatment time 12 to 22 years; Alternative #4B, 10 to 18 years; Alternative #5, 8 to 15 years; Alternative #6, 8 to 15 years.

7.2.4 Attain Cleanup Standards - Soil

The removal/treatment of all residual toluene mass in soil to meet Unrestricted Use (Protection of Groundwater) SCOs and/or Restricted (Commercial) Use SCOs is more problematic. Based on the RFI results (see Section 5.4), residual toluene exceeding SCOs is present in soils adjacent to the former tank farm and beneath significant portions of the footprints of Buildings #58, #59 & #61 (see Figure 5-1). Residual toluene mass also remains under the adjacent off-site railroad property north of the former tank farm. (The presence of active railroad tracks and the overlying embankment precludes excavation in this area.) Alternative #1 ("no action"), Alternative #2 (long-term groundwater monitoring), and, for all practical purposes, Alternative #4 (enhanced bioremediation) do not address this performance standard.

Some components of Alternative #5 (EFR) and Alternative #6 (SVE) will remediate vadose zone soils. These technologies can be fairly effective at removing residual toluene mass in sandy vadose soils, but they are less effective at treating clays and silty clays present in the vadose zone at the Former Norton/Nashua site.

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[3] Note: Contingent groundwater treatment via Alternative #4, #5, or #6 will also likely be required after the completion of excavation to reach the groundwater RPG.

[4] Including 2 to 3 years of post-excavation groundwater treatment (see footnote #3).

Similarly some components included in Alternative #5 (EFR and ISCO) and Alternative #6 (GWE) are capable of treating soils in the saturated zone. Again, these technologies can be fairly effective at removing residual toluene mass in sandy soils, but they are less effective at treating the clays and silty clays present at the Former Norton/Nashua site. Therefore, significant residual mass would remain in slits and clay-rich soils after active remediation via Alternative #5 or Alternative #6. Residual toluene would eventually degrade via natural processes; however, the Unrestricted Use (Protection of Groundwater) SCOs and the Restricted (Commercial) Use SCOs would not be achieved for several decades.

With regards to Alternative #3, "shallow" excavation activities at the Facility can extend to a depth of approximately ten feet to twelve feet (a maximum of one to two below the water table) without requiring dewatering. (Small volumes of saturated sediments could potentially be mixed with drier soils or staged and allowed to drain back into the open excavation.) However, any "deep" excavation activities (i.e., deeper than ten to twelve feet) would require extensive dewatering to allow removal of soils (and to maintain excavation wall stability). As previously discussed, extensive excavation dewatering is a significant technical challenge at the Site.

The majority of the residual toluene mass at the Former Norton/Nashua site is immediately above, or up to four to six feet below, the water table. As illustrated on Figure 7-1, the hypothetical "shallow" excavation footprint at the Former Norton/Nashua site is approximately 50,000 square feet and with few exceptions (small "boxes" in Buildings #58 & #61) is underlain by a hypothetical "deep" excavation footprint of 80,750 square feet. The large deep excavation footprint would necessitate: 1) the temporary removal and staging (or disposal) of significant volumes of overlying soils; and 2) dewatering of the excavation to allow deeper soil removal. The additional field requirements and additional removal and disposal costs associated with these deeper soils would add approximately 50% to the cost of this alternative (i.e., total costs of approximately $8.2 million to $10 million.)

Further, as a function of the large hypothetical "deep" excavation footprint, soil removal activities would have to encompass more than 40 I-beam (structural) footers and multiple building wall (structural) footers. To maintain the structural integrity of the building, it would be necessary to leave a buffer "cone" of soil around each footer, and significant residual toluene mass would remain within and below each cone of soil[5]. These constraints and other indoor issues limit excavation activities, even with dewatering, to a total depth of approximately 14 feet.

Therefore, although Alternative #3 could potentially address residual vadose soil contamination, the majority of the residual mass, which resides in the saturated zone, will not be addressed by this technology without dewatering. Moreover, even if dewatering and deeper soil removal is performed, there will be significant residual mass left beyond the excavation limits.

To this end, excavation would not be stand-alone remedial technology, and groundwater treatment via another technology would be needed to reach groundwater standards (with or without dewatering). Residual toluene in soil would eventually degrade via natural processes; however, the Unrestricted Use (Protection of Groundwater) SCOs and the Restricted (Commercial) Use SCOs would not be achieved for several decades.

As summarized above, none of the CMS Alternatives would be expected to achieve Unrestricted Use (Protection of Groundwater) SCOs or Restricted (Commercial) Use SCOs in the short term. However, Alternative #5 (EFR and ISCO) and Alternative #6 (dedicated remedial system) can address areas of residual soil mass in the saturated zone that are currently sustaining groundwater impact (and EFR/ISCO or SVE will also treat vadose and smear zone contamination).

[5] These soils could potentially be environmentally isolated by injecting them with a concrete-like sealing material; however, the technical difficulty (and cost) would be greatly increased because of the proposed excavation depth (and below the water table).

EFR and other fluid extraction technologies remove dissolved toluene in the saturated zone from “accessible” saturated clays (and enhance biodegradation), and ISCO destroys accessible residual mass in the saturated zone (and will potentially open additional pathways to residual mass currently “locked” in clays and other “tight” sediments). There is little opportunity for significant mass transfer from residual toluene mass residing in the less “accessible” clays and other “tight” sediments that do not respond to EFR and/or ISCO treatment; the residual mass in these areas is not currently substantially contributing to groundwater contamination and will slowly dissipate and degrade over time.

For these reasons, an exception to the applicability of the protection of groundwater standards (i.e., the Unrestricted Use SCOs) as set forth in 6 NYCRR 375-6.5(a)(1) is requested because:

1) The groundwater standard contravention is the result of an on-site source which is addressed by the remedial program.
2) An environmental easement or other institutional control will be put in place (see Section 2.6.2) which provides for a groundwater use restriction. (There is no current use of groundwater at the Former Norton/Nashua site.)
3) Groundwater contamination at the site is not migrating, nor is it likely to migrate, off-site.
4) Groundwater quality will improve over time.

Therefore, if this request is approved, the CM Target for soils would be the Restricted (Commercial) Use SCOs.

In conclusion, all of the proposed alternatives (with the additional environmental easement and institutional controls discussed in Section 5.3) meet the first two performance standards: 1) maintain source control; and 2) protect human health and the environment. All of the proposed alternatives, except Alternative #1, also ultimately meet the third performance standard of attaining cleanup standards for groundwater. Therefore, Alternative #1 will not receive further consideration.

None of the proposed alternatives will attain cleanup standards for soil in the short-term (although Alternative #3 will likely remove the most mass given a specified period of time). However, as discussed above, after treatment via Alternatives #5 and #6, any remaining residual soil mass is not expected to significantly contribute to groundwater contamination. The remaining alternatives will be further evaluated regarding: 1) long-term reliability and effectiveness; 2) reduction of toxicity, mobility, and/or volume of waste; 3) short-term effectiveness; 4) implementability; 5) remedy cost; 6) community acceptance; and 7) consistency with "green" remediation practices in Section 8.0.

SECTION 8.0

EVALUATION OF ALTERNATIVE CORRECTIVE MEASURES

As discussed in Section 7.0, all of the proposed alternatives except Alternative #1 ("no action") meet the three performance standards: 1) maintain source control; 2) protect human health and the environment; and 3) attain cleanup standards for groundwater (but none of the proposed alternatives will attain cleanup standards for soil in the short-term). Therefore, the remaining proposed alternatives will be further evaluated regarding: 1) long-term reliability and effectiveness; 2) reduction of toxicity, mobility, and/or volume of waste; 3) short-term effectiveness; 4) implementability; 5) remedy cost; 6) community acceptance; and 7) consistency with "green" remediation practices. Corrective measures alternative rankings for each criterion are summarized on Table 8-1.

8.1 Additional Remedial Alternative Evaluation Factors

8.1.1 Long-Term Reliability and Effectiveness

Based on long-term monitoring and current site data (see Section 6.6), natural attenuation of toluene is actively occurring at the Former Norton/Nashua site. Therefore, treatment via long-term groundwater monitoring under Alternative #2 has been demonstrated to be reliable, and, for that reason, is proposed as the off-site remedial alternative (and will ultimately be utilized to reach CM targets under all proposed remedial alternative scenarios). However, natural attenuation is more effective at lower toluene concentrations and there is a large uncertainty regarding total treatment time at on-site toluene "hot spots".

Alternative #3 (excavation) is considered highly reliable for accessible (vadose) soil. However, as discussed previously, the majority of the residual soil mass is not accessible and resides at or below the water table, so contingent groundwater treatment would also be necessary.

Pilot testing results indicated Alternative #4A (see Section 6.4.1) had limited effect on dissolved toluene concentrations (magnitude and areal extent), but the treatment system required little maintenance. Alternative #4B pilot testing results (see Section 6.4.2) were slightly better, but the treatment system components required frequent maintenance. Therefore, there is a large degree of uncertainty regarding the long-term reliability and effectiveness of the Alternative #4 remedial technologies.

EFR pilot testing (Alternative #5) resulted in significant improvement in toluene concentrations at most extraction wells (see Section 6.3), but toluene concentrations remained elevated at selected EFR extraction wells. Similarly, ISCO pilot testing (Alternative #5) was generally effective at reducing dissolved toluene concentrations (and toluene concentrations in soil) across most of the treatment area (see Section 6.2), but selected areas demonstrated recalcitrant toluene concentrations. Although additional testing/treatment may be necessary to verify the effectiveness of Alternative #5 at toluene "hot spots", the long-term reliability and effectiveness of Alternative #5 to reduce toluene concentrations to RPG is rated very good (see Table 8-1).

EFR results (see above) suggest mass recovery systems such as GWE and/or SVE can potentially be effective at reducing dissolved toluene concentration, but there is less certainty whether these systems can achieve the RPG (of 1,000 µg/L to 10,000 µg/L). There has been no pilot testing conducted for any of the remedial technologies included under Alternative #6. The reliability of large remedial systems (operation and performance) is moderate. Therefore, the overall long-term reliability and effectiveness of Alternative #6 is rated moderate to good.

8.1.2 Reduction of Toxicity, Mobility, and/or Volume of Waste

Remediation via Alternative #2, Alternative #4, and Alternative #5 (ISCO only) ultimately results in the physical destruction of toluene (see Table 8-1). Remediation via Alternative #3, Alternative #5 (EFR only) and Alternative #6 involves the physical removal of toluene for off-site disposal and/or transfer to another medium (GAC, atmospheric discharge).

There are no significant wastes other than purge water generated in association with Alternative #2 and Alternative #4. Significant solid wastes (over 12,000 tons of soil above the water table) are generated in association with Alternative #3 for off-site disposal or treatment/recycling (and significant liquid wastes would be generated if excavation dewatering is performed). Liquid wastes generated during EFR events conducted as part of Alternative #5 require transport for off-site disposal. Depending on the final technology, remedial systems operated under Alternative #6 may generate granular activated carbon (which can be reactivated) and other wastes, which may require off-site disposal.

8.1.3 Short-Term Effectiveness

Alternative #2 will have little short-term effectiveness. Alternative #3 can reduce residual mass in the shallow soil column in the short-term (but groundwater will likely require secondary treatment). Alternative #4A had only minor effectiveness during pilot testing, but Alternative #4B testing results were slightly better.

Based on pilot testing results, use of Alternative #5 will result in a significant short-term (1 to 2 years) toluene reduction (see Table 8-1). The short-term effectiveness of Alternative #6 should be similar, but the associated technologies are untested at the Site (and will require 6 to 12 months of system design, permitting, and installation to implement).

8.1.4 Implementability

Alternative #2, Alternative #4, and Alternative #5 do not require significant permitting or other approvals for implementation. Alternative #3 requires approval from the property owner and will disrupt or significantly interfere with operations. Alternative #6 potentially requires extensive discharge (vapor and/or groundwater) permitting.

Access issues for Alternative #2 and Alternative #5 are generally minor (coordination with ongoing warehousing operations). Alternative #5 also requires monitoring for potential negative effects (vapor migration, uncontrolled reaction) during implementation (ISCO only).

Alternative #4A requires a relatively small footprint for oxygen cylinders (and well access); the footprint for Alternative #4B is larger, and a power source is required. Alternative #6 requires a large equipment footprint, pilot testing, system design, and significant infrastructure (i.e., piping network and power supply), so permissibility is low (see Table 8-1). In addition to the high costs associated with trenching in/through the concrete slab, installing the infrastructure would cause significant disruption to ongoing warehousing operations and access could be denied by the property owner. (One alternative that avoids floor trenching is the use of horizontal wells. However, the presence of abundant fill material such as bricks, railroad ties, and other debris below the concrete slab would make the successful installation of horizontal wells problematic and these fill materials could also cause short-circuiting of vapor recovery).

The greatest access issues are associated with Alternative #3. There will be a significant disruption to business requiring the temporary relocation of product and on-site workers. Alternative #3 will also require removal (and replacement) of large areas of: 1) a four to six-inch thick concrete slab; and 2) storm (and potentially sanitary) sewer lines. There are also significant potential concerns regarding the structural integrity of the buildings, interference with operations, supply chain issues, and more. Therefore, the implementability of this technology is considered unrealistic.

8.1.5 Remedy Cost

The least expensive remedy is Alternative #2 (see Table 8-1), followed by Alternative #5, which does not utilize any installed equipment or infrastructure (except monitoring/extraction wells). Multiple sets of propriety equipment increase the cost of Alternative #4, and the additional cost of equipment and infrastructure required for Alternative #6 is significant. The preliminary cost estimate for Alterative #3 is an order of magnitude higher resulting in an unrealistic ranking for this technology.

8.1.6 Community Acceptance

The default remedy proposed for the Off-Site AOC is long-term groundwater monitoring. None of the proposed on-site alternatives will include an off-site component, and none of the proposed on-site remedial alternatives should have any potential environmental, aesthetic, or other impact on off-site areas except as noted below. Therefore, community acceptance of remedial alternatives will most likely favor the shortest total treatment time (see Section 7.2 & Table 8-1); i.e., Alternatives #3, #5, or #6.

Alternative #3 will require the use of large equipment and increased truck traffic to remove soils for off-site disposal, Alternative #4 and Alternative #6 will require truck delivery of large pieces of remedial equipment to the Site, and Alternative #5 utilizes a vacuum tanker truck for EFR events. Given the ongoing warehousing operations at the Site, which utilize railcars and tractor trailer trucks for deliveries, the additional truck traffic associated with remedial activities under any of the alternatives is insignificant. During prior outdoor excavation activities (see Section 4.2.1), there was no known disruption to off-site areas.

Potential sources of noise from remedial activities include: 1) heavy excavation equipment used for Alternative #3; 2) the vac-truck used for EFR events, and pumps and compressors used for ISCO, under Alternative #5; and 3) remediation equipment (pumps, motors, blowers, etc.) utilized for Alternative #6. The treatment areas (inside the facility and north of Building #61) are at least 250 feet from the nearest residential areas and are further isolated by: 1) a wooded hill to the north; and 2) facility buildings to the east and south, which should mitigate any noise effects. In addition, any remedial activities associated with Alternatives #3 & #5 would be limited to normal business hours.

8.1.7 Consistency with "Green" Remediation Practices

None of the proposed remedial alternatives have a noteworthy "green" component (see Table 8-1). The generation of wastes associated with each alternative is discussed under Section 8.1.2. The vac-truck utilized for Alternative #5 consumes energy and generates emissions. The remedial system used for Alternative #4B requires a power source that consumes a moderate amount of energy. The remedial systems used for Alternative #6 consume significantly larger amounts of energy.

8.2 Evaluation Summary

8.2.1 Alternative #2

Alternative #2, long-term groundwater monitoring, is proposed as the presumptive remedy for the Off-Site AOC. Alternative #2 is easily implemented, ultimately reduces wastes, and has the lowest cost of the proposed on-site remedial alternatives (see Table 8-1). However, long-term groundwater monitoring receives the lowest ratings for short-term effectiveness (and associated community acceptance for the on-site remedy) and has less long-term reliability than other alternatives for treating on-site toluene "hot spots".

8.2.2 Alternative #3

Alternative #3 will leave the majority of residual mass in place at Site, and likely require the use of secondary groundwater treatment. Alternative #3B (indoor excavation) will cause extensive disruption to current business operations, requires extensive health and safety procedures to protect on-site workers, and could raise potential concerns regarding the structural integrity of the buildings; therefore, the permissibility of this alternative is unrealistic or prohibitive. Alternative #3A (outdoor excavation) is less difficult to implement, but still requires health and safety procedures to protect on-site workers, replacement of utility lines, and procedures to protect the structural integrity of the building, resulting in a low permissibility rating. very low or prohibitive. Finally, remedial costs for Alternative #3 are extremely high.

Although excavation would likely remove the greatest amount of residual soil mass per unit of time (which will require off-site disposal/treatment), a secondary technology will likely be required to reduce dissolved toluene concentrations to the RPG. Further, unless extensive dewatering (with concomitant implementability issues and higher costs) is performed to allow deeper excavation, significant residual mass (60% or more) will remain in place (both indoors and outdoors). For these reasons, Alternative #3 is rejected for on-site use at the Former Norton Nashua site.

8.2.3 Alternative #4

Alternative #4 is easily implemented and ultimately reduces wastes. The use of enhanced bioremediation has moderate costs, but only low to moderate short-term effectiveness (see Table 8-1). The remedial technologies evaluated under Alternatives #4A & #4B also have only marginally better long-term reliability than Alternative #2. For these reasons, Alternative #4 is rejected for on-site use at the Former Norton Nashua site.

8.2.4 Alternative #5

Alternative #5 is easily implemented. ISCO destroys residual toluene, but EFR events generate liquid wastes that require disposal, and there is a carbon footprint associated with the vac-truck (see Table 8-1). The costs associated with Alternative #5 are moderate, but the associated technologies have high short-term effectiveness and high long-term effectiveness and reliability. Alternative #5 is retained for on-site use at the Former Norton Nashua site.

8.2.5 Alternative #6

Similar to Alternative #5, the remedial technologies associated with Alternative #6 generate wastes that may require disposal (or transfer wastes to another medium), and the remedial system consumes energy, but this Alternative has high short-term effectiveness (although there may be a delay in implementation due to testing, design, and installation time), and moderate to high long-term reliability (see Table 8-1). However, remedial costs (capital and O&M) are high and the permissibility of Alternative #6 is rated very low or prohibitive due to its potential disruption of ongoing warehousing operations at the facility. For these reasons, Alternative #6 is rejected for on-site use at the Former Norton Nashua site.

SECTION 9.0

SELECTION OF PREFERRED ALTERNATIVE CORRECTIVE MEASURE

After careful consideration of the various potential Corrective Measures, Korlipara, FES, and SGC recommend Alternative #2 - long-term groundwater monitoring for remediation in the Off-Site AOC at the Former Norton Nashua site. Alternative #5 - EFR and ISCO, followed by Alternative #2 - long-term groundwater monitoring, is recommended for on-site remediation at the Former Norton Nashua site.

Although there is no current toluene exposure for off-site residents or workers, in combination with proposed institutional controls, Alternative #2 will attain cleanup standards and protect human health and the environment in the Off-Site AOC. Alternative #2 is by far the least obtrusive alternative and is highly suitable for the Off-Site AOC, where dissolved toluene concentrations are already below the proposed RPG, and recent dissolved toluene concentrations met the groundwater standard in all but one monitoring point.

Although there is no current toluene exposure for on-site workers, in combination with proposed institutional controls, Alternative #5 will maintain source control and protect human health and the environment in the two on-site target treatment areas: the Former Tank Farm Area SWMU and the Building Subslab AOC. Pilot testing of Alternative #5 has demonstrated both short-term and long-term effectiveness of this remedial alternative at the Former Norton Nashua site. Alternative #5 has moderate associated costs, but is relatively easy to implement at the Former Norton Nashua site. The only low ratings for Alternative #5 are: 1) EFR events generate liquid wastes for off-site disposal; 2) the carbon footprint of the vac-truck; and 3) monitoring for possible negative side effects must be conducted during ISCO treatment, but these issues are relatively minor negatives.

Alternative #2 is rejected for immediate on-site use because its short-term effectiveness is too low and it has less long-term reliability for treating on-site toluene “hot spots”. However, once dissolved toluene concentrations reach the proposed RPG via implementation of Alternative #5, Alternative #2 will ultimately attain cleanup standards and protect human health and the environment in the On-Site AOC.

SECTION 10.0

INTERIM ON-SITE AND OFF-SITE GROUNDWATER SAMPLING AND EFR PROGRAMS

During the CMS internal review and public comment period, which may last for an extended period of time, the on-site and off-site groundwater sampling programs will continue at the Site, as outlined in the November 2010 CMS Workplan – Pilot Testing Extension (onsite) and the December 2010 SRA Workplan (offsite) as modified and summarized below. An updated groundwater monitoring plan will be provided in the Final CMS Workplan.

Per direction of the NYSDEC, EFR events will also continue during the CMS internal review and public comment period. Additional details are provided below.

10.1 Interim On-Site Groundwater Monitoring Program

Toluene concentrations exceeded 10,000 µg/L at six locations in 2013: MW-22, MW-27, MP-25, MP-26, MP-27 & MP-37. An on-site groundwater sampling event was conducted during Fourth Quarter 2013 at these locations plus MW-26 (see Figure 10-1 for sampling locations) to confirm recently obtained sampling results and evaluate current site conditions. Sampling results are summarized in Table 2-1.

An annual on-site sampling event was recently completed in June 2014. The following monitoring wells/points were sampled: 1) the six wells where toluene concentrations recently exceeded 10,000 µg/L in 2013: MW-22, MW-27, MP-25, MP-26, MP-27 & MP-37; 2) “sentinel” wells MW-12 & MW-15; and 3) a confirmatory sample at delineation well MP-40 (see Figure 10-1 for sampling locations). Additional groundwater samples were collected from proposed EFR wells (see Section 10.4) to document the effectiveness of the interim treatment.

If the toluene concentration is ND or less than 5 µg/L (i.e., the Corrective Measure Objective) at a specific sampling location, a confirmatory sample will be collected. If the toluene concentration remains less than 5 µg/L for four consecutive events, a written request will be submitted to the NYSDEC to discontinue sampling at that location. However, even if the toluene concentration is ND or less than 5 µg/L at sentinel wells, interim semi-annual sampling will continue to ensure there is no off-site migration of dissolved toluene.

Interim monitoring at locations where the toluene concentration exceeds 10,000 µg/L (i.e., above the proposed RPG) will be conducted at least annually. (Because these locations are also proposed EFR wells [see Section 10.4], sampling will actually be more frequent.) If there is a significant increase in dissolved toluene concentrations at any monitoring points/wells inside the facility during interim monitoring, the need to reevaluate the vapor intrusion pathway will be reviewed with the NYSDEC Project Engineer.

10.2 Interim Off-Site Groundwater Monitoring Program

The off-site groundwater monitoring program will include the following seven off-site monitoring wells/points: MW-18, MW-19, MP-6, MP-14, MP-17, MP-19 & MP-22 (see Figure 10-2 for proposed sampling locations). A sampling event was recently completed in June 2014 (however, a confirmatory sample was collected at MP-14 during Fourth Quarter 2013; see Table 2-1). Thereafter, interim monitoring of the seven off-site wells will be conducted on an annual basis unless one of the contingencies discussed below is triggered.

If toluene concentrations at any off-site well are above the groundwater standard (i.e., 5 µg/L), the location will be monitored quarterly for at least one year or until the NYSDEC states otherwise. If toluene is detected at concentrations above 1,000 µg/L (i.e., the proposed RPG) at any off-site monitoring location, a confirmatory sample will be collected within 45 days, and thereafter, the location will be monitored quarterly for at least one year.

Further, if the off-site toluene concentrations exceeds 1,000 µg/L, and is also approaching or above historical maximums, at any off-site monitoring locations: 1) the NYSDEC Engineer will be notified within 72 hours; and 2) the need for increased monitoring (frequency and/or monitoring points), and/or reevaluation of the vapor intrusion pathway will be discussed with the NYSDEC Project Engineer.

10.3 Groundwater Sample Collection and Analyses

Monitoring points/wells will be sampled via the micropurge sampling method. The United States Environmental Protection Agency (USEPA) has encouraged the use of this method because of its reproducibility, accuracy, and cost-effectiveness (USEPA, 1996a & 1996b).

A micropurging pump capable of a flow rate of approximately 0.1 to 0.5 liters per minute (i.e., peristaltic/bladder pump) will be used to minimize turbulence in the well bore and hydraulic stress on the formation. The pump will be positioned in the middle of the saturated portion of the screened interval of the well. Water quality indicator parameters (temperature, pH, specific conductivity, ORP, DO, and turbidity) will be monitored during purging with a continuous "flow-through" cell device (YSI-600XL or equivalent). Readings will be taken every three to five minutes until the following stabilization rates are achieved: temperature ± 3%, pH ± 0.1 standard units, specific conductivity ± 3%, ORP ± 10 mV, DO ± 10%, and turbidity ± 10% (or less than 10 nephelometric turbidity units).

After the water quality parameters have stabilized, groundwater samples will be collected directly from the pump effluent line using dedicated tubing and pump bladders at each well. Groundwater samples will be collected in a manner that minimizes turbulence in the samples.

Groundwater samples will be collected in appropriate laboratory bottleware, logged on a chain-of-custody form, and maintained at 4°C until laboratory receipt via courier or overnight delivery. Groundwater samples will be analyzed for VOCs via EPA Method 8260 plus heptane. All analyses will include Category B laboratory deliverables.

10.4 Interim EFR Events

As discussed in Section 1.0, it was agreed at the February 20, 2014 meeting attended by the NYSDEC, FES, and Korlipara that EFR events would be conducted at the Facility on an interim basis until the Statement of Basis is finalized. Interim EFR events will be conducted at the Site approximately every 75 days.

Interim EFR events will be conducted at all on-site wells exhibiting toluene concentrations exceeding 10,000 µg/L. Based on recent sampling results (see Table 2-1), six locations currently meet this condition: MW-22, MW-27, MP-25, MP-26, MP-27 & MP-37. If toluene concentrations at a specific well decreases below 10,000 µg/L during the interim program, an alternate extraction well with toluene concentrations between 1,000 µg/L and 10,000 µg/L may be selected. Each interim EFR event will last approximately one and a half days.

Prior to each interim EFR event, groundwater samples will be collected for VOC analysis (see previous section) from the EFR extraction wells utilized during the previous event. PID readings and liquid level measurements will be obtained from each extraction well prior to applying vacuum. A vacuum truck “stinger” (drop tube) will then be inserted into the test well to remove fluids. Applied vacuum readings will be obtained via gauge at the truck. Fluid removal via stinger will continue for a maximum of approximately one hour. After fluid removal via stinger is completed, a PID reading will be obtained from the extraction well.

The vacuum truck hose will then be connected to the riser of the extraction well, so vacuum is applied to the entire well. Previous EFR pilot testing indicates this is the most effective method of fluid and vapor recovery at most wells. Applied vacuum readings will be obtained via gauge at the truck. Whole well vacuum will continue at each extraction well until: 1) approximately 500 gallons of fluids have been recovered; or 2) a maximum of two hours. After whole well vacuum is terminated, PID readings and liquid level measurements will be collected from the extraction well. Total fluids recovered from each well will be obtained at the truck (via gauge or tank “stick”).

Field results will be reviewed after each interim event to determine if any modifications to the field protocol are warranted. Fluids removed during interim EFR events will be transported via vacuum truck to an off-site facility for proper disposal (see Section 10.6).

10.5 Biosupplementation

CMS biochemical nutrient analysis and supplementation (see Section 6.4.3) indicated that groundwater in the vicinity of the dissolved toluene plume may be deficient in nitrate, phosphate, and other micronutrients necessary for optimal biological activity. Selected monitoring points (see below) may be dosed with approximately 100-200 grams of potassium nitrate dissolved in several gallons of potable-grade water to try to raise the nitrate concentration to the optimal concentration of 2 to 5 mg/L. Selected monitoring points will also be dosed with a phosphate solution (diluted 12% phosphate Miracle-Gro, or similar) where applicable.

Prior to each EFR interim event, nitrate and phosphate levels will be measured (via field chemical analysis kit) at selected monitoring wells in the general vicinity of the proposed EFR extraction wells (see Figure 10-1). After the field measurements are completed, the above nitrate and/or phosphate solutions will be added to wells exhibiting nitrate concentrations less than 1 part per million (ppm) or phosphate concentrations less than 0.5 ppm.

10.6 Purge Water Disposal

Purge water from groundwater sampling conducted in conjunction with ongoing monitoring will be temporarily containerized in 55-gallon drums. Drums will be stored at an approved on-site staging location pending proper off-site disposal (via vacuum truck in association with interim EFR events; see Section 10.4).

SECTION 11.0

PROJECT SCHEDULE

This revised CMS Report has been prepared per the general requirements of NYSDEC CO: 4-20001205-3375 in response to several iterations of comments received from the NYSDEC including the most recent set of written comments dated April 8, 2014 and email correspondence dated April 11, 2014. Within 45 days of receipt of comments from the NYSDEC (or within 30 days of a meeting with the NYSDEC) on the revised Report, a finalized CMS Report will be submitted for final approval, if determined to be necessary.

Following final NYSDEC approval of the CMS Report, and finalization of a Statement of Basis and associated public notification period, a draft CMS Workplan, which outlines the implementation of the approved remedy for the Site will be submitted to the NYSDEC. Within 45 days of receipt of comments from the NYSDEC (or within 30 days of a meeting with the NYSDEC to discuss the draft Workplan, if determined to be necessary), a finalized CMS Workplan will be submitted for final approval.

An updated project schedule is included as Table 11-1. Progress reports summarizing the status of all activities associated with CMS implementation will be submitted to the NYSDEC on a monthly basis. Copies of any new soil, sediment, groundwater, and/or vapor sampling laboratory data packages will be submitted to the NYSDEC EQuIS database following third party data validation.

SECTION 12.0

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TABLES

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

ON-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
DGC-1	12/7/89	<1	<1	<1	NA	<1	NA	<1	<1	<1	<1		NA
	11/9/90	<10	<5	<5	NA	<5	NA	<5	<5	<5	<5		NA
	12/7/93	<10	<10	<10	NA	<10	NA	<10	<10	<10	<10		ND
	11/1/01	<10	<5	<5	<5	<5	<5	<5	<5	ND*	<5	<5	ND
	2/19/04	<10	<5	<5	<5	<5	<5	**3 JB**	<5	<10	<5	<5	**6 J**
DGC-2	12/7/89	<1	<1	<1	NA	<1	NA	<1	<1	<1	<1		NA
	11/9/90	<10	<5	<5	NA	<5	NA	<5	<5	<5	<5		NA
**	12/6/93	<10	<10	<10	NA	<10	NA	<10	<10	<10	**4 JB**		ND
	11/1/01	<10	<5	<5	<5	<5	<5	<5	<5	ND*	<5	<5	ND
	2/19/04	<10	<5	<5	<5	<5	<5	**3 JB**	<5	<10	<5	<5	**6 J**
DGC-3	12/7/89	<1	<1	<1	NA	<1	NA	<1	<1	<1	<1		NA
	11/9/90	<10	<5	<5	NA	<5	NA	<5	<5	<5	<5		NA
	12/6/93	<10	<10	<10	NA	<10	NA	<10	<10	<10	**2 JB**		ND
	11/1/01	not sampled - well destroyed											
DGC-4	12/7/89	<1	<1	<1	NA	<1	NA	<1	<1	<1	<1		NA
	11/9/90	<10	<5	<5	NA	<5	NA	<5	<5	<5	<5		NA
	12/7/93	<10	<10	<10	NA	<10	NA	<10	<10	<10	<10		ND
	11/1/01	<10	<5	<5	<5	<5	<5	<5	NS	NS		NS	ND
	2/19/04	<10	<5	<5	<5	<5	<5	**2 JB**	<5	<10	<5	<5	**6 J**
DGC-5	12/7/89	<1	<1	<1	NA	<1	NA	<1	<1	<1	<1		NA
	11/9/90	<10	<5	<5	NA	<5	NA	**7**	<5	<5	<5		NA
	12/7/93	<10	<10	<10	NA	<10	NA	<10	<10	<10	<10		ND
	11/1/01	<10	<5	<5	<5	<5	<5	<5	<5	ND*	<5	<5	ND
	2/19/04	**32**	<5	<5	<5	<5	<5	**5 JB**	<5	<10	<5	<5	**10 J**
(Dup.)	2/19/04	<10	<5	<5	<5	<5	<5	**3 JB**	<5	<10	<5	<5	**6 J**
	12/8/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	NA
		well destroyed during 2010-2011 soil excavation activities											

* Heptane was not detected, but refer to the QA/QC report qualifier.

** Styrene detected at DGC-2 (1 JB µg/L) on 12/6/93.

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

ON-SITE MONITORING WELL/POINTS

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DGC-6	11/9/90	**BPQL**	<2500	<2500	NA	<2500	NA	**BPQL**	**35,000**	<2500	<2500		NA
**	12/7/93	<10	<10	<10	NA	<10	NA	<10	**180**	<10	<10		ND
	11/1/01	<10	<5	<5	<5	<5	<5	<5	<5	ND*	<5	<5	ND
	2/20/04	<10	<5	<5	<5	<5	<5	**4 JB**	<5	<10	<5	<5	**8 J**
	6/16/04	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	10/28/04	<10	<10	<10	<10	<10	<10	**6 J**	<10	<10	<10	<10	ND
DGC-7	11/9/90	**BPQL**	<500	<500	NA	<500	NA	**BPQL**	**6,400**	<500	<500		NA
	12/7/93	<10	<10	<10	NA	<10	NA	<10	**2 J**	<10	<10		ND
	11/1/01	<10	<5	<5	<5	<5	<5	<5	**150**	ND*	<5	<5	ND
	2/18/04	<10	<5	<5	<5	<5	<5	**4 JB**	<5	<10	<5	<5	ND
***	6/15/04	**2 JB**	<5	<5	<5	<5	<5	<5	**1 JB**	<10	<5	<5	ND
	10/27/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
DGC-8	11/9/90	**BPQL**	<5000	<5000	NA	<5000	NA	**8,000 B**	**95,000**	<5000	<5000		NA
	12/7/93	<8300	<8300	<8300	NA	<8300	NA	**880 J**	**290,000**	<1700	**2,400 JB**		ND
	8/16/95	NA	NA	NA	NA	NA	NA	NA	**160,000**	**52**	NA	NA	NA
	11/1/01	ND	ND	ND	NA	ND	NA	ND	**200,000**	ND*	ND	**150 J**	ND
	2/19/04	<20000	<10000	<10000	<10000	<10000	<10000	<10000	**200,000**	<20000	<10000	<10000	**10,000 J**
	6/15/04	**2,100 JB**	<5000	<5000	<5000	<5000	<5000	<5000	**190,000**	<10000	<5000	<5000	ND
(Dup.)	6/15/04	<10000	<5000	<5000	<5000	<5000	<5000	<5000	**110,000**	<10000	<5000	<5000	ND
		well destroyed during 2010-2011 soil excavation activities											
DGC-9	Dec-90	-	-	-	-	-	-	-	ND	ND	-	-	-
	12/7/93	<10	<10	<10	NA	<10	NA	<10	**2 J**	<10	<10		ND
	11/1/01	<10	<5	<5	<5	<5	<5	<5	<5	ND*	<5	<5	ND
	2/19/04	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	6/15/04	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND

* Heptane was not detected, but refer to the QA/QC report qualifier.

** Carbon disulfide detected at DGC-7 (1 J µg/L) on 12/7/93.

*** 4-Methyl-2-pentanone detected at DGC-7 (1 J µg/L) on 6/15/04.

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

ON-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
DGC-10	Dec-90	-	-	-	-	-	-	-	ND	ND	-	-	-
	12/6/93	<10	<10	<10	NA	<10	NA	<10	<10	<10	**1 JB**		ND
	11/1/01	<10	<5	<5	<5	<5	<5	<5	<5	ND*	<5	<5	ND
	2/19/04	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	6/15/04	<10	<5	<5	<5	<5	<5	<5	**2 J**	<10	<5	<5	ND
MW-11	2/20/04	<10	<5	<5	<5	<5	<5	**4 JB**	<5	<10	<5	<5	**23 J**
	6/15/04	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	10/28/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/8/05	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	10/25/05	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	5/2/06	<10	<10	<10	<10	<10	<10	**6 JB**	<10	<10	<10	<10	ND
MW-12	2/19/04	<10	<5	<5	<5	<5	<5	**9 B**	**6**	<10	<5	<5	**14 J**
	6/15/04	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	6/23/05	**10 JB**	<10	<10	<10	<10	<10	<10	**3 J**	<10	<10	<10	ND
	8/21/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	3/14/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	9/20/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	3/27/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	8/27/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/8/09	<10	<5	<5	<5	<5	<5	<5	**15**	<10	<5	<5	ND
	6/1/09	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
(Dup.)	6/1/09	<10	<5	<5	<5	<5	<5	**7.0 B**	<5	<5	<5	<5	ND

* Heptane was not detected, but refer to the QA/QC report qualifier.

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

ON-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MW-13	2/19/04	**63**	<5	<5	<5	<5	<5	**3 JB**	<5	<10	<5	<5	**15 J**
	6/15/04	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	3/14/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
(& Dup.)	9/21/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	3/27/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	8/27/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/8/09	<10	<5	<5	<5	<5	<5	<5	**29**	<10	<5	<5	ND
	6/1/09	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
MW-14	2/18/04	<20000	<10000	<10000	<10000	<10000	<10000	**8,300 JB**	**590,000 E**	<20000	<10000	<10000	ND
	10/28/04	<1000	<1000	<1000	<1000	**470 J**	230 J	**430 J**	**16,000**	<1000	**1,100 J**	**3,600**	ND
	4/7/05	<10000	<10000	<10000	<10000	<10000	<10000	**1,400 J**	**110,000**	<10000	<10000	<10000	ND
	5/2/06	<5000	<5000	<5000	<5000	<5000	<5000	**2,600 JB**	**83,000**	<5000	<5000	**2,200 J**	ND
	3/27/08	<500	<500	<500	<500	<500	**770**	<500	**9,300**	<500	<500	**270 J**	ND
	8/28/08	<1000	<1000	<1000	<1000	<1000	**750 J**	<1000	**9,100**	<1000	<1000	<1000	ND
		well destroyed during 2010-2011 soil excavation activities											
MW-15	2/19/04	<10	<5	<5	<5	<5	<5	**3 JB**	**5**	**120**	<5	**1 J**	ND
	6/15/04	<10	<5	<5	<5	<5	<5	<5	**3 J**	<10	<5	<5	ND
	10/28/04	<10	<10	<10	<10	<10	**37**	<10	**3 J**	<10	<10	<10	ND
	4/7/05	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	3/14/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**126 JN**
	9/20/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**6 J**
	3/27/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	8/27/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/8/09	<10	<5	<5	<5	<5	<5	<5	**20**	<10	<5	<5	ND
	6/1/09	<10	<5	<5	<5	<5	<5	<5	**13**	<5	<5	<5	ND
	5/12/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	**13.7 J**
	5/2/12	**7.7 J**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
	11/28/12	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**26**	<10	<5.0	<5.0	NA
	4/17/13	<6	<0.5	<0.8	<2	<0.8	**6**	<2	<0.7	<2	<0.8	<0.8	NA

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

ON-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MW-16	2/19/04	<20	<10	<10	<10	<10	<10	**16 B**	**190**	<20	<10	<10	**10 J**
	6/16/04	<10	<5	<5	<5	<5	<5	<5	**2 JB**	<10	<5	<5	ND
	10/28/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	6/23/05	**59**	<10	<10	<10	<10	<10	**2 J**	**20**	<10	<10	<10	ND
	10/25/05	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	2/16/06	**14 B**	<10	<10	<10	<10	<10	**4 JB**	<10	<10	<10	<10	ND
	5/2/06	**9 J**	<10	<10	<10	<10	<10	**4 JB**	<10	<10	<10	<10	ND
	8/21/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
MW-17	2/19/04	<2000	<1000	<1000	<1000	<1000	<1000	**720 JB**	**33,000**	<2000	<1000	<1000	**1,000 J**
	6/16/04	<2000	<1000	<1000	<1000	<1000	<1000	<1000	**17,000**	<2000	<1000	<1000	ND
	6/23/05	**440 B**	**15 J**	<100	<100	<100	<100	**19 J**	**1,000**	<100	<100	<100	ND
	8/27/08	<10	**5.2 J**	<10	<10	<10	**2.9 J**	<10	**3.7 J**	<10	<10	<10	**20.1 JN**
	5/10/11	<10	<5	<5	<5	<5	**12**	<5	**21**	<10	<5	<5	**72.6 J**
	12/8/11	<10	<5	<5	<5	<5	**7.9**	<5	**2.0 J**	<10	<5	<5	NA
MW-20	5/10/11	<10000	<5000	<5000	<5000	<5000	<5000	<5000	**83,000**	<10000	<5000	<5000	ND
	7/27/11	<3400	<2500	<2500	<2500	<2500	<2500	<5600	**70,000**	<5000	<2500	<2500	ND
	10/19/11	**230 J**	<250	<250	<250	<250	<250	**160 J**	**8,200**	<500	<250	<250	ND
	5/3/12	**41 J**	<25	<25	<25	<25	**19 J**	<25	**560**	<50	<25	<25	NA
MW-21	5/10/11	<50	<25	<25	<25	<25	<25	<25	**520**	<50	<25	<25	ND
	5/12/11	<600 J	<250 J	<250 J	<250 J	<250 J	<250 J	<250 J	**4,300 J**	<500 J	<250 J	<250 J	ND

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Watervliet, New York

ON-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MW-22	5/10/11	<10000 J	<5000 J	<5000 J	<5000 J	<5000 J	<5000 J	<5000 J	**120,000 J**	<10000 J	<5000 J	<5000 J	ND
	7/27/11	<4300	<2500	<2500	<2500	<2500	<2500	<5000	**63,000**	<5000	<2500	<2500	ND
(Dup.)	7/27/11	<4000	<2500	<2500	<2500	<2500	<2500	<4400	**59,000**	<5000	<2500	<2500	ND
	10/20/11	**2,500 J**	<2500	<2500	<2500	<2500	<2500	**1,800 J**	**45,000**	<5000	<2500	<2500	ND
	12/8/11	**3,400 J**	<2500	<2500	<2500	<2500	<2500	**2,200 JB**	**40,000**	<5000	<2500	<2500	NA
	2/21/12	**2,100 J**	<1200	<1200	<1200	<1200	<1200	**1,000 JB**	**40,000**	<2500	<1200	<1200	NA
	5/3/12	**1,900 J**	<1200	<1200	<1200	<1200	<1200	<1200	**35,000**	<2500	<1200	<1200	NA
	7/18/12	<2000	<1000	<1000	<1000	<1000	<1000	<1000	**30,000**	<2000	<1000	<1000	NA
	11/29/12	<2500	<1200	<1200	<1200	<1200	**400 J**	<1200	**22,000**	<2500	<1200	<1200	NA
	2/6/13	<100	<50	<50	<50	<50	<50	<50	**1,500**	<100	<50	<50	NA
(& Dup.)	4/16/13	<120	**16 J**	<16	<40	<16	<20	<40	**20,000**	<40	<16	<16	NA
	6/4/13	<60	**10 J**	<8	<20	<8	<10	<20	**15,000**	<20	<8	<8	NA
	12/10/13	<60	**23 J**	<8	<20	<8	**19 J**	<20	**20,000**	<20	<8	<8	NA
MW-23	5/10/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	5/12/11	<10 J	<5 J	<5 J	<5 J	<5 J	<5 J	<5 J	<5 J	<10 J	<5 J	<5 J	ND
	10/18/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
MW-24	5/10/11	<100	<50	<50	<50	<50	<50	<50	**2,200 EJ**	<100	<50	<50	ND
MW-25	7/25/11	<6.7	<5	**3 J**	<5	<5	<5	<12	<5	<10	<5	<5	ND
	12/7/11	**8.6 J**	<5	<5	**3.7 J**	<5	**28**	<5	<5	<10	<5	<5	NA
MW-26	7/25/11	**8,500 B**	<2500	<2500	<2500	<2500	<2500	**2,700 B**	**59,000**	<5000	<2500	<2500	ND
	12/8/11	<2000	<1000	<1000	<1000	<1000	<1000	**1,200 B**	**22,000**	<2000	<1000	<1000	NA
	2/23/12	**630 JB**	<500	<500	<500	<500	<500	**420 JB**	**7,900**	<1000	<500	<500	NA
	12/9/13	<60	<5	<8	<20	**19 J**	<10	<20	**6,800**	<20	**11 J**	**32 J**	NA

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Watervliet, New York

ON-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MW-27	7/25/11	<31000	<10000	**6,200 J**	<10000	<10000	<10000	<10000	**260,000**	<20000	<10000	<10000	ND
	10/19/11	**11,000 J**	<10000	<10000	<10000	<10000	<10000	**7,300 J**	**160,000**	<20000	<10000	<10000	ND
	12/8/11	**14,000 J**	<10000	<10000	<10000	<10000	<10000	**8,800 JB**	**210,000**	<20000	<10000	<10000	NA
	2/23/12	**8,800 JB**	<10000	<10000	<10000	<10000	<10000	**6,600 JB**	**180,000**	<20000	<10000	<10000	NA
	5/4/12	**6,400 JB**	<5000	<5000	<5000	<5000	<5000	**6,000**	**100,000**	<10000	<5000	<5000	NA
*	7/18/12	<10000	<5000	<5000	<5000	<5000	<5000	<5000	**110,000**	<10000	<5000	<5000	NA
	2/5/13	<5000	<2500	<2500	<2500	<2500	<2500	<2500	**67,000**	<5000	<2500	<2500	NA
	4/17/13	<300	**37 J**	<40	<100	**50 J**	**99 J**	<100	**95,000**	<100	**42 J**	**140 J**	NA
	6/5/13	<300	**100 J**	<40	<100	**69 J**	**74 J**	<100	**110,000**	<100	**64 J**	**210 J**	NA
	12/10/13	<300	**31 J**	<40	<100	**87 J**	**140 J**	<100	**110,000**	<100	**82 J**	**240 J**	NA
MW-37R **	5/3/12	**18 J**	<10	<10	<10	<10	**5.4 J**	<10	**250**	<20	<10	<10	NA
	7/17/12	<20	<10	<10	<10	<10	<10	<10	**390**	<20	<10	<10	NA
	7/18/12	<50	<25	<25	<25	<25	<25	<25	**640**	<50	<25	<25	NA
	11/29/12	<100	<50	<50	<50	<50	<50	<50	**1,900**	<100	<50	<50	NA
MP-1	2/18/04	**5,000**	<1000	<1000	<1000	<1000	<1000	**610 JB**	**35,000**	<2000	<1000	<1000	ND
	4/7/05	**94 J**	<100	<100	**78 J**	<100	**78 J**	<100	**1,300**	<100	<100	<100	ND
	6/23/05	**7,000**	<2000	<2000	<2000	<2000	<2000	**600 J**	**36,000**	<2000	<2000	<4000	ND
	2/16/06	<10	<10	<10	<10	<10	**39 J**	**3 JB**	**8 J**	<10	<10	<10	ND
(Dup.)	2/16/06	**18 B**	<10	<10	<10	<10	**38 J**	**4 JB**	**8 J**	<10	<10	<10	ND
***	5/2/06	**450 J**	<500	<500	<500	<500	<500	**330 JB**	**5,600**	<500	<500	<500	ND
(Dup.)	5/2/06	<500	<500	<500	<500	<500	<500	**320 JB**	**5,400**	<500	<500	<500	ND
	3/14/07	<100	<100	<100	**56 J**	<100	**120**	**320 JB**	**1,100**	**71 J**	<100	<100	**2,150 JN**
	9/20/07	<20	<20	<20	<20	<20	<20	<20	**50**	<10	<20	<20	**1,260 JN**

* 2-Butanone (MEK) detected at MW-27 (2,700 J µg/L) on 7/18/12.
** Sample collected immediately after well development.
*** Chlorobenzene detected at MP-1 (150 J µg/L) on 5/2/06.

Table 2-1
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Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MP-2	2/18/04	<200	<100	<100	<100	<100	<100	**67 JB**	**2,200**	<200	<100	<100	ND
	6/23/05	**12 J**	**5 J**	<20	<20	**8 J**	**470 E**	**5 J**	**13**	<20	<20	**4 J**	ND
DIL	6/23/05	**51 B**	<50	<50	<50	<50	**350**	**10 J**	**12 J**	<50	<50	<50	**400 J**
	10/25/05	<500	<500	<500	<500	<500	**330 J**	**1,000**	**4,600**	<500	<500	<500	ND
	6/2/09	<100	<50	<50	<50	<50	**310**	**77**	**1,200**	<50	<50	<50	303 J
	8/26/09	<20	<10	<10	**32**	**6.9 J**	**280**	<10	**330**	<10	<10	<10	**336 J**
	5/12/11	<10	<5	<5	<5	<5	<5	<5	**70**	<10	<5	<5	ND
	10/19/11	**16**	<5	<5	<5	<5	<5	<5	**58**	<10	<5	<5	ND
	5/2/12	**15 J**	<10	<10	<10	<10	**5.5 J**	<10	**260**	<20	<10	<10	NA
MP-3	2/18/04	<25000	<12000	<12000	<12000	<12000	<12000	**6,500 JB**	**410,000**	<25000	<12000	<12000	ND
	6/1/09	<2000	<1000	<1000	<1000	<1000	<1000	<1000	**39,000**	<1000	<1000	<1000	ND
	8/25/09	<1000	<500	<500	<500	<500	<500	<500	**15,000**	<500	<500	<500	ND
		well destroyed during 2010-2011 soil excavation activities											
MP-4	2/19/04	<100	<50	<50	<50	<50	<50	**89 B**	**1,700**	<100	<50	<50	**70 J**
		well destroyed during 2010-2011 soil excavation activities											
MP-8	2/19/04	<10	<5	<5	<5	<5	<5	**9 B**	<5	<10	<5	<5	**7 J**
MP-9	2/19/04	<10	<5	<5	<5	<5	<5	**7 B**	**12**	**72**	<5	**2 J**	ND
	6/15/04	<10	<5	<5	<5	<5	<5	<5	**5 JB**	<10	<5	<5	ND
	10/28/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/8/05	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	6/23/05	**37**	<10	<10	<10	<10	<10	**2 J**	<10	<10	<10	<10	ND

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

ON-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MP-10	2/20/04	<10	**4 J**	<5	<5	<5	<5	**7 B**	**400 E**	**6 J**	<5	**3 J**	ND
MP-10 RE	2/20/04	<2000	<1000	<1000	<1000	<1000	<1000	**780 JB**	**1,700 D**	<2000	<1000	<1000	**1,000 J**
	6/16/04	**45 JB**	<50	<50	<50	<50	<50	<50	**910**	**34 J**	<50	<50	ND
	4/8/05	<10	<10	<10	<10	<10	<10	<10	**21**	<10	<10	<10	ND
	10/25/05	<10	<10	<10	<10	<10	<10	**13**	**10 J**	<10	<10	<10	ND
	2/16/06	<10	<10	<10	<10	<10	<10	**4 JB**	<10	<10	<10	<10	ND
	5/2/06	<10	<10	<10	<10	<10	<10	**5 JB**	**9 J**	<10	<10	<10	ND
*	8/21/06	<10	<10	<10	<10	<10	**8 J**	<10	**31**	<10	<10	<10	ND
	3/14/07	<10	<10	<10	<10	<10	<10	<10	**6 J**	<10	<10	<10	**132 JN**
	8/27/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**17.2 JN**
	5/10/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	**113.6 J**
	5/2/12	**4.7 J**	<5.0	<5.0	<5.0	<5.0	**2.2 J**	<5.0	**2.9 J**	<10	<5.0	<5.0	NA
	11/28/12	<10	<5.0	<5.0	<5.0	<5.0	**1.6 J**	<5.0	<5.0	<10	<5.0	<5.0	NA
(Dup.)	11/28/12	<10 J	<5.0 J	<5.0 J	<5.0 J	<5.0 J	**5.6 J**	<5.0 J	<5.0 J	<10 J	<5.0 J	<5.0 J	NA
	4/16/13	<6	<0.5	<0.8	<2	<0.8	**2 J**	<2	<0.7	<2	<0.8	<0.8	NA
MP-11	2/20/04	<10000	<5000	<5000	<5000	<5000	<5000	**4,700 JB**	**150,000**	<10000	<5000	<5000	**6,000 J**
	6/23/05	<10000	<10000	<10000	<10000	<10000	<10000	**2,300 J**	**150,000**	<10000	<10000	<10000	ND
	10/25/05	<5000	<5000	<5000	<5000	<5000	<5000	**2,700 J**	**60,000**	<5000	<5000	<5000	ND
	2/16/06	**16,000 B**	<10000	<10000	<10000	<10000	<10000	**4,300 JB**	**190,000**	<10000	<10000	<10000	ND
	3/14/07	<5000	<5000	<5000	<5000	<5000	<5000	<5000	**97,000**	<5000	<5000	<5000	ND
	9/20/07	<10000	<10000	<10000	<10000	<10000	<10000	<10000	**180,000**	<10000	<10000	<10000	**7,000 J**
	4/8/09	<10000	<5000	<5000	<5000	<5000	<5000	<5000	**100,000**	<10000	<5000	<5000	ND
	8/25/09	<2500	<1200	<1200	<1200	<1200	<1200	<1200	**27,000**	<1200	<1200	<1200	ND
	11/3/09	<5000	<2500	<2500	<2500	<2500	<2500	<2500	**71,000**	<5000	<2500	<2500	**9,800 J**
	2/17/10	<2000	<1000	<1000	<1000	<1000	<1000	**2,700**	**35,000**	<2000	<1000	<1000	ND
	5/10/11	<1000 J	<500 J	<500 J	<500 J	<500 J	<500 J	<500 J	**17,000 J**	<1000 J	<500 J	<500 J	ND
	5/12/11	<710	<500	<500	<500	<500	<500	<500	**24,000 EJ**	<1000	<500	<500	ND
(cont.)	12/8/11	**830 J**	<500	<500	<500	<500	<500	**410 JB**	**12,000**	<1000	<500	<500	NA

* 2-Butanone (MEK) detected at MP-10 (38 µg/L) on 8/21/06.

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

ON-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MP-11	2/22/12	**420 JB**	<500	<500	<500	<500	<500	**110 JB**	**13,000**	<1000	<500	<500	NA
(cont.)	5/2/12	**320 J**	<250	<250	<250	<250	<250	<250	**6,800**	<500	<250	<250	NA
(Dup.)	5/2/12	**690 B**	<250	<250	**140 J**	<250	<250	**140 J**	**8,600**	<500	<250	<250	NA
	2/6/13	<500	<250	<250	<250	<250	<250	<250	**5,000**	<500	<250	<250	NA
(Dup.)	2/6/13	<100	<50	<50	<50	<50	<50	<50	**1,600**	<100	<50	<50	NA
	4/16/13	<30	<3	<4	<10	**5 J**	**6 J**	<10	**6,000**	<10	<4	**7 J**	NA
MP-12	2/20/04	<10	<5	<5	<5	<5	<5	**4 JB**	**160**	<10	<5	<5	**6 J**
	2/16/06	**32 B**	<10	<10	<10	<10	<10	**3 JB**	<10	<10	<10	<10	ND
	2/18/10	<10	<5	<5	<5	<5	<5	**3.4 J**	<5	<10	<5	<5	ND
	10/18/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
MP-23	6/2/09	<200	<100	<100	<100	<100	<100	**100**	**3,700**	<100	<100	<100	ND
	8/25/09	<200	<100	<100	<100	<100	<100	<100	**2,800**	<100	<100	<100	ND
	2/18/10	<500	<250	<250	<250	<250	<250	<250	**7,400**	<500	<250	<250	ND
	5/11/11	<50	<25	<25	<25	<25	<25	<25	**1,100 EJ**	<50	<25	<25	ND
	7/17/12	<200	<100	<100	<100	<100	<100	<100	**3,700**	<200	<100	<100	NA
	2/5/13	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**24**	<10	<5.0	<5.0	NA
MP-24	4/8/09	<10000	<5000	<5000	<5000	<5000	<5000	<5000	**96,000**	<10000	<5000	<5000	ND
	8/25/09	<2500	<1200	<1200	<1200	<1200	<1200	<1200	**46,000**	<1200	<1200	<1200	ND
	11/3/09	<5000	<2500	<2500	<2500	<2500	<2500	<2500	**67,000**	<5000	<2500	<2500	ND
	2/18/10	<5000	<2500	<2500	<2500	<2500	<2500	<2500	**42,000**	<5000	<2500	<2500	ND
	5/11/11	<200	<100	<100	<100	<100	<100	<100	**2,300**	<200	<100	<100	ND
	7/18/12	<100	<50	<50	<50	<50	<50	<50	**1,000**	<100	<50	<50	NA
	7/18/12	<100	<50	<50	<50	<50	<50	<50	**860**	<100	<50	<50	NA
	2/5/13	<50	<25	<25	<25	<25	<25	<25	**590**	<50	<25	<25	NA

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

ON-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MP-25	6/2/09	<10000	<5000	<5000	<5000	<5000	<5000	**6,000**	**150,000**	<5000	<5000	<5000	ND
	2/18/10	<500	<250	<250	<250	<250	<250	<250	**7,100**	<500	<250	<250	ND
	5/10/11	<1000	<500	<500	<500	<500	<500	<500	**11,000**	<1000	<500	<500	ND
	5/4/12	**3,300 JB**	<2500	<2500	<2500	<2500	<2500	**2,600**	**79,000**	<5000	<2500	<2500	NA
	7/17/12	<5000	<2500	<2500	<2500	<2500	<2500	<2500	**66,000**	<5000	<2500	<2500	NA
	2/5/13	<10000	<5000	<5000	<5000	<5000	<5000	<5000	**130,000**	<10000	<5000	<5000	NA
	4/17/13	<600	**78 J**	<80	<200	<80	**440 J**	<200	**160,000**	<200	<80	**110 J**	NA
	6/5/13	<120	**51 J**	<40	<100	**47 J**	**190 J**	<200	**120,000**	<100	<40	**74 J**	NA
	12/10/13	<300	**41 J**	<40	<100	**70 J**	**510**	<100	**98,000**	<100	<40	**87 J**	NA
MP-26	6/2/09	<500	<250	<250	<250	<250	<250	<250	**8,800**	<250	<250	<250	ND
	8/25/09	<1000	<500	<500	<500	<500	<500	<500	**12,000**	<500	<500	<500	ND
	2/18/10	<5000	<2500	<2500	<2500	<2500	<2500	<2500	**64,000**	<5000	<2500	<2500	ND
	10/19/11	**470 J**	<500	<500	<500	<500	<500	**280 J**	**13,000**	<1000	<500	<500	ND
	12/8/11	**730 J**	<500	<500	<500	<500	<500	**450 JB**	**14,000**	<1000	<500	<500	NA
	2/22/12	**480 JB**	<500	<500	<500	<500	<500	**210 JB**	**13,000**	<1000	<500	<500	NA
	5/3/12	<1000	<500	<500	<500	<500	<500	<500	**13,000**	<1000	<500	<500	NA
	7/17/12	<1000	<500	<500	<500	<500	<500	<500	**10,000**	<1000	<500	<500	NA
	2/5/13	<4000	<2000	<2000	<2000	<2000	<2000	<2000	**69,000**	<4000	<2000	<2000	NA
	4/18/13	<120	**20 J**	<16	<40	<16	<20	<40	**33,000**	<40	<16	<16	NA
	6/6/13	<30	**3 J**	<4	<10	<4	<5	<10	**3,600**	<10	<4	<4	NA
	12/10/13	<300	**30 J**	<40	<100	<40	<50	<100	**64,000**	<100	<40	<40	NA

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

ON-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MP-27	6/2/09	<10000	<5000	<5000	<5000	<5000	<5000	**6,100**	**130,000**	<5000	<5000	<5000	ND
	8/25/09	<5000	<2500	<2500	<2500	<2500	<2500	<2500	**50,000**	<2500	<2500	<2500	ND
	2/18/10	<1000	<500	<500	<500	<500	<500	**400 J**	**13,000**	<1000	<500	<500	ND
	7/19/12	<20	<10	<10	<10	<10	<10	<10	**260**	<20	<10	<10	NA
	2/5/13	<2000	<1000	<1000	<1000	<1000	<1000	<1000	**41,000 EJ**	<2000	<1000	<1000	NA
	4/18/13	<300	**34 J**	<40	<100	<40	**150 J**	<100	**67,000**	<100	<40	<40	NA
	6/6/13	<120	**22 J**	<16	<40	<16	**44 J**	<40	**31,000**	<40	<16	<16	NA
	12/10/13	<120	<10	<16	<40	<16	**57 J**	<40	**12,000**	<40	<16	<16	NA
(Dup.)	12/10/13	<60	**10 J**	<8	<20	<8	**58**	<20	**12,000**	<20	<8	**9 J**	NA
MP-28	6/2/09	<1000	<500	<500	<500	<500	<500	<500	**12,000**	<500	<500	<500	ND
	8/25/09	<10	<5	<5	<5	<5	<5	<5	**100**	<5	<5	<5	ND
	2/18/10	<50	<25	<25	<25	<25	<25	<25	**480**	<50	<25	<25	**34 J**
	7/19/12	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**170**	<10	<5.0	<5.0	NA
	2/5/13	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**41**	<10	<5.0	<5.0	NA
MP-29	6/2/09	<50	<25	<25	<25	<25	<25	<25	**690**	<25	<25	<25	ND
	8/25/09	<500	<250	<250	<250	<250	<250	<250	**6,000**	<250	<250	<250	ND
	2/18/10	<500	<250	<250	<250	<250	<250	**130 J**	**5,600**	<500	<250	<250	ND
	7/18/12	<1000	<500	<500	<500	<500	<500	<500	**15,000**	<1000	<500	<500	NA
	2/5/13	<250	<120	<120	<120	<120	<120	<120	**2,300**	<250	<120	<120	NA

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

ON-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MP-30	4/8/09	<1000	<500	<500	<500	<500	<500	<500	**19,000**	<1000	<500	<500	ND
	8/25/09	<200	<100	<100	<100	<100	<100	<100	**2,300**	<100	<100	<100	ND
	2/18/10	<1000	<500	<500	<500	<500	<500	<500	**14,000**	<1000	<500	<500	ND
(Dup.)	2/18/10	<2000	<1000	<1000	<1000	<1000	<1000	<1000	**18,000**	<2000	<1000	<1000	ND
	5/10/11	<200 J	<100 J	<100 J	<100 J	<100 J	<100 J	<100 J	**4,200 DJ**	<200 J	<100 J	<100 J	ND
(Dup.)	5/10/11	<250	<120	<120	<120	<120	<120	<120	**4,400**	<250	<120	<120	ND
	5/12/11	<1100 J	<500 J	<500 J	<500 J	<500 J	<500 J	<500 J	**17,000 J**	<1000 J	<500 J	<500 J	ND
	12/8/11	**590 J**	<500	<500	<500	<500	<500	**410 JB**	**9,900**	<1000	<500	<500	NA
	5/2/12	<1000	<500	<500	<500	<500	<500	<500	**11,000**	<1000	<500	<500	NA
	11/29/12	<1000	<500	<500	<500	<500	<500	<500	**11,000**	<1000	<500	<500	NA
	2/6/13	<250	<120	<120	<120	<120	<120	<120	**2,500**	<250	<120	<120	NA
	4/16/13	<60	**8 J**	<8	<20	<8	<10	<20	**8,900**	<20	<8	<8	NA
MP-31	6/2/09	<10	<5	<5	<5	<5	**4.4 J**	**5.6**	<5	<5	<5	<5	**13 J**
	2/17/10	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	**7 J**
MP-32	6/2/09	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
	2/17/10	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
MP-33	4/8/09	<20	<10	<10	<10	<10	<10	<10	**350**	**22**	<10	<10	**39 JN**
	8/24/09	<10	<5	<5	<5	<5	<5	<5	**8.8**	<5	<5	<5	ND
	2/17/10	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
MP-34	5/11/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	**20.6 J**
	7/25/11	<5.4	<5	<5	<5	<5	<5	<6.3	<5	<10	<5	<5	**11.3 J**
MP-35	5/11/11	<500	<250	<250	<250	<250	<250	<250	**7,400**	**300 J**	<250	<250	**780 J**
	7/17/12	<10	<5.0	<5.0	<5.0	**3.3 J**	**110**	<5.0	**4.2 J**	**130**	<5.0	**4.6 J**	NA
MP-36	10/19/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	2/21/12	**5.9 JB**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
(Dup.)	2/21/12	**8.2 JB**	<5.0	<5.0	<5.0	<5.0	<5.0	**4.8 JB**	<5.0	<10	<5.0	<5.0	NA

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Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

ON-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MP-37	10/19/11	**4,900 J**	<5000	<5000	<5000	<5000	<5000	**3,100 J**	**190,000**	<10000	<5000	<5000	ND
	12/8/11	<10000	<5000	<5000	<5000	<5000	<5000	**3,900 JB**	**170,000**	<10000	<5000	<5000	NA
(Dup.)	12/8/11	<10000	<5000	<5000	<5000	<5000	<5000	**5,100 B**	**160,000**	<10000	<5000	<5000	NA
	2/21/12	**3,000 JB**	<2500	<2500	<2500	<2500	<2500	**1,800 B**	**96,000**	<10000	<2500	<2500	NA
	5/3/12	**4,000 J**	<2500	<2500	<2500	<2500	<2500	<2500	**56,000**	<5000	<2500	<2500	NA
	7/18/12	<5000	<2500	<2500	<2500	<2500	<2500	<2500	**54,000**	<5000	<2500	<2500	NA
	11/29/12	<5000	<2500	<2500	<2500	<2500	<2500	<2500	**80,000**	<5000	<2500	<2500	NA
	2/6/13	<10000	<5000	<5000	<5000	<5000	<5000	<5000	**110,000**	<10000	<5000	<5000	NA
	4/16/13	<120	**22 J**	<16	<40	<16	**22 J**	<40	**33,000**	**49 J**	<16	<16	NA
	6/4/13	<120	**23 J**	<16	<40	<16	**26 J**	<40	**40,000**	**51 J**	<16	<16	NA
	12/10/13	<300	**89 J**	<40	<100	<40	**50 J**	<100	**110,000**	**120 J**	<40	<40	NA
MP-38	10/20/11	**24 J**	<25	<25	**13 J**	<25	**60**	**15 J**	**500**	<50	<25	<25	**156 JN**
MP-39	10/18/11	**52 J**	<50	<50	<50	<50	<50	**60**	**1,700**	<100	<50	<50	ND
MP-40	7/17/12	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
IS-1	8/24/09	<10	<5	<5	<5	<5	<5	**5.1**	**4.4 J**	<5	<5	<5	**128 J**
	2/18/10	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5.0	ND
IS-2 *	8/24/09	<50	<25	<25	<25	<25	<25	<25	**900**	<25	<25	<25	ND
	2/17/10	<500	<250	<250	<250	<250	<250	<250	**5,500**	<500	<250	<250	ND

* cis-1,3-Dichloropropene detected at IS-2 (8.9 J µg/L) on 8/24/09.

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

OFF-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MW-18	5/3/06	<50	<50	<50	<50	<50	<50	**21 JB**	**580**	<50	<50	<50	ND
	8/22/06	<50	<50	<50	<50	<50	<50	<50	**590**	<50	<50	<50	ND
	12/20/06	<10	<10	<10	<10	<10	<10	**4 JB**	<10	<10	<10	<10	ND
	3/14/07	<100	<100	<100	<100	<100	<100	<100	**1,400**	<100	<100	<100	ND
	5/23/07	<100	<100	<100	<100	<100	<100	<100	**580**	<100	<100	<100	ND
	9/21/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/11/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	3/27/08	<200	<200	<200	<200	<200	<200	<200	**1,900**	<200	<200	<200	ND
	6/25/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	8/26/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/16/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/7/09	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	6/8/09	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
*	11/4/09	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	2/19/10	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	5/9/11	<20	<10	<10	<10	<10	<10	<10	**290**	<20	<10	<10	ND
	7/27/11	<8.3	<5	<5	<5	<5	<5	<7.3	<5	<10	<5	<5	ND
	5/3/12	**6.8 J**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
	11/28/12	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
	4/18/13	<6	<0.5	<0.8	<2	<0.8	<1	<2	<0.7	<2	<0.8	<0.8	NA

* Chloromethane detected at MW-18 (620 E µg/L) on 11/4/09.

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

OFF-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MW-19	5/3/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	8/22/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/20/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	3/14/07	<10	<10	<10	<10	<10	<10	<10	**6 J**	<10	<10	<10	ND
	5/23/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	9/21/07	<10	<10	<10	<10	<10	<10	<10	**18**	<10	<10	<10	ND
(& Dup.)	12/11/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	3/28/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
(Dup.)	3/28/08	<10	<10	<10	<10	<10	<10	<10	**7.9 J**	<10	<10	<10	ND
	6/25/08	<10	<10	<10	<10	<10	<10	**5.1 J**	<10	<10	<10	<10	ND
	8/26/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/16/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/7/09	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	6/8/09	**11**	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
*	11/4/09	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	2/19/10	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	5/9/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	5/3/12	<10	<5.0	<5.0	<5.0	<5.0	**3.9 J**	<5.0	**3.2 J**	<10	<5.0	<5.0	NA
	11/28/12	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
	4/18/13	<6	<0.5	<0.8	<2	<0.8	<1	<2	<0.7	<2	<0.8	<0.8	NA
MP-5	2/18/04	<10	<5	**1 J**	<5	<5	<5	**4 JB**	**44**	<10	<5	<5	ND
	6/14/04	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	10/27/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/7/05	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	8/27/08	<10	<10	<10	<10	<10	2.0 J	<10	<10	<10	<10	<10	ND
	12/16/08	<10	<10	<10	**3.1 J**	<10	**4.5 J**	<10	<10	<10	<10	<10	ND

* Chloromethane detected at MW-18 (540 E µg/L) on 11/4/09.

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

OFF-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MP-6	6/14/04	**410 JB**	<500	<500	<500	<500	<500	<500	**9,100**	<1000	<500	<500	ND
	10/27/04	<10	<10	<10	<10	<10	<10	<10	**120**	<10	<10	<10	ND
(Dup.)	10/27/04	**36**	<10	<10	<10	<10	<10	<10	**150**	<10	<10	<10	ND
	4/7/05	<10	<10	<10	<10	<10	<10	<10	**6 J**	<10	<10	<10	ND
	6/23/05	<500	<500	<500	<500	<500	<500	<500	**7,900**	<500	<500	<500	ND
	10/25/05	<10	<10	<10	<10	<10	<10	**4 JB**	**6 J**	<10	<10	<10	ND
(Dup.)	10/25/05	<10	<10	<10	<10	<10	<10	<10	**4 J**	<10	<10	<10	ND
	5/2/06	<10	**3 J**	<10	<10	<10	<10	**5 JB**	**150**	<10	<10	<10	ND
	8/22/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/20/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	5/23/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	9/20/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/11/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
(& Dup.)	3/26/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	6/25/08	<500	<500	<500	<500	<500	<500	<500	**5,600**	<500	<500	<500	ND
	8/27/08	<100	<100	<100	<100	<100	<100	<100	**1,600**	<100	<100	<100	ND
(Dup.)	8/27/08	<100	<100	<100	**23 J**	<100	<100	<100	**1,200**	<100	<100	<100	ND
	12/16/08	<10	<10	<10	**32**	<10	**8.6 J**	<10	<10	<10	<10	<10	**41.9 JN**
	4/7/09	<10	<5	<5	**62**	<5	**25**	<5	<5	<10	<5	<5	**59.5 JN**
	6/1/09	<100	<50	<50	**100**	<50	**120**	**88 B**	**1,800**	<50	<50	<50	**59 J**
	11/4/09	<10	<5	<5	**95**	<5	**110**	<5	<5	<10	<5	<5	**94 J**
	2/17/10	<10	<5	<5	<5	<5	<5	<5	2.7 J	<10	<5	<5	**180 J**
	5/12/11	<10	<5	<5	**46**	<5	**160**	<5	<5	<10	<5	<5	**105.9 J**
	10/18/11	<10	<5	<5	**63**	<5	**190**	<5	<5	<10	<5	<5	**97.2 JN**
	5/2/12	**28 JB**	<25	<25	**67**	<25	**540**	<25	<25	<50	<25	<25	NA
	11/27/12	<100	<50	<50	**90 J**	<50	**1,400 J**	<50	<50	<100	<50	<50	NA
	4/17/13	<6	<0.5	<0.8	**51**	<0.8	**570**	<2	**0.8 J**	<2	<0.8	<0.8	NA

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

OFF-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MP-7	2/18/04	<10	<5	**2 J**	**2 J**	<5	**2 J**	**5 B**	**4 J**	<10	<5	<5	ND
	6/14/04	<10	<5	<5	<5	<5	<5	<5	**3 JB**	<10	<5	<5	ND
	10/27/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/7/05	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
		well abandoned in December 2008											-
MP-13	9/9/04	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	ND
	10/25/05	<10	<10	<10	<10	<10	<10	**4 JB**	<10	<10	<10	<10	ND
		well abandoned in December 2008											-
MP-14	9/9/04	**76**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**850**	<5.0	<5.0	<5.0	ND
	4/7/05	<10	<10	<10	<10	<10	<10	<10	**46**	<10	<10	<10	ND
(Dup.)	4/7/05	<10	<10	<10	<10	<10	<10	<10	**48**	<10	<10	<10	ND
	6/23/05	<10	<10	<10	<10	<10	<10	<10	**110**	<10	<10	<10	ND
(Dup.)	6/23/05	<10	<10	<10	<10	<10	<10	**4 J**	**170**	<10	<10	<10	ND
	10/25/05	<10	<10	<10	**6 J**	<10	<10	<10	**7 J**	<10	<10	<10	ND
	5/3/06	<10	<10	<10	<10	<10	<10	**5 JB**	<10	<10	<10	<10	ND
	8/22/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/19/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	5/23/07	<10	<10	<10	<10	<10	<10	<10	**4 J**	<10	<10	<10	ND
	9/20/07	<100	<100	<100	<100	<100	<100	<100	**870**	<100	<100	<100	ND
	12/11/07	<100	<100	<100	<100	<100	<100	<100	**1,400**	<100	<100	<100	ND
	3/27/08	<200	<200	<200	<200	<200	<200	<200	**3,100**	<200	<200	<200	ND
	6/25/08	<10	<10	<10	<10	<10	<10	<10	**10**	<10	<10	<10	ND
	8/26/08	<10	<10	<10	<10	<10	<10	<10	**140**	<10	<10	<10	ND
	12/17/08	<10	<10	<10	<10	<10	<10	<10	**38**	<10	<10	<10	ND
(Dup.)	12/17/08	<10	<10	<10	<10	<10	<10	<10	**48**	<10	<10	<10	ND
	4/7/09	<10	<5	<5	<5	<5	<5	<5	**67**	<10	<5	<5	ND
(Dup.)	4/7/09	<10	<5	<5	<5	<5	<5	<5	**68**	<10	<5	<5	ND
(cont.)	6/1/09	<10	<5	<5	<5	<5	<5	<5	**14**	<5	<5	<5	ND

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

OFF-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MP-14	11/3/09	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	**13.5 J**
(Dup.)	11/3/09	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
(cont.)	2/17/10	**8.2 J**	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	**120 J**
	5/9/11	<10	<5	<5	<5	<5	**12**	<5	**85**	<10	<5	<5	**6.8 J**
	4/17/13	<6	<0.5	<0.8	<2	<0.8	**10**	<2	**180**	<2	<0.8	<0.8	NA
	6/4/13	<6	<0.5	<0.8	**3 J**	<0.8	**5 J**	<2	**23**	<2	<0.8	<0.8	NA
(Dup.)	6/4/13	<6	<0.5	<0.8	**3 J**	<0.8	**4 J**	<2	**21**	<2	<0.8	<0.8	NA
	12/9/13	<6	<0.5	<0.8	<2	<0.8	**22**	<2	**8**	<2	<0.8	<0.8	NA
MP-15	9/9/04	**12**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	ND
(Dup.)	9/9/04	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	ND
	12/17/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
MP-16	9/9/04	**13**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	ND
	5/23/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	9/20/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/11/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	6/25/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	8/26/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/7/09	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	6/8/09	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

OFF-SITE MONITORING WELL/POINTS

Sample Designation		Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MP-17		9/7/04	<2500	<1200	<1200	<1200	<1200	<1200	<1200	**10,000**	<2500	<1200	<1200	ND
		10/27/04	<250	<250	<250	<250	<250	<250	<250	**4,800**	<250	<250	<250	ND
		4/7/05	<10	<10	<10	<10	<10	**12**	<10	**1,400 E**	<10	<10	<10	ND
		4/7/05	<200	<200	<200	<200	<200	<200	<200	**1,400 D**	<200	<200	<200	ND
		6/23/05	<100	<100	<100	<100	<100	<100	<100	**1,200**	<100	<100	<100	ND
		10/25/05	<200	<200	<200	<200	<200	<200	**340**	**1,900**	<200	<200	<200	ND
		5/3/06	<10	<10	<10	<10	<10	<10	<10	**160**	<10	<10	<10	ND
		12/19/06	<10	<10	<10	<10	<10	**6 J**	<10	**180**	<10	<10	<10	ND
		3/14/07	<10	<10	<10	<10	<10	<10	<10	**78**	<10	<10	<10	ND
		5/23/07	<200	<200	<200	<200	<200	<200	<200	**2,200**	<200	<200	<200	ND
		9/20/07	<10	<10	<10	<10	<10	<10	<10	**330/540 E**	<10	<10	<10	ND
		12/11/07	<20	<20	<20	<20	<20	<20	<20	**220**	<20	<20	<20	ND
		3/27/08	<20	<20	<20	<20	<20	<20	<20	**240**	<20	<20	<20	ND
		6/25/08	<10	<10	<10	<10	<10	<10	<10	**8.3 J**	<10	<10	<10	ND
(Dup.)		6/25/08	<10	<10	<10	<10	<10	<10	<10	**8.4**	<10	<10	<10	ND
		8/26/08	<10	<10	<10	<10	<10	<10	<10	**4.3 J**	<10	<10	<10	ND
		12/17/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
		4/7/09	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
		6/8/09	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	**5.5 J**
	*	11/4/09	<10	<5	<5	<5	<5	<5	<5	**8.5**	<10	<5	<5	**6.9 J**
	**	2/17/10	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
		5/9/11	<10 J	<5 J	<5 J	<5 J	<5 J	<5 J	<5 J	**4.7 J**	<10 J	<5 J	<5 J	ND
		10/18/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
		5/2/12	**5.9 J**	<5.0	<5.0	<5.0	<5.0	**2.7**	<5.0	**3.0 J**	<10	<5.0	<5.0	NA
		11/28/12	<10	<5.0	<5.0	<5.0	<5.0	**1.9 J**	<5.0	<5.0	<10	<5.0	<5.0	NA
		4/18/13	<6	<0.5	<0.8	<2	<0.8	**1 J**	<2	<0.7	<2	<0.8	<0.8	NA

* Chloromethane detected at MP-17 (680 E µg/L) on 11/4/09.

** 4-Methyl-2-pentanone detected at MP-17 (2.8 J µg/L) on 2/17/10.

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

OFF-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MP-18	10/27/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/7/05	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	6/23/05	<10	<10	<10	<10	<10	<10	**4 J**	<10	<10	<10	<10	ND
	10/25/05	<10	<10	<10	<10	<10	<10	**7 J**	<10	<10	<10	<10	ND
	5/3/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	8/21/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
*	12/19/06	**17**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	5/23/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	9/20/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	3/27/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	6/25/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	8/26/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	5/2/12	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
	11/28/12	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
	4/17/13	<6	<0.5	<0.8	<2	<0.8	<1	<2	<0.7	<2	<0.8	<0.8	NA
MP-19	6/23/05	**13**	<10	<10	<10	<10	<10	**4 J**	<10	<10	<10	<10	ND
	5/3/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
MP-20 **	10/27/04	**10**	<10	**12**	<10	<10	<10	<10	<10	<10	<10	<10	ND
		well abandoned in December 2008											-
MP-21	10/27/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
		well abandoned in December 2008											-

* 2-Butanone (MEK) and methyl acetate detected at MP-18 (concentrations 10 µg/L &7 J µg/L, respectively) on 12/19/06.

** Bromodichloromethane detected at MP-20 (3 J µg/L) on 10/27/04.

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

OFF-SITE MONITORING WELL/POINTS

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
MP-22	11/15/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/7/05	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	6/23/05	<10	<10	<10	<10	<10	<10	**4 J**	<10	<10	<10	<10	ND
	10/25/05	<10	<10	<10	<10	<10	<10	**7 J**	<10	<10	<10	<10	ND
	5/2/06	<10	<10	<10	<10	<10	<10	**5 JB**	**10 J**	<10	<10	<10	ND
(& Dup.)	8/21/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
(& Dup.)	12/19/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
(& Dup.)	3/14/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
(& Dup.)	5/23/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	9/21/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/11/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	3/26/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	6/25/08	<10	<10	<10	<10	<10	<10	<10	**58**	<10	<10	<10	ND
	8/28/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/17/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
(& Dup.)	4/7/09	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	6/8/09	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
	11/4/09	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	2/19/10	<10	<5	**4.5 J**	<5	<5	<5	<5	<5	<10	<5	<5	ND
	5/9/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	5/3/12	**6.1 J**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
	11/28/12	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
	4/17/13	<6	<0.5	<0.8	<2	<0.8	<1	<2	<0.7	<2	<0.8	<0.8	NA
32 Craig St.1	10/26/05	<10	<10	<10	<10	<10	<10	**6 J**	<10	<10	<10	<10	ND
32 Craig St.2	10/26/05	<10	<10	<10	<10	<10	<10	**5 J**	<10	<10	<10	<10	ND

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

QA/QC SAMPLES

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro- form (µg/L)	Cyclo- hexane (µg/L)	Ethyl- benzene (µg/L)	Methyl- cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o- Xylenes (µg/L)	m,p- Xylenes (µg/L)	Total TICs (µg/L)
TB	12/7/93	<10	<10	<10	NA	<10	NA	<10	<10	<10	**1 JB**		ND
	2/18/04	<10	<5	<5	<5	<5	<5	**5 JB**	<5	<10	<5	<5	**5 J**
	2/20/04	<10	<5	<5	<5	<5	<5	**10 B**	<5	<10	<5	<5	**5 J**
*	6/16/04	**19 B**	<5	<5	<5	<5	<5	**8**	<5	<10	<5	<5	ND
	9/7/04	**14 B**	<5	<5	<5	<5	<5	**6 J**	<5	<5	<5	<5	ND
	9/9/04	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	ND
	10/26/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**9 JB**
	10/28/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	11/15/04	**19**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/8/05	**9 JB**	<10	<10	<10	<10	<10	**2 JB**	<10	<10	<10	<10	ND
	6/23/05	**16**	<10	<10	<10	<10	<10	**4 J**	<10	<10	<10	<10	ND
	10/25/05	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**8 JB**
	5/2/06	**14**	<10	<10	<10	<10	<10	**7 JB**	<10	<10	<10	<10	**6 JB**
	5/3/06	**11**	<10	<10	<10	<10	<10	**6 JB**	<10	<10	<10	<10	**7 JB**
	8/21/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/19/06	<10	<10	<10	<10	<10	<10	**6 JB**	<10	<10	<10	<10	ND
	3/14/07	<10	<10	<10	<10	<10	<10	**6 JB**	<10	<10	<10	<10	ND
	5/23/07	**8 JB**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	9/21/07	**14**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/11/07	**9.2 J**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	3/28/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	6/25/08	<10	<10	**8.4 J**	<10	<10	<10	<10	<10	<10	<10	<10	ND
	8/26/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/16/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/7/09	**9.9 J**	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	6/1/09	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
	6/8/09	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
(cont.)	8/25/09	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND

* 2-Butanone detected in the TB sample on 6/16/04 (18 µg/L).

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

QA/QC SAMPLES

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
TB	11/4/09	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
(cont.)	2/19/10	<10	<5	**2.9 J**	<5	<5	<5	**4 J**	<5	<10	<5	<5	ND
	5/9/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	5/11/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	7/25/11	**7.9 JB**	<5	<5	<5	<5	<5	**7.4 B**	<5	<10	<5	<5	ND
	10/18/11	**5.8 J**	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	12/8/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	NA
	2/23/12	**12 B**	<5	<5	<5	<5	<5	**1.6 JB**	<5	<10	<5	<5	NA
	5/2/12	**7.2 J**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
	5/4/12	**7.3 J**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
	7/17/12	**7.5 JB**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
	11/29/12	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
	2/6/13	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
	4/17/13	<6	<0.5	<0.8	<2	<0.8	<1	<2	<0.7	<2	<0.8	<0.8	NA
	4/18/13	<6	<0.5	<0.8	<2	<0.8	<1	<2	<0.7	<2	<0.8	<0.8	NA
	6/5/13	<6	<0.5	<0.8	<2	<0.8	<1	<2	<0.7	<2	<0.8	<0.8	NA
	6/6/13	<6	<0.5	<0.8	<2	<0.8	<1	<2	<0.7	<2	<0.8	<0.8	NA
	12/10/13	<6	<0.5	<0.8	<2	<0.8	<1	<2	<0.7	<2	<0.8	<0.8	NA
FB	2/20/04	<10	<5	<5	<5	<5	<5	**10 B**	<5	<10	<5	<5	ND
	6/15/04	<10	<5	<5	<5	<5	<5	<5	**3 JB**	<10	<5	<5	ND
	9/9/04	<10	<5.0	**12**	<5.0	<5.0	<5.0	<5.0	**2 J**	<5.0	<5.0	<5.0	**20 J**
	10/27/04	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**6 JB**
	11/15/04	**15**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	4/8/05	< 10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	6/23/05	**16**	<10	<10	<10	<10	<10	**5 JB**	<10	<10	<10	<10	ND
	10/25/05	<10	<10	<10	<10	<10	<10	**6 J**	<10	<10	<10	<10	**6 JB**
*	5/2/06	**9 J**	<10	<10	<10	<10	<10	**5 JB**	<10	<10	<10	<10	**6 JB**
(cont.) *	5/3/06	<10	<10	<10	<10	<10	<10	**3 J**	<10	<10	<10	<10	**8 JB**

* Chlorobenzene detected in the FB sample on 5/2/06 (7 J µg/L) and 5/3/06 (5 J µg/L).

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

QA/QC SAMPLES

Sample Designation	Sampling Date	Acetone (µg/L)	Benzene (µg/L)	Chloro-form (µg/L)	Cyclo-hexane (µg/L)	Ethyl-benzene (µg/L)	Methyl-cyclohexane (µg/L)	Methylene Chloride (µg/L)	Toluene (µg/L)	Heptane (µg/L)	o-Xylenes (µg/L)	m,p-Xylenes (µg/L)	Total TICs (µg/L)
FB	8/21/06	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
(cont.)	12/19/06	<10	<10	<10	<10	<10	<10	**6 JB**	<10	<10	<10	<10	ND
	3/14/07	<10	<10	<10	<10	<10	<10	**6 JB**	<10	<10	<10	<10	ND
	5/23/07	**7 JB**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	9/21/07	**8 J**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/11/07	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	3/26/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	6/25/08	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**45 J**
	8/26/08	**8.3 JB**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
	12/16/08	<10	<10	<10	<10	<10	<10	**2.4 J**	<10	<10	<10	<10	ND
	4/7/09	**16**	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	6/1/09	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
	6/8/09	<10	<5	<5	<5	<5	<5	**5.1 B**	<5	<5	<5	<5	ND
	11/4/09	<10	<5	<5	<5	<5	<5	**5.4**	<5	<10	<5	<5	ND
	2/19/10	**13**	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	ND
	5/9/11	<10	<5	<5	<5	<5	<5	<6.3	<5	<10	<5	<5	ND
	7/27/11	**8.2 JB**	<5	<5	<5	<5	<5	**8.1 B**	<5	<10	<5	<5	ND
	10/18/11	<10	<5	<5	<5	<5	<5	**2.2 J**	<5	<10	<5	<5	ND
	12/8/11	<10	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	NA
	2/21/12	**6.6 JB**	<5	<5	<5	<5	<5	**1.4 JB**	<5	<10	<5	<5	NA
	5/2/12	**5.1 JB**	<5.0	<5.0	<5.0	<5.0	<5.0	**3.4 J**	<5.0	<10	<5.0	<5.0	NA
*	7/17/12	**9.9 JB**	<5.0	<5.0	<5.0	<5.0	<5.0	**2.1 J**	<5.0	<10	<5.0	<5.0	NA
	2/6/13	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	NA
	6/6/13	<6	<0.5	<0.8	<2	<0.8	<1	<2	<0.7	<2	<0.8	<0.8	NA
**	12/10/13	<6	<0.5	<0.8	<2	<0.8	<1	<2	<0.7	<2	<0.8	<0.8	NA

** 2-Butanone (MEK) detected in the FB sample on 7/17/12 (19 µg/L).

** cis-1,2-DCE detected in the FB sample on 12/10/13 (1 J µg/L).

Table 2-1
Groundwater Analytical Data Summary - Volatile Organic Compounds (VOCs)
Former Norton/Nashua
Watervliet, New York

NOTES:

µg/L = micrograms per liter; TICs = tentatively identified compounds; Dup. = duplicate sample; FB = field blank; TB = trip blank; NA = not analyzed for the indicated parameter; ND = not detected; B = detected in the laboratory blank; DIL/D = laboratory diluted sample; E = laboratory estimated concentration; J = estimated concentration, detected below the quantitation limit; < ("less than") = analyte concentration below the laboratory detection limit; BPQL = compound reported present below the practical quantitation limit, "-" = analytical data/report not available for review.

VOCs analyzed via EPA Method 8260 plus heptane (and TICs in selected samples). Only detected analytes are listed above. For a complete list of analytes, see the original laboratory reports. B-qualified TICs are not summed in above table.

Table 3-1
Facility Monitoring Wells - Vapor Analytical Data
Former Norton/Nashua, Watervliet, NY

On-Site Vapor/Air Samples (2/18/04)	MW-11* (µg/m³)	MW-12 (µg/m³)	DGC-12 (µg/m³)	MW-13 (µg/m³)	Ambient (µg/m³)	Blank (µg/m³)
Heptane	**49**	<0.8	<0.8	**20**	<0.8	<0.8
Toluene	**83**	**8**	**8**	**4**	**8**	<0.8
Acetone	**26**	**14**	**14**	**10**	**10**	<2
Benzene	**10**	**1 J**	**2 J**	**2 J**	**0.6 J**	<0.6
2-Butanone	<1	**3**	**3**	<1	**2 J**	<1
Carbon Disulfide	**3**	<2	<2	**3 J**	<2	<2
Chloroethane	<0.5	<0.5	**1 J**	<0.5	<0.5	<0.5
Chloroform	**5**	<1	<1	**3 J**	<1	<1
Chloromethane	<0.4	**1 J**	**2 J**	**12**	**2**	<0.4
Dichlorodifluoromethane	**2 J**	**2 J**	**2 J**	**2 J**	**2 J**	<1
Ethylbenzene	**4 J**	**1 J**	**1 J**	**0.9 J**	<0.9	<0.9
4-Ethyltoluene	**3 J**	<1	**1 J**	**1 J**	<1	<1
Hexane	**18**	**2 J**	**1 J**	**28**	**0.7 J**	<0.7
Methyl Tertiary Butyl Ether	<0.7	<0.7	<0.7	**79**	<0.7	<0.7
Pentane	**44**	**6**	**3**	**118 D**	**3**	<0.6
Propene	**14**	**13**	**11**	**67 D**	**4**	<0.4
tert-Butyl Alcohol	<0.6	**6**	<0.6	<0.6	<0.6	<0.6
Tetrachloroethene	<1	**3 J**	**2 J**	**14**	<1	<1
1,1,1 Trichloroethane	<1	**4 J**	**3 J**	<1	<1	<1
Trichloroethene	**1 J**	<1	<1	<1	<1	<1
Trichlorofluoromethane	**2 J**	**1 J**	**2 J**	**2 J**	**2 J**	<1
1,2,4 Trimethylbenzene	**3 J**	**1 J**	**1 J**	**1 J**	<1	<1
m/p-Xylenes	**9**	**4 J**	**3 J**	**3 J**	<0.9	<0.9
o-Xylenes	**3 J**	**1 J**	**1 J**	**1 J**	<0.9	<0.9
Total VOC TICs	**2,322**	**1,115**	**496**	**1,080**	**15**	0
Total non-Methane VOCs	**2,469**	**1,178**	**549**	**1,427**	**41**	0
Methane	**4,527 J**	**2,362 J**	**2,493 J**	**15,745**	**2,755 J**	**2,362 J**

* also detected at MW-11: acrolein (5 µg/m³); acetonitrile (12 µg/m³); 1,2-dichloroethane (1 J µg/m³); methylene chloride (3 J µg/m³); octane (3 J µg/m³); and styrene (3 J µg/m³).

All results presented in µg/m³. Parts per billion by volume (ppbv) results in the original laboratory report were converted to µg/m³ by multiplying by the m.w. (molecular weight) and dividing by an STP (25°C) conversion factor of 24.45. An m.w. of 119 was assumed to convert the total VOC TIC concentration.

µg/m³ = micrograms per cubic meter; TICs = tentatively identified compounds; VOCs = volatile organic compounds; D = laboratory qualified diluted sample; J = estimated concentration, compound detected below the quantitation limit; < ("less than") = analyte concentration below the laboratory detection limit.

DGC-12 was a blind field replicate of MW-12. The "ambient" sample was collected by placing the summa canister on the ground near MW-13.

All samples were analyzed for VOCs via EPA Method TO-15 plus TICs and methane via EPA Modified Method 18. Only detected analytes are listed above. A complete list of analytes is provided in the original laboratory report.

Table 3-2
Facility Ambient Air - Vapor Analytical Data
Former Norton/Nashua
Watervliet, NY

On-Site Air Samples (12/4/03)	M34-Bldg. 61 ($\mu g/m^3$)	P14-Bldg. 58 ($\mu g/m^3$)
Heptane	**3 J**	**3 J**
Toluene	**19**	**26**
Acetone	**12**	**7**
Acrolein	**5**	**2**
Benzene	**6**	**3**
2-Butanone	<1.5	**3**
Carbon Tetrachloride	<1.3	<1.3
Chloroform	<1.0	<1.0
Chloromethane	**1.0 J**	**1.2 J**
Dichlorodifluoromethane	**2 J**	**2 J**
Ethylbenzene	**3 J**	**4**
4-Ethyltoluene	**3 J**	**2 J**
Hexane	**4**	**2 J**
Isooctane	**2 J**	**2 J**
Methyl Tertiary Butyl Ether	<0.7	<0.7
Methylene Chloride	<1.7	<1.7
Octane	**1.9 J**	<0.9
Pentane	**9**	**6**
Propene	**103**	**86**
Styrene	**1.7 J**	**3 J**
Tetrachloroethene	**3 J**	**3 J**
1,1,1-Trichloroethane	<1.1	<1.1
Trichlorofluoromethane	**1.7 J**	**3 J**
1,2,4-Trimethylbenzene	**5**	**3 J**
1,3,5-Trimethylbenzene	**2 J**	<1
m/p-Xylenes	**9**	**17**
o-Xylene	**3 J**	**4**
Total VOC analytes	**199**	**182**
Total VOC TICs	NA	NA

All results presented in micrograms per cubic meter ($\mu g/m^3$). Parts per billion by volume (ppbv) results in the original laboratory report were converted to $\mu g/m^3$ by multiplying by the m.w. (molecular weight) and dividing by an STP (25°C) conversion factor of 24.45.

TICs = tentatively identified compounds; VOCs = volatile organic compounds; J = estimated concentration, compound detected below the quantitation limit; < ("less than") = analyte conc. below the laboratory detection limit; NA = not analyzed for the indicated parameter.

All samples were analyzed for VOCs via EPA Method TO-15. Only detected and selected analytes are listed above. A complete list of analytes is provided in the original laboratory report.

Table 3-3
Off-Site AOC Vapor Samples - 2004 Vapor Analytical Data
Former Norton/Nashua
Watervliet, NY

Off-Site Vapor Samples (9/10/04)	**VMP-1 (1-3)*** ($\mu g/m^3$)	**VMP-2 (5.5-7.5)** ($\mu g/m^3$)	**Ambient** ($\mu g/m^3$)
Heptane	**25**	**1 J**	<0.8
Toluene	**90**	**8**	**4**
Acetone	**62 D**	**14**	**10**
Acrolein	**14**	**1 J**	<1
Benzene	**3**	**0.6 J**	<0.6
2-Butanone	**53**	**3**	**2 J**
Chloromethane	**2**	**1 J**	**2 J**
Dichlorodifluoromethane	**3 J**	**3 J**	**3 J**
Ethylbenzene	**30**	**4 J**	**2 J**
4-Ethyltoluene	**15**	**1 J**	<1
Hexane	**49**	**1 J**	<0.7
Isooctane	**5**	**1 J**	<0.9
Methyl t-Butyl Ether	**397 D**	<0.7	<0.7
Pentane	**80 D**	**2 J**	<0.6
Propene	**48**	**2**	**1 J**
tert-Butyl Alcohol	<0.6	**2 J**	<0.6
Tetrachloroethene	**3 J**	<1	<1
1,1,1-Trichloroethane	**158 D**	**5**	<1
Trichlorofluoromethane	**2 J**	**2 J**	**2 J**
1,2,4-Trimethylbenzene	**20**	**1 J**	<1
m/p-Xylene	**96**	**13**	**4**
o-Xylene	**22**	**3 J**	**2 J**
TOTAL non-methane VOCs	**1177**	**68**	**31**
Methane	**2,900 J**	**4,800 J**	**4,400 J**
TOTAL VOC TICs	**4,317 J**	**2,229 J**	**847 J**

* also detected at VMP-1: carbon disulfide (6 $\mu g/m^3$); carbon tetrachloride (3 J $\mu g/m^3$); chloroform (2 J $\mu g/m^3$); cumene (4 J $\mu g/m^3$); 1,2-dichloroethane (4 $\mu g/m^3$); dichlorofluoromethane (24 J $\mu g/m^3$); 4-methyl-2-pentanone (4 J $\mu g/m^3$); methylene chloride (10 $\mu g/m^3$); octane (14 J $\mu g/m^3$); styrene (13 µg/m3); 1,3,5-trimethylbenzene (5 $\mu g/m^3$), and vinyl chloride (1 J $\mu g/m^3$).

All results presented in $\mu g/m^3$. Parts per billion by volume (ppbv) results in the original laboratory report were converted to $\mu g/m^3$ by multiplying by the m.w. (molecular weight) and dividing by an STP (25°C) conversion factor of 24.45. An m.w. of 119 was assumed to convert the total VOC TIC concentration.

VOC = volatile organic compound; TICs = tentatively identified compounds; D = laboratory diluted concentration; J = estimated concentration, compound detected below the quantitation limit; < ("less than") = analyte concentration below the laboratory detection limit.

All samples were analyzed for VOCs plus TICs and methane via EPA Method TO-15. Only detected analytes are listed above. A complete list of analytes is provided in the original laboratory report.

Table 3-4
Off-Site AOC Indoor Air/Vapor Samples - 2006 Vapor Analytical Data
Former Norton/Nashua
Watervliet, NY

Off-Site Air/Vapor Samples ($\mu g/m^3$)	**21 Alden St.**			**Outdoor**
	First Floor	**Basement**	**MSVP-1**	**Ambient**
	2/15/2006	2/15/2006	2/15/2006	2/15/2006
Heptane	**8.6 J**	<0.82	**0.99 J**	**1.5 J**
Toluene	**6.3**	**1.9 J**	**22**	**2.4 J**
Acetone	**48**	**9.9**	**8.3**	**13**
Acetonitrile	<0.84	<0.84	<0.84	<0.84
Benzene	**3.7**	**1.8 J**	**0.71 J**	**1.6 J**
2-Butanone	**7.7**	**2.6 J**	**2.0 J**	**1.8 J**
Carbon Tetrachloride	<1.3	<1.3	<1.3	<1.3
Chloroform	<0.98	<0.98	<0.98	<0.98
Chloromethane	**3.5**	**1.6 J**	<0.41	**1.9 J**
1,4-Dichlorobenzene	**270**	**46**	**18**	<3.0
Dichlorodifluoromethane	**4.2 J**	**4.3 J**	**2.60 J**	**3.8 J**
Ethyl Acetate	<0.72	<0.72	<0.72	<0.72
Ethylbenzene	**1.0 J**	<0.87	**6.6**	**2.2 J**
4-Ethyltoluene	<0.98	<0.98	**3.3 J**	**4.1 J**
Hexane	**1.5 J**	**1.2 J**	<0.70	**0.88 J**
Isooctane	<0.93	<0.93	<0.93	**8.4**
Methyl Tertiary Butyl Ether	<0.72	<0.72	<0.72	<0.72
Methylene Chloride	<1.7	<1.7	<1.7	<1.7
Octane	<0.93	<0.93	**6.1**	**1.3 J**
Pentane	**3.3**	**3.1**	<0.59	**2.1 J**
Propene	**12**	**6.2**	**0.86 J**	**3.6**
Styrene	<0.85	<0.85	**1.2 J**	<0.85
Tertiary Butyl Alcohol	**3.6**	**1.8 J**	**4.2**	**1.8 J**
Tetrachloroethene	**8.9**	<1.4	<1.4	<1.4
1,1,1-Trichloroethane	<1.1	<1.1	**1.9 J**	<1.1
Tricholorfluoromethane	**3.0 J**	**2.7 J**	**1.2 J**	**2.2 J**
1,2,4-Trimethylbenzene	**1.1 J**	<0.98	**3.9 J**	**5.1**
1,3,5-Trimethylbenzene	<0.98	<0.98	**1.4 J**	**1.7 J**
m/p-Xylenes	**3.0 J**	**1.4 J**	**22.0**	**6.2**
o-Xylene	**1.2 J**	<0.87	**7.7**	**2.9 J**
Total VOC analytes	**367**	**65**	**95**	**36**
Total VOC TICs	**297 J**	**73 J**	**715 J**	**54 J**

Table 3-4
Off-Site AOC Indoor Air/Vapor Samples - 2006 Vapor Analytical Data
Former Norton/Nashua
Watervliet, NY

Off-Site Air/Vapor Samples ($\mu g/m^3$)	23 Alden St.			25 Alden St.		
	First Floor 2/15/2006	**Basement** 2/15/2006	**SVP-1** 2/15/2006	**First Floor** 2/15/2006	**Basement** 2/15/2006	**VMP-1** 2/15/2006
Heptane	**2.1 J**	<0.82	**2.0 J**	**2.4 J**	**3.4 J**	**2.8 J**
Toluene	**11**	**1.8 J**	**17**	**7.6**	**5.9**	**7.7**
Acetone	**28**	**5.6**	**130**	**17**	**16**	**19**
Acetonitrile	**33**	<0.84	**14**	<0.84	<0.84	<0.84
Benzene	**3.1 J**	**0.98 J**	**2.4 J**	**1.3 J**	**4.2**	**3.6**
2-Butanone	**4.2**	<1.5	**3.8**	**3.1**	**2.0 J**	**1.9 J**
Carbon Tetrachloride	**4.6 J**	<1.3	<1.3	<1.3	<1.3	<1.3
Chloroform	<0.98	<0.98	<0.98	**2.5 J**	<0.98	**3.2 J**
Chloromethane	**1.9 J**	**0.93 J**	**1.8 J**	**1.8 J**	**2.6**	**2.3**
1,4-Dichlorobenzene	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Dichlorodifluoromethane	**15**	**3.3 J**	**3.7 J**	**3.6 J**	**4.0 J**	**4.1 J**
Ethyl Acetate	<0.72	<0.72	<0.72	**2.6 J**	<0.72	<0.72
Ethylbenzene	<0.87	<0.87	**1.8 J**	<0.87	**0.92 J**	**1.5 J**
4-Ethyltoluene	<0.98	<0.98	<0.98	<0.98	<0.98	<0.98
Hexane	**2.7 J**	<0.70	**2.6 J**	**1.2 J**	**6.3**	**5.1**
Isooctane	**1.2 J**	<0.93	**1.4 J**	**8.1**	**1.1 J**	**1.2 J**
Methyl Tertiary Butyl Ether	**1.7 J**	<0.72	**1.1 J**	<0.72	<0.72	<0.72
Methylene Chloride	**15**	<1.7	**7.6**	<1.7	<1.7	<1.7
Octane	<0.93	<0.93	**1.5 J**	<0.93	**1.4 J**	**1.8 J**
Pentane	**2.8 J**	**1.1 J**	**7.0**	**2.5 J**	**15**	**13**
Propene	**10**	**2.3**	**7.3**	**4.5**	**30**	**26**
Styrene	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85
Tertiary Butyl Alcohol	**2.1 J**	**3.1**	**6.4**	**1.1 J**	**3.8**	**1.8 J**
Tetrachloroethene	<1.4	<1.4	<1.4	<1.4	<1.4	**1.8 J**
1,1,1-Trichloroethane	**4.0 J**	<1.1	<1.1	<1.1	<1.1	<1.1
Tricholorfluoromethane	**26**	**3.5 J**	**2.3 J**	**1.8 J**	**2.2 J**	**2.3 J**
1,2,4-Trimethylbenzene	<0.98	<0.98	**1.0 J**	<0.98	**1.2 J**	**1.5 J**
1,3,5-Trimethylbenzene	<0.98	<0.98	<0.98	<0.98	<0.98	<0.98
m/p-Xylenes	**2.3 J**	**1.6 J**	**5.8**	<0.87	**3.0 J**	**5.1**
o-Xylene	**1.0 J**	**0.89 J**	**2.1 J**	<0.87	**1.6 J**	**2.3 J**
Total VOC analytes	**142**	**11**	**199**	**40**	**84**	**82**
Total VOC TICs	**102 J**	**10 J**	**146 J**	**63 J**	**131 J**	**180 J**

$\mu g/m^3$ = micrograms per cubic meter; VOC = volatile organic compound; TICs = tentatively identified compounds; J = estimated concentration, compound detected below the quantitation limit; < ("less than") = analyte concentration below the laboratory detection limit.

All samples were analyzed for VOCs via EPA Method TO-15 plus TICs. Only detected analytes are listed above. A complete list of analytes is provided in the original laboratory report.

All results presented in micrograms per cubic meter ($\mu g/m^3$). An average TIC molecular weight of 119 was assumed to convert the laboratory reported parts per billion by volume (ppbv) values to $\mu g/m^3$.

Table 3-5
Facility Office Area Ambient Air/Vapor - Vapor Analytical Data
Former Norton/Nashua
Watervliet, NY

On-Site Air/Vapor Samples	**VMP-2*** 3/26/2009 **(µg/m³)**	**IA-1 / Dup.** 3/26/2009 **(µg/m³)**	**VMP-2*** 2/18/2010 **(µg/m³)**	**IA-1 / Dup.**** 2/18/2010 **(µg/m³)**	**Outdoor***** 2/18/2010 **(µg/m³)**
Heptane	**5.4**	<4.1 / <4.1	<0.82	**2.2 / <0.82**	<0.82
Toluene	**39**	**44 / 42**	**3.7**	**14 / 13**	**0.37 J**
Acetone	**25**	**22 / 9.7**	**2.9**	**11 / 13**	**2.6**
Benzene	**3.7**	<3.2 / <3.2	**0.51 J**	**2.3 / 2.7**	**0.54 J**
2-Butanone	**8.9**	<5.9 / <5.9	**0.35 J**	**2.1 / 2.8**	**0.35 J**
Carbon Tetrachloride	**8.5**	<6.3 / <6.3	**11**	**0.63 J / 0.69 J**	**0.69 J**
Chloromethane	<2.1	<2.1 / <2.1	**0.35 J**	**1.1 / 1.2**	**1.2**
Ethanol	NA	NA	**28.3**	**167 E / 190 E**	**2.4**
Dichlorodifluoromethane	<4.9	<4.9 / <4.9	**2.9**	**2.7 / 3.0**	**3.3**
Ethyl Acetate	<3.6	**7.2 / 7.1**	**3.4**	**1.2 / 1.3**	<0.72
Hexane	**8.4**	**3.8 / 4.1**	**0.67 J**	**5.3 / 5.3**	<0.70
Isopropyl Alcohol	NA	NA	**3.7**	**22 / 21**	<0.49
Methylene Chloride	<1.0	<1.0 / **1.1**	**1.3**	**2.1 / <0.69**	<0.69
Pentane	**15**	**12 / 12**	NA	NA	NA
Propene	**10**	**20 / 21**	NA	NA	NA
Tetrachloroethene	<6.8	<6.8 / <6.8	**1.3**	**14 / 12**	**0.75**
1,1,1-Trichloroethane	<5.5	<5.5 / <5.5	**0.60 J**	<1.1 / <1.1	<1.1
Trichlorofluoromethane	<5.6	<5.6 / <5.6	**1.9**	**2.2 / 2.4**	**1.8**
m/p-Xylenes	**8.6**	**6.2 / 7.2**	**0.74 J**	**6.9 / 7.8**	<0.87
o-Xylene	<4.3	<4.3 / <4.3	**0.74 J**	**2.9 / 3.4**	<0.87
Total VOC analytes	**143**	**130 / 133**	**66**	**274 / 299**	**15**
Total VOC TICs	**263 J**	**434 J / 438 J**	**87.1 J**	**218 J / 220 J**	**6.3 J**

* also detected at VMP-2 on 3/26/09: carbon disulfide (10 µg/m³); on 2/18/10: propylene (1.9 µg/m³).

** also detected at IA-1/Dup. on 2/18/10: cyclohexane (1.9/2.1 µg/m³); ethylbenzene (3.0/3.6 µg/m³); cyclohexane (1.9/2.1 µg/m³); 4-ethyltoluene (1.6/1.4 µg/m³); methyl isobutyl ketone (<0.82/0.70 J µg/m³); methyl tert-butyl ether (<0.72/0.58 J µg/m³); styrene (0.60 J/0.55 J µg/m³); tert-butyl alcohol (0.73/2.7 µg/m³); 1,2,4-trimethylbenzene (3.9/3.8 µg/m³); 1,3.5-trimethylbenzene (1.4/1.4 µg/m³); 2,2,4-trimethylpentane (1.2/1.2 µg/m³); and vinyl acetate (<0.70/1.6 µg/m³).

*** also detected in the 2/18/10 Outdoor Air sample: Freon 113 (0.77 J µg/m³)

The only VOCs detected in the 3/26/09 Outdoor Ambient Air sample were: acetone (19 µg/m³) and TICs (51.6 J µg/m³). The only VOCs detected in the 3/26/09 Trip Blank sample were: TICs (11.2 J µg/m³).

µg/m³ = micrograms per cubic meter; VOC = volatile organic compound; TICs = tentatively identified compounds; TICs = tentatively identified compounds; E = laboratory estimated concentration; J = estimated concentration, compound detected below the quantitation limit; < ("less than") = analyte concentration below the laboratory detection limit.

Additional notes for Table 3-5:

All results presented in micrograms per cubic meter ($\mu g/m^{3}$). An average TIC molecular weight of 119 was assumed to convert the laboratory reported parts per billion by volume (ppbv) values to $\mu g/m^3$.

All samples were analyzed for VOCs via EPA Method TO-15 plus TICs. Only detected analytes are listed above. A complete list of analytes is provided in the original laboratory report.

Table 3-6
QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT SUMMARY
Former Norton/Nashua Facility
Watervliet, New York

Environmental Media & Exposure Route	**Human Exposure Assessment**
Direct contact with surface soils (and incidental ingestion) applies to On-Site SWMU/AOC only	People are not coming into contact with because all contaminated surface soils are covered with pavement or buildings.
Direct contact with subsurface soils (and incidental ingestion)	People can come into contact if they complete ground-intrusive work onsite. People can come into contact if they complete deep (at least eight feet) ground-intrusive work in selected off-site areas.
Ingestion of groundwater	Contaminated groundwater is not being used for drinking water, as the area is served by the public water supply. There are no known domestic water supply wells in the area (however, there is a "garden" well on one off-site property). People can come into contact if private wells are installed on the property. People can come into contact if private wells are installed on selected off-site properties.
Direct contact with groundwater	People can come into contact if they complete ground-intrusive work at the site (approximate depth eight to ten feet).
Inhalation of air (exposures related to soil vapor intrusion)	A monitoring program was completed at on-site and off-site buildings to verify that additional actions are not needed to address exposures related to soil vapor intrusion. A soil vapor intrusion evaluation will be completed if new construction is planned onsite or offsite in the future (or groundwater conditions change).

Table 4-1
Pre-Excavation Soil Boring Analytical Data - VOCs
Former Norton/Nashua Facility, Watervliet, NY

Sample No.	Sampling Date	Sample Depth (feet)	Acetone (µg/kg)	Benzene (µg/kg)	Cyclo-hexane (µg/kg)	Ethyl-benzene (µg/kg)	Methyl Cyclohexane (µg/kg)	Methylene Chloride (µg/kg)	m,p-Xylenes (µg/kg)	Toluene (µg/kg)	Heptane (µg/kg)	VOC TICs (µg/kg)
B-1	11/18/2010	7.0	**15**	<6.6	<6.6	<6.6	<6.6	**3.8 JB**	<6.6	**5.9 J**	<13	ND
B-2	11/18/2010	6.0	<130	<64	**50 J**	<64	**1,700**	**55 JB**	<64	**58 J**	<130	**2,079**
B-3	11/18/2010	4.0	**68**	<31	<31	<31	**220**	<31	<31	**210**	<62	**386**
B-4	11/18/2010	6.0	**40**	<6.7	<6.7	**9.6**	**61**	**8.0 B**	**5.1 J**	**28**	**6.2 J**	**153**
B-5	11/18/2010	5.0	<5300	<2600	<2600	<2600	**9,100**	<2600	<2600	**73,000**	**15,000**	**12,200**
B-6	11/18/2010	4.0	<12000	<6100	<6100	<6100	**12,000**	<6100	**3,900 J**	**160,000**	**34,000**	**32,000**
B-1	11/18/2010	9.0	<5300	<2600	<2600	<2600	**17,000**	<2600	<2600	**88,000**	**39,000**	**41,300**
B-2	11/18/2010	8.0	**59**	<12	<12	**16**	**94**	**12 JB**	**30**	**180**	**74**	**124**
B-3	11/18/2010	8.0	<460000	*<230000*	<230000	<230000	**220,000 J**	<230000	<230000	**4,500,000**	**460,000 J**	ND
B-4	11/18/2010	9.0	<480000	*<240000*	<240000	<240000	<240000	<240000	<240000	**7,900,000**	<480000	ND
B-5	11/18/2010	7.0	<5900	<3000	<3000	<3000	**96,000**	<3000	<3000	**16,000**	**69,000**	**85,400**
B-6	11/18/2010	7.0	<240000	*<120000*	<120000	<120000	**150,000**	<120000	<120000	**2,900,000**	**320,000**	**300,000**
B-1	11/18/2010	11.0	<23000	<11000	<11000	<11000	**24,000**	<11000	<11000	**340,000**	**58,000**	**45,000**
B-2	11/18/2010	11.0	<100	<56	<56	<56	**74**	<56	<56	**1,100**	**71 J**	ND
B-3	11/18/2010	11.0	<2500	<1200	<1200	<1200	<1200	**1,400 B**	<1200	**23,000**	<2500	ND
B-4	11/18/2010	12.0	**24**	<6.0	<6.0	<6.0	<6.0	**5.3 JB**	<6.0	**190**	<12	ND
B-5	11/18/2010	11.0	<100	<56	<56	<56	<56	<56	<56	**960**	<110	ND
B-6	11/18/2010	11.0	<1100	<570	<570	<570	<570	<570	<570	**19,000**	**430 J**	**850**
B-7	11/18/2010	11.0	15	<5.7	<5.7	<5.7	<5.7	**5.5 JB**	<5.7	**34**	<11	ND
FB*	11/18/2010	-	<10	<5.0	<5.0	<5.0	<5.0	**6.0 B**	<5.0	<5.0	<10	ND
TB*	11/18/2010	-	<10	<5.0	<5.0	<5.0	<5.0	**2.8 JB**	<5.0	<5.0	<5.0	ND
* aqueous sample - concentration in micrograms per liter (µg/L)			**500,000**	**44,000**	**500,000****	**390,000**	**500,000****	**500,000**	**500,000**	**500,000**	**500,000****	**-**
			NYSDEC Restricted Use (Commercial) SCO per 6 NYCRR Part 375								exceedance =	(yellow)
** unrestricted/commercial SCO not listed - used cap value			**50**	**60**	**100,000****	**1,000**	**100,000****	**50**	**260**	**700**	**100,000****	**-**
			NYSDEC Unrestricted Use SCO per 6 NYCRR Part 375								exceedance =	(orange)

µg/kg = micrograms per kilogram; VOC = volatile organic compound; TICs = tentatively identified compounds; ND = not detected; < ("less than") = analyte concentration below the laboratory detection limit. B = compound detected in the laboratory method blank, J = estimated concentration; compound detected below the quantitation limit; FB = field blank; TB = trip blank; SCO = soil clean-up objective; sample B-7 is a blind replicate of sample B-6.

VOCs analyzed via EPA Method 8260 plus TICs. Only detected (boldface)/selected analytes are listed above. For a complete list of analytes, see the laboratory report.

Table 4-1

Pre-Excavation Soil Boring Analytical Data - PCBs/SVOCs

Former Norton/Nashua Facility, Watervliet, NY

PCBs

Sample Designation	Sample Depth (feet)	Sampling Date	Aroclor 1016 (µg/kg)	Aroclor 1221 (µg/kg)	Aroclor 1232 (µg/kg)	Aroclor 1242 (µg/kg)	Aroclor 1248 (µg/kg)	Aroclor 1254 (µg/kg)	Aroclor 1260 (µg/kg)	Aroclor 1262 (µg/kg)	Aroclor 1268 (µg/kg)	Total Aroclors (µg/kg)
B-2	1.0	11/18/2010	<40	<40	<40	<40	<40	<40	**39 J**	<40	<40	**39 J**
B-3	1.0	11/18/2010	<39	<39	<39	<39	<39	<39	**30 J**	<39	<39	**30 J**
B-4	1.0	11/18/2010	<39	<39	<39	<39	<39	<39	**33 J**	<39	<39	**33 J**
B-2	3.0	11/18/2010	<42	<42	<42	<42	<42	<42	<42	<42	<42	**0**
B-3	2.0	11/18/2010	<41	<41	<41	<41	<41	<41	<41	<41	<41	**0**
B-4	2.0	11/18/2010	<42	<42	<42	<42	<42	<42	<42	<42	<42	**0**
			NYSDEC Restricted Use SCO (commercial) per 6 NYCRR Part 375							exceedance =	(none)	**1,000**
			NYSDEC Unrestricted Use SCO per 6 NYCRR Part 375							exceedance =	(none)	**100**

SVOCs

Sample Designation	Sample Depth (feet)	Sampling Date	BkF (µg/kg)	Benzo(a) pyrene (µg/kg)	Chrysene (µg/kg)	DBahA (µg/kg)	1,2-DCB (µg/kg)	IcdP (µg/kg)	2-MP (µg/kg)	3 & 4-MP (µg/kg)	Nitro-benzene (µg/kg)	Phenol (µg/kg)
FES B11-2	5 - 10	2/4/2011	<330	<330	<330	<330	**170 J**	<330	**570**	**580**	**190 J**	**160 J**
FES B11-4	5 - 10	2/4/2011	<330	<330	<330	<330	**170 J**	<330	<330	<330	**190 J**	**160 J**
Restricted Use (Commercial) SCO			56,000	1,000	56,000	560	500,000	5,600	500,000	500,000	3,700*	500,000
NYSDEC Unrestricted Use SCO			800	1,000	1,000	330	1,100	500	330	330	170**	330

* residential supplemental SCO (no promulgated commercial SCO)

** protection of groundwater supplemental SCO

(yellow) = exceeds Restricted Use (Commercial) SCO (none)

(orange) = exceeds Unrestricted Use SCO

µg/kg = micrograms per kilogram; BkF = benzo(k)fluoranthene; DBahA = dibenzo(a,h)anthracene; DCB = dichlorobenzene; IcdP = indeno(1,2,3-cd)pyrene; MP = methylphenol; < ("less than") = analyte concentration below the laboratory detection limit; J = estimated concentration; compound detected below the quantitation limit; SCO = soil clean-up objective.

Polychlorinated biphenyls (PCBs) analyzed via EPA Method 8082. Semi-volatiles analyzed via EPA Method 8270. Only detected/selected analytes are listed above; detections in boldface. For a complete list of analytes, see the laboratory reports.

Table 4-1
Pre-Excavation Soil Boring Analytical Data - metals
Former Norton/Nashua Facility, Watervliet, NY

Sample Designation	Sampling Date	Sample Depth (feet)	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)
FES B11-1	2/4/2011	5 - 10	<4.3	**3.5**	**145**	**0.70**	<0.43	**17.7**	**22.1**
FES B11-2	2/4/2011	5 - 10	<4.1	**5.2**	**98.6**	**0.60**	<0.41	**20.6**	**7.99**
FES B11-3	2/4/2011	5 - 10	<3.5	**6.3**	**121**	**0.61**	<0.35	**19.4**	**11.6**
FES B11-4	2/4/2011	5 - 10	<4.3	**9.4**	**95.6**	**0.87**	<0.43	**24.3**	**12.4**
FES B11-5	2/4/2011	5 - 10	<3.9	**10.0**	**111**	**1.03**	<0.39	**23.5**	**14.2**
NYSDEC Unrestricted Use SCO			**12***	**13**	**350**	**7.2**	**2.5**	**1/30***	**63**
Restricted Use (Commercial) SCO			**10,000**	**16**	**400**	**590**	**9.3**	**400/1,500***	**1,000**

Sample Designation	Sampling Date	Sample Depth (feet)	Mercury (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Thallium (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
FES B11-1	2/4/2011	5 - 10	<0.09	**17.3**	<0.9	<0.43	<3.9	**23.3**	**60.1**
FES B11-2	2/4/2011	5 - 10	<0.08	**26.6**	<0.8	<0.41	<3.7	**21.4**	**91.0**
FES B11-3	2/4/2011	5 - 10	<0.08	**26.5**	<0.7	<0.35	<3.2	**22.1**	**89.2**
FES B11-4	2/4/2011	5 - 10	<0.09	**25.5**	<0.9	<0.43	<3.8	**32.6**	**73.5**
FES B11-5	2/4/2011	5 - 10	<0.08	**32.3**	<0.8	<0.39	<3.5	**26.4**	**94.3**
NYSDEC Unrestricted Use SCO			**0.18**	**30**	**3.9**	**2**	**5***	**39***	**109**
Restricted Use (Commercial) SCO			**2.8**	**310**	**1,500**	**1,500**	**10,000**	**10,000**	**10,000**

* protection of ecological resources suuplemental SCO
** commercial SCO not listed - used cap value
*** hexavalent/trivalent SCOs listed (analysis was for total chromium)

(yellow) = exceeds Restricted Use (Commercial) SCO (none)
(orange) = exceeds Unrestricted Use SCO

mg/kg = milligrams per kilogram; SCO = NYSDEC Soil Clean-Up Objective per 6 NYCRR Part 375; < ("less than") = analyte concentration below the laboratory detection limit; J = estimated concentration; compound detected below the quantitation limit.

Selected metals analyzed via EPA Method 6010/SW7471. Detections in boldface.

Table 4-2

Post-Excavation Soil Analytical Data

Former Norton/Nashua Facility, Watervliet, NY

Sample Designation	Sampling Date	Sample Depth (feet)	Acetone (µg/kg)	Benzene (µg/kg)	Cyclo-hexane (µg/kg)	Ethyl-benzene (µg/kg)	Methyl Cyclohexane (µg/kg)	Methylene Chloride (µg/kg)	m,p-Xylenes (µg/kg)	Toluene (µg/kg)	Heptane (µg/kg)	VOC TICs (µg/kg)
POST-EXCAVATION SIDEWALL SAMPLES												
SW-W-1	3/2/2011	8.5-9.0	<18	<6.0	<6.0	<6.0	**8.4**	<6.0	<6.0	<6.0	<12	**259 J**
SW-W-2	3/3/2011	8.5-9.0	<14	<5.8	**2.5 J**	<5.8	**46**	<5.8	<5.8	**4.2 J**	**2.9 J**	**160 J**
SW-N-1	3/2/2011	8.5-9.0	<92	<32	**34**	<32	**1,100**	<32	<32	<32	<64	**5,885 J**
SW-N-2	3/4/2011	8.5-9.0	<14	<6.4	<6.4	<6.4	**10**	<6.4	<6.4	**39**	<13	**84.8 J**
SW-N-3	3/4/2011	8.5-9.0	<31000	<23000	<23000	<23000	**52,000**	<23000	<23000	**680,000**	**170,000**	**344,000 J**
SW-E-1	3/4/2011	8.5-9.0	<62	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	**10**	<12	**24.3 J**
SW-E-2	3/4/2011	8.5-9.0	<59	<5.9	<5.9	<5.9	**10**	<5.9	<5.9	**31**	**9.9 J**	**183 J**
SW-S-1A	3/3/2011	8.5-9.0	<32	<6.2	**4.8 J**	<6.2	**66**	<6.2	<6.2	**9.6**	<12	**575 J**
SW-S-2	3/8/2011	8.5-9.0	<12000	<6100	<6100	<6100	**11,000**	<9000	<6100	**120,000**	**35,000**	**57,900 J**
SW-S-1B(3)	3/8/2011	8.5-9.0	<33	<6.3	<6.3	<6.3	**45**	<7.4	<6.3	<6.3	<13	**554 J**
QA/QC SAMPLES												
TB*	3/2/2011	-	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	ND
TB*	3/3/2011	-	**9.2 J**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	ND
TB*	3/4/2011	-	**11 B**	<5.0	<5.0	<5.0	<5.0	**2.9 JB**	<5.0	<5.0	<10	ND
TB*	3/8/2011	-	**7.9 JB**	<5.0	<5.0	<5.0	<5.0	**3.7 JB**	<5.0	<5.0	<10	ND
FB-1*	3/8/2011	-	**8.0 JB**	<5.0	<5.0	<5.0	<5.0	**5.7 B**	<5.0	<5.0	<10	ND
			500,000	**44,000**	**500,000****	**390,000**	**500,000****	**500,000**	**500,000**	**500,000**	**500,000****	**-**
			NYSDEC Restricted Use (Commercial) SCO per 6 NYCRR Part 375								exceedance =	
			50	**60**	**100,000****	**1,000**	**100,000****	**50**	**260**	**700**	**100,000****	**-**
			NYSDEC Unrestricted Use SCO per 6 NYCRR Part 375								exceedance =	

* aqueous sample - concentration in micrograms per liter (µg/L)

** unrestricted/commercial SCO not listed - used cap value

µg/kg = micrograms per kilogram; VOC = volatile organic compound; TICs = tentatively identified compounds; ND = not detected; < ("less than") = analyte concentration below the laboratory detection limit. B = compound also detected in the laboratory method blank, J = estimated concentration; compound detected below the quantitation limit; FB = field blank; TB = trip blank; SCO = soil clean-up objective.

March 2011 samples collected prior to chemical oxidation (chem-ox) treatment of excavation. VOCs analyzed via EPA Method 8260 plus TICs. Only detected/selected analytes are listed above; detections in boldface. For a complete list of analytes, see the laboratory report.

Table 4-2
Post-Excavation Soil Analytical Data
Former Norton/Nashua Facility, Watervliet, NY

Sample Designation	Sampling Date	Sample Depth (feet)	Anthra-cene (µg/kg)	Benzo(a) anthracene (µg/kg)	Benzo(b) fluoranthene (µg/kg)	Benzo(k) fluoranthene (µg/kg)	Benzo(g,h,i) perylene (µg/kg)	Benzo(a) pyrene (µg/kg)	Chrysene (µg/kg)	Fluor-anthene (µg/kg)
POST-EXCAVATION SIDEWALL SAMPLES										
SW-W-1	3/2/2011	8.5-9.0	<400	<400	<400	<400	<400	<400	<400	<400
SW-W-2	3/3/2011	8.5-9.0	<380	<380	<380	<380	<380	<380	<380	<380
SW-N-1	3/2/2011	8.5-9.0	<420	<420	<420	<420	<420	<420	<420	<420
SW-N-2	3/4/2011	8.5-9.0	<420	<420	<420	<420	<420	<420	<420	<420
SW-N-3	3/4/2011	8.5-9.0	<380	<380	<380	<380	<380	<380	<380	<380
SW-E-1	3/4/2011	8.5-9.0	<400	<400	<400	<400	<400	<400	<400	<400
SW-E-2	3/4/2011	8.5-9.0	<390	<390	<390	<390	<390	<390	<390	<390
SW-S-1A	3/3/2011	8.5-9.0	<410	<410	<410	<410	<410	<410	<410	<410
SW-S-2	3/8/2011	8.5-9.0	<400	<400	<400	<400	<400	<400	<400	<400
SW-S-1B(3)	3/8/2011	8.5-9.0	**140 J**	**320 J**	**380 J**	**330 J**	**130 J**	**210 J**	**460**	**450**
FB-1*	3/8/2011	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Restricted Use (Commercial) SCO			**500,000**	**5,600**	**5,600**	**56,000**	**500,000**	**1,000**	**56,000**	**500,000**
NYSDEC Unrestricted Use SCO			**100,000**	**1,000**	**1,000**	**800**	**100,000**	**1,000**	**56,000**	**500,000**

* aqueous sample

(yellow) = exceeds Restricted Use (Commercial) SCO (none)
(orange) = exceeds Unrestricted Use SCO (none)

Table 4-2
Post-Excavation Soil Analytical Data
Former Norton/Nashua Facility, Watervliet, NY

Sample Designation	Sampling Date	Sample Depth (feet)	Indeno(1,2,3-cd) pyrene (µg/kg)	2-Methyl-phenol (µg/kg)	4-Methyl-phenol (µg/kg)	Naph-thalene (µg/kg)	Phenan-thene (µg/kg)	Pyrene (µg/kg)	BEHP (µg/kg)	SVOC TICs (µg/kg)
POST-EXCAVATION SIDEWALL SAMPLES										
SW-W-1	3/2/2011	8.5-9.0	<400	<400	<400	<400	<400	<400	<400	ND
SW-W-2	3/3/2011	8.5-9.0	<380	<380	<380	<380	<380	<380	<380	**15,810 J**
SW-N-1	3/2/2011	8.5-9.0	<420	<420	<420	<420	<420	<420	<420	**520 J**
SW-N-2	3/4/2011	8.5-9.0	<420	<420	<420	<420	<420	<420	<420	**12,190 J**
SW-N-3	3/4/2011	8.5-9.0	<380	**1,600**	**1,500**	**160 J**	**79 J**	<380	<1400	**21,150 J**
SW-E-1	3/4/2011	8.5-9.0	<400	<400	<400	<400	<400	<400	<400	**15,250 J**
SW-E-2	3/4/2011	8.5-9.0	<390	<390	<390	<390	<390	<390	<390	**15,200 J**
SW-S-1A	3/3/2011	8.5-9.0	<410	<410	<410	<410	<410	<410	<410	**19,490 J**
SW-S-2	3/8/2011	8.5-9.0	<400	**120 J**	**130 J**	<400	<400	<400	<400	**12,840 J**
SW-S-1B(3)	3/3/2011	8.5-9.0	**160 J**	<410	<410	<410	**230 J**	**460**	<410	**14,380 J**
FB-1*	3/8/2011	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**1.8 J**	NA
Restricted Use (Commercial) SCO			**5,600**	**500,000**	**500,000**	**500,000**	**500,000**	**500,000**	**50,000***	**-**
NYSDEC Unrestricted Use SCO			**500**	**330**	**330**	**12,000**	**100,000**	**100,000**	**50,000***	**-**

* aqueous sample

** residential supplemental SCO (no promulgated commercial SCO)

(yellow) = exceeds Restricted Use (Commercial) SCO (none)

(orange) = exceeds Unrestricted Use SCO

µg/kg = micrograms per kilogram; BEHP = bis(2-ethylhexyl)phthalate; TICs = tentatively identified compounds; < ("less than") = analyte concentration below the laboratory detection limit; J = estimated concentration; compound detected below the quantitation limit; NA = not analyzed for the indicated parameter; ND = not detected; SCO = NYSDEC soil clean-up objective per 6 NYCRR Part 375.

Semi-volatile organic compounds (SVOCs) plus TICs analyzed via EPA Method 8270. Detections in boldface. Only detected and selected analytes are listed above. For a complete list of analytes, see the laboratory report. (Note: dimethylphthalate was detected in all soil samples, but all detections were J-qualified and "B-qualified" indicating the analyte was also detected in the laboratory method blank, and all reported concentrations were below the Unrestricted Use SCO.)

Table 4-3

Post-Excavation Treatment Soil Analytical Data

Former Norton/Nashua Facility, Watervliet, NY

Sample Designation	Sampling Date	Sample Depth (feet)	Acetone (µg/kg)	Benzene (µg/kg)	Cyclo-hexane (µg/kg)	Ethyl-benzene (µg/kg)	Methyl Cyclohexane (µg/kg)	Methylene Chloride (µg/kg)	m,p-Xylenes (µg/kg)	Toluene (µg/kg)	Heptane (µg/kg)	VOC TICs (µg/kg)
POST-EXCAVATION TREATMENT SAMPLES												
MW-25	5/11/2011	12.5-13.0	<15	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	**770 EJ**	<12	ND
MW-25 RE	5/11/2011	12.5-13.0	<120	<30	<30	<30	<30	<37	<30	**98**	<60	ND
MW-26	5/11/2011	13.5-14.0	<11	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5	**4.7 J**	<11	ND
MW-27	5/11/2011	13.5-14.0	<23 J	<5.5 J	<5.5 J	<5.5 J	<5.5 J	<5.6 J	<5.5 J	**180 J**	**6.8 J**	ND
MW-27 RE	5/11/2011	13.5-14.0	<19	<5.5	<5.5	<5.5	<5.5	<8.7	<5.5	**100**	<11	ND
Post Ex 1	5/11/2011	6.5-7.0	<11	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4	**11**	<11	ND
Post Ex 2	5/11/2011	8.5-9.0	<1200	<580	<580	**280 J**	<580	<580	**1,600**	**21,000**	<1200	ND
* unrestricted/commercial SCO not listed - used cap value			**500,000**	**44,000**	**500,000***	**390,000**	**500,000***	**500,000**	**500,000**	**500,000**	**500,000***	**-**
			NYSDEC Restricted Use (Commercial) SCO per 6 NYCRR Part 375								exceedance =	(none)
			50	**60**	**100,000***	**1,000**	**100,000***	**50**	**260**	**700**	**100,000***	**-**
			NYSDEC Unrestricted Use SCO per 6 NYCRR Part 375								exceedance =	

µg/kg = micrograms per kilogram; VOC = volatile organic compound; TICs = tentatively identified compounds; ND = not detected; < ("less than") = analyte concentration below the laboratory detection limit. B = compound also detected in the laboratory method blank, E = laboratory estimated concentration; J = estimated concentration; compound detected below the quantitation limit; FB = field blank; TB = trip blank; SCO = soil clean-up objective.

May 2011 samples collected after chem-ox treatment of excavation. VOCs analyzed via EPA Method 8260 plus TICs.
Only detected/selected analytes are listed above; detections in boldface. For a complete list of analytes, see the laboratory report.

Table 4-4

Summary of Sewer Sediment Analytical Data - Semi-Volatiles

Former Norton/Nashua Facility

Watervliet, NY

Sample Designation	Sampling Date	Acenaph-thene (µg/kg)	Anthracene (µg/kg)	Benzo(a) anthracene (µg/kg)	Benzo(a) pyrene (µg/kg)	Benzo(b) fluoranthene (µg/kg)	Benzo(k) fluoranthene (µg/kg)	Benzo(g,h,i) perylene (µg/kg)	Chrysene (µg/kg)
MH-2	9/14/2010	13,000	38,000	36,000	24,000	22,000	22,000	26,000	37,000
MH-2.5	2/17/2004	100,000	360,000	410,000	340,000	270,000	260,000	220,000	410,000
MH-3.5	2/17/2004	200,000	690,000	870,000	620,000	510,000	500,000	400,000	890,000
(MH-21)	2/17/2004	39,000	150,000	190,000	140,000	120,000	110,000	95,000	200,000
MH-3.5	9/13/2010	9,600 J	29,000	37,000	28,000	26,000	25,000	20,000	40,000
MH-6	10/31/2001	890 J	4,500	6,700	5,800	6,000	6,000	2,300	7,000
MH-6	9/13/2010	270 J	1,100	1,000	820	740	690	560	1,000
MH-50	9/13/2010	160 J	690	900	810	750	870	470	970
MH-11	11/2/2001	780 J	<4200	9,400	8,900	11,000	11,000	4,600	11,000
MH-11 RE	11/2/2001	790 J	4,400	9,900	9,500	12,000	11,000	3,800 J	12,000
MH-13	2/17/2004	8,000	28,000	34,000	27,000	20,000	25,000	14,000	37,000
MH-14	2/17/2004	100,000	300,000	370,000	310,000	240,000	260,000	190,000	380,000
FB-1*	10/31/2001	<10	<10	<10	<10	<10	<10	<10	<10
FB*	2/17/2004	<5	<5	<5	<5	<5	<5	<5	<5
FB*	9/13/2010	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1
NYSDEC Sediment Screening Criteria (1999) - µg/kg		140,000	107,000	12,000	1,300	-	-	-	-

* aqueous samples

Yellow = most recent samples (2010)

Orange = exceeds Sediment Screening Criteria

Table 4-4
Summary of Sewer Sediment Analytical Data - Semi-Volatiles
Former Norton/Nashua Facility
Watervliet, NY

Sample Designation	Sampling Date	Dibenzo(a,h) anthracene (µg/kg)	Fluor-anthene (µg/kg)	Fluorene (µg/kg)	Indeno(1,2,3-cd) pyrene (µg/kg)	Phenan-thene (µg/kg)	Pyrene (µg/kg)	2-Methyl naphthalene (µg/kg)	Naph-thalene (µg/kg)
MH-2	9/14/2010	**2,500 J**	**110,000**	**9,300**	**21,000**	**96,000**	**75,000**	**3,000 J**	**9,100**
MH-2.5	2/17/2004	<78000	**960,000**	**83,000**	**270,000**	**800,000**	**920,000**	**20,000 J**	**72,000 J**
MH-3.5	2/17/2004	**111,000 J**	**1,700,000**	**200,000**	**440,000**	**1,600,000**	**1,700,000**	**61,000 J**	**130,000 J**
(MH-21)	2/17/2004	**9,700 J**	**360,000**	**39,000**	**110,000**	**330,000**	**380,000**	**9,200 J**	**20,000 J**
MH-3.5**	9/13/2010	**22,000**	**81,000**	**7,600 J**	**25,000**	**75,000**	**70,000**	**2,500 J**	**6,300 J**
MH-6	10/31/2001	**6,000**	**12,000**	**1,000 J**	**3,200**	**9,900**	**14,000**	<2200	<2200
MH-6**	9/13/2010	**340 J**	**2,700**	**320 J**	**800**	**2,900**	**2,000**	**83 J**	**230 J**
MH-50**	9/13/2010	**140 J**	**2,400**	**130 J**	**720**	**1,900**	**1,800**	<350	**120 J**
MH-11	11/2/2001	**<4200**	**13,000**	**720 J**	**5,600**	**10,000**	**31,000**	<4200	<4200
MH-11 RE	11/2/2001	**<4200**	**17,000**	**770 J**	**5,400**	**10,000**	**23,000**	<4200	<4200
MH-13	2/17/2004	**2,600 J**	**80,000 E**	**6,100**	**16,000**	**66,000**	**57,000**	**1,700 J**	**4,700 J**
MH-14	2/17/2004	**19,000 J**	**880,000**	**89,000**	**240,000**	**790,000**	**830,000**	**21,000 J**	**67,000 J**
FB-1*	10/31/2001	<10	<10	<10	<10	<10	<10	<10	<10
FB*	2/17/2004	<5	<5	<5	<5	<5	<5	<5	<5
FB*	9/13/2010	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1
* aqueous samples		**-**	**1,020,000**	**8,000**	**-**	**120,000**	**961,000**	**34,000**	**30,000**
		NYSDEC Sediment Screening Criteria (1999) - µg/kg							

** 4-nitrophenol also reported present in MH-3.5 at a concentration of 8,800 µg/kg;
dimethylphthalate also reported present in MH-6/MH-50 at a concentration of 100 JB/250 JB mg/kg

[yellow] = most recent samples (2010)   [orange] = exceeds Sediment Screening Criteria

Table 4-4
Summary of Sewer Sediment Analytical Data - Semi-Volatiles
Former Norton/Nashua Facility
Watervliet, NY

Sample Designation	Sampling Date	Carbazole (µg/kg)	Dibenzo-furan (µg/kg)	1,4-Dichloro-benzene (µg/kg)	bis(2-Ethyl-hexyl)phthalate (µg/kg)	Butylbenzyl-phthalate (µg/kg)	Di-n-butyl phthalate (µg/kg)	Di-n-octyl-phthalate (µg/kg)	SVOC TICs (µg/kg)
MH-2	9/14/2010	**9,300**	**7,100 J**	<8500	<8500	<8500	<8500	<8500	**726,300 J**
MH-2.5	2/17/2004	**130,000**	**54,000 J**	*<78000*	<78000	<78000	<78000	<78000	**1,118,000 JN**
MH-3.5	2/17/2004	**210,000**	**110,000 J**	*<180000*	<180000	<180000	<180000	<180000	**3,050,000 JN**
(MH-21)	2/17/2004	**46,000**	**20,000 J**	*<34000*	<34000	<34000	<34000	<34000	**850,000 JN**
MH-3.5	9/13/2010	**8,400 J**	**6,100 J**	<12000	<12000	<12000	<12000	<12000	**129,800 J**
MH-6	10/31/2001	<2200	**580 J**	<2200	**1,200 J**	<2200	<2200	<2200	**10,800 JN**
MH-6	9/13/2010	**330 J**	**230 J**	<360	**130 J**	<360	<360	**620**	**2,340 J**
MH-50**	9/13/2010	**250 J**	**130 J**	<350	**140 J**	<350	<350	<350	**4,450 J**
MH-11	11/2/2001	<4200	<4200	<4200	**13,000**	<4200	<4200	<4200	**14,000 JN**
MH-11 RE	11/2/2001	<4200	<4200	<4200	**12,000**	<4200	<4200	<4200	**24,000 JN**
MH-13	2/17/2004	**8,700**	**4,200 J**	<4700	**650 J**	<4800	<4800	<4800	**78,000 JN**
MH-14	2/17/2004	**85,000**	**56,000 J**	*<74000*	<74000	<74000	<74000	<74000	**1,120,000 JN**
FB-1*	10/31/2001	<10	<10	<10	<10	<10	<10	<10	ND
FB*	2/17/2004	<5	<5	<5	<5	<5	<5	<5	ND
FB*	9/13/2010	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	ND
NYSDEC Sediment Screening Criteria (1999) - µg/kg		**-**	**-**	**12,000**	**199,500**	**-**	**-**	**-**	**-**

* aqueous samples

[yellow] = most recent samples (2010) [orange] = exceeds Sediment Screening Criteria

µg/kg = micrograms per kilogram; FB = field blank; TICs = tentatively identified compounds; B = compound also detected in the laboratory method blank;
J = estimated concentration, detected below the quantitation limit; N = presumptive evidence of a compound; ND = not detected; RE = laboratory replicate.
MH-20/MH-21/MH-50 samples are blind replicate samples.

Semi-volatile organic compounds (SVOCs) via EPA Method 8270. Only detected analytes are listed above. A complete list of analytes is provided in the laboratory report.
TIC totals do not include B-qualified detections. Lowest (most conservative) sediment criterion for each compound listed above.

Table 4-5
Summary of Sewer Water Analytical Data - Semi-Volatiles
Former Norton/Nashua Facility
Watervliet, NY

Sample Designation	Sampling Date	Acenaph-thene (µg/L)	Anthra-cene (µg/L)	Benzo(a) anthracene (µg/L)	Benzo(a) pyrene (µg/L)	Benzo(b) fluoranthene (µg/L)	Benzo(g,h,i) perylene (µg/L)	Benzo(k) fluoranthene (µg/L)	Chrysene (µg/L)	Fluor-anthene (µg/L)	Fluorene (µg/L)	Indeno(1,2,3-cd)pyrene (µg/L)
MH-1	6/14/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
(MH-20)	6/14/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
MH-5	10/31/2001	<10	**2 J**	**3 J**	**3 J**	**3 J**	**2 J**	**4 J**	**4 J**	**7 J**	<10	**2 J**
	2/17/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
MH-6	10/31/2001	<10	**2 J**	**4 J**	**4 J**	**4 J**	**2 J**	**5 J**	**5 J**	**9 J**	<10	**2 J**
MH-11	11/2/2001	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
MH-12	2/17/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
MH-12	9/14/2010	**9.4 J**	**32**	**33**	**23**	**21**	**13**	**21**	**34**	**73**	**11**	**17**
MH-13	2/17/2004	<5	**1 J**	**2 J**	**1 J**	**1 J**	**0.9 J**	**1 J**	**2 J**	**3 J**	<5	**0.9 J**
(MH-20)	2/17/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
MH-14	2/17/2004	**2 J**	**9**	**17**	**14**	**12**	**8**	**13**	**18**	**29**	**2 J**	**9**
FB-2	10/31/2001	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
FB	2/17/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	A(C)	**5.3 A(C)**	**3.8 A(C)**	**0.03 A(C)**	NA	NA	NA	NA	NA	NA	**0.54 A(C)**	NA
	other	**48 A(A)**	**35 A(A)**	**0.23 A(A)**	**0.0012 H(FC)**	NA	NA	NA	NA	NA	**4.8 A(A)**	NA
		NYSDEC Surface-Water Class C standard (6 NYCRR Part 703) - µg/L										

= most recent samples (2010)

= exceeds Surface-Water Class C Standard - A(C)

= exceeds Surface-Water Class C Standard - other

Table 4-5
Summary of Sewer Water Analytical Data - Semi-Volatiles
Former Norton/Nashua Facility
Watervliet, NY

Sample Designation	Sampling Date	Phenanthrene (µg/L)	Pyrene (µg/L)	Carbazole (µg/L)	Dibenzofuran (µg/L)	4-Methylphenol (µg/L)	Naphthalene (µg/L)	Phenol (µg/L)	BEHP (µg/L)	Butylbenzyl phthalate (µg/L)	Di-n-butyl phthalate (µg/L)	SVOC TICs (µg/L)
MH-1	6/14/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	**57 JN**
(MH-20)	6/14/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	**55 JN**
MH-5	10/31/2001	**4 J**	**6 J**	<10	<10	<10	<10	<10	**2 J**	<10	<10	**4 J**
	2/17/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	**3 JN**
MH-6	10/31/2001	**5 J**	**8 J**	<10	<10	<10	<10	<10	**3 J**	<10	<10	**200 J**
MH-11	11/2/2001	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**5 J**
MH-12	2/17/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	**2 JN**
MH-12*	9/14/2010	**66**	**51**	**10 J**	**6.0 J**	<11	**5.8 J**	<11	**6.8 J**	<11	**10 J**	**337.3 J**
MH-13	2/17/2004	**2 J**	**2 J**	<5	<5	<5	<5	<5	**0.7 J**	<5	**2 J**	**6 JN**
(MH-20)	2/17/2004	<5	<5	<5	<5	<5	<5	<5	**0.8 J**	<5	<5	**3 JN**
MH-14	2/17/2004	**21**	**25**	**2 J**	**0.9 J**	<5	**0.8 J**	**0.7 J**	**4 J**	<5	**22**	**214 JN**
FB-2	10/31/2001	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND
FB	2/17/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
	A(C)	**5.0 A(C)**	**4.6 A(C)**	NA	NA	NA	NA	NA	**0.6 A(C)**	NA	NA	NA
	other	**45 A(A)**	**42 A(A)**	NA	NA	NA	NA	**5 E**	NA	NA	NA	NA
		NYSDEC Surface-Water Class C standard (6 NYCRR Part 703) - µg/L										

* dibenz(a,h)anthracene also reported present in the 9/14/10 MH-12 sample at a concentration of 3.9 J µg/L

= most recent samples (2010)

= exceeds Surface-Water Class C Standard - A(C)

= exceeds Surface-Water Class C Standard - other

µg/L = micrograms per liter; FB = field blank; BEHP = bis-(2-ethylhexyl)phthalate); TICs = tentatively identified compounds; J = estimated concentration, detected below the quantitation limit; N = presumptive evidence of a compound; NA = standard/guideline not available; ND = not detected; A(A) = fish survival; A(C) = fish propagation; E = aesthetic; H(FC) = human fish consumption. MH-20 samples are blind replicates.

Semi-volatile organic compounds (SVOCs) via EPA Method 8270. Only detected analytes are listed above. A complete list of analytes is provided in the laboratory report. TIC totals do not include B-qualified detections (B = also detected in the laboratory method blank). Lowest (most conservative) Surface-Water Class C standard (Hudson River 4, 6 NYCRR Part 858) listed above for each compound.

Table 4-6
Summary of Sewer Sediment/Water Analytical Data - PCBs
Former Norton/Nashua Facility
Watervliet, NY

Sample Designation	Sampling Date	Aroclor 1016 (µg/kg)	Aroclor 1221 (µg/kg)	Aroclor 1232 (µg/kg)	Aroclor 1242 (µg/kg)	Aroclor 1248 (µg/kg)	Aroclor 1254 (µg/kg)	Aroclor 1260 (µg/kg)	Aroclor 1262 (µg/kg)	Aroclor 1268 (µg/kg)	Total Aroclors (µg/kg)
MH-2	9/14/2010	<43	<43	<43	**210**	<43	**150**	<43	<43	<43	**360**
MH-3.5	9/13/2010	<240	<240	<240	<240	<240	**900**	<240	<240	<240	**900**
MH-6	9/13/2010	<36	<36	<36	<36	<36	**57**	<36	<36	<36	**57**
MH-50	9/13/2010	<35	<35	<35	<35	<35	**59**	<35	<35	<35	**59**
		Wildlife Bioaccumulation (total PCBs) - 1,400					**Human Health Bioaccumulation (total PCBs) - 0.8**				
		NYSDEC Sediment Screening Criteria (1999) - µg/kg									

Sample Designation	Sampling Date	Aroclor 1016 (µg/L)	Aroclor 1221 (µg/L)	Aroclor 1232 (µg/L)	Aroclor 1242 (µg/L)	Aroclor 1248 (µg/L)	Aroclor 1254 (µg/L)	Aroclor 1260 (µg/L)	Aroclor 1262 (µg/L)	Aroclor 1268 (µg/L)	Total Aroclors (µg/L)
MH-2	9/21/2011*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MH-3	9/21/2011*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MH-5	9/21/2011*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MH-12	9/14/2010	<0.130	<0.130	<0.130	**0.183**	<0.130	**0.210**	<0.130	<0.130	<0.130	**0.393**
MH-14	9/21/2011*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FB	9/13/2010	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	-
		Total PCBs - 0.12									
		NYSDEC Surface-Water Class C standard (6 NYCRR Part 703) - µg/L									

* sample collected
by the NYSDEC

[yellow] = most recent samples (2011) [orange] = exceeds Sediment Screening Criteria or or Surface-Water Class C Standard

µg/kg = micrograms per kilogram; µg/L = micrograms per liter; ND = not detected; FB = field blank. MH-50 is a blind replicate sample.

Polychlorinated biphenyls (PCBs) analyzed via EPA Method 8082. Lowest (most conservative) sediment criteria and Surface-Water Class C standard (Hudson River 4, 6 NYCRR Part 858) listed above for each analyte.

Table 6-1
Selected Corrective Measure Alternative(s)
2007 Preliminary Corrective Measure Study
Former Norton/Nashua Facility, Watervliet, New York

	Area of Concern (AOC)/Solid Waste Management Unit (SWMU)	Selected Corrective Measure Alternative(s)
Building Subslab AOC	**Former "Beartex" Sump Pit SWMU/ Building #61 Doorway Spill AOC**	enhanced bioremediation (and contingent EFR) or ISCO (and contingent EFR) followed by MNA
Building Subslab AOC	**Building #58 AOC**	
Building Subslab AOC	**Former Text Pit AOC**	
Building Subslab AOC	**Former Solvent Line AOC**	
	Former Tank Farm SWMU (FPP)	passive FPP recovery, EFR
	Former Tank Farm SWMU	soil excavation and/or enhanced bioremediation, ISCO, MNA
	Off-Site AOC	MNA
	Former Filter Room AOC	*No Further Action*
	Former Solvent Recovery Room AOC	*No Further Action*
	Quonset Hut B AOC	*No Further Action*
	Quonset Hut C AOC	*No Further Action*
	Sanitary Sewer SWMU	*No Further Action*
	Storm Sewer SWMU	*sewer sediment removal, sediment/water monitoring (done)*

EFR = enhanced fluid recovery (vacuum truck or similar); FPP = free-phase product;
ISCO = in-situ chemical oxidation; MNA = monitored natural attenuation.

Table 6-2
Pre- and Post-ISCO Soil Analytical Data
Former Norton/Nashua Facility, Watervliet, NY

Sample Designation	Sample Type	Sampling Date	Sample Depth (feet)	Acetone (µg/kg)	Benzene (µg/kg)	Cyclo-hexane (µg/kg)	Ethyl-benzene (µg/kg)	Methyl Cyclohexane (µg/kg)	Methylene Chloride (µg/kg)	m,p-Xylenes (µg/kg)	Toluene (µg/kg)	Heptane (µg/kg)
SB-201	**PRE**	3/23/2009	9.0-10.0	<11,000	<5,700	<5,700	<5,700	**19,000**	<5,700	<5,700	**120,000**	**43,000**
SB-206	**POST**	8/25/2009	9.0-10.0	**25**	<12	<12	<12	<12	**13 B**	**23**	**310**	**15**
SB-202	**PRE**	3/23/2009	9.0-10.0	<240,000	<120,000	<120,000	<120,000	**420,000**	**110,000 J**	<120,000	**3,600,000**	**1,000,000**
SB-205	**POST**	8/25/2009	9.0-10.0	<23,000	<11,000	<11,000	<11,000	**110,000**	**13,000 B**	**13,000**	**420,000**	**160,000**
MP-23	**PRE**	3/24/2009	12.5-13.5	<110,000	<56,000	<56,000	<56,000	<56,000	<56,000	<56,000	**1,500,000**	**61,000 J**
MP-24	**PRE**	3/24/2009	12.0-12.5	**17,000**	<5,700	<5,700	<5,700	**10,000**	<5,700	<5,700	**180,000**	**33,000**
SB-207	**POST**	8/25/2009	9.0-10.0	**24**	<5.6	<5.6	<5.6	<5.6	**10 B**	<5.6	**130**	<5.6
MP-25	**PRE**	3/24/2009	10.5-11.0	<640,000	<320,000	<320,000	<320,000	**720,000**	<320,000	<320,000	**8,600,000**	**470,000 J**
SB-208S	**POST**	8/25/2009	9.0-10.0	<2,200	<1,100	<1,100	<1,100	**3,800**	**1,100 B**	<1,100	**32,000**	**5,800**
SB-204	**PRE**	3/24/2009	13.0-13.5	*<1,200,000*	*<580,000*	*<580,000*	*<580,000*	**800,000**	*<580,000*	*<580,000*	**13,000,000**	**1,200,000**
SB-208D	**POST**	8/25/2009	13.0-14.0	<110	<54	<54	<54	<54	<54	<54	**1,700**	<54
1112-1S	**PRE**	11/12/2012	8.5-9.0	**13 B**	<4.6	<4.6	<4.6	**3.7 B**	**2.3 JB**	<4.6	**26 B**	**8.5 J**
1112-1D	**PRE**	11/12/2012	10.0-10.5	<11000	<5500	**2,500 J**	<5500	**15,000**	**1,500 JB**	**1,300 J**	**37,000 B**	<11000
1D Dup.	**PRE**	11/12/2012	10.0-10.5	<11000	<5500	**3,100 J**	<5500	**20,000**	**1,700 JB**	**3,800 J**	**220,000 EB**	<11000
1112-2S	**PRE**	11/12/2012	9.0-9.5	**34 B**	<5.8	<5.8	<5.8	**33**	**7.5 B**	**3.5 J**	**250 EB**	**33**
1112-2D	**PRE**	11/12/2012	10.0-10.5	**21 B**	<5.0	<5.0	<5.0	**26**	**2.9 JB**	<5.0	**17 B**	<9.9
1112-3S	**PRE**	11/12/2012	8.5-9.0	**45 B**	<5.8	<5.8	<5.8	**8.1**	**5.0 JB**	**5.1 J**	**83 B**	**23**
1112-3D	**PRE**	11/12/2012	10.5-11.0	**19 B**	**2.2 J**	<4.2	**6.2**	**19**	**3.5 JB**	**25**	**150 B**	<8.3
TB*	**PRE**	11/12/2012	-	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**3.8 JB**	<10
NYSDEC Restricted Use (Commercial) SCO per 6 NYCRR Part 375 (exceedance = yellow stippled)				**500,000**	**44,000**	**500,000****	**390,000**	**500,000****	**500,000**	**500,000**	**500,000**	**500,000****
NYSDEC Unrestricted Use SCO per 6 NYCRR Part 375 (exceedance = orange)				**50**	**60**	**100,000****	**1,000**	**100,000****	**50**	**260**	**700**	**100,000****

* aqueous sample - concentration in micrograms per liter (µg/L)

** unrestricted/commercial SCO not listed - used cap value

ISCO = in situ chemical oxidation (chem-ox); µg/kg = micrograms per kilogram; PRE = March 2009 & November 2012 samples collected prior to the chem-ox treatment; POST = August 2009 samples collected after chem-ox treatment; Dup. = duplicate sample; TB = trip blank; < ("less than") = analyte detected below the quantitation limit; B = compound also detected in the laboratory method blank; E = laboratory estimated concentration; J = estimated concentration; compound detected below the quantitation limit; SCO = soil clean-up objective.

Volatile organic compounds (VOCs) analyzed via EPA Method 8260. Only detected analytes are listed above; detections in boldface. For a complete list of analytes, see the laboratory reports.

Table 6-3
2009 ISCO Pilot Test - Vapor Analytical Data
Former Norton/Nashua, Watervliet, NY

VAPOR SAMPLE 6/10/2009	**MP-27** ($\mu g/m^3$)
Carbon Dioxide	<0.050 %
Oxygen	**12%**
Methane	**6,400**
Heptane	**2,000,000**
Toluene	**31,000,000**
Acetone	**170,000**
Benzene	<64,000
2-Butanone	<120,000
Carbon Disulfide	**120,000**
Carbon Tetrachloride	<130,000
Chloromethane	<41,000
1,2-Dichloroethane	<81,000
Ethylbenzene	<87,000
4-Ethyltoluene	<98,000
Hexane	<70,000
Methyl Tertiary Butyl Ether	<72,000
Methylene Chloride	**240,000**
Octane	<93,000
Pentane	<59,000
Propene	<34,000
Styrene	<85,000
Tetrachloroethene	<140,000
1,1,1-Trichloroethane	<110,000
Trichloroethene	**2,200,000**
1,2,4-Trimethylbenzene	<98,000
1,3,5-Trimethylbenzene	<98,000
m/p-Xylenes	<87,000
o-Xylene	<87,000
Total VOC analytes	**35,730,000**
Total VOC TICs	**21,333,400**

All samples were analyzed for VOCs via EPA Method TO-15 plus TICs.
All results presented in micrograms per cubic meter ($\mu g/m^{3)}$. An average TIC molecular weight of 119 was assumed to convert the laboratory reported parts per million by volume (ppmv) values to µg/m3.

($\mu g/m^3$) = micrograms per cubic meter; VOCs = volatile organic compounds; TICs = tentatively identified compounds; < ("less than") = analyte concentration below the laboratory detection limit.

Table 6-4a
2009 ISCO Pilot Test - Field Monitoring Data - Groundwater/Vapor
Former Norton/Nashua
Watervliet, NY

Injection Point ID	Injection Date	Screen Interval (ft)	Persulfate Volume (gal)	Injection Time (min)	Catalyst Volume (gal)	Injection Time (min)	Oxidizer Volume (gal)	Injection Time (min)	Persulfate Flow Rate (gpm)	Catalyst Flow Rate (gpm)	Oxidizer Flow Rate (gpm)
DP-1D	08-Jun-09	12.5-20	100	42	50	21	85	31	2.38	2.38	2.74
DP-1D	09-Jun-09	12.5-20	-	-	-	-	15	7	-	-	2.14
DP-1S	09-Jun-09	6.5-13.5	100	56	50	28	100	130	1.79	1.79	0.77
DP-2D	11-Jun-09	12.5-20	100	47	50	16	100	82	2.13	3.13	1.22
DP-2S	11-Jun-09	6.5-13.5	100	76	50	72	120	77	1.32	0.69	1.56
DP-3D	08-Jun-09	12.5-20	100	44	50	14	65	21	2.27	3.57	3.10
DP-3D	09-Jun-09	12.5-20	-	-	-	-	35	12	-	-	2.92
DP-3S	09-Jun-09	6.5-13.5	100	75	50	34	100	107	1.33	1.47	0.93
DP-4D	10-Jun-09	12.5-20	100	54	50	28	100	157	1.85	1.79	0.64
DP-4S	11-Jun-09	6.5-13.5	100	48	50	22	100	107	2.08	2.27	0.93
DP-5D	08-Jun-09	12.5-20	100	34	50	12	100	32	2.94	4.17	3.13
DP-5S	09-Jun-09	6.5-13.5	100	56	50	29	100	71	1.79	1.72	1.41
DP-6D	10-Jun-09	12.5-20	100	47	50	25	100	100	2.13	2.00	1.00
DP-6S	10-Jun-09	6.5-13.5	100	46	50	21	30	23	2.17	2.38	1.30
DP-6S	11-Jun-09	6.5-13.5	-	-	-	-	70	26	-	-	2.69
DP-7D	09-Jun-09	12.5-20	100	42	50	20	100	133	2.38	2.50	0.75
DP-7S	09-Jun-09	6.5-13.5	100	30	50	23	100	115	3.33	2.17	0.87
DP-8D	10-Jun-09	12.5-20	100	45	50	20	100	51	2.22	2.50	1.96
DP-8S	10-Jun-09	6.5-13.5	100	35	50	15	50	48	2.86	3.33	1.04
DP-8S	11-Jun-09	6.5-13.5	-	-	-	-	50	60	-	-	0.83
DP-9D	11-Jun-09	12.5-20	100	70	50	24	100	100	1.43	2.08	1.00
DP-9S	11-Jun-09	6.5-13.5	100	35	50	22	165	114	2.86	2.27	1.45

Table 6-4a
2009 ISCO Pilot Test - Injection Volume/Flow Rate Summary
Former Norton/Nashua
Watervliet, NY

Injection Point ID	Injection Date	Screen Interval (ft)	Persulfate Volume (gal)	Injection Time (min)	Catalyst Volume (gal)	Injection Time (min)	Oxidizer Volume (gal)	Injection Time (min)	Persulfate Flow Rate (gpm)	Catalyst Flow Rate (gpm)	Oxidizer Flow Rate (gpm)
DP-10D	10-Jun-09	12.5-20	100	53	50	17	100	52	1.89	2.94	1.92
DP-10S	10-Jun-09	6.5-13.5	100	51	50	29	100	64	1.96	1.72	1.56
DP-11D	11-Jun-09	12.5-20	100	52	50	21	100	42	1.92	2.38	2.38
DP-11S	11-Jun-09	6.5-13.5	100	52	50	19	80	83	1.92	2.63	0.96
DP-12D	10-Jun-09	12.5-20	100	43	50	20	100	59	2.33	2.50	1.69
DP-12S	10-Jun-09	6.5-13.5	100	36	50	16	100	97	2.78	3.13	1.03
DP-13D	11-Jun-09	12.5-20	100	36	50	18	100	132	2.78	2.78	0.76
DP-13S	11-Jun-09	6.5-13.5	100	68	50	33	35	22	1.47	1.52	1.59
DP-14D	09-Jun-09	12.5-20	100	44	50	26	100	75	2.27	1.92	1.33
DP-14S	09-Jun-09	6.5-13.5	100	58	50	20	100	84	1.72	2.50	1.19
DP-15D	10-Jun-09	12.5-20	100	38	50	21	100	73	2.63	2.38	1.37
DP-15S	10-Jun-09	6.5-13.5	100	60	50	48	100	143	1.67	1.04	0.70
DP-16D	09-Jun-09	12.5-20	100	38	50	20	100	76	2.63	2.50	1.32
DP-16S	09-Jun-09	6.5-13.5	100	60	50	20	100	52	1.67	2.50	1.92
injection totals by date	08-Jun-09		300	120	150	47	250	84	2.50	3.19	2.98
	09-Jun-09		900	459	450	220	950	862	1.96	2.05	1.10
	10-Jun-09		1100	508	550	260	980	867	2.17	2.12	1.13
	11-Jun-09		900	484	450	247	1020	845	1.86	1.82	1.21
Total Volume/Time			**3200**	**1571**	**1600**	**774**	**3200**	**2658**	**2.15**	**2.33**	**1.50**

ft = feet; gal = gallons; min = minutes; gpm = gallons per minute.

Persulfate concentration 12.5%; catalyst used was ISOTEC series Cat-4260 chelated iron complex; oxidizer (stabilized hydrogen peroxide) concentration 12.5%;

Table 6-4b
2009 ISCO Pilot Test - Field Monitoring Data - Groundwater/Vapor
Former Norton/Nashua
Watervliet, NY

Monitoring Point	Date	Time	Persulfate (mg/L)	Iron (mg/L)	H_2O_2 (mg/L)	Cond. (ms)	ORP (mV)	pH (su)	TDS (mg/L)	Temp. (^oC)
MW-14	6/9/2009	10:30 AM	70.0	160	20.0	5,420	387	2.91	4,174	16.3
MW-14	6/9/2009	1:10 PM	200	>200	9.0	4,048	327	3.81	3,030	17.2
MW-14	6/9/2009	4:00 PM	1,500	>200	75.0	6,748	597	2.86	5,296	17.3
MW-14	6/10/2009	10:30 AM	>3,500	180	350	10,710	605	2.54	8,826	18.3
MW-14	6/10/2009	4:30 PM	>3,500	>200	>1,000	27,650	610	1.74	26,120	24.2
MW-14	6/11/2009	10:30 AM	-	-	-	-	-	-	-	-
MW-14	6/11/2009	4:00 PM	-	-	-	-	-	-	-	-
MW-14	8/25/2009	3:00 PM	-	-	-	2,290	148	6.69	-	16.8
MP-3	6/1/2009	4:30 PM	-	-	-	554	18	6.36	-	13.7
MP-3	6/9/2009	10:30 AM	1.4	100	0.4	1,140	-29	6.22	785	16.1
MP-3	6/9/2009	1:10 PM	10.5	140	0.8	1,650	-12	6.11	1,148	17.1
MP-3	6/9/2009	4:00 PM	-	-	-	-	-	-	-	-
MP-3	6/10/2009	10:30 AM	>3,500	160	>1,000	5,614	353	4.56	4,322	18.3
MP-3	6/10/2009	4:30 PM	>3,500	>200	>1,000	17,670	512	2.18	15,580	22.9
MP-3	6/11/2009	9:30 AM	-	-	-	1,688	379	4.21	1,179	19.0
MP-3	6/11/2009	4:00 PM	-	-	-	-	-	-	-	-
MP-3	8/25/2010	2:00 PM	-	-	-	813	-138	6.29	-	19.4
MP-12	6/10/2009	2:00 PM	2.0	2.4	ND	885	188	6.71	602	18.1
MP-12	6/11/2009	3:30 PM	-	-	-	21	499	2.18	19	21.1
MP-12	6/12/2009	8:00 AM	-	-	-	4,177	306	4.91	3,135	17.0
MP-12	8/25/2009	3:00 PM	-	-	-	390	-173	7.29	-	15.4

Table 6-4b
2009 ISCO Pilot Test - Field Monitoring Data - Groundwater
Former Norton/Nashua
Watervliet, NY

Monitoring Point	Date	Time	Persulfate (mg/L)	Iron (mg/L)	H_2O_2 (mg/L)	Cond. (ms)	ORP (mV)	pH (su)	TDS (mg/L)	Temp. (^oC)
MP-23	6/2/2009	1:00 PM	-	-	-	490	-41	6.95	-	13.5
MP-23	6/9/2009	10:30 AM	2.1	8.0	ND	647	-70	5.73	435	15.9
MP-23	6/9/2009	1:10 PM	1.4	12.0	0.2	655	-51	6.70	439	17.0
MP-23	6/9/2009	4:00 PM	1.8	15.0	0.2	642	-47	6.78	432	17.1
MP-23	6/10/2009	10:30 AM	100	5.0	3.0	1,073	400	6.33	732	18.7
MP-23	6/10/2009	4:30 PM	200	4.8	2.0	1,400	154	6.67	965	19.7
MP-23	6/11/2009	10:30 AM	100	5.0	2.0	1,435	270	6.35	995	18.2
MP-23	6/11/2009	4:00 PM	200	6.4	12.0	1,415	207	6.29	975	19.6
MP-23	6/12/2009	8:00 AM	-	-	-	1,764	222	5.27	1,236	16.9
MP-23	8/25/2009	4:00 PM	-	-	-	410	-143	7.07	-	17.0
MP-24	6/2/2009	11:30 AM	-	-	-	419	-54	6.83	-	9.0
MP-24	6/9/2009	10:30 AM	2.8	9.0	0.2	583	-40	6.72	390	16.1
MP-24	6/9/2009	1:10 PM	2.8	7.4	0.8	577	58	6.42	384	16.9
MP-24	6/9/2009	4:00 PM	3.0	6.2	0.2	576	45	6.51	386	16.8
MP-24	6/10/2009	10:30 AM	2,500	100	50.0	7,800	575	3.10	6,185	19.1
MP-24	6/10/2009	4:30 PM	>3,500	100	500	29,910	652	2.24	28,930	21.5
MP-24	6/11/2009	10:30 AM	3,000	>200	600	13,920	608	2.62	11,890	19.0
MP-24	6/11/2009	4:00 PM	>3,500	>200	160	14,740	604	2.64	12,670	20.5
MP-24	6/12/2009	8:00 AM	-	-	-	8,473	571	2.75	6,812	17.7
MP-24	8/25/2009	3:00 PM	-	-	-	1,320	-147	6.70	-	17.7
MP-24	11/3/2009	4:00 PM	12	-	-	1,292	-144	6.64	-	15.3
MP-24	1/25/2010*	12:00 PM	0	-	-	-	-	-	-	-

* date of analysis for sample collected on 11/3/2009 and held at the laboratory

Table 6-4b
2009 ISCO Pilot Test - Field Monitoring Data - Groundwater
Former Norton/Nashua
Watervliet, NY

Monitoring Point	Date	Time	Persulfate (mg/L)	Iron (mg/L)	H_2O_2 (mg/L)	Cond. (ms)	ORP (mV)	pH (su)	TDS (mg/L)	Temp. (^oC)
MP-25	6/2/2009	8:30 AM	-	-	-	670	102	6.48	-	13.1
MP-25	6/9/2009	10:30 AM	2.1	10.0	ND	821	-10	6.30	557	16.1
MP-25	6/9/2009	1:10 PM	2.1	14.0	15.0	1,623	219	6.00	1,127	17.6
MP-25	6/9/2009	4:00 PM	>3,500	20.0	25.0	6,109	285	5.87	4,753	17.1
MP-25	6/10/2009	10:30 AM	80.0	8.0	4.0	3,207	380	6.02	2,337	19.1
MP-25	6/10/2009	4:30 PM	140	8.2	25.0	4,463	166	5.32	3,359	19.9
MP-25	6/11/2009	10:30 AM	180	10.0	50.0	6,898	433	3.24	5,405	19.3
MP-25	6/11/2009	4:00 PM	200	8.6	25.0	6,680	371	3.56	5,202	21.0
MP-25	6/12/2009	8:00 AM	-	-	-	3,734	329	5.66	2,771	17.2
MP-26	6/2/2009	11:00 AM	-	-	-	390	-63	7.12	-	12.5
MP-26	6/9/2009	11:30 AM	-	-	-	598	-67	6.73	403	16.2
MP-26	6/9/2009	4:30 PM	-	-	-	627	-65	6.54	4,225	15.9
MP-26	6/10/2009	8:00 AM	-	-	-	743	63	6.44	504	14.8
MP-26	6/11/2009	8:00 AM	-	-	-	622	-25	6.42	419	16.3
MP-26	6/11/2009	3:30 PM	-	-	-	1,621	272	6.04	1,127	17.5
MP-26	6/12/2009	8:30 AM	-	-	-	1,182	192	5.49	821	16.2
MP-26	8/25/2010	11:00 AM	-	-	-	1,601	-149	6.70	-	17.2
MP-27	6/2/2009	12:00 PM	-	-	-	537	-32	6.64	-	12.5
MP-27	6/9/2009	11:30 AM	-	-	-	1,531	243	6.23	1,071	13.1
MP-27	6/9/2009	4:30 PM	-	-	-	25	591	2.34	24	16.8
MP-27	6/10/2009	8:00 AM	-	-	-	16	502	6.45	14	15.4
MP-27	6/11/2009	8:00 AM	-	-	-	17	434	4.59	15	16.3
MP-27	6/11/2009	3:30 PM	-	-	-	17	444	4.46	15	17.7
MP-27	6/12/2009	8:30 AM	-	-	-	13	386	4.93	11	16.0
MP-27	8/25/2009	10:30 AM	-	-	-	814	-151	6.82	-	17.8

Table 6-4b
2009 ISCO Pilot Test - Field Monitoring Data - Groundwater
Former Norton/Nashua
Watervliet, NY

Monitoring Point	Date	Time	Persulfate (mg/L)	Iron (mg/L)	H_2O_2 (mg/L)	Cond. (ms)	ORP (mV)	pH (su)	TDS (mg/L)	Temp (^oC)
MP-28	6/2/2009	11:00 AM	-	-	-	530	43	6.81	-	13.7
MP-28	6/9/2009	11:30 AM	-	-	-	658	-113	6.99	444	16.2
MP-28	6/9/2009	5:00 PM	-	-	-	722	156	6.79	485	17.5
MP-28	6/10/2009	8:00 AM	-	-	-	651	-57	6.86	439	15.3
MP-28	6/10/2009	4:30 PM	-	-	-	646	190	6.40	425	-
MP-28	6/11/2009	8:00 AM	-	-	-	773	73	6.74	525	16.3
MP-28	6/11/2009	3:30 PM	-	-	-	713	233	6.29	482	17.4
MP-28	6/12/2009	8:30 AM	-	-	-	720	29	6.39	487	16.0
MP-28	8/25/2010	12:30 PM	-	-	-	460	-108	7.11	-	16.6
MP-29	6/2/2009	10:00 AM	-	-	-	520	660	7.00	-	14.0
MP-29	6/9/2009	9:00 AM	-	-	-	836	-58	6.86	568	17.3
MP-29	6/9/2009	5:00 PM	-	-	-	684	-62	6.87	460	17.0
MP-29	6/10/2009	8:00 AM	-	-	-	637	-60	6.82	430	15.3
MP-29	6/11/2009	8:30 AM	-	-	-	642	-23	6.54	432	16.2
MP-29	6/11/2009	4:00 PM	-	-	-	628	9	6.54	422	17.0
MP-29	6/12/2009	9:00 AM	-	-	-	634	-19	6.41	428	16.3
MP-29	8/25/2009	8:30 AM	-	-	-	550	-168	6.99	-	17.2
MP-30	4/8/2009	10:00 AM	-	-	-	456	-96	7.42	-	12.2
MP-30	6/9/2009	9:00 AM	-	-	-	634	-130	6.99	427	16.2
MP-30	6/9/2009	5:00 PM	-	-	-	615	-40	6.91	413	17.7
MP-30	6/10/2009	8:00 AM	-	-	-	623	-63	6.91	420	15.1
MP-30	6/10/2009	4:30 PM	-	-	-	627	-95	6.90	421	18.2
MP-30	6/11/2009	9:00 AM	-	-	-	630	-13	6.31	424	16.7
MP-30	8/25/2009	10:00 AM	-	-	-	497	-175	7.11	-	16.7

Table 6-4b
2009 ISCO Pilot Test - Field Monitoring Data - Groundwater
Former Norton/Nashua
Watervliet, NY

Monitoring Point	Date	Time	Persulfate (mg/L)	Iron (mg/L)	H_2O_2 (mg/L)	Cond. (ms)	ORP (mV)	pH (su)	TDS (mg/L)	Temp (^oC)
MP-31	6/2/2009	12:00 PM	-	-	-	530	-22	7.10	-	14.4
MP-31	6/9/2009	11:00 AM	-	-	-	785	-68	6.61	532	16.9
MP-31	6/9/2009	4:30 PM	-	-	-	660	-43	6.26	444	17.3
MP-31	6/10/2009	8:30 AM	-	-	-	664	-90	7.10	447	15.7
MP-31	6/10/2009	4:00 PM	-	-	-	705	-17	6.59	472	19.6
MP-31	6/11/2009	9:00 AM	-	-	-	650	-63	6.71	437	16.7
MP-31	8/25/2009	3:00 PM	-	-	-	410	-124	7.17	-	17.2

H_2O_2 = hydrogen peroxide; DCO_2 = dissolved carbon dioxide; Cond. = conductivity; ORP = oxidation-reduction potential; TDS = total dissolved solids; Temp. = temperature; mg/L = milligrams per liter; mS = microSiemens; mV = millivolts; su = standard units; oC = degrees Celsius; ND = not detected.

Table 6-4c
2009 ISCO Pilot Test - Field Monitoring Data - Groundwater/Vapor
Former Norton/Nashua
Watervliet, NY

Monitoring Point	Date	Time	DTW (feet)	DO (%)	DCO_2 (mg/L)	PID (ppmv)	LEL (%)	O_2 (%)	CO_2 (%)
MW-14	6/8/2009	11:00 AM	8.25	0.4	-	417	99	10.8	3.8
MW-14	6/8/2009	5:00 PM	4.00	1.2	-	1,800	100	OVERR	10.5
MW-14	6/8/2009	5:30 PM	variable	OVERR	(6/9/09)	-	-	-	-
MW-14	6/10/2010	7:30 AM	8.15	OVERR	150+	2,188	100	37.0	OVERR
MW-14	6/12/2010	9:30 AM	8.01	-	-	OVERR	OVERR	OVERR	OVERR
MW-14	8/25/2009	3:00 PM	-	0.86 ppm	-	-	-	-	-
MP-2	6/2/2009	8:30 AM	11.61	2.15 ppm	-	147	-	-	-
MP-2	6/8/2009	11:00 AM	8.10	0.5	-	68.2	55.0	17.5	1.6
MP-2	6/8/2009	4:30 PM	8.00	-	-	-	-	-	-
MP-2	6/8/2009	5:00 PM	7.04	-	-	-	-	-	-
MP-2	6/8/2009	5:30 PM	-	-	-	-	-	-	-
MP-2	6/9/2009	9:30 AM	5.81	3.6	-	72.5	OVERR	8.3	16.7
MP-2	6/10/2009	7:30 AM	-	-	-	40.3	1	22.1	0.3
MP-2	6/11/2009	7:30 AM	4.15	-	-	640	1	22.9	0.2
MP-2	8/25/2009	3:00 PM	10.21	0.13 ppm	-	168	-	-	-
MP-3	6/1/2009	4:30 PM	10.35	0.64 ppm	-	92	-	-	-
MP-3	6/8/2009	11:00 AM	8.19	0.9	-	142	99	7.9	6.5
MP-3	6/8/2009	5:30 PM	6.38	9.8	-	153	100	OVERR	13.3
MP-3	6/9/2009	9:30 AM	5.81	3.6	-	72.5	OVERR	8.3	16.7
MP-3	6/10/2009	7:30 AM	-	-	-	40.3	1	22.1	0.2
MP-3	6/11/2009	7:30 AM	8.02	-	-	0.0	4	OVERR	14.4
MP-3	6/11/2009	9:30 AM	7.14	-	-	670	3	29.9	0.2
MP-3	8/25/2009	2:00 PM	9.35	0.60 ppm	-	72.9	-	-	-

Table 6-4c
2009 ISCO Pilot Test - Field Monitoring Data - Groundwater/Vapor
Former Norton/Nashua
Watervliet, NY

Monitoring Point	Date	Time	DTW (feet)	DO (%)	DCO_2 (mg/L)	PID (ppmv)	LEL (%)	O_2 (%)	CO_2 (%)
MP-12	6/10/2009	1:00 PM	9.06	-	-	1,542	OVERR	14.3	17.7
MP-12	6/11/2009	9:30 AM	9.05	-	-	1,150	1	20.0	0.8
MP-12	6/11/2009	3:30 PM	9.09	-	-	1,150	3	25.5	3.6
MP-12	6/12/2009	8:00 AM	9.08	-	-	690	1	20.9	0.0
MP-12	8/25/2009	3:00 PM	-	0.77 ppm	-	-	-	-	-
MP-23	6/1/2009	4:30 PM	8.35	0.84 ppm	-	34.1	-	-	-
MP-23	6/8/2009	11:00 AM	8.67	0.3	-	67.1	99	6.6	6.6
MP-23	6/8/2009	5:45 PM	8.70	0.5	-	69.8	19	19.3	0.5
MP-23	6/9/2009	9:30 AM	8.61	0.6	60	59.1	OVERR	11.8	4.5
MP-23	6/10/2009	8:00 AM	8.65	0.8	30	97.1	OVERR	16.3	2.6
MP-23	6/10/2009	4:30 PM	8.61	-	-	-	0	20.9	0.0
MP-23	6/11/2009	7:30 AM	8.62	-	-	OVERR	2	20.9	0.2
MP-23	6/11/2009	4:30 PM	8.64	-	-	OVERR	OVERR	OVERR	OVERR
MP-23	6/12/2009	8:00 AM	8.61	-	-	210	0	20.9	0.0
MP-23	8/25/2009	4:00 PM	8.21	0.30 ppm	-	168	-	-	-
MP-24	4/8/2009	11:30 AM	8.82	1.66 ppm	-	-	-	-	-
MP-24	6/8/2009	11:00 AM	8.63	0.2	-	0.3	0	16.1	2.2
MP-24	6/8/2009	5:45 PM	8.91	0.4	-	136	9	19.2	1.1
MP-24	6/9/2009	9:30 AM	8.22	1.7	35	786	15	23.4	0.7
MP-24	6/9/2009	4:00 PM	8.49	21.3	50	1,025	47	24.4	7.3
MP-24	6/10/2009	8:00 AM	8.68	0.6	-	818	3	20.9	0.2
MP-24	6/10/2009	5:00 PM	9.22	-	-		83	OVERR	OVERR
MP-24	6/11/2009	7:30 AM	8.74	-	-	10,250	6	21.1	2.8
MP-24	6/11/2009	4:30 PM	8.71	-	-	8,950	21	31.7	3.6
MP-24	6/12/2009	8:00 AM	8.64	-	-	1,100	2	21.7	1.3
MP-24	8/25/2009	3:00 PM	8.39	0.40 ppm	-	17	-	-	-

Table 6-4c
2009 ISCO Pilot Test - Field Monitoring Data - Groundwater/Vapor
Former Norton/Nashua
Watervliet, NY

Monitoring Point	Date	Time	DTW (feet)	DO (%)	DCO_2 (mg/L)	PID (ppmv)	LEL (%)	O_2 (%)	CO_2 (%)
MP-25	6/2/2009	8:30 AM	8.85	0.88 ppm	-	47.6	-	-	-
MP-25	6/8/2009	11:00 AM	8.94	0.3	-	98.3	1	17.6	0.7
MP-25	6/8/2009	5:00 PM	7.38	-	-	-	-	-	-
MP-25	6/9/2009	9:30 AM	6.52	0.5	145	153	7	1.5	14.3
MP-25	6/9/2009	4:30 PM	8.10	OVERR	150+	4,340	100	OVERR	OVERR
MP-25	6/10/2009	8:00 AM	8.82/9.31	-	-	4,386	7	20.9	0.0
MP-25	6/10/2009	5:00 PM	8.59	-	-		81	OVERR	9.4
MP-25	6/11/2009	8:00 AM	8.81/9.01	-	-	37,250	6	22.6	0.6
MP-25	6/11/2009	4:30 PM	8.79/8.98	-	-	30,250	82	32.0	11.8
MP-25	6/12/2009	8:00 AM	8.85/9.01	-	-	1,000	1	20.9	0.0
MP-26	6/2/2009	11:00 AM	9.10	0.60 ppm	-	0.0	-	-	-
MP-26	6/9/2009	9:00 AM	8.87	0.5	-	13.0	0	2.8	13.5
MP-26	6/9/2009	11:30 AM	-	-	60	0.0	0	20.9	-
MP-26	6/9/2009	4:30 PM	8.87	0.5	55	734	41	OVERR	17.6
MP-26	6/10/2009	8:00 AM	9.25	0.8	-	12.1	2	19.4	1.1
MP-26	6/11/2009	8:00 AM	9.24	-	-	OVERR	0	20.9	0.1
MP-26	6/11/2009	5:30 PM	9.23	-	-	46,500	98	OVERR	OVERR
MP-26	6/12/2009	8:30 AM	9.20	-	-	600	1	20.9	0.2
MP-26	8/25/2009	11:00 AM	9.08	0.51 ppm	-	0.0	-	-	-

Table 6-4c
2009 ISCO Pilot Test - Field Monitoring Data - Groundwater/Vapor
Former Norton/Nashua
Watervliet, NY

Monitoring Point	Date	Time	DTW (feet)	DO (%)	DCO_2 (mg/L)	PID (ppmv)	LEL (%)	O_2 (%)	CO_2 (%)
MP-27	6/2/2009	12:00 PM	10.20	0.69 ppm	-	9.5	-	-	-
MP-27	6/9/2009	11:30 AM	8.50	0.8	-	335	19	1.7	15.1
MP-27	6/9/2009	5:00 PM	7.42	78.2	-	1,529	91	OVERR	15.3
MP-27	6/10/2009	8:00 AM	9.15	5.6	-	128	1	20.9	0.1
MP-27	6/11/2009	8:00 AM	9.31	-	-	OVERR	2	20.9	0.1
MP-27	6/11/2009	3:30 PM	8.95	-	-	OVERR	OVERR	OVERR	OVERR
MP-27	6/12/2009	8:30 AM	9.29	-	-	740	3	20.9	0.1
MP-27	8/25/2009	10:30 AM	9.57	0.48 ppm	-	13.6	-	-	-
MP-28	6/2/2009	11:00 AM	9.42	0.86 ppm	-	46.2	-	-	-
MP-28	6/9/2009	11:30 AM	-	-	60	43.0	22	18.7	1.8
MP-28	6/9/2009	5:00 PM	-	0.9	35	143	OVERR	1.5	17.9
MP-28	6/10/2009	8:00 AM	9.47	0.8	-	0.0	5	20.9	0.0
MP-28	6/10/2009	4:30 PM	9.34	-	-	0.0	OVERR	5.8	OVERR
MP-28	6/11/2009	8:00 AM	9.43	-	-	10,250	0	19.4	0.8
MP-28	6/11/2009	3:30 PM	9.44	-	-	39,250	29	13.4	0.6
MP-28	6/12/2009	8:30 AM	9.42	-	-	460	0	20.9	0.1
MP-28	8/25/2010	12:30 PM	9.31	0.46 ppm	-	1.7	-	-	-
MP-29	6/2/2009	10:00 AM	9.40	1.61 ppm	-	25.6	-	-	-
MP-29	6/9/2009	9:00 AM	-	-	75	20.3	31	18.7	1.0
MP-29	6/9/2009	5:00 PM	-	1.5	45	808	10	23.4	0.9
MP-29	6/10/2009	8:00 AM	9.51	1.4	-	942	5	20.9	0.2
MP-29	6/11/2009	8:30 AM	9.48	-		1300	2	20.9	0.3
MP-29	6/11/2009	4:00 PM	9.47	-	-	1,750	18	30.5	3.4
MP-29	6/12/2009	9:00 AM	9.48	-	-	920	3	21.3	0.3
MP-29	8/25/2009	8:00 AM	9.24	0.33 ppm	-	1.0	-	-	-

Table 6-4c
2009 ISCO Pilot Test - Field Monitoring Data - Groundwater/Vapor
Former Norton/Nashua
Watervliet, NY

Monitoring Point	Date	Time	DTW (feet)	DO (%)	DCO_2 (mg/L)	PID (ppmv)	LEL (%)	O_2 (%)	CO_2 (%)
MP-30	4/8/2009	9:00 AM	9.32	0.40 ppm	-	-	-	-	-
MP-30	6/9/2009	5:00 PM	-	1.1	30.0	842	2	3.5	8.9
MP-30	6/10/2009	8:00 AM	9.25	0.5	-	0.0	0	20.9	0.0
MP-30	6/10/2009	4:30 PM	9.16	-	-	0.0	0	1.3	16.5
MP-30	6/11/2009	9:00 AM	9.42	-	-	410	0	19.3	0.7
MP-30	8/25/2009	10:00 AM	8.94	0.36 ppm	-	0.0	-	-	-
MP-31	6/2/2009	12:00 PM	9.35	1.17 ppm	-	0.0	-	-	-
MP-31	6/9/2009	11:00 AM	-	-	30.0	-	-	-	-
MP-31	6/9/2009	4:30 PM	9.44	0.7	40.0	26.9	2	20.9	0.0
MP-31	6/10/2009	8:30 AM	9.46	0.4	-	26.0	0	20.9	0.1
MP-31	6/10/2009	4:00 PM	9.19	-	-	0.0	0	20.9	0.0
MP-31	6/11/2009	9:00 AM	9.43	-	-	300	0	20.9	0.0
MP-31	8/25/2009	3:00 PM	-	0.60 ppm	-	-	-	-	-
VP-2	6/11/2009	9:30 AM	-	-	-	3,500	-	20.9	0.1
VP-2	6/12/2009	8:30 AM	-	-	-	530	1	20.9	0.0

DTW = depth to water; DO = dissolved oxygen; DCO_2 = dissolved carbon dioxide; PID = photoionization detector; LEL = lower explosive limit; O2 = vapor-phase oxygen; CO_2 = vapor-phase carbon dioxide; mg/L = milligrams per liter; ppm(v) = parts per million (by volume); OVERR = value over instrument range.

Table 6-5
2009 EFR Pilot Test - Field Data
Former Norton/Nashua
Watervliet, NY

Depth to Water (feet)	EXTRACTION WELL MP-11	IS-1	IS-2	MP-28	MP-29	MP-30	MP-31	MP-32	MP-33
STATIC	10.24	9.22	9.25	9.16	9.00	9.16	9.10	9.35	9.46
MAXIMUM	9.11	9.50	9.32	9.66	9.85	9.45	9.85	9.73	9.74
END TEST	9.11	9.38	9.26	9.66	9.69	9.25	9.63	9.61	9.65
RECOVERY	9.23	9.28	9.24	9.13	9.34	9.13	9.25	9.38	9.48
% RECOVERY	11%	79%	114%	106%	60%	110%	80%	92%	93%
MAXIMUM DRAWDOWN	+1.13	0.28	0.07	0.50	0.85	0.29	0.75	0.38	0.28

Dissolved Oxygen (%)	EXTRACTION WELL MP-11	IS-1	IS-2	MP-28	MP-29	MP-30	MP-31	MP-32	MP-33
STATIC	1.0	1.1	0.5	0.6	0.6	0.9	0.5	0.4	1.0
END TEST	0.9	0.5	0.8	1.7	0.6	0.6	1.3	1.4	2.9
CHANGE	-0.1	-0.6	+0.3	+1.1	0.0	-0.3	+0.8	+1.0	+1.9

Phase I - stinger (liquid recovery):
Vacuum at extraction point- 10-19 inches of mercury
Duration - approx. 40 minutes
Extraction well was dewatered at end of test but recharging
Total fluid recovery - 160 gallons

Phase II - whole well (vapor/liquid recovery):
Vacuum at extraction point - 46-52 inches of water
Flow rate - approx. 100-125 standard cubic feet per minute
Duration - approx. 3 hours (test stopped/restarted after 1.5 hours)
Recovery monitoring period 3.5 hours
Total fluid recovery - 175 gallons

Table 6-6
C-Sparger/iSOC 2009-2010 Pilot Testing Field Data - Dissolved Oxygen
Former Norton/Nashua
Watervliet, New York

C-SPARGER	PRE-TEST	START TEST			RESTART C-SPARGER				END C-SPARGER						
Sample Location	**3-Nov-10**	**4-Nov**	**5-Nov**	**11-Dec**	**5-Jan-10**	**12-Jan**	**19-Jan**	**26-Jan**	**1-Feb**	**12-Feb**	**5-Mar**	**15-Mar**	**5-Apr**	**30-Apr**	**8-Jun**
C-SPARGER MONITORING POINTS															
MP-12	0.6	0.7	0.6	-	1.5	-	-	3.6	1.2	2.7	2.5	1.3	1.3	1.7	1.2
MP-23	-	-	-	-	3.1	1.3	2.0	1.9	1.6	1.2	2.0	1.1	0.75	4.0	2.1
MP-24	-	-	-	-	2.4	1.1	2.1	2.6	2.5	1.2	1.9	1.0	1.0	2.4	1.1
MP-25	-	1.5	7.9	-	11.9	8.9	8.9	11.8	2.9	1.8	2.7	1.1	0.4	2.1	1.0
MP-26	0.6	1.2	2.0	-	5.4	8.1	8.5	8.5	2.0	1.0	1.1	1.1	0.84	1.4	-
MP-27	0.7	7.5	4.7	-	8.2	8.4	8.5	8.6	5.4	0.9	1.2	1.0	1.0	1.2	-
MP-28	0.6	0.6	0.6	-	8.7	8.8	8.9	8.5	5.5	0.8	1.5	1.0	1.3	-	-
MP-29	0.5	1.2	0.8	-	2.1	1.8	2.2	1.9	1.9	1.1	1.9	1.4	-	-	-
MP-30	0.5	0.6	0.6	-	2.1	1.5	1.9	7.0	3.7	0.8	1.4	1.6	1.6	-	1.4
average	0.6	1.9	2.4	-	5.0	5.0	5.4	6.0	3.0	1.3	1.8	1.2	1.0	2.1	1.4

iSOC	PRE-TEST	START TEST													
Sample Location	**3-Nov-10**	**4-Nov**	**5-Nov**	**11-Dec**	**5-Jan-10**	**12-Jan**	**19-Jan**	**26-Jan**	**1-Feb**	**12-Feb**	**5-Mar**	**15-Mar**	**5-Apr**	**30-Apr**	**8-Jun**
iSOC WELLS															
IS-1	-	-	-	26	-	26	29	13	-	26.8	24.7	25.1	19.6	27.7	18.9
IS-2	-	5.7	6.1	34	-	29	32	23	22	24.6	24.8	25.6	23.1	28.5	19.6
iSOC MONITORING POINTS															
MP-11	0.9	5.0	2.1	1.8	2.4	0.9	1.9	3.8	2.6	2.4	1.6	1.5	1.6	1.4	1.4
MP-31	0.9	6.9	6.5	-	1.1	0.8	1.2	1.3	2.1	1.5	1.7	1.4	1.3	2.1	2.0
MP-32	1.3	6.4	6.4	1.6	2.4	1.4	1.9	1.8	2.7	1.2	1.6	1.2	1.5	2.2	2.0
MP-33	-	2.0	2.2	1.4	2.3	1.5	1.8	1.5	1.6	1.6	1.5	1.2	0.81	2.3	1.6
average	1.0	5.1	4.3	1.6	2.1	1.2	1.7	2.1	2.3	1.7	1.6	1.3	1.3	2.0	1.8

[yellow] = baseline DO   [white] = baseline DO + 0.0 - 0.9 ppm   [blue] = baseline DO + ≥ 1.0 ppm

Dissolved oxygen (DO) in parts per million (ppm). Selected anomalous field readings are not tabulated above.

Table 6-7
Supplemental Groundwater Analyses - Bioparameters
Former Norton/Nashua
Watervliet, New York

FIELD MEASUREMENTS:

Well ID	Sampling Date	DO (mg/L)	ORP (mV)	pH (su)	Ferrous Iron (mg/L)
DGC-8	18-Feb-04	**0.90**	**-148.5**	**6.33**	**50**
DGC-9	18-Feb-04	**1.75**	**-94.3**	**7.18**	<1
MP-27	2-Jun-09	**0.69**	**-31.5**	**6.58**	**1.26**
MP-23	2-Jun-09	**0.49**	**-51.8**	**7.09**	**3.0**
MP-31	2-Jun-09	**1.17**	**-31.6**	**7.08**	**1.4**
MP-11	25-Aug-09	**0.57**	**-172.1**	**6.85**	NM
MP-11	10-May-11	**0.74**	**-57.1**	**6.40**	NM
MP-25	10-May-11	**1.06**	**-109.9**	**6.68**	NM

BACTERIAL COUNTS:

Well ID	Toluene Degraders	BTEX Degraders	Total Heterotrophic Bacteria	Ratio of toluene (or BTEX) degraders: total heterotrophs
DGC-8	**300**	NA	**7,900**	**0.038**
DGC-9	<300	NA	**1,650**	<0.182
MP-27	NA	**62,000**	**1,740,000**	**0.036**
MP-23	NA	**39,000**	**2,340,000**	**0.017**
MP-31	NA	**485**	**140,000**	**0.003**

Table 6-7
Supplemental Groundwater Analyses - Bioparameters
Former Norton/Nashua
Watervliet, New York

LABORATORY ANALYSES:

Well ID	Sampling Date	Methane (µg/L)	Ethane/ Ethene (µg/L)	Iron (mg/L)	Dissolved Iron (mg/L)	TOC (mg/L)	BOD (mg/L)	COD (mg/L)
DGC-8	18-Feb-04	**52.7**	<3.0	**46.5**	NA	NA	NA	NA
DGC-9	18-Feb-04	<2.0	<3.0	**0.0982 B**	NA	NA	NA	NA
MP-27	2-Jun-09	**22.6**	<1.0	**0.435 E**	**0.194**	**6.4**	NA	**881**
MP-23	2-Jun-09	<1.0	<1.0	**1.320 E**	<0.0016	**1.8**	NA	<5.0
MP-31	2-Jun-09	**1.1**	<1.0	**0.483 E**	**0.0029**	**2.6**	NA	**6.5**
MP-11	25-Aug-09	NA	NA	NA	NA	NA	**35.0**	**48.7**
MP-11	10-May-11	NA	NA	**11.1 J**	**0.351 J***	NA	NA	NA
MP-25	10-May-11	NA	NA	**16.4 J**	**0.642 J***	NA	NA	NA

* samples field filtered

LABORATORY ANALYSES:

Well ID	Sampling Date	Alkalinity (mg/L)	Chloride (mg/L)	Nitrate - Nitrogen (mg/L)	Nitrite - Nitrogen (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Total Phosphate (mg/L)
DGC-8	18-Feb-04	**370**	NA	<0.020	<0.020	<1.0	<0.100	**0.160**
DGC-9	18-Feb-04	**260**	NA	<0.020	<0.020	**59.2**	<0.100	**0.050**
MP-27	2-Jun-09	**400**	**37.9**	<0.020	<0.010	**2.5**	<0.100	**0.725**
MP-23	2-Jun-09	**210**	**40.2**	<0.020	<0.010	**50.9**	**0.120**	**0.043**
MP-31	2-Jun-09	**280**	**36.3**	<0.020	<0.010	**4.9**	<0.100	**0.130**
MP-11	25-Aug-09	NA	NA	<0.020	NA	NA	NA	**0.220**
MP-11	10-May-11	NA	NA	**0.049**	<0.010	NA	NA	**0.229 J****
MP-25	10-May-11	NA	NA	<0.020	<0.010	NA	NA	**0.300 J****

** samples analyzed for total phosphorus

Table 6-7
Supplemental Groundwater Analyses - Bioparameters
Former Norton/Nashua
Watervliet, New York

NOTES:

DO = dissolved oxygen; ORP = oxidation-reduction potential; BTEX = benzene, toluene, ethylbenzene, and xylenes; TOC = total organic carbon; BOD = biochemical oxygen demand; COD = chemical oxygen demand; mg/L = milligrams per liter; mV = millivolts, su = standard pH units; µg/L = micrograms per liter; B = analyte also detected in laboratory method blank sample; E = laboratory estimated concentration; J = estimated concentration, detected below the quantitation limit; < ("less than") = analyte concentration below the laboratory detection limit; NA = not analyzed for the indicated parameter; NM = not measured for the indicated field parameter.

Dissolved toluene concentrations at time of sampling: high - DGC-8 & MP-27; moderate - MP-11, MP-23 & MP-25; and non-detect - DGC-9 & MP-31.

Bacterial enumerations via Standard Method 9215. Results presented in colony forming units per milliliter (cfu/ml).

Methane/ethane/ethene analysis via Misc. GC Methods; iron via EPA Method 6010B; TOC via Standard Method (SM) 5310C; BOD via SM 5210B; COD via EPA Method 410.4; alkalinity via EPA Method 310.1 (2004)/SM 2320B (2009); chloride via EPA Method 300.0; nitrate/nitrite via EPA Method 300.0 (2004 & 06-09 nitrate)/SM 4500B (2009 & 2011); sulfate via EPA Method 300.0; sulfide via EPA Method 376.2 (2004)/SM 4500D (2009); and total phosphate via EPA Method 365.2 (2004)/SM 4500D (2009).

Table 8-1
Technology Screening Matrix
Former Norton/Nashua Facility, Watervliet, New York

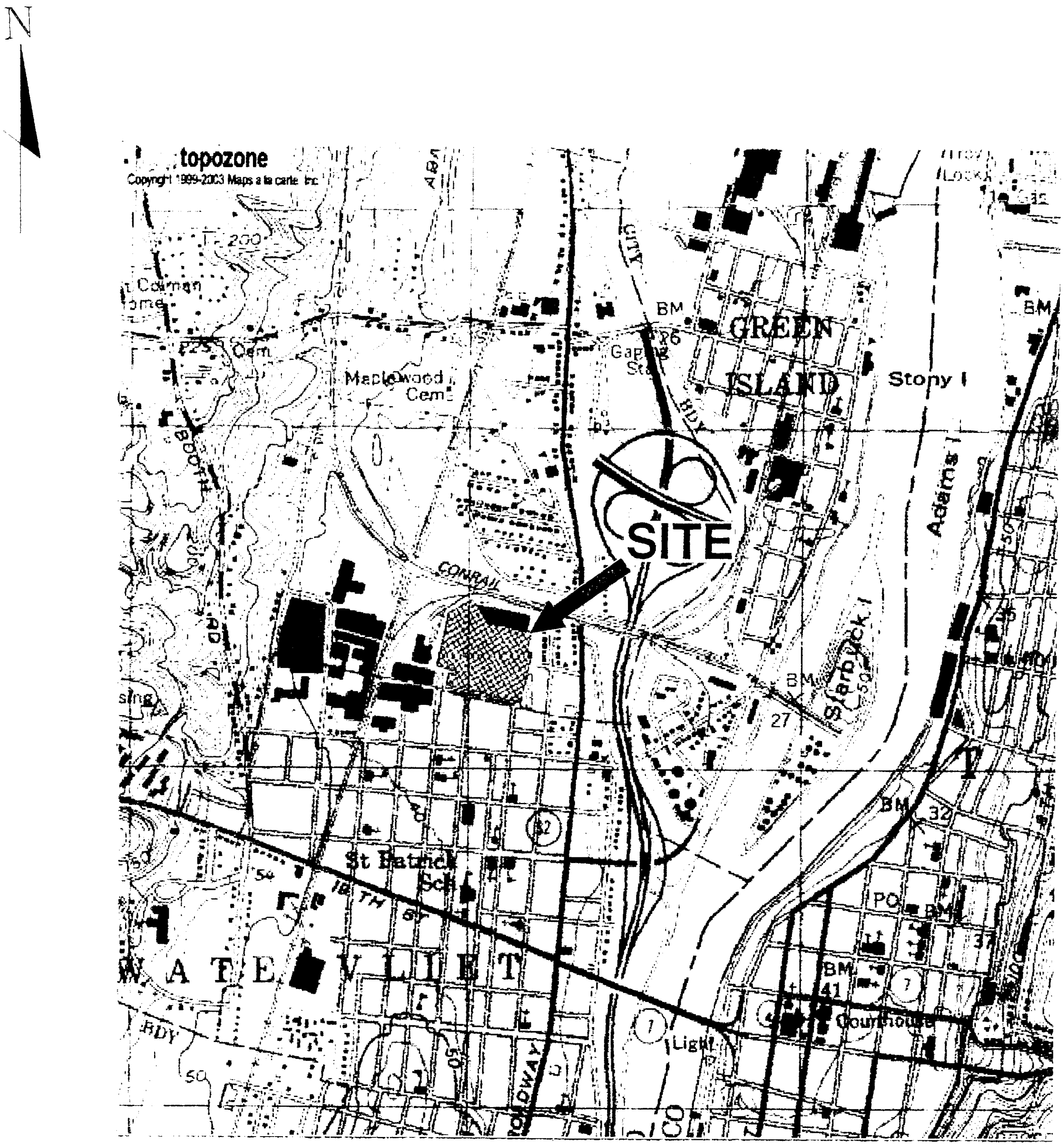
TREATMENT TECHNOLOGY	Long-Term Reliability/ Effectiveness	Reduction of Toxicity, Mobility, and/or Volume of Waste	Short-Term Effectiveness	Implement-ability	Remedy Cost	Community Acceptance	Consistency with "Green" Remediation Practices
OFF-SITE AOC							
Alternative #2 (long-term monitoring)	**GOOD**	**VERY GOOD**	POOR	**VERY GOOD**	**VERY GOOD**	**GOOD**	FAIR
ON-SITE SWMU/AOC							
Alternative #2 (long-term monitoring)	POOR	**VERY GOOD**	POOR	**GOOD**	**VERY GOOD**	POOR	FAIR
Alternative #3A (SWMU excavation)	**VERY GOOD**	POOR	**VERY GOOD**	VERY POOR	POOR	**GOOD**	POOR TO FAIR
Alternative #3B (AOC excavation)	**VERY GOOD**	POOR	**VERY GOOD**	VERY POOR	VERY POOR	**GOOD**	POOR TO FAIR
Alternative #4A (iSOC)	POOR TO FAIR	**VERY GOOD**	POOR TO FAIR	**GOOD**	FAIR	POOR TO FAIR	FAIR
Alternative #4B (C-Sparger)	FAIR	**VERY GOOD**	FAIR	FAIR	POOR TO FAIR	FAIR	FAIR
Alternative #5 (EFR/ISCO)	**VERY GOOD**	FAIR	**VERY GOOD**	FAIR TO GOOD	FAIR	**GOOD**	POOR TO FAIR
Alternative #6 (GWE, SVE/IAS, or DPVE)	FAIR TO GOOD	POOR	**VERY GOOD**	VERY POOR	POOR TO FAIR	**GOOD**	POOR

Note: Alternative #1 ("no action") was not considered for additional screening (see Section 7.0).

Table 11-1
Tentative Project Schedule
Former Norton/Nashua
Watervliet, New York

	4Q2013			1Q2014			2Q2014			3Q2014			4Q2014		
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Prepare CMS Report															
NYSDEC Review of CMS Report															
Joint Meeting to Discuss CMS Report															
Final Comments on CMS Report															
Finalize CMS Report															
NYSDEC Issues Statement of Basis										TBD					
Public Comment Period										TBD					
NYSDEC Issues Order on Consent										TBD					
Prepare Final CMS Workplan										TBD					
Proposed Interim EFR Events															
On-Site Groundwater Sampling Events											(EFR)		(EFR)		
Off-Site Groundwater Sampling Events															

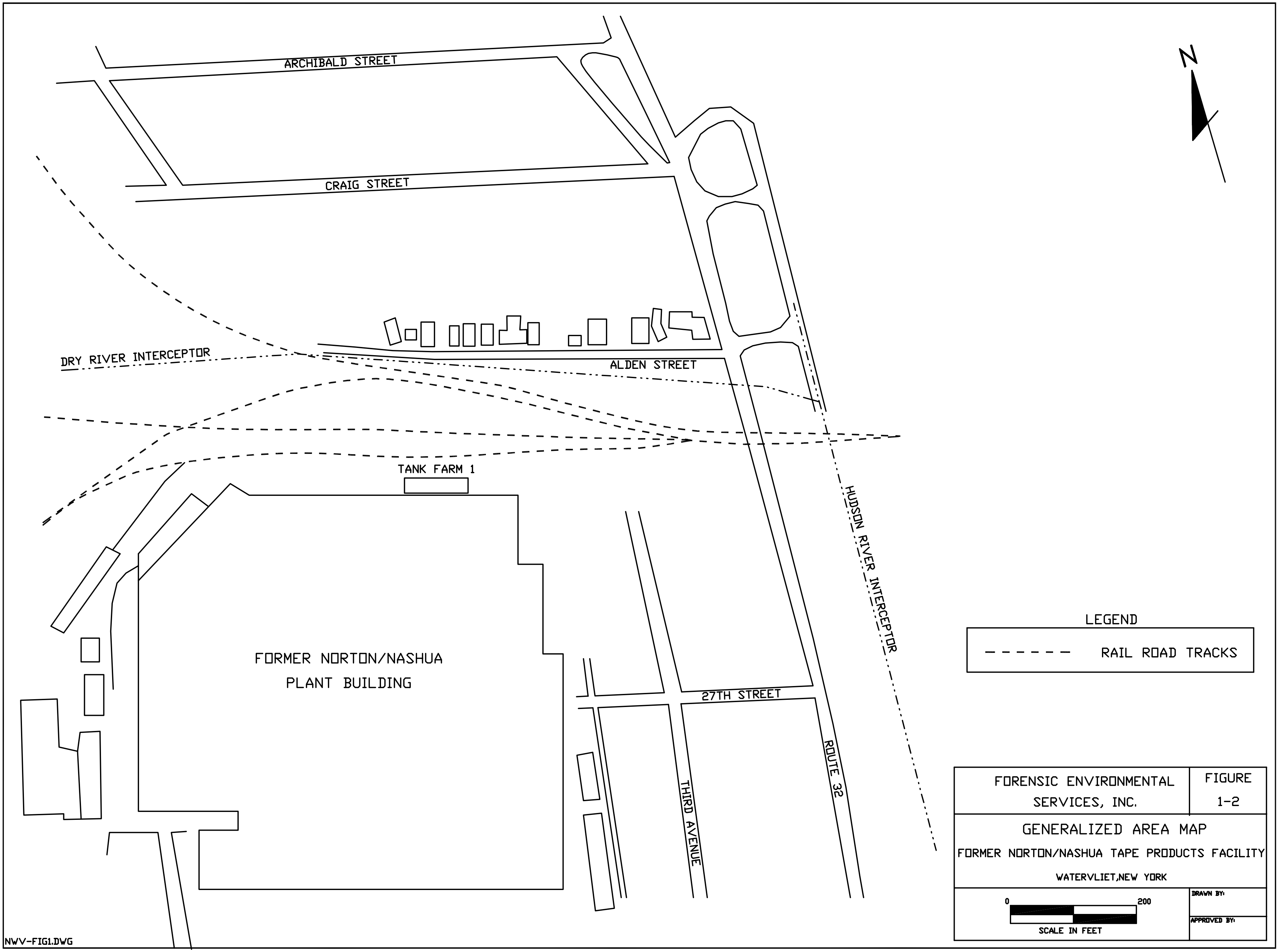
FIGURES



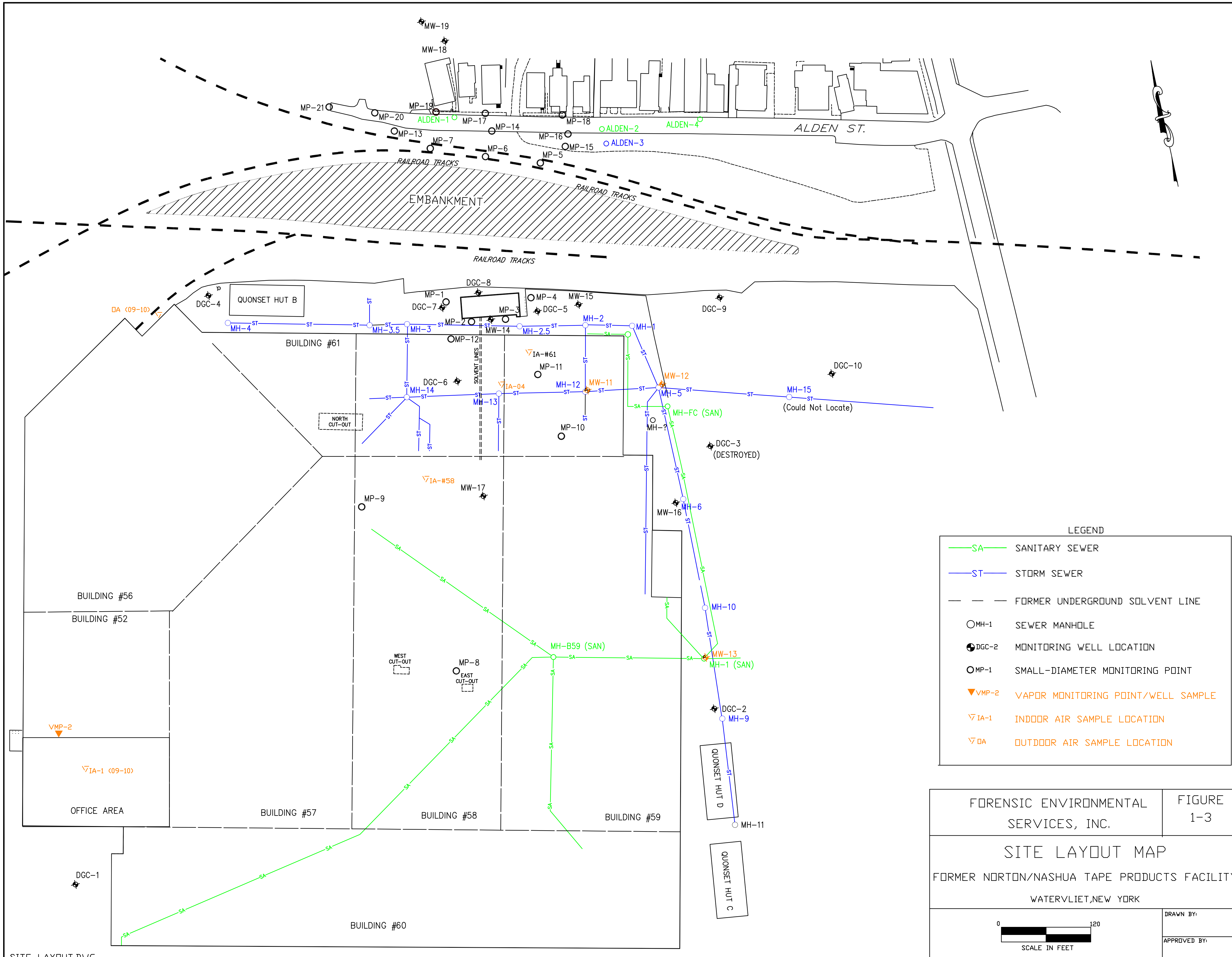
DERIVED FROM THE TROY SOUTH QUADRANGLE
COMPILED BY THE U.S. GEOLOGICAL SURVEY.

FORENSIC ENVIRONMENTAL SERVICES, INC.	FIGURE 1-1
SITE LOCATION MAP FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY WATERVLIET, NEW YORK	
0 — 1540 SCALE IN FEET	DRAWN BY: APPROVED BY:

WV-TOPO.DWG



N
ARCHIBALD STREET
CRAIG STREET
DRY RIVER INTERCEPTOR
ALDEN STREET
TANK FARM 1
HUDSON RIVER INTERCEPTOR
FORMER NORTON/NASHUA PLANT BUILDING
27TH STREET
THIRD AVENUE
ROUTE 32
LEGEND
RAIL ROAD TRACKS
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 1-2
GENERALIZED AREA MAP
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
200
SCALE IN FEET
DRAWN BY:
APPROVED BY:
NWV-FIG1.DWG



FORENSIC ENVIRONMENTAL SERVICES, INC.

FIGURE 1-3

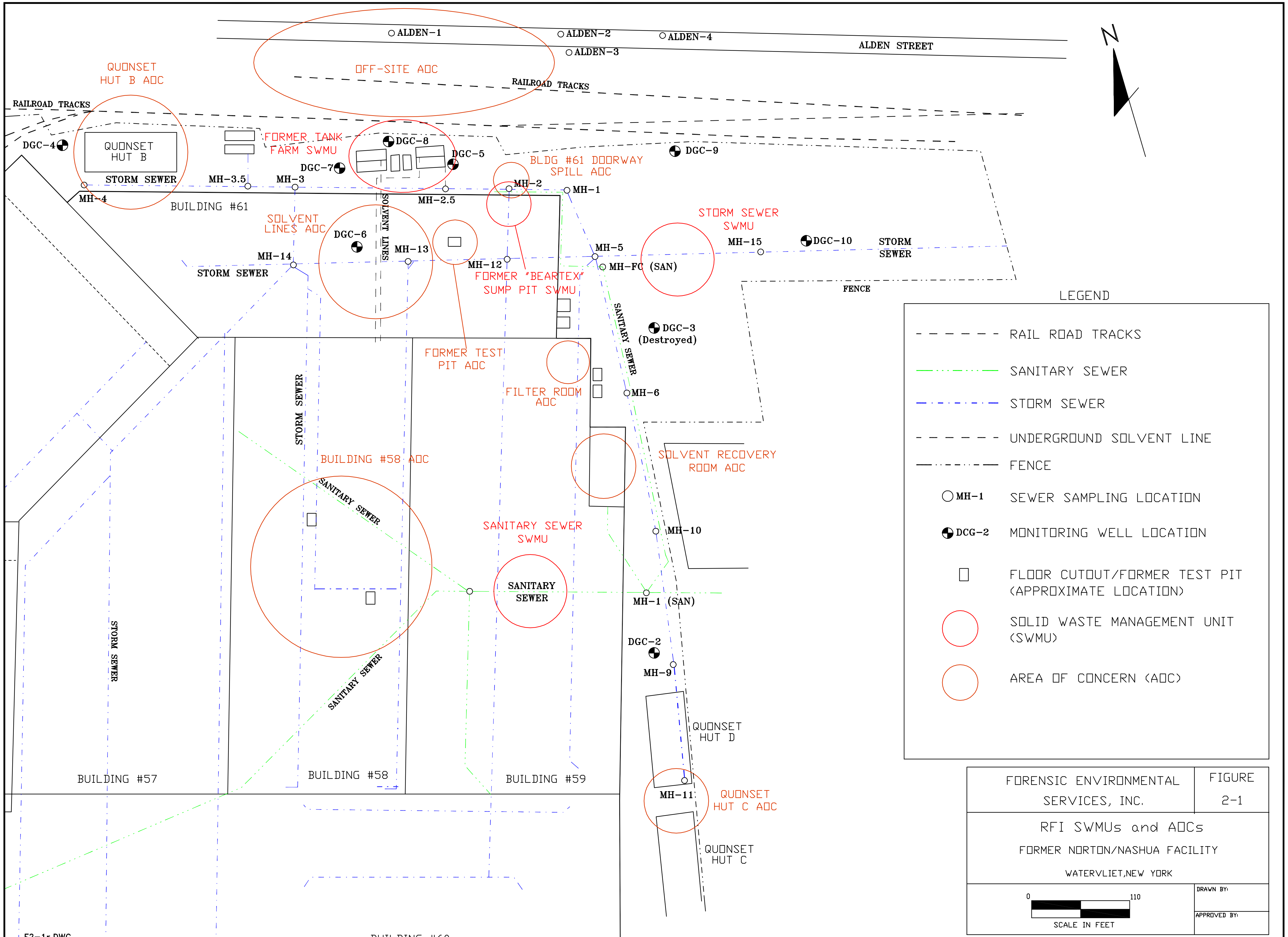
SITE LAYOUT MAP

FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY

WATERVLIET,NEW YORK

DRAWN BY:

APPROVED BY:



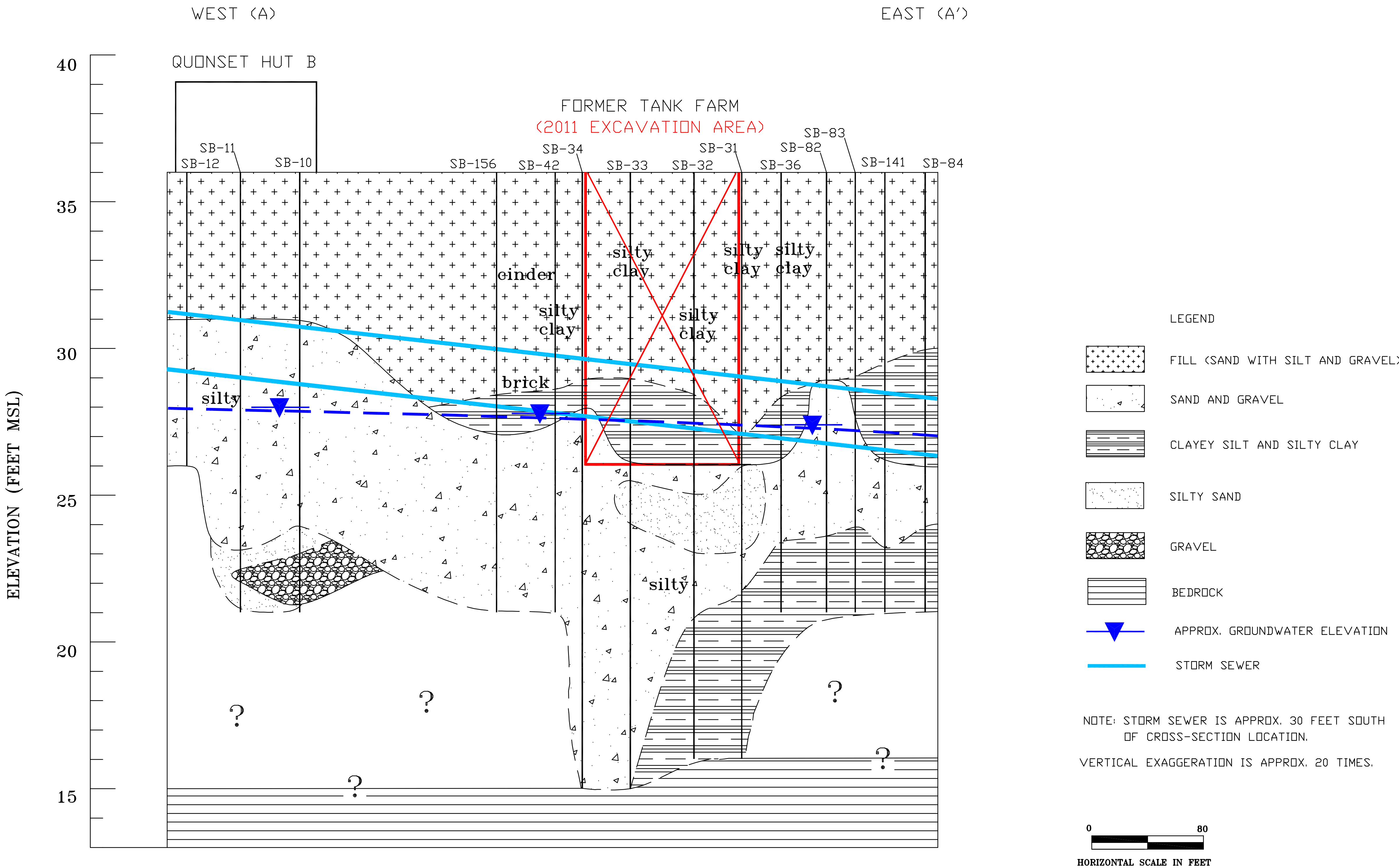
ALDEN STREET
ALDEN-1
ALDEN-2
ALDEN-3
ALDEN-4
OFF-SITE AOC
RAILROAD TRACKS
QUONSET HUT B AOC
QUONSET HUT B
DGC-4
STORM SEWER
MH-4
MH-3.5
MH-3
FORMER TANK FARM SWMU
DGC-8
DGC-5
DGC-7
MH-2.5
BLDG #61 DOORWAY SPILL AOC
DGC-9
MH-2
MH-1
BUILDING #61
SOLVENT LINES AOC
SOLVENT LINES
DGC-6
MH-13
MH-14
STORM SEWER
MH-12
FORMER "BEARTEX" SUMP PIT SWMU
MH-5
MH-FC (SAN)
STORM SEWER SWMU
MH-15
DGC-10
STORM SEWER
FENCE
SANITARY SEWER
DGC-3 (Destroyed)
FORMER TEST PIT AOC
FILTER ROOM AOC
MH-6
STORM SEWER
BUILDING #58 AOC
SOLVENT RECOVERY ROOM AOC
SANITARY SEWER
SANITARY SEWER SWMU
SANITARY SEWER
MH-10
MH-1 (SAN)
STORM SEWER
DGC-2
MH-9
SANITARY SEWER
QUONSET HUT D
BUILDING #57
BUILDING #58
BUILDING #59
MH-11
QUONSET HUT C AOC
QUONSET HUT C
BUILDING #60
F2-1r.DWG
N
LEGEND
RAIL ROAD TRACKS
SANITARY SEWER
STORM SEWER
UNDERGROUND SOLVENT LINE
FENCE
MH-1 SEWER SAMPLING LOCATION
DCG-2 MONITORING WELL LOCATION
FLOOR CUTOUT/FORMER TEST PIT (APPROXIMATE LOCATION)
SOLID WASTE MANAGEMENT UNIT (SWMU)
AREA OF CONCERN (AOC)
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 2-1
RFI SWMUs and AOCs
FORMER NORTON/NASHUA FACILITY
WATERVLIET,NEW YORK
0
110
SCALE IN FEET
DRAWN BY:
APPROVED BY:

FIGURE 2-2

IDEALIZED GEOLOGIC CROSS-SECTION (A – A')

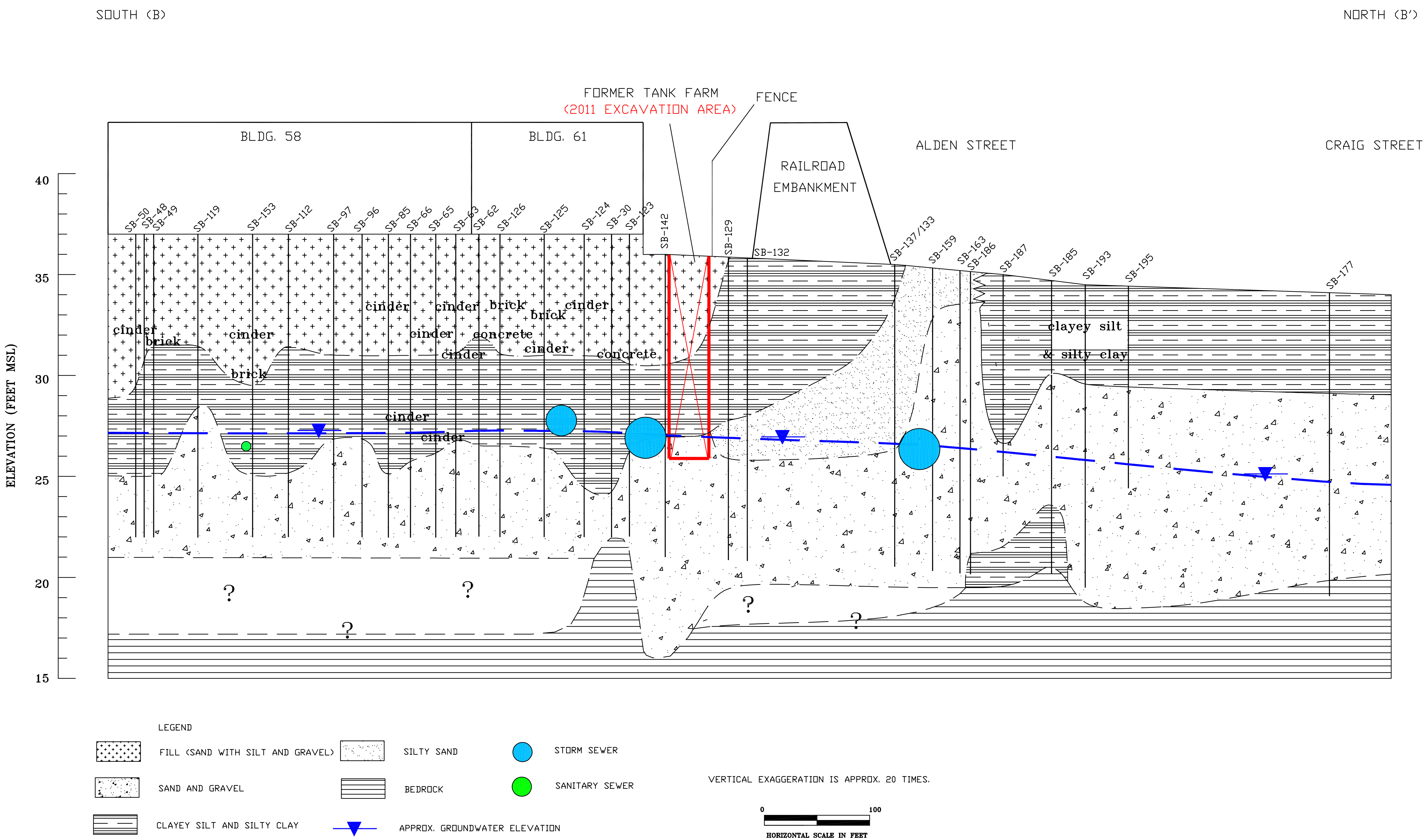
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY

WATERVLIET, NEW YORK

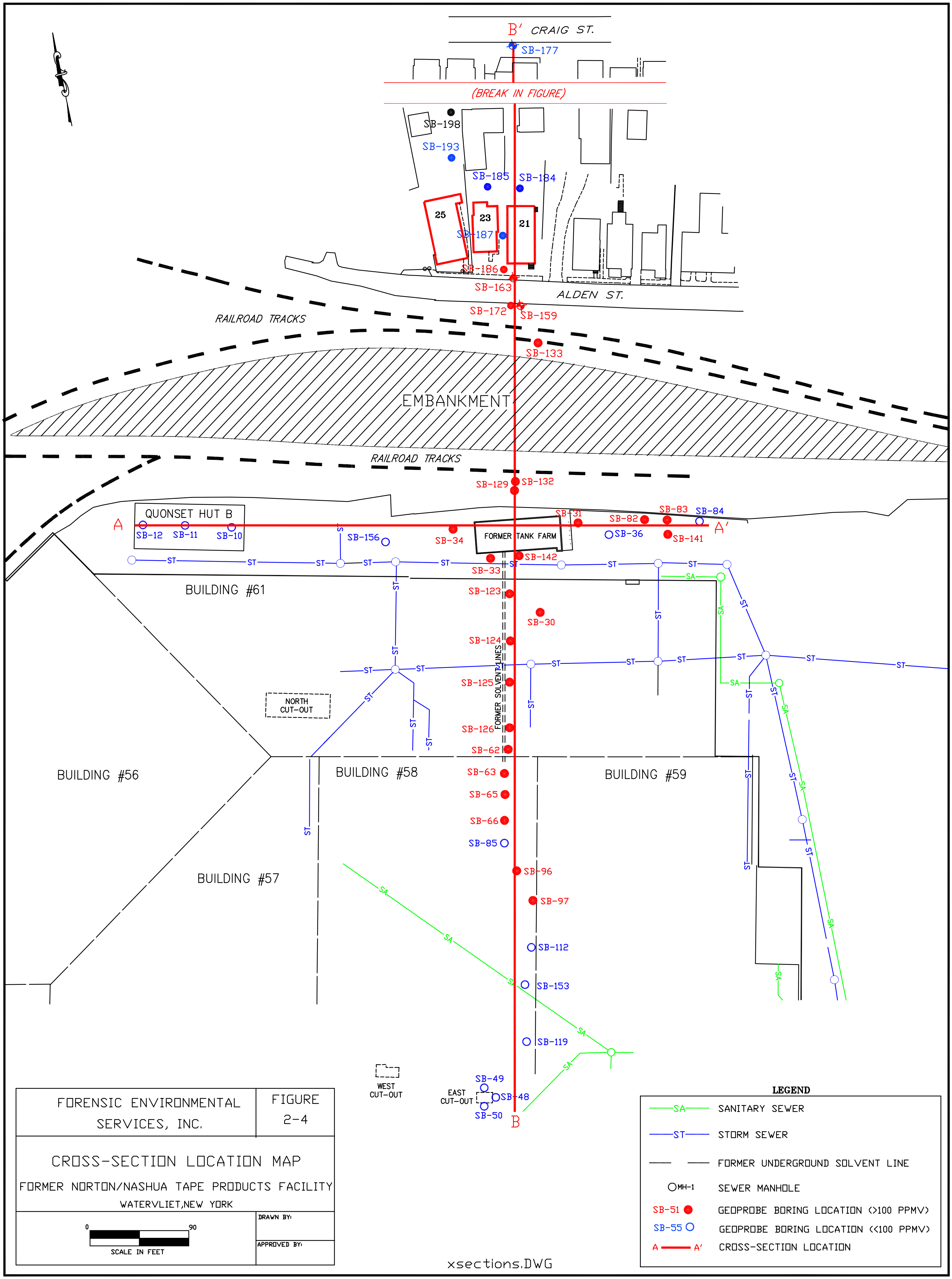


WV_A-A.DWG

FIGURE 2-3
IDEALIZED GEOLOGIC CROSS-SECTION (B - B')
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK



WV_B-B.DWG



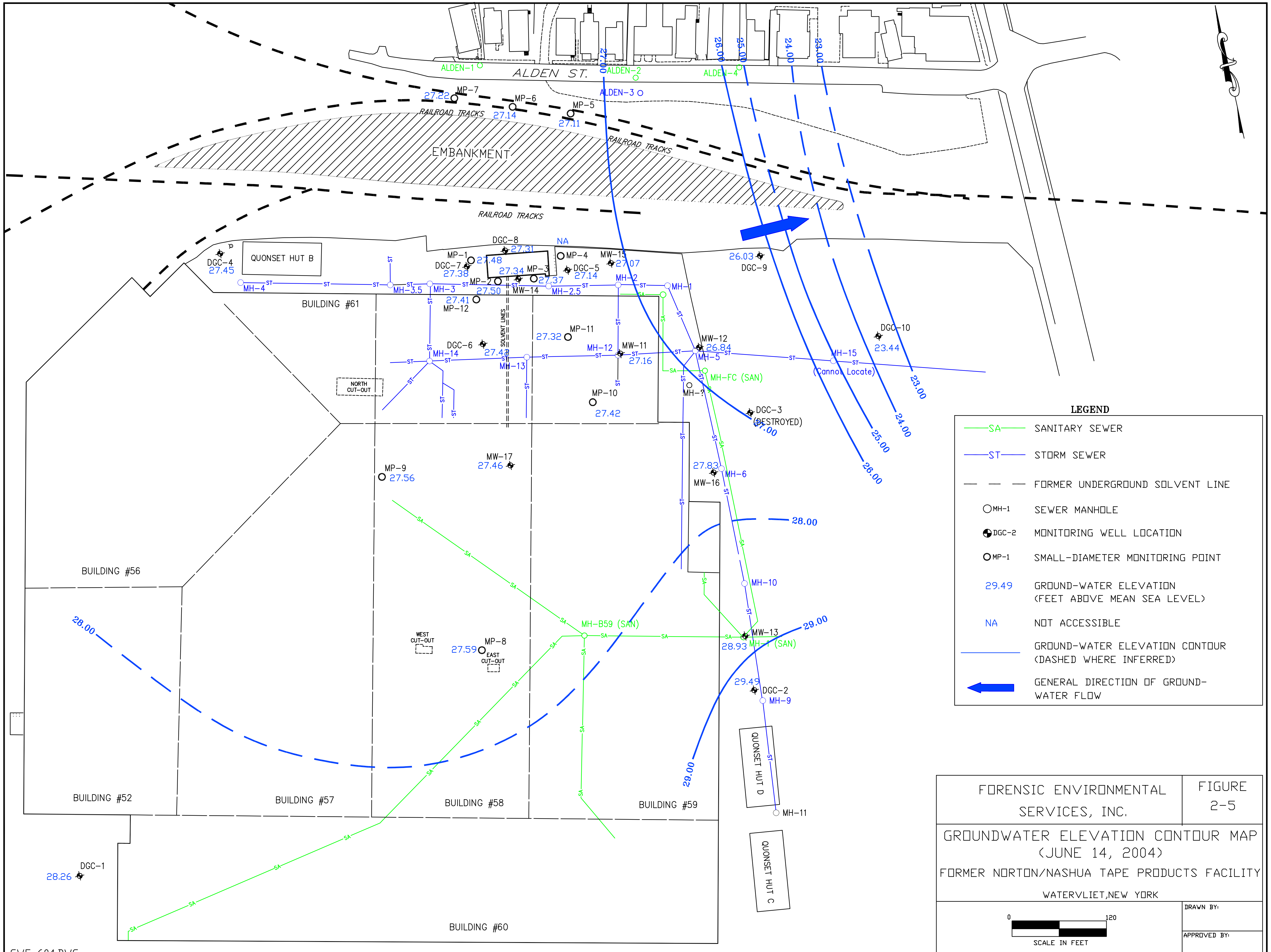
FORENSIC ENVIRONMENTAL SERVICES, INC.

FIGURE 2-4

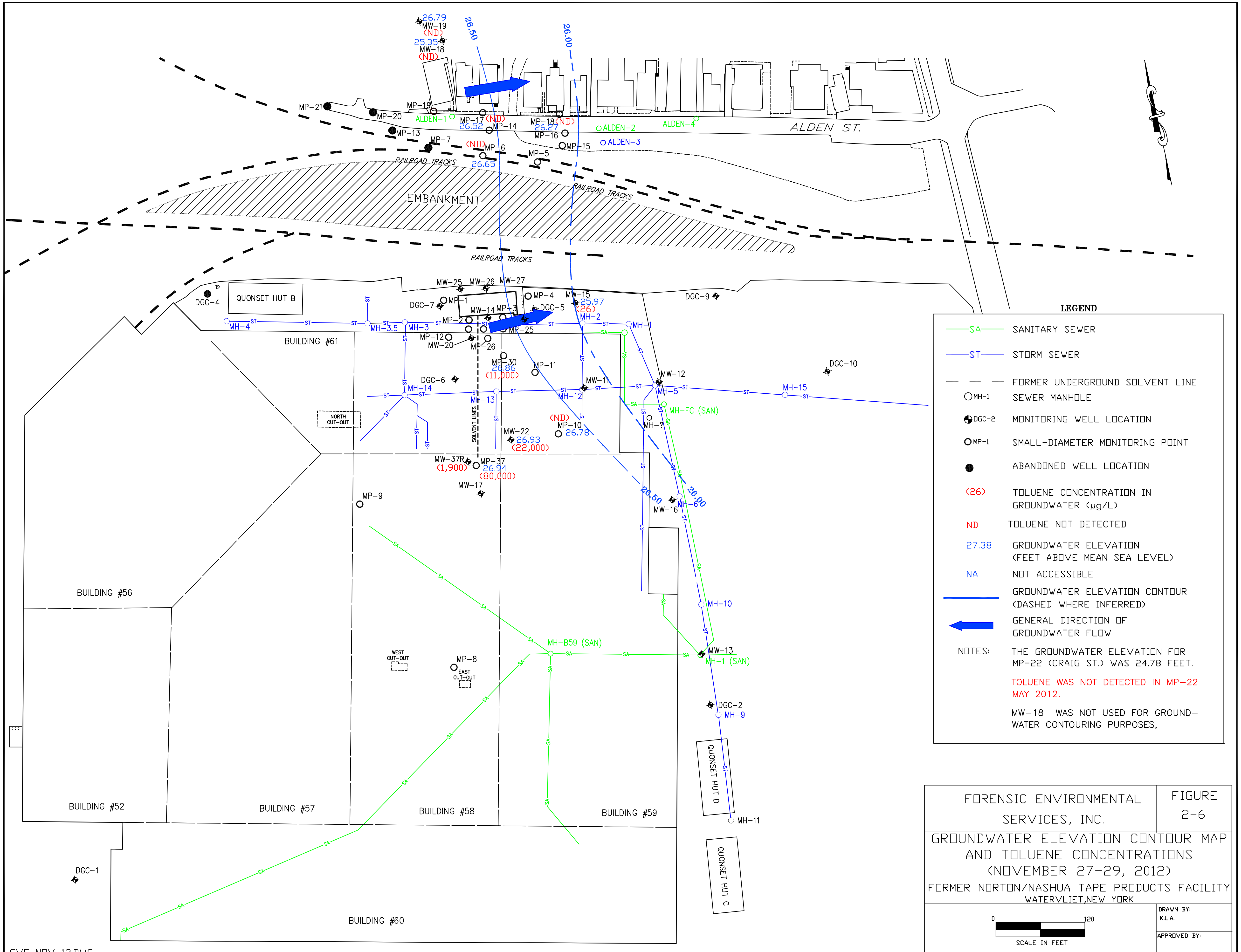
CROSS-SECTION LOCATION MAP

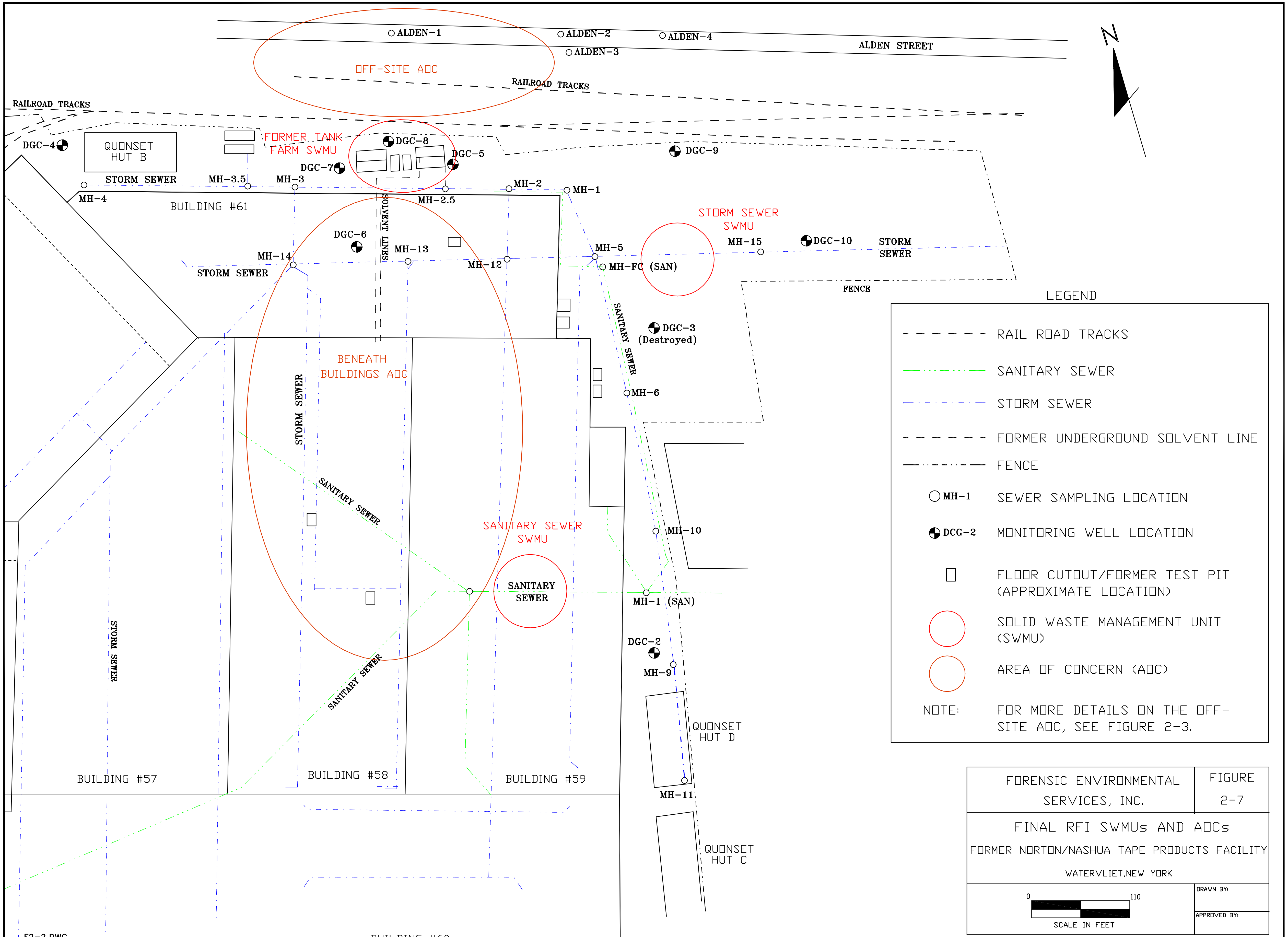
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY

WATERVLIET, NEW YORK

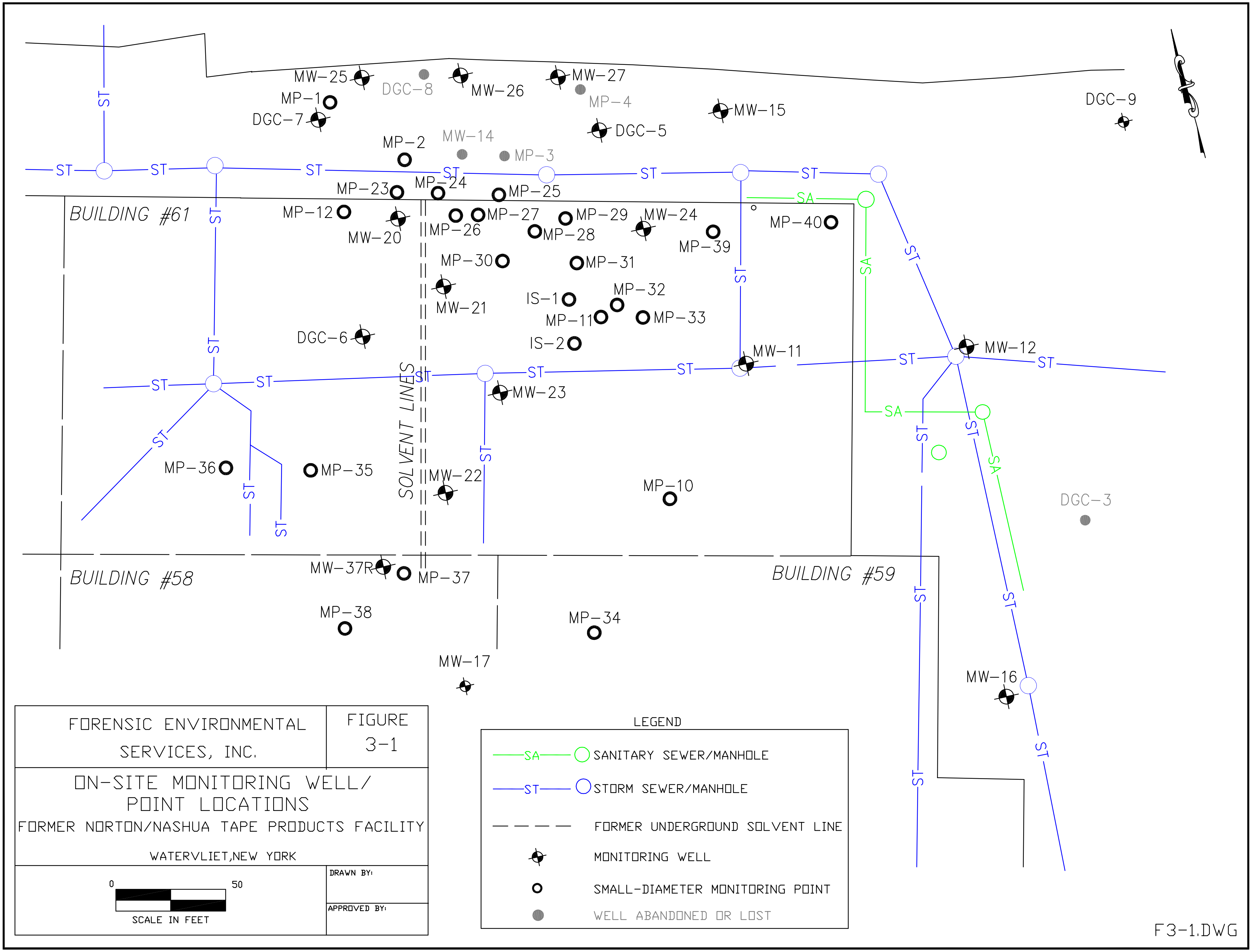


ALDEN ST.
ALDEN-1
ALDEN-2
ALDEN-3
ALDEN-4
RAILROAD TRACKS
RAILROAD TRACKS
RAILROAD TRACKS
EMBANKMENT
MP-7 27.22
MP-6 27.14
MP-5 27.11
27.00
26.00
25.00
24.00
23.00
QUONSET HUT B
DGC-4 27.45
DGC-8 27.31
NA
MP-1 27.48
DGC-7 27.38
27.34 MP-3
MP-2 27.50
27.37
MP-4
MW-15 27.07
DGC-5 27.14
MW-14
MH-4
MH-3.5
MH-3
MH-2.5
MH-2
MH-1
26.03 DGC-9
BUILDING #61
27.41 MP-12
SOLVENT LINES
27.32 MP-11
DGC-6 27.43
MH-14
MH-13
MH-12
MW-11 27.16
MW-12 26.84
MH-5
MH-15 (Cannot Locate)
DGC-10 23.44
MH-FC (SAN)
MH-?
DGC-3 (DESTROYED)
NORTH CUT-OUT
MP-10 27.42
MP-9 27.56
MW-17 27.46
27.83 MW-16
MH-6
28.00
MH-10
BUILDING #56
28.00
MH-B59 (SAN)
WEST CUT-OUT
27.59 MP-8
EAST CUT-OUT
MW-13 28.93
MH-1 (SAN)
29.00
29.49 DGC-2
MH-9
29.00
QUONSET HUT D
MH-11
QUONSET HUT C
BUILDING #52
BUILDING #57
BUILDING #58
BUILDING #59
BUILDING #60
DGC-1 28.26
GWF-604.DWG
LEGEND
SA SANITARY SEWER
ST STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
MH-1 SEWER MANHOLE
DGC-2 MONITORING WELL LOCATION
MP-1 SMALL-DIAMETER MONITORING POINT
29.49 GROUND-WATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)
NA NOT ACCESSIBLE
GROUND-WATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
GENERAL DIRECTION OF GROUND-WATER FLOW
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 2-5
GROUNDWATER ELEVATION CONTOUR MAP (JUNE 14, 2004)
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK
0
120
SCALE IN FEET
DRAWN BY:
APPROVED BY:

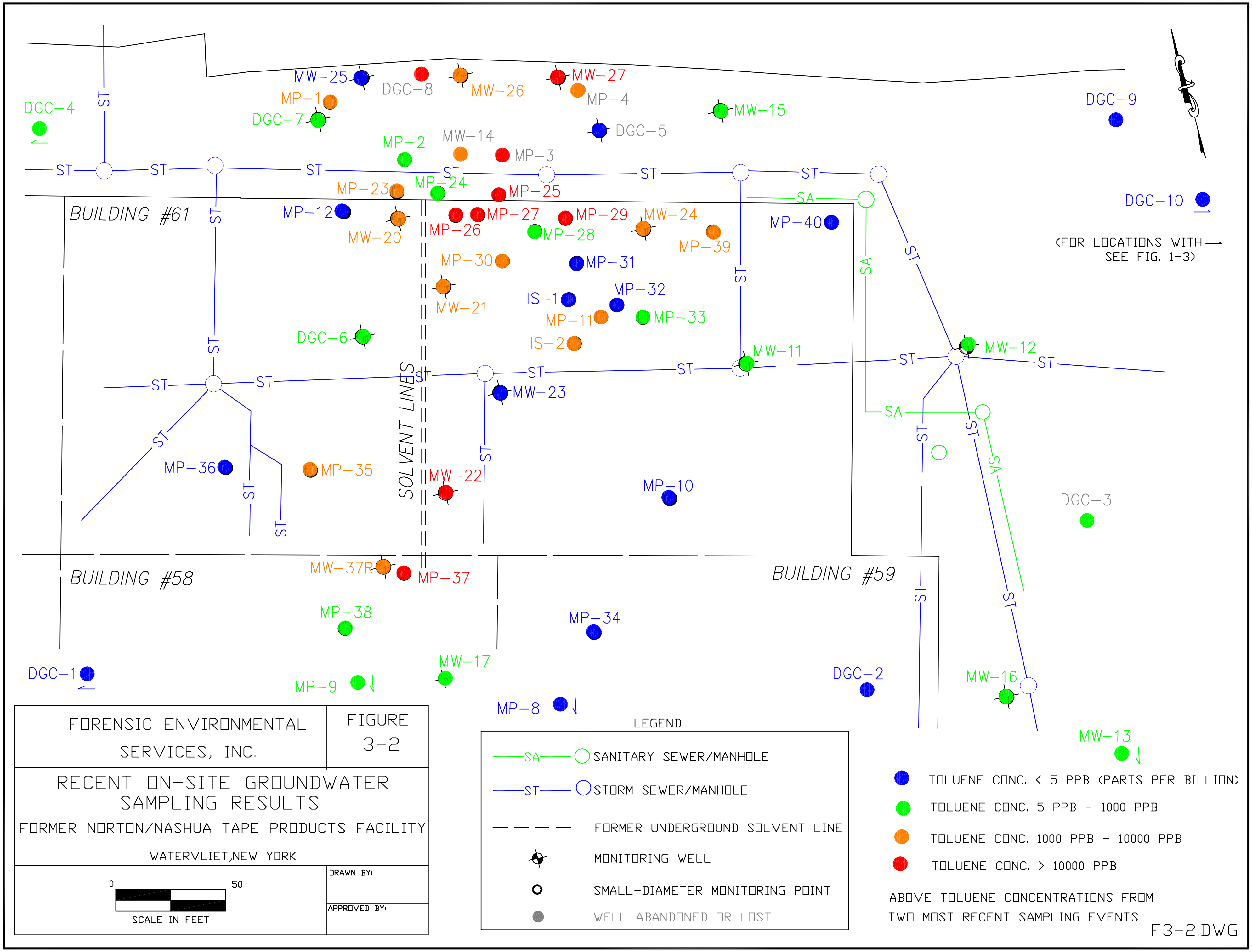

ALDEN ST.
RAILROAD TRACKS
EMBANKMENT
QUONSET HUT B
BUILDING #61
BUILDING #56
BUILDING #52
BUILDING #57
BUILDING #58
BUILDING #59
BUILDING #60
QUONSET HUT D
QUONSET HUT C
NORTH CUT-OUT
WEST CUT-OUT
EAST CUT-OUT
SOLVENT LINES
26.50
26.00
MW-19 26.79 (ND)
MW-18 25.35 (ND)
MP-17 26.52 (ND)
MP-18 26.27 (ND)
MP-6 26.65 (ND)
MW-15 25.97 (26)
MP-30 26.86 (11,000)
MW-22 26.93 (22,000)
MP-10 26.78 (ND)
MW-37R (1,900)
MP-37 26.94 (80,000)
MH-B59 (SAN)
MH-FC (SAN)
MH-1 (SAN)
LEGEND
SA SANITARY SEWER
ST STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
MH-1 SEWER MANHOLE
DGC-2 MONITORING WELL LOCATION
MP-1 SMALL-DIAMETER MONITORING POINT
ABANDONED WELL LOCATION
(26) TOLUENE CONCENTRATION IN GROUNDWATER (µg/L)
ND TOLUENE NOT DETECTED
27.38 GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)
NA NOT ACCESSIBLE
GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
GENERAL DIRECTION OF GROUNDWATER FLOW
NOTES: THE GROUNDWATER ELEVATION FOR MP-22 (CRAIG ST.) WAS 24.78 FEET.
TOLUENE WAS NOT DETECTED IN MP-22 MAY 2012.
MW-18 WAS NOT USED FOR GROUND-WATER CONTOURING PURPOSES,
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 2-6
GROUNDWATER ELEVATION CONTOUR MAP AND TOLUENE CONCENTRATIONS (NOVEMBER 27-29, 2012)
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0 120
SCALE IN FEET
DRAWN BY: K.L.A.
APPROVED BY:
GWF-NOV_12.DWG

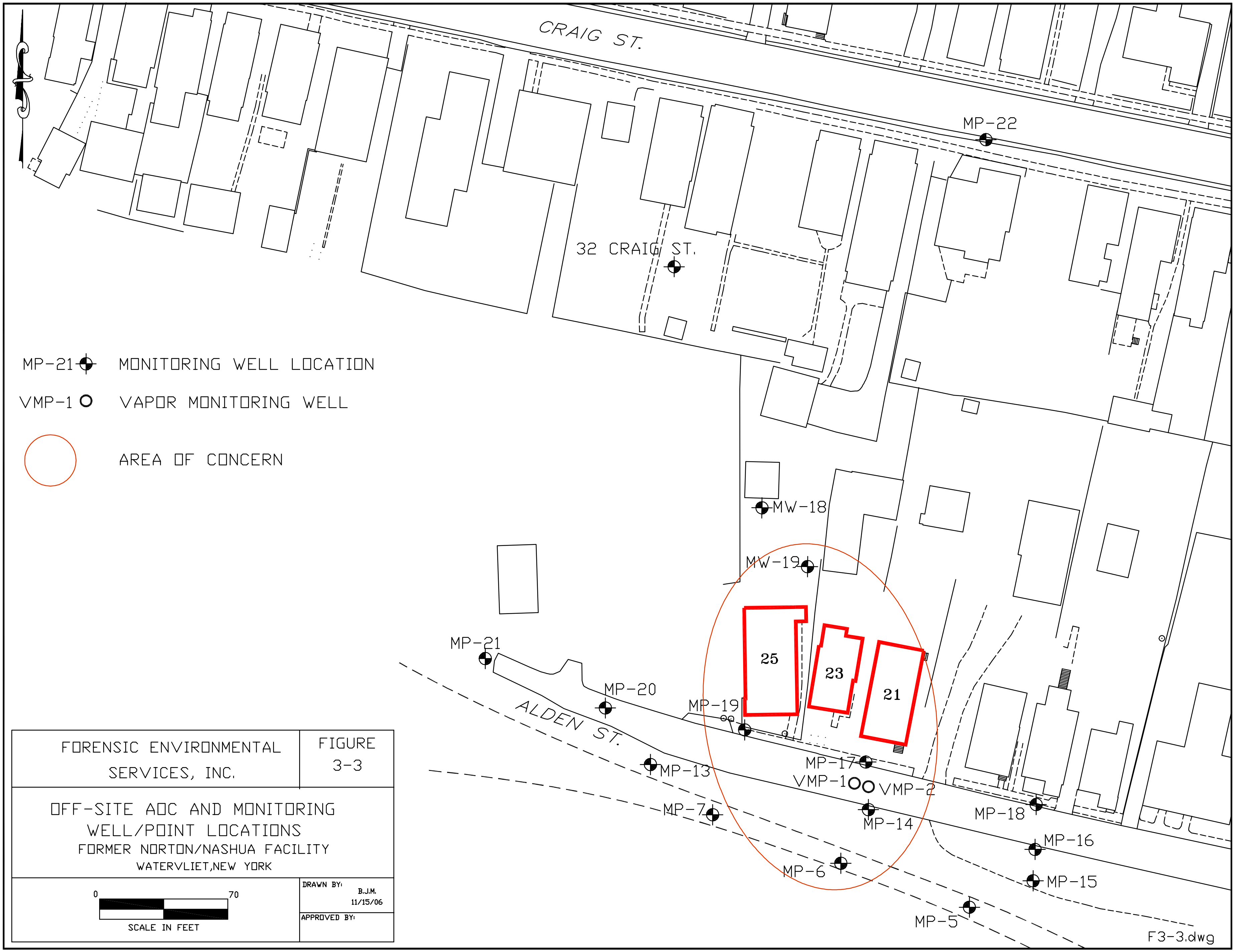


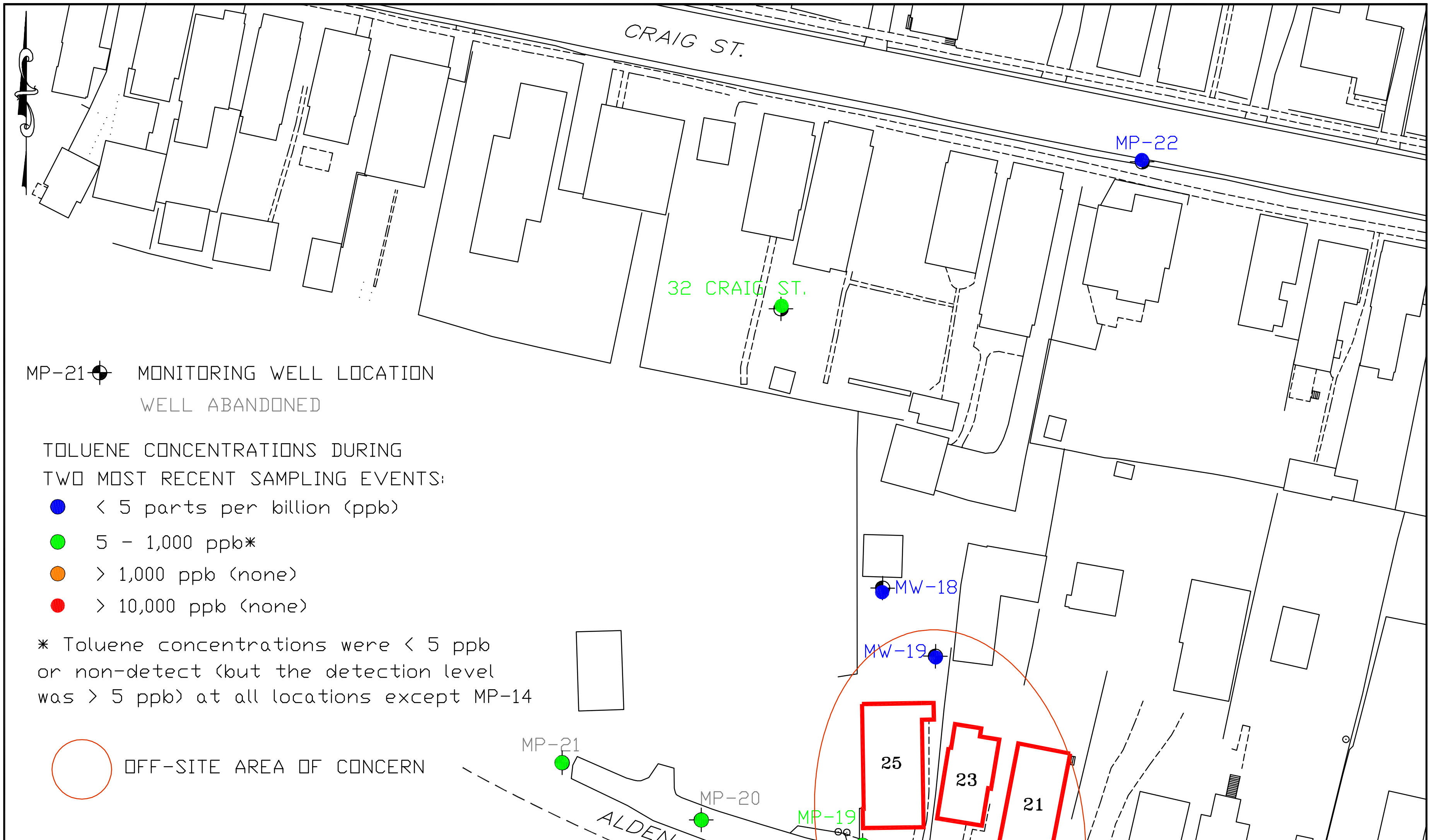
ALDEN-1
ALDEN-2
ALDEN-3
ALDEN-4
ALDEN STREET
OFF-SITE AOC
RAILROAD TRACKS
RAILROAD TRACKS
QUONSET HUT B
DGC-4
FORMER TANK FARM SWMU
DGC-8
DGC-5
DGC-7
DGC-9
STORM SEWER
MH-3.5
MH-3
MH-2
MH-1
MH-4
MH-2.5
BUILDING #61
SOLVENT LINES
STORM SEWER SWMU
DGC-6
MH-13
MH-12
MH-14
MH-5
MH-FC (SAN)
MH-15
DGC-10
STORM SEWER
STORM SEWER
FENCE
SANITARY SEWER
DGC-3 (Destroyed)
BENEATH BUILDINGS AOC
STORM SEWER
MH-6
SANITARY SEWER
SANITARY SEWER SWMU
SANITARY SEWER
MH-10
MH-1 (SAN)
DGC-2
MH-9
SANITARY SEWER
STORM SEWER
QUONSET HUT D
BUILDING #57
BUILDING #58
BUILDING #59
MH-11
QUONSET HUT C
BUILDING #60
F2-2.DWG
N
LEGEND
RAIL ROAD TRACKS
SANITARY SEWER
STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
FENCE
MH-1 SEWER SAMPLING LOCATION
DCG-2 MONITORING WELL LOCATION
FLOOR CUTOUT/FORMER TEST PIT (APPROXIMATE LOCATION)
SOLID WASTE MANAGEMENT UNIT (SWMU)
AREA OF CONCERN (AOC)
NOTE: FOR MORE DETAILS ON THE OFF-SITE AOC, SEE FIGURE 2-3.
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 2-7
FINAL RFI SWMUs AND AOCs
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
110
SCALE IN FEET
DRAWN BY:
APPROVED BY:



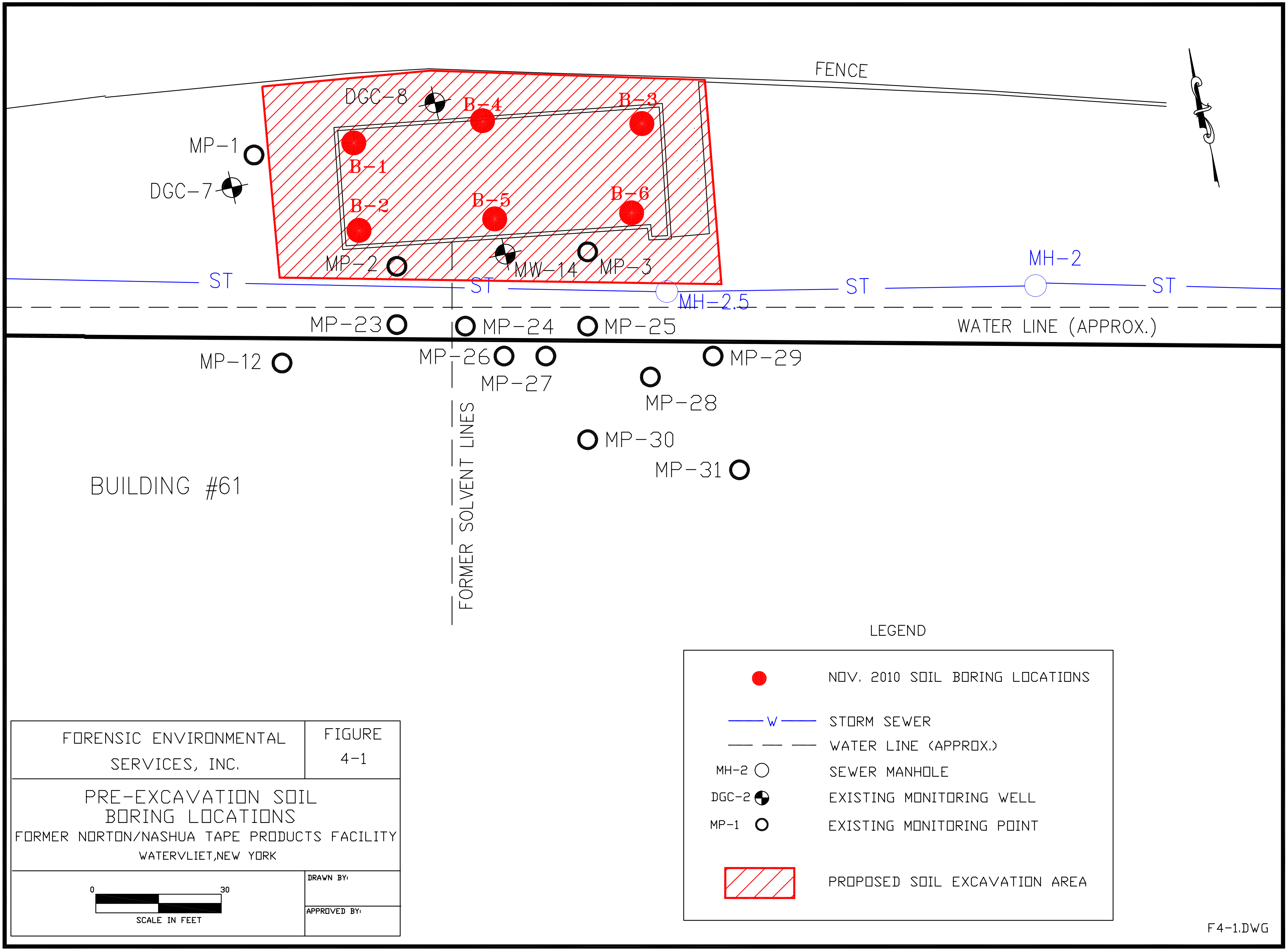
MW-25
MP-1
DGC-7
DGC-8
MW-26
MW-27
MP-4
MW-15
DGC-5
DGC-9
MP-2
MW-14
MP-3
MP-23
MP-24
MP-25
BUILDING #61
MP-12
MW-20
MP-26
MP-27
MP-28
MP-29
MW-24
MP-39
MP-40
MP-30
MP-31
MW-21
IS-1
MP-32
MP-11
MP-33
IS-2
DGC-6
MW-11
MW-12
MW-23
SOLVENT LINES
MP-36
MP-35
MW-22
MP-10
DGC-3
BUILDING #58
MW-37R
MP-37
BUILDING #59
MP-38
MP-34
MW-17
MW-16
ST
SA
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 3-1
ON-SITE MONITORING WELL/ POINT LOCATIONS
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
50
SCALE IN FEET
DRAWN BY:
APPROVED BY:
LEGEND
SA SANITARY SEWER/MANHOLE
ST STORM SEWER/MANHOLE
FORMER UNDERGROUND SOLVENT LINE
MONITORING WELL
SMALL-DIAMETER MONITORING POINT
WELL ABANDONED OR LOST
F3-1.DWG

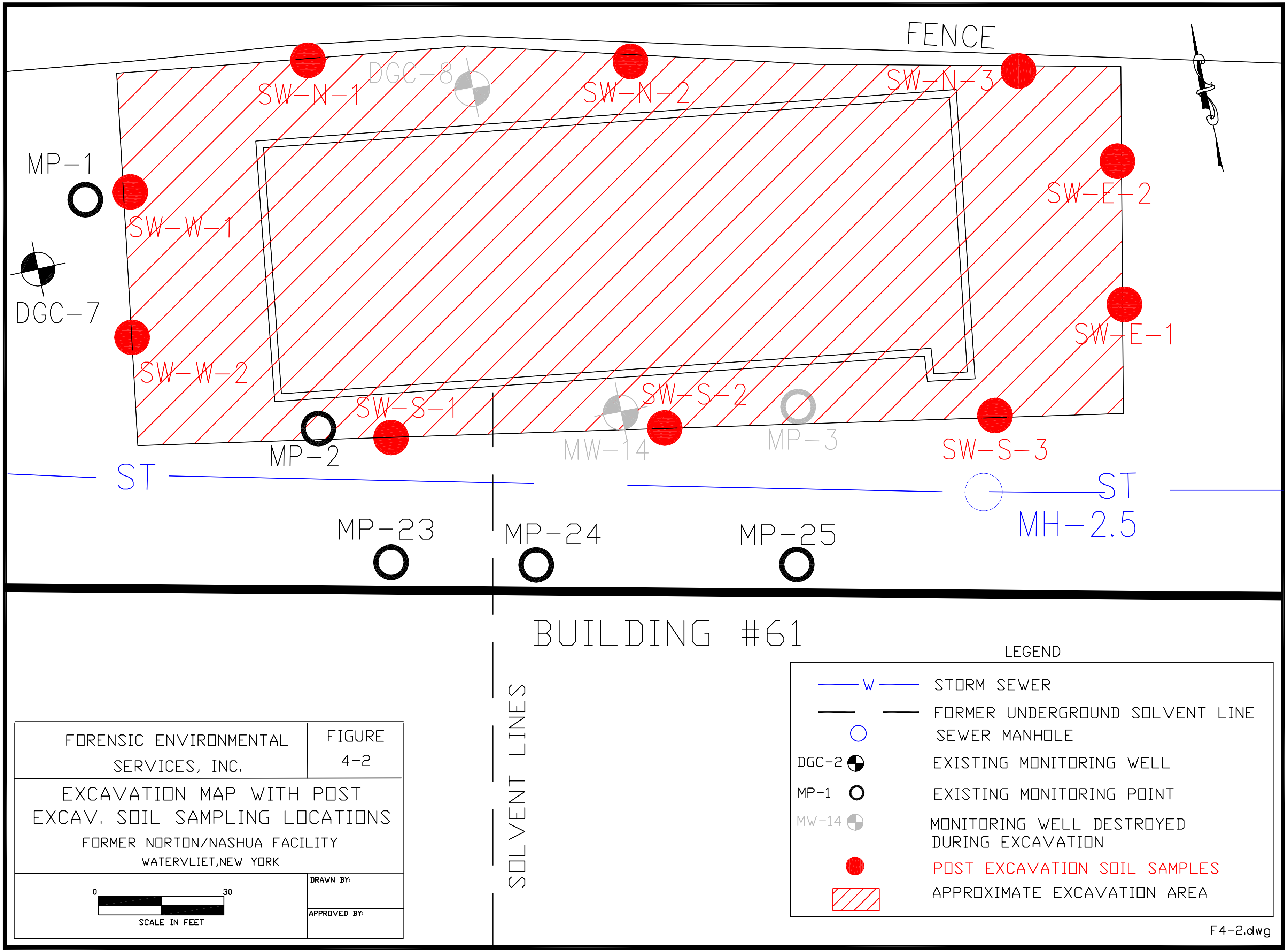

MW-25
DGC-8
MW-26
MW-27
MP-4
MP-1
DGC-4
DGC-7
MW-15
DGC-9
DGC-5
MP-2
MW-14
MP-3
ST
SA
MP-23
MP-24
MP-25
DGC-10
BUILDING #61
MP-12
MP-27
MP-29
MW-24
MP-40
MW-20
MP-26
MP-28
MP-39
(FOR LOCATIONS WITH ⟶
SEE FIG. 1-3)
MP-30
MP-31
MW-21
IS-1
MP-32
MP-11
MP-33
IS-2
DGC-6
MW-11
MW-12
SOLVENT LINES
MW-23
MP-36
MP-35
MW-22
MP-10
DGC-3
MW-37R
MP-37
BUILDING #58
BUILDING #59
MP-38
MP-34
DGC-1
MP-9
MW-17
DGC-2
MW-16
MP-8
MW-13
FORENSIC ENVIRONMENTAL
SERVICES, INC.
FIGURE
3-2
RECENT ON-SITE GROUNDWATER
SAMPLING RESULTS
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
50
SCALE IN FEET
DRAWN BY:
APPROVED BY:
LEGEND
SANITARY SEWER/MANHOLE
STORM SEWER/MANHOLE
FORMER UNDERGROUND SOLVENT LINE
MONITORING WELL
SMALL-DIAMETER MONITORING POINT
WELL ABANDONED OR LOST
TOLUENE CONC. < 5 PPB (PARTS PER BILLION)
TOLUENE CONC. 5 PPB - 1000 PPB
TOLUENE CONC. 1000 PPB - 10000 PPB
TOLUENE CONC. > 10000 PPB
ABOVE TOLUENE CONCENTRATIONS FROM
TWO MOST RECENT SAMPLING EVENTS
F3-2.DWG

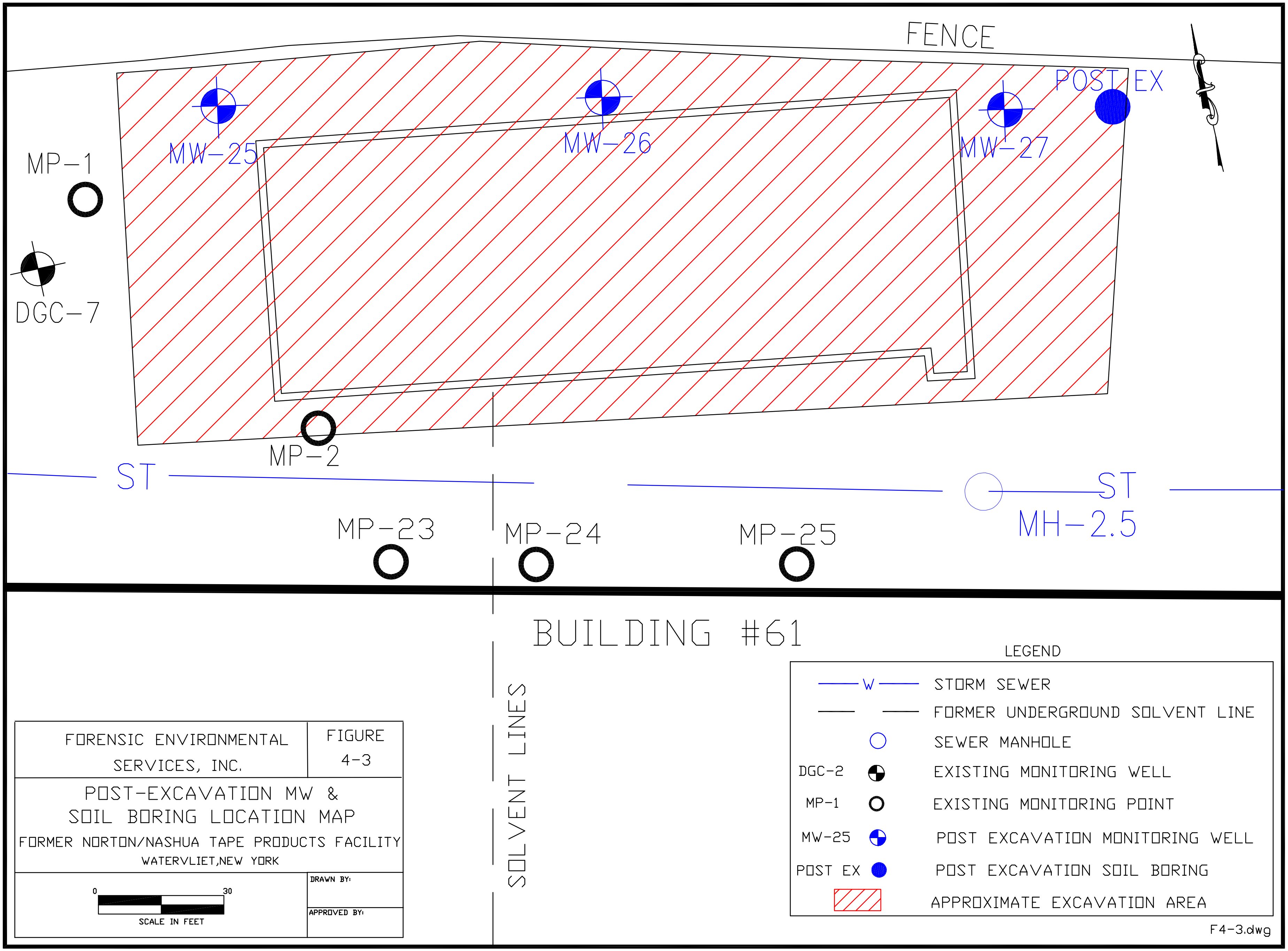

CRAIG ST.
MP-22
32 CRAIG ST.
MP-21 MONITORING WELL LOCATION
VMP-1 VAPOR MONITORING WELL
AREA OF CONCERN
MW-18
MW-19
25
23
21
MP-21
MP-20
MP-19
ALDEN ST.
MP-17
VMP-1
VMP-2
MP-13
MP-7
MP-14
MP-18
MP-16
MP-6
MP-15
MP-5
F3-3.dwg
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 3-3
OFF-SITE AOC AND MONITORING WELL/POINT LOCATIONS
FORMER NORTON/NASHUA FACILITY
WATERVLIET,NEW YORK
0
70
SCALE IN FEET
DRAWN BY:
B.J.M.
11/15/06
APPROVED BY:

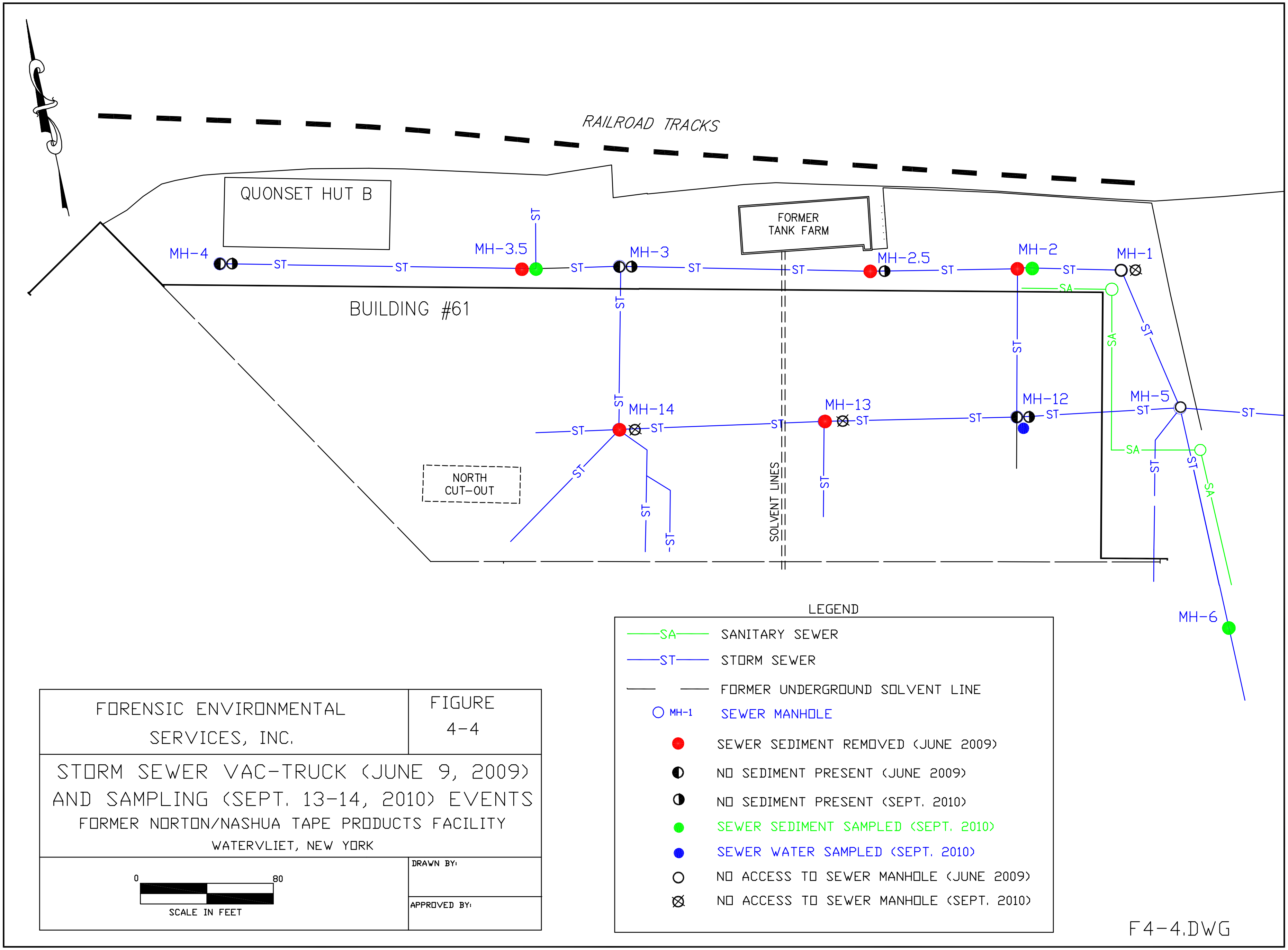


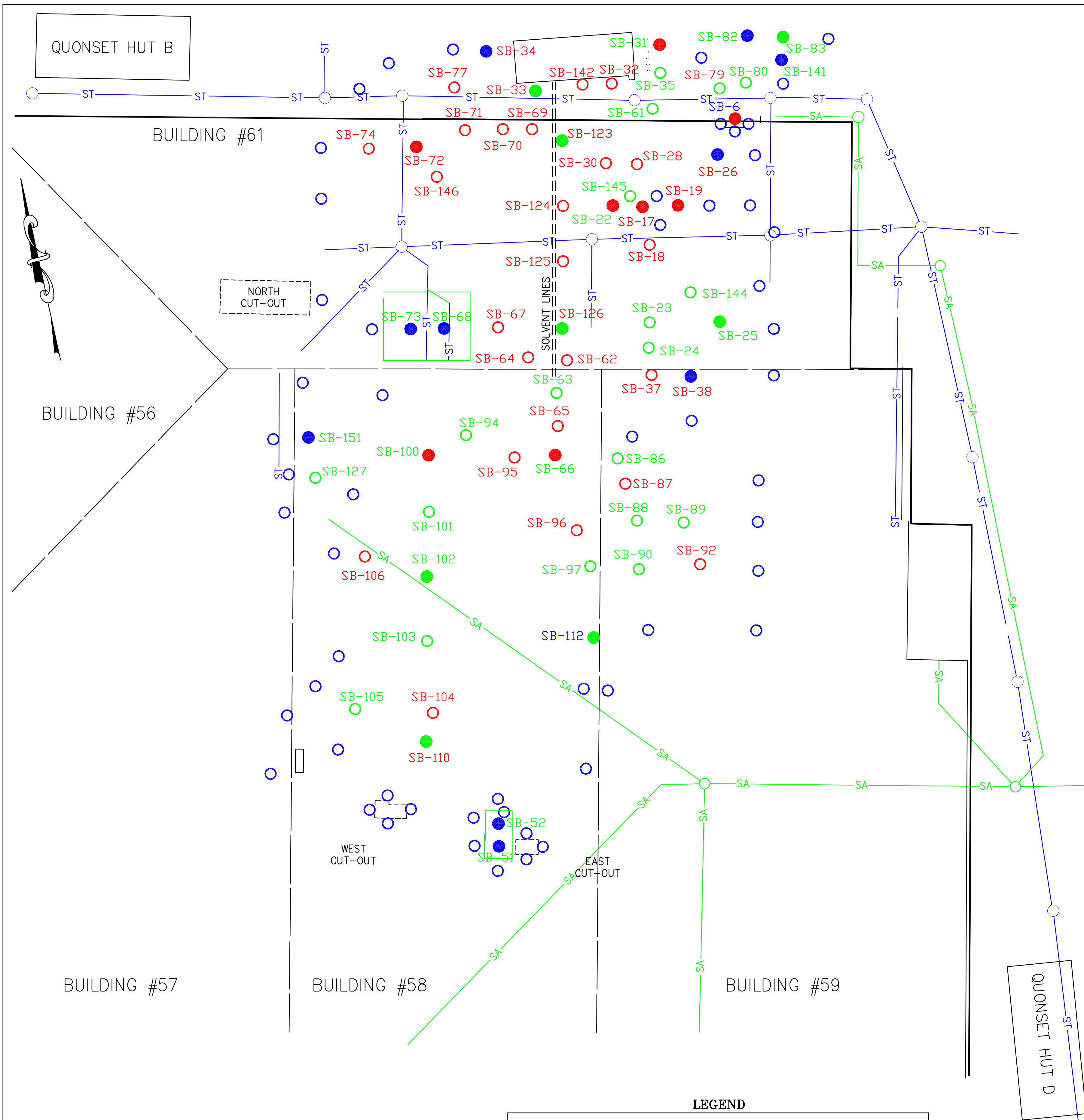
FORENSIC ENVIRONMENTAL SERVICES, INC.	FIGURE 3-4
RECENT OFF-SITE AOC GROUNDWATER SAMPLING RESULTS FORMER NORTON/NASHUA FACILITY WATERVLIET,NEW YORK	
0 70 SCALE IN FEET	DRAWN BY: APPROVED BY:


FENCE
DGC-8
B-4
B-3
MP-1
B-1
DGC-7
B-2
B-5
B-6
MP-2
MW-14
MP-3
ST
ST
ST
MH-2
ST
MH-2.5
MP-23
MP-24
MP-25
WATER LINE (APPROX.)
MP-12
MP-26
MP-29
MP-27
MP-28
MP-30
MP-31
FORMER SOLVENT LINES
BUILDING #61
LEGEND
NOV. 2010 SOIL BORING LOCATIONS
W
STORM SEWER
WATER LINE (APPROX.)
MH-2
SEWER MANHOLE
DGC-2
EXISTING MONITORING WELL
MP-1
EXISTING MONITORING POINT
PROPOSED SOIL EXCAVATION AREA
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 4-1
PRE-EXCAVATION SOIL BORING LOCATIONS
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
30
SCALE IN FEET
DRAWN BY:
APPROVED BY:
F4-1.DWG


FENCE
SW-N-1
DGC-8
SW-N-2
SW-N-3
MP-1
SW-W-1
DGC-7
SW-W-2
SW-E-2
SW-E-1
SW-S-1
SW-S-2
MP-2
MW-14
MP-3
SW-S-3
ST
ST
MH-2.5
MP-23
MP-24
MP-25
BUILDING #61
SOLVENT LINES
LEGEND
W STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
SEWER MANHOLE
DGC-2 EXISTING MONITORING WELL
MP-1 EXISTING MONITORING POINT
MW-14 MONITORING WELL DESTROYED DURING EXCAVATION
POST EXCAVATION SOIL SAMPLES
APPROXIMATE EXCAVATION AREA
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 4-2
EXCAVATION MAP WITH POST EXCAV. SOIL SAMPLING LOCATIONS
FORMER NORTON/NASHUA FACILITY
WATERVLIET,NEW YORK
0
30
SCALE IN FEET
DRAWN BY:
APPROVED BY:
F4-2.dwg


FENCE
POST EX
MW-25
MW-26
MW-27
MP-1
DGC-7
MP-2
ST
ST
MH-2.5
MP-23
MP-24
MP-25
BUILDING #61
SOLVENT LINES
LEGEND
W STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
SEWER MANHOLE
DGC-2 EXISTING MONITORING WELL
MP-1 EXISTING MONITORING POINT
MW-25 POST EXCAVATION MONITORING WELL
POST EX POST EXCAVATION SOIL BORING
APPROXIMATE EXCAVATION AREA
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 4-3
POST-EXCAVATION MW & SOIL BORING LOCATION MAP
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
30
SCALE IN FEET
DRAWN BY:
APPROVED BY:
F4-3.dwg


RAILROAD TRACKS
QUONSET HUT B
FORMER TANK FARM
BUILDING #61
NORTH CUT-OUT
SOLVENT LINES
MH-4
MH-3.5
MH-3
MH-2.5
MH-2
MH-1
MH-14
MH-13
MH-12
MH-5
MH-6
ST
SA
LEGEND
SA SANITARY SEWER
ST STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
MH-1 SEWER MANHOLE
SEWER SEDIMENT REMOVED (JUNE 2009)
NO SEDIMENT PRESENT (JUNE 2009)
NO SEDIMENT PRESENT (SEPT. 2010)
SEWER SEDIMENT SAMPLED (SEPT. 2010)
SEWER WATER SAMPLED (SEPT. 2010)
NO ACCESS TO SEWER MANHOLE (JUNE 2009)
NO ACCESS TO SEWER MANHOLE (SEPT. 2010)
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 4-4
STORM SEWER VAC-TRUCK (JUNE 9, 2009) AND SAMPLING (SEPT. 13-14, 2010) EVENTS
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK
0
80
SCALE IN FEET
DRAWN BY:
APPROVED BY:
F4-4.DWG



LEGEND

SA	SANITARY SEWER
ST	STORM SEWER
— —	FORMER UNDERGROUND SOLVENT LINE
MH-1	SEWER MANHOLE
SB-51	GEOPROBE BORING PID >100 PPMV
SB-55	GEOPROBE BORING PID <100 PPMV and VOC CONCENTRATION BELOW STANDARDS
	VOC CONCENTRATION EXCEEDS STANDARDS
	VOC CONCENTRATION BELOW STANDARDS
SB-55	ELEVATED VOCS BELOW WATER TABLE

FORENSIC ENVIRONMENTAL SERVICES, INC.

FIGURE 5-1

ON-SITE RFI SOIL BORING LOCATIONS WITH PID/SAMPLING RESULTS

FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY

WATERVLIET,NEW YORK

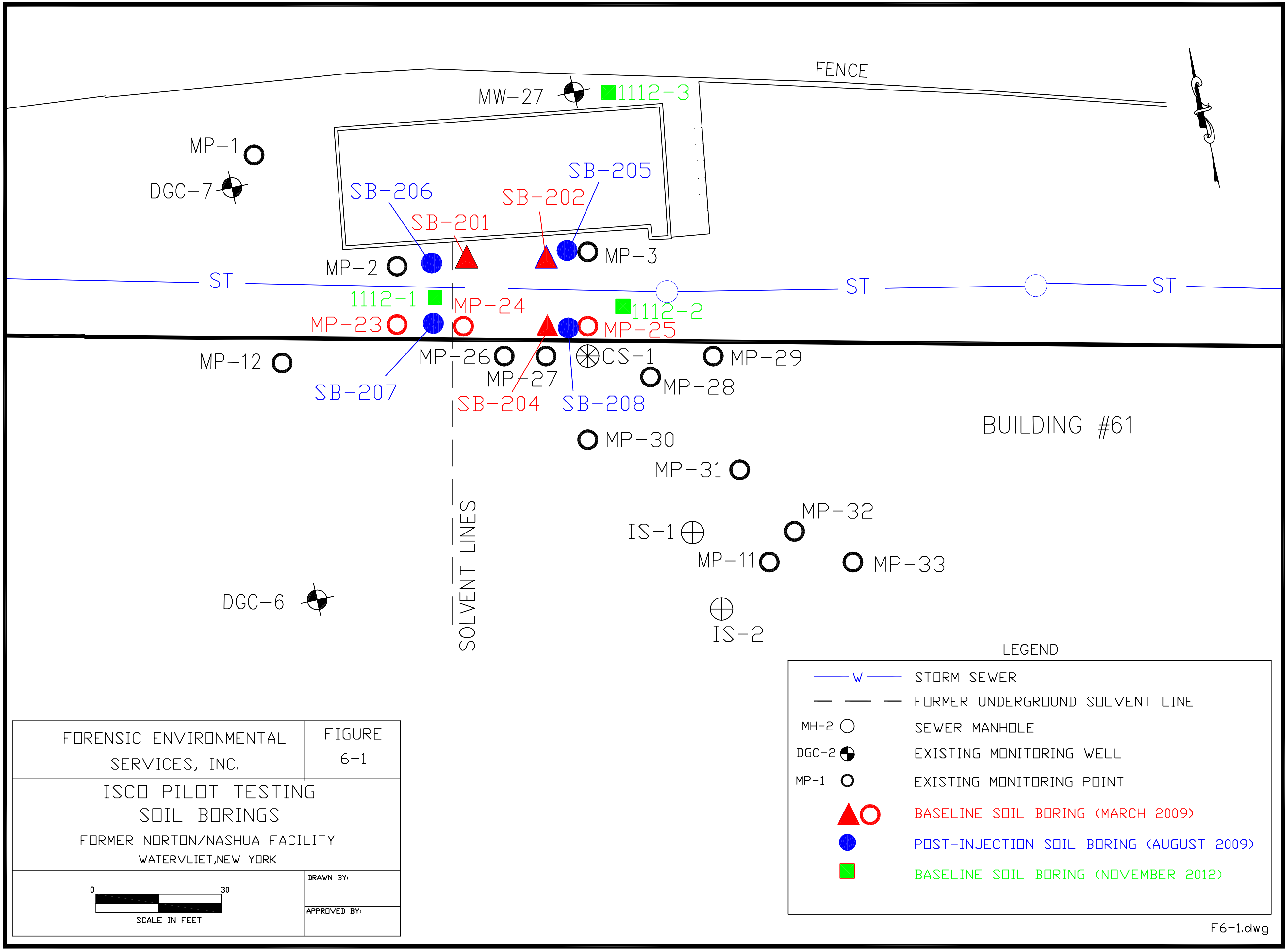
0 90

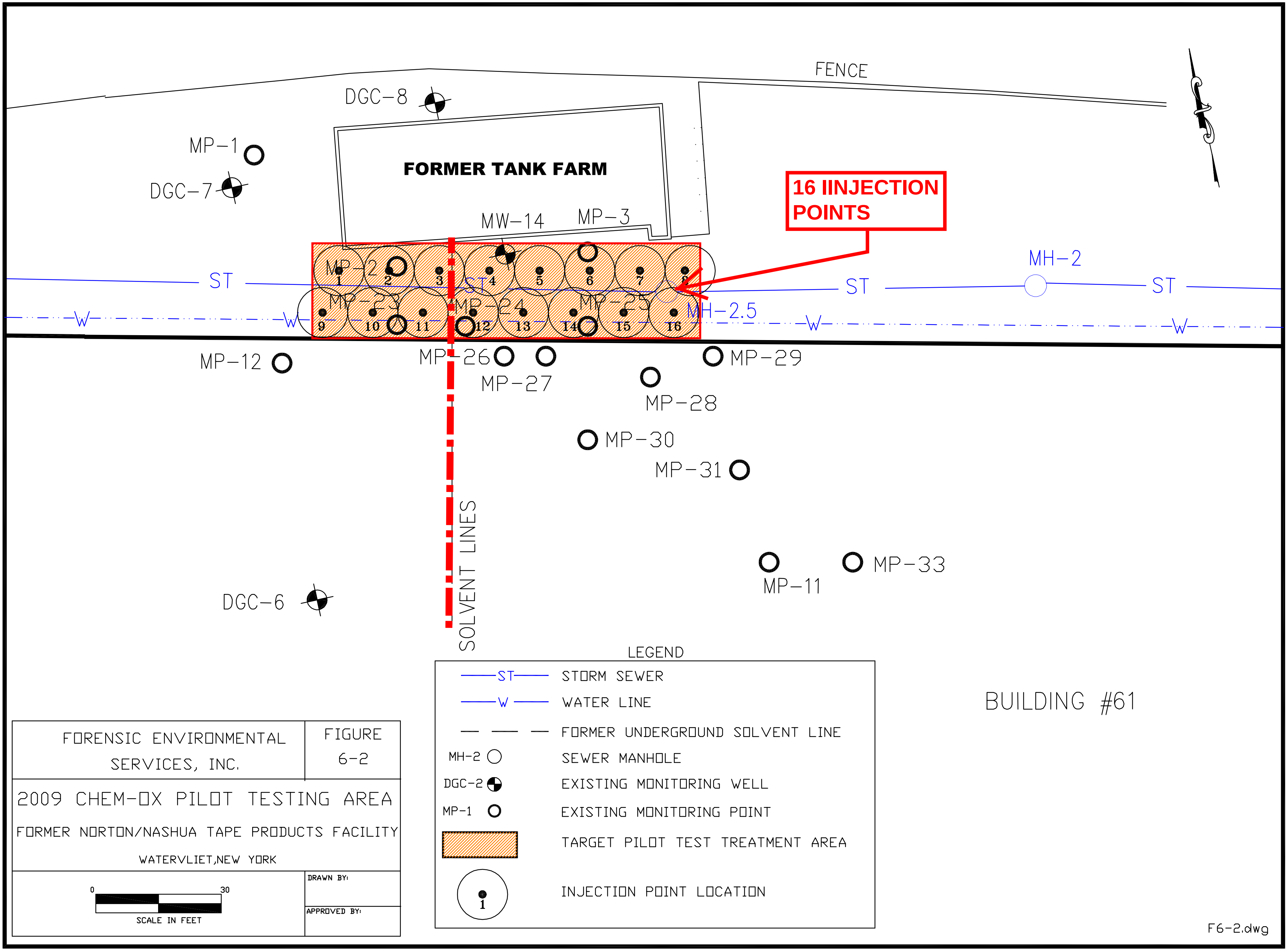
SCALE IN FEET

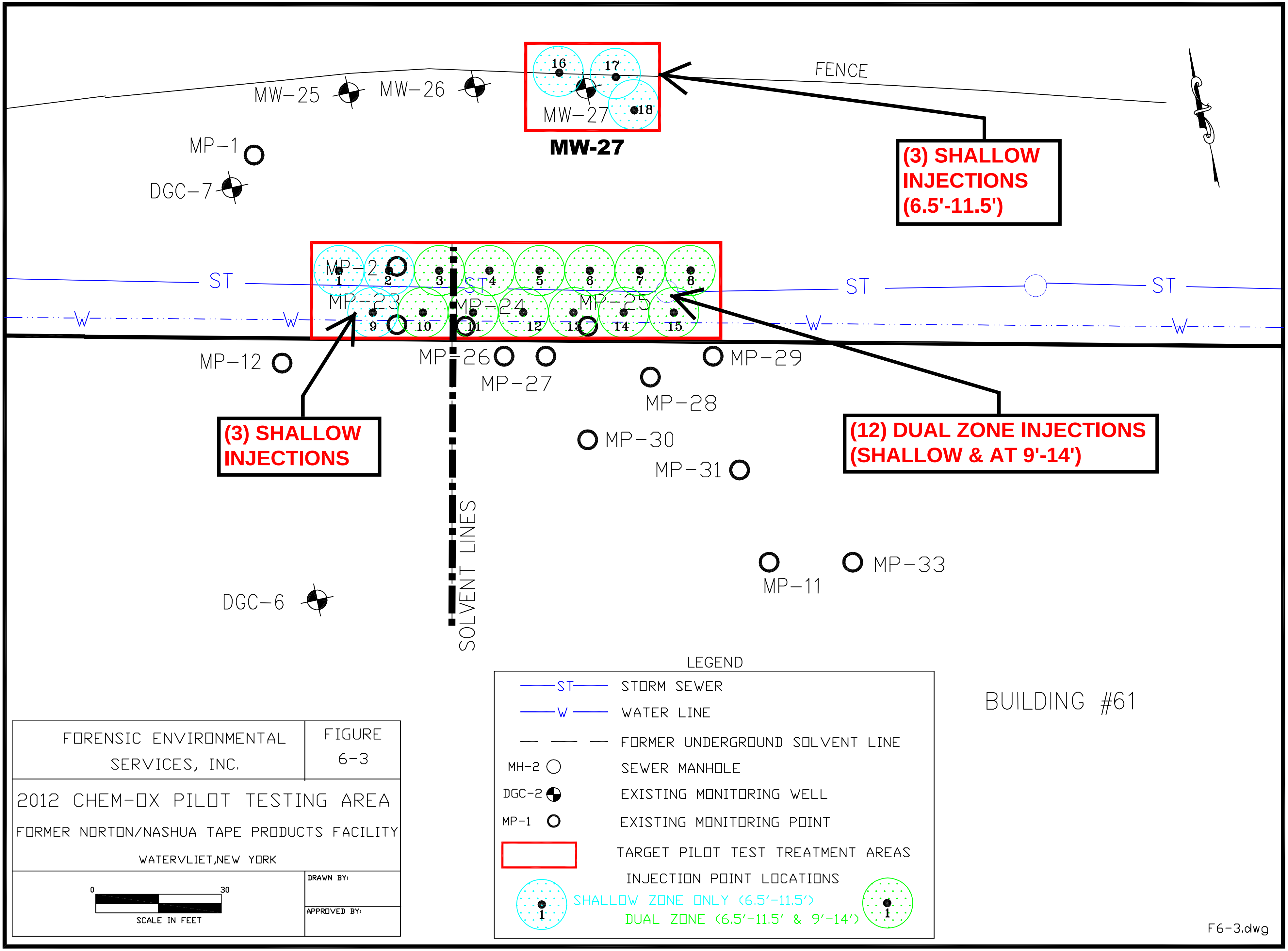
DRAWN BY:

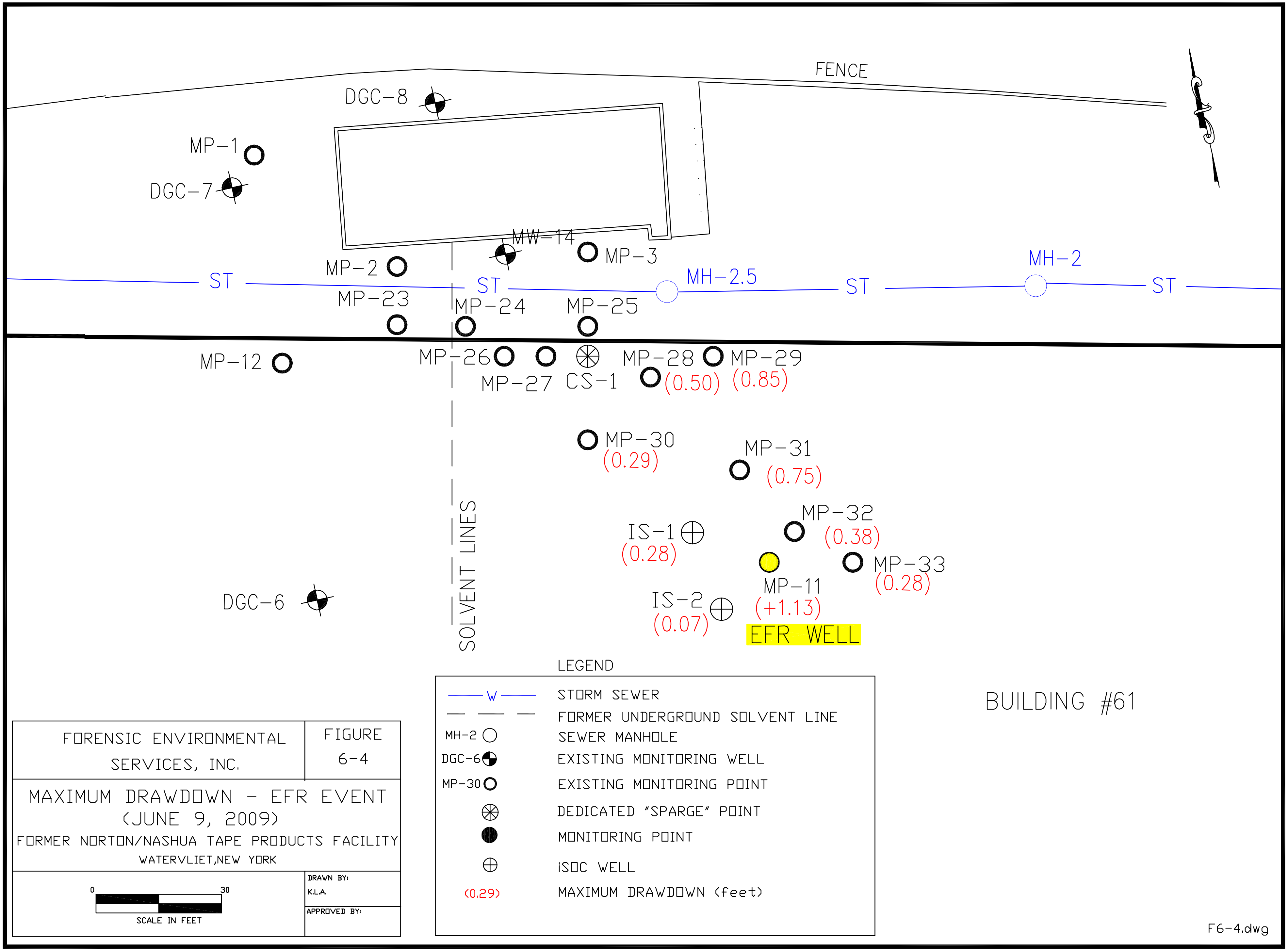
APPROVED BY:

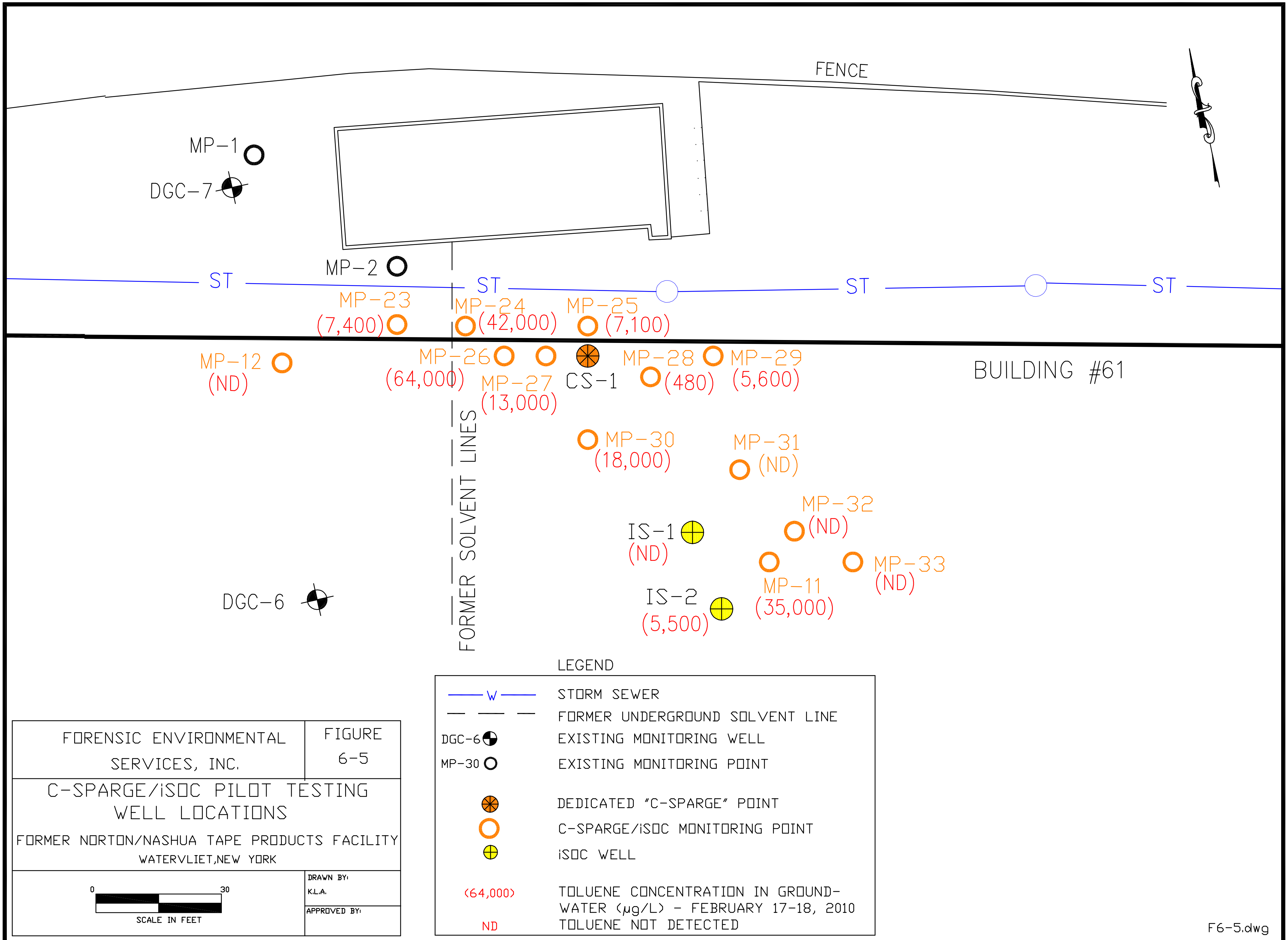
F5-1.dwg

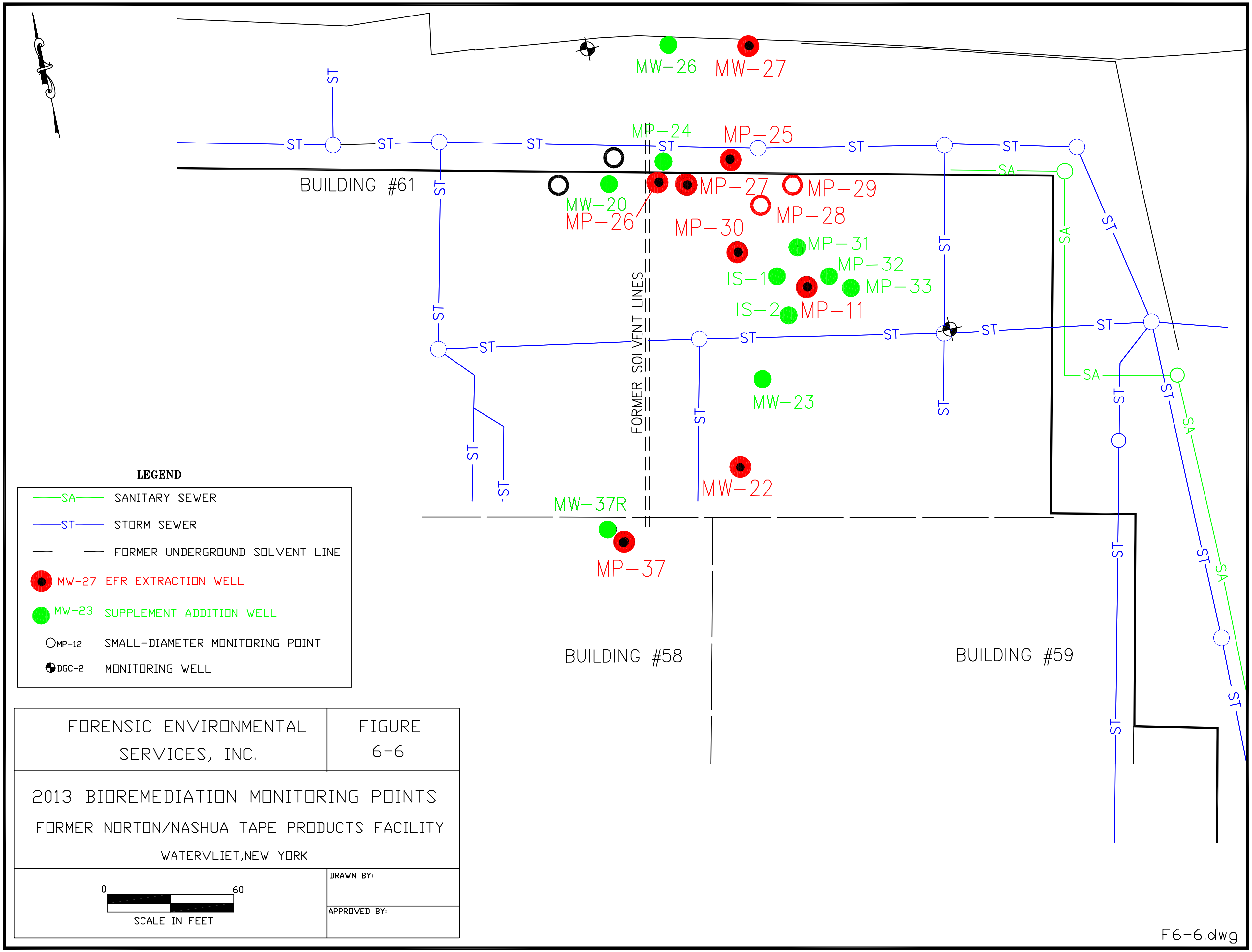

FENCE
MW-27
1112-3
MP-1
DGC-7
SB-206
SB-205
SB-202
SB-201
MP-2
MP-3
ST
ST
ST
1112-1
MP-24
1112-2
MP-23
MP-25
MP-12
MP-26
CS-1
MP-29
MP-27
MP-28
SB-207
SB-204
SB-208
BUILDING #61
MP-30
MP-31
SOLVENT LINES
MP-32
IS-1
MP-11
MP-33
DGC-6
IS-2
LEGEND
W STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
MH-2 SEWER MANHOLE
DGC-2 EXISTING MONITORING WELL
MP-1 EXISTING MONITORING POINT
BASELINE SOIL BORING (MARCH 2009)
POST-INJECTION SOIL BORING (AUGUST 2009)
BASELINE SOIL BORING (NOVEMBER 2012)
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 6-1
ISCO PILOT TESTING
SOIL BORINGS
FORMER NORTON/NASHUA FACILITY
WATERVLIET,NEW YORK
0
30
SCALE IN FEET
DRAWN BY:
APPROVED BY:
F6-1.dwg

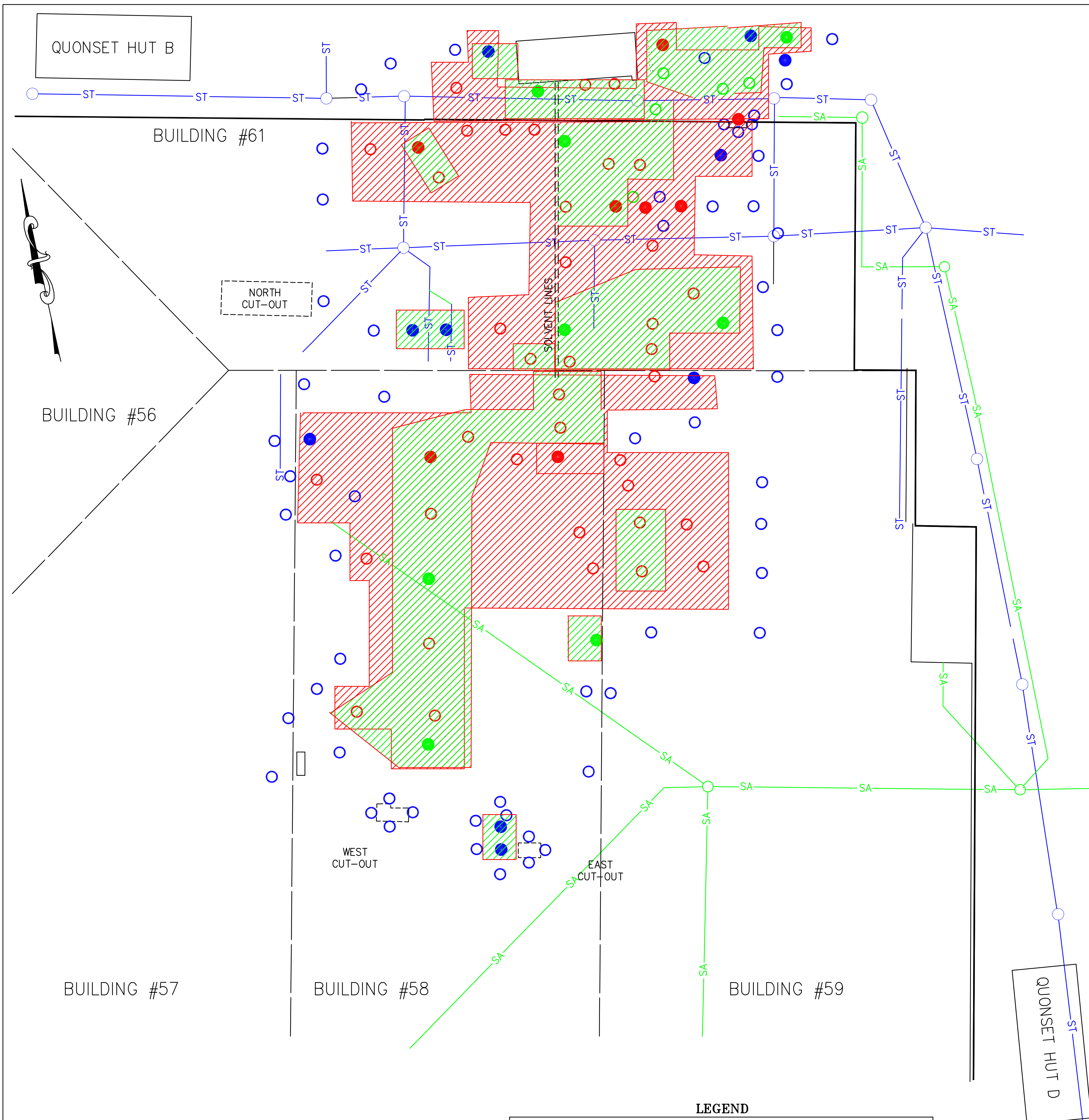

FENCE
DGC-8
MP-1
DGC-7
FORMER TANK FARM
16 IINJECTION POINTS
MW-14
MP-3
MP-2
MP-23
MP-24
MP-25
ST
W
MH-2
MH-2.5
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
MP-12
MP-26
MP-27
MP-28
MP-29
MP-30
MP-31
MP-11
MP-33
DGC-6
SOLVENT LINES
LEGEND
ST STORM SEWER
W WATER LINE
FORMER UNDERGROUND SOLVENT LINE
MH-2 SEWER MANHOLE
DGC-2 EXISTING MONITORING WELL
MP-1 EXISTING MONITORING POINT
TARGET PILOT TEST TREATMENT AREA
1 INJECTION POINT LOCATION
BUILDING #61
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 6-2
2009 CHEM-OX PILOT TESTING AREA
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0 30
SCALE IN FEET
DRAWN BY:
APPROVED BY:
F6-2.dwg


FENCE
MW-25
MW-26
MW-27
16
17
18
MW-27
(3) SHALLOW INJECTIONS (6.5'-11.5')
MP-1
DGC-7
ST
W
MP-2
MP-23
MP-24
MP-25
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
MP-12
MP-26
MP-27
MP-28
MP-29
MP-30
MP-31
(3) SHALLOW INJECTIONS
(12) DUAL ZONE INJECTIONS (SHALLOW & AT 9'-14')
SOLVENT LINES
MP-11
MP-33
DGC-6
BUILDING #61
LEGEND
ST STORM SEWER
W WATER LINE
FORMER UNDERGROUND SOLVENT LINE
MH-2 SEWER MANHOLE
DGC-2 EXISTING MONITORING WELL
MP-1 EXISTING MONITORING POINT
TARGET PILOT TEST TREATMENT AREAS
INJECTION POINT LOCATIONS
SHALLOW ZONE ONLY (6.5'-11.5')
DUAL ZONE (6.5'-11.5' & 9'-14')
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 6-3
2012 CHEM-OX PILOT TESTING AREA
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
30
SCALE IN FEET
DRAWN BY:
APPROVED BY:
F6-3.dwg


FENCE
DGC-8
MP-1
DGC-7
MW-14
MP-3
MP-2
ST
MH-2.5
MH-2
MP-23
MP-24
MP-25
MP-12
MP-26
MP-28
MP-29
MP-27
CS-1
(0.50)
(0.85)
MP-30
(0.29)
MP-31
(0.75)
SOLVENT LINES
MP-32
(0.38)
IS-1
(0.28)
MP-33
(0.28)
DGC-6
MP-11
(+1.13)
IS-2
(0.07)
EFR WELL
LEGEND
W STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
MH-2 SEWER MANHOLE
DGC-6 EXISTING MONITORING WELL
MP-30 EXISTING MONITORING POINT
DEDICATED "SPARGE" POINT
MONITORING POINT
iSOC WELL
(0.29) MAXIMUM DRAWDOWN (feet)
BUILDING #61
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 6-4
MAXIMUM DRAWDOWN - EFR EVENT (JUNE 9, 2009)
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
30
SCALE IN FEET
DRAWN BY:
K.L.A.
APPROVED BY:
F6-4.dwg


FENCE
MP-1
DGC-7
MP-2
ST
ST
ST
ST
MP-23
(7,400)
MP-24
(42,000)
MP-25
(7,100)
MP-12
(ND)
MP-26
(64,000)
MP-27
(13,000)
CS-1
MP-28
(480)
MP-29
(5,600)
BUILDING #61
MP-30
(18,000)
MP-31
(ND)
FORMER SOLVENT LINES
MP-32
(ND)
IS-1
(ND)
MP-33
(ND)
IS-2
(5,500)
MP-11
(35,000)
DGC-6
LEGEND
W
STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
DGC-6
EXISTING MONITORING WELL
MP-30
EXISTING MONITORING POINT
DEDICATED "C-SPARGE" POINT
C-SPARGE/iSOC MONITORING POINT
iSOC WELL
(64,000)
TOLUENE CONCENTRATION IN GROUND-WATER (µg/L) - FEBRUARY 17-18, 2010
ND
TOLUENE NOT DETECTED
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 6-5
C-SPARGE/iSOC PILOT TESTING WELL LOCATIONS
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
30
SCALE IN FEET
DRAWN BY:
K.L.A.
APPROVED BY:
F6-5.dwg


MW-26
MW-27
MP-24
MP-25
MP-27
MP-29
MP-28
MW-20
MP-26
MP-30
MP-31
MP-32
MP-33
IS-1
IS-2
MP-11
MW-23
MW-22
MW-37R
MP-37
BUILDING #61
BUILDING #58
BUILDING #59
FORMER SOLVENT LINES
ST
SA
LEGEND
SANITARY SEWER
STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
MW-27 EFR EXTRACTION WELL
MW-23 SUPPLEMENT ADDITION WELL
MP-12 SMALL-DIAMETER MONITORING POINT
DGC-2 MONITORING WELL
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 6-6
2013 BIOREMEDIATION MONITORING POINTS
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
60
SCALE IN FEET
DRAWN BY:
APPROVED BY:
F6-6.dwg



FORENSIC ENVIRONMENTAL SERVICES, INC.

FIGURE 7-1

SOILS WITH ELEVATED PID/SAMPLING DATA

FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY

WATERVLIET, NEW YORK

0 90

SCALE IN FEET

DRAWN BY:

APPROVED BY:

LEGEND

SA — SANITARY SEWER

ST — STORM SEWER

FORMER UNDERGROUND SOLVENT LINE

MH-1 SEWER MANHOLE

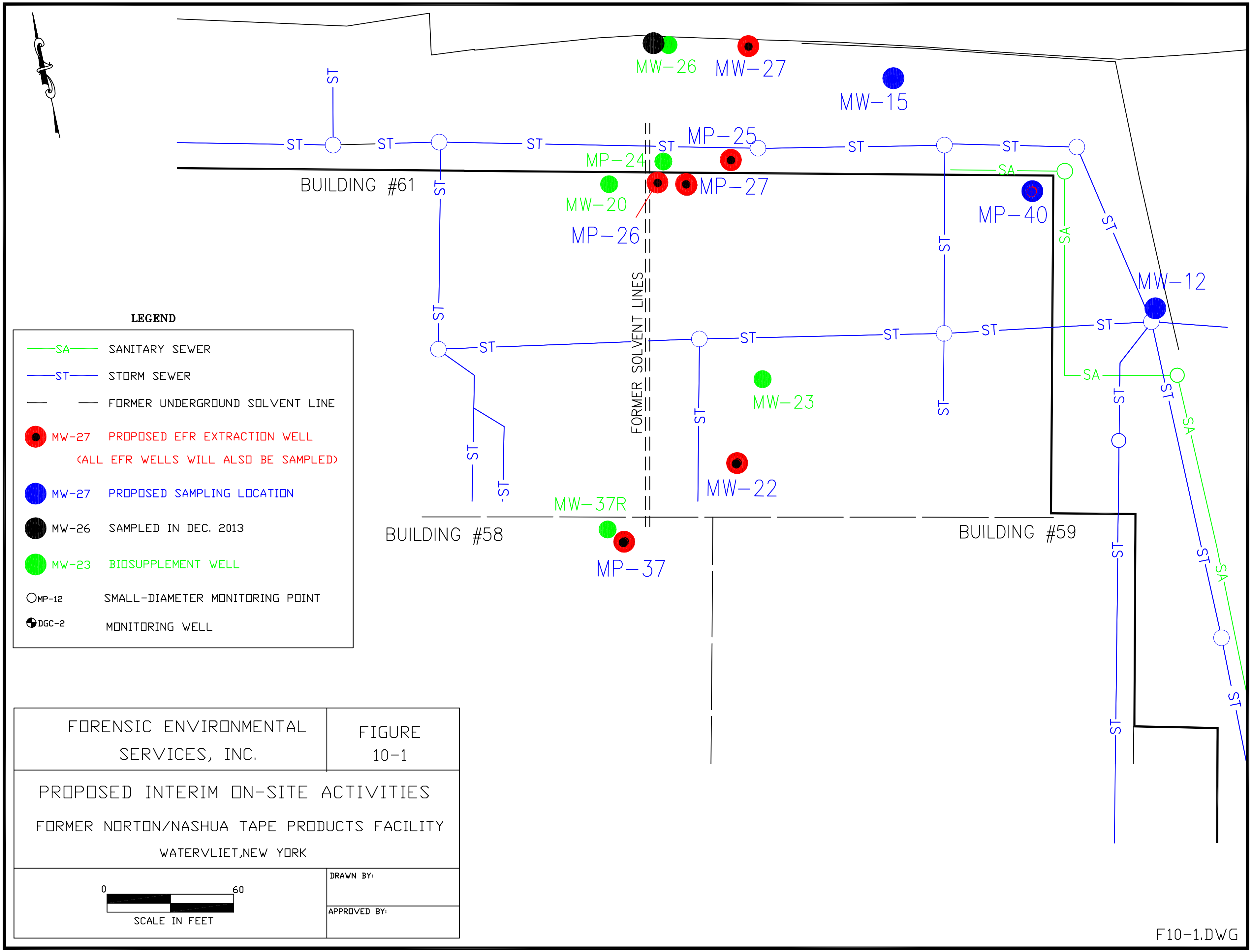
GEOPROBE BORING PID <100 PPMV AND VOC CONCENTRATIONS BELOW STANDARDS

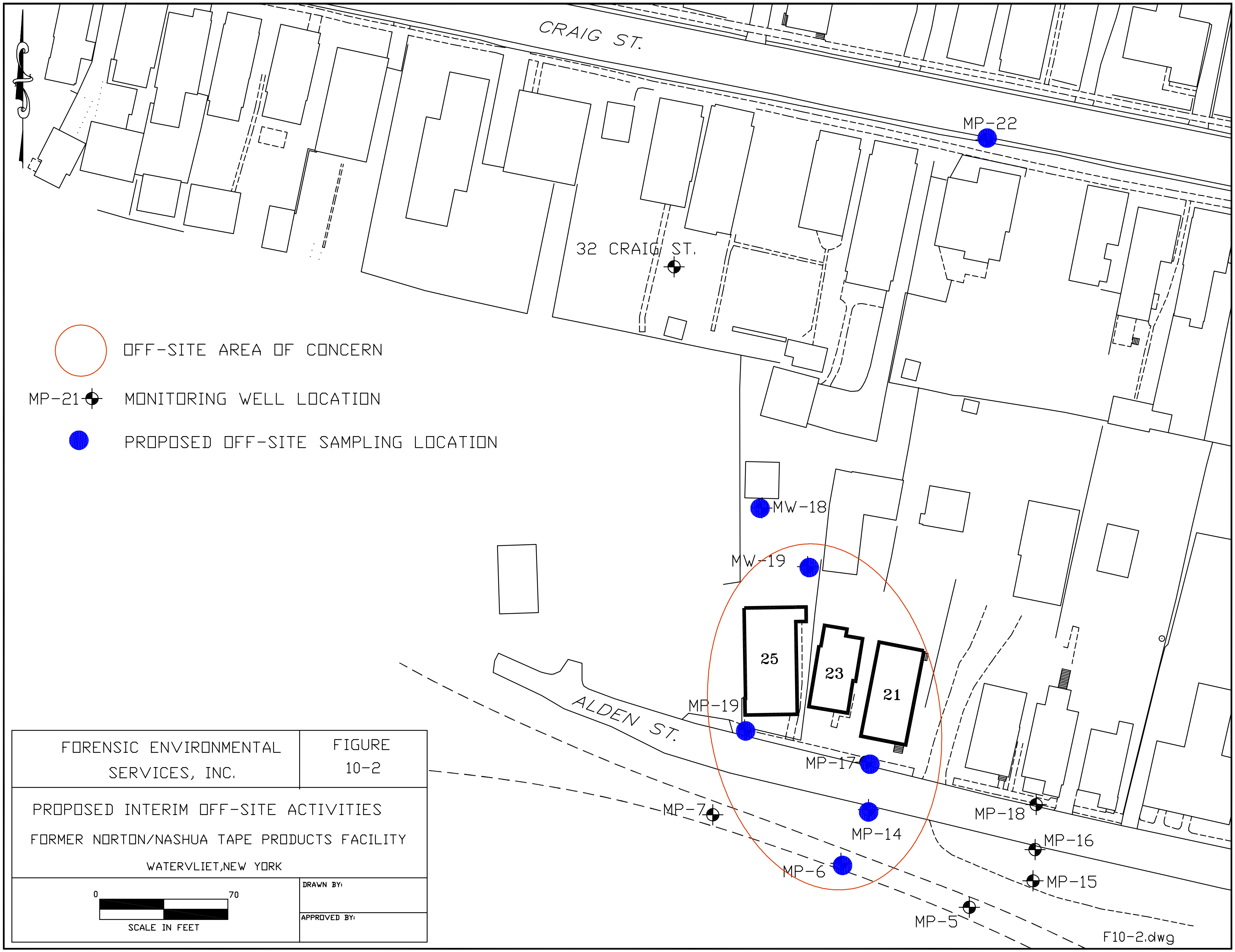
GEOPROBE BORING PID >100 PPMV OR VOC CONCENTRATION(S) EXCEED(S) STANDARDS ABOVE WATER TABLE

GEOPROBE BORING PID >100 PPMV OR VOC CONCENTRATION(S) EXCEED(S) STANDARDS BELOW WATER TABLE

AREA OF IMPACTED SOIL ABOVE/ BELOW WATER TABLE

F7-1.dwg


MW-26
MW-27
MW-15
MP-25
MP-24
MP-27
MW-20
MP-26
MP-40
MW-12
BUILDING #61
FORMER SOLVENT LINES
MW-23
MW-22
MW-37R
MP-37
BUILDING #58
BUILDING #59
ST
SA
LEGEND
SA SANITARY SEWER
ST STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
MW-27 PROPOSED EFR EXTRACTION WELL
(ALL EFR WELLS WILL ALSO BE SAMPLED)
MW-27 PROPOSED SAMPLING LOCATION
MW-26 SAMPLED IN DEC. 2013
MW-23 BIOSUPPLEMENT WELL
MP-12 SMALL-DIAMETER MONITORING POINT
DGC-2 MONITORING WELL
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 10-1
PROPOSED INTERIM ON-SITE ACTIVITIES
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
60
SCALE IN FEET
DRAWN BY:
APPROVED BY:
F10-1.DWG



CRAIG ST.
32 CRAIG ST.
MP-22
MW-18
MW-19
25
23
21
ALDEN ST.
MP-19
MP-17
MP-14
MP-7
MP-6
MP-5
MP-18
MP-16
MP-15
OFF-SITE AREA OF CONCERN
MP-21
MONITORING WELL LOCATION
PROPOSED OFF-SITE SAMPLING LOCATION
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 10-2
PROPOSED INTERIM OFF-SITE ACTIVITIES
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
70
SCALE IN FEET
DRAWN BY:
APPROVED BY:
F10-2.dwg

APPENDIX A

ISOTEC CHEM-OX REPORTS

LABORATORY TREATABILITY STUDY REPORT

FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
2600 SEVENTH AVENUE
WATERVLIET, NEW YORK

MAY 14, 2009

PREPARED FOR

FORENSIC ENVIRONMENTAL SERVICES, INC.
113 JOHN ROBERT THOMAS DRIVE
EXTON, PA 19341

PREPARED BY

IN-SITU OXIDATIVE TECHNOLOGIES, INC.
51 EVERETT DRIVE, SUITE A-10
WEST WINDSOR, NEW JERSEY 08550
WWW.INSITUOXIDATION.COM

ISOTEC PROJECT NO. 801394

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Section 1 Executive Summary

In-Situ Oxidative Technologies, Inc. (ISOTEC[SM]) was retained by Forensic Environmental Services, Inc. (FES) to conduct an in-situ chemical oxidation (ISCO) bench-scale laboratory treatability study (study) on soil and groundwater samples collected from the former Norton/Nashua Tape Products Facility site located in Watervliet, New York. Contaminants of concern (COCs) for the study are volatile organic compounds (VOCs), primarily toluene and total xylenes (xylenes).

The purpose of the study was to determine the potential effectiveness of modified Fenton's reagent (MFR) and activated sodium persulfate reagent (ASP) on site samples. MFR promotes contaminant destruction via oxidizing and reducing free radicals including hydroxyl radicals, superoxide radicals and hydroperoxide anions. ASP promotes contaminant destruction via oxidizing sulfate free radicals. Three persulfate activation methods were employed in the study – catalyst activation (Cat-SP), peroxide activation (Perx-SP) and alkali activation (Alk-SP).

FES personnel collected soil and groundwater samples from the site and shipped them to ISOTEC's research facility for use during the treatability study. The treatability study consisted of two sets of studies to evaluate the COC treatment effectiveness, one set using MFR (MFR study) and the other using ASP (ASP study). Each study consisted of two tests, one on groundwater samples (GW-test) and the other on slurry samples (SL-test), which were prepared by mixing site soils with site groundwater. Various reagent doses (presented as a percentage by weight of sample being tested) were evaluated as shown below.

Reagent Dosages Evaluated in the Treatability Study

Test	MFR GW-test	MFR SL-test	ASP GW-test	ASP SL-test
Dosage evaluated	**0.1%, 0.5% & 1%**	**0.75%, 1.5% & 3%**	**0.5% & 1%**	**1.5% & 3%**

For the reagent doses evaluated, treatability study results indicated the following:

MFR Study,

- In the MFR GW-test, maximum VOC reduction was achieved with all three doses tested. Total VOCs were treated from 66,387 micrograms per liter (ug/l) to non-detectable (ND) levels with toluene (65,600 ug/l) and xylenes (787 ug/l) both being treated to ND levels.

- In the MFR SL-test, VOC reductions achieved were 42% (0.75% dose), 78% (1.5% dose) and 73% (3% dose). Toluene decreased from 34 milligrams per kilogram (mg/kg) to 7.4 mg/kg and xylenes decreased from 1.1 mg/kg to 0.3 mg/kg following the 1.5% dose treatment.

ASP-test,

- In the ASP GW-test, greater than 99% VOC reduction was achieved with all three activation methods evaluated. Total VOCs were treated from 51,244 ug/l to 44 ug/l using Cat-SP, to ND using Perx-SP and to 267 ug/l using Alk-SP. Toluene was treated from 50,400 ug/l to ND using both Cat-SP and Perx-SP, and to 223 ug/l using Alk-SP; xylenes was treated from 844 ug/l to ND using all three activation methods.
- In the ASP SL-test, VOC reductions achieved were 71% (Cat-SP and Perx-SP) and 56% (Alk-SP). Toluene decreased from 7.1 mg/kg to 2.1 mg/kg using both Cat-SP and Perx-SP, and to 3.3 mg/kg using Alk-SP. Total xylenes decreased from 0.78 mg/kg to 0.13 mg/kg using Cat-SP, to 0.16 mg/kg using Perx-SP and to 0.17 mg/kg using Alk-SP.

Based on the treatability study results, ISOTEC recommends a field pilot program for the N/NTP site using either MFR or Perx-SP. The oxidant selection should be based on overall costs and viability of each technology at the subject site. Results of the bench-scale study can be used to design a field pilot program for the Norton/ Nashua Tape Products Facility site.

Section 2 Study Objectives

The objectives of the study were as follows:

- Evaluate the COC treatment effectiveness of MFR reagent on site-specific groundwater and slurry samples
- Evaluate the COC treatment effectiveness of ASP on site-specific groundwater and slurry samples; and
- Select the most effective reagent for a potential field scale application at the site.

Section 3 Sample Collection and Preparation

FES personnel provided a groundwater sample (identified as “MW-14”) and a soil sample [(identified as “SB-203 (9-14)”] collected on March 27, 2009 and March 23, 2009, respectively, for the treatability study. The samples were stored at <4^{o}C during shipment and at ISOTEC’s facility until commencement of each test.

Prior to initiating the study, soils were screened to remove rock fragments, composited and designated as “Soil Comp”. Then a portion of “Soil Comp” was collected and submitted for total organic carbon (TOC), total iron and total manganese analyses. Similarly, a portion of “MW-14” was collected and submitted for VOCs, dissolved iron and dissolved manganese analyses. The composited soil was then prepared into slurry by mixing 2 parts of soil from “Soil Comp” with 1 part of groundwater from “MW-14” (by weight). A portion of the slurry (designated as “SL/Initial”) was collected and submitted for VOC analyses. The remaining groundwater and slurry were then used to conduct experiments to evaluate the COC treatment effectiveness of both MFR and ASP. Experiments were performed on groundwater samples (GW-test) and slurry samples (SL-test) independently. A total of four tests were performed, MFR GW-test, MFR SL-test, ASP GW-test and ASP SL-test. Within each ASP test, three persulfate activation methods were evaluated: catalyst activation, peroxide activation and alkali activation as shown below.

MFR Study	**ASP Study**		
	Catalyst Activation	Peroxide Activation	Alkali Activation
MFR GW-test	ASP GW-test		
MFR SL-test	ASP SL-test		

Section 4 Laboratory Treatability Study

As discussed in Section 3, the treatability study consisted of two sets of experiments: MFR study and ASP study with each experiment consisting of two tests, GW-test and SL-test.

In general, each test comprised of the following four steps:

1. Reagent selection,
2. Establishing experimental control,
3. Experimental setup, and
4. Sample analysis.

4.1 Reagent Selection

FES requested ISOTEC to evaluate two reagents; MFR and ASP in the bench-scale treatability study. Both reagents contain an oxidant and an activating agent. The oxidants used in the study were hydrogen peroxide for MFR and sodium persulfate for ASP. The catalyst used in MFR was ISOTEC's patented catalyst 4260 (Cat-4260). Cat-4260 is a circum-neutral pH (e.g. 5-8) chelated-iron complex with high mobility within the subsurface. The activating agents used in ASP were: Cat-4260S (a parallel catalyst of Cat-4260 for persulfate) for Cat-SP, stabilized hydrogen peroxide for Perx-SP and alkali [i.e. sodium hydroxide (NaOH)] for Alk-SP. Alkali activation was achieved by adjusting the pH value of sample contents in each reactor to greater than 10-12 using NaOH.

4.2 Establishing Experimental Controls

An experimental "control" sample was set up during each test to document the following:

- Reduction or changes in concentrations of the target constituents due to sample dilution by reagent volumes injected.
- Reduction in concentrations of the target constituents due to volatilization caused by room temperature test conditions.

The "control" sample was set up exactly the same way, remained at, and was subject to the same conditions as the associated "treatment" reactors. However, the "control" reactor was injected with distilled water instead of reagent (see Section 4.3.3 below). The volume of distilled water injected was identical to the volumes of reagent injected into the "treatment" reactors.

4.3 Experimental Setup

4.3.1 Reactor preparation

In order to provide an unbiased comparison between the MFR, Cat-SP, Perx-SP and Alk-SP, all procedures and concentrations used to set up the reactors for each reagent were identical within the same test matrix as shown below.

Number of Reactors Used in Each Experiment

MFR GW-test		**ASP GW-test**			
			Cat-SP	**Perx-SP**	**Alk-SP**
Control	Treatment	Control	Treatment	Treatment	Treatment
1	3	1	2	2	2
MFR SL-test		**ASP SL-test**			
			Cat-SP	**Perx-SP**	**Alk-SP**
Control	Treatment	Control	Treatment	Treatment	Treatment
1	3	1	2	2	2

4.3.1.1 GW-test

Both MFR GW-test and ASP GW-test were performed in 140-ml VOC-tight glass reactors. Each reactor contained exactly 126 milliliter (ml) of groundwater leaving enough headspace for injection of reagent. The reactors were sealed with crimp-top aluminum caps fitted with septa to facilitate reagent injections.

4.3.1.2 SL-test

Both MFR SL-test and ASP SL-test were performed in 40-ml VOC-tight glass reactors. Each reactor contained exactly 22.5 g of 2:1 slurry (15 g of soil and 7.5 ml of GW) leaving enough headspace for injection of reagent. The reactors were sealed with screw top caps fitted with septa to facilitate reagent injections.

Duplicates were setup for each reactor for the purpose of pH, peroxide and persulfate concentration measurements.

4.3.2 Reagent Applications

To conduct the experiments, a predetermined amount of the MFR reagent was injected into each associated "treatment" reactor as small incremental dosages. The "treatment" reactors received one, two and three doses to represent low, medium and high treatment conditions. A time gap of approximately 24 hours was maintained between dosages. The multiple dosage approach (incremental approach) was used during the test to increase treatment efficiency, minimize gas formation and the resulting pressure buildup. For the three ASP reagents, all the doses were given together. Distilled water was used to compensate the difference of reagent volumes applied between the reactors. The "control" reactor in each experiment received an equivalent volume of distilled water instead of reagent. The final oxidant concentrations (by weight of the sample being treated) in the treatment reactors were:

Reagent dosages Evaluated in the study

MFR GW-test	MFR SL-test	ASP GW-test	ASP SL-test
0.1%, 0.5% & 1%	0.75%, 1.5% & 3%	0.5% & 1%	1.5% & 3%

All reactors (control and treatment) receiving MFR were left undisturbed for a minimum of 24 hours after the last dose. At the end of the 24 hour time period, hydrogen peroxide concentrations were measured to ensure greater than 90% of the peroxide was consumed and bovine catalase enzyme was injected to decompose residual peroxide. All reactors (control and treatment) receiving Cat-SP, Perx-SP and Alk-SP were left undisturbed for two weeks before analytical sample collection due to relatively slow persulfate decomposition in comparison to hydrogen peroxide. At the end of 2 weeks, residual persulfate concentrations were measured and sodium thiosulfate was injected to decompose residual persulfate. To collect samples for chemical analyses, liquid from each reactor of both GW-test was carefully decanted into 40 ml vials preserved with hydrochloric acid and submitted for VOCs analysis. Methanol was added as preservative/extract in each reactor of both SL-test and were submitted "as is" to an independent laboratory for VOC analysis.

Hydrogen peroxide and persulfate concentrations and the pH values were measured after analytical sample collection in the GW-test reactors and in the associated duplicates of the SL-test.

4.4 Sample Analysis

Integrated Analytical Laboratories, LLC. (IAL), a NELAP New Jersey certified analytical laboratory, performed analyses using EPA method 624 or 8260B for VOCs, EPA method 6020 for iron and manganese and modified Lloyd Kahn for TOC. Sodium persulfate concentrations were measured using a Chemetrics test kit. Hydrogen peroxide concentrations were measured using test strips. Analytical results are summarized in Tables 1 through 5 and discussed in Section 5. Laboratory reports are provided in Appendix 1.

Section 5 Treatability Study Results

Treatability study results (including the initial characteristics analyses and experiment results) are presented in Tables 1 through 5 and discussed below in Sections 5.1 and 5.2.

5.1 Initial Characteristics (Table 1)

A preliminary assessment of site-specific factors that could affect the ISCO process was performed based on TOC, iron and manganese concentrations in site soil; VOC concentrations in the soil-slurry and groundwater, and dissolved iron and dissolved manganese in groundwater (Table 1).

Two VOCs were detected during the initial characterization resulting in a cumulative VOC concentration of 75,472 ug/l in the groundwater sample and 141 mg/kg in the slurry sample. The two compounds detected were: toluene at 74,700 ug/l in groundwater and 136 mg/kg in slurry, and xylenes at 772 ug/l in the groundwater sample and 4.5 mg/kg in the slurry sample.

TOC was present at a concentration of 3,770 mg/kg in site soil, which is likely to exert a moderate to high demand for oxidant. Iron in soil was detected at 23,600 mg/kg and manganese at 793 mg/kg. Iron present in soils could catalyze decomposition of sodium persulfate/ hydrogen peroxide. Iron in its dissolved phase in groundwater is known to be a catalyst to promote free radical reactions. Dissolved iron and manganese were found to be at 8.6 mg/l and 8.4 mg/l, respectively. These concentrations alone are not sufficient to function as effective naturally occurring catalysts for the free radical reactions. Therefore, external catalyst needs to be applied during field implementation of both MFR and Cat-SP.

5.2 Experiment Results

Experiment results are summarized in Tables 2 and 3 for MFR study and Tables 4 and 5 for ASP study. COC treatment effectiveness is evaluated by comparison of “treated” sample data with the associated “control” sample data. As discussed in Section 4.3.2, the “control” sample underwent the same conditions as all “treated” samples but received zero dosage of reagent. Therefore, the differences in contaminant concentrations between “treated” samples and the “control” sample best represent the treatment effectiveness. For discussion purpose, all non-detectable (ND) values are assumed to be equal to zero in the contaminant reduction calculations.

5.2.1 MFR-study results

The MFR-study results indicate that MFR has actively promoted oxidation reactions and achieved substantial VOC reduction in both groundwater and slurry samples. Final pH values ranged 5.73-6.29 in the GW-test and 6.35-6.67 in the SL-test with the "control" values of 6.05 (GW) and 6.79 (SL). This circum-neutral (pH ranging 5-8) feature is desirable for field application as it is very difficult to adjust the pH value of a large subsurface body. Details for each test are further discussed below.

5.2.1.1 MFR GW-Test Results (Table 2)

Results of the MFR GW-test indicated that MFR has successfully destroyed VOCs with maximum (nearly 100%) VOC reduction being achieved in the groundwater samples. Concentrations of total VOCs were reduced from 66,387 ug/l to ND levels following the lowest reagent dose (0.1% by the weight of groundwater being tested) application. Toluene and xylenes, the primary site COCs, were the only two VOCs detected in the control reactor and were both treated to ND from 65,600 ug/l and 787 ug/l, respectively.

5.2.1.2 MFR SL-Test Results (Table 3)

The MFR SL-test results indicated that MFR has successfully promoted oxidation reactions and substantially reduced VOC contamination in the slurry samples. Total VOC concentrations decreased from 35 mg/kg to 20 mg/kg following the application of 0.75% reagent dose, to 7.7 mg/kg following 1.5% dose and to 9.5 mg/kg following 3% dose, an equivalent 42%, 78% and 73% VOC reduction, respectively. Toluene and xylenes were the only two VOCs detected in "control". Maximum reductions achieved were 78% for toluene from 34 mg/kg to 7.4 mg/kg and 74% for xylenes from 1.1 mg/kg to 0.3 mg/kg.

5.2.2 ASP-Test Results

The ASP-test results indicate that greater than 99% VOC reduction was achieved in the groundwater sample following the treatment of persulfate activated with all three activating agents, Cat-SP, Perx-SP and Alk-SP. In the SL-test, up to 71% VOC reduction was achieved by Cat-SP and Perx-SP, and 56% VOC reduction was obtained using Alk-SP. Results are further discussed below for GW-test and SL-test.

5.2.2.1 ASP GW-test Results (Table 4)

Data in Table 4 indicate that VOC reduction was achieved by greater than 99% for all three activation methods. Similar to the MFR study, toluene and xylenes were the only VOCs detected in the control sample at a concentration of 50,400 ug/l for toluene and 844 ug/l for xylenes. Among the three activation methods, Perx-SP produced superior results with both toluene and xylenes being completely treated to ND levels following only the lower (0.5%) reagent dose tested. Cat-SP yielded the second best VOC destruction with toluene and xylenes also reduced to ND levels following the 0.5% dose but several VOCs (such as chloromethane, benzene, etc.) persisted at concentrations ranging from 0.2 ug/l to 80 ug/l even following the higher (1%) dose treatment. Alk-SP achieved 50% VOC reduction following 0.5% dose treatment and greater than 99% VOC reduction following the 1% dose treatment. Toluene was reduced from 50,400 ug/l to 223 ug/l and xylenes from 844 ug/l to ND following the 1% dose treatment.

Persulfate measurements indicate that persulfate activation and consumption achieved were 29-37% for Cat-SP, 7-27% for Perx-SP and 18-33% for Alk-SP indicating that lower doses than tested during the bench study will be adequate to achieve the noted percent VOC reduction in groundwater.

The final pH values in the test reactors ranged from 2.33-2.73 for Cat-SP, 2.12-2.21 for Perx-SP and 12.22-12.3 for Alk-SP.

5.2.2.2 ASP SL-test Results (Table 5)

VOC reduction achieved was 71% with both Cat-SP and Perx-SP and 56% with Alk-SP following the higher (3%) dose treatment. Toluene was treated from 7.0 mg/kg to 2.3 mg/kg using Cat-SP and Perx-SP, and to 3.5 mg/kg using Alk-SP. Xylenes were reduced from 0.78 mg/kg to 0.13 mg/kg (Cat-SP), 0.36 mg/kg (Perx-SP) and 0.17 mg/kg (Alk-SP).

Persulfate measurements indicate that persulfate activation and consumption achieved were 96-98% for Cat-SP, 100% for Perx-SP and 99-100% for Alk-SP indicating higher doses than tested during the bench study will be needed to achieve the noted or higher percent VOC reduction.

The final pH values in the test reactors ranged 5.86-6.17 for catalyst activation, 6.27-6.79 for peroxide activation and 12.19-10.16 for alkali activation.

Section 6 Conclusions and Recommendations

Treatability study results indicate that both MFR and ASP are effective towards treating site COCs including toluene and xylenes, with MFR producing an overall higher VOC reduction in both groundwater and slurry samples. Among the three activated persulfate reagents, Perx-SP produced higher VOC reduction than Cat-SP and Alk-SP.

Based on the treatability study results, ISOTEC recommends a field pilot study at the N/NFP site to further evaluate the effectiveness of MFR and Perx-SP.

6.1 Lessons Learned

Past experience when comparing treatability study results to in-situ chemical oxidation field results suggests several lessons learned that should be considered when reviewing this study:

- **Reagent Volume** – There are inherent implementation variables between lab study set-ups and field injections. Field injections are limited by the ability of the subsurface to accept reagent volumes; therefore (1) a simple mass calculation cannot be made, (2) a volume calculated and (3) then injected in one application. Injection pressures will increase and reagents may find pathways to surface when too large a reagent volume is injected at any one time. Therefore, the total volume (mass) of reagent required for treatment may be injected over multiple batch injection events in order to safely complete a remediation project. This limitation is not necessarily a factor when completing a lab study. Priorities in the lab study include limiting the number of "set-ups" and the cost associated with multiple analytical samples. These factors create differing "doses" in the laboratory than would be applied in the field.

  When reviewing the lab study procedures and results, please note that a lab study dose may not be equivalent to a field injection event. It may take multiple field injections to deliver the same mass of reagent that is delivered in one lab study dose or vice versa. Also, due to inherent heterogeneity associated with most native soil subsurface matrices, the reagent volumes estimated from the bench-scale studies do not necessarily apply for the entire site. Therefore, the estimated reagent volume from the treatability study should be applied in increments. For example, the volume determined from the treatability study can be applied as 3 increments of 33% volume (of the estimated treatability study volume) with performance monitoring conducted after each increment to determine if the next incremental volume is needed. This will ensure that the field injections are completed in the most economical manner while meeting the necessary performance objectives.

- **Mass Phase Changes** – Remediation due to chemical oxidation occurs, for all practical purposes, in the aqueous phase. Contaminant mass, however, is concentrated in the adsorbed phase. Therefore, to achieve remediation result, mass must be transferred into the aqueous phase from the adsorbed phase. MFR accomplishes this through both chemical (secondary radicals) and physical (increased turbidity) means. Other oxidants such as sodium persulfate rely, primarily, on physical means. Slurry reactors are prepared with more liquid than found under in-situ conditions. This very act causes desorption of mass due to physical agitation. In-situ conditions are not necessarily reflective of a soil-slurry reactor. Lab study results may be positively skewed for all oxidants, primarily for oxidants other than modified Fenton's due to this mass phase change.

TABLES

Table 1. Initial Characterization
FES/ Watervliet Site, New York
ISOTEC Project Number: 801394

Sample ID **Matrix**	**MW-14** **Aqueous**	**SL/Initial** **Slurry**	**Soil Comp** **Soil**
VOCs	**(ug/l)**	**(mg/kg)**	**(mg/kg)**
Toluene	74,700.00	136.00	NA
Ethylbenzene	ND<260	ND<0.808	NA
Total Xylenes	772.00	4.51	NA
Total VOCs	**75,472.00**	**140.51**	**NA**
Total TICs	ND	29.10	NA
Other Parameters	(ug/l)	(mg/kg)	(mg/kg)
Iron	8,660.00	NA	23,600.00
Manganese	8,350.00	NA	793.00
Total Organic Carbon	NA	NA	3,770.00

Note:

The above list includes the compounds that were detected in at least one sample. The entire list of 37 compounds analyzed plus tentatively identified compounds (TICs) are included in Appendix 1.

ug/l = micrograms per liter mg/kg = milligrams per kilogram

ND = compound was analyzed but not detected at or above the method detection limit (MDL) as indicated by the number following "<".

NA = compound was not analyzed.

Table 2. MFR GW-Test Results
FES/ Watervliet Site, New York
ISOTEC Project Number: 801394

Sample ID	**GWF/Control**	**GWF/T-A**	**GWF/T-B**	**GWF/T-C**
Catalyst Used	**none**	**Cat-4260**	**Cat-4260**	**Cat-4260**
Oxidant Used	**none**	**H2O2**	**H2O2**	**H2O2**
Oxidant Conc. by Sample Weight	**0%**	**0.1%**	**0.5%**	**1%**
Matrix	**Aqueous**	**Aqueous**	**Aqueous**	**Aqueous**
VOCs (ug/l)				
Toluene	65,600.00	ND<0.24	ND<0.24	ND<0.24
Ethylbenzene	ND<260	ND<0.26	ND<0.26	ND<0.26
Total Xylenes	787.00	ND<0.70	ND<0.70	ND<0.70
Total VOCs	**66,387.00**	**0.00**	**0.00**	**0.00**
Total TICs	ND	40.50	15.30	15.90
% Reduction				
Total VOCs	**-**	**100.0%**	**100.0%**	**100.0%**
Final pH Value	6.05	5.73	6.02	6.29

Note:

The above list includes the compounds that were detected in at least one sample. The entire list of 37 compounds analyzed plus tentatively identified compounds (TICs) are included in Appendix 1.

ug/l = micrograms per liter

ND = compound was analyzed but not detected at or above the method detection limit (MDL) as indicated by the number following "<".

Percent reduction is relative to "Control" assuming an "ND" value equal to zero.

Table 3. MFR SL-Test Results
FES/ Watervliet Site, New York
ISOTEC Project Number: 801394

Sample ID	**SLF/Control**	**SLF/T-A**	**SLF/T-B**	**SLF/T-C**
Catalyst Used	**none**	**Cat-4260**	**Cat-4260**	**Cat-4260**
Oxidant Used	**none**	**H2O2**	**H2O2**	**H2O2**
Oxidant Conc. by Sample Weight	**0%**	**0.75%**	**1.5%**	**3.0%**
Matrix	**Soil**	**Soil**	**Soil**	**Soil**
VOCs (mg/kg)				
Toluene	33.80	19.40	7.41	9.09
Ethylbenzene	ND<0.195	0.10	ND<0.097	ND<0.097
Total Xylenes	1.11	0.72	0.29	0.39
Total VOCs	**34.91**	**20.22**	**7.70**	**9.48**
Total TICs	4.41	3.53	ND	0.55
% Reduction				
Total VOCs	**-**	**42.1%**	**77.9%**	**72.9%**
Final pH Value	6.79	6.35	6.51	6.67

Note:

The above list includes the compounds that were detected in at least one sample. The entire list of 37 compounds analyzed plus tentatively identified compounds (TICs) are included in Appendix 1.

mg/kg = milligrams per kilogram

ND = compound was analyzed but not detected at or above the method detection limit (MDL) as indicated by the number following "<".

Percent reduction is relative to "Control" assuming an "ND" value equal to zero.

Table 4. ASP GW-Test Results
FES/ Watervliet Site, New York
ISOTEC Project Number: 801394

		Catalyst Activation		Peroxide Activation		Alkali Activation	
Sample ID	**GW/Control**	**GWC/T-A**	**GWC/T-B**	**GWH/T-C**	**GWH/T-D**	**GWA/T-E**	**GWA/T-F**
Catalyst Used	**none**	**Cat-4260S**	**Cat-4260S**	**H2O2**	**H2O2**	**Alkali**	**Alkali**
Oxidant Used	**none**	**S2O8**	**S2O8**	**S2O8**	**S2O8**	**S2O8**	**S2O8**
Oxidant Conc. by Sample Weight	**0%**	**0.5%**	**1%**	**0.5%**	**1%**	**0.5%**	**1%**
Matrix	**Aqueous**	**Aqueous**	**Aqueous**	**Aqueous**	**Aqueous**	**Aqueous**	**Aqueous**
VOCs (ug/l)							
Chloromethane	ND<205	2.46	75.70	ND<0.41	ND<0.41	ND<82	ND<2.05
Bromomethane	ND<220	ND<0.44	2.53	ND<0.44	ND<0.44	ND<88	ND<2.20
Methylene Chloride	ND<990	ND<1.98	2.53	ND<1.98	ND<1.98	ND<396	ND<9.9
tert-Btyl alcohol (TBA)	ND<560	3.88	4.42	ND<1.12	ND<1.12	ND<224	ND<5.6
Methyl tert-butyl ether (MTBE)	ND<55	0.19	ND<0.11	ND<0.11	ND<0.11	ND<224	ND<0.55
Benzene	ND<140	36.30	0.58	ND<0.28	ND<0.28	ND<56	44.3
Toluene	50,400.00 D	ND<0.24	ND<0.24	ND<0.24	ND<0.24	25200 D	223
Chlorobenzene	ND<115	1.23	ND<0.23	ND<0.23	ND<0.23	ND<46	ND<1.15
Ethylbenzene	ND<130	ND<0.26	ND<0.26	ND<0.26	ND<0.26	68	ND<1.3
Total Xylenes	844.00	ND<0.70	ND<0.70	ND<0.70	ND<0.70	223	ND<3.5
Total VOCs	**51,244.00**	**44.06**	**85.76**	**0.00**	**0.00**	**25,491.00**	**267.30**
Total TICs	ND	275.00	25.30	26.30	71	ND	45
Total VOC Reduction	**-**	**99.9%**	**99.8%**	**100.0%**	**100.0%**	**50.3%**	**99.5%**
Initial S2O8 Value	-	7,000	15,000	7,000	15,000	7,000	15,000
Final S2O8 Value	-	5,000	9,500	6,500	11,000	5,750	10,000
S2O8 Consumption	**-**	**28.6%**	**36.7%**	**7.1%**	**26.7%**	**17.9%**	**33.3%**
Final pH Value	6.27	2.73	2.33	2.21	2.12	12.22	12.3

Note:

The above list includes the compounds that were detected in at least one sample. The entire list of 37 compounds analyzed plus tentatively identified compounds (TICs) along with the Chain-of-Custody are included in Appendix 1.

Cat-4260S = ISOTEC patented catalyst, S2O8 = sodium persulfate, H2O2 = hydrogen peroxide, ug/l = micrograms per liter

ND = compound was analyzed but not detected at or above the method detection limit (MDL) as indicated by the number following "<".

Percent reduction is relative to "Control" assuming an "ND" value equal to zero.

Table 5. ASP SL-Test Results
FES/ Watervliet Site, New York
ISOTEC Project Number: 801394

		Catalyst Activation		Peroxide Activation		Alkali Activation	
Sample ID	**SL/Control**	**SLC/T-A**	**SLC/T-B**	**SLH/T-C**	**SLH/T-D**	**SLA/T-E**	**SLA/T-F**
Catalyst Used	**none**	**Cat-4260S**	**Cat-4260S**	**H2O2**	**H2O2**	**Alkali**	**Alkali**
Oxidant Used	**none**	**S2O8**	**S2O8**	**S2O8**	**S2O8**	**S2O8**	**S2O8**
Oxidant Conc. by Sample Weight	**0%**	**1.5%**	**3%**	**1.5%**	**3%**	**1.5%**	**3%**
Matrix	**0%**	**Slurry**	**Slurry**	**Slurry**	**Slurry**	**Slurry**	**Slurry**
VOCs (mg/kg)							
Toluene	7.13	6.72	2.15	9.16	2.15	10.5	3.33
Total Xylenes	0.78	0.28	0.13	0.36	0.16	0.447	0.171
Total VOCs	**7.91**	**7.00**	**2.28**	**9.52**	**2.31**	**10.95**	**3.50**
Total TICs	ND	275.00	25.30	26.30	71	ND	45
Total VOC Reduction	**-**	**11.6%**	**71.1%**	**increase**	**70.9%**	**increase**	**55.7%**
Initial S2O8 Value	**-**	25,000	59,375	25,000	59,375	25,000	59,375
Final S2O8 Value	**-**	900	1,500	0	0	0	560
S2O8 Consumption	**-**	**96.4%**	**97.5%**	**100.0%**	**100.0%**	**100.0%**	**99.1%**
Final pH Value	6.70	6.17	5.86	6.79	6.27	12.19	10.16

Note:

The above list includes the compounds that were detected in at least one sample. The entire list of 37 compounds analyzed plus tentatively identified compounds (TICs) along with the Chain-of-Custody are included in Appendix 1.

Cat-4260S = ISOTEC patented catalyst, S2O8 = sodium persulfate, H2O2 = hydrogen peroxide

mg/kg = milligrams per kilogram

ND = compound was analyzed but not detected at or above the method detection limit (MDL) as indicated by the number following "<".

Percent reduction is relative to "Control" assuming an "ND" value equal to zero.

APPENDIX 1
LABORATORY ANALYTICAL DATA REPORTS

Integrated Analytical Laboratories LLC

ANALYTICAL DATA REPORT
for
Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET - 801394
Lab Case Number: E09-03320

MDL = METHOD DETECTION LIMIT

Volatiles + Cis 1,2-DCE (Including MTBE & TBA)

Lab ID: 03320-001
Client ID: MW-14
Matrix-Units: Aqueous-ug/L
Percent Moisture: 100

Date Sampled: 4/3/2009
Time Sampled: 11:30
Date Analyzed: 4/8/09

Compound	Conc	Q	MDL
Chloromethane	ND		410
Vinyl chloride	ND		630
Bromomethane	ND		440
Chloroethane	ND		480
Trichlorofluoromethane	ND		520
Acrolein	ND		2490
1,1-Dichloroethene	ND		440
Methylene chloride	ND		1980
Acrylonitrile	ND		1160
tert-Butyl alcohol (TBA)	ND		1120
trans-1,2-Dichloroethene	ND		380
Methyl tert-butyl ether (MTBE)	ND		110
1,1-Dichloroethane	ND		310
cis-1,2-Dichloroethene	ND		190
Chloroform	ND		290
1,1,1-Trichloroethane	ND		370
Carbon tetrachloride	ND		330
1,2-Dichloroethane (EDC)	ND		240
Benzene	ND		280
Trichloroethene	ND		320
1,2-Dichloropropane	ND		200
Bromodichloromethane	ND		190
2-Chloroethyl vinyl ether	ND		170
cis-1,3-Dichloropropene	ND		150
Toluene	74700		240
trans-1,3-Dichloropropene	ND		120
1,1,2-Trichloroethane	ND		170
Tetrachloroethene	ND		320
Dibromochloromethane	ND		120
Chlorobenzene	ND		230
Ethylbenzene	ND		260
Total Xylenes	772		700
Bromoform	ND		140
1,1,2,2-Tetrachloroethane	ND		200
1,3-Dichlorobenzene	ND		150
1,4-Dichlorobenzene	ND		150
1,2-Dichlorobenzene	ND		190
TOTAL VO's:	75500		
TOTAL TIC's:	ND		
TOTAL VO's & TIC's:	75500		

ND = Analyzed for but Not Detected at the MDL

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Randolph, NJ 07869
Phone: 973 361 4252
Fax: 973 989 5288

Integrated Analytical Laboratories LLC

ANALYTICAL DATA REPORT
for
Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET - 801394
Lab Case Number: E09-03320

MDL = METHOD DETECTION LIMIT

Volatiles + Cis 1,2-DCE (Including MTBE & TBA)

Lab ID: 03320-002 | Date Sampled: 4/3/2009
Client ID: SL/INITIAL | Time Sampled: 11:30
Matrix-Units: Sludge-mg/Kg | Date Analyzed: 4/8/09
Percent Moisture: 11.6

Compound	Conc	Q	MDL
Chloromethane	ND		0.808
Vinyl chloride	ND		0.808
Bromomethane	ND		0.808
Chloroethane	ND		0.808
Trichlorofluoromethane	ND		0.808
Acrolein	ND		0.808
1,1-Dichloroethene	ND		0.808
Methylene chloride	ND		0.808
Acrylonitrile	ND		0.808
tert-Butyl alcohol (TBA)	ND		4.04
trans-1,2-Dichloroethene	ND		0.808
Methyl tert-butyl ether (MTBE)	ND		0.808
1,1-Dichloroethane	ND		0.808
cis-1,2-Dichloroethene	ND		0.808
Chloroform	ND		0.808
1,1,1-Trichloroethane	ND		0.808
Carbon tetrachloride	ND		0.808
1,2-Dichloroethane (EDC)	ND		0.808
Benzene	ND		0.404
Trichloroethene	ND		0.808
1,2-Dichloropropane	ND		0.808
Bromodichloromethane	ND		0.808
2-Chloroethyl vinyl ether	ND		0.808
cis-1,3-Dichloropropene	ND		0.808
Toluene	136		0.808
trans-1,3-Dichloropropene	ND		0.808
1,1,2-Trichloroethane	ND		0.808
Tetrachloroethene	ND		0.808
Dibromochloromethane	ND		0.808
Chlorobenzene	ND		0.808
Ethylbenzene	ND		0.808
Total Xylenes	4.51		0.808
Bromoform	ND		0.808
1,1,2,2-Tetrachloroethane	ND		0.808
1,3-Dichlorobenzene	ND		0.808
1,4-Dichlorobenzene	ND		0.808
1,2-Dichlorobenzene	ND		0.808
TOTAL VO's:	141		
TOTAL TIC's:	29.1		
TOTAL VO's & TIC's:	170		

ND = Analyzed for but Not Detected at the MDL

273 Franklin Road
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INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVLIET

Lab ID: 03320-002
Client ID: SL/INITIAL
Date Received: 04/03/2009
Date Analyzed: 04/08/2009
Date File: F0915.D

GC/MS Column: DB-624
Sample wt/vol: 0.007g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 714.3
% Moisture: 11.6

CAS #	Compound	Estimated Concentration	Retention Time
	Unknown alkane	11.6	6.28
	Unknown alkane	10.4	6.77
	Unknown cyclic hydrocarbon	7.11	7.41

Total TICs = 29.1

Integrated Analytical Laboratories LLC

ANALYTICAL DATA REPORT

for

Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET - 801394
Lab Case Number: E09-03320

MDL = METHOD DETECTION LIMIT

Metals

Lab ID: 03320-003 | Date Sampled: 4/3/2009
Client ID: SOIL COMP | Time Sampled: 11:30
Matrix-Units: Soil-mg/Kg | Date Analyzed: 4/10/09
Percent Moisture: 11.6

Parameter	Result	Q	MDL
Iron	23600		28.1
Manganese	793		1.13

General Analytical

Lab ID: 03320-003 | Date Sampled: 4/3/2009
Client ID: SOIL COMP | Time Sampled: 11:30
Percent Moisture: 11.6

Parameter	Result	MDL	Matrix-Units	Date Analyzed
Total Organic Carbons	3770	240	Soil-mg/Kg	4/14/2009 10:00

Metals

Lab ID: 03320-004 | Date Sampled: 4/3/2009
Client ID: MW-14 FILT. | Time Sampled: 11:30
Matrix-Units: Aqueous-ug/L | Date Analyzed: 4/10/09
Percent Moisture: 100

Parameter	Result	Q	MDL
Iron	8660		100
Manganese	8350		4.00

These data have been reviewed and accepted by:

Michael Leftin

Michael H. Leftin, Ph.D.
Laboratory Director

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INTEGRATED ANALYTICAL LABORATORIES
CHAIN OF CUSTODY

CUSTOMER

Company: ISOTEC-WW
Address:
Telephone #:
Fax #:
Project Manager: Prasad Kakarla
Sampler: Yan Chin
Project Name: FES/Watervliet
Project Location (State): NY
Bottle Order #:
Quote #: 80394

REPORTING INFO

REPORT TO: ISOTEC-WW
Address:
Attn:
FAX #
INVOICE TO: ISOTEC-WW
Address:
Attn:
PO # 3669

Turnaround Time (starts the following day if samples rec'd at lab > 5PM)

*Lab notification is required for RUSH TAT prior to sample arrival. RUSH TAT IS NOT GUARANTEED WITHOUT LAB APPROVAL. **RUSH SURCHARGES WILL APPLY IF ABLE TO ACCOMMODATE.

PHC- MUST CHOOSE
DRO (3-5 day TAT) QAM025 (5 day TAT min.)
SEE BELOW (under comments section for explanation)

Verbal/Fax: 24 hr* 48 hr* 72 hr* 1 wk* 2 wk/Std
Hard Copy: 3 wk/Std
Other *call for price
Results needed by:

Rush TAT Charge **: 24 hr - 100%…. 48 hr - 75%…. 72 hr - 50%…. 96 hr - 35%…. 5 day - 25%…. 6-9 day 10%

Report Format: Results Only; Reduced; Regulatory - 15% Surcharge applies; Other (describe)

DISKETTE: SRP. dbf format; SRP.wk1 format; lab approved custom EDD; NO DISK/CD REQ'D

Cooler Temp 4 °C

Sample Matrix
DW - Drinking Water AQ - Aqueous WW - Waste Water
OI - Oil LIQ - Liquid (Specify) OT - Other (Specify)
S - Soil SL - Sludge SOL - Solid W - Wipe

SAMPLE INFORMATION

ANALYTICAL PARAMETERS; # BOTTLES & PRESERVATIVES

Client ID	Depth (ft. only)	Sampling Date	Sampling Time	Matrix	# containers	IAL #	(VOt10)	TOC	Fe	Mn						HCl	NaOH	HNO3	H2SO4	MeOH	Other	None	Encore
MW-14		4/3/09	11:30Am	A	2+1	1	X		X	X						2						1	
SL/Initial		↓	↓	SL	1	2	X													1			
Soil comp				S	1	3		X	X	X												1	

SL/Initial contains: 15.02g-soil, 7.5mL-H2O & 15mL-MeOH.

Known Hazard: Yes or No Describe:
Conc. Expected: Low Med High

Please print legibly and fill out completely. Samples cannot be processed and the turnaround time will not start until any ambiguities have been resolved.

MDL Req: Old GWQS - 11/05 GWQS - SCC - OTHER (SEE COMMENTS)

Comments: Use lowest MDLs possible.

	Signature/Company	Date	Time		Signature/Company
Relinquished by:	[signature]	4/3/09	12noon	Received by:	[signature]
Relinquished by:	[signature]	4/3/09	1610	Received by:	[signature]
Relinquished by:				Received by:	
Relinquished by:				Received by:	
Relinquished by:				Received by:	

DRO (8015B) - used for: Fuel Oil #2/Home Heating Oil #1 /#2
QAM-025 (OQA-QAM025) - used for: all other fuel oils and unknown contamination

Lab Case # 03320

PAGE: 1 of 1

LAB COPIES - WHITE & YELLOW; CLIENT COPY - PINK

PROJECT INFORMATION

E09-03320

Case No. E09-03320 **Project** FES/WATERVLIET - 801394

Customer	**Isotec**	**P.O. #**	3669
Contact	Prasad Kakarla	**Received**	4/3/2009 16:10
EMail	pkakarla@insituoxidation.com; ychin@insituoxidation.com ☑ EMail EDDs	**Verbal Due**	4/17/2009
Phone	(609) 275-8500 **Fax** 1(609) 275-9608	**Report Due**	4/24/2009

Report To	**Bill To**
51 Everett Drive	51 Everett Drive
Suite A-10	Suite A-10
West Windsor, NJ 08550	West Windsor, NJ 08550
Attn: Prasad Kakarla	Attn: Prasad Kakarla

Report Format **Result Only**

Additional Info ☐ State Form ☐ Field Sampling ☐ Conditional VOA

Lab ID	Client Sample ID	Depth Top / Bottom	Sampling Time	Matrix	Unit	# of Containers
03320-001	MW-14	n/a	4/3/2009@11:30	Aqueous	ug/L	3
03320-002	SL/INITIAL	n/a	4/3/2009@11:30	Sludge	mg/Kg	1
03320-003	SOIL COMP	n/a	4/3/2009@11:30	Soil	mg/Kg	1
03320-004	MW-14 FILT.	n/a	4/3/2009@11:30	Aqueous	ug/L	1

Sample #	Tests	Status	QA Method
001	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	624
"	Metals Filtration	Run	
002	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	8260B
003	Iron - Fe	Run	6020
"	Manganese - Mn	Run	6020
"	TOC	Run	Mod Lloyd Kahn
004	Iron - Fe	Run	6020
"	Manganese - Mn	Run	6020

04/06/2009 11:35 by ellen - NOTE 1

PLEASE USE LOWEST MDLs POSSIBLE.

04/06/2009 11:36 by ellen - NOTE 2

SAMPLE CONTENTS: 15.02g SOIL/7.5ml H2O/15ml MEOH

INTEGRATED ANALYTICAL LABORATORIES, LLC

SAMPLE RECEIPT VERIFICATION

CASE NO: **E 09** **03320** CLIENT: ISOTEC --WW

COOLER TEMPERATURE: 2° - 6°C: ✓ (See Chain of Custody)

Comments

COC: COMPLETE / INCOMPLETE

KEY

✓	**= YES/NA**
✗	**= NO**

✓	Bottles Intact
✓	no-Missing Bottles
✓	no-Extra Bottles
✓	Sufficient Sample Volume
✓	no-headspace/bubbles in VOs
✓	Labels intact/correct
✓	pH Check (exclude VOs)[1]
✓	Correct bottles/preservative
✓	Sufficient Holding/Prep Time[1]
	Sample to be Subcontracted
✓	**Chain of Custody is Clear**

[1] All samples with "Analyze Immediately" holding times will be analyzed by this laboratory past the holding time. This includes but is not limited to the following tests: pH, Temperature, Free Residual Chlorine, Total Residual Chlorine, Dissolved Oxygen, Sulfite.

ADDITIONAL COMMENTS:

SAMPLE(S) VERIFIED BY: INITIAL DM DATE 4/3/09

CORRECTIVE ACTION REQUIRED: **YES** (SEE BELOW) **NO**

If COC is **NOT** clear, ***STOP*** until you get client to authorize/clarify work.

CLIENT NOTIFIED: YES Date/ Time: NO

PROJECT CONTACT:

SUBCONTRACTED LAB:

DATE SHIPPED:

ADDITIONAL COMMENTS:

VERIFIED/TAKEN BY: INITIAL KN DATE 4/6/09

Laboratory Custody Chronicle

IAL Case No.

E09-03320

Client Isotec

Project FES/WATERVLIET - 801394

Received On 4/ 3/2009@16:10

Department: Volatiles			Prep. Date	Analyst	Analysis Date	Analyst
PP VOA + 10 + Cis 1,2-DCE + MTBE & TBA	03320-001	Aqueous	n/a	n/a	4/ 8/09	Barbara
"	-002	Sludge	n/a	n/a	4/ 8/09	Xing

Department: Metals			Prep. Date	Analyst	Analysis Date	Analyst
Iron - Fe	-003	Soil	4/ 9/09	Lisa	4/10/09	Wei
"	-004	Aqueous	4/ 7/09	Lisa	4/10/09	Wei
Manganese - Mn	-003	Soil	4/ 9/09	Lisa	4/10/09	Wei
"	-004	Aqueous	4/ 7/09	Lisa	4/10/09	Wei

Department: Wet Chemistry			Prep. Date	Analyst	Analysis Date	Analyst
TOC	-003	Soil	n/a	n/a	4/14/09	Elma

Review and Approval: AJeanno

Integrated Analytical Labs ~ 273 Franklin Road, Randolph, NJ 07869 ~ (973) 361-4252 ~ Fax (973) 989-5288

Integrated Analytical Laboratories LLC

ANALYTICAL DATA REPORT
for
Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET SITE - 801394
Lab Case Number: E09-03394

MDL = METHOD DETECTION LIMIT

Volatiles (Including MTBE & TBA)

Lab ID: 03394-001
Client ID: SLF/CONTROL
Matrix-Units: Sludge-mg/Kg
Percent Moisture: 11.6

Date Sampled: 4/6/2009
Time Sampled: 11:00
Date Analyzed: 4/8/09

Compound	Conc	Q	MDL
Chloromethane	ND		0.195
Vinyl chloride	ND		0.195
Bromomethane	ND		0.195
Chloroethane	ND		0.195
Trichlorofluoromethane	ND		0.195
Acrolein	ND		0.195
1,1-Dichloroethene	ND		0.195
Methylene chloride	ND		0.195
Acrylonitrile	ND		0.195
tert-Butyl alcohol (TBA)	ND		0.975
trans-1,2-Dichloroethene	ND		0.195
Methyl tert-butyl ether (MTBE)	ND		0.195
1,1-Dichloroethane	ND		0.195
cis-1,2-Dichloroethene	ND		0.195
Chloroform	ND		0.195
1,1,1-Trichloroethane	ND		0.195
Carbon tetrachloride	ND		0.195
1,2-Dichloroethane (EDC)	ND		0.195
Benzene	ND		0.097
Trichloroethene	ND		0.195
1,2-Dichloropropane	ND		0.195
Bromodichloromethane	ND		0.195
2-Chloroethyl vinyl ether	ND		0.195
cis-1,3-Dichloropropene	ND		0.195
Toluene	33.8		0.195
trans-1,3-Dichloropropene	ND		0.195
1,1,2-Trichloroethane	ND		0.195
Tetrachloroethene	ND		0.195

ND = Analyzed for but Not Detected at the MDL
Continued on Next Page

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Integrated Analytical Laboratories LLC

ANALYTICAL DATA REPORT
for
Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET SITE - 801394
Lab Case Number: E09-03394

MDL = METHOD DETECTION LIMIT

Volatiles (Including MTBE & TBA)

Lab ID: 03394-001
Client ID: SLF/CONTROL
Matrix-Units: Sludge-mg/Kg
Percent Moisture: 11.6

Date Sampled: 4/6/2009
Time Sampled: 11:00
Date Analyzed: 4/8/09

Compound	Conc	Q	MDL
Dibromochloromethane	ND		0.195
Chlorobenzene	ND		0.195
Ethylbenzene	ND		0.195
Total Xylenes	1.11		0.195
Bromoform	ND		0.195
1,1,2,2-Tetrachloroethane	ND		0.195
1,3-Dichlorobenzene	ND		0.195
1,4-Dichlorobenzene	ND		0.195
1,2-Dichlorobenzene	ND		0.195
TOTAL VO's:	34.9		
TOTAL TIC's:	4.41		
TOTAL VO's & TIC's:	39.3		

ND = Analyzed for but Not Detected at the MDL

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ANALYTICAL DATA REPORT
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Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET SITE - 801394
Lab Case Number: E09-03394

MDL = METHOD DETECTION LIMIT

Volatiles (Including MTBE & TBA)

Lab ID: 03394-002
Client ID: SLF/T-A
Matrix-Units: Sludge-mg/Kg
Percent Moisture: 11.6

Date Sampled: 4/6/2009
Time Sampled: 11:00
Date Analyzed: 4/8/09

Compound	Conc	Q	MDL
Chloromethane	ND		0.097
Vinyl chloride	ND		0.097
Bromomethane	ND		0.097
Chloroethane	ND		0.097
Trichlorofluoromethane	ND		0.097
Acrolein	ND		0.097
1,1-Dichloroethene	ND		0.097
Methylene chloride	ND		0.097
Acrylonitrile	ND		0.097
tert-Butyl alcohol (TBA)	ND		0.488
trans-1,2-Dichloroethene	ND		0.097
Methyl tert-butyl ether (MTBE)	ND		0.097
1,1-Dichloroethane	ND		0.097
cis-1,2-Dichloroethene	ND		0.097
Chloroform	ND		0.097
1,1,1-Trichloroethane	ND		0.097
Carbon tetrachloride	ND		0.097
1,2-Dichloroethane (EDC)	ND		0.097
Benzene	ND		0.049
Trichloroethene	ND		0.097
1,2-Dichloropropane	ND		0.097
Bromodichloromethane	ND		0.097
2-Chloroethyl vinyl ether	ND		0.097
cis-1,3-Dichloropropene	ND		0.097
Toluene	19.4		0.097
trans-1,3-Dichloropropene	ND		0.097
1,1,2-Trichloroethane	ND		0.097

ND = Analyzed for but Not Detected at the MDL
Continued on Next Page

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ANALYTICAL DATA REPORT
for
Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET SITE - 801394
Lab Case Number: E09-03394

MDL = METHOD DETECTION LIMIT

Volatiles (Including MTBE & TBA)

Lab ID: 03394-002 — Date Sampled: 4/6/2009
Client ID: SLF/T-A — Time Sampled: 11:00
Matrix-Units: Sludge-mg/Kg — Date Analyzed: 4/8/09
Percent Moisture: 11.6

Compound	Conc	Q	MDL
Tetrachloroethene	ND		0.097
Dibromochloromethane	ND		0.097
Chlorobenzene	ND		0.097
Ethylbenzene	0.103		0.097
Total Xylenes	0.720		0.097
Bromoform	ND		0.097
1,1,2,2-Tetrachloroethane	ND		0.097
1,3-Dichlorobenzene	ND		0.097
1,4-Dichlorobenzene	ND		0.097
1,2-Dichlorobenzene	ND		0.097
TOTAL VO's:	20.2		
TOTAL TIC's:	3.53		
TOTAL VO's & TIC's:	23.7		

Volatiles (Including MTBE & TBA)

Lab ID: 03394-003 — Date Sampled: 4/6/2009
Client ID: SLF/T-B — Time Sampled: 11:00
Matrix-Units: Sludge-mg/Kg — Date Analyzed: 4/8/09
Percent Moisture: 11.6

Compound	Conc	Q	MDL
Chloromethane	ND		0.097
Vinyl chloride	ND		0.097
Bromomethane	ND		0.097
Chloroethane	ND		0.097
Trichlorofluoromethane	ND		0.097
Acrolein	ND		0.097
1,1-Dichloroethene	ND		0.097
Methylene chloride	ND		0.097

ND = Analyzed for but Not Detected at the MDL

Continued on Next Page

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ANALYTICAL DATA REPORT
for
Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET SITE - 801394
Lab Case Number: E09-03394

MDL = METHOD DETECTION LIMIT

Volatiles (Including MTBE & TBA)

Lab ID: 03394-003
Client ID: SLF/T-B
Matrix-Units: Sludge-mg/Kg
Percent Moisture: 11.6

Date Sampled: 4/6/2009
Time Sampled: 11:00
Date Analyzed: 4/8/09

Compound	Conc	Q	MDL
Acrylonitrile	ND		0.097
tert-Butyl alcohol (TBA)	ND		0.488
trans-1,2-Dichloroethene	ND		0.097
Methyl tert-butyl ether (MTBE)	ND		0.097
1,1-Dichloroethane	ND		0.097
cis-1,2-Dichloroethene	ND		0.097
Chloroform	ND		0.097
1,1,1-Trichloroethane	ND		0.097
Carbon tetrachloride	ND		0.097
1,2-Dichloroethane (EDC)	ND		0.097
Benzene	ND		0.049
Trichloroethene	ND		0.097
1,2-Dichloropropane	ND		0.097
Bromodichloromethane	ND		0.097
2-Chloroethyl vinyl ether	ND		0.097
cis-1,3-Dichloropropene	ND		0.097
Toluene	7.41		0.097
trans-1,3-Dichloropropene	ND		0.097
1,1,2-Trichloroethane	ND		0.097
Tetrachloroethene	ND		0.097
Dibromochloromethane	ND		0.097
Chlorobenzene	ND		0.097
Ethylbenzene	ND		0.097
Total Xylenes	0.288		0.097
Bromoform	ND		0.097
1,1,2,2-Tetrachloroethane	ND		0.097
1,3-Dichlorobenzene	ND		0.097
1,4-Dichlorobenzene	ND		0.097
1,2-Dichlorobenzene	ND		0.097
TOTAL VO's:	7.70		
TOTAL TIC's:	ND		
TOTAL VO's & TIC's:	7.70		

ND = Analyzed for but Not Detected at the MDL

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Integrated Analytical Laboratories LLC

ANALYTICAL DATA REPORT

for

Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET SITE - 801394
Lab Case Number: E09-03394

MDL = METHOD DETECTION LIMIT

Volatiles (Including MTBE & TBA)

Lab ID: 03394-004
Client ID: SLF/T-C
Matrix-Units: Sludge-mg/Kg
Percent Moisture: 11.6

Date Sampled: 4/6/2009
Time Sampled: 11:00
Date Analyzed: 4/8/09

Compound	Conc	Q	MDL
Chloromethane	ND		0.097
Vinyl chloride	ND		0.097
Bromomethane	ND		0.097
Chloroethane	ND		0.097
Trichlorofluoromethane	ND		0.097
Acrolein	ND		0.097
1,1-Dichloroethene	ND		0.097
Methylene chloride	ND		0.097
Acrylonitrile	ND		0.097
tert-Butyl alcohol (TBA)	ND		0.488
trans-1,2-Dichloroethene	ND		0.097
Methyl tert-butyl ether (MTBE)	ND		0.097
1,1-Dichloroethane	ND		0.097
cis-1,2-Dichloroethene	ND		0.097
Chloroform	ND		0.097
1,1,1-Trichloroethane	ND		0.097
Carbon tetrachloride	ND		0.097
1,2-Dichloroethane (EDC)	ND		0.097
Benzene	ND		0.049
Trichloroethene	ND		0.097
1,2-Dichloropropane	ND		0.097
Bromodichloromethane	ND		0.097
2-Chloroethyl vinyl ether	ND		0.097
cis-1,3-Dichloropropene	ND		0.097
Toluene	9.09		0.097
trans-1,3-Dichloropropene	ND		0.097
1,1,2-Trichloroethane	ND		0.097
Tetrachloroethene	ND		0.097

ND = Analyzed for but Not Detected at the MDL

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Integrated Analytical Laboratories LLC

ANALYTICAL DATA REPORT
for
Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET SITE - 801394
Lab Case Number: E09-03394

MDL = METHOD DETECTION LIMIT

Volatiles (Including MTBE & TBA)

Lab ID: 03394-004 | Date Sampled: 4/6/2009
Client ID: SLF/T-C | Time Sampled: 11:00
Matrix-Units: Sludge-mg/Kg | Date Analyzed: 4/8/09
Percent Moisture: 11.6

Compound	Conc	Q	MDL
Dibromochloromethane	ND		0.097
Chlorobenzene	ND		0.097
Ethylbenzene	ND		0.097
Total Xylenes	0.386		0.097
Bromoform	ND		0.097
1,1,2,2-Tetrachloroethane	ND		0.097
1,3-Dichlorobenzene	ND		0.097
1,4-Dichlorobenzene	ND		0.097
1,2-Dichlorobenzene	ND		0.097
TOTAL VO's:	9.48		
TOTAL TIC's:	0.546		
TOTAL VO's & TIC's:	10.0		

Volatiles (Including MTBE & TBA)

Lab ID: 03394-005 | Date Sampled: 4/6/2009
Client ID: GWF/CONTROL | Time Sampled: 11:00
Matrix-Units: Aqueous-ug/L | Date Analyzed: 4/9/09
Percent Moisture: 100

Compound	Conc	Q	MDL
Chloromethane	ND		410
Vinyl chloride	ND		630
Bromomethane	ND		440
Chloroethane	ND		480
Trichlorofluoromethane	ND		520
Acrolein	ND		2490
1,1-Dichloroethene	ND		440
Methylene chloride	ND		1980
Acrylonitrile	ND		1160

ND = Analyzed for but Not Detected at the MDL

Continued on Next Page

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Integrated Analytical Laboratories LLC

ANALYTICAL DATA REPORT
for
Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET SITE - 801394
Lab Case Number: E09-03394

MDL = METHOD DETECTION LIMIT

Volatiles (Including MTBE & TBA)

Lab ID: 03394-005
Client ID: GWF/CONTROL
Matrix-Units: Aqueous-ug/L
Percent Moisture: 100

Date Sampled: 4/6/2009
Time Sampled: 11:00
Date Analyzed: 4/9/09

Compound	Conc	Q	MDL
tert-Butyl alcohol (TBA)	ND		1120
trans-1,2-Dichloroethene	ND		380
Methyl tert-butyl ether (MTBE)	ND		110
1,1-Dichloroethane	ND		310
cis-1,2-Dichloroethene	ND		190
Chloroform	ND		290
1,1,1-Trichloroethane	ND		370
Carbon tetrachloride	ND		330
1,2-Dichloroethane (EDC)	ND		240
Benzene	ND		280
Trichloroethene	ND		320
1,2-Dichloropropane	ND		200
Bromodichloromethane	ND		190
2-Chloroethyl vinyl ether	ND		170
cis-1,3-Dichloropropene	ND		150
Toluene	65600		240
trans-1,3-Dichloropropene	ND		120
1,1,2-Trichloroethane	ND		170
Tetrachloroethene	ND		320
Dibromochloromethane	ND		120
Chlorobenzene	ND		230
Ethylbenzene	ND		260
Total Xylenes	787		700
Bromoform	ND		140
1,1,2,2-Tetrachloroethane	ND		200
1,3-Dichlorobenzene	ND		150
1,4-Dichlorobenzene	ND		150
1,2-Dichlorobenzene	ND		190
TOTAL VO's:	66400		
TOTAL TIC's:	ND		
TOTAL VO's & TIC's:	66400		

ND = Analyzed for but Not Detected at the MDL

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ANALYTICAL DATA REPORT
for
Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET SITE - 801394
Lab Case Number: E09-03394

MDL = METHOD DETECTION LIMIT

Volatiles (Including MTBE & TBA)

Lab ID: 03394-006
Client ID: GWF/T-A
Matrix-Units: Aqueous-ug/L
Percent Moisture: 100

Date Sampled: 4/6/2009
Time Sampled: 11:00
Date Analyzed: 4/9/09

Compound	Conc	Q	MDL
Chloromethane	ND		0.410
Vinyl chloride	ND		0.630
Bromomethane	ND		0.440
Chloroethane	ND		0.480
Trichlorofluoromethane	ND		0.520
Acrolein	ND		2.49
1,1-Dichloroethene	ND		0.440
Methylene chloride	ND		1.98
Acrylonitrile	ND		1.16
tert-Butyl alcohol (TBA)	ND		1.12
trans-1,2-Dichloroethene	ND		0.380
Methyl tert-butyl ether (MTBE)	ND		0.110
1,1-Dichloroethane	ND		0.310
cis-1,2-Dichloroethene	ND		0.190
Chloroform	ND		0.290
1,1,1-Trichloroethane	ND		0.370
Carbon tetrachloride	ND		0.330
1,2-Dichloroethane (EDC)	ND		0.240
Benzene	ND		0.280
Trichloroethene	ND		0.320
1,2-Dichloropropane	ND		0.200
Bromodichloromethane	ND		0.190
2-Chloroethyl vinyl ether	ND		0.170
cis-1,3-Dichloropropene	ND		0.150
Toluene	ND		0.240
trans-1,3-Dichloropropene	ND		0.120
1,1,2-Trichloroethane	ND		0.170
Tetrachloroethene	ND		0.320

ND = Analyzed for but Not Detected at the MDL
Continued on Next Page

Integrated Analytical Laboratories LLC

ANALYTICAL DATA REPORT
for
Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET SITE - 801394
Lab Case Number: E09-03394

MDL = METHOD DETECTION LIMIT

Volatiles (Including MTBE & TBA)

Lab ID: 03394-006 | Date Sampled: 4/6/2009
Client ID: GWF/T-A | Time Sampled: 11:00
Matrix-Units: Aqueous-ug/L | Date Analyzed: 4/9/09
Percent Moisture: 100

Compound	Conc	Q	MDL
Dibromochloromethane	ND		0.120
Chlorobenzene	ND		0.230
Ethylbenzene	ND		0.260
Total Xylenes	ND		0.700
Bromoform	ND		0.140
1,1,2,2-Tetrachloroethane	ND		0.200
1,3-Dichlorobenzene	ND		0.150
1,4-Dichlorobenzene	ND		0.150
1,2-Dichlorobenzene	ND		0.190
TOTAL VO's:	ND		
TOTAL TIC's:	40.5		
TOTAL VO's & TIC's:	40.5		

Volatiles (Including MTBE & TBA)

Lab ID: 03394-007 | Date Sampled: 4/6/2009
Client ID: GWF/T-B | Time Sampled: 11:00
Matrix-Units: Aqueous-ug/L | Date Analyzed: 4/9/09
Percent Moisture: 100

Compound	Conc	Q	MDL
Chloromethane	ND		0.410
Vinyl chloride	ND		0.630
Bromomethane	ND		0.440
Chloroethane	ND		0.480
Trichlorofluoromethane	ND		0.520
Acrolein	ND		2.49
1,1-Dichloroethene	ND		0.440
Methylene chloride	ND		1.98
Acrylonitrile	ND		1.16
tert-Butyl alcohol (TBA)	ND		1.12

ND = Analyzed for but Not Detected at the MDL
Continued on Next Page

273 Franklin Road
Randolph, NJ 07869
Phone: 973 361 4252
Fax: 973 989 5288

Integrated Analytical Laboratories LLC

ANALYTICAL DATA REPORT
for
Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET SITE - 801394
Lab Case Number: E09-03394

MDL = METHOD DETECTION LIMIT

Volatiles (Including MTBE & TBA)

Lab ID: 03394-007
Client ID: GWF/T-B
Matrix-Units: Aqueous-ug/L
Percent Moisture: 100

Date Sampled: 4/6/2009
Time Sampled: 11:00
Date Analyzed: 4/9/09

Compound	Conc	Q	MDL
trans-1,2-Dichloroethene	ND		0.380
Methyl tert-butyl ether (MTBE)	ND		0.110
1,1-Dichloroethane	ND		0.310
cis-1,2-Dichloroethene	ND		0.190
Chloroform	ND		0.290
1,1,1-Trichloroethane	ND		0.370
Carbon tetrachloride	ND		0.330
1,2-Dichloroethane (EDC)	ND		0.240
Benzene	ND		0.280
Trichloroethene	ND		0.320
1,2-Dichloropropane	ND		0.200
Bromodichloromethane	ND		0.190
2-Chloroethyl vinyl ether	ND		0.170
cis-1,3-Dichloropropene	ND		0.150
Toluene	ND		0.240
trans-1,3-Dichloropropene	ND		0.120
1,1,2-Trichloroethane	ND		0.170
Tetrachloroethene	ND		0.320
Dibromochloromethane	ND		0.120
Chlorobenzene	ND		0.230
Ethylbenzene	ND		0.260
Total Xylenes	ND		0.700
Bromoform	ND		0.140
1,1,2,2-Tetrachloroethane	ND		0.200
1,3-Dichlorobenzene	ND		0.150
1,4-Dichlorobenzene	ND		0.150
1,2-Dichlorobenzene	ND		0.190
TOTAL VO's:	ND		
TOTAL TIC's:	15.3		
TOTAL VO's & TIC's:	15.3		

ND = Analyzed for but Not Detected at the MDL

273 Franklin Road
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Fax: 973 989 5288

Integrated Analytical Laboratories LLC

ANALYTICAL DATA REPORT
for
Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET SITE - 801394
Lab Case Number: E09-03394

MDL = METHOD DETECTION LIMIT

Volatiles (Including MTBE & TBA)

Lab ID: 03394-008
Client ID: GWF/T-C
Matrix-Units: Aqueous-ug/L
Percent Moisture: 100

Date Sampled: 4/6/2009
Time Sampled: 11:00
Date Analyzed: 4/9/09

Compound	Conc	Q	MDL
Chloromethane	ND		0.410
Vinyl chloride	ND		0.630
Bromomethane	ND		0.440
Chloroethane	ND		0.480
Trichlorofluoromethane	ND		0.520
Acrolein	ND		2.49
1,1-Dichloroethene	ND		0.440
Methylene chloride	ND		1.98
Acrylonitrile	ND		1.16
tert-Butyl alcohol (TBA)	ND		1.12
trans-1,2-Dichloroethene	ND		0.380
Methyl tert-butyl ether (MTBE)	ND		0.110
1,1-Dichloroethane	ND		0.310
cis-1,2-Dichloroethene	ND		0.190
Chloroform	ND		0.290
1,1,1-Trichloroethane	ND		0.370
Carbon tetrachloride	ND		0.330
1,2-Dichloroethane (EDC)	ND		0.240
Benzene	ND		0.280
Trichloroethene	ND		0.320
1,2-Dichloropropane	ND		0.200
Bromodichloromethane	ND		0.190
2-Chloroethyl vinyl ether	ND		0.170
cis-1,3-Dichloropropene	ND		0.150
Toluene	ND		0.240
trans-1,3-Dichloropropene	ND		0.120
1,1,2-Trichloroethane	ND		0.170

ND = Analyzed for but Not Detected at the MDL
Continued on Next Page

Integrated Analytical Laboratories LLC

ANALYTICAL DATA REPORT
for
Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: FES/WATERVLIET SITE - 801394
Lab Case Number: E09-03394

MDL = METHOD DETECTION LIMIT

Volatiles (Including MTBE & TBA)

Lab ID: 03394-008
Client ID: GWF/T-C
Matrix-Units: Aqueous-ug/L
Percent Moisture: 100

Date Sampled: 4/6/2009
Time Sampled: 11:00
Date Analyzed: 4/9/09

Compound	Conc	Q	MDL
Tetrachloroethene	ND		0.320
Dibromochloromethane	ND		0.120
Chlorobenzene	ND		0.230
Ethylbenzene	ND		0.260
Total Xylenes	ND		0.700
Bromoform	ND		0.140
1,1,2,2-Tetrachloroethane	ND		0.200
1,3-Dichlorobenzene	ND		0.150
1,4-Dichlorobenzene	ND		0.150
1,2-Dichlorobenzene	ND		0.190
TOTAL VO's:	ND		
TOTAL TIC's:	15.9		
TOTAL VO's & TIC's:	15.9		

ND = Analyzed for but Not Detected at the MDL

These data have been reviewed and accepted by:

Michael H. Leftin

Michael H. Leftin, Ph.D.
Laboratory Director

273 Franklin Road
Randolph, NJ 07869
Phone: 973 361 4252
Fax: 973 989 5288

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVLIET

Lab ID: 03394-001
Client ID: SLF/CONTROL
Date Received: 04/06/2009
Date Analyzed: 04/08/2009
Date File: F0916.D

GC/MS Column: DB-624
Sample wt/vol: 0.029g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 172.4
% Moisture: 11.6

CAS #	Compound	Estimated Concentration	Retention Time
	Unknown alkane	1.52	6.27
	Unknown alkane	1.60	6.76
	Unknown cyclic hydrocarbon	1.29	7.40

Total TICs = 4.41

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVLIET

Lab ID: 03394-002
Client ID: SLF/T-A
Date Received: 04/06/2009
Date Analyzed: 04/08/2009
Date File: F0917.D

GC/MS Column: DB-624
Sample wt/vol: 0.058g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 86.2
% Moisture: 11.6

CAS #	Compound	Estimated Concentration	Retention Time
	Unknown alkane	1.28	6.27
	Unknown alkane	1.30	6.76
	Unknown cyclic hydrocarbon	0.946	7.40

Total TICs = 3.53

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVLIET

Lab ID: 03394-003
Client ID: SLF/T-B
Date Received: 04/06/2009
Date Analyzed: 04/08/2009
Date File: F0918.D

GC/MS Column: DB-624
Sample wt/vol: 0.058g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 86.2
% Moisture: 11.6

CAS #	Compound	Estimated Concentration	Retention Time
	No peaks detected		

Total TICs = 0

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVLIET

Lab ID: 03394-004
Client ID: SLF/T-C
Date Received: 04/06/2009
Date Analyzed: 04/08/2009
Date File: F0919.D

GC/MS Column: DB-624
Sample wt/vol: 0.058g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 86.2
% Moisture: 11.6

CAS #	Compound	Estimated Concentration	Retention Time
	Unknown alkane	0.546	6.76

Total TICs = 0.546

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03394-005
Client ID: GWF/CONTROL
Date Received: 04/06/2009
Date Analyzed: 04/09/2009
Data file: E5457.D

GC/MS Column: DB-624
Sample wt/vol: 0.005mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 1000
% Moisture: 100

CAS #	Compound	Estimated Concentration	Retention Time
	No peaks detected		

Total TICs = 0

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03394-006
Client ID: GWF/T-A
Date Received: 04/06/2009
Date Analyzed: 04/09/2009
Date File: E5458.D

GC/MS Column: DB-624
Sample wt/vol: 5mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 1
% Moisture: 100

CAS #	Compound	Estimated Concentration	Retention Time
	Unknown	10.4	2.42
000067-64-1	Acetone	21.3	3.86
	Unknown	4.90	8.08
	Unknown	3.90	8.87

Total TICs = 40.5

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03394-007
Client ID: GWF/T-B
Date Received: 04/06/2009
Date Analyzed: 04/09/2009
Date File: E5459.D

GC/MS Column: DB-624
Sample wt/vol: 5mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 1
% Moisture: 100

CAS #	Compound	Estimated Concentration	Retention Time
000067-64-1	Acetone	15.3	3.86

Total TICs = 15.3

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03394-008
Client ID: GWF/T-C
Date Received: 04/06/2009
Date Analyzed: 04/09/2009
Date File: E5460.D

GC/MS Column: DB-624
Sample wt/vol: 5mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 1
% Moisture: 100

CAS #	Compound	Estimated Concentration	Retention Time
000067-64-1	Acetone	12.8	3.86
	Unknown alkane	3.10	5.81

Total TICs = 15.9

Phone # (973) 361-4252
Fax # (973) 989-5288

INTEGRATED ANALYTICAL LABORATORIES
CHAIN OF CUSTODY

273 Franklin Rd
Randolph, NJ 07869

CUSTOMER		REPORTING INFO	
Company:	ISOTEC - WW	REPORT TO:	ISOTEC - WW
Address:		Address:	
Telephone #:		Attn:	
Fax #:		FAX #	
Project Manager:	Prasad Kakarla	INVOICE TO:	ISOTEC - WW
Sampler:	Yan Chin	Address:	
Project Name:	FES/Watervliet Site		
Project Location (State):	NY		
Bottle Order #:		Attn:	
Quote #:	801394	PO #	

Turnaround Time (starts the following day if samples rec'd at lab > 5PM)

* Lab notification is required for RUSH TAT prior to sample arrival. RUSH TAT IS NOT GUARANTEED WITHOUT LAB APPROVAL. **RUSH SURCHARGES WILL APPLY IF ABLE TO ACCOMMODATE.

PHC- MUST CHOOSE
DRO (3-5 day TAT) QAM025 (5 day TAT min.)
SEE BELOW (under comments section for explanation)

Verbal/Fax: 24 hr* 48 hr* 72 hr* 1 wk* 2 wk/Std
Results needed by:
Hard Copy: 3 wk/Std
Other *call for price

Rush TAT Charge **: 24 hr - 100%…. 48 hr - 75%…. 72 hr - 50%…. 96 hr - 35%…. 5 day - 25%…. 6-9 day 10%

Report Format: Results Only; Reduced; Regulatory - 15% Surcharge applies; Other (describe)

DISKETTE: SRP. dbf format; SRP.wk1 format; lab approved custom EDD; NO DISK/CD REQ'D

Cooler Temp 4 °C

Sample Matrix
DW - Drinking Water AQ - Aqueous WW - Waste Water
OI - Oil LIQ - Liquid (Specify) OT - Other (Specify)
S - Soil SL - Sludge SOL - Solid W - Wipe

SAMPLE INFORMATION

Client ID	Depth (ft. only)	Sampling Date	Sampling Time	Matrix	# containers	IAL #	(VOHO)	Sample Contents: Soil (g)	H2O (ml)	MeOH (ml)	HCl	NaOH	HNO3	H2SO4	MeOH	Other	None	Encore
SLF/Control		4/6/09	11 AM	SL	1	1	X	15.03	10.71	15					1			
SLF/T-A		↓	↓	↓	↓	2	↓	15.02	↓	↓					1			
SLF/T-B		↓	↓	↓	↓	3	↓	15.00	↓	↓					1			
SLF/T-C		↓	↓	↓	↓	4	↓	15.01	↓	↓					1			
GWF/Control		↓	↓	A	2	5	↓				2							
GWF/T-A		↓	↓	↓	↓	6	↓				2							
GWF/T-B		↓	↓	↓	↓	7	↓				2							
GWF/T-C		↓	↓	↓	↓	8	↓				2							

Known Hazard: Yes or No Describe:

Conc. Expected: Low Med High

Please print legibly and fill out completely. Samples cannot be processed and the turnaround time will not start until any ambiguities have been resolved.

MDL Req: Old GWQS - 11/05 GWQS - SCC - OTHER (SEE COMMENTS)

	Signature/Company	Date	Time		Signature/Company
Relinquished by:	[signature]	4/6/09	11 AM	Received by:	[signature]
Relinquished by:	[signature]	4-6-09	1720	Received by:	[signature]
Relinquished by:				Received by:	
Relinquished by:				Received by:	
Relinquished by:				Received by:	

Comments: Use lowest MDLs possible. MDLs for "control" should NOT be lower than other samples. Use "True" MDLs as reporting limits.

DRO (8015B) - used for: Fuel Oil #2/Home Heating Oil #1 /#2
QAM-025 (OQA-QAM025) - used for: all other fuel oils and unknown contamination

Lab Case # 03394

PAGE: 1 of 1

LAB COPIES - WHITE & YELLOW; CLIENT COPY - PINK

01/2007 rev

Ref. No: G 393600198

PROJECT INFORMATION

E09-03394

Case No. E09-03394 **Project** FES/WATERVLIET SITE - 801394

Customer Isotec

P.O. # 3671

Contact Prasad Kakarla

EMail pkakarla@insituoxidation.com; ychin@insituoxidation.com

☑ EMail EDDs

Phone (609) 275-8500 **Fax** 1(609) 275-9608

Received 4/6/2009 17:20

Verbal Due 4/21/2009

Report Due 4/28/2009

Report To

51 Everett Drive

Suite A-10

West Windsor, NJ 08550

Attn: Prasad Kakarla

Bill To

51 Everett Drive

Suite A-10

West Windsor, NJ 08550

Attn: Prasad Kakarla

Report Format **Result Only**

Additional Info ☐ State Form ☐ Field Sampling ☐ Conditional VOA

Lab ID	Client Sample ID	Depth Top / Bottom	Sampling Time	Matrix	Unit	# of Containers
03394-001	SLF/CONTROL	n/a	4/6/2009@11:00	Sludge	mg/Kg	1
03394-002	SLF/T-A	n/a	4/6/2009@11:00	Sludge	mg/Kg	1
03394-003	SLF/T-B	n/a	4/6/2009@11:00	Sludge	mg/Kg	1
03394-004	SLF/T-C	n/a	4/6/2009@11:00	Sludge	mg/Kg	1
03394-005	GWF/CONTROL	n/a	4/6/2009@11:00	Aqueous	ug/L	2
03394-006	GWF/T-A	n/a	4/6/2009@11:00	Aqueous	ug/L	2
03394-007	GWF/T-B	n/a	4/6/2009@11:00	Aqueous	ug/L	2
03394-008	GWF/T-C	n/a	4/6/2009@11:00	Aqueous	ug/L	2

Sample #	Tests	Status	QA Method
001	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	In Process	8260B
002	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	In Process	8260B
003	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	In Process	8260B
004	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	In Process	8260B
005	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	624
006	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	624
007	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	624
008	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	624

04/07/2009 09:42 by ellen - NOTE 1

SAMPLE CONTENTS:
SAMPLE #1: 15.03g SOIL/10.71ml H2O/15ml MEOH
SAMPLE #2: 15.02g SOIL/10.71ml H2O/15ml MEOH
SAMPLE #3: 15.00g SOIL/10.71ml H2O/15ml MEOH
SAMPLE #4: 15.01g SOIL/10.71ml H2O/15ml MEOH

04/07/2009 09:44 by ellen - NOTE 2

PLEASE USE LOWEST MDLs POSSIBLE. MDLs FOR CONTROL SAMPLES SHOULD NOT BE LOWER THAN OTHER SAMPLES. USE TRUE MDLs AS THE REPORTING LIMTS. MDLs SHOULD NOT EXCEED THE MDLs USED IN JOB #3320.

INTEGRATED ANALYTICAL LABORATORIES, LLC

SAMPLE RECEIPT VERIFICATION

CASE NO: **E 09** **03394** CLIENT: ISOTEC -WW

COOLER TEMPERATURE: 2° - 6°C: ✓ (See Chain of Custody)

Comments

COC: COMPLETE / INCOMPLETE

KEY

✓	**= YES/NA**
✗	**= NO**

		Comments
✓	Bottles Intact	
✓	no-Missing Bottles	
✓	no-Extra Bottles	
✓	Sufficient Sample Volume	
✓	no-headspace/bubbles in VOs	
✓	Labels intact/correct	
✓	pH Check (exclude VOs)[1]	
✓	Correct bottles/preservative	
✓	Sufficient Holding/Prep Time[1]	
	Sample to be Subcontracted	
✓	**Chain of Custody is Clear**	

[1] All samples with "Analyze Immediately" holding times will be analyzed by this laboratory past the holding time. This includes but is not limited to the following tests: pH, Temperature, Free Residual Chlorine, Total Residual Chlorine, Dissolved Oxygen, Sulfite.

ADDITIONAL COMMENTS:

SAMPLE(S) VERIFIED BY: INITIAL EM DATE 4/6/09

CORRECTIVE ACTION REQUIRED: **YES** ☐ (SEE BELOW) **NO** ☐

If COC is **NOT** clear, ***STOP*** until you get client to authorize/clarify work.

CLIENT NOTIFIED: YES ☐ Date/ Time: ______ NO ☐

PROJECT CONTACT:

SUBCONTRACTED LAB:

DATE SHIPPED:

ADDITIONAL COMMENTS:

VERIFIED/TAKEN BY: INITIAL MF DATE 4-7-09

REV 03/2009

Laboratory Custody Chronicle

IAL Case No.

E09-03394

Client Isotec

Project FES/WATERVLIET SITE - 801394

Received On 4/ 6/2009@17:20

Department: Volatiles			Prep. Date	Analyst	Analysis Date	Analyst
PP VOA + 10 + Cis 1,2-DCE + MTBE & TBA	03394-001	Sludge	n/a	n/a	4/ 8/09	Xing
"	-002	"	n/a	n/a	4/ 8/09	Xing
"	-003	"	n/a	n/a	4/ 8/09	Xing
"	-004	"	n/a	n/a	4/ 8/09	Xing
"	-005	Aqueous	n/a	n/a	4/ 9/09	Xing
"	-006	"	n/a	n/a	4/ 9/09	Xing
"	-007	"	n/a	n/a	4/ 9/09	Xing
"	-008	"	n/a	n/a	4/ 9/09	Xing

Review and Approval:

Integrated Analytical Labs ~ 273 Franklin Road, Randolph, NJ 07869 ~ (973) 361-4252 ~ Fax (973) 989-5288

Integrated Analytical Laboratories LLC

ANALYTICAL DATA REPORT

Isotec
51 Everett Drive
Suite A-10
West Windsor, NJ 08550

Project Name: **FES/WATERVLIET-801394**
IAL Case Number: **E09-03904**

These data have been reviewed and accepted by:

Michael H. Lefkin

Michael H. Lefkin, Ph.D.
Laboratory Director

273 Franklin Road
Randolph, NJ 07869
Phone: 973 361 4252
Fax: 973 989 5288

Sample Summary

IAL Case No. **E09-03904**

Client Isotec

Project FES/WATERVLIET-801394

Received On 4/20/2009@17:20

Lab ID	Client Sample ID	Depth Top/Bottom	Sampling Time	Matrix	# of Container
03904-001	SLS/CONTROL	n/a	4/20/2009	Sludge	1
03904-002	SLC/T-A	n/a	4/20/2009	Sludge	1
03904-003	SLC/T-B	n/a	4/20/2009	Sludge	1
03904-004	SLH/T-C	n/a	4/20/2009	Sludge	1
03904-005	SLH/T-D	n/a	4/20/2009	Sludge	1
03904-006	SLA/T-E	n/a	4/20/2009	Sludge	1
03904-007	SLA/T-F	n/a	4/20/2009	Sludge	1
03904-008	GWS/CONTROL	n/a	4/20/2009	Aqueous	2
03904-009	GWC/T-A	n/a	4/20/2009	Aqueous	2
03904-010	GWC/T-B	n/a	4/20/2009	Aqueous	2
03904-011	GWH/T-C	n/a	4/20/2009	Aqueous	2
03904-012	GWH/T-D	n/a	4/20/2009	Aqueous	2
03904-013	GWA/T-E	n/a	4/20/2009	Aqueous	2
03904-014	GWA/T-F	n/a	4/20/2009	Aqueous	2

INTEGRATED ANALYTICAL LABORATORIES, LLC.

TABLE OF CONTENTS

* Methodology is included in the IAL Project Information Page

INTEGRATED ANALYTICAL LABORATORIES, LLC.

MATRIX QUALIFIERS

A - Indicates the sample is an Aqueous matrix.

O - Indicates the sample is an Oil matrix.

S - Indicates the sample is a Soil, Sludge or Sediment matrix.

X - Indicates the sample is an Other matrix as indicated by Client Chain of Custody.

DATA QUALIFIERS

B - Indicates the analyte was found in the Blank and in the sample. It indicates possible sample contamination and warns the data user to use caution when applying the results of the analyte.

C - Common Laboratory Contaminant.

D - The compound was reported from the Diluted analysis.

D.F. - Dilution Factor.

E - Estimated concentration, reported results are outside the calibrated range of the instrument.

J - Indicates an estimated value. The compound was detected at a value below the method detection limit but greater than zero. For GC/MS procedures, the mass spectral data meets the criteria required to identify the target compound.

MDL - Method Detection Limit.

MI - Indicates compound concentration could not be determined due to Matrix Interferences.

NA - Not Applicable.

ND - Indicates the compound was analyzed for but Not Detected at the MDL.

REPORT QUALIFIERS

All solid sample analyses are reported on a dry weight basis.

All solid sample values are corrected for original sample size and percent solids.

Q - Qualifier

INTEGRATED ANALYTICAL LABORATORIES, LLC.

SUMMARY REPORT
Client: Isotec
Project: FES/WATERVLIET-801394
Lab Case No.: E09-03904

	Lab ID:	03904-001			03904-002			03904-003			03904-004		
	Client ID:	SLS/CONTROL			SLC/T-A			SLC/T-B			SLH/T-C		
	Matrix:	Sludge			Sludge			Sludge			Sludge		
	Sampled Date	4/20/09			4/20/09			4/20/09			4/20/09		
PARAMETER(Units)		Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Volatiles (Units)		*(mg/Kg-ppm)*			*(mg/Kg-ppm)*			*(mg/Kg-ppm)*			*(mg/Kg-ppm)*		
(Including MTBE & TBA)													
tert-Butyl alcohol (TBA)		ND		0.505	ND		0.505	ND		0.505	ND		0.505
Methyl tert-butyl ether (MTBE)		ND		0.101	ND		0.101	ND		0.101	ND		0.101
cis-1,2-Dichloroethene		ND		0.101	ND		0.101	ND		0.101	ND		0.101
Toluene		7.13		0.101	6.72		0.101	2.15		0.101	9.16		0.101
Total Xylenes		0.781		0.101	0.276		0.101	0.134		0.101	0.364		0.101
TOTAL VO's:		7.91			7.00			2.28			9.52		
TOTAL TIC's:		3.81			3.71			0.727			0.626		
TOTAL VO's & TIC's:		11.7			10.7			3.01			10.1		

	Lab ID:	03904-005			03904-006			03904-007		
	Client ID:	SLH/T-D			SLA/T-E			SLA/T-F		
	Matrix:	Sludge			Sludge			Sludge		
	Sampled Date	4/20/09			4/20/09			4/20/09		
PARAMETER(Units)		Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Volatiles (Units)		*(mg/Kg-ppm)*			*(mg/Kg-ppm)*			*(mg/Kg-ppm)*		
(Including MTBE & TBA)										
tert-Butyl alcohol (TBA)		ND		0.505	ND		0.505	ND		0.505
Methyl tert-butyl ether (MTBE)		ND		0.101	ND		0.101	ND		0.101
cis-1,2-Dichloroethene		ND		0.101	ND		0.101	ND		0.101
Toluene		2.15		0.101	10.5		0.101	3.33		0.101
Total Xylenes		0.155		0.101	0.447		0.101	0.171		0.101
TOTAL VO's:		2.31			10.9			3.50		
TOTAL TIC's:		3.59			3.09			2.76		
TOTAL VO's & TIC's:		5.90			14.0			6.26		

ND = Analyzed for but Not Detected at the MDL

INTEGRATED ANALYTICAL LABORATORIES, LLC.

SUMMARY REPORT
Client: Isotec
Project: FES/WATERVLIET-801394
Lab Case No.: E09-03904

Lab ID:	03904-008			03904-009			03904-010			03904-011		
Client ID:	GWS/CONTROL			GWC/T-A			GWC/T-B			GWH/T-C		
Matrix:	Aqueous			Aqueous			Aqueous			Aqueous		
Sampled Date	4/20/09			4/20/09			4/20/09			4/20/09		
PARAMETER(Units)	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Volatiles (Units)	(ug/L-ppb)			(ug/L-ppb)			(ug/L-ppb)			(ug/L-ppb)		
(Including MTBE & TBA)												
Chloromethane	ND		205	2.46		0.410	75.7		0.410	ND		0.410
Bromomethane	ND		220	ND		0.440	2.53		0.440	ND		0.440
Methylene chloride	ND		990	ND		1.98	2.53		1.98	ND		1.98
tert-Butyl alcohol (TBA)	ND		560	3.88		1.12	4.42		1.12	ND		1.12
Methyl tert-butyl ether (MTBE)	ND		55.0	0.186		0.110	ND		0.110	ND		0.110
cis-1,2-Dichloroethene	ND		95.0	ND		0.190	ND		0.190	ND		0.190
Benzene	ND		140	36.3		0.280	0.577		0.280	ND		0.280
Toluene	50400	D	240	ND		0.240	ND		0.240	ND		0.240
Chlorobenzene	ND		115	1.23		0.230	ND		0.230	ND		0.230
Total Xylenes	844		350	ND		0.700	ND		0.700	ND		0.700
TOTAL VO's:	51200			44.1			85.8			ND		
TOTAL TIC's:	ND			275			25.3			26.3		
TOTAL VO's & TIC's:	51200			319			111			26.3		

Lab ID:	03904-012			03904-013			03904-014		
Client ID:	GWH/T-D			GWA/T-E			GWA/T-F		
Matrix:	Aqueous			Aqueous			Aqueous		
Sampled Date	4/20/09			4/20/09			4/20/09		
PARAMETER(Units)	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Volatiles (Units)	(ug/L-ppb)			(ug/L-ppb)			(ug/L-ppb)		
(Including MTBE & TBA)									
tert-Butyl alcohol (TBA)	ND		1.12	ND		224	ND		5.60
Methyl tert-butyl ether (MTBE)	ND		0.110	ND		22.0	ND		0.550
cis-1,2-Dichloroethene	ND		0.190	ND		38.0	ND		0.950
Benzene	ND		0.280	ND		56.0	44.3		1.40
Toluene	ND		0.240	25200	D	120	223		1.20
Ethylbenzene	ND		0.260	68.0		52.0	ND		1.30
Total Xylenes	ND		0.700	223		140	ND		3.50
TOTAL VO's:	ND			25500			267		
TOTAL TIC's:	71.0			ND			45.0		
TOTAL VO's & TIC's:	71.0			25500			312		

ND = Analyzed for but Not Detected at the MDL
D = The compound was reported from the Diluted analysis

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-001
Client ID: SLS/CONTROL
Date Received: 04/20/2009
Date Analyzed: 04/25/2009
Data file: J2049.D

GC/MS Column: DB-624
Sample wt/vol: 0.056g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 89.3
% Moisture: 11.6

Compound	Concentration	Q	MDL
Chloromethane	ND		0.101
Vinyl chloride	ND		0.101
Bromomethane	ND		0.101
Chloroethane	ND		0.101
Trichlorofluoromethane	ND		0.101
Acrolein	ND		0.101
1,1-Dichloroethene	ND		0.101
Methylene chloride	ND		0.101
Acrylonitrile	ND		0.101
tert-Butyl alcohol (TBA)	ND		0.505
trans-1,2-Dichloroethene	ND		0.101
Methyl tert-butyl ether (MTBE)	ND		0.101
1,1-Dichloroethane	ND		0.101
cis-1,2-Dichloroethene	ND		0.101
Chloroform	ND		0.101
1,1,1-Trichloroethane	ND		0.101
Carbon tetrachloride	ND		0.101
1,2-Dichloroethane (EDC)	ND		0.101
Benzene	ND		0.051
Trichloroethene	ND		0.101
1,2-Dichloropropane	ND		0.101
Bromodichloromethane	ND		0.101
2-Chloroethyl vinyl ether	ND		0.101
cis-1,3-Dichloropropene	ND		0.101
Toluene	7.13		0.101
trans-1,3-Dichloropropene	ND		0.101
1,1,2-Trichloroethane	ND		0.101
Tetrachloroethene	ND		0.101
Dibromochloromethane	ND		0.101
Chlorobenzene	ND		0.101
Ethylbenzene	ND		0.101
Total Xylenes	0.781		0.101
Bromoform	ND		0.101
1,1,2,2-Tetrachloroethane	ND		0.101
1,3-Dichlorobenzene	ND		0.101
1,4-Dichlorobenzene	ND		0.101
1,2-Dichlorobenzene	ND		0.101

Total Target Compounds: 7.91

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-001
Client ID: SLS/CONTROL
Date Received: 04/20/2009
Date Analyzed: 04/25/2009
Date File: J2049.D

GC/MS Column: DB-624
Sample wt/vol: 0.056g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 89.3
% Moisture: 11.6

CAS #	Compound	Estimated Concentration	Retention Time
	Unknown alkane	0.929	6.36
	Unknown alkane	0.566	6.86
	Unknown cyclic hydrocarbon	2.31	7.50

Total TICs = 3.81

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-002
Client ID: SLC/T-A
Date Received: 04/20/2009
Date Analyzed: 04/22/2009
Data file: J1982.D

GC/MS Column: DB-624
Sample wt/vol: 0.056g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 89.3
% Moisture: 11.6

Compound	Concentration	Q	MDL
Chloromethane	ND		0.101
Vinyl chloride	ND		0.101
Bromomethane	ND		0.101
Chloroethane	ND		0.101
Trichlorofluoromethane	ND		0.101
Acrolein	ND		0.101
1,1-Dichloroethene	ND		0.101
Methylene chloride	ND		0.101
Acrylonitrile	ND		0.101
tert-Butyl alcohol (TBA)	ND		0.505
trans-1,2-Dichloroethene	ND		0.101
Methyl tert-butyl ether (MTBE)	ND		0.101
1,1-Dichloroethane	ND		0.101
cis-1,2-Dichloroethene	ND		0.101
Chloroform	ND		0.101
1,1,1-Trichloroethane	ND		0.101
Carbon tetrachloride	ND		0.101
1,2-Dichloroethane (EDC)	ND		0.101
Benzene	ND		0.051
Trichloroethene	ND		0.101
1,2-Dichloropropane	ND		0.101
Bromodichloromethane	ND		0.101
2-Chloroethyl vinyl ether	ND		0.101
cis-1,3-Dichloropropene	ND		0.101
Toluene	6.72		0.101
trans-1,3-Dichloropropene	ND		0.101
1,1,2-Trichloroethane	ND		0.101
Tetrachloroethene	ND		0.101
Dibromochloromethane	ND		0.101
Chlorobenzene	ND		0.101
Ethylbenzene	ND		0.101
Total Xylenes	0.276		0.101
Bromoform	ND		0.101
1,1,2,2-Tetrachloroethane	ND		0.101
1,3-Dichlorobenzene	ND		0.101
1,4-Dichlorobenzene	ND		0.101
1,2-Dichlorobenzene	ND		0.101

Total Target Compounds: 7.00

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-002
Client ID: SLC/T-A
Date Received: 04/20/2009
Date Analyzed: 04/22/2009
Date File: J1982.D

GC/MS Column: DB-624
Sample wt/vol: 0.056g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 89.3
% Moisture: 11.6

CAS #	Compound	Estimated Concentration	Retention Time
	Unknown alkane	1.34	6.36
	Unknown alkane	1.28	6.86
	Unknown cyclic hydrocarbon	1.09	7.51

Total TICs = 3.71

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-003
Client ID: SLC/T-B
Date Received: 04/20/2009
Date Analyzed: 04/22/2009
Data file: J1976.D

GC/MS Column: DB-624
Sample wt/vol: 0.056g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 89.3
% Moisture: 11.6

Compound	Concentration	Q	MDL
Chloromethane	ND		0.101
Vinyl chloride	ND		0.101
Bromomethane	ND		0.101
Chloroethane	ND		0.101
Trichlorofluoromethane	ND		0.101
Acrolein	ND		0.101
1,1-Dichloroethene	ND		0.101
Methylene chloride	ND		0.101
Acrylonitrile	ND		0.101
tert-Butyl alcohol (TBA)	ND		0.505
trans-1,2-Dichloroethene	ND		0.101
Methyl tert-butyl ether (MTBE)	ND		0.101
1,1-Dichloroethane	ND		0.101
cis-1,2-Dichloroethene	ND		0.101
Chloroform	ND		0.101
1,1,1-Trichloroethane	ND		0.101
Carbon tetrachloride	ND		0.101
1,2-Dichloroethane (EDC)	ND		0.101
Benzene	ND		0.051
Trichloroethene	ND		0.101
1,2-Dichloropropane	ND		0.101
Bromodichloromethane	ND		0.101
2-Chloroethyl vinyl ether	ND		0.101
cis-1,3-Dichloropropene	ND		0.101
Toluene	2.15		0.101
trans-1,3-Dichloropropene	ND		0.101
1,1,2-Trichloroethane	ND		0.101
Tetrachloroethene	ND		0.101
Dibromochloromethane	ND		0.101
Chlorobenzene	ND		0.101
Ethylbenzene	ND		0.101
Total Xylenes	0.134		0.101
Bromoform	ND		0.101
1,1,2,2-Tetrachloroethane	ND		0.101
1,3-Dichlorobenzene	ND		0.101
1,4-Dichlorobenzene	ND		0.101
1,2-Dichlorobenzene	ND		0.101

Total Target Compounds: 2.28

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-003
Client ID: SLC/T-B
Date Received: 04/20/2009
Date Analyzed: 04/22/2009
Date File: J1976.D

GC/MS Column: DB-624
Sample wt/vol: 0.056g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 89.3
% Moisture: 11.6

CAS #	Compound	Estimated Concentration	Retention Time
	Unknown alkane	0.727	6.86

Total TICs = 0.727

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-004
Client ID: SLH/T-C
Date Received: 04/20/2009
Date Analyzed: 04/22/2009
Data file: J1977.D

GC/MS Column: DB-624
Sample wt/vol: 0.056g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 89.3
% Moisture: 11.6

Compound	Concentration	Q	MDL
Chloromethane	ND		0.101
Vinyl chloride	ND		0.101
Bromomethane	ND		0.101
Chloroethane	ND		0.101
Trichlorofluoromethane	ND		0.101
Acrolein	ND		0.101
1,1-Dichloroethene	ND		0.101
Methylene chloride	ND		0.101
Acrylonitrile	ND		0.101
tert-Butyl alcohol (TBA)	ND		0.505
trans-1,2-Dichloroethene	ND		0.101
Methyl tert-butyl ether (MTBE)	ND		0.101
1,1-Dichloroethane	ND		0.101
cis-1,2-Dichloroethene	ND		0.101
Chloroform	ND		0.101
1,1,1-Trichloroethane	ND		0.101
Carbon tetrachloride	ND		0.101
1,2-Dichloroethane (EDC)	ND		0.101
Benzene	ND		0.051
Trichloroethene	ND		0.101
1,2-Dichloropropane	ND		0.101
Bromodichloromethane	ND		0.101
2-Chloroethyl vinyl ether	ND		0.101
cis-1,3-Dichloropropene	ND		0.101
Toluene	9.16		0.101
trans-1,3-Dichloropropene	ND		0.101
1,1,2-Trichloroethane	ND		0.101
Tetrachloroethene	ND		0.101
Dibromochloromethane	ND		0.101
Chlorobenzene	ND		0.101
Ethylbenzene	ND		0.101
Total Xylenes	0.364		0.101
Bromoform	ND		0.101
1,1,2,2-Tetrachloroethane	ND		0.101
1,3-Dichlorobenzene	ND		0.101
1,4-Dichlorobenzene	ND		0.101
1,2-Dichlorobenzene	ND		0.101

Total Target Compounds: 9.52

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-004
Client ID: SLH/T-C
Date Received: 04/20/2009
Date Analyzed: 04/22/2009
Date File: J1977.D

GC/MS Column: DB-624
Sample wt/vol: 0.056g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 89.3
% Moisture: 11.6

CAS #	Compound	Estimated Concentration	Retention Time
	Unknown alkane	0.626	6.86

Total TICs = 0.626

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-005
Client ID: SLH/T-D
Date Received: 04/20/2009
Date Analyzed: 04/22/2009
Data file: J1978.D

GC/MS Column: DB-624
Sample wt/vol: 0.056g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 89.3
% Moisture: 11.6

Compound	Concentration	Q	MDL
Chloromethane	ND		0.101
Vinyl chloride	ND		0.101
Bromomethane	ND		0.101
Chloroethane	ND		0.101
Trichlorofluoromethane	ND		0.101
Acrolein	ND		0.101
1,1-Dichloroethene	ND		0.101
Methylene chloride	ND		0.101
Acrylonitrile	ND		0.101
tert-Butyl alcohol (TBA)	ND		0.505
trans-1,2-Dichloroethene	ND		0.101
Methyl tert-butyl ether (MTBE)	ND		0.101
1,1-Dichloroethane	ND		0.101
cis-1,2-Dichloroethene	ND		0.101
Chloroform	ND		0.101
1,1,1-Trichloroethane	ND		0.101
Carbon tetrachloride	ND		0.101
1,2-Dichloroethane (EDC)	ND		0.101
Benzene	ND		0.051
Trichloroethene	ND		0.101
1,2-Dichloropropane	ND		0.101
Bromodichloromethane	ND		0.101
2-Chloroethyl vinyl ether	ND		0.101
cis-1,3-Dichloropropene	ND		0.101
Toluene	2.15		0.101
trans-1,3-Dichloropropene	ND		0.101
1,1,2-Trichloroethane	ND		0.101
Tetrachloroethene	ND		0.101
Dibromochloromethane	ND		0.101
Chlorobenzene	ND		0.101
Ethylbenzene	ND		0.101
Total Xylenes	0.155		0.101
Bromoform	ND		0.101
1,1,2,2-Tetrachloroethane	ND		0.101
1,3-Dichlorobenzene	ND		0.101
1,4-Dichlorobenzene	ND		0.101
1,2-Dichlorobenzene	ND		0.101

Total Target Compounds: 2.31

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-005	GC/MS Column: DB-624
Client ID: SLH/T-D	Sample wt/vol: 0.056g
Date Received: 04/20/2009	Matrix-Units: Sludge-mg/Kg (ppm)
Date Analyzed: 04/22/2009	Dilution Factor: 89.3
Date File: J1978.D	% Moisture: 11.6

CAS #	Compound	Estimated Concentration	Retention Time
	Unknown alkane	1.04	6.36
	Unknown alkane	1.96	6.86
	Unknown cyclic hydrocarbon	0.586	7.51

Total TICs = 3.59

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-006
Client ID: SLA/T-E
Date Received: 04/20/2009
Date Analyzed: 04/22/2009
Data file: J1979.D

GC/MS Column: DB-624
Sample wt/vol: 0.056g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 89.3
% Moisture: 11.6

Compound	Concentration	Q	MDL
Chloromethane	ND		0.101
Vinyl chloride	ND		0.101
Bromomethane	ND		0.101
Chloroethane	ND		0.101
Trichlorofluoromethane	ND		0.101
Acrolein	ND		0.101
1,1-Dichloroethene	ND		0.101
Methylene chloride	ND		0.101
Acrylonitrile	ND		0.101
tert-Butyl alcohol (TBA)	ND		0.505
trans-1,2-Dichloroethene	ND		0.101
Methyl tert-butyl ether (MTBE)	ND		0.101
1,1-Dichloroethane	ND		0.101
cis-1,2-Dichloroethene	ND		0.101
Chloroform	ND		0.101
1,1,1-Trichloroethane	ND		0.101
Carbon tetrachloride	ND		0.101
1,2-Dichloroethane (EDC)	ND		0.101
Benzene	ND		0.051
Trichloroethene	ND		0.101
1,2-Dichloropropane	ND		0.101
Bromodichloromethane	ND		0.101
2-Chloroethyl vinyl ether	ND		0.101
cis-1,3-Dichloropropene	ND		0.101
Toluene	10.5		0.101
trans-1,3-Dichloropropene	ND		0.101
1,1,2-Trichloroethane	ND		0.101
Tetrachloroethene	ND		0.101
Dibromochloromethane	ND		0.101
Chlorobenzene	ND		0.101
Ethylbenzene	ND		0.101
Total Xylenes	0.447		0.101
Bromoform	ND		0.101
1,1,2,2-Tetrachloroethane	ND		0.101
1,3-Dichlorobenzene	ND		0.101
1,4-Dichlorobenzene	ND		0.101
1,2-Dichlorobenzene	ND		0.101

Total Target Compounds: 10.9

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-006
Client ID: SLA/T-E
Date Received: 04/20/2009
Date Analyzed: 04/22/2009
Date File: J1979.D

GC/MS Column: DB-624
Sample wt/vol: 0.056g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 89.3
% Moisture: 11.6

CAS #	Compound	Estimated Concentration	Retention Time
	Unknown alkane	1.04	6.36
	Unknown alkane	1.07	6.86
	Unknown cyclic hydrocarbon	0.980	7.51

Total TICs = 3.09

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-007
Client ID: SLA/T-F
Date Received: 04/20/2009
Date Analyzed: 04/22/2009
Data file: J1980.D

GC/MS Column: DB-624
Sample wt/vol: 0.056g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 89.3
% Moisture: 11.6

Compound	Concentration	Q	MDL
Chloromethane	ND		0.101
Vinyl chloride	ND		0.101
Bromomethane	ND		0.101
Chloroethane	ND		0.101
Trichlorofluoromethane	ND		0.101
Acrolein	ND		0.101
1,1-Dichloroethene	ND		0.101
Methylene chloride	ND		0.101
Acrylonitrile	ND		0.101
tert-Butyl alcohol (TBA)	ND		0.505
trans-1,2-Dichloroethene	ND		0.101
Methyl tert-butyl ether (MTBE)	ND		0.101
1,1-Dichloroethane	ND		0.101
cis-1,2-Dichloroethene	ND		0.101
Chloroform	ND		0.101
1,1,1-Trichloroethane	ND		0.101
Carbon tetrachloride	ND		0.101
1,2-Dichloroethane (EDC)	ND		0.101
Benzene	ND		0.051
Trichloroethene	ND		0.101
1,2-Dichloropropane	ND		0.101
Bromodichloromethane	ND		0.101
2-Chloroethyl vinyl ether	ND		0.101
cis-1,3-Dichloropropene	ND		0.101
Toluene	3.33		0.101
trans-1,3-Dichloropropene	ND		0.101
1,1,2-Trichloroethane	ND		0.101
Tetrachloroethene	ND		0.101
Dibromochloromethane	ND		0.101
Chlorobenzene	ND		0.101
Ethylbenzene	ND		0.101
Total Xylenes	0.171		0.101
Bromoform	ND		0.101
1,1,2,2-Tetrachloroethane	ND		0.101
1,3-Dichlorobenzene	ND		0.101
1,4-Dichlorobenzene	ND		0.101
1,2-Dichlorobenzene	ND		0.101

Total Target Compounds: 3.50

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-007
Client ID: SLA/T-F
Date Received: 04/20/2009
Date Analyzed: 04/22/2009
Date File: J1980.D

GC/MS Column: DB-624
Sample wt/vol: 0.056g
Matrix-Units: Sludge-mg/Kg (ppm)
Dilution Factor: 89.3
% Moisture: 11.6

CAS #	Compound	Estimated Concentration	Retention Time
	Unknown alkane	0.929	6.36
	Unknown alkane	1.12	6.86
	Unknown cyclic hydrocarbon	0.707	7.51

Total TICs = 2.76

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-008
Client ID: GWS/CONTROL
Date Received: 04/20/2009
Date Analyzed: 04/24/2009
Data file: E5940.D

GC/MS Column: DB-624
Sample wt/vol: 0.01mL
Matrix-Units: Aqueous-µg/L (ppb)
Dilution Factor: 500
% Moisture: 100

Compound	Concentration	Q	MDL
Chloromethane	ND		205
Vinyl chloride	ND		315
Bromomethane	ND		220
Chloroethane	ND		240
Trichlorofluoromethane	ND		260
Acrolein	ND		1250
1,1-Dichloroethene	ND		220
Methylene chloride	ND		990
Acrylonitrile	ND		580
tert-Butyl alcohol (TBA)	ND		560
trans-1,2-Dichloroethene	ND		190
Methyl tert-butyl ether (MTBE)	ND		55.0
1,1-Dichloroethane	ND		155
cis-1,2-Dichloroethene	ND		95.0
Chloroform	ND		145
1,1,1-Trichloroethane	ND		185
Carbon tetrachloride	ND		165
1,2-Dichloroethane (EDC)	ND		120
Benzene	ND		140
Trichloroethene	ND		160
1,2-Dichloropropane	ND		100
Bromodichloromethane	ND		95.0
2-Chloroethyl vinyl ether	ND		85.0
cis-1,3-Dichloropropene	ND		75.0
Toluene	51200	E	120
trans-1,3-Dichloropropene	ND		60.0
1,1,2-Trichloroethane	ND		85.0
Tetrachloroethene	ND		160
Dibromochloromethane	ND		60.0
Chlorobenzene	ND		115
Ethylbenzene	ND		130
Total Xylenes	844		350
Bromoform	ND		70.0
1,1,2,2-Tetrachloroethane	ND		100
1,3-Dichlorobenzene	ND		75.0
1,4-Dichlorobenzene	ND		75.0
1,2-Dichlorobenzene	ND		95.0

Total Target Compounds: 52000 E

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-008
Client ID: GWS/CONTROL
Date Received: 04/20/2009
Date Analyzed: 04/24/2009
Data file: E5940.D

GC/MS Column: DB-624
Sample wt/vol: 0.01mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 500
% Moisture: 100

CAS #	Compound	Estimated Concentration	Retention Time
	No peaks detected		

Total TICs = 0

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-008DIL
Client ID: GWS/CONTROL
Date Received: 04/20/2009
Date Analyzed: 04/27/2009
Data file: E5983.D

GC/MS Column: DB-624
Sample wt/vol: 0.005mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 1000
% Moisture: 100

Compound	Concentration	Q	MDL
Chloromethane	ND		410
Vinyl chloride	ND		630
Bromomethane	ND		440
Chloroethane	ND		480
Trichlorofluoromethane	ND		520
Acrolein	ND		2490
1,1-Dichloroethene	ND		440
Methylene chloride	ND		1980
Acrylonitrile	ND		1160
tert-Butyl alcohol (TBA)	ND		1120
trans-1,2-Dichloroethene	ND		380
Methyl tert-butyl ether (MTBE)	ND		110
1,1-Dichloroethane	ND		310
cis-1,2-Dichloroethene	ND		190
Chloroform	ND		290
1,1,1-Trichloroethane	ND		370
Carbon tetrachloride	ND		330
1,2-Dichloroethane (EDC)	ND		240
Benzene	ND		280
Trichloroethene	ND		320
1,2-Dichloropropane	ND		200
Bromodichloromethane	ND		190
2-Chloroethyl vinyl ether	ND		170
cis-1,3-Dichloropropene	ND		150
Toluene	50400		240
trans-1,3-Dichloropropene	ND		120
1,1,2-Trichloroethane	ND		170
Tetrachloroethene	ND		320
Dibromochloromethane	ND		120
Chlorobenzene	ND		230
Ethylbenzene	ND		260
Total Xylenes	766		700
Bromoform	ND		140
1,1,2,2-Tetrachloroethane	ND		200
1,3-Dichlorobenzene	ND		150
1,4-Dichlorobenzene	ND		150
1,2-Dichlorobenzene	ND		190

Total Target Compounds: 51200

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-009
Client ID: GWC/T-A
Date Received: 04/20/2009
Date Analyzed: 04/24/2009
Data file: E5941.D

GC/MS Column: DB-624
Sample wt/vol: 5mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 1
% Moisture: 100

Compound	Concentration	Q	MDL
Chloromethane	2.46		0.410
Vinyl chloride	ND		0.630
Bromomethane	ND		0.440
Chloroethane	ND		0.480
Trichlorofluoromethane	ND		0.520
Acrolein	ND		2.49
1,1-Dichloroethene	ND		0.440
Methylene chloride	ND		1.98
Acrylonitrile	ND		1.16
tert-Butyl alcohol (TBA)	3.88		1.12
trans-1,2-Dichloroethene	ND		0.380
Methyl tert-butyl ether (MTBE)	0.186		0.110
1,1-Dichloroethane	ND		0.310
cis-1,2-Dichloroethene	ND		0.190
Chloroform	ND		0.290
1,1,1-Trichloroethane	ND		0.370
Carbon tetrachloride	ND		0.330
1,2-Dichloroethane (EDC)	ND		0.240
Benzene	36.3		0.280
Trichloroethene	ND		0.320
1,2-Dichloropropane	ND		0.200
Bromodichloromethane	ND		0.190
2-Chloroethyl vinyl ether	ND		0.170
cis-1,3-Dichloropropene	ND		0.150
Toluene	ND		0.240
trans-1,3-Dichloropropene	ND		0.120
1,1,2-Trichloroethane	ND		0.170
Tetrachloroethene	ND		0.320
Dibromochloromethane	ND		0.120
Chlorobenzene	1.23		0.230
Ethylbenzene	ND		0.260
Total Xylenes	ND		0.700
Bromoform	ND		0.140
1,1,2,2-Tetrachloroethane	ND		0.200
1,3-Dichlorobenzene	ND		0.150
1,4-Dichlorobenzene	ND		0.150
1,2-Dichlorobenzene	ND		0.190

Total Target Compounds: 44.1

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-009
Client ID: GWC/T-A
Date Received: 04/20/2009
Date Analyzed: 04/24/2009
Data file: E5941.D

GC/MS Column: DB-624
Sample wt/vol: 5mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 1
% Moisture: 100

CAS #	Compound	Estimated Concentration	Retention Time
	~~No peaks detected~~		
000067-64-1	Acetone	9.52	3.86
	Cyclohexane, methyl	53.3	7.82
	Substituted benzene	212	13.05

5/5/09-AJ

Total TICs = 275 ✓

5/5/09-AJ

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-010
Client ID: GWC/T-B
Date Received: 04/20/2009
Date Analyzed: 04/24/2009
Data file: E5942.D

GC/MS Column: DB-624
Sample wt/vol: 5mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 1
% Moisture: 100

Compound	Concentration	Q	MDL
Chloromethane	75.7		0.410
Vinyl chloride	ND		0.630
Bromomethane	2.53		0.440
Chloroethane	ND		0.480
Trichlorofluoromethane	ND		0.520
Acrolein	ND		2.49
1,1-Dichloroethene	ND		0.440
Methylene chloride	2.53		1.98
Acrylonitrile	ND		1.16
tert-Butyl alcohol (TBA)	4.42		1.12
trans-1,2-Dichloroethene	ND		0.380
Methyl tert-butyl ether (MTBE)	ND		0.110
1,1-Dichloroethane	ND		0.310
cis-1,2-Dichloroethene	ND		0.190
Chloroform	ND		0.290
1,1,1-Trichloroethane	ND		0.370
Carbon tetrachloride	ND		0.330
1,2-Dichloroethane (EDC)	ND		0.240
Benzene	0.577		0.280
Trichloroethene	ND		0.320
1,2-Dichloropropane	ND		0.200
Bromodichloromethane	ND		0.190
2-Chloroethyl vinyl ether	ND		0.170
cis-1,3-Dichloropropene	ND		0.150
Toluene	ND		0.240
trans-1,3-Dichloropropene	ND		0.120
1,1,2-Trichloroethane	ND		0.170
Tetrachloroethene	ND		0.320
Dibromochloromethane	ND		0.120
Chlorobenzene	ND		0.230
Ethylbenzene	ND		0.260
Total Xylenes	ND		0.700
Bromoform	ND		0.140
1,1,2,2-Tetrachloroethane	ND		0.200
1,3-Dichlorobenzene	ND		0.150
1,4-Dichlorobenzene	ND		0.150
1,2-Dichlorobenzene	ND		0.190

Total Target Compounds: 85.8

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-010
Client ID: GWC/T-B
Date Received: 04/20/2009
Date Analyzed: 04/24/2009
Data file: E5942.D

GC/MS Column: DB-624
Sample wt/vol: 5mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 1
% Moisture: 100

CAS #	Compound	Estimated Concentration	Retention Time
	~~No peaks detected~~		
000067-64-1	Acetone	13.1	3.85
000078-93-3	2-Butanone	3.12	5.90
	Substituted benzene	9.1	13.05

5/5/09-AJ

Total TICs = 25.3

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-011
Client ID: GWH/T-C
Date Received: 04/20/2009
Date Analyzed: 04/25/2009
Data file: E5943.D

GC/MS Column: DB-624
Sample wt/vol: 5mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 1
% Moisture: 100

Compound	Concentration	Q	MDL
Chloromethane	ND		0.410
Vinyl chloride	ND		0.630
Bromomethane	ND		0.440
Chloroethane	ND		0.480
Trichlorofluoromethane	ND		0.520
Acrolein	ND		2.49
1,1-Dichloroethene	ND		0.440
Methylene chloride	ND		1.98
Acrylonitrile	ND		1.16
tert-Butyl alcohol (TBA)	ND		1.12
trans-1,2-Dichloroethene	ND		0.380
Methyl tert-butyl ether (MTBE)	ND		0.110
1,1-Dichloroethane	ND		0.310
cis-1,2-Dichloroethene	ND		0.190
Chloroform	ND		0.290
1,1,1-Trichloroethane	ND		0.370
Carbon tetrachloride	ND		0.330
1,2-Dichloroethane (EDC)	ND		0.240
Benzene	ND		0.280
Trichloroethene	ND		0.320
1,2-Dichloropropane	ND		0.200
Bromodichloromethane	ND		0.190
2-Chloroethyl vinyl ether	ND		0.170
cis-1,3-Dichloropropene	ND		0.150
Toluene	ND		0.240
trans-1,3-Dichloropropene	ND		0.120
1,1,2-Trichloroethane	ND		0.170
Tetrachloroethene	ND		0.320
Dibromochloromethane	ND		0.120
Chlorobenzene	ND		0.230
Ethylbenzene	ND		0.260
Total Xylenes	ND		0.700
Bromoform	ND		0.140
1,1,2,2-Tetrachloroethane	ND		0.200
1,3-Dichlorobenzene	ND		0.150
1,4-Dichlorobenzene	ND		0.150
1,2-Dichlorobenzene	ND		0.190

Total Target Compounds: 0

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-011
Client ID: GWH/T-C
Date Received: 04/20/2009
Date Analyzed: 04/25/2009
Date File: E5943.D

GC/MS Column: DB-624
Sample wt/vol: 5mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 1
% Moisture: 100

CAS #	Compound	Estimated Concentration	Retention Time
000067-64-1	Acetone	26.3	3.85

Total TICs = 26.3

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-012
Client ID: GWH/T-D
Date Received: 04/20/2009
Date Analyzed: 04/25/2009
Data file: E5944.D

GC/MS Column: DB-624
Sample wt/vol: 5mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 1
% Moisture: 100

Compound	Concentration	Q	MDL
Chloromethane	ND		0.410
Vinyl chloride	ND		0.630
Bromomethane	ND		0.440
Chloroethane	ND		0.480
Trichlorofluoromethane	ND		0.520
Acrolein	ND		2.49
1,1-Dichloroethene	ND		0.440
Methylene chloride	ND		1.98
Acrylonitrile	ND		1.16
tert-Butyl alcohol (TBA)	ND		1.12
trans-1,2-Dichloroethene	ND		0.380
Methyl tert-butyl ether (MTBE)	ND		0.110
1,1-Dichloroethane	ND		0.310
cis-1,2-Dichloroethene	ND		0.190
Chloroform	ND		0.290
1,1,1-Trichloroethane	ND		0.370
Carbon tetrachloride	ND		0.330
1,2-Dichloroethane (EDC)	ND		0.240
Benzene	ND		0.280
Trichloroethene	ND		0.320
1,2-Dichloropropane	ND		0.200
Bromodichloromethane	ND		0.190
2-Chloroethyl vinyl ether	ND		0.170
cis-1,3-Dichloropropene	ND		0.150
Toluene	ND		0.240
trans-1,3-Dichloropropene	ND		0.120
1,1,2-Trichloroethane	ND		0.170
Tetrachloroethene	ND		0.320
Dibromochloromethane	ND		0.120
Chlorobenzene	ND		0.230
Ethylbenzene	ND		0.260
Total Xylenes	ND		0.700
Bromoform	ND		0.140
1,1,2,2-Tetrachloroethane	ND		0.200
1,3-Dichlorobenzene	ND		0.150
1,4-Dichlorobenzene	ND		0.150
1,2-Dichlorobenzene	ND		0.190

Total Target Compounds: 0

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-012
Client ID: GWH/T-D
Date Received: 04/20/2009
Date Analyzed: 04/25/2009
Date File: E5944.D

GC/MS Column: DB-624
Sample wt/vol: 5mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 1
% Moisture: 100

CAS #	Compound	Estimated Concentration	Retention Time
000067-64-1	Acetone	71.0	3.85

Total TICs = 71.0

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-013
Client ID: GWA/T-E
Date Received: 04/20/2009
Date Analyzed: 04/25/2009
Data file: E5945.D

GC/MS Column: DB-624
Sample wt/vol: 0.025mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 200
% Moisture: 100

Compound	Concentration	Q	MDL
Chloromethane	ND		82.0
Vinyl chloride	ND		126
Bromomethane	ND		88.0
Chloroethane	ND		96.0
Trichlorofluoromethane	ND		104
Acrolein	ND		498
1,1-Dichloroethene	ND		88.0
Methylene chloride	ND		396
Acrylonitrile	ND		232
tert-Butyl alcohol (TBA)	ND		224
trans-1,2-Dichloroethene	ND		76.0
Methyl tert-butyl ether (MTBE)	ND		22.0
1,1-Dichloroethane	ND		62.0
cis-1,2-Dichloroethene	ND		38.0
Chloroform	ND		58.0
1,1,1-Trichloroethane	ND		74.0
Carbon tetrachloride	ND		66.0
1,2-Dichloroethane (EDC)	ND		48.0
Benzene	ND		56.0
Trichloroethene	ND		64.0
1,2-Dichloropropane	ND		40.0
Bromodichloromethane	ND		38.0
2-Chloroethyl vinyl ether	ND		34.0
cis-1,3-Dichloropropene	ND		30.0
Toluene	27200	E	48.0
trans-1,3-Dichloropropene	ND		24.0
1,1,2-Trichloroethane	ND		34.0
Tetrachloroethene	ND		64.0
Dibromochloromethane	ND		24.0
Chlorobenzene	ND		46.0
Ethylbenzene	68.0		52.0
Total Xylenes	223		140
Bromoform	ND		28.0
1,1,2,2-Tetrachloroethane	ND		40.0
1,3-Dichlorobenzene	ND		30.0
1,4-Dichlorobenzene	ND		30.0
1,2-Dichlorobenzene	ND		38.0

Total Target Compounds: 27500 E

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS
Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-013
Client ID: GWA/T-E
Date Received: 04/20/2009
Date Analyzed: 04/25/2009
Data file: E5945.D

GC/MS Column: DB-624
Sample wt/vol: 0.025mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 200
% Moisture: 100

CAS #	Compound	Estimated Concentration	Retention Time
	No peaks detected		

Total TICs = 0

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-013DIL
Client ID: GWA/T-E
Date Received: 04/20/2009
Date Analyzed: 04/27/2009
Data file: E5984.D

GC/MS Column: DB-624
Sample wt/vol: 0.01mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 500
% Moisture: 100

Compound	Concentration	Q	MDL
Chloromethane	ND		205
Vinyl chloride	ND		315
Bromomethane	ND		220
Chloroethane	ND		240
Trichlorofluoromethane	ND		260
Acrolein	ND		1250
1,1-Dichloroethene	ND		220
Methylene chloride	ND		990
Acrylonitrile	ND		580
tert-Butyl alcohol (TBA)	ND		560
trans-1,2-Dichloroethene	ND		190
Methyl tert-butyl ether (MTBE)	ND		55.0
1,1-Dichloroethane	ND		155
cis-1,2-Dichloroethene	ND		95.0
Chloroform	ND		145
1,1,1-Trichloroethane	ND		185
Carbon tetrachloride	ND		165
1,2-Dichloroethane (EDC)	ND		120
Benzene	ND		140
Trichloroethene	ND		160
1,2-Dichloropropane	ND		100
Bromodichloromethane	ND		95.0
2-Chloroethyl vinyl ether	ND		85.0
cis-1,3-Dichloropropene	ND		75.0
Toluene	25200		120
trans-1,3-Dichloropropene	ND		60.0
1,1,2-Trichloroethane	ND		85.0
Tetrachloroethene	ND		160
Dibromochloromethane	ND		60.0
Chlorobenzene	ND		115
Ethylbenzene	ND		130
Total Xylenes	ND		350
Bromoform	ND		70.0
1,1,2,2-Tetrachloroethane	ND		100
1,3-Dichlorobenzene	ND		75.0
1,4-Dichlorobenzene	ND		75.0
1,2-Dichlorobenzene	ND		95.0

Total Target Compounds: 25200

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-014
Client ID: GWA/T-F
Date Received: 04/20/2009
Date Analyzed: 04/25/2009
Data file: E5946.D

GC/MS Column: DB-624
Sample wt/vol: 1mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 5
% Moisture: 100

Compound	Concentration	Q	MDL
Chloromethane	ND		2.05
Vinyl chloride	ND		3.15
Bromomethane	ND		2.20
Chloroethane	ND		2.40
Trichlorofluoromethane	ND		2.60
Acrolein	ND		12.5
1,1-Dichloroethene	ND		2.20
Methylene chloride	ND		9.90
Acrylonitrile	ND		5.80
tert-Butyl alcohol (TBA)	ND		5.60
trans-1,2-Dichloroethene	ND		1.90
Methyl tert-butyl ether (MTBE)	ND		0.550
1,1-Dichloroethane	ND		1.55
cis-1,2-Dichloroethene	ND		0.950
Chloroform	ND		1.45
1,1,1-Trichloroethane	ND		1.85
Carbon tetrachloride	ND		1.65
1,2-Dichloroethane (EDC)	ND		1.20
Benzene	44.3		1.40
Trichloroethene	ND		1.60
1,2-Dichloropropane	ND		1.00
Bromodichloromethane	ND		0.950
2-Chloroethyl vinyl ether	ND		0.850
cis-1,3-Dichloropropene	ND		0.750
Toluene	223		1.20
trans-1,3-Dichloropropene	ND		0.600
1,1,2-Trichloroethane	ND		0.850
Tetrachloroethene	ND		1.60
Dibromochloromethane	ND		0.600
Chlorobenzene	ND		1.15
Ethylbenzene	ND		1.30
Total Xylenes	ND		3.50
Bromoform	ND		0.700
1,1,2,2-Tetrachloroethane	ND		1.00
1,3-Dichlorobenzene	ND		0.750
1,4-Dichlorobenzene	ND		0.750
1,2-Dichlorobenzene	ND		0.950

Total Target Compounds: 267

INTEGRATED ANALYTICAL LABORATORIES

VOLATILE ORGANICS

Tentatively Identified Compounds

Client/Project: ISOTEC/FES/WATERVL

Lab ID: 03904-014
Client ID: GWA/T-F
Date Received: 04/20/2009
Date Analyzed: 04/25/2009
Date File: E5946.D

GC/MS Column: DB-624
Sample wt/vol: 1mL
Matrix-Units: Aqueous-μg/L (ppb)
Dilution Factor: 5
% Moisture: 100

CAS #	Compound	Estimated Concentration	Retention Time
000067-64-1	Acetone	22.0	3.85
	Substituted benzene	23.0	13.05

Total TICs = 45.0

Phone # (973) 361-4252
Fax # (973) 989-5288

INTEGRATED ANALYTICAL LABORATORIES
CHAIN OF CUSTODY

273 Franklin Rd
Randolph, NJ 07869

CUSTOMER	
Company:	ISOTEC-WW
Address:	
Telephone #:	
Fax #:	
Project Manager:	Prasad Kakarla
Sampler:	Yan Chin
Project Name:	FES/Watervliet
Project Location (State):	NY
Bottle Order #:	
Quote #:	801394

REPORTING INFO	
REPORT TO:	ISOTEC-WW
Address:	
Attn:	
FAX #	
INVOICE TO:	ISOTEC-WW
Address:	
Attn:	
PO #	3678

Turnaround Time (starts the following day if samples rec'd at lab > 5PM)

* Lab notification is required for RUSH TAT prior to sample arrival. RUSH TAT IS NOT GUARANTEED WITHOUT LAB APPROVAL. ** RUSH SURCHARGES WILL APPLY IF ABLE TO ACCOMMODATE.

PHC- MUST CHOOSE
DRO (3-5 day TAT) QAM025 (5 day TAT min.)
SEE BELOW (under comments section for explanation)

Verbal/Fax 24 hr* 48 hr* 72 hr* 1 wk* 2 wk/Std
Hard Copy 3 wk/Std
Other *call for price

Results needed by:

Rush TAT Charge **
24 hr - 100%....
48 hr - 75%....
72 hr - 50%....
96 hr - 35%....
5 day - 25%....
6-9 day 10%

Report Format
Results Only
Reduced
Regulatory - 15% Surcharge applies
Other (describe)

DISKETTE
SRP. dbf format
SRP.wk1 format
lab approved custom EDD
NO DISK/CD REQ'D

Cooler Temp 4 °C

Sample Matrix
DW - Drinking Water AQ - Aqueous WW - Waste Water
OI - Oil LIQ - Liquid (Specify) OT - Other (Specify)
S - Soil SL - Sludge SOL - Solid W - Wipe

SAMPLE INFORMATION

ANALYTICAL PARAMETERS — Sample Contents

Client ID	Depth (ft. only)	Sampling Date	Sampling Time	Matrix	# containers	IAL #	(VOt10)	Soil (g)	H2O (ml)	MeOH (ml)	HCl	NaOH	HNO3	H2SO4	MeOH	Other	None	Encore
SLS/Control				SL	1	1	X	15.02	11.71	15					1			
SLC/T-A						2		15.03							1			
SLC/T-B						3		14.98							1			
SLH/T-C						4		14.99							1			
SLH/T-D						5		14.99							1			
SLA/T-E						6		14.98							1			
SLA/T-F				↓	↓	7	↓	15.03	↓	↓					1			

Known Hazard: Yes or No Describe:

Conc. Expected: Low Med High

MDL Req: Old GWQS - 11/05 GWQS - SCC - OTHER (SEE COMMENTS)

Please print legibly and fill out completely. Samples cannot be processed and the turnaround time will not start until any ambiguities have been resolved.

	Signature/Company	Date	Time		Signature/Company
Relinquished by:		4/20/09	11AM	Received by:	
Relinquished by:		4/20/09	1720	Received by:	
Relinquished by:				Received by:	
Relinquished by:				Received by:	
Relinquished by:				Received by:	

Comments: Use lowest MDLs possible & use true MDLs as reporting limits. MDLs for "Control" should NOT be lower than other samples.

DRO (8015B) - used for: Fuel Oil #2/Home Heating Oil #1 /#2
QAM-025 (OQA-QAM025) - used for: all other fuel oils and unknown contamination

Lab Case # 03904

PAGE: 1 of 2

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01/2007 rev

Phone # (973) 361-4252
Fax # (973) 989-5288

INTEGRATED ANALYTICAL LABORATORIES
CHAIN OF CUSTODY

273 Franklin Rd
Randolph, NJ 07869

CUSTOMER	
Company:	ISOTEC - WW
Address:	
Telephone #:	
Fax #:	
Project Manager:	
Sampler:	
Project Name:	
Project Location (State):	
Bottle Order #:	
Quote #:	801394

REPORTING INFO	
REPORT TO:	ISOTEC - WW
Address:	
Attn:	
FAX #	
INVOICE TO:	ISOTEC - WW
Address:	
Attn:	
PO #	3678

Turnaround Time (starts the following day if samples rec'd at lab > 5PM)

*Lab notification is required for RUSH TAT prior to sample arrival. RUSH TAT IS NOT GUARANTEED WITHOUT LAB APPROVAL. **RUSH SURCHARGES WILL APPLY IF ABLE TO ACCOMMODATE.

PHC- MUST CHOOSE

DRO (3-5 day TAT) QAM025 (5 day TAT min.)

SEE BELOW (under comments section for explanation)

Verbal/Fax 24 hr* 48 hr* 72 hr* 2 wk/Std 1 wk* — Results needed by:

Hard Copy 3 wk/Std

Other *call for price

Rush TAT Charge **
24 hr - 100%....
48 hr - 75%....
72 hr - 50%....
96 hr - 35%....
5 day - 25%....
6-9 day 10%

Report Format
Results Only
Reduced
Regulatory - 15% Surcharge applies
Other (describe)

DISKETTE
SRP. dbf format
SRP.wk1 format
lab approved custom EDD
NO DISK/CD REQ'D

Cooler Temp 4 °C

Sample Matrix
DW - Drinking Water AQ - Aqueous WW - Waste Water
OI - Oil LIQ - Liquid (Specify) OT - Other (Specify)
S - Soil SL - Sludge SOL - Solid W - Wipe

SAMPLE INFORMATION

ANALYTICAL PARAMETERS / **# BOTTLES & PRESERVATIVES**

Client ID	Depth (ft. only)	Sampling Date	Sampling Time	Matrix	# containers	IAL #	(VO+10)								HCl	NaOH	HNO3	H2SO4	MeOH	Other	None	Encore
GWS/Control				AQ	2	8	X								2							
GWC/T-A						9									2							
GWC/T-B						10									2							
GWH/T-C						11									2							
GWH/T-D						12									2							
GWA/T-E						13									2							
GWA/T-F						14									2							

Known Hazard: Yes or No Describe:

Conc. Expected: Low Med High

MDL Req: Old GWQS - 11/05 GWQS - SCC - OTHER (SEE COMMENTS)

Please print legibly and fill out completely. Samples cannot be processed and the turnaround time will not start until any ambiguities have been resolved.

	Signature/Company	Date	Time		Signature/Company
Relinquished by:	[signature]	4/20/09	11Am	Received by:	[signature]
Relinquished by:	[signature]	4/20/09	1720	Received by:	[signature]
Relinquished by:				Received by:	
Relinquished by:				Received by:	
Relinquished by:				Received by:	

Comments: Same as page 1

DRO (8015B) - used for: Fuel Oil #2/Home Heating Oil #1 /#2
QAM-025 (OQA-QAM025) - used for: all other fuel oils and unknown contamination

Lab Case # C3904

PAGE: 2 of 2

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035

01/2007 rev

Ref. No: G 092600138

PROJECT INFORMATION

E09-03904

Case No. E09-03904 **Project** FES/WATERVLIET-801394

Customer Isotec | **P.O. #** 3678

Contact Prasad Kakarla | **Received** 4/20/2009 17:20

EMail pkakarla@insituoxidation.com; ychin@insituoxidation.com ☑ EMail EDDs | **Verbal Due** 5/5/2009

Phone (609) 275-8500 **Fax** 1(609) 275-9608 | **Report Due** 5/12/2009

Report To

51 Everett Drive

Suite A-10

West Windsor, NJ 08550

Attn: Prasad Kakarla

Bill To

51 Everett Drive

Suite A-10

West Windsor, NJ 08550

Attn: Prasad Kakarla

Report Format **Result Only**

Additional Info ☐ State Form ☐ Field Sampling ☐ Conditional VOA

Lab ID	Client Sample ID	Depth Top / Bottom	Sampling Time	Matrix	Unit	# of Containers
03904-001	SLS/CONTROL	n/a	4/20/2009	Sludge	mg/Kg	1
03904-002	SLC/T-A	n/a	4/20/2009	Sludge	mg/Kg	1
03904-003	SLC/T-B	n/a	4/20/2009	Sludge	mg/Kg	1
03904-004	SLH/T-C	n/a	4/20/2009	Sludge	mg/Kg	1
03904-005	SLH/T-D	n/a	4/20/2009	Sludge	mg/Kg	1
03904-006	SLA/T-E	n/a	4/20/2009	Sludge	mg/Kg	1
03904-007	SLA/T-F	n/a	4/20/2009	Sludge	mg/Kg	1
03904-008	GWS/CONTROL	n/a	4/20/2009	Aqueous	ug/L	2
03904-009	GWC/T-A	n/a	4/20/2009	Aqueous	ug/L	2
03904-010	GWC/T-B	n/a	4/20/2009	Aqueous	ug/L	2
03904-011	GWH/T-C	n/a	4/20/2009	Aqueous	ug/L	2
03904-012	GWH/T-D	n/a	4/20/2009	Aqueous	ug/L	2
03904-013	GWA/T-E	n/a	4/20/2009	Aqueous	ug/L	2
03904-014	GWA/T-F	n/a	4/20/2009	Aqueous	ug/L	2

Sample #	Tests	Status	QA Method
001	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	8260B
002	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	8260B
003	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	8260B
004	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	8260B
005	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	8260B
006	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	8260B
007	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	8260B
008	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	624
009	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	624
010	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	624
011	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	624
012	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	624
013	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	624
014	PP VOA + 10 + Cis 1,2-DCE + MTBE _TBA	Run	624

PROJECT INFORMATION

E 0 9 - 0 3 9 0 4

Case No. E09-03904 **Project** FES/WATERVLIET-801394

04/21/2009 12:24 by kim - NOTE 1

PLEASE USE LOWEST MDLs POSSIBLE. MDLs FOR CONTROL SAMPLES SHOULD NOT BE LOWER THAN OTHER SAMPLES. USE TRUE MDLs AS THE REPORTING LIMITS. MDLs SHOULD NOT EXCEED THE MDLs USED IN JOB #3320.

04/21/2009 12:39 by kim - NOTE 2

SAMPLE CONTENTS:

Sample 1: 15.02g Soil/11.71mL H20/15mL MeOH
Sample 2: 15.03g Soil/11.71mL H20/15mL MeOH
Sample 3: 14.98g Soil/11.71mL H20/15mL MeOH
Sample 4: 14.99g Soil/11.71mL H20/15mL MeOH
Sample 5: 14.99g Soil/11.71mL H20/15mL MeOH
Sample 6: 14.98g Soil/11.71mL H20/15mL MeOH
Sample 7: 15.03g Soil/11.71mL H20/15mL MeOH

INTEGRATED ANALYTICAL LABORATORIES, LLC

SAMPLE RECEIPT VERIFICATION

CASE NO: **E 09** **03904** CLIENT: ISOTEC -WW

COOLER TEMPERATURE: 2° - 6°C: ✓ (See Chain of Custody)

Comments

COC: COMPLETE / INCOMPLETE

KEY

✓	= YES/NA
✗	= NO

✗ Vo Vials have Exp. date of 10/9/08

✓	Bottles Intact	(not IAL vials)
✓	no-Missing Bottles	
✓	no-Extra Bottles	
✓	Sufficient Sample Volume	
✓	no-headspace/bubbles in VOs	
✓	Labels intact/correct	
✓	pH Check (exclude VOs)[1]	
✓	Correct bottles/preservative	
✓	Sufficient Holding/Prep Time[1]	
☐	Sample to be Subcontracted	
✓	**Chain of Custody is Clear**	

[1] All samples with "Analyze Immediately" holding times will be analyzed by this laboratory past the holding time. This includes but is not limited to the following tests: pH, Temperature, Free Residual Chlorine, Total Residual Chlorine, Dissolved Oxygen, Sulfite.

ADDITIONAL COMMENTS:

SAMPLE(S) VERIFIED BY: INITIAL CM DATE 4/20/09

CORRECTIVE ACTION REQUIRED: **YES** ☐ (SEE BELOW) **NO** ☐

If COC is **NOT** clear, ***STOP*** until you get client to authorize/clarify work.

CLIENT NOTIFIED: YES ☐ Date/ Time: ____ NO ☐

PROJECT CONTACT:

SUBCONTRACTED LAB:

DATE SHIPPED:

ADDITIONAL COMMENTS:

VERIFIED/TAKEN BY: INITIAL KN DATE 4/21/09

REV 03/2009

Laboratory Custody Chronicle

IAL Case No.

E09-03904

Client Isotec

Project FES/WATERVLIET-801394

Received On 4/20/2009@17:20

Department: Volatiles			Prep. Date	Analyst	Analysis Date	Analyst
PP VOA + 10 + Cis 1,2-DCE + MTBE & TBA	03904-001	Sludge	n/a	n/a	4/25/09	Xing
"	-002	"	n/a	n/a	4/22/09	Xing
"	-003	"	n/a	n/a	4/22/09	Xing
"	-004	"	n/a	n/a	4/22/09	Xing
"	-005	"	n/a	n/a	4/22/09	Xing
"	-006	"	n/a	n/a	4/22/09	Xing
"	-007	"	n/a	n/a	4/22/09	Xing
"	-008	Aqueous	n/a	n/a	4/24/09	Barbara
"	-009	"	n/a	n/a	4/24/09	Barbara
"	-010	"	n/a	n/a	4/24/09	Barbara
"	-011	"	n/a	n/a	4/25/09	Barbara
"	-012	"	n/a	n/a	4/25/09	Barbara
"	-013	"	n/a	n/a	4/25/09	Barbara
"	-014	"	n/a	n/a	4/25/09	Barbara

Review and Approval: [signature]

Integrated Analytical Labs ~ 273 Franklin Road, Randolph, NJ 07869 ~ (973) 361-4252 ~ Fax (973) 989-5288

11 Princess Road
Suite A
Lawrenceville, NJ 08648
(609) 275-8500 phone
(609) 275-9608 fax

6452 Fig Street
Suite C
Arvada, Colorado 80004
(303) 843-9079 phone
(303) 843-9094 fax

Sent via E-Mail to forensic@chesco.com

November 29, 2012

Forensic Environmental Services, Inc.
113 John Robert Thomas Drive
Exton, PA 19341
Attn: Robert W. Zei

RE: ***ISOTEC^{SM} Treatment Program Letter Report***
Norton/Nashua Tape Products Site
2600 7th Avenue
Watervliet, New York
ISOTEC Project #801394

Dear Mr. Zei:

In-Situ Oxidative Technologies, Inc. (ISOTEC^{SM}) is pleased to provide the following letter report to Forensic Environmental Services, Inc. (FES) for the in-situ chemical oxidation (ISCO) treatment program implemented at the Former Norton/Nashua Tape Products Facility located at 2600 7th Avenue in Watervliet, New York.

Constituents of concern (COC) at the subject site are volatile organic compounds (VOCs), primarily benzene, toluene, ethylbenzene, total xylenes (BTEX). Most recent COC levels detected in groundwater in well MW-27 were 100,000 micrograms per liter (ug/l) for toluene (May 2012). Other notable COC concentrations within the injection area include MP-25 at 79,000 ug/l and MP-26 at 13,000 ug/l (sample collection event May, 2012). General subsurface lithology at the site consists of silty clays with layers of fine to coarse sands and gravel from 0 to 15 feet bgs. Groundwater was encountered at approximately 7-ft to 9-ft below ground surface (bgs) and flowed in the east-northeast direction.

The overall objective of the treatment program is to achieve significant destruction of COCs in soils and groundwater in the approximately 2,000 square feet (ft^2) area adjacent to a former tank farm near MW-14 as well as a small area surrounding MW-27. The ISCO process implemented at the site utilized our proprietary modified Fenton's reagent activated sodium persulfate (MFR+XFR) process, which uses a combination of stabilized hydrogen peroxide, chelated iron catalyst and sodium persulfate. Treatment program activities took place over five (5) days during the period of November 12-16, 2012 and targeted thirty-two 5-ft injection intervals.

Mobilization and Demobilization

Mobilization activities included transportation and staging of ISOTEC equipment, materials, instruments, personnel, and services required for implementing the treatment program at the site. Equipment transported to the site included a 22-ft box truck housing miscellaneous equipment such as hoses, pumps, drums, tanks, mixers, generator, compressor, etc. Materials transported to the site included 34% hydrogen peroxide and other proprietary chemical mixes required for reagent preparation. Water for chemical dilution and decontamination was procured from a fire hydrant in the vicinity of the treatment area. Utility verification and marking was completed by FES prior to sampling and injection activities.

Demobilization activities included removal of all staged equipment, materials, instruments, personnel, and services from the site at the conclusion of the treatment program. Activities included decontamination of all equipment, drums, and instruments. Demobilization activities took place at the conclusion of the treatment program when the staged equipment, materials, instruments, personnel, and services were no longer needed. All non-regulated waste and debris generated during demobilization activities (including used nitrile gloves, rags, used plastic chemical bags, etc.) was removed. Any unused chemicals were transported from the site during demobilization activities.

Injection Pathways

Injection locations utilized for the treatment program consisted of eighteen (18) temporary direct push locations, fourteen (14) dual zone locations installed from 6.5-ft to 11.5-ft bgs and 9-ft to 14-ft bgs, and four (4) locations installed from 6.5-ft to 11.5-ft bgs only. Injection locations were installed at 12-ft spacing (i.e. 6-ft radius of influence, ROI) within the treatment area. An injection manifold was installed at each location, fitted with inlet and pressure release ports as well as a pressure gauge to monitor wellhead pressure.

Zebra Environmental Corporation (Zebra) was subcontracted to collect soil samples prior to implementation of the treatment program and to install injection locations during the program. Zebra utilized 4-ft sections of 1.5-inch direct push rod along with ISOTEC's custom stainless steel slotted screens to install injection locations at the site. Once reagent delivery was completed the rods and screen were removed and the location was filled with bentonite pellets and capped with asphalt patch.

Injection Activities

Treatment program injection activities began on November 12, 2012 and ended on November 16, 2012 for a total of five (5) days. A total of 8,000-gallons of MFR + XFR (1,600-gallons of chelated iron catalyst, 3,200-gallons of stabilized 10% hydrogen peroxide and 3,200-gallons of 10% sodium persulfate) were injected at an average flow rate of 1.16 gallons per minute (gpm) for the catalyst, 1.41 gpm for the hydrogen peroxide and 2.02 gpm for the sodium persulfate. Injection pressures at the site were low, in the 0 to 10 pounds per square inch (psi) range measured at the well head. Injection volume and flow rate summaries are provided in the included attachments.

Reagent staging was done adjacent to the injection area. Secondary containment was utilized for both concentrated and diluted reagent mixes during the treatment program. Diluted reagent was prepared as needed and utilized before the end of each working day. Traffic cones, barricades and caution tape were utilized to identify the exclusion zone and to provide a vehicle throughway during injection activities.

A water main break in a different area of the property on Friday, November 16, 2012 caused the water source at the site to be shut down for the remainder of the injection event. ISOTEC was able to find a local business which allowed field crew to acquire the remaining water needed for treatment completion.

During reinstallation of the final injection location (IP-7S) the drill rig blew a hydraulic line. Due to the estimated time for repair of the drill rig a decision was made to inject the remaining reagent volume (100 gallons each hydrogen peroxide and sodium persulfate) evenly between IP-13S and IP-15S. Any remaining injection locations were removed by hand.

Radius of Influence (ROI) Monitoring

To evaluate ISCO radial effect, periodic samples were collected from monitoring wells MP-20, MP's-23-29, and MW-27 and monitored for conductivity, redox potential (ORP), pH, total dissolved solids (TDS), temperature, iron, H_2O_2, and sodium persulfate. ISCO radial effects are defined by fluctuations observed in these parameters over time. In general, a 30-50% increase over the baseline data is indicative of a radial effect.

Monitoring data is provided in the included attachments. In general, fluctuations in parameters were noted at all treatment area monitoring locations to varying degrees.

- Fluctuations in iron concentrations were noted in seven of the nine monitoring wells. Greatest increases in Iron were observed at monitoring wells MP-24, MP-27 and MW-27 (all greater than 100 mg/l).
- Hydrogen peroxide increases were negligible (<1 mg/l) in MP-23, MP-28 and MP-29 with substantial increases (120 to >1,000 mg/l) noted in MP-20, MP's-25-27 and MW-27.
- Increases in sodium persulfate concentrations were noted in six of the nine monitoring wells, most notably at MP-20, MP's-24-27 and MW-27.
- ORP increases were observed in all monitoring wells due to transformation of subsurface conditions into a more oxidizing environment from ISCO.
- pH fluctuated between circum-neutral and low conditions in five of the nine monitoring wells while the remaining four locations remained circum-neutral.
- Temperature increases from the exothermic reaction were generally limited to less than 1 to approximately 3 degrees C during the same day of injection.

Conclusions

ISCO injection activities during the treatment program were completed in a safe manner and within the timeframe proposed. All but one proposed injection location was able to receive the targeted reagent quantity with little reagent surfacing.

We hope that the above treatment program report will meet your needs and look forward to working with you on this project to a satisfactory completion. If you have any questions or need additional information, please contact Prasad Kakarla (extension 111) or myself at (609) 275-8500 extension 161.

Very truly yours,
In-Situ Oxidative Technologies, Inc.

Kevin O'Neal

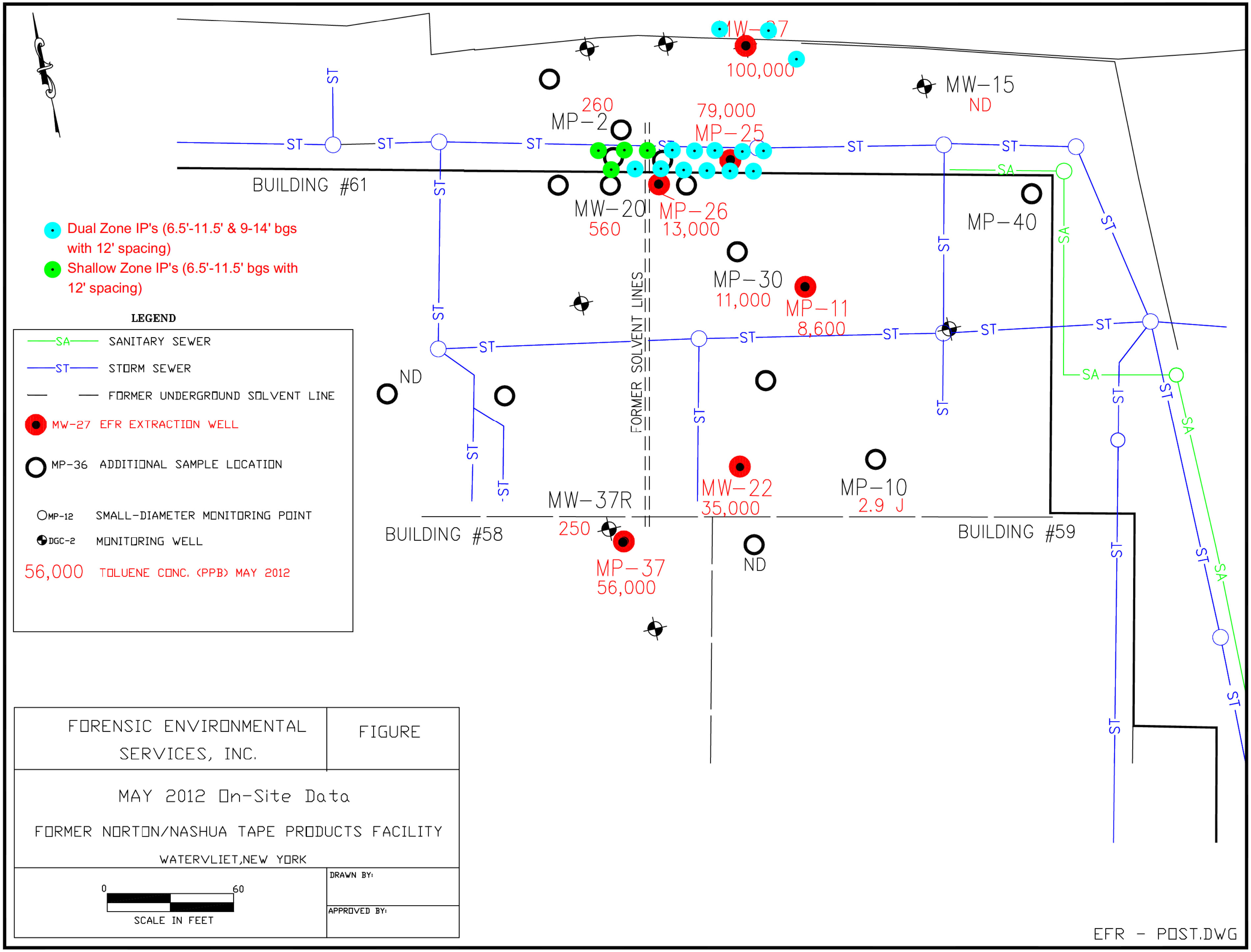
Kevin O'Neal
Field Operations Manager

Reviewed By:

Prasad Kakarla

Prasad Kakarla, P.E.
Technical Director

attachments



MW-27
100,000
MW-15
ND
260
MP-2
79,000
MP-25
BUILDING #61
MW-20
560
MP-26
13,000
MP-40
MP-30
11,000
MP-11
8,600
FORMER SOLVENT LINES
ND
MW-37R
250
MW-22
35,000
MP-10
2.9 J
BUILDING #58
BUILDING #59
MP-37
56,000
ND
ST
SA
Dual Zone IP's (6.5'-11.5' & 9-14' bgs with 12' spacing)
Shallow Zone IP's (6.5'-11.5' bgs with 12' spacing)
LEGEND
SA SANITARY SEWER
ST STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
MW-27 EFR EXTRACTION WELL
MP-36 ADDITIONAL SAMPLE LOCATION
MP-12 SMALL-DIAMETER MONITORING POINT
DGC-2 MONITORING WELL
56,000 TOLUENE CONC. (PPB) MAY 2012
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE
MAY 2012 On-Site Data
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
60
SCALE IN FEET
DRAWN BY:
APPROVED BY:
EFR - POST.DWG

Treatment Program
Injection Volume/Flow Rate Summary
FES/Nashua Tape Products Site
Watervliet, NY
Isotec Project #801394

Injection Point	Injection Date	Injection Depth	Persulfate Volume (gal)	Persulfate Injection Time (mins)	Catalyst Volume (gal)	Catalyst Injection Time (mins)	H_2O_2 Volume (gal)	H_2O_2 Injection Time (mins)	Persulfate Flow Rate (gal/min)	Catalyst Flow Rate (gal/min)	H_2O_2 Flow Rate (gal/min)
IP-02D	12-Nov-12	9.0-14.0	50	18	50	20	80	44	2.78	2.50	1.82
IP-08S		6.5-11.5	50	30	50	24	30	18	1.67	2.08	1.67
IP-10S		6.5-11.5	50	24	50	26	40	15	2.08	1.92	2.67
IP-02D	13-Nov-12	9.0-14.0	50	22			20	40	2.27		0.50
IP-02S		6.5-11.5	100	112	50	42	100	100	0.89	1.19	1.00
IP-04D		9.0-14.0	100	79	50	34	100	188	1.27	1.47	0.53
IP-06D		9.0-14.0	100	59	50	32	50	87	1.69	1.56	0.57
IP-08S		6.5-11.5	50	18	0	0	70	99	2.78	0.00	0.71
IP-10S		6.5-11.5	50	21	0	0	60	72	2.38	0.00	0.83
IP-12D		9.0-14.0	100	58	50	24	100	127	1.72	2.08	0.79
IP-12S		6.5-11.5	100	44	50	37	50	34	2.27	1.35	1.47
IP-16D		9.0-14.0	100	41	50	19	100	40	2.44	0.82	2.50
IP-01S	14-Nov-12	6.5-11.5	100	52	50	25	100	77	1.92	1.04	1.30
IP-04S		6.5-11.5	100	47	50	11	100	142	2.13	0.94	0.70
IP-06D		9.0-14.0					50	37			1.35
IP-06S		6.5-11.5	100	63	50	27	100	105	1.59	1.26	0.95
IP-09S		6.5-11.5	100	97	50	40	100	70	1.03	1.94	1.43
IP-12S		6.5-11.5					50	20			2.50
IP-14D		6.5-11.5	100	51	50	22	100	83	1.96	1.02	1.20
IP-14S		6.5-11.5	100	52	50	24	50	32	1.92	1.04	1.56
IP-16S		6.5-11.5	100	41	50	18	100	144	2.44	0.82	0.69
IP-18D		9.0-14.0	100	70	50	28	100	139	1.43	1.40	0.72
IP-18S		6.5-11.5	100	41	50	42	100	54	2.44	0.82	1.85
IP-03D	15-Nov-12	9.0-14.0	100	55	50	31	100	57	1.82	1.10	1.75
IP-03S		6.5-11.5	100	50	50	22	100	53	2.00	1.00	1.89
IP-05D		9.0-14.0	100	46	50	22	100	80	2.17	0.92	1.25
IP-05S		6.5-11.5	100	45	50	17	100	55	2.22	0.90	1.82
IP-07D		9.0-14.0	100	71	50	32	50	103	1.41	1.42	0.49
IP-11D		9.0-14.0	100	35	50	17	100	86	2.86	0.70	1.16
IP-11S		6.5-11.5	100	65	50	31	100	82	1.54	1.30	1.22
IP-13D		9.0-14.0	100	57	50	21	125	112	1.75	1.14	1.12
IP-14S		6.5-11.5					25	16			1.56
IP-15D		9.0-14.0	100	40	50	21	100	70	2.50	0.80	1.43
IP-17D		9.0-14.0	100	51	50	20	100	63	1.96	1.02	1.59
IP-17S		6.5-11.5	100	73	50	25	50	25	1.37	1.46	2.00
IP-07D	16-Nov-12	9.0-14.0					50	30			1.67
IP-07S		6.5-11.5			50	68				0.74	
IP-13S		6.5-11.5	100	35	50	16	100	71	2.86	0.70	1.41
IP-13S		6.5-11.5	50	29			50	22	1.72		2.27
IP-15S		6.5-11.5	150	46	50	16	150	72	3.26	0.92	2.08
IP-17S		6.5-11.5					50	23			2.17
TOTALS			**3200**		**1600**		**3200**		**2.02**	**1.16**	**1.41**

Stabilized Hydrogen Peroxide (H_2O_2) was injected at 10% concentration
Catalyst is ISOTEC series Cat-4260 chelated iron complex at 10-15% concentration
Sodium Persulfate was injected at 10% concentration

Treatment Program
Groundwater Field Sample Parameters
FES/Nashua Tape Products Site
Watervliet, NY
Isotec Project #801394

Point	Date & Time	Iron (mg/l)	H_2O_2 (mg/l)	Persulfate (mg/l)	Cond (uS)	ORP (mV)	pH (SU)	TDS (mg/l)	Temp. (°C)
MP-20	11/13/2012 10:15AM	7.4	0.4	<0.7	702	-24	8.47	483	11.2
MP-20	11/13/12 2:45 PM	11.0	4.0	1.4	684	193	5.19	468	13.0
MP-20	11/14/12 10:30 AM	11	0.4	>0.7	707	76	6.15	484	11.8
MP-20	11/14/12 2:45 PM	48	200.0	2,800	13,370	468	5.63	47,360	10.6
MP-20	11/15/12 11:00 AM	26	>1000	2,800	7,845	511	4.45	6,459	14.9
MP-20	11/15/12 3:00 PM	12	500	NA	5,844	431	5.88	4,777	10.5
MP-20	11/16/12 11:00 AM	10	8	NA	4,028	317	6.16	3,123	9.9
MP-23	11/13/12 10:15 AM	20.0	0.6	<0.7	968	70	6.72	676	9.6
MP-23	11/13/12 2:45 PM	20.0	0.6	<0.7	995	117	6.01	695	9.8
MP-23	11/14/12 10:30 AM	22	0.6	<0.7	1,022	62	6.22	712	11.4
MP-23	11/14/12 2:45 PM	28	<0.2	2.8	1,109	230	6.57	761	10.6
MP-23	11/15/12 11:00 AM	50	0.4	1.4	1,259	220	5.99	882	11.9
MP-23	11/15/12 3:00 PM	34	0.8	NA	1,308	315	6.63	926	9.2
MP-23	11/16/12 11:00 AM	40	0.6	NA	1,506	231	6.71	1,076	8.3
MP-24	11/13/12 10:15 AM	18.0	<0.2	<0.7	953	68	6.71	661	12.5
MP-24	11/13/12 2:45 PM	16.0	0.2	<0.7	1,115	161	6.14	783	10.1
MP-24	11/14/12 10:30 AM	11	<0.2	<0.7	1,192	72	6.61	836	11.2
MP-24	11/14/12 2:45 PM	18	<0.2	<0.7	1,177	211	6.23	827	10.6
MP-24	11/15/12 11:00 AM	12	>1000	350	12,500	528	3.1	10,950	13.9
MP-24	11/15/12 3:00 PM	30	>1000	NA	23,310	586	1.75	23,060	9.6
MP-24	11/16/12 11:00 AM	>100	>1000	NA	27,140	580	1.93	27,710	7.1
MP-25	11/13/12 10:15 AM	12.0	<0.2	<0.7	1,209	67	6.63	848	12.1
MP-25	11/13/12 2:45 PM	18	0.2	0.7	1,233	150	6.24	869	9.4
MP-25	11/14/12 10:30 AM	12	<0.2	2.8	1,212	132	6.29	850	12.4
MP-25	11/14/12 2:45 PM	36	0.6	140	2,702	251	6.29	2,011	9.9
MP-25	11/15/12 11:00 AM	18	>1000	700	14,810	280	2.91	13,300	12.6
MP-25	11/15/12 3:00 PM	24	600	NA	11,390	553	2.8	9,966	8.9
MP-25	11/16/12 11:00 AM	20	80	NA	7,242	446	3.73	5,990	8.6
MP-26	11/13/12 10:15 AM	14.0	<0.2	<0.7	1,013	37	7.74	708	11.2
MP-26	11/13/12 2:45 PM	20	0.2	<0.7	1,086	98	6.22	761	10.2
MP-26	11/14/12 10:30 AM	32	1.2	14	2,084	94	6.54	1,516	12.2
MP-26	11/14/12 2:45 PM	32	1.8	7	4,953	288	5.69	3,925	10.5
MP-26	11/15/12 11:00 AM	40	0.2	2.8	3,909	380	5.46	2,994	12.9
MP-26	11/15/12 3:00 PM	48	1.2	NA	3,931	455	4.93	3,037	9
MP-26	11/16/12 11:00 AM	86	120	NA	14,610	519	2.78	13,340	8.3

Treatment Program
Groundwater Field Sample Parameters
FES/Nashua Tape Products Site
Watervliet, NY
Isotec Project #801394

Point	Date & Time	Iron (mg/l)	H_2O_2 (mg/l)	Persulfate (mg/l)	Cond (uS)	ORP (mV)	pH (SU)	TDS (mg/l)	Temp. (°C)
MP-27	11/13/12 10:15 AM	14.0	<0.2	<0.7	940	45	7.15	653	10.8
MP-27	11/13/12 2:45 PM	16	0.2	<0.7	1,232	93	6.17	868	10.0
MP-27	11/14/12 10:30 AM	>100	>1000	350	11,140	598	2.80	9,621	12.6
MP-27	11/14/12 2:45 PM	>100	40.0	700	17,170	582	2.97	15,920	9.6
MP-27	11/15/12 11:00 AM	18	>1000	1,750	19,040	555	2.13	17,750	15.0
MP-27	11/15/12 3:00 PM	20	120	NA	25,480	537	1.68	25,540	9.2
MP-27	11/16/12 11:00 AM	74	40	NA	13,690	455	2.51	12,320	8.5
MP-28	11/15/12 11:00 AM	12	0.2	0.7	994	300	5.44	685	14.8
MP-28	11/15/12 3:00 PM	15	0.2	NA	854	432	5.44	594	8.7
MP-28	11/16/12 11:00 AM	18	0.2	NA	907	338	5.6	634	7.8
MP-29	11/15/12 11:00 AM	9	0.2	<0.7	744	203	6.04	508	15.1
MP-29	11/15/12 3:00 PM	15	<0.2	NA	715	354	6.21	493	8.3
MP-29	11/16/12 11:00 AM	14	0.2	NA	668	262	6.1	459	8.7
MW-26	11/14/12 2:45 PM	9	0.4	<0.7	1,429	95	5.74	1,014	9.8
MW-27	11/14/12 2:45 PM	>100	0.8	28	4,116	123	5.81	3,204	10.0
MW-27	11/15/12 3:00 PM	>100	>1000	>7000	8,740	506	3.46	7,370	9.4
MW-27	11/16/12 11:00 AM	>100	>1000	NA	12,730	521	2.89	11,330	8.1

NOTES:
ND = not detected
NA = sample not analyzed
Cond = conductivity
ORP = oxidation-reduction potential
TDS = total dissolved solids
Temp = temperature
mg/l = milligrams per liter
uS = micro Siemens
mV = milli volts
ft = feet below top of casing
^{o}C = Degree celsius

November 12-16, 2012
Treatment Program Groundwater Sample
Parameter Chart
FES/Nashua Tape Products Site
Watervliet, NY
ISOTEC Project #801394

November 12-16, 2012
Treatment Program Groundwater Sample
Parameter Chart
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Watervliet, NY
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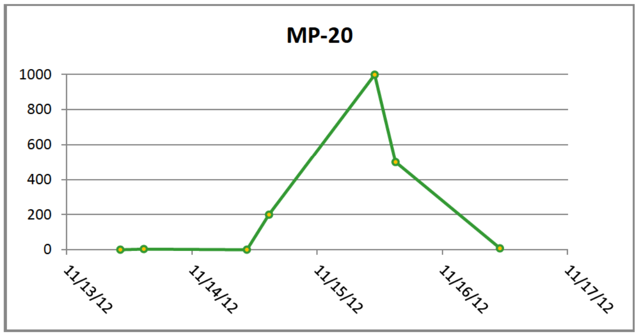
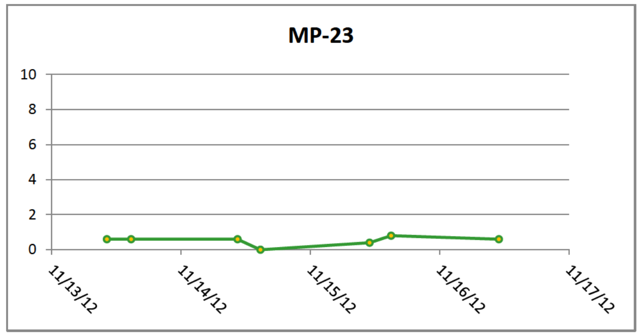
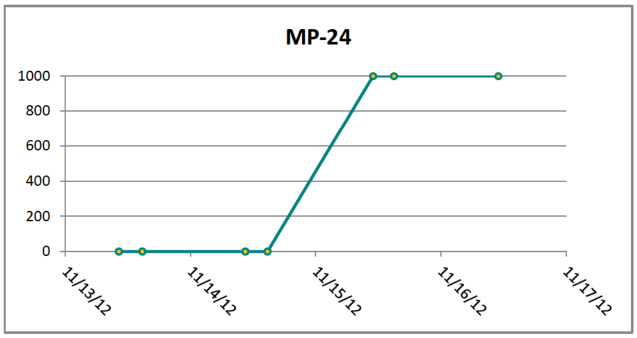
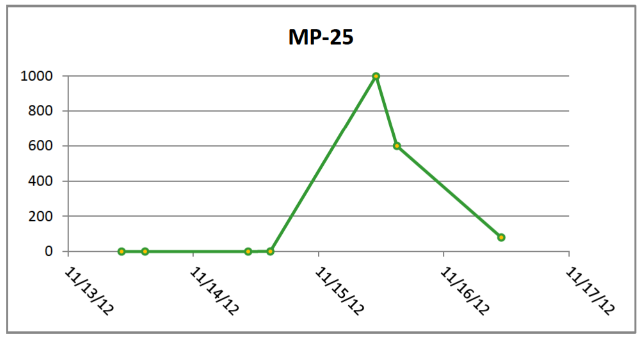
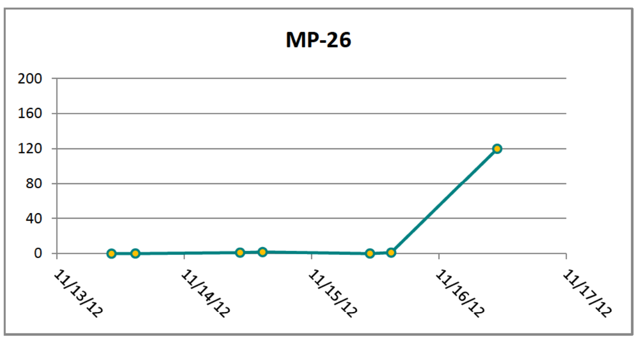
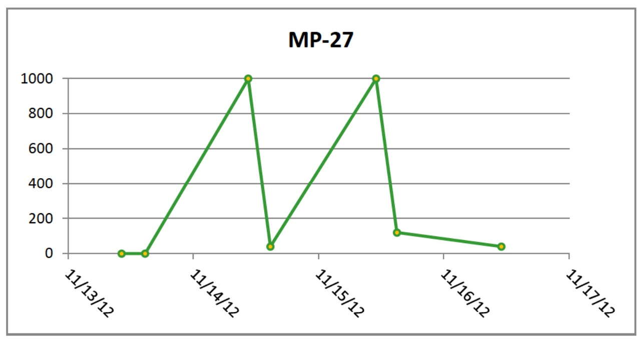


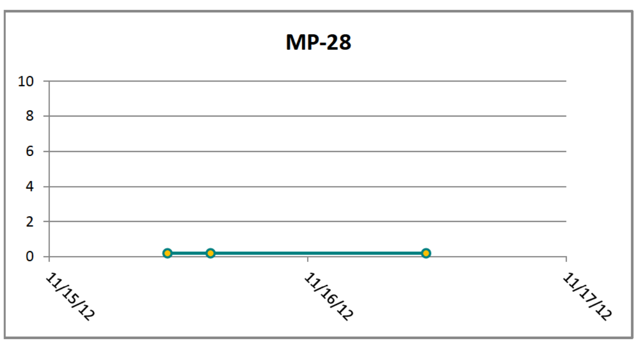


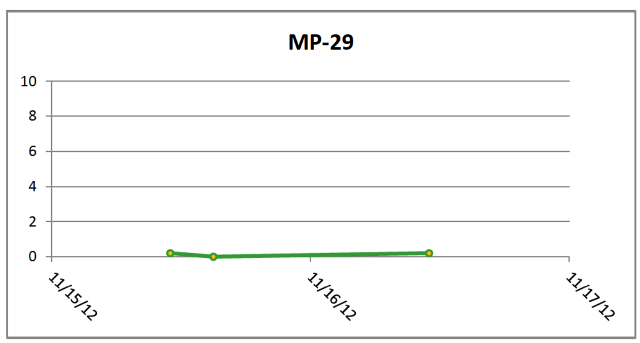


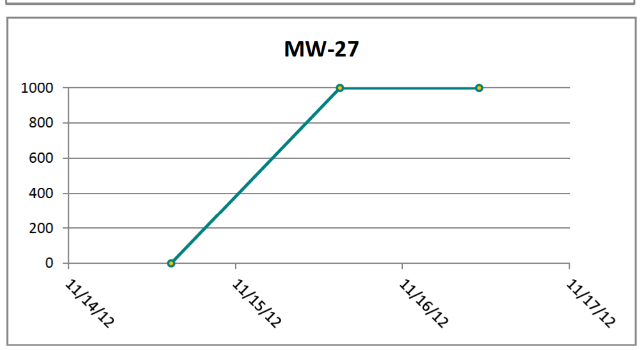






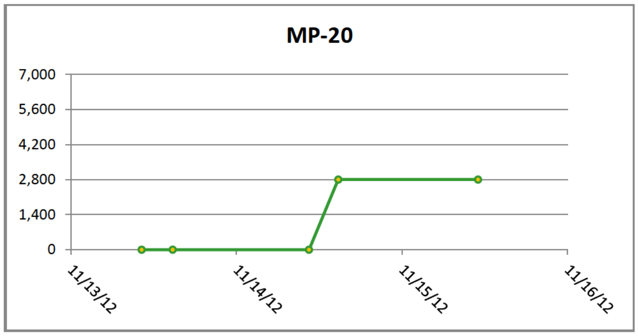


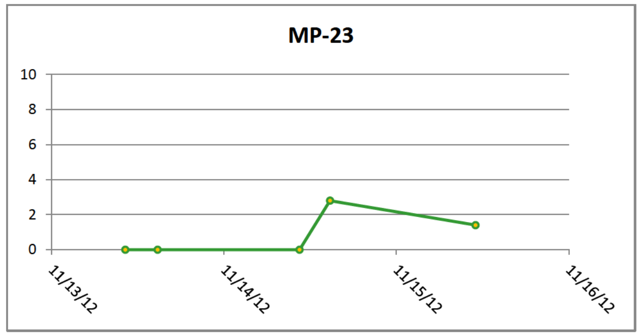


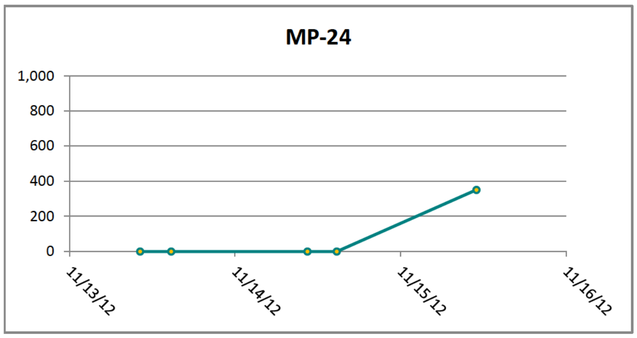


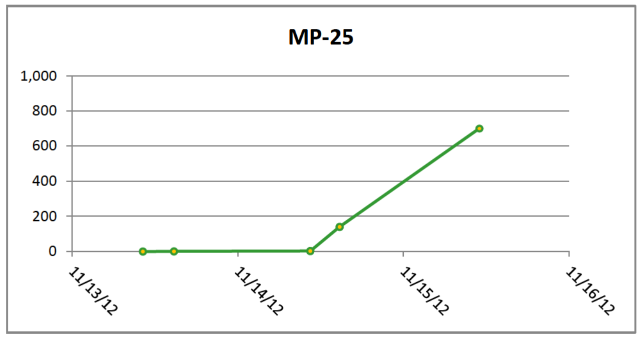
Hydrogen Peroxide (mg/L)

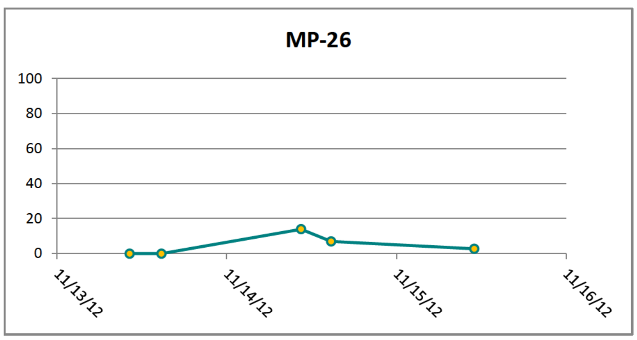
November 12-16, 2012
Treatment Program Groundwater Sample
Parameter Chart
FES/Nashua Tape Products Site
Watervliet, NY
ISOTEC Project #801394

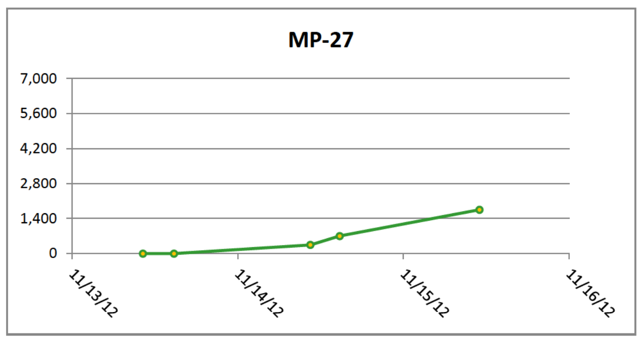


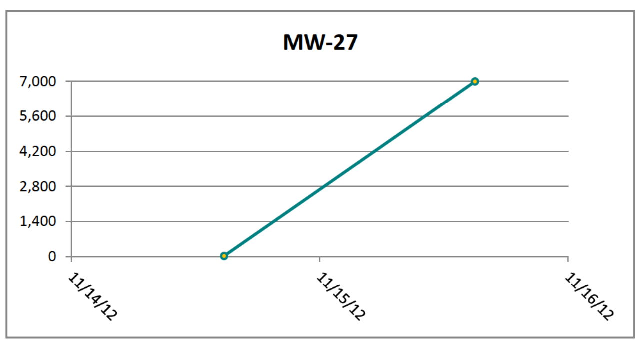






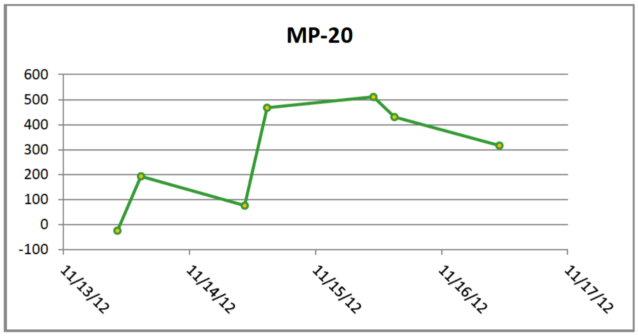


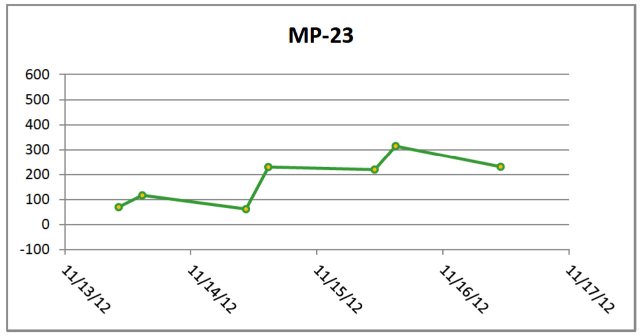


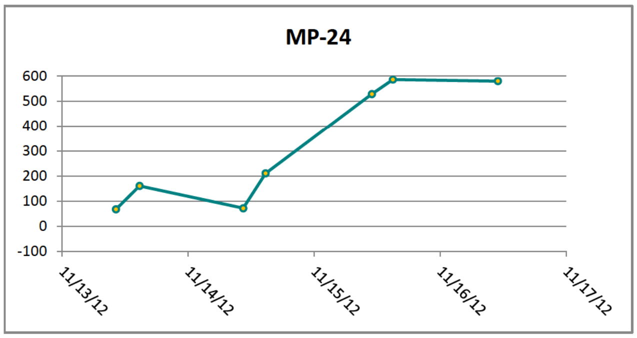


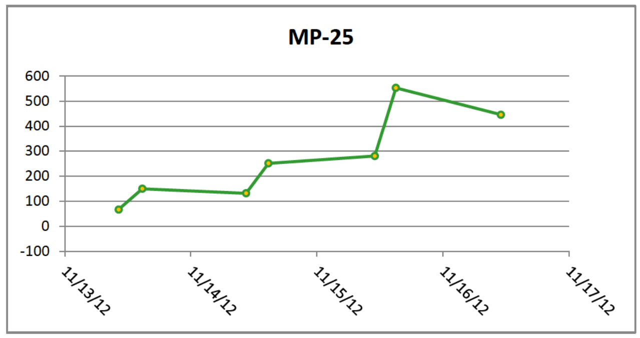
Sodium Persulfate (mg/L)

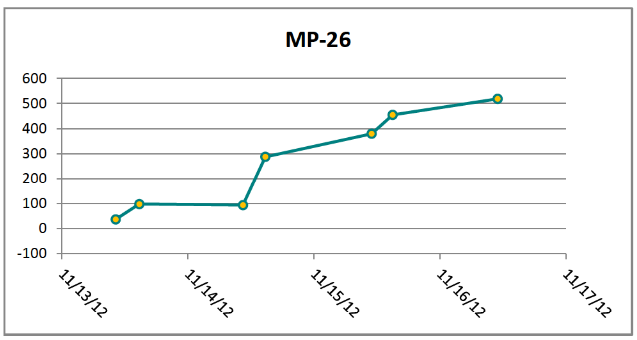
November 12-16, 2012
Treatment Program Groundwater Sample
Parameter Chart
FES/Nashua Tape Products Site
Watervliet, NY
ISOTEC Project #801394

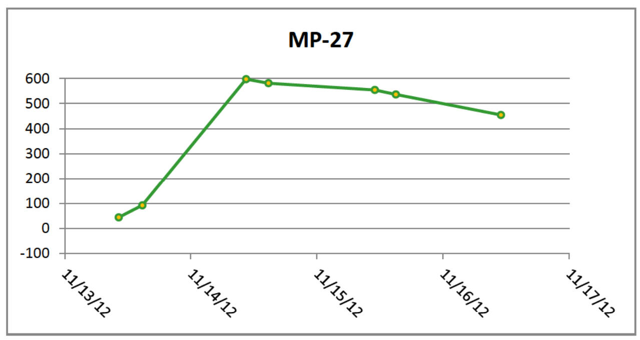


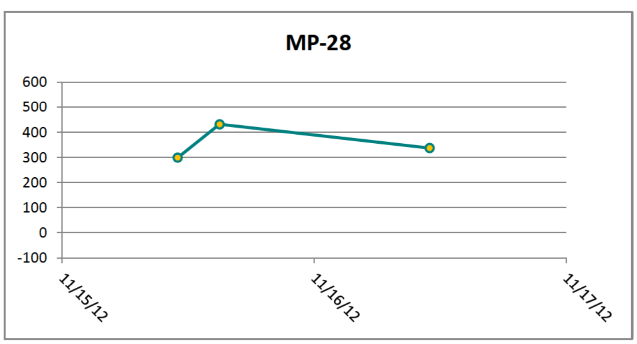


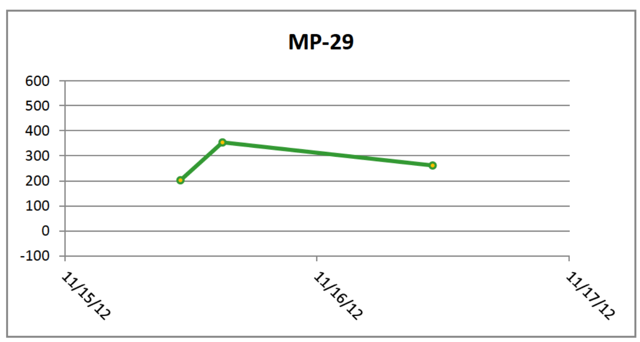


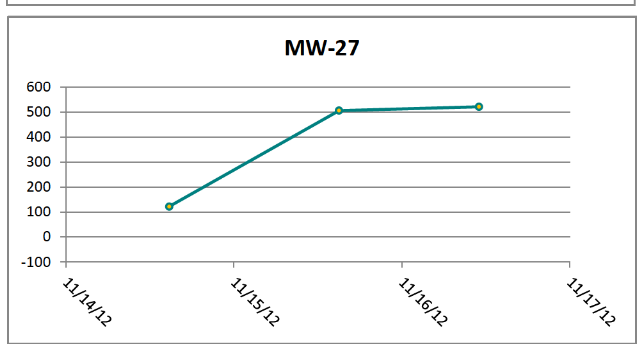












Oxygen Redox Potential (mV)

November 12-16, 2012
Treatment Program Groundwater Sample
Parameter Chart
FES/Nashua Tape Products Site
Watervliet, NY
ISOTEC Project #801394

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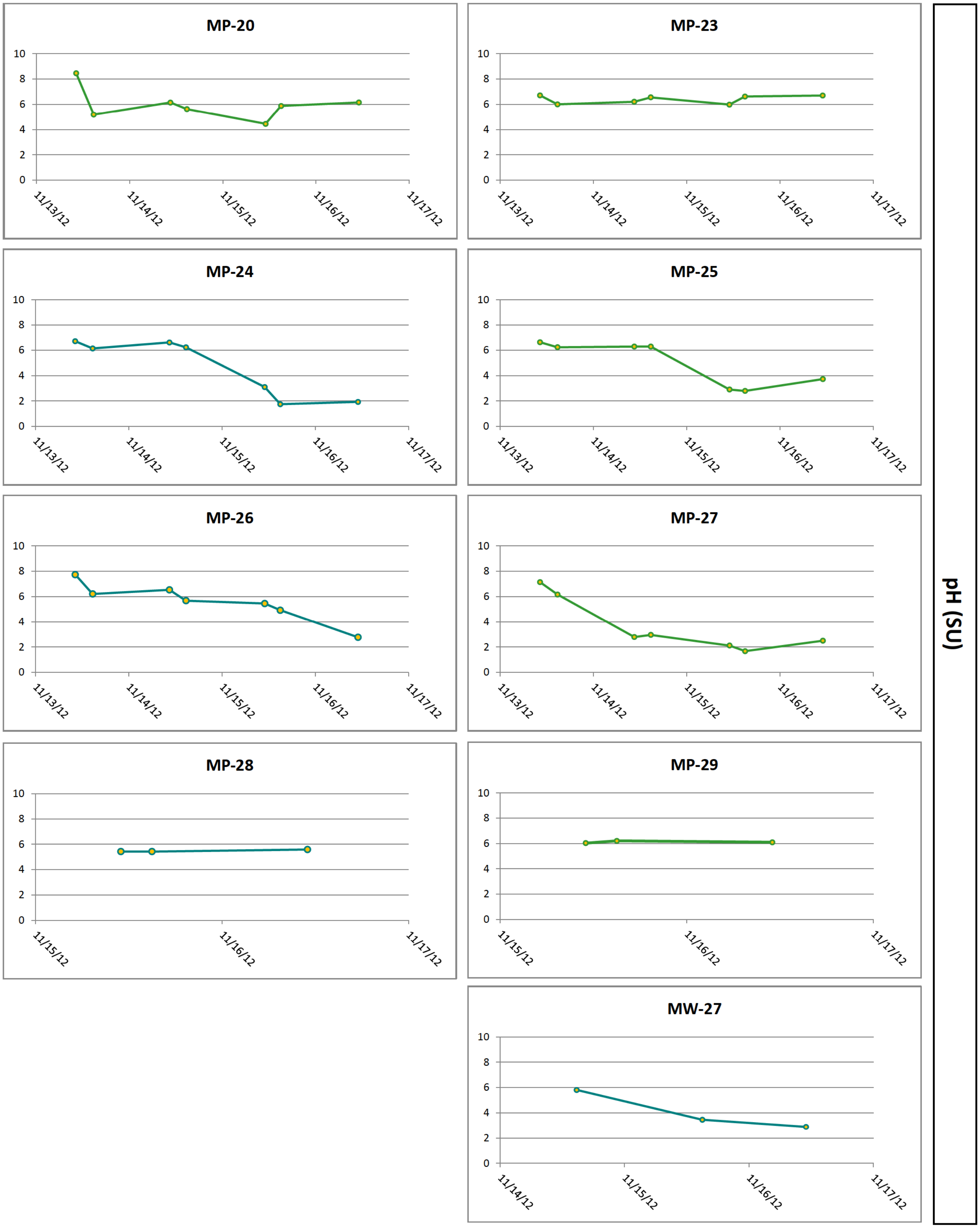

November 12-16, 2012
Treatment Program Groundwater Sample
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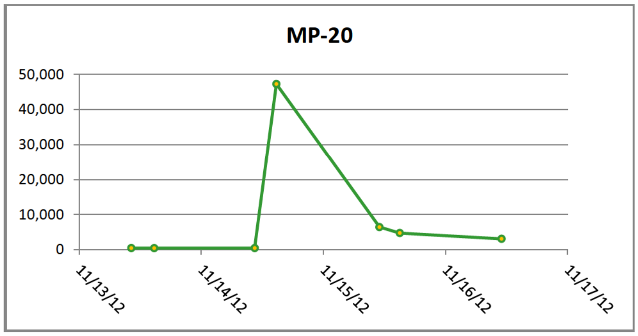
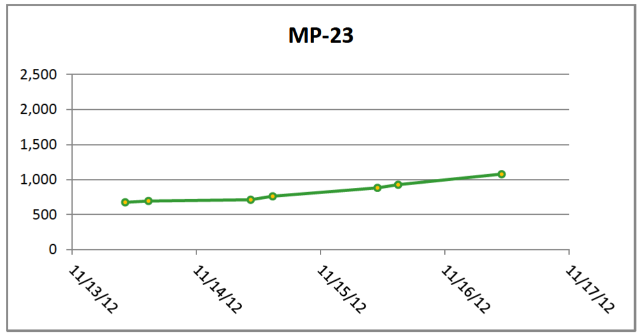
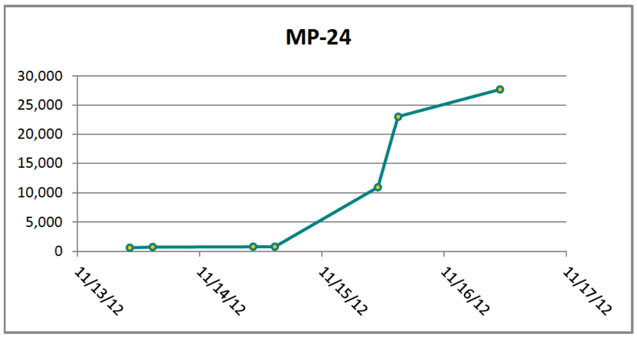
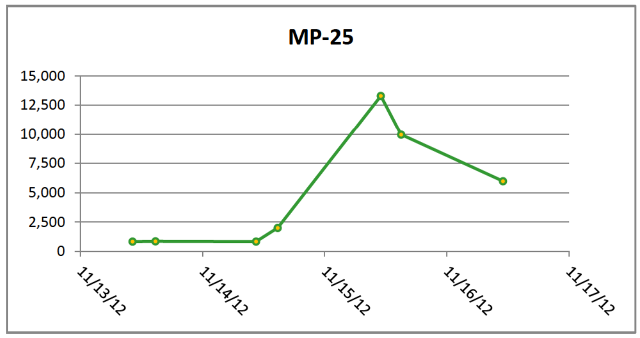
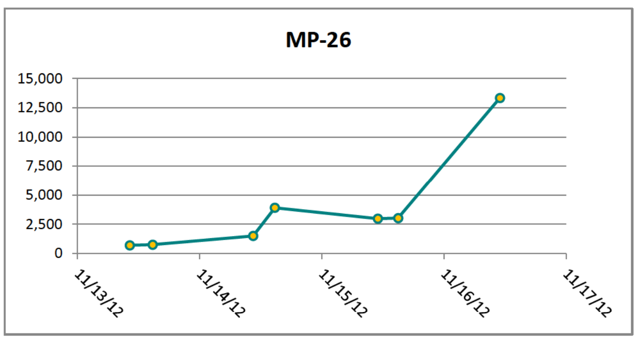
Total Dissolved Solids (mg/l)

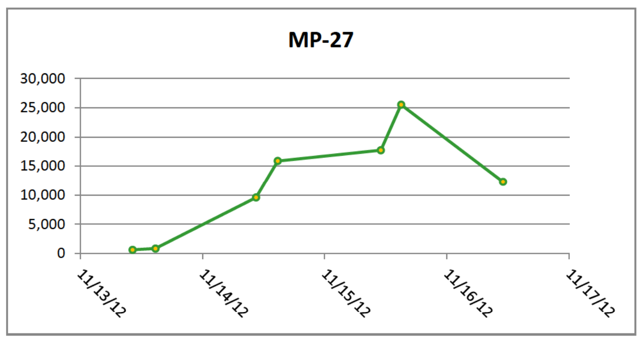


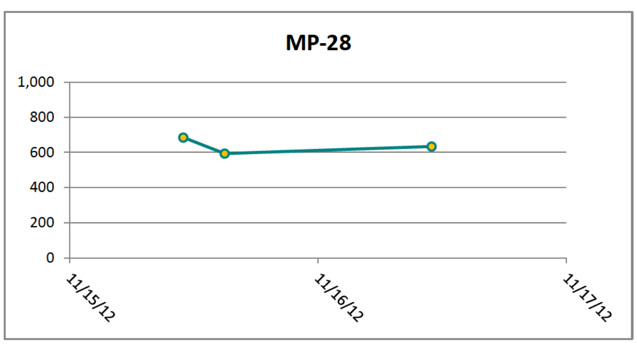


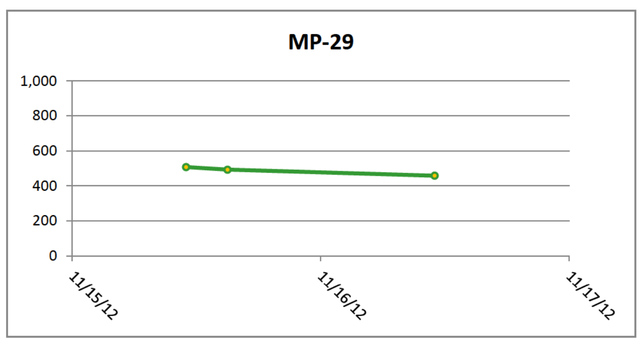


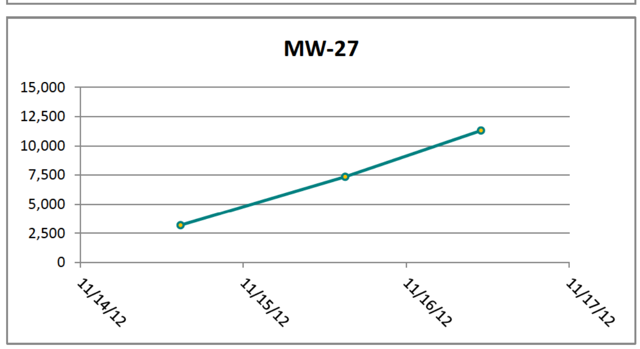








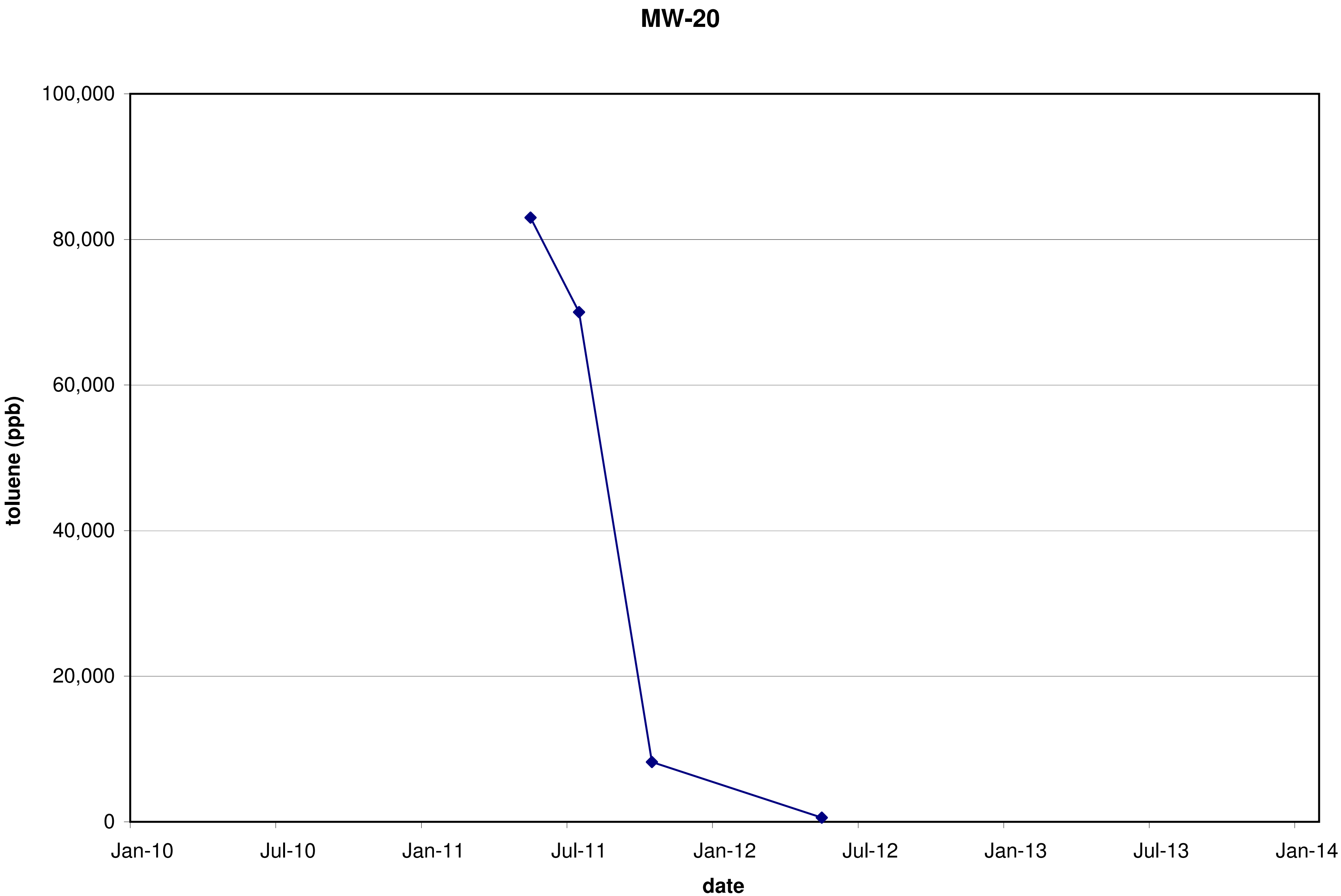




November 12-16, 2012
Treatment Program Groundwater Sample
Parameter Chart
FES/Nashua Tape Products Site
Watervliet, NY
ISOTEC Project #801394

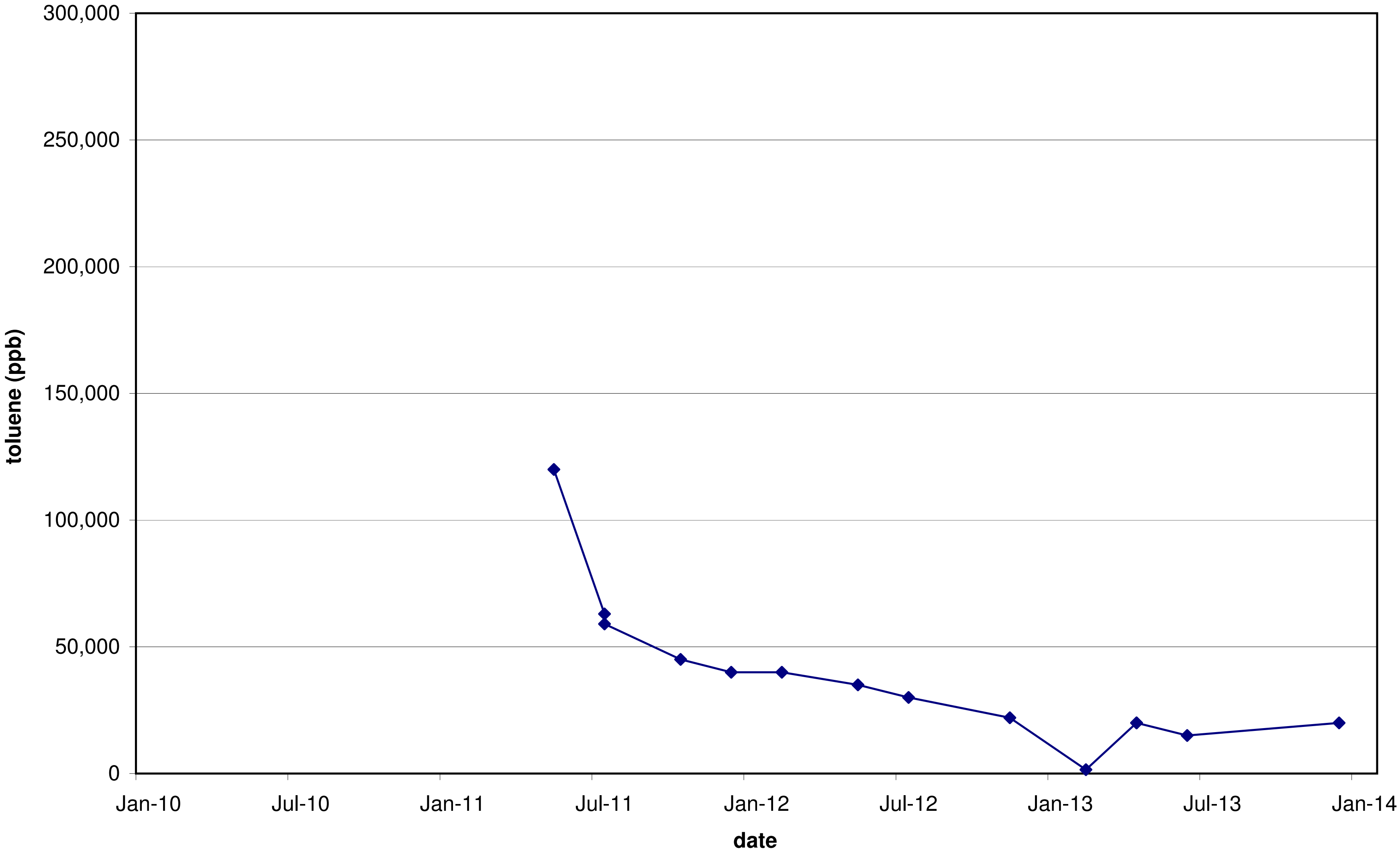
APPENDIX B

TOLUENE CONCENTRATION VS. TIME GRAPHS

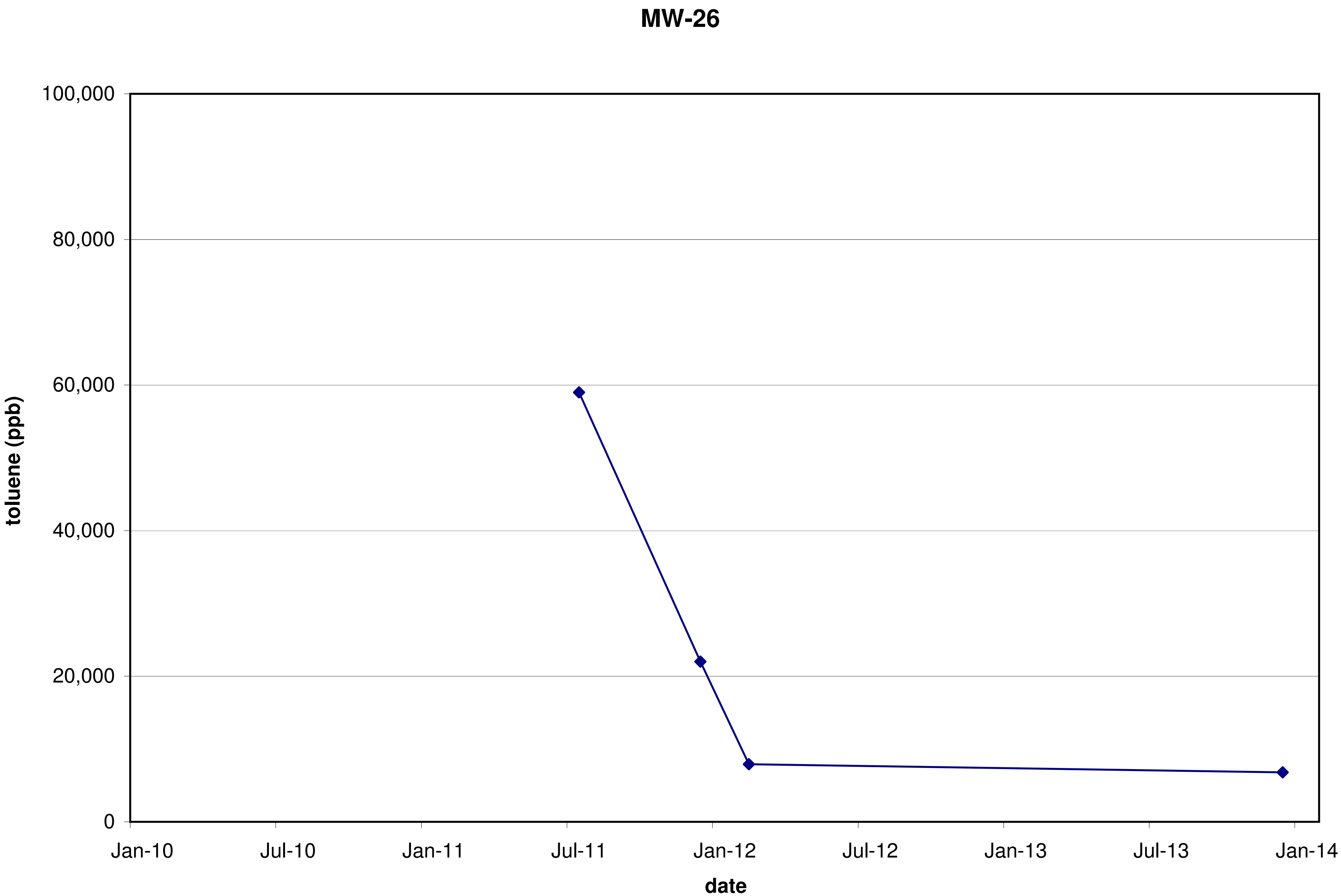

MW-20
100,000
80,000
60,000
40,000
20,000
0
toluene (ppb)
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
date

APPENDIX B

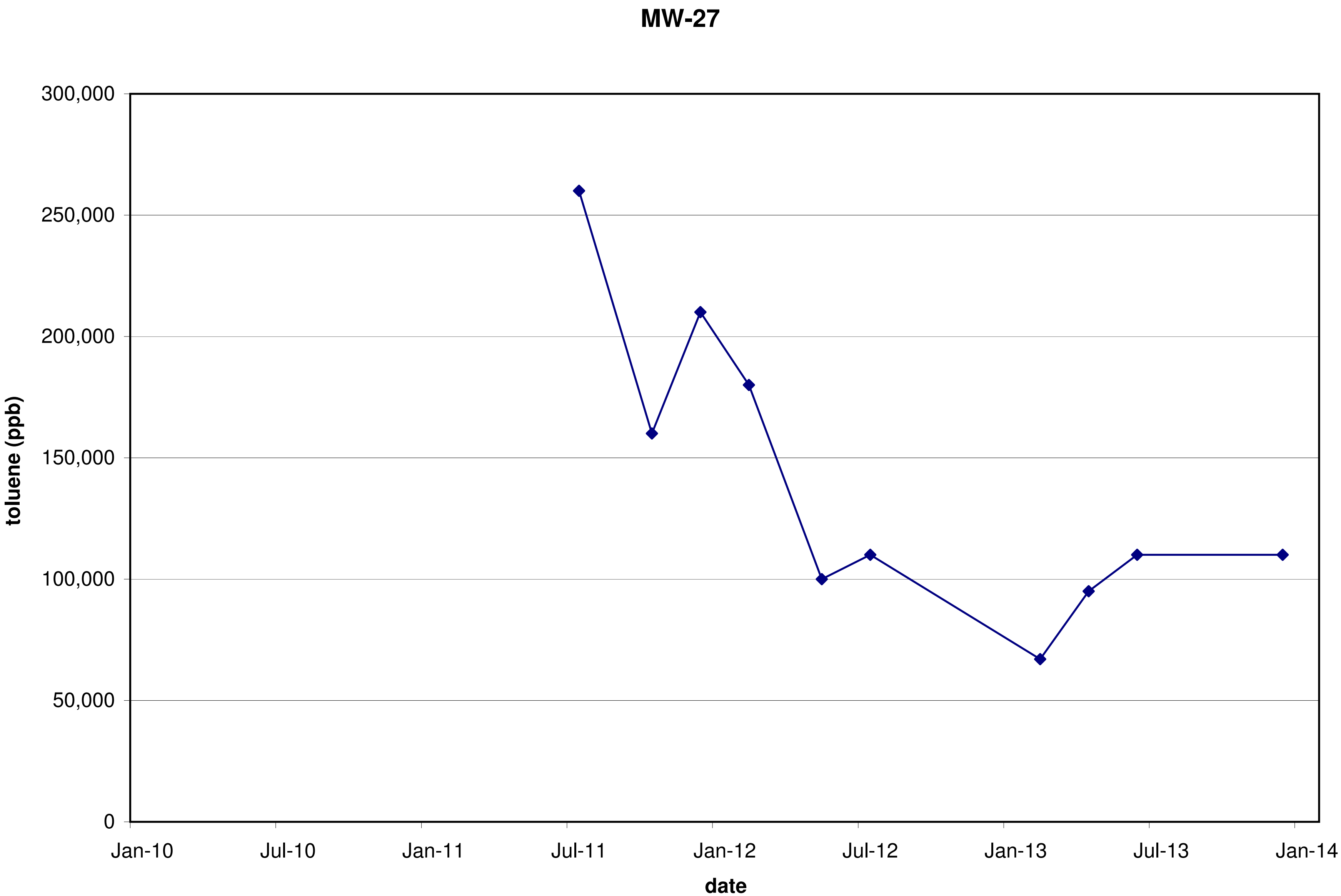
MW-22



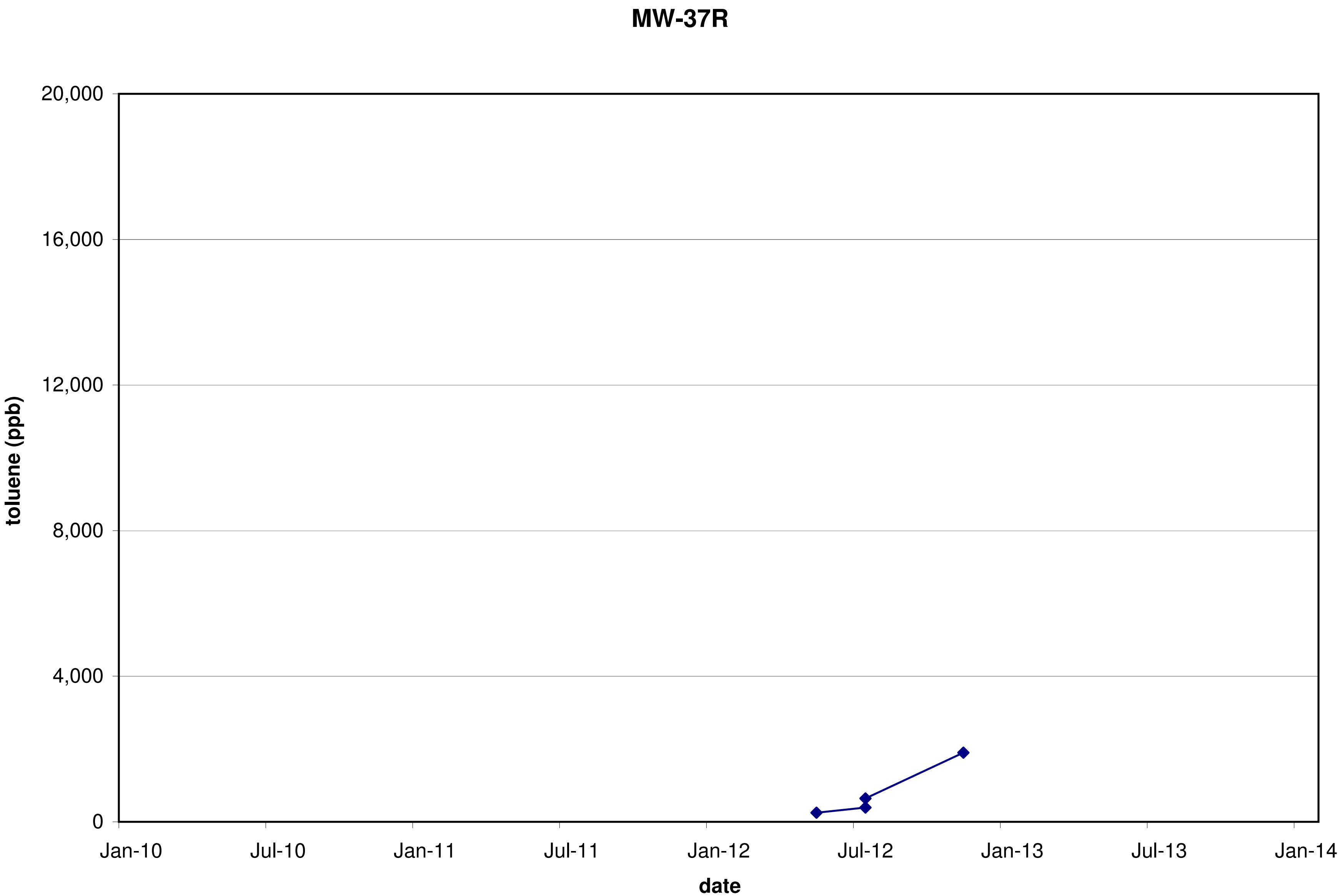
300,000
250,000
200,000
150,000
100,000
50,000
0
toluene (ppb)
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
date


MW-26
100,000
80,000
60,000
40,000
20,000
0
toluene (ppb)
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
date

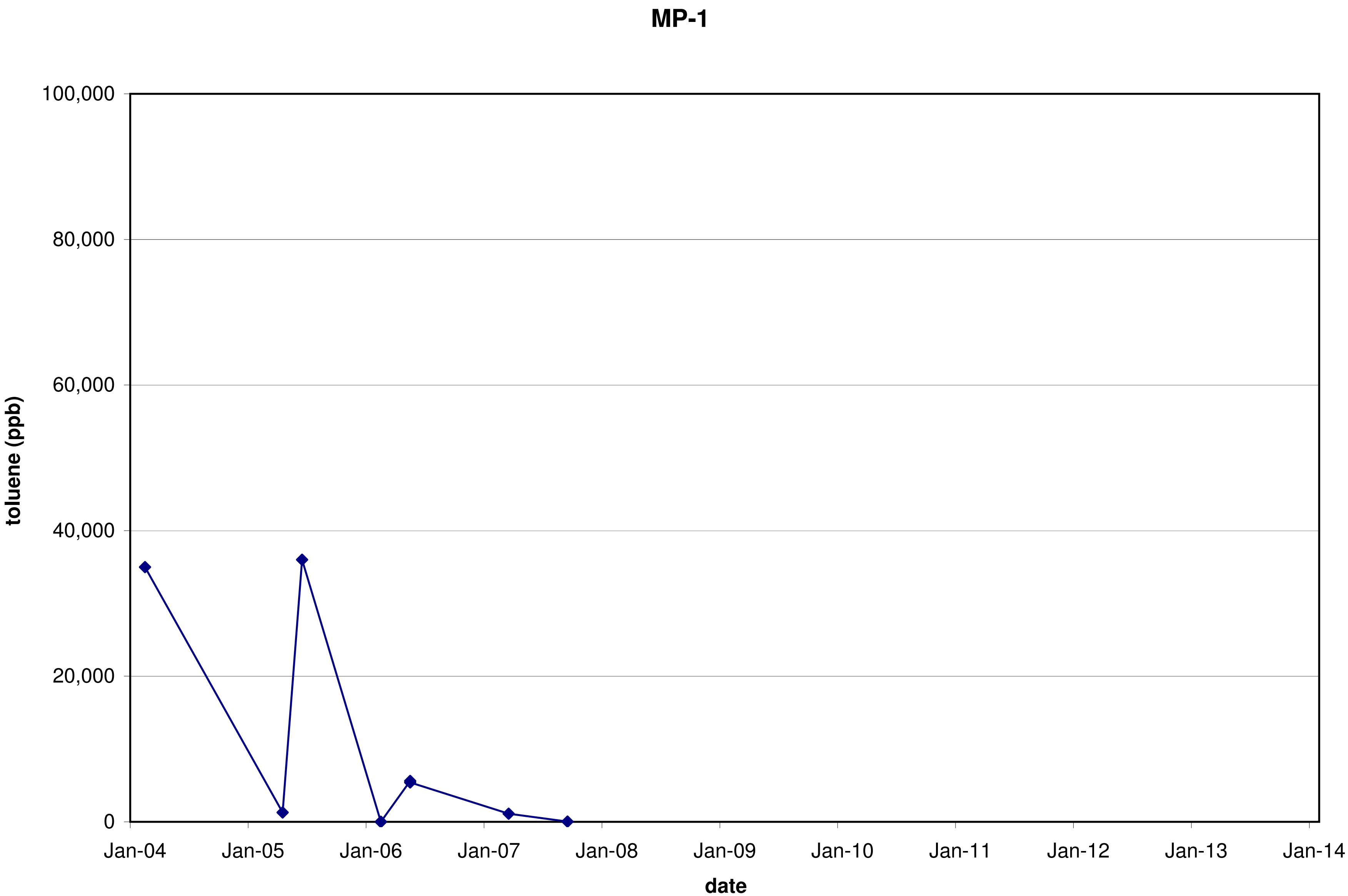
APPENDIX B


MW-27
toluene (ppb)
300,000
250,000
200,000
150,000
100,000
50,000
0
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
date

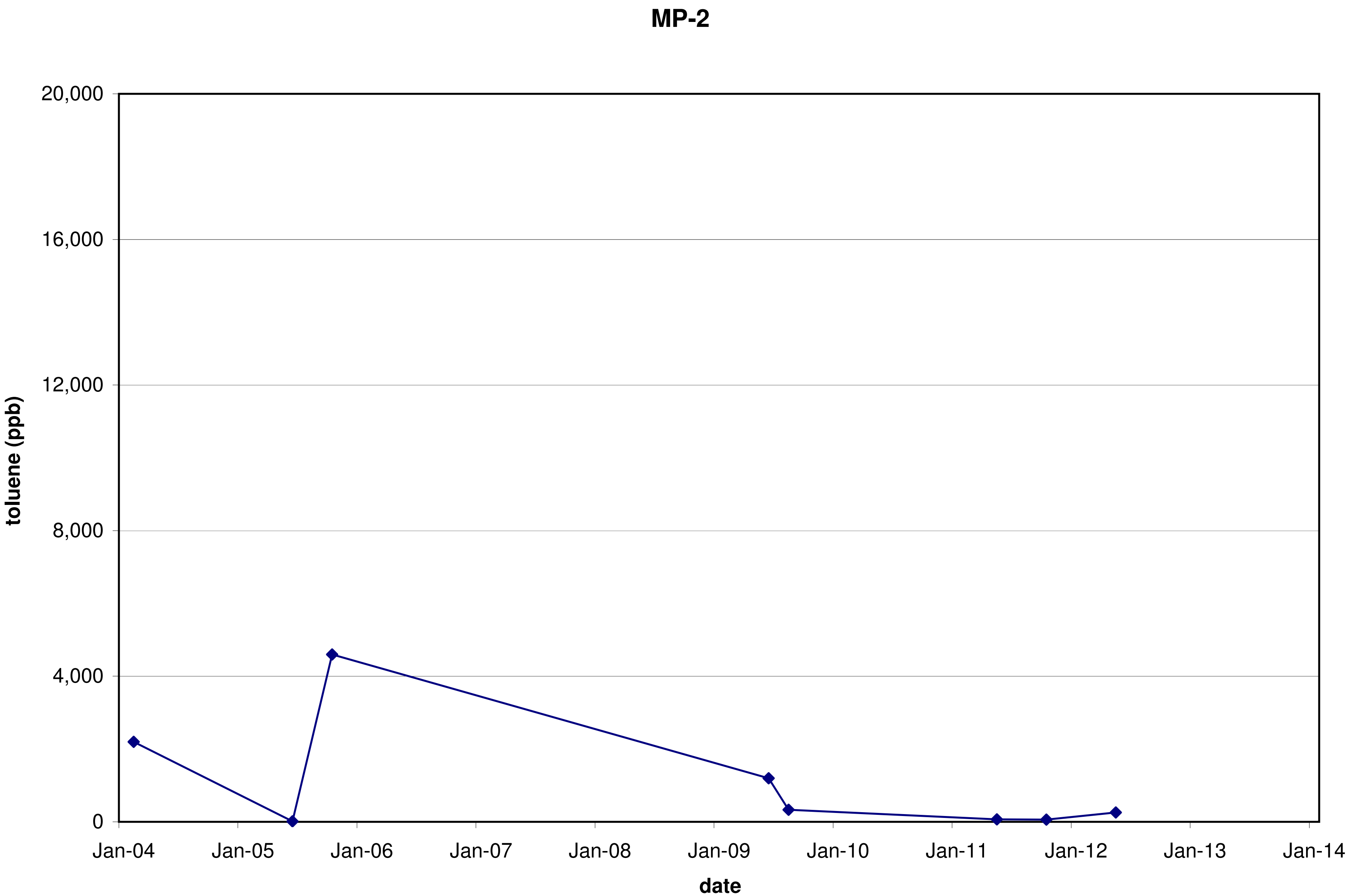
APPENDIX B


MW-37R
20,000
16,000
12,000
8,000
4,000
0
toluene (ppb)
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
date

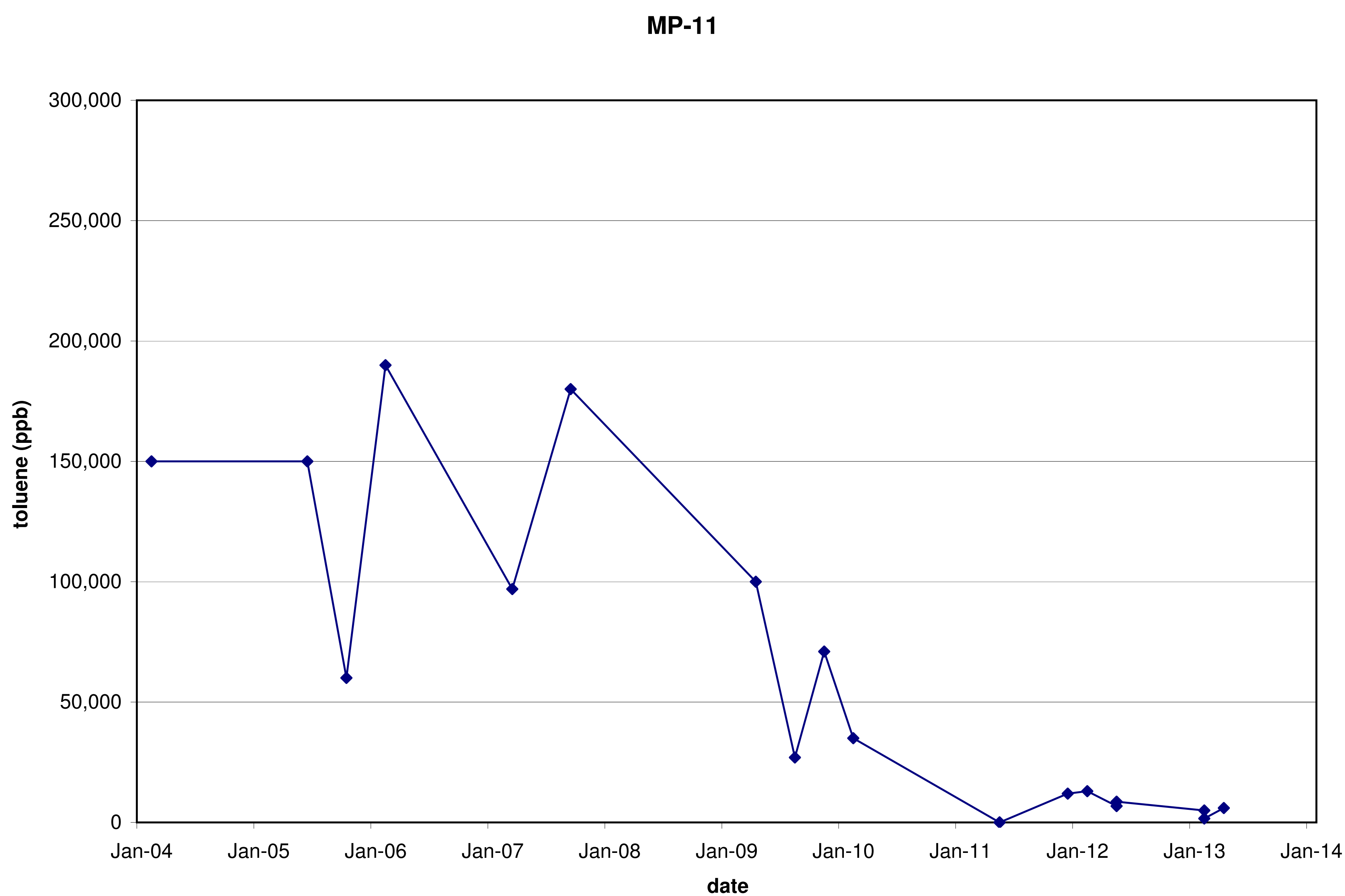
APPENDIX B


MP-1
100,000
80,000
60,000
40,000
20,000
0
toluene (ppb)
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
date

APPENDIX B

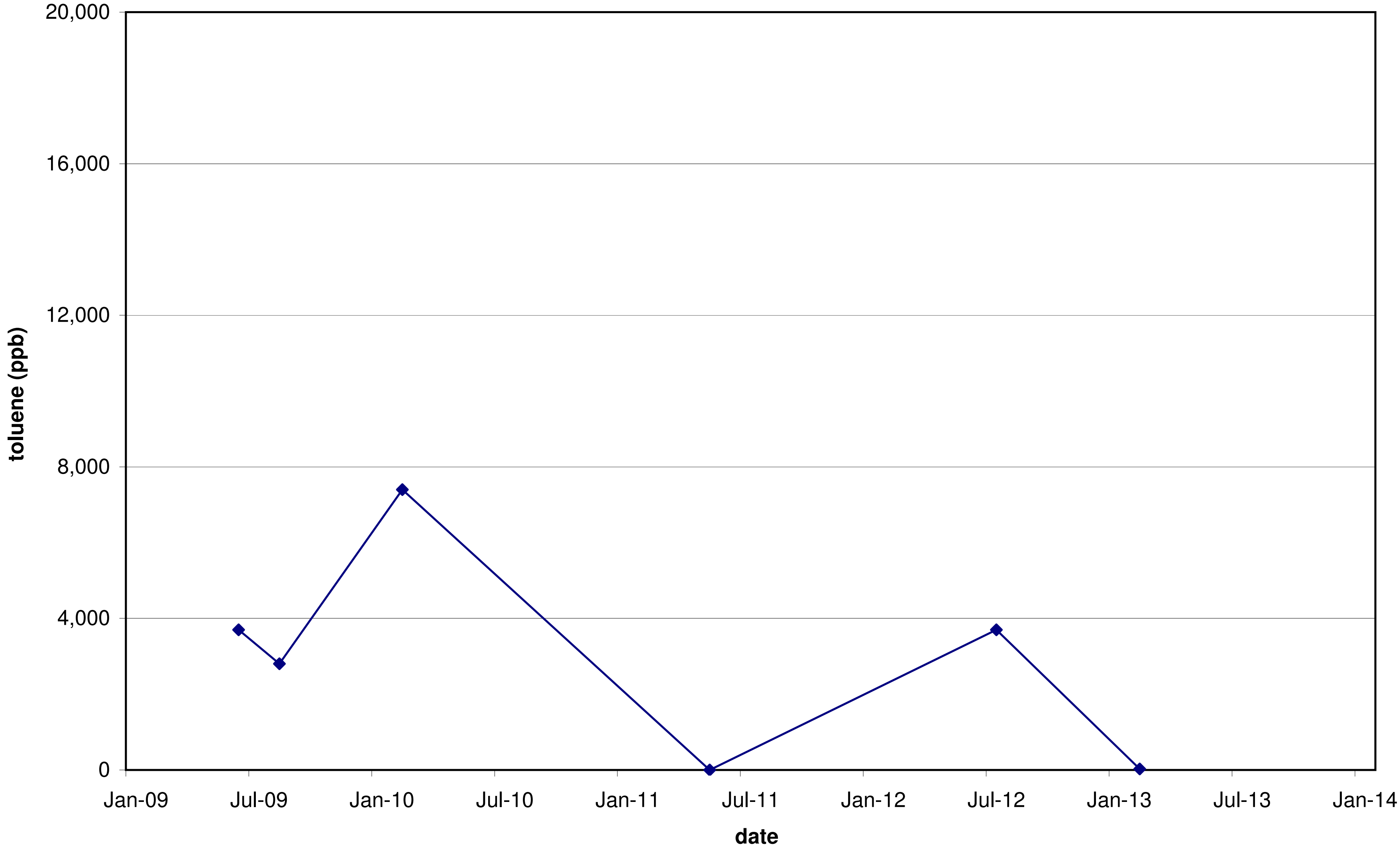

MP-2
20,000
16,000
12,000
8,000
4,000
0
toluene (ppb)
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
date

APPENDIX B

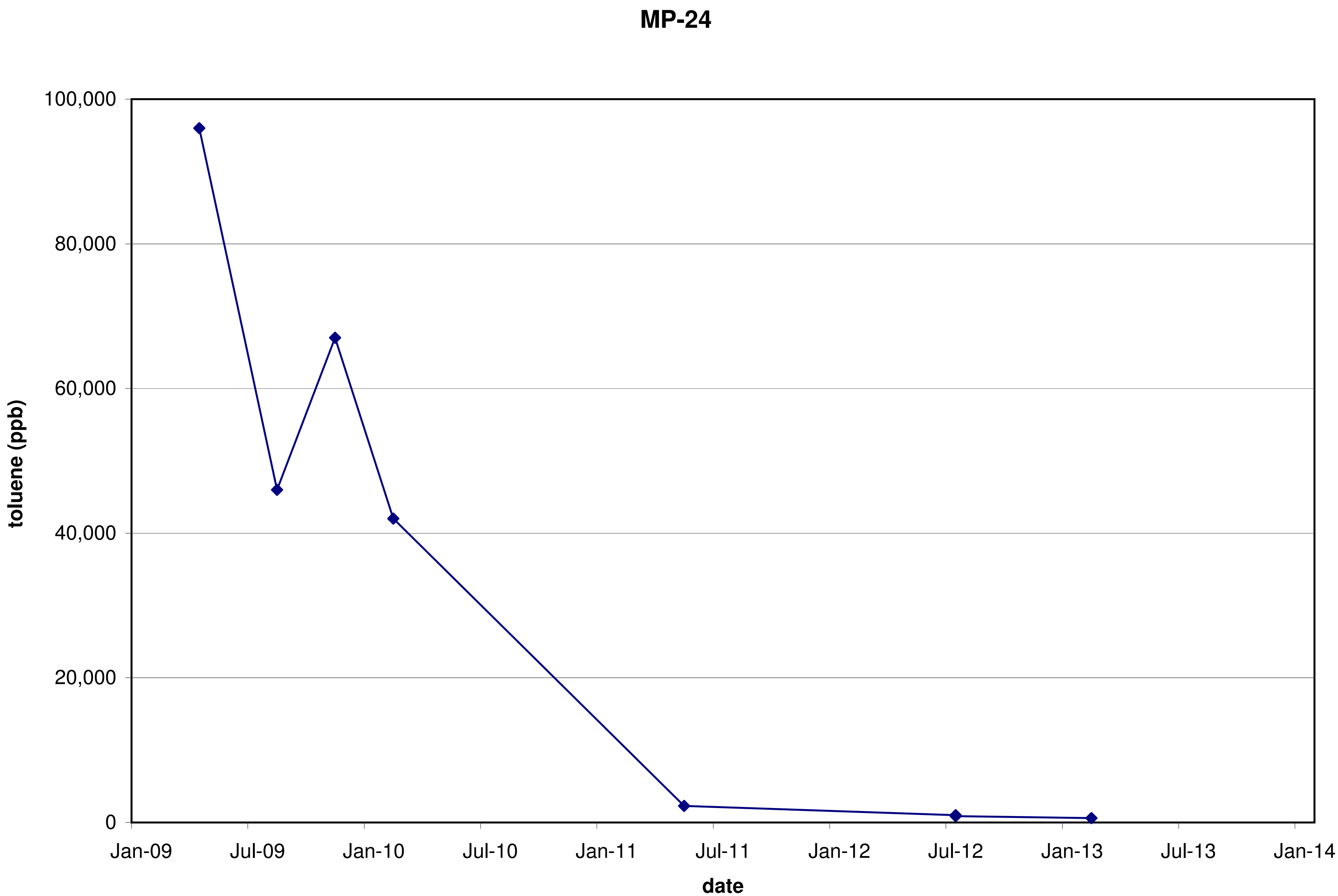

MP-11
300,000
250,000
200,000
150,000
100,000
50,000
0
toluene (ppb)
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
date

APPENDIX B

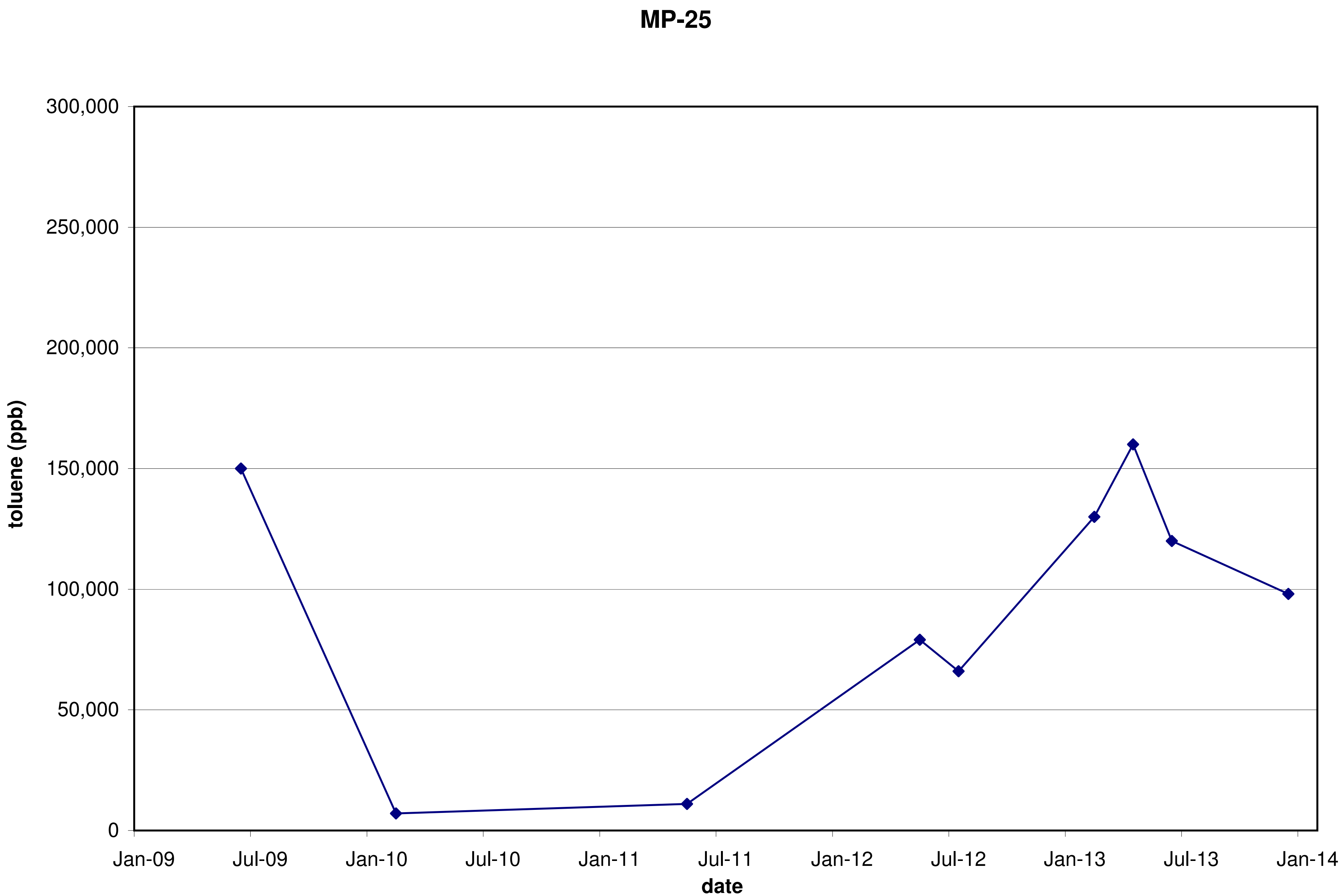
MP-23



APPENDIX B


MP-24
100,000
80,000
60,000
40,000
20,000
0
toluene (ppb)
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
date

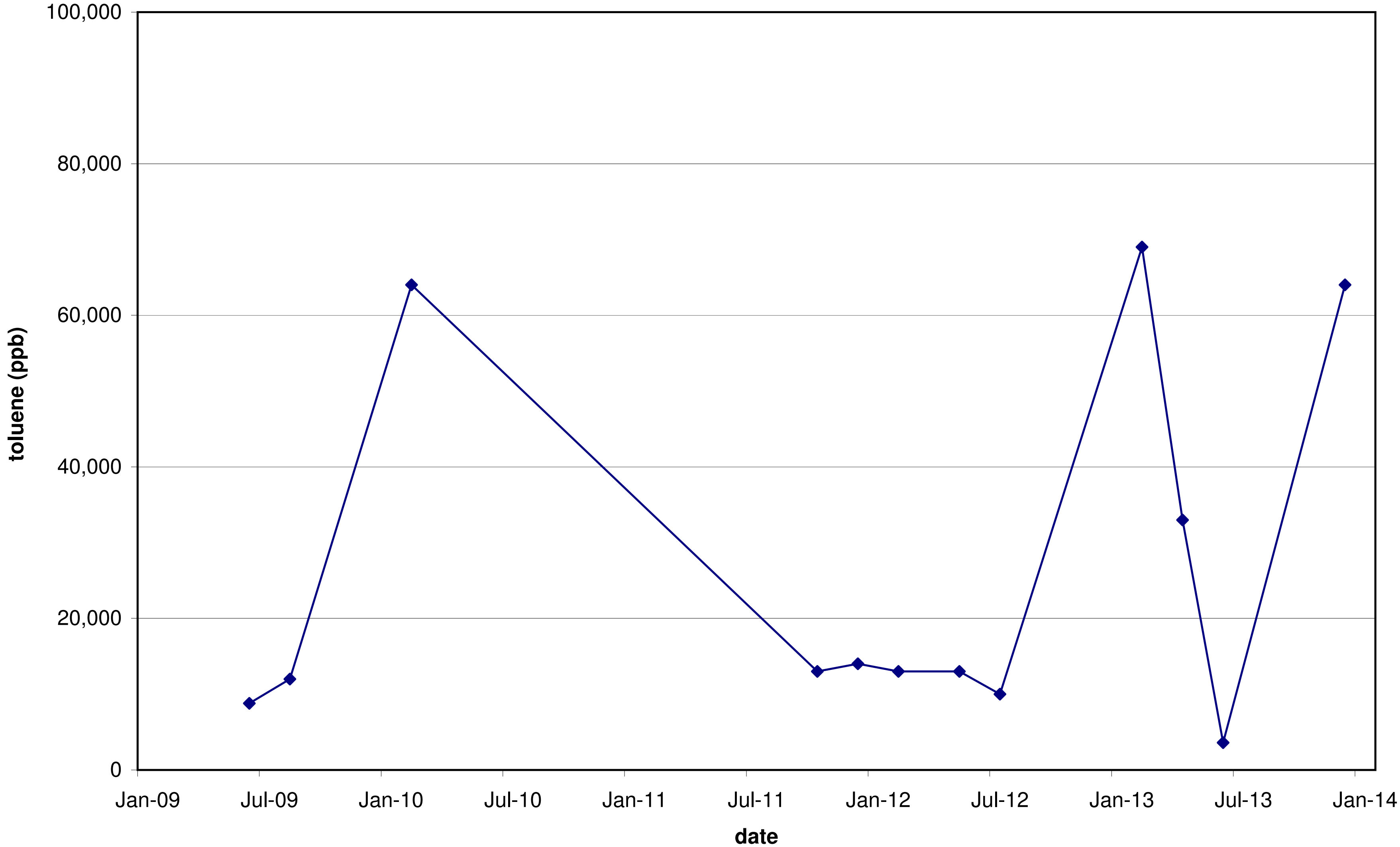
APPENDIX B



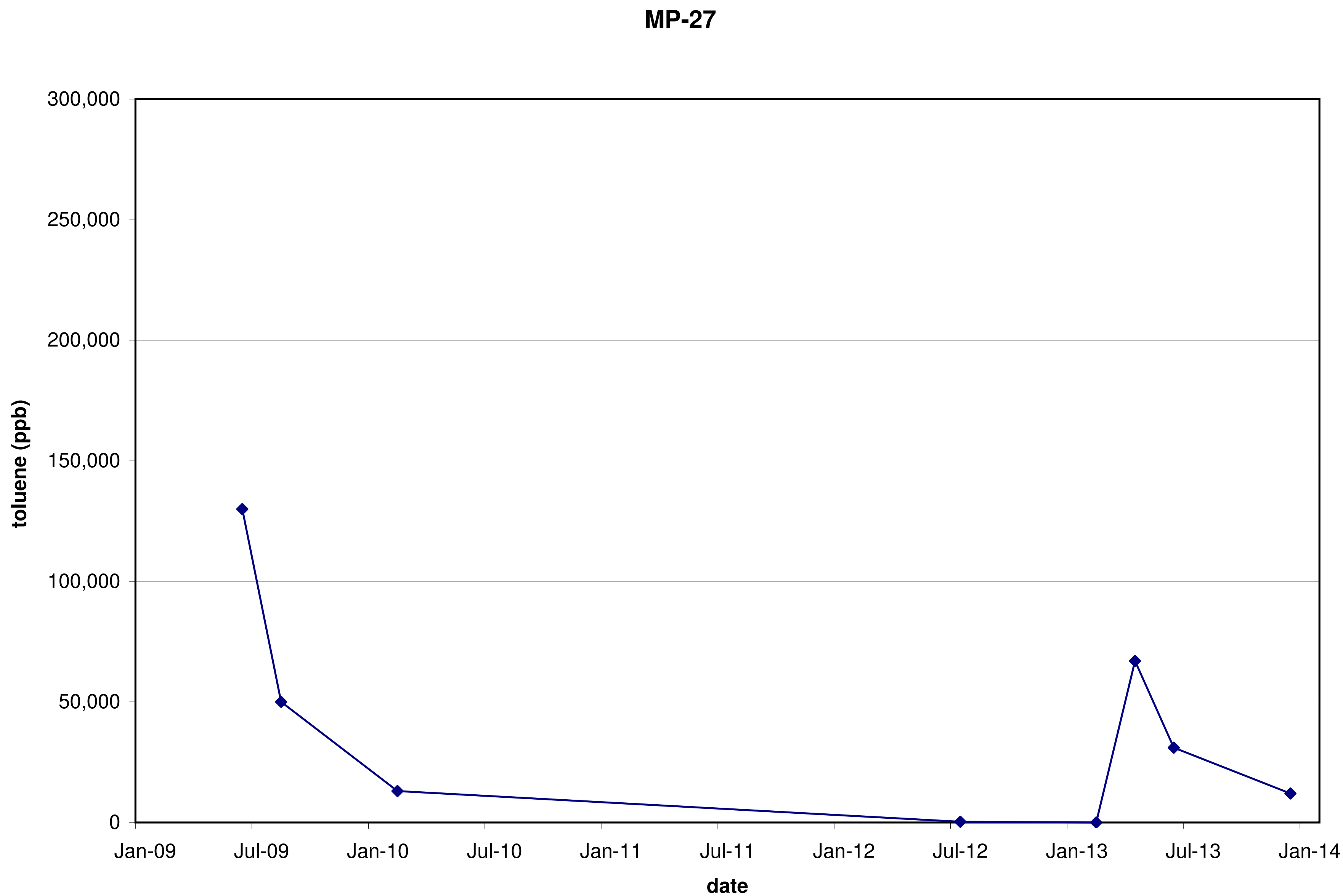
MP-25
300,000
250,000
200,000
150,000
100,000
50,000
0
toluene (ppb)
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
date

APPENDIX B

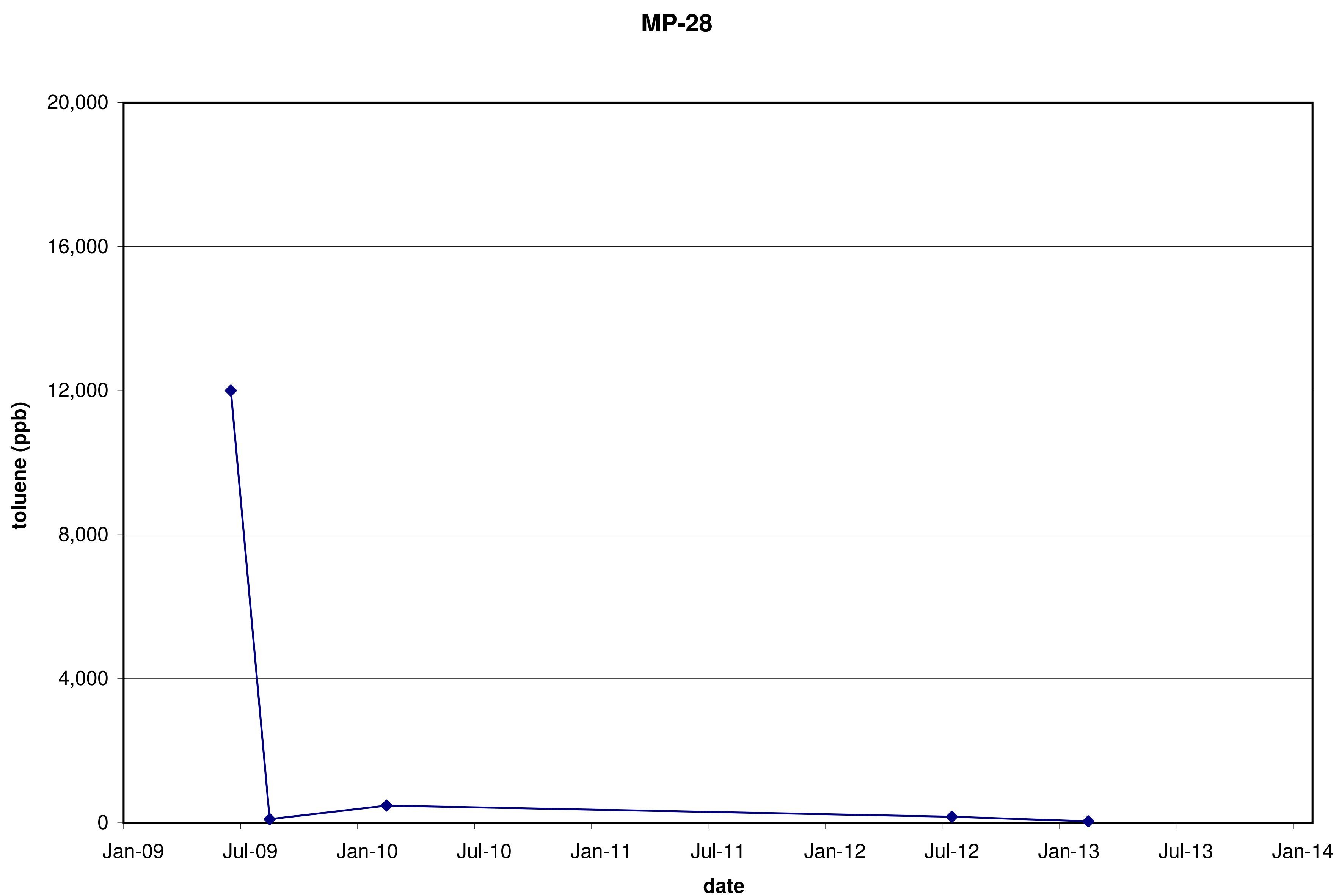
MP-26



APPENDIX B

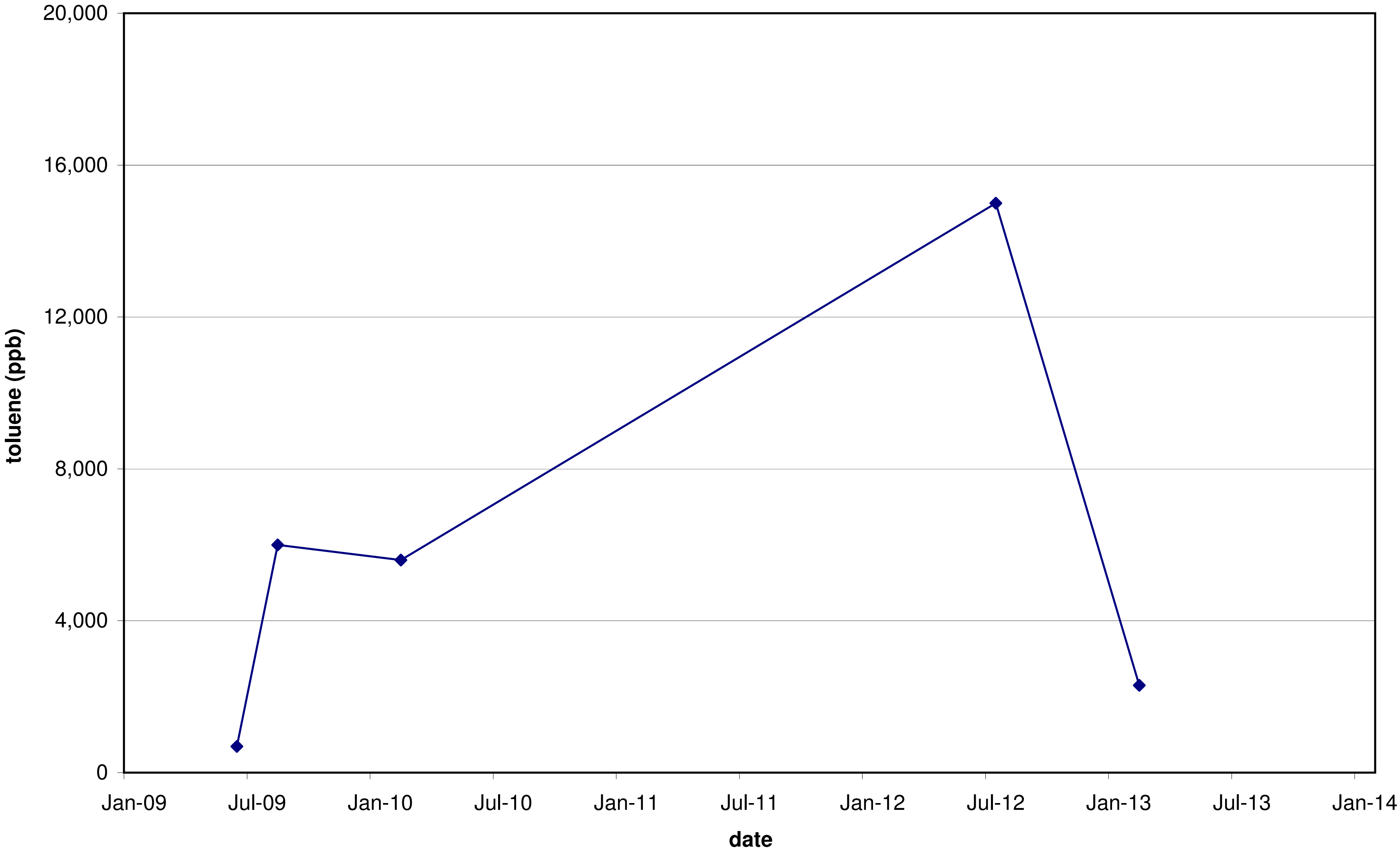

MP-27
300,000
250,000
200,000
150,000
100,000
50,000
0
toluene (ppb)
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
date

APPENDIX B

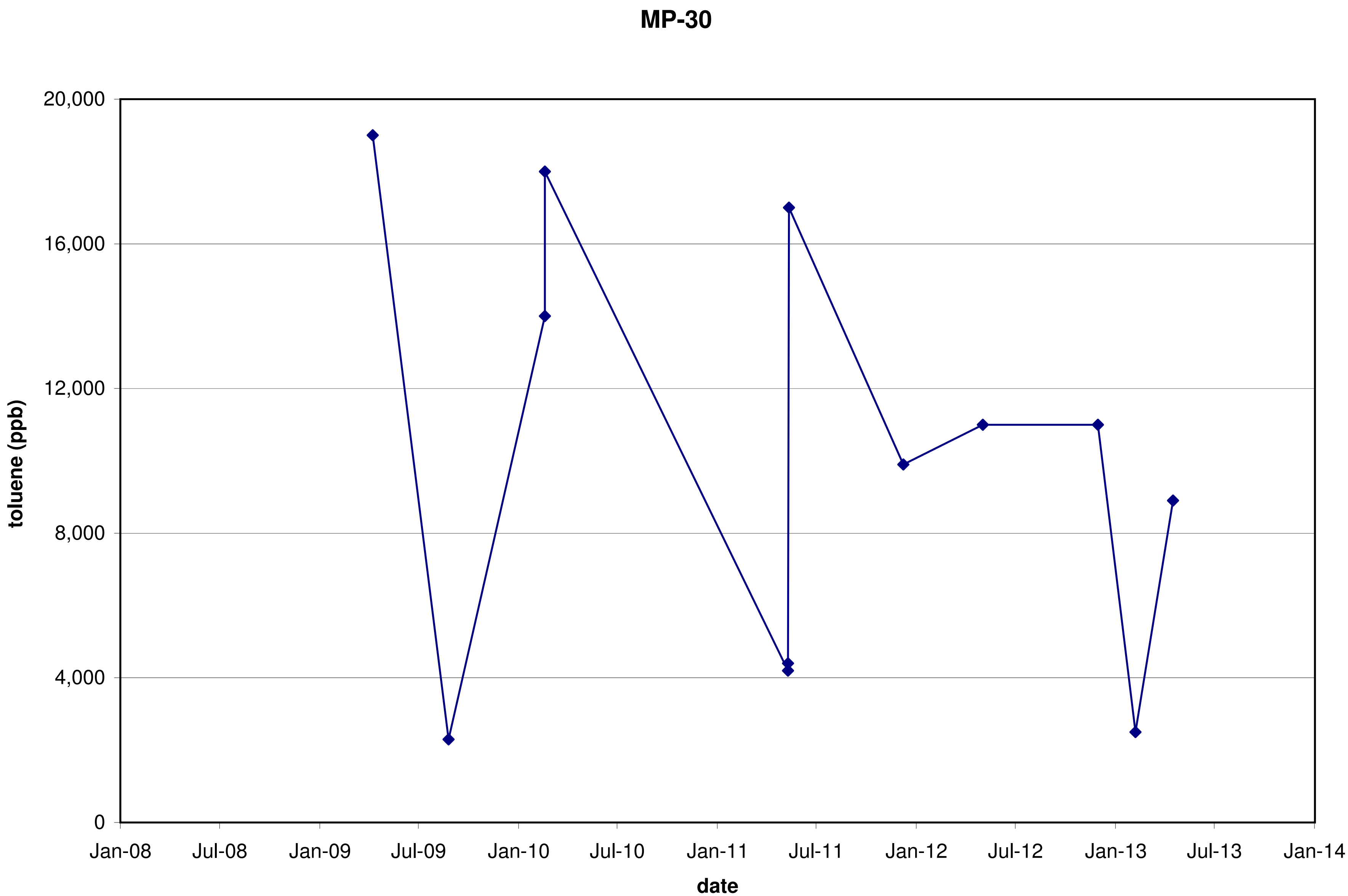

MP-28
20,000
16,000
12,000
8,000
4,000
0
toluene (ppb)
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
date

APPENDIX B

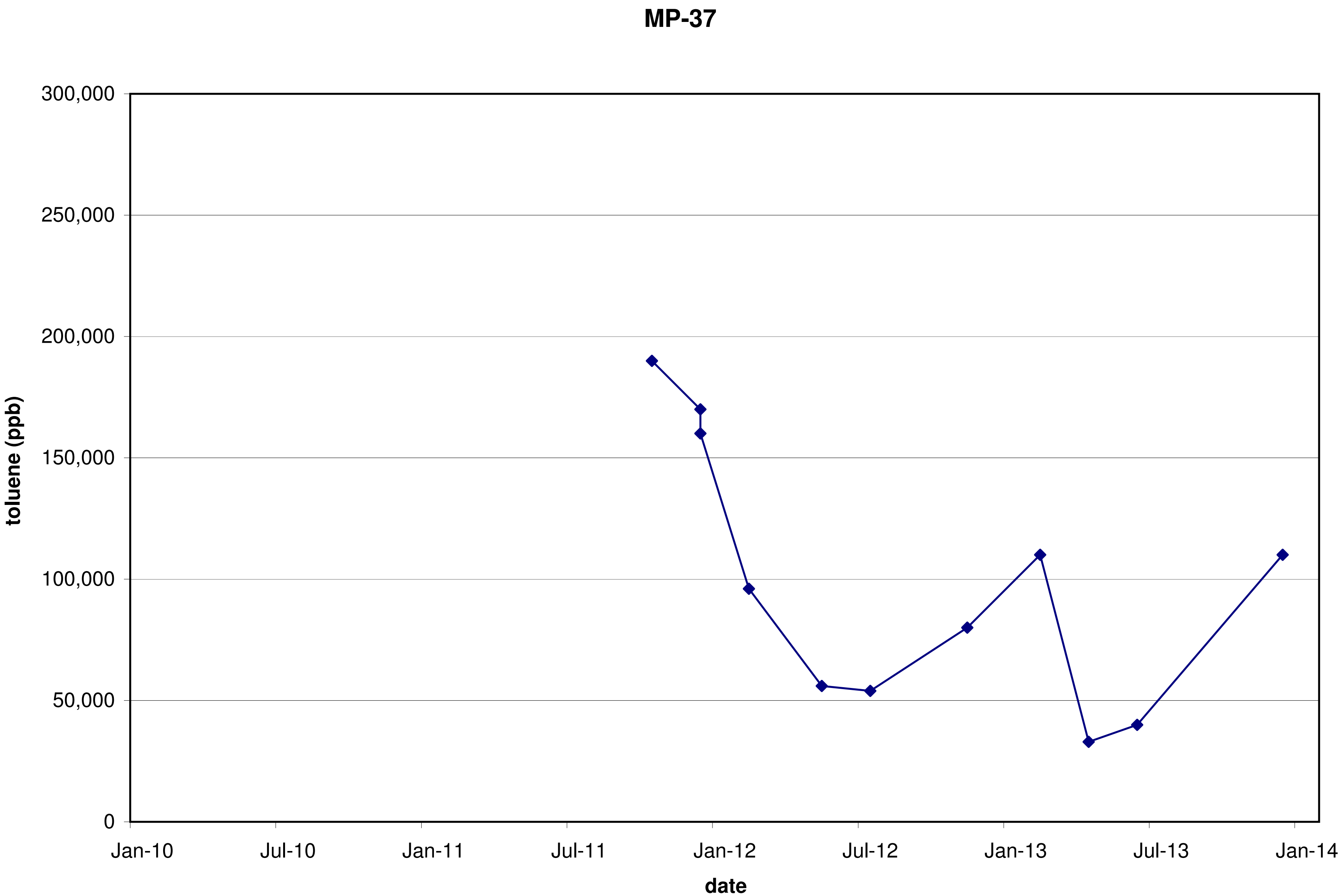
MP-29



APPENDIX B

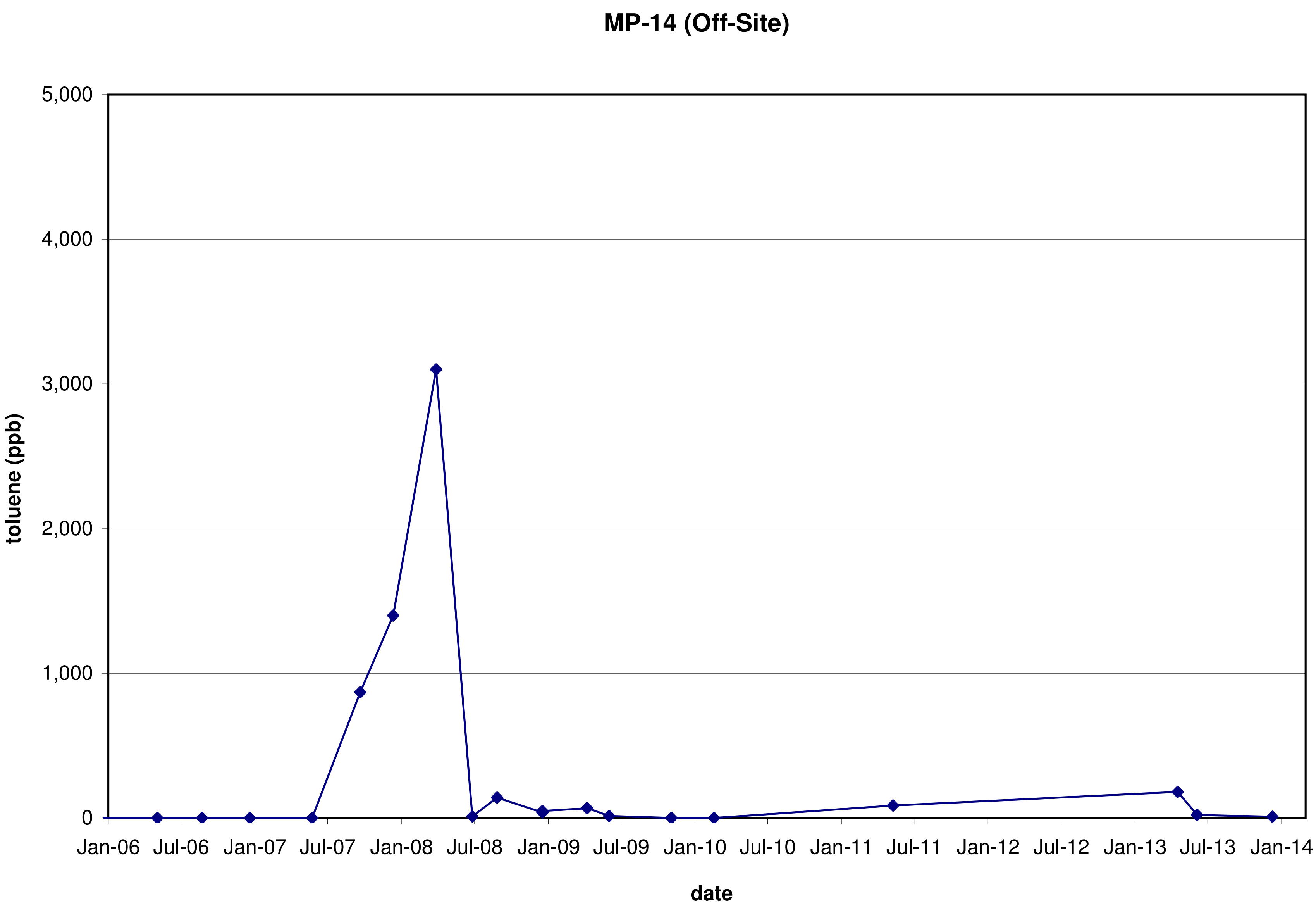

MP-30
toluene (ppb)
20,000
16,000
12,000
8,000
4,000
0
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
date

APPENDIX B



MP-37
300,000
250,000
200,000
150,000
100,000
50,000
0
toluene (ppb)
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
date

APPENDIX B



MP-14 (Off-Site)
5,000
4,000
3,000
2,000
1,000
0
toluene (ppb)
Jan-06
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
date

APPENDIX B

APPENDIX C

BIOSCIENCE BIOREMEDIATION REPORTS

Bioscience, Inc.
Environmental Products and Services

ISO 9001: 2000 Certified

Bioscience Technical Services
Results of Microbial Count Testing for O2 Technologies, Inc.

Bioscience, Inc was requested to provide analytical services for remediation of a site in Watervliet, NY contaminated by toluene. Technical background information was provided by O2 Technologies, Inc. The initial testing requested was for Total Heterotrophic Plate Count (THPC) and Toluene Degrader Count (TDC). Two soil samples and one groundwater sample were received by Bioscience on 8/26/09. The samples are labeled as follows:

Sample Description	Sample Date/Time	Sample Size
MP-11 (groundwater)	8/25/09; 8:26	One gallon
SB-209 (8-11') soil	8/25/09; 11:05	2 500mL glass (plus one broken*)
SB-210 (8-11') soil	8/25/09; 11:35	2 500mL glass (plus one broken*)

*The broken containers did not impact the ability to perform the initial tests but may limit any additional testing required.

<u>Methods</u>

Bioscience conducted Total Heterotrophic Plate Counts via a modified Standard Methods for the Examination of Water and Wastewater Method 9215C. The modification consisted of:

A.) mixing groundwater samples with 15 g glass beads in the first dilution and shaking on a gyrotory shaker at 400 cpm for 5 minutes, and

B.) homogenizing soil samples (~2 g) in a blender for two, five minute periods with 1 mL of 3% sodium dodecyl sulfate and with 98 mL phosphate buffered dilution water. 0.1 mL of each dilution was plated onto triplicate plates of Standard Methods Agar and counts were made after 72 hours at room temperature.

Bioscience conducted Toluene Degrader Counts by inoculation of dilutions prepared as above into Bushnell-Haas Medium with 1 mL toluene added per liter. The toluene was added after sterilization of the base medium with the medium temperature above 80°C, then dispensed aseptically into tubes with 5 mL medium per tube. 1.0 mL of each dilution was added to triplicate tubes and these were incubated at room temperature in a sealed plastic bag containing an open flask of toluene to maintain toluene-saturated headspace for 14 days. 1.0 mL of each dilution was also inoculated into control Bushnell-Haas Medium with no toluene (one tube) and incubated at room temperature in air. Then 1.0 mL of 0.3% iodonitrotetrazolium violet (INT) was added and the tubes were allowed to develop color over-night. Counts were obtained from a most-probable number table for three tubes per dilution and 10-fold dilutions. The two lowest dilutions of the soils had a significant color in the controls and toluene containing tubes but color intensity was much less than positive controls or the groundwater positive tubes. Note: this procedure is a modification of J.R. Haines et al, J. Ind. Microbiol. 16:36-41; 1996.

Results:

Sample Description	THPC (CFU/mL or g dry weight)	Toluene Degrader Count (CFU/mL or g dry weight)	Moisture content (%)- used for correction to dry weight basis	
MP-11 (groundwater)	$1.85*10^{5}$	$>1.2*10^{5}$	NA	
SB-209 (8-11') soil	$4.6*10^{5}$	<15	13.8 #	
SB-210 (8-11') soil	$3.6*10^{4}$	<15	32.4 +	

partially air-dried prior to sampling
+ tested as received

966 Postal Road • Suite 200 • Allentown, PA 18109 • (484) 245-5232 • (800) 627-3069 • Fax (484) 245-5236
E-mail: bioscience@bioscienceinc.com • Website: www.bioscienceinc.com

Both soil samples were wet and quite clayey with mottled color and a significant stone content. SB210 had a strong odor of toluene as received.

Prepared by: Richard D. Bleam
Bioscience, Inc. 09/21/09

Bioscience, Inc.
Environmental Products and Services

Report of Bioremediation Testing of Groundwater Prepared for GHR Consulting Services, Inc. December 22, 2009

Introduction.

Bioscience, Inc. performed testing to evaluate bioremediation potential of the Watervliet, NY site. Previous testing found an adequate toluene degrading microbe population in groundwater from MP-11 but the groundwater still contained 27 mg/L toluene. The current testing was performed to determine if addition of nutrients could stimulate toluene degradation.

Scope of Testing.

Biodegradation Rate Testing. Based on the contamination levels determined for samples from MP-11 respirometric testing is appropriate* to evaluate the biodegradation of toluene in groundwater. Bioscience used the BI-2000 Electrolytic Respirometer (see attached data sheet) with four 1 L reactors to evaluate the effect of nutrients. All reactors had 900 mL of groundwater (sample in-house). The reactors were set up as follows:

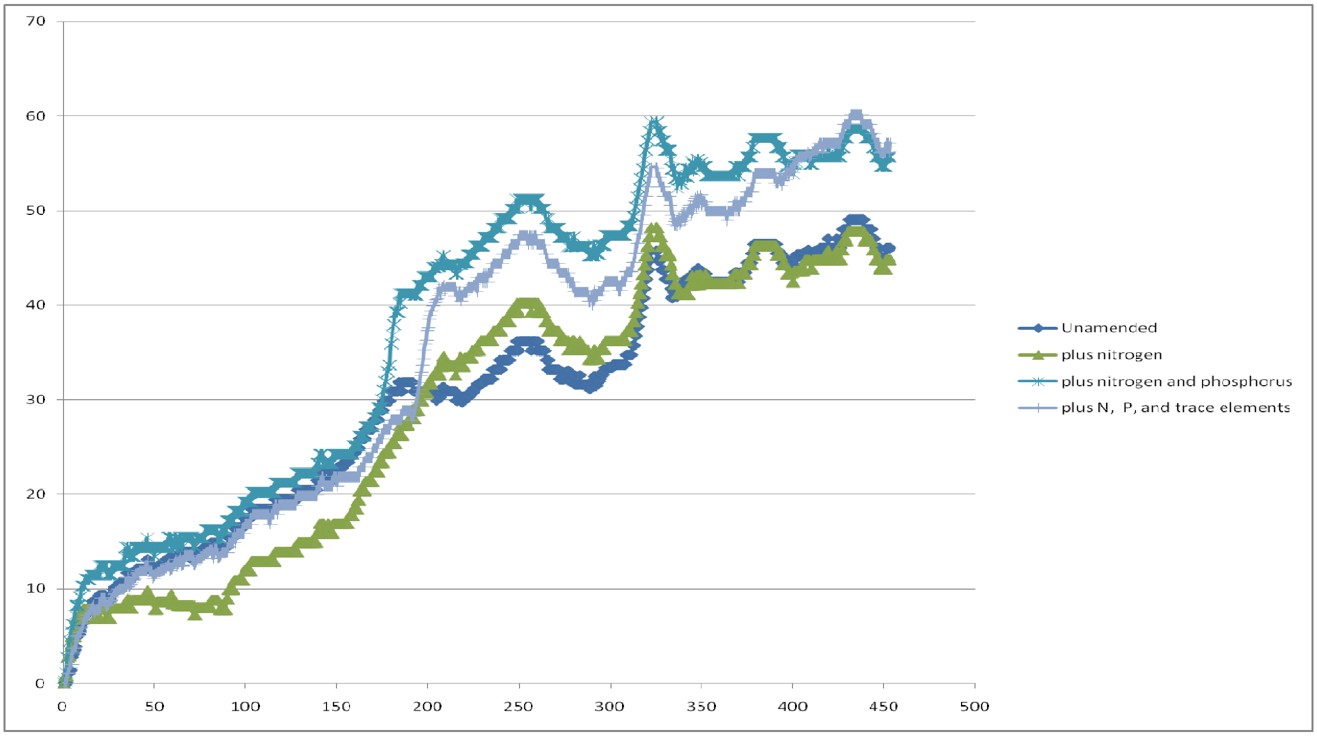
Reactor #	GW source	Nutrients
1	MP-11	-
2	MP-11	N
3	MP-11	N+P
4	MP-11	N+P+trace

*When contaminant levels are high enough to anticipate significant oxygen consumption (>20 mg/L) electrolytic respirometry can accurately measure oxygen consumption. The toluene concentration on August 9, 2009 was 27 mg/L and other non-analyzed components probably contribute significantly so that an oxygen consumption of >50mg/L was expected if the toluene was completely degraded.

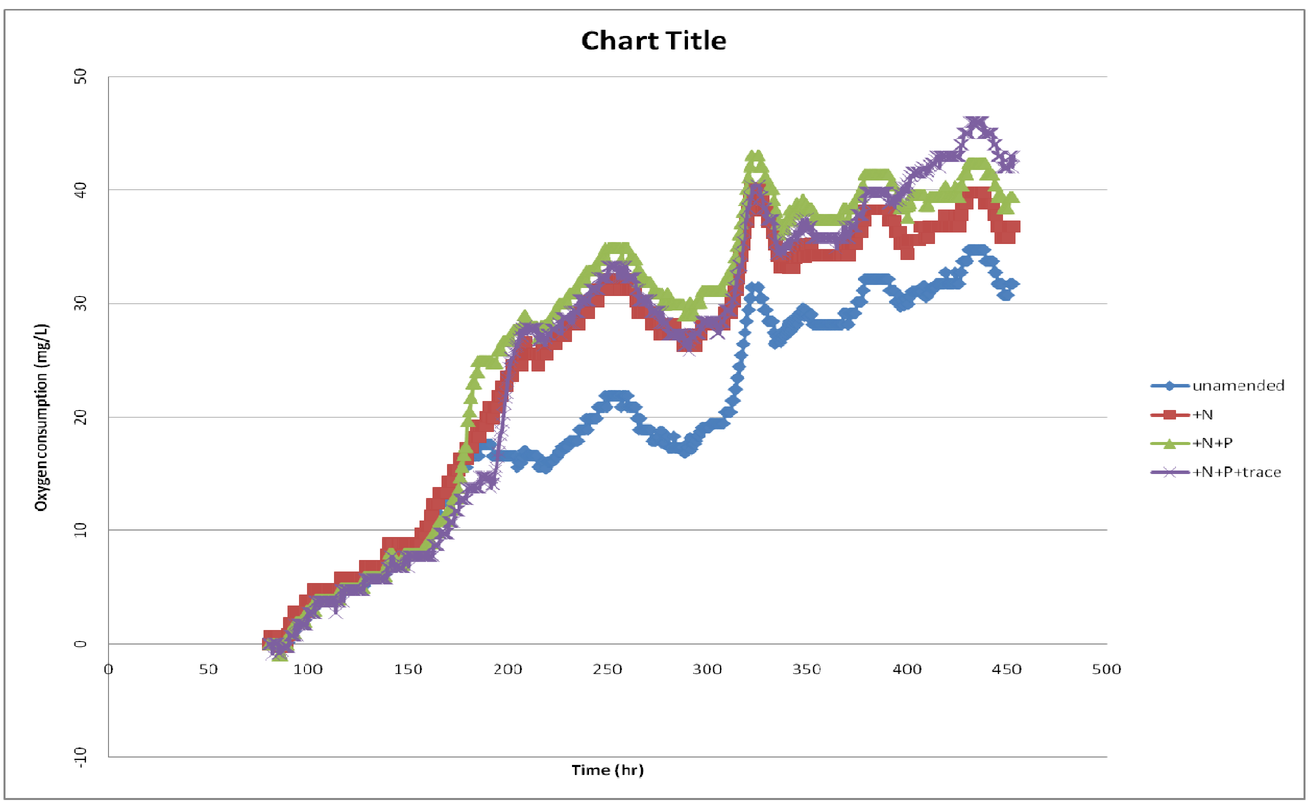
The sample as-received had a significant odor of toluene but after storage no odor was detected. Oxygen uptake was relatively low after 130 hours, so a toluene spike of 10 µL (9.6 mg/L) was used to ensure a significant concentration of toluene was present and to increase oxygen consumption. Nutrient consisting of 0.65 mL of ammonium bicarbonate solution (2860 mg/L as N) was added to provide 2 mg/L ammonium-N (N), 2.0 mL potassium phosphate solution (230 mg/L as P) to provide 0.5 mg/L of phosphate-P (P) and 0.5 mL of a 0.2% solution of commercial product containing trace elements (trace) was added where indicated in the table. The trace element product contains boron, copper, iron, magnesium, manganese, molybdenum, sulfur and zinc. The initial pH was 6.9. All reactors were incubated at 15°C.

Results.

The graph of oxygen consumption versus time is shown below.



There appears to be an anomaly in the oxygen consumption of the reactor with nitrogen added. The oxygen consumption stops from about 40 hours to about 90 hours. A replot of the data from 80 hours on shows a clustering of the data until the toluene addition, then all reactors with nutrient show enhancement of oxygen consumption.



Data Summary

	Final toluene (mg/L)	Oxygen consumption @450 hours (mg/L)	Oxygen consumption after toluene addition (mg/L)
Unamended	2.31	46.0	25.6
+N	0.008	44.8	29.9
+N+P	0.005	55.7	33.5
+N+P+trace	<0.002	57.2	37.3

The theoretical oxygen consumption for 9.6 mg/L is 30.0 mg/L (3.13 mg oxygen /mg toluene). Clearly, some of the oxygen uptake is due to oxidation of initially present toluene or other organic matter. The analytical data confirms that addition of nitrogen is important for increasing toluene degradation. Addition of phosphorus and trace elements may improve degradation as shown by increase in oxygen consumption but the impact is not statistically significant in terms of the analytical results.

The peaks and valleys in the oxygen uptake data are due to atmospheric pressure changes during the experiment. The respirometer uses atmospheric pressure as a reference and the software makes corrections in the data as atmospheric pressure changes and the experiment proceeds. These "corrections" are more significant in experiments with a low total oxygen consumption. The relative oxygen consumption (difference between reactors) is more accurate than the total oxygen consumption and the error due to pressure changes may be as high as 3 mg/L. This error is not cumulative; the maximum error in total oxygen consumption is about 5%.

Conclusions.

The MP-11 water sample contains sufficient toluene degraders to perform complete bioremediation of toluene. The water appears to be deficient in nutrients with nitrogen being the limiting factor. As toluene concentrations increase and/or other oxidizable substrate is present, nutrient deficiency may play a larger role in limiting degradation. Bioscience recommends addition of low concentrations of ammonium nitrogen, phosphate and trace minerals in areas of high substrate concentration to speed biodegradation and ensure complete removal.

Waterviet

AMERICAN Westech INCORPORATED

Laboratory Result Summary

Laboratory Project ID: 0912238

GHR Consulting Services
Jim Morrow
224 B S. Maple Street
Ambler, PA 19002

Contact: Jim Morrow
Project Name: Water Vliet
Project Number: N/A
Purchase Order Number: N/A
Sampled By: Richard Bleam
Date Received: December 14, 2009
Time Received: 3:42 PM

Analytical Testing Parameters

Client Sample ID: **Reactor 1**
Lab Sample ID: **0912238-01**
Collection Date: **12/11/2009**
Collection Time: **4:40 PM**

Volatile Organic Compounds by GC/MS

Parameter	Results	Units	PQL	Method	Test Date	Test Time	Analyst
Toluene	**2,310**	ug/L	100	SW846 8260B	12/17/2009	2:21 PM	JMS

Analytical Testing Parameters

Client Sample ID: **Reactor 2**
Lab Sample ID: **0912238-02**
Collection Date: **12/11/2009**
Collection Time: **4:45 PM**

Volatile Organic Compounds by GC/MS

Parameter	Results	Units	PQL	Method	Test Date	Test Time	Analyst
Toluene	**7.83**	ug/L	2.00	SW846 8260B	12/16/2009	10:53 AM	JMS

Analytical Testing Parameters

Client Sample ID: **Reactor 3**
Lab Sample ID: **0912238-03**
Collection Date: **12/11/2009**
Collection Time: **4:50 PM**

Volatile Organic Compounds by GC/MS

Parameter	Results	Units	PQL	Method	Test Date	Test Time	Analyst
Toluene	**5.33**	ug/L	2.00	SW846 8260B	12/16/2009	11:25 AM	JMS

Analytical Testing Parameters

Client Sample ID: **Reactor 4**
Lab Sample ID: **0912238-04**
Collection Date: **12/11/2009**
Collection Time: **4:55 PM**

Volatile Organic Compounds by GC/MS

Parameter	Results	Units	PQL	Method	Test Date	Test Time	Analyst
Toluene	<2.00	ug/L	2.00	SW846 8260B	12/16/2009	11:53 AM	JMS

4359 LINGLESTOWN ROAD ♦ HARRISBURG, PA 17112
WWW.AMERICANWESTECH.COM
TELEPHONE: (717) 651-9700
FAX: (717) 657-0752

Laboratory Result Summary

Laboratory Project ID: 0912238

Report Comments:

The **PQL** is the **Practical Quantitation Limit**, which is defined as the lowest quantitation level of an analyte that can be readily achieved within the specified limits of precision and accuracy of an analytical method during routine laboratory operating conditions. The value may be raised depending on the characteristics or behavior of the target analyte.

All samples were analyzed **"as received"** from the client. American Westech Inc. can only assume that all samples were collected and submitted by the CLIENT following the appropriate protocols set forth by the regulatory requirements. This document shall not be reproduced, except in full, without the written approval of American Westech Inc. If there are any questions pertaining to this laboratory report please contact a Client Services Coordinator or the Laboratory Director at (717) 651-9700.

Laboratory Certifications:

- NELAP accredited by the PADEP (22-00578) & NJDEP (PA019) for numerous solid and chemical materials and non-potable water parameters. Please refer to our certified parameter lists for each state for specific information on the approved methodologies.
- PADEP accredited for various drinking water parameters including: Volatile Organic Compounds, Metals, Inorganics, and Microbiology (22-00578). Please refer to our certified parameter list for specific information on the approved methodologies.

Reviewed and Approved By:

William W. Smith, Jr.
Laboratory Director

Date Reviewed and Approved:

12-21-05

APPENDIX D

MONITORING POINT/WELL, VAPOR MONITORING POINT BORING LOGS AND CONSTRUCTION DIAGRAMS

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Former Tank Farm SWMU)
Boring Number: MP-23	**Date Drilled:** 3/24/2009	**Logged by:** Bryan J. Machella
Drilling Company: Environmental Cleanup Solutions. Inc.	**Drilling Method:** Geoprobe™	**Sampling Method:** Macro-Core
Well Installed: Yes (MP-23)	**Casing Material / Diameter:** PVC/1-1/4-inch (pre-pack)	**Total Depth (feet):** 18.5

Notes: Soil sample MP-23 (12.5 to 13.5 feet) submitted for laboratory analysis of VOCs, TICs, and heptane.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	2	0.0		Asphalt
-					Brown silty sand with gravel.
-					Moist at 3.5'.
-					
-					
5	5 - 10	2.5			Gray clayey silt.
-					Lower 9": gray silt to fine to coarse sand and gravel.
-					Slight toluene odor at 10'.
-			0.0		
-			0.0		
10	10 - 15	3	120 - 160		Saturated.
-				MP-23	Brown to gray silt to fine to coarse sand; coarse gravel.
-			100 - 200	(12.5 - 13.5)	
-			1,500 - 1,700		
-			77 - 110		
15			8 - 14		
-					**Boring MP-23 terminated at 18.5 feet.**

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	Project Number: 029.08	Location: Watervliet, New York (Former Tank Farm SWMU)
Boring Number: MP-24	**Date Drilled:** 3/24/2009	**Logged by:** Bryan J. Machella
Drilling Company: Environmental Cleanup Solutions. Inc.	**Drilling Method:** Geoprobe™	**Sampling Method:** Macro-Core
Well Installed: Yes (MP-24)	**Casing Material / Diameter:** PVC/1-1/4-inch (pre-pack)	**Total Depth (feet):** 20.0

Notes: Soil sample MP-24 (12 to 12.5 feet) submitted for laboratory analysis of VOCs, TICs, and heptane.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	2.5	0.0		Asphalt
-					Silt, sand, and gravel.
-					Moist at 3.5'.
-					Cinder-like material in lower 12".
-					
5	5 - 10	3			Upper 12": brown silt, sand, and gravel.
-					4": tan silty clay.
-			1 - 2		Silt to fine to coarse sand and gravel.
-			1 - 2		Wet at 9'.
-			0.5 - 1		
10	10 - 15	3	0.5 - 1		Saturated.
-				MP-24	Upper 15": fine to coarse sand; coarse gravel.
-			250 - 795	(12 - 12.5)	Silt and very fine sand.
-			135 - 150		Lower 6": silt to fine to coarse sand.
-			10 - 15		
15			9 - 10		
-					**Boring MP-24 terminated at 20 feet.**

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Former Tank Farm SWMU)
Boring Number: MP-25	**Date Drilled:** 3/24/2009	**Logged by:** Bryan J. Machella
Drilling Company: Environmental Cleanup Solutions. Inc.	**Drilling Method:** Geoprobe^{TM}	**Sampling Method:** Macro-Core
Well Installed: Yes (MP-25)	**Casing Material / Diameter:** PVC/1-1/4-inch (pre-pack)	**Total Depth (feet):** 18.5

Notes: Soil sample MP-25 (10.5 to 11 feet) submitted for laboratory analysis of VOCs, TICs, heptane, COD, TOC, Fe, TPH GRO, and R, C, I.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	2.5			Asphalt
-					Coarse gravel in upper 3".
-					Silt to fine to medium sand.
-			15 - 25		Wet at 4'.
-			4 - 7		
5	5 - 10	2	95 - 110		Brown to gray silt, sand, and gravel.
-					
-					
-			15 - 25		
-			10 - 15		
10	10 - 15	4.5	60 - 80	MP-25	Saturated.
-			1,500 - 1,800	(10.5 - 11)	Fine to coarse sand; coarse gravel.
-					Possible trace phase-separated hydrocarbons (PSH).
-					Lower 2': silt to fine to coarse sand; trace coarse gravel.
-					
15			40 - 50		
-					**Boring MP-25 terminated at 18.5 feet.**

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Former Solvent Lines - Building #61)
Boring Number: MP-26	**Date Drilled:** 3/26/2009	**Logged by:** Bryan J. Machella
Drilling Company: Environmental Cleanup Solutions. Inc.	**Drilling Method:** Geoprobe™	**Sampling Method:** Macro-Core
Well Installed: Yes (MP-26)	**Casing Material / Diameter:** PVC/1-1/4-inch (pre-pack)	**Total Depth (feet):** 20.0

Notes: Soil sample MP-26 (12 to 13 feet) submitted for laboratory analysis of VOCs, TICs, and heptane.
Blind duplicate soil sample also collected.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	2.5	0.0		Concrete slab.
-					Brown silt, sand, and gravel.
-					Black cinder-like material from 3'7" to 4'.
-					
-					
5	5 - 10	3			Brown silt, sand, and gravel.
-					1/4 - 1/2" rock fragments.
-			0.0		Moist in lower 2'6".
-			0.0		
-			4.3		
10	10 - 15	4	0.8		Saturated at 12'.
-			100 - 180	MP-26	Upper 12": silt, sand, and gravel.
-			1,700 - 1,800	(12 - 13)	12-13': silt to fine to coarse sand.
-			1,700 - 1,800		13 - 14': fine to coarse sand grading to silt and very fine sand.
-			500 - 700		Lower 6": gravelly clayey silt.
15			20 - 25		
-					**Boring MP-26 terminated at 20 feet.**

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	Project Number: 029.08	Location: Watervliet, New York (Former Solvent Lines - Building #61)
Boring Number: MP-27	**Date Drilled:** 3/26/2009	**Logged by:** Bryan J. Machella
Drilling Company: Environmental Cleanup Solutions. Inc.	**Drilling Method:** Geoprobe™	**Sampling Method:** Macro-Core
Well Installed: Yes (MP-27)	**Casing Material / Diameter:** PVC/1-1/4-inch (pre-pack)	**Total Depth (feet):** 20.0

Notes: Soil sample MP-27 (11 to 12 feet) submitted for laboratory analysis of VOCs, TICs, and heptane. MS/MSD also collected.
Soil sample MP-27 (12 to 13 feet) submitted for laboratory analysis of COD, TOC, Fe, TPH GRO, and R,C,I.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	4	5 - 10		Concrete slab.
-					Light brown silt, sand, and gravel; 1/4-1/2" rock fragments.
-					
-					
-					
5	5 - 10	3			Light brown silt and fine sand.
-					7 - 7'8": dark brown silt, sand, and gravel.
-			1 - 2		
-			70 - 80		
-			10 - 11		
10	10 - 15	4	7 - 8	MP-27	Saturated.
-			1,700 - 1,800	(11 - 12)	Silt to fine to coarse sand; 1 to 2" rounded rock fragments.
-			1,700 - 1,800	MS/MSD	Lower 12": gravelly, clayey silt.
-			1,700 - 1,800	(12 - 13)	
-			1,700 - 1,800		
15			150 - 225		
-					**Boring MP-27 terminated at 20 feet.**

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	Project Number: 029.08	Location: Watervliet, New York (Former Solvent Lines - Building #61)
Boring Number: CS-1	**Date Drilled:** 3/26/2009	**Logged by:** Bryan J. Machella
Drilling Company: Environmental Cleanup Solutions. Inc.	**Drilling Method:** Geoprobe™	**Sampling Method:** Macro-Core
Well Installed: Yes (CS-1)	**Casing Material / Diameter:** Prefabricated Air Sparge Well	**Total Depth (feet):** 17.5 Moved location at set well on 6/2/2009

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	2.5			Concrete slab.
-					2.5 - 3': light brown silt and fine sand.
-			200 - 225		Silt, sand, and gravel; 1/4-1/2" rock fragments.
-			200 - 210		
-			65 - 70		
5	5 - 10	2.5			Brown silt, sand, and gravel; 1/4-1/2" rock fragments.
-					Lower 3": wet; gray silt, sand, and gravel.
-					
-			100 - 180		
-			75 - 80		
10	10 - 15	1	15 - 20		Silt to fine to coarse sand and gravel; "soupy"
-			1,800		Poor recovery.
-					Strong toluene odor.
-					
-					
15					
-					**Boring CS-1 terminated at 17.5 feet.**

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Former Solvent Lines - Building #61)
Boring Number: MP-28	**Date Drilled:** 3/26/2009	**Logged by:** Bryan J. Machella
Drilling Company: Environmental Cleanup Solutions. Inc.	**Drilling Method:** Geoprobe™	**Sampling Method:** Macro-Core
Well Installed: Yes (MP-28)	**Casing Material / Diameter:** PVC/1-1/4-inch (pre-pack)	**Total Depth (feet):** 17.5

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	3			Concrete slab.
-					Upper 6": brown silt to fine to medium sand; trace cobbles.
-			20 - 30		Dark brown to black silt, sand, and gravel. Cinder material
-			10 - 11		at 4'; brick material in bottom of sample.
-			2 - 5		
5	5 - 10	2.5	5 - 10		Silt, sand, and gravel; trace clay; 1/4-1" rock fragments
-					Gravelly silty clay.
-					
-			30 - 35		
-			200 - 225		
10	10 - 15	3	15 - 20		Saturated at 13'.
-					Upper 12": brown silt, sand, and gravel.
-			5 - 10		13 - 15': silt to fine to coarse sand and gravel.
-			6 - 8		
-			40 - 55		
15			0 - 0.1		
-					**Boring MP-28 terminated at 17.5 feet.**

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Former Solvent Lines - Building #61)
Boring Number: MP-29	**Date Drilled:** 3/26/2009	**Logged by:** Bryan J. Machella
Drilling Company: Environmental Cleanup Solutions. Inc.	**Drilling Method:** Geoprobe™	**Sampling Method:** Macro-Core
Well Installed: Yes (MP-29)	**Casing Material / Diameter:** PVC/1-1/4-inch (pre-pack)	**Total Depth (feet):** 20.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	2.5			Concrete slab.
-					Brown to dark brown to black silt, sand, and gravel.
-			390 - 400		Brick and cinder material at 4 to 5 feet.
-			250 - 270		
-			180 - 195		
5	5 - 10	3			Brown to light brown gravelly, clayey silt.
-					Increased clay content at 9 to 9.5 feet.
-			120 - 125		Lower 6": wet; gravelly, clayey silt with shale fragments.
-			290 - 300		
-			110 - 115		
10	10 - 15	1	25 - 30		Saturated.
-			500 - 1,800		Silt to fine to coarse sand; trace gravel.
-					Toluene odor present.
-					
-					
15					
-					**Boring MP-29 terminated at 20 feet.**

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	Project Number: 029.08	Location: Watervliet, New York (Former Solvent Lines - Building #61)
Boring Number: MP-30	**Date Drilled:** 3/26/2009	**Logged by:** Bryan J. Machella
Drilling Company: Environmental Cleanup Solutions. Inc.	**Drilling Method:** Geoprobe^{TM}	**Sampling Method:** Macro-Core
Well Installed: Yes (MP-30)	**Casing Material / Diameter:** PVC/1-1/4-inch (pre-pack)	**Total Depth (feet):** 17.5

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	3			Concrete slab.
-			10 - 15		Upper 12": light brown silt and very fine sand.
-			10 - 15		Dark brown/black silt, sand, and gravel; brick/cinder material.
-			20 - 25		Lower 3": silt to fine to coarse sand; trace gravel.
-			25 - 35		
5	5 - 10	2.5			Gravelly clayey silt to silty clay.
-					Quarts fragments at 9.5'.
-					
-			20 - 22		
-			85 - 95		
10	10 - 15	2.5	135 - 145		Wet at 13.5 feet.
-					Upper 12": brown gravelly, clayey silt to silt to fine to coarse sand.
-					Lower 1.5': wet; gray silt to fine to coarse sand.
-			30 - 35		Toluene odor present.
-			1,500 - 1,800		
15			500 - 600		
-					**Boring MP-30 terminated at 17.5 feet.**

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Former Solvent Lines - Building #61)
Boring Number: MP-31	**Date Drilled:** 3/26/2009	**Logged by:** Bryan J. Machella
Drilling Company: Environmental Cleanup Solutions. Inc.	**Drilling Method:** Geoprobe™	**Sampling Method:** Macro-Core
Well Installed: Yes (MP-31)	**Casing Material / Diameter:** PVC/1-1/4-inch (pre-pack)	**Total Depth (feet):** 20.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	2	0.0		Concrete slab.
-					Brown silt, sand, and gravel; 1/2-1" rock fragments.
-					
-					
-					
5	5 - 10	1.5			Brown silt, sand, and gravel; 1/2-1" rock fragments.
-					Lower 6": gravelly, clayey silt.
-					
-					
-			7 - 8		
10	10 - 15	2	1 - 2	NM	Saturated.
-					Fine to coarse sand to coarse gravel.
-					Lower 7": gray gravelly, clayey silt.
-					
-					
15					
-					**Boring MP-31 terminated at 20 feet.**

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Former Solvent Lines - Building #61)
Boring Number: MP-32	**Date Drilled:** 5/19/2009	**Logged by:** Bryan J. Machella
Drilling Company: Environmental Cleanup Solutions. Inc.	**Drilling Method:** Geoprobe™	**Sampling Method:** Macro-Core
Well Installed: Yes (MP-32)	**Casing Material / Diameter:** PVC/2-inch	**Total Depth (feet):** 20.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5				Concrete slab.
-					No Geoprobe soil (Macrocore) samples collected; see boring
-					log for SB-19 for soil description.
-					
-					
5	5 - 10				
-					
-					
-					
-					
10	10 - 15				
-					
-					
-					
-					
15					
-					**Boring MP-32 terminated at 20 feet.**

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Former Solvent Lines - Building #61)
Boring Number: MP-33	**Date Drilled:** 3/26/2009	**Logged by:** Bryan J. Machella
Drilling Company: Environmental Cleanup Solutions. Inc.	**Drilling Method:** Geoprobe™	**Sampling Method:** Macro-Core
Well Installed: Yes (MP-33)	**Casing Material / Diameter:** PVC/1-1/4-inch (pre-pack)	**Total Depth (feet):** 20.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	3			Concrete slab.
-					Upper 12": light brown silt to fine sand.
-			0.0		Gravelly, clayey silt.
-			0.0		Lower 6": dark brown silt and fine sand.
-			5 - 6		
5	5 - 10	4	15 - 20		6 - 7': silt and fine sand.
-			35 - 40		8 - 10': gray silty clay; trace gravel.
-			30 - 35		9 - 10': silty clay with gravel.
-			10 - 15		
-			15 - 20		
10	10 - 15	0	10 - 15		No Recovery.
-					
-					
-					
-					
15					
-					**Boring MP-33 terminated at 20 feet.**

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Inside Building #59)
Boring Number: MP-34	**Date Drilled:** 2/4/2011	**Logged by:** Kyle Swartzwelder
Drilling Company: Aquifer Drilling & Testing, Inc.	**Drilling Method:** Low Clearance Drill Rig	**Sampling Method:** Macro-Core
Well Installed: Yes	**Casing Material / Diameter:** PVC / 1 inch	**Total Depth (feet):** 15.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0					Brown silt with gravel and cobble; dry.
-					
-					Borehole not logged - see adjacent boring log SB-59.
-					
-					
5					
-					
-					
-					Wet.
-					
10					
-					
-					
-					
-					
15					
-					**Boring MP-34 terminated at 15 feet.**
-					
-					
-					

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Inside Building #61)
Boring Number: MP-35	**Date Drilled:** 2/1/2011	**Logged by:** Kyle Swartzwelder
Drilling Company: Aquifer Drilling & Testing, Inc.	**Drilling Method:** Low Clearance Drill Rig	**Sampling Method:** Macro-Core
Well Installed: Yes	**Casing Material / Diameter:** PVC / 2 inch	**Total Depth (feet):** 15.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0					Brown silt with gravel and cobble; dry.
-					
-					Borehole not logged - see adjacent boring log SB-67.
-					
-					
5					
-					
-					
-					Wet.
-					
10					
-					
-					
-					
-					
15					
-					**Boring MP-35 terminated at 15 feet.**
-					
-					
-					

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Inside Building #61)
Boring Number: MP-36	**Date Drilled:** 7/26/2011	**Logged by:** Denise Gatlin
Drilling Company: Aquifer Drilling & Testing, Inc.	**Drilling Method:** Geoprobe^{TM}	**Sampling Method:** Macro-Core
Well Installed: Yes	**Casing Material / Diameter:** PVC / 1 inch	**Total Depth (feet):** 15.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	3			Concrete Slab
-			>9999		Fill; gravel, brick, sand and silt.
-					
-					
-					
5	5 - 10	3.5	8		5 - 7': fill; sand, brick and gravel.
-			46.6		7 - 8.5': clayey silt.
-					
-					
-					
10	10 - 15	3.8	9.2		Silty clay; wet at 10.17 feet.
-					
-					
-					
-					
15					
-					**Boring MP-36 terminated at 15 feet.**
-					
-					
-					

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Inside Building #58)
Boring Number: MP-37	**Date Drilled:** 7/27/2011	**Logged by:** Denise Gatlin
Drilling Company: Aquifer Drilling & Testing, Inc.	**Drilling Method:** Track Mounted Rig (CME 55)	**Sampling Method:** Macro-Core (MW-37R) / Drill Cuttings Observed
Well Installed: Yes	**Casing Material / Diameter:** PVC / 1 inch	**Total Depth (feet):** 15.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0					Concrete Slab
-					Dark brown; fine to medium sand with gravel; dry.
-					
-					
-					
5					
-					
-					
-					
-					
10			>9999		Dark brown clay with fine to medium sand; wet.
-					Water encountered at 10.40 feet.
-					
-					
-					
15					
-					
-					**Boring MP-37 terminated at 15 feet.**
-					
-					

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Inside Building #58)
Boring Number: MP-38	**Date Drilled:** 7/26/2011	**Logged by:** Denise Gatlin
Drilling Company: Aquifer Drilling & Testing, Inc.	**Drilling Method:** Geoprobe™	**Sampling Method:** Macro-Core
Well Installed: Yes	**Casing Material / Diameter:** PVC / 1 inch	**Total Depth (feet):** 15.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	3.55			Concrete Slab
-			6.8		Fill; brick, concrete and gravel.
-			0.2		
-					
-					
5	5 - 10	4.1	12.7		5 - 8': Fill; concrete, brick and gravel.
-			943		8 - 9.1': Gray silt; dry.
-			2169		
-					
-					
10	10 - 15	3.9	1634		10 - 12': Fill; concrete, brick and gravel.
-			60.4		12 - 13.9': Grayish/black silty sand.
-			953		Water encountered at 10.30 feet.
-					
-					
15					
-					**Boring MP-38 terminated at 15 feet.**
-					
-					
-					

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	Project Number: 029.08	Location: Watervliet, New York (Inside Building #61)
Boring Number: MP-39	**Date Drilled:** 7/26/2011 & 7/27/2011	**Logged by:** Denise Gatlin
Drilling Company: Aquifer Drilling & Testing, Inc.	**Drilling Method:** Track Mounted Rig (CME 55)	**Sampling Method:** Macro-Core / Drill Cuttings Observed
Well Installed: Yes	**Casing Material / Diameter:** PVC / 1 inch	**Total Depth (feet):** 15.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	2.3			Concrete Slab
-			4.6		Fill; brick, concrete and gravel.
-					
-					
-					
5	5 - 10	1.4	30.1		Fill; brick, concrete and gravel.
-			21.5		
-					
-					
-					
10	10 - 15	3.95	3901		10 - 11.95; Fill; brick, concrete and gravel.
-					11.95 - 13.95; Grayish/black sandy silt; wet; toluene odor.
-					Water encountered at 10.20 feet.
-					
-					
15					
-					**Boring MP-39 terminated at 15 feet.**
-					
-					
-					

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Inside Building #61)
Boring Number: MP-40	**Date Drilled:** 5/2/2012	**Logged by:** Kristin Allen
Drilling Company: Aquifer Drilling & Testing, Inc.	**Drilling Method:** Track Mounted Rig (CME 55)	**Sampling Method:** Drill Cuttings Observed
Well Installed: Yes	**Casing Material / Diameter:** PVC / 1 inch	**Total Depth (feet):** 15.25

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5				Concrete Slab (5.5 inches)
-			0.6 - 1.2		Dark brown to brown fine to medium sand; dry; no odor present.
-					
-					
-					
5	5 - 10		0.0 - 0.2		Brown fine to medium sand with little clay; dry; no odor present.
-					
-					
-					
-					
10	10 - 15		6.8		Grayish brown clay with fine to medium sand; wet.
-					Water encountered at 10.08 feet.
-					
-					
-					
15					
-					**Borings MP-40 terminated at 15.25 feet.**
-					
-					
-					

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Former Solvent Lines - Building #61)
Boring Number: IS-1	**Date Drilled:** 5/22/2009	**Logged by:** Bryan J. Machella
Drilling Company: Environmental Cleanup Solutions. Inc.	**Drilling Method:** Geoprobe™	**Sampling Method:** Macro-Core
Well Installed: Yes (IS-1)	**Casing Material / Diameter:** PVC/2-inch	**Total Depth (feet):** 16.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	3			Concrete slab.
-					Brown silt, sand, and gravel.
-			2 - 3		3 - 4': silty clay with gravel.
-			2 - 3		Lower 12": brown silt, sand, and gravel.
-			6 - 7		
5	5 - 10	0	6 - 7		No Recovery.
-					Reddish-brown quartzite fragment in cone of sample.
-					
-					
-					
10	10 - 15	3.5	5 - 10		Saturated.
-					Upper 6": brown clayey silt with gravel.
-					7": silt to fine to coarse sand; shale fragments.
-					Lower 6": gray clayey silt with gravel.
-					
15					
-					
					Boring IS-1 terminated at 16 feet.

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Former Solvent Lines - Building #61)
Boring Number: IS-2	**Date Drilled:** 3/26/2009	**Logged by:** Bryan J. Machella
Drilling Company: Environmental Cleanup Solutions. Inc.	**Drilling Method:** Geoprobe^{TM}	**Sampling Method:** Macro-Core
Well Installed: Yes (IS-2)	**Casing Material / Diameter:** PVC/2-inch	**Total Depth (feet):** 15.0

Notes: Soil sample IS-2 (13 to 14 feet) submitted for laboratory analysis of VOCs, TICs, heptane, COD, TOC, Fe, TPH GRO, and R, C, I.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5	3			Concrete slab.
-			8 - 10		Brown silt, sand, and gravel.
-					Brick and cinder material from 2.5 to 3'.
-					Lower 6": silt and very fine sand.
-					
5	5 - 10	3.5			Upper 1.5': silt, sand, and gravel.
-					Gray gravelly, silty clay to clayey silt to silt and fine sand and
-			100 - 105		gravel.
-			117 - 120		
-			75 - 80		
10	10 - 15	2.5	15 - 20		Saturated at 13.5'.
-					Gray silt to fine to coarse sand and gravel.
-			500 - 700	IS-2	Toluene odor present.
-			1,000 - 1,800	(13 - 14)	Shale fragments present.
-			100 - 150		
15					
-					**Boring IS-2 terminated at 15 feet.**

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Inside Building #61)
Boring Number: MW-20	**Date Drilled:** 2/2/2011	**Logged by:** Kyle Swartzwelder
Drilling Company: Aquifer Drilling & Testing, Inc.	**Drilling Method:** Low Clearance Drill Rig	**Sampling Method:** Macro-Core
Well Installed: Yes	**Casing Material / Diameter:** PVC / 2 inch	**Total Depth (feet):** 15.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0					Brown silt with gravel and cobble; dry.
-					
-					Borehole not logged - see adjacent boring log SB-69.
-					
-					
5					
-					
-					
-					Wet.
-					
10					
-					
-					
-					
-					
15					
-					**Boring MW-20 terminated at 15 feet.**
-					
-					
-					

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Inside Building #61)
Boring Number: MW-21	**Date Drilled:** 2/1/2011	**Logged by:** Kyle Swartzwelder
Drilling Company: Aquifer Drilling & Testing, Inc.	**Drilling Method:** Low Clearance Drill Rig	**Sampling Method:** Macro-Core
Well Installed: Yes	**Casing Material / Diameter:** PVC / 2 inch	**Total Depth (feet):** 15.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0					Brown silt with gravel and cobble; dry.
-					
-					Borehole not logged - see adjacent boring log SB-124.
-					
-					
5					
-					
-					
-					Wet at 8'.
-					
10					
-					
-					
-					
-					
15					
-					**Boring MW-21 terminated at 15 feet.**
-					
-					
-					

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Inside Building #61)
Boring Number: MW-22	**Date Drilled:** 1/31/2011	**Logged by:** Kyle Swartzwelder
Drilling Company: Aquifer Drilling & Testing, Inc.	**Drilling Method:** Low Clearance Drill Rig	**Sampling Method:** Macro-Core
Well Installed: Yes	**Casing Material / Diameter:** PVC / 2 inch	**Total Depth (feet):** 18.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0					Dark brown silt and cobble; dry (0' - 9').
-					
-					Borehole not logged - see adjacent boring log SB-126.
-					
-					
5					
-					
-					
-					
-					Damp at 9'.
10					
-					
-					
-					
-					
15					Toluene Odor.
-					
-					
-					
-					**Boring MW-22 terminated at 18 feet.**

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Inside Building #61)
Boring Number: MW-23	**Date Drilled:** 2/3/2011	**Logged by:** Kyle Swartzwelder
Drilling Company: Aquifer Drilling & Testing, Inc.	**Drilling Method:** Low Clearance Drill Rig	**Sampling Method:** Macro-Core
Well Installed: Yes	**Casing Material / Diameter:** PVC / 2 inch	**Total Depth (feet):** 15.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0					Brown silt with gravel and cobble; dry.
-					
-					Borehole not logged - see adjacent boring log SB-18.
-					
-					
5					
-					
-					
-					Wet.
-					
10					
-					
-					
-					
-					
15					
-					**Boring MW-23 terminated at 15 feet.**
-					
-					
-					

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Inside Building #61)
Boring Number: MW-24	**Date Drilled:** 2/2/2011	**Logged by:** Kyle Swartzwelder
Drilling Company: Aquifer Drilling & Testing, Inc.	**Drilling Method:** Low Clearance Drill Rig	**Sampling Method:** Macro-Core
Well Installed: Yes	**Casing Material / Diameter:** PVC / 2 inch	**Total Depth (feet):** 15.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0					Brown silt with gravel and cobble; dry.
-					
-					Borehole not logged - see adjacent boring log SB-9.
-					
-					
5					
-					
-					
-					Wet.
-					
10					
-					
-					
-					
-					
15					
-					**Boring MW-24 terminated at 15 feet.**
-					
-					
-					

Log of Soil Boring

Project Name: Saint-Gobain, Watervliet	**Project Number:** 029.08	**Location:** Watervliet, New York (Inside Building #58)
Boring Number: MP-37R	**Date Drilled:** 5/2/2012 - 5/3/2012	**Logged by:** Kristin Allen
Drilling Company: Aquifer Drilling & Testing, Inc.	**Drilling Method:** Track Mounted Rig (CME 55)	**Sampling Method:** Drill Cuttings Observed
Well Installed: Yes	**Casing Material / Diameter:** PVC / 2 inch	**Total Depth (feet):** 19.0

Notes: No soil samples collected for laboratory analysis.

Depth (feet)	Sample Interval (feet)	Recovery (feet)	PID (ppm)	Sample Interval	Soil Classification / Description color, texture, structure
0	0 - 5		1.6		Concrete Slab (6 inches).
-					Dark brown fine to medium sand with gravel; dry; no odor.
-					Red clay brick void layer from approximately 2 - 3'.
-					
-					
5	5 - 10				No cuttings generated.
-					Old railroad ties soaked in creosote observed at approx. 6.5'.
-					(Drill bit unable to drill past 6.5' - switch to an ugly bit).
-					Red clay brick from 7.5 - 9.5'.
-					
10	10 - 20		363		Brown clay with fine to medium sand; toluene/creosote odor.
-					
-					
-					
-					Water encountered at approximately 14'.
15					
-					
-					
-					
-					**Boring MW-37R terminated at 19 feet.**

MONITORING WELL CONSTRUCTION DIAGRAM

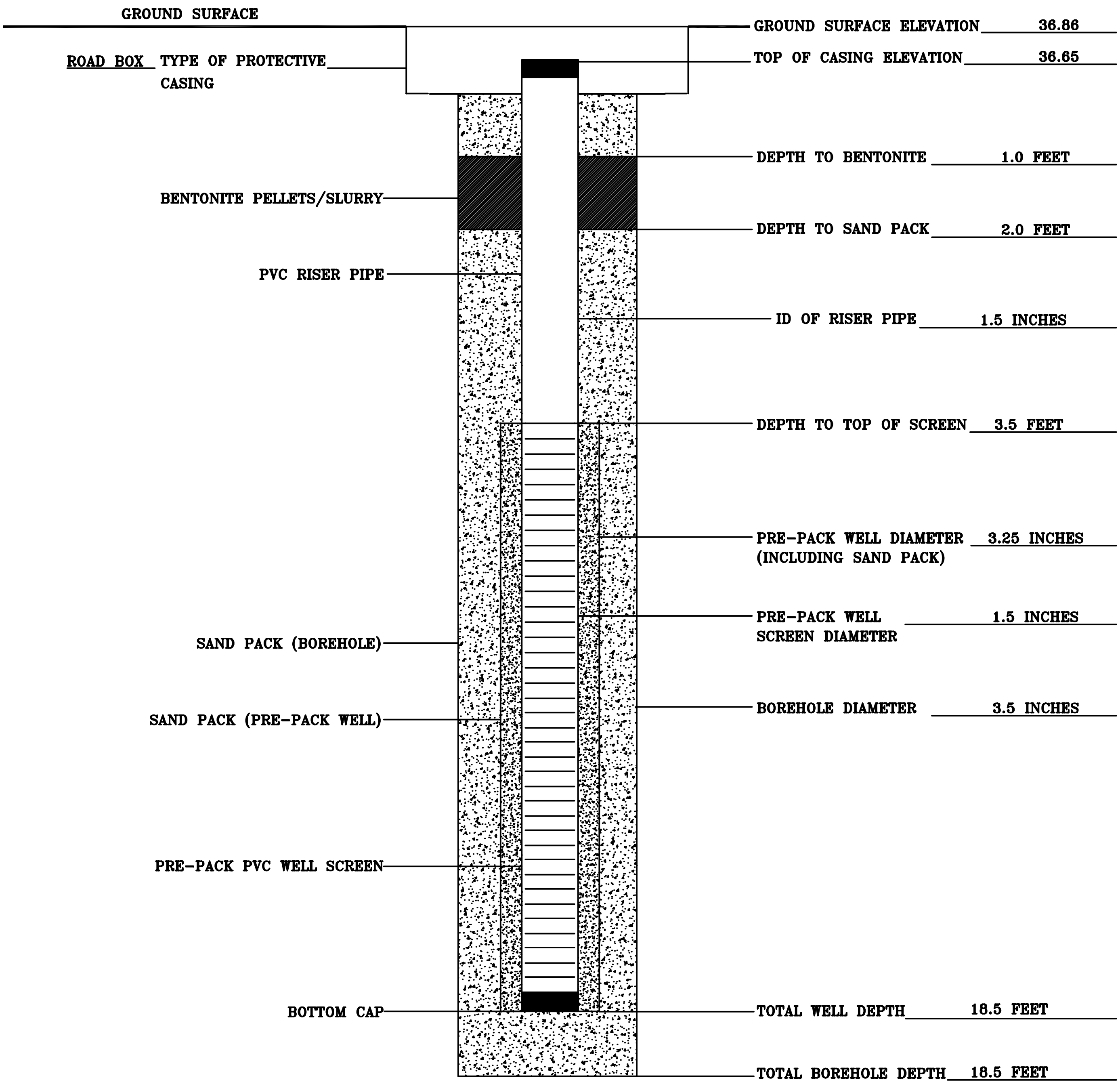
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION MARCH 25, 2009

DRILLING COMPANY ECSI

WELL DESIGNATION MP-23

WELL DESCRIPTION GROUNDWATER MONITORING



MP-23.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

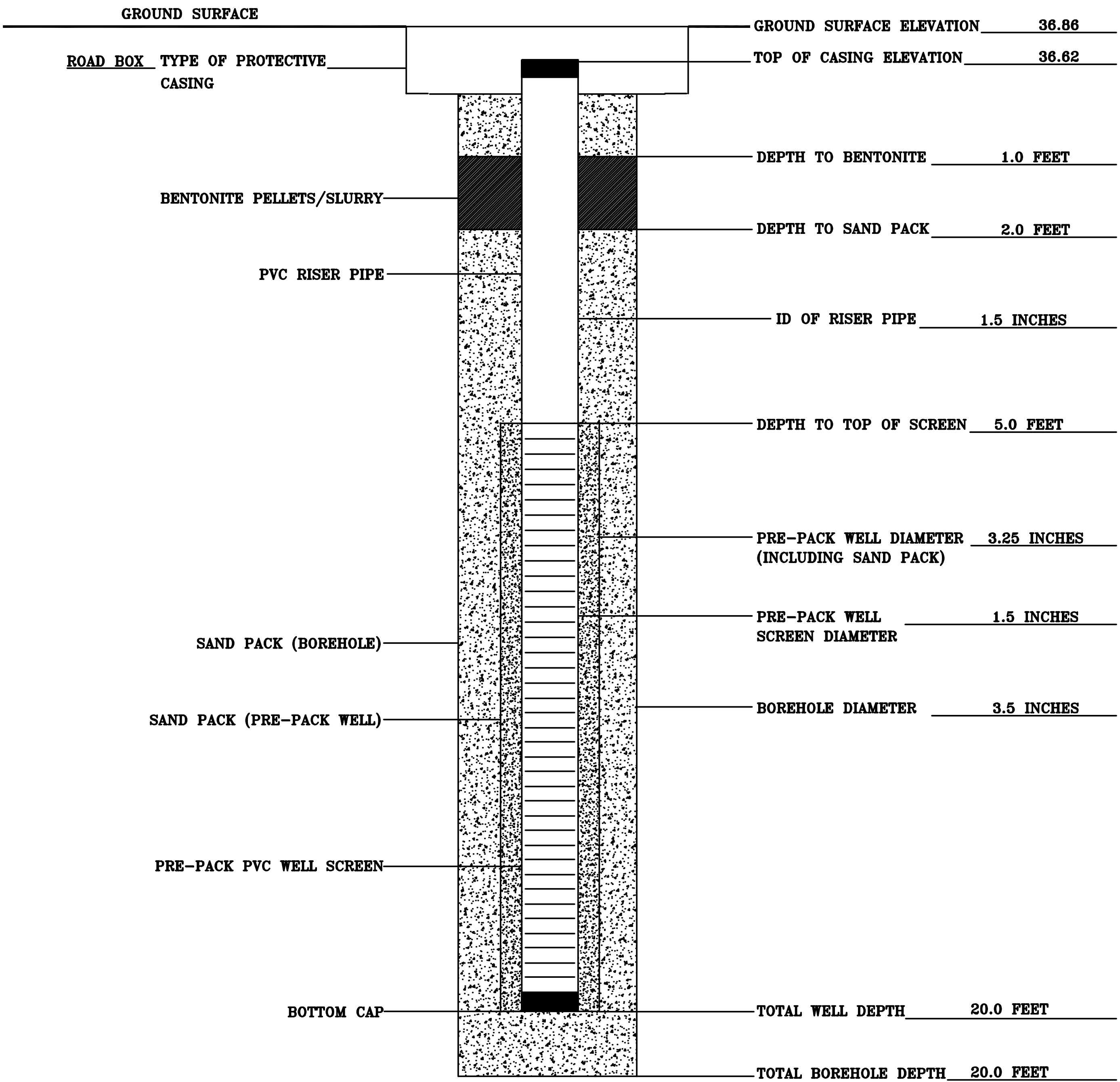
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: MARCH 24, 2009

DRILLING COMPANY: ECSI

WELL DESIGNATION: MP-24

WELL DESCRIPTION: GROUNDWATER MONITORING



MP-24.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

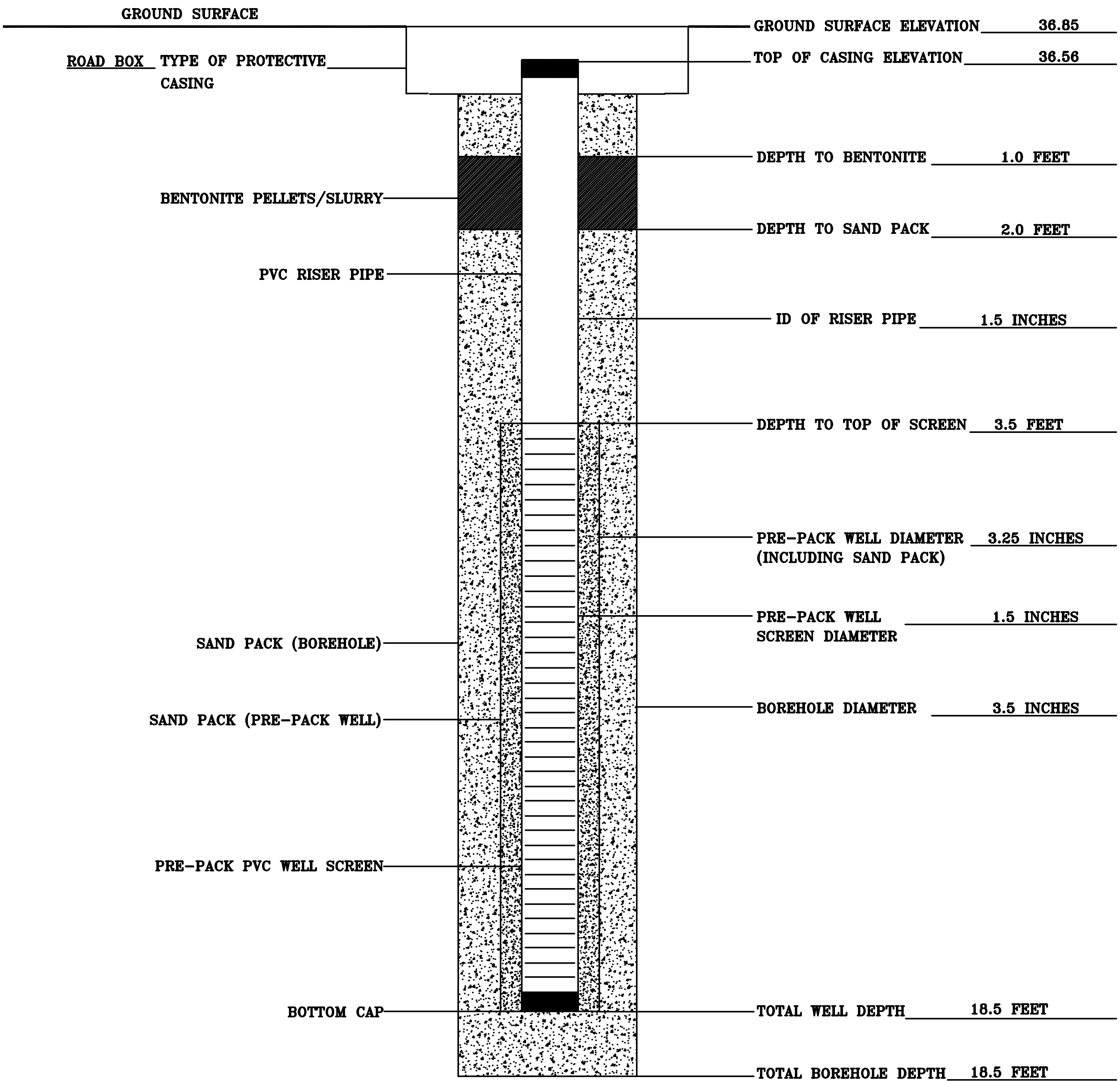
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: MARCH 24, 2009

DRILLING COMPANY: ECSI

WELL DESIGNATION: MP-25

WELL DESCRIPTION: GROUNDWATER MONITORING



MP-25.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

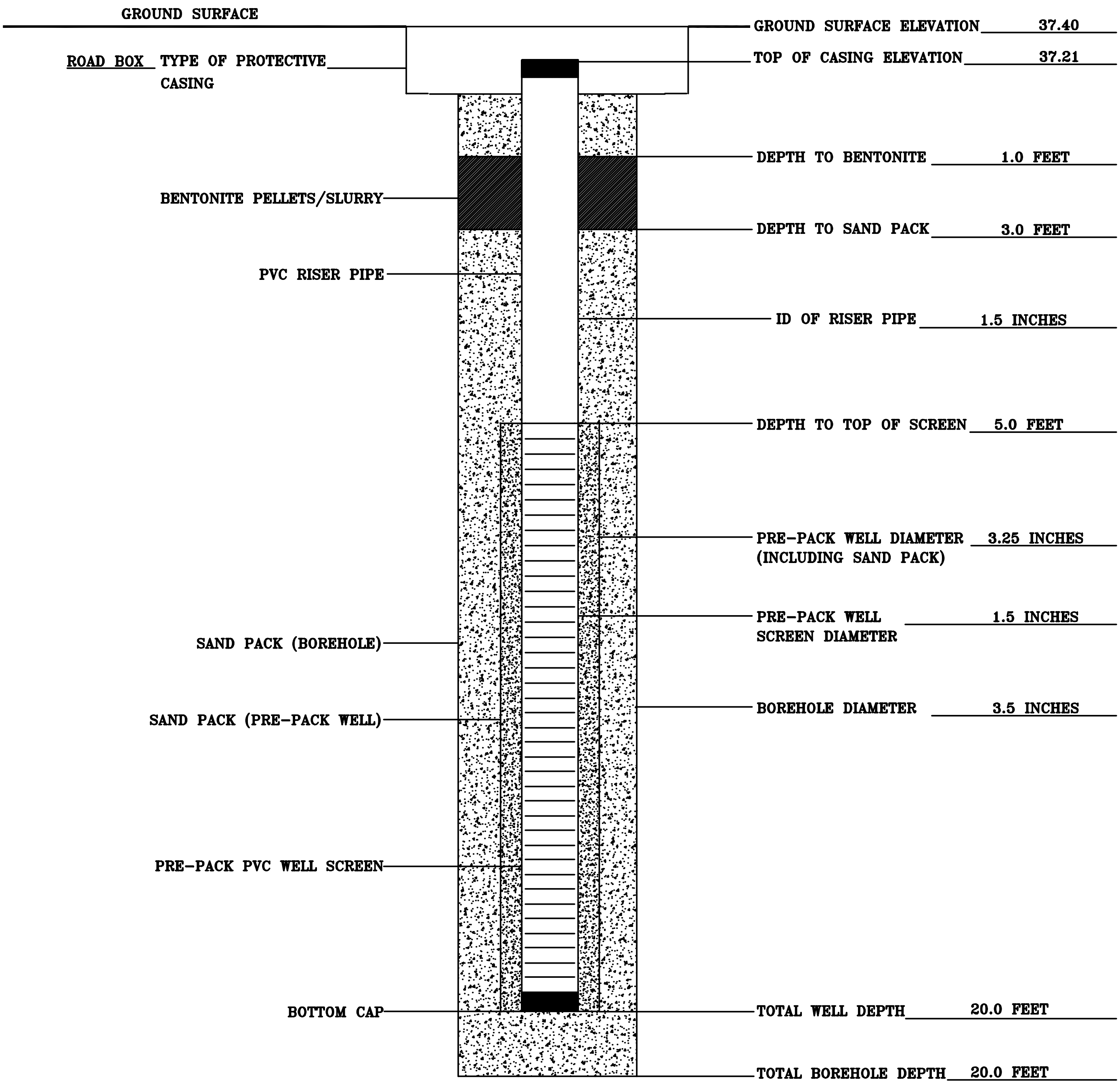
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION MARCH 27, 2009

DRILLING COMPANY ECSI

WELL DESIGNATION MP-26

WELL DESCRIPTION GROUNDWATER MONITORING



MP-26.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

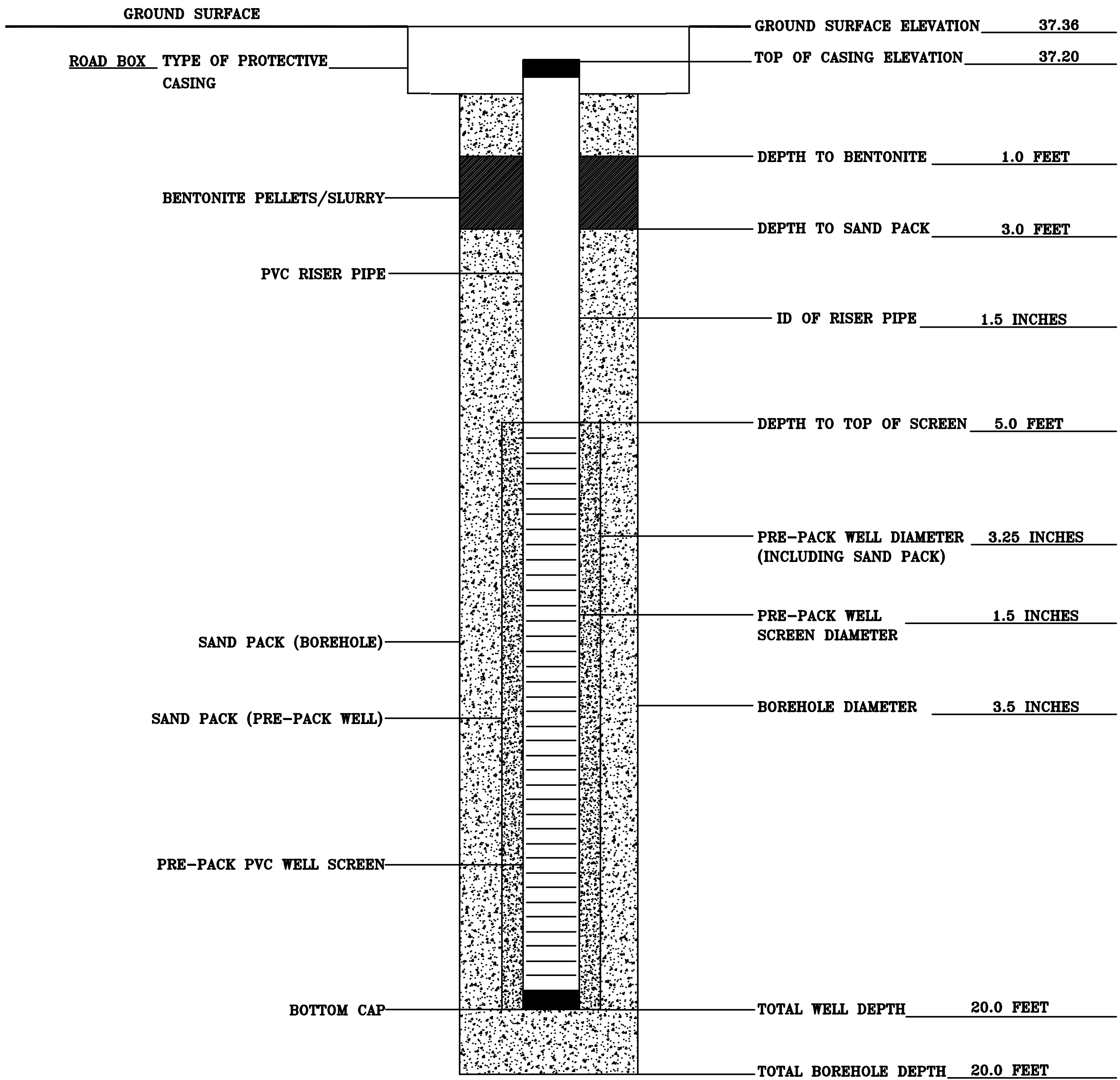
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: MARCH 27, 2009

DRILLING COMPANY: ECSI

WELL DESIGNATION: MP-27

WELL DESCRIPTION: GROUNDWATER MONITORING



MP-27.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

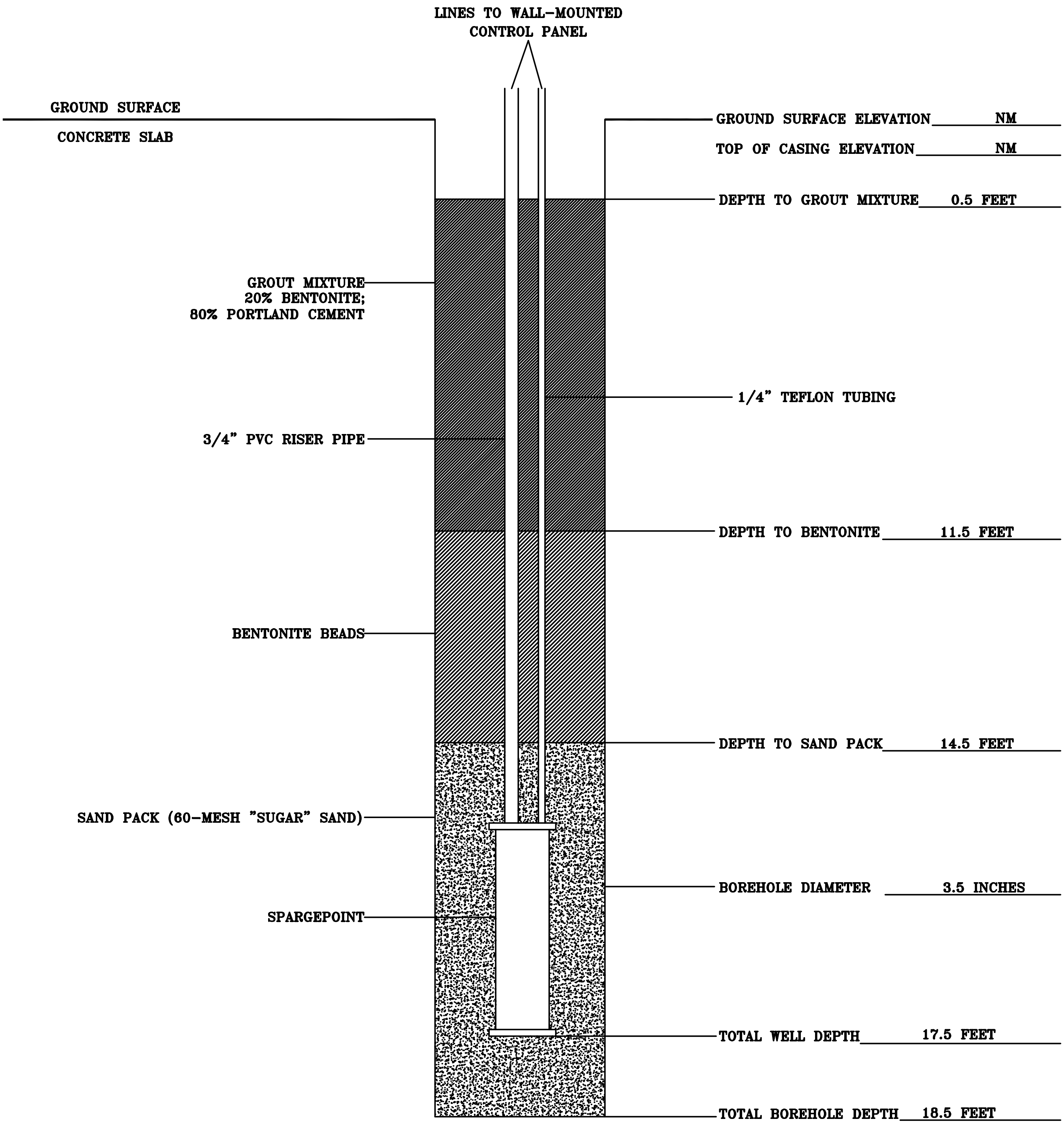
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

WELL DESIGNATION CS-1

DATE OF INSTALLATION JUNE 2, 2009

DRILLING COMPANY ECSI

WELL DESCRIPTION AIR SPARGE PILOT TESTING



CS-1.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

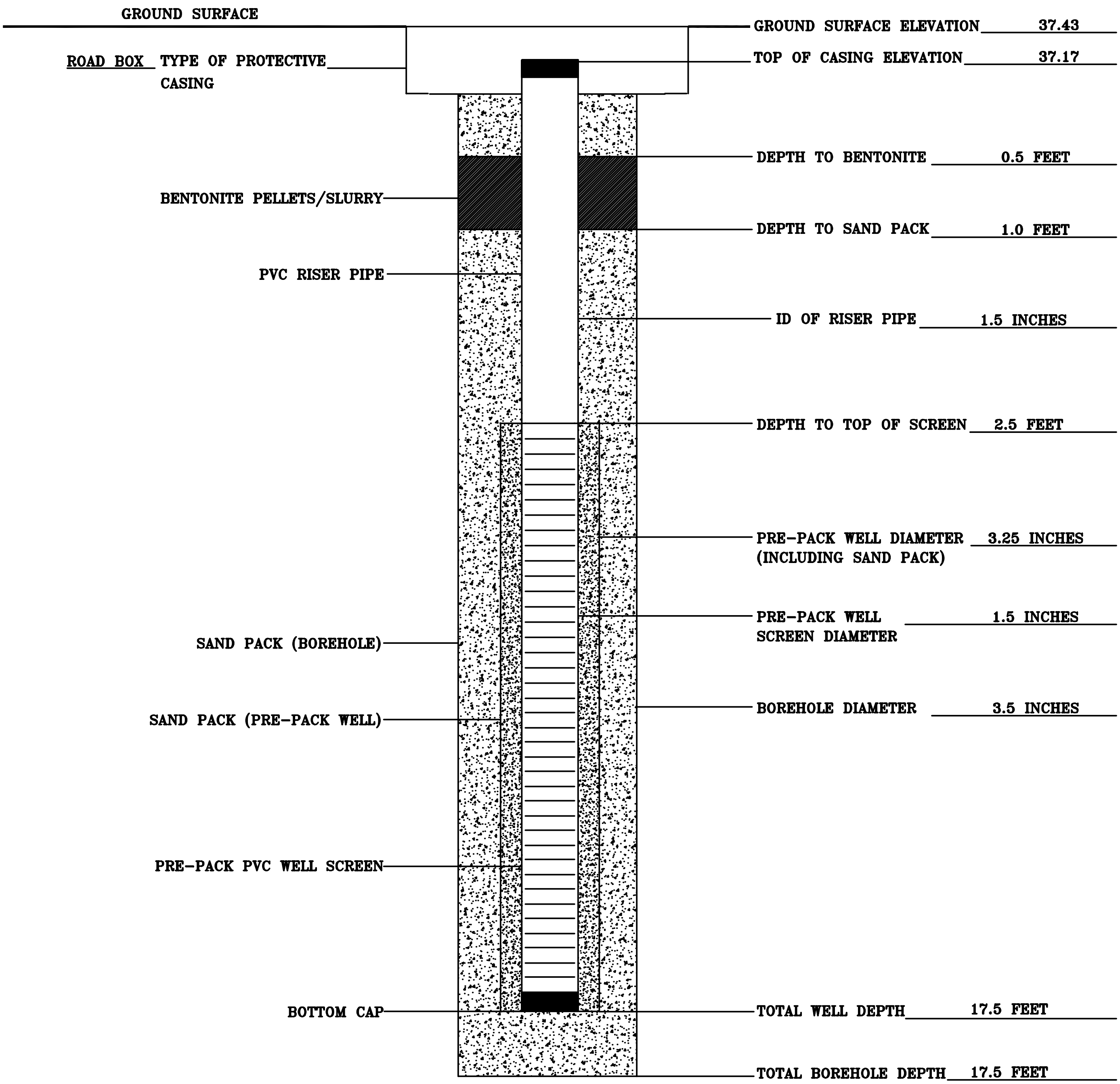
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: MARCH 27, 2009

DRILLING COMPANY: ECSI

WELL DESIGNATION: MP-28

WELL DESCRIPTION: GROUNDWATER MONITORING



MP-28.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

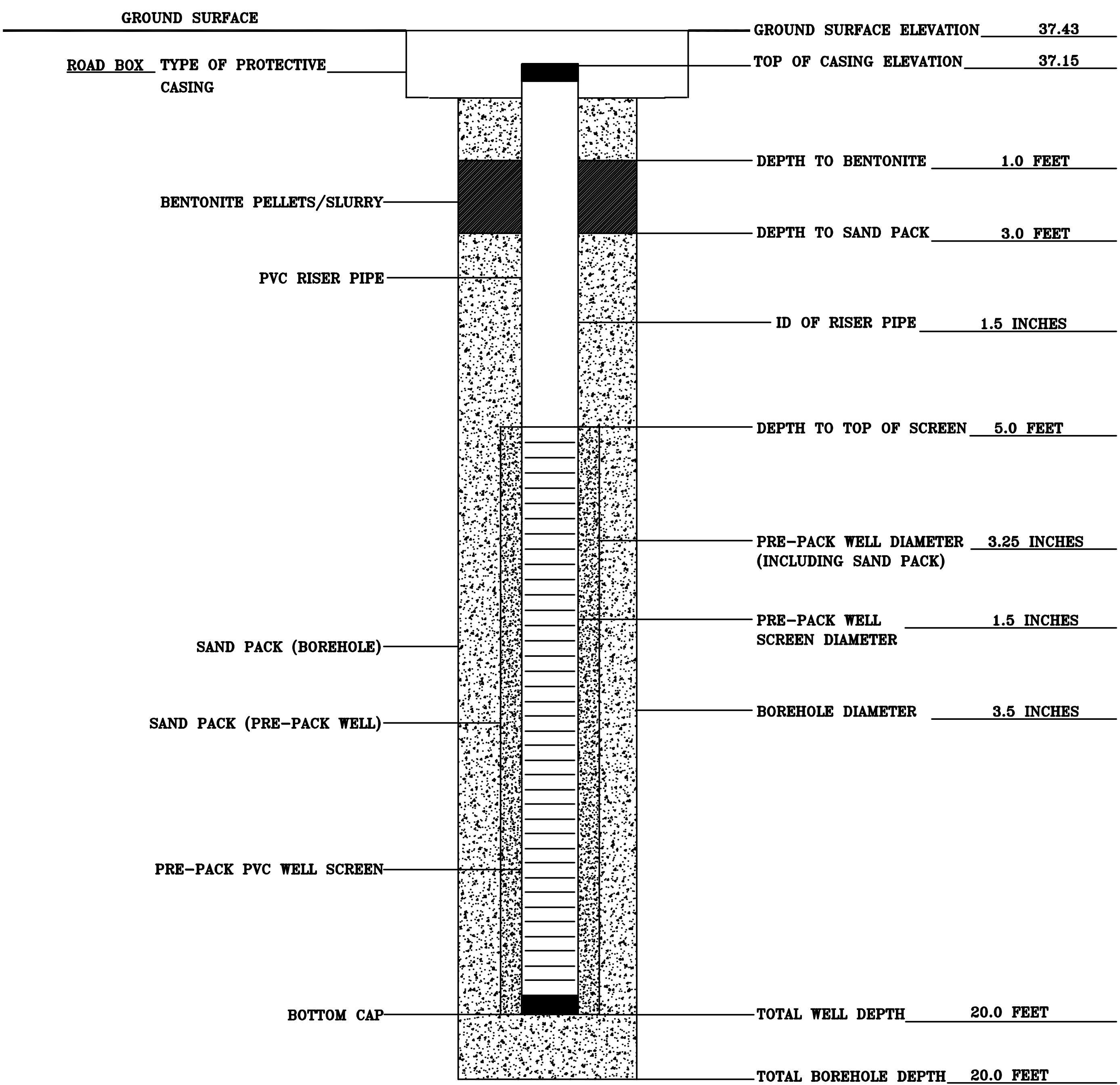
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: MARCH 27, 2009

DRILLING COMPANY: ECSI

WELL DESIGNATION: MP-29

WELL DESCRIPTION: GROUNDWATER MONITORING



MP-29.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

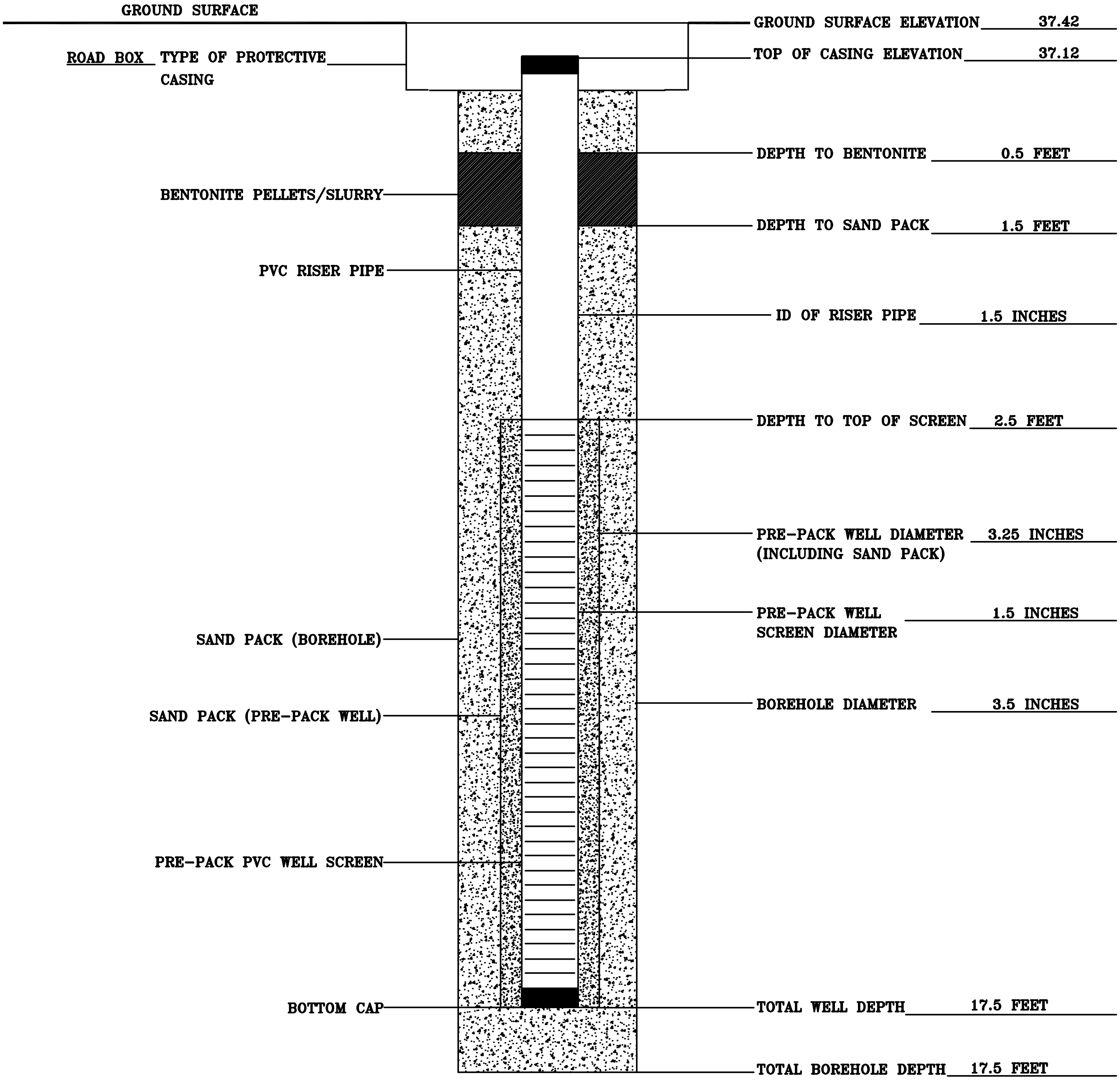
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION MARCH 27, 2009

DRILLING COMPANY ECSI

WELL DESIGNATION MP-30

WELL DESCRIPTION GROUNDWATER MONITORING



MP-30.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

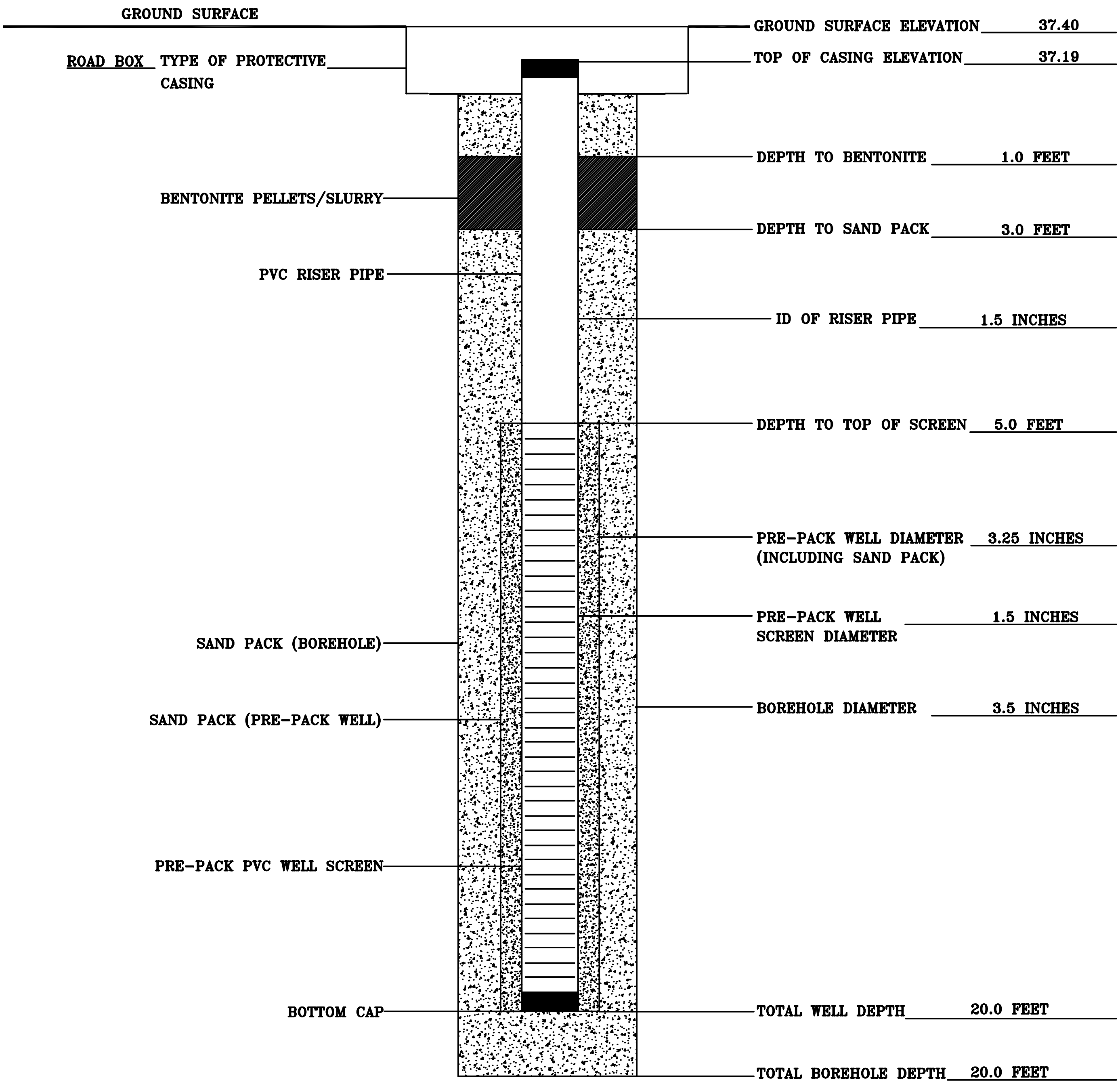
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION MARCH 27, 2009

DRILLING COMPANY ECSI

WELL DESIGNATION MP-31

WELL DESCRIPTION GROUNDWATER MONITORING



MP-31.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

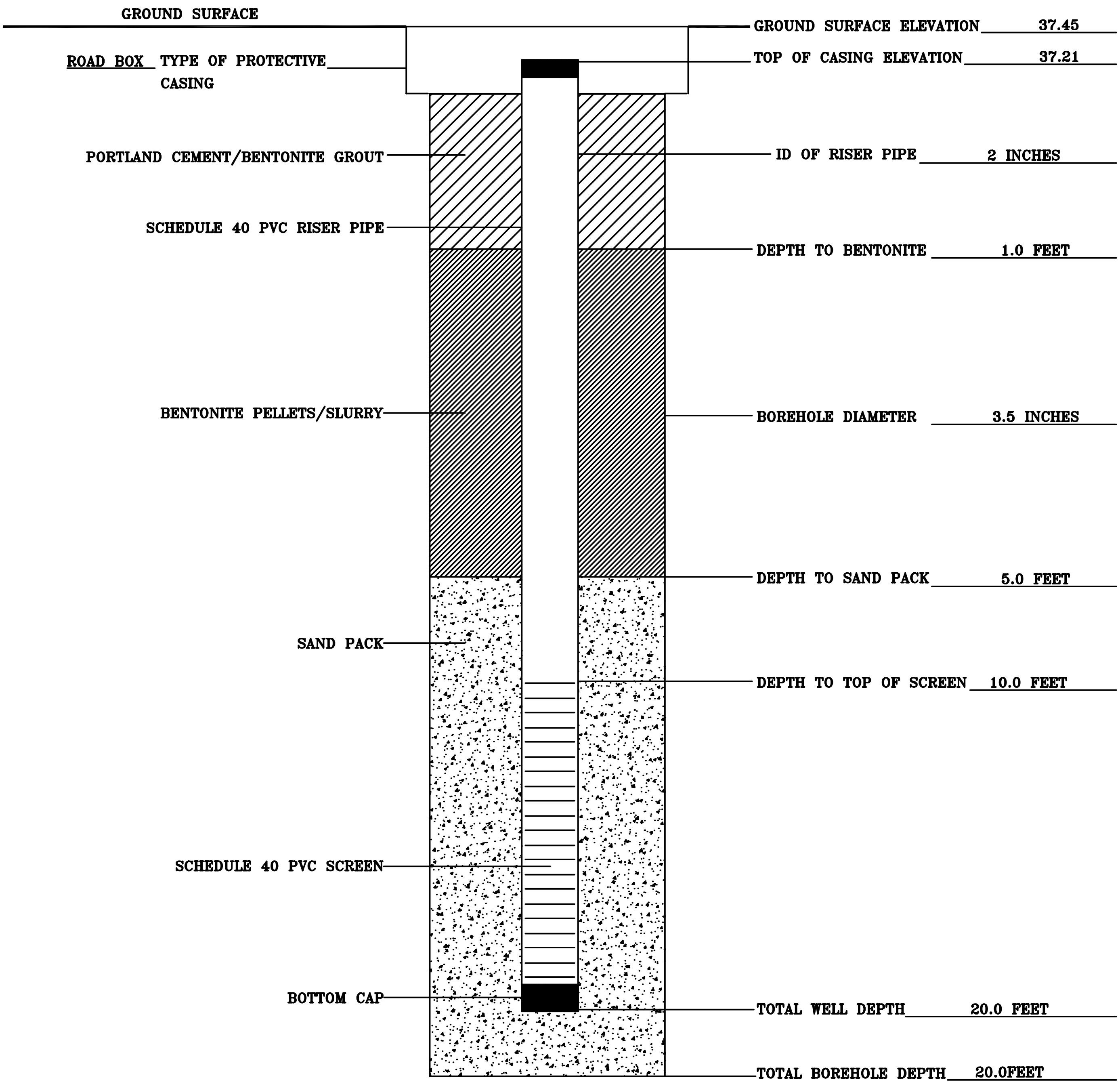
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: MAY 19, 2009

DRILLING COMPANY: ECSI

WELL DESIGNATION: MP-32

WELL DESCRIPTION: GROUNDWATER MONITORING



MP-32.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

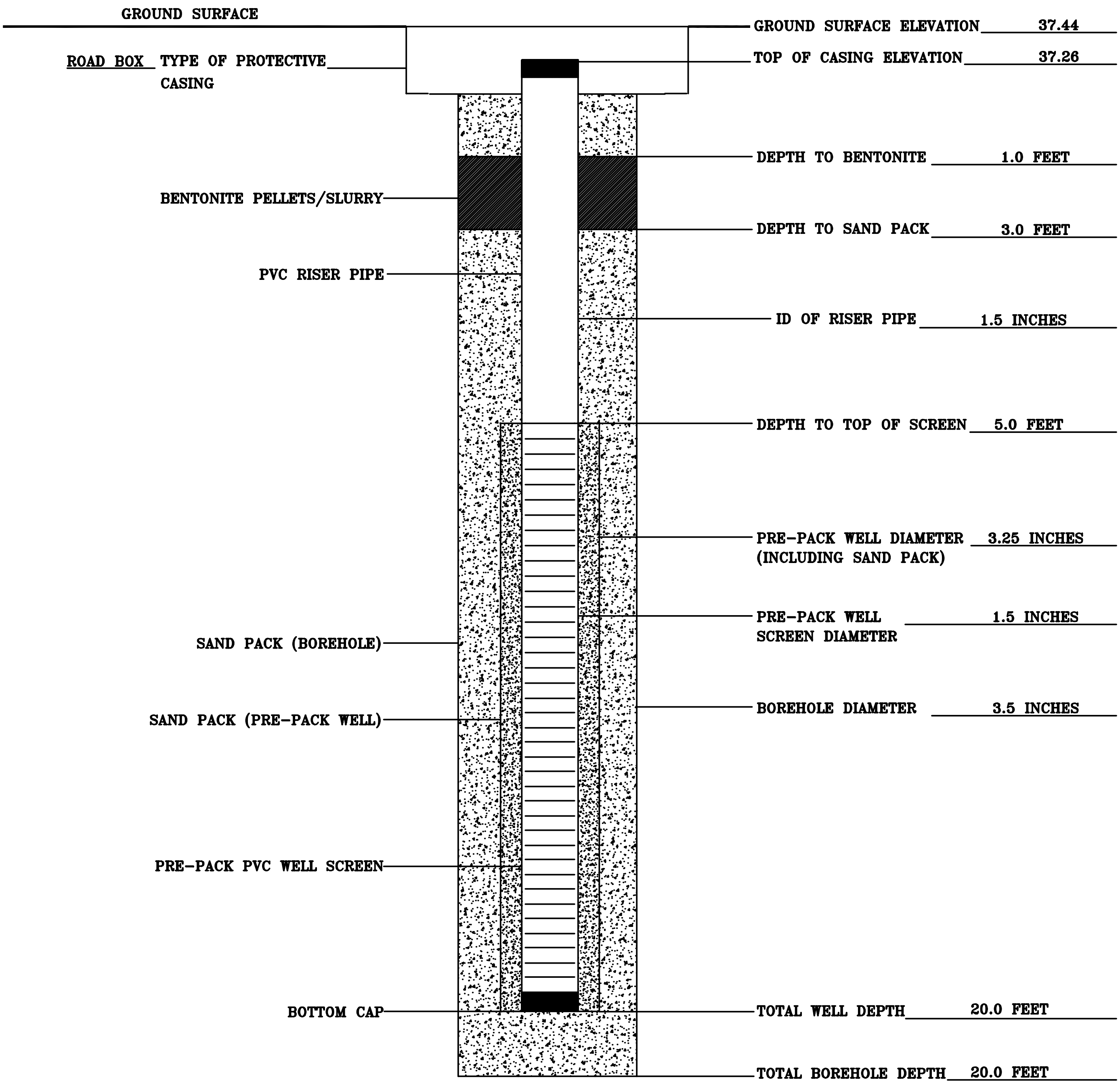
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: MARCH 27, 2009

DRILLING COMPANY: ECSI

WELL DESIGNATION: MP-33

WELL DESCRIPTION: GROUNDWATER MONITORING



MP-33.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

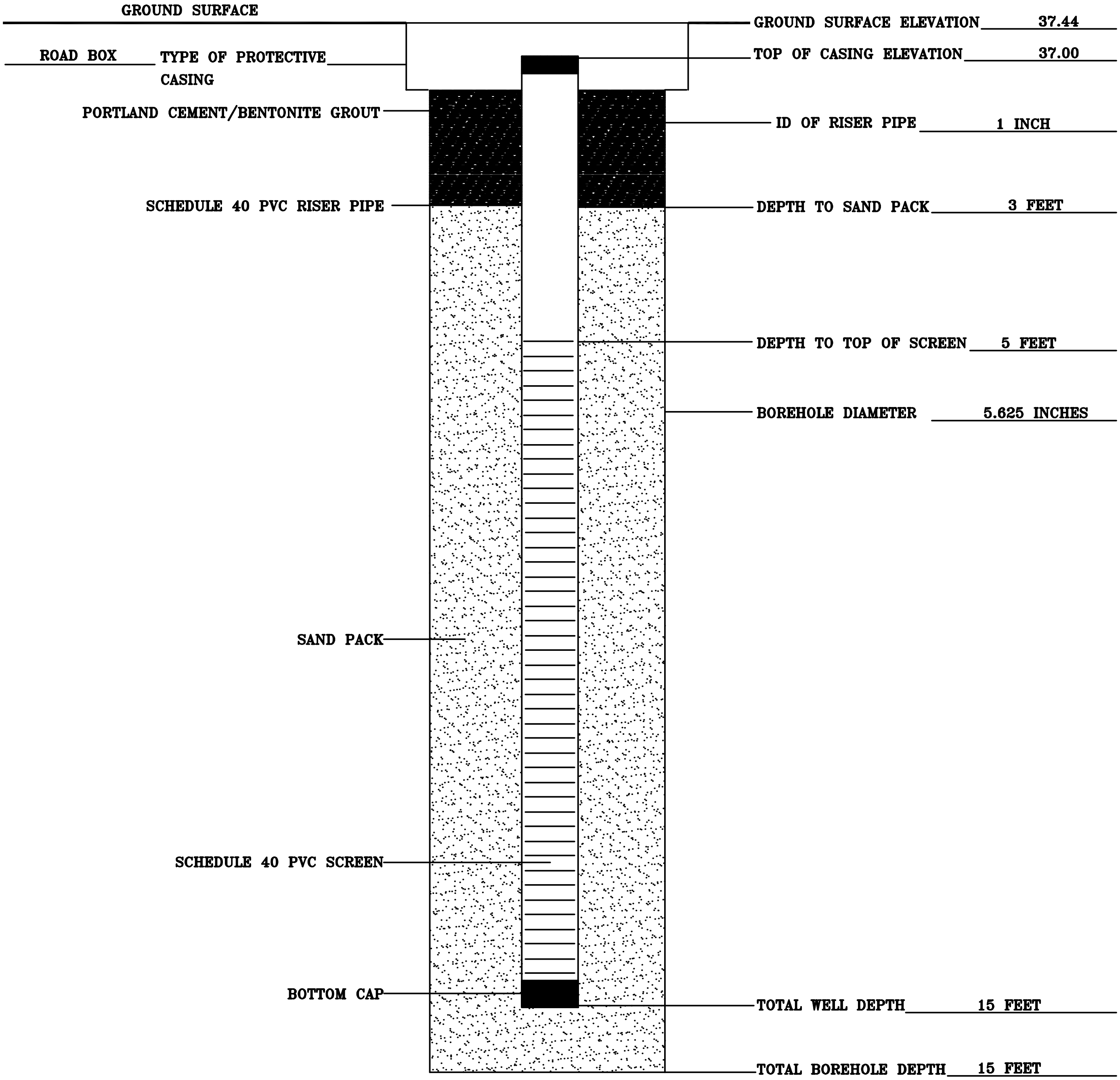
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: FEBRUARY 4, 2011

DRILLING COMPANY: ADT

WELL DESIGNATION: MP-34

WELL DESCRIPTION: GROUNDWATER MONITORING



MP-34.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

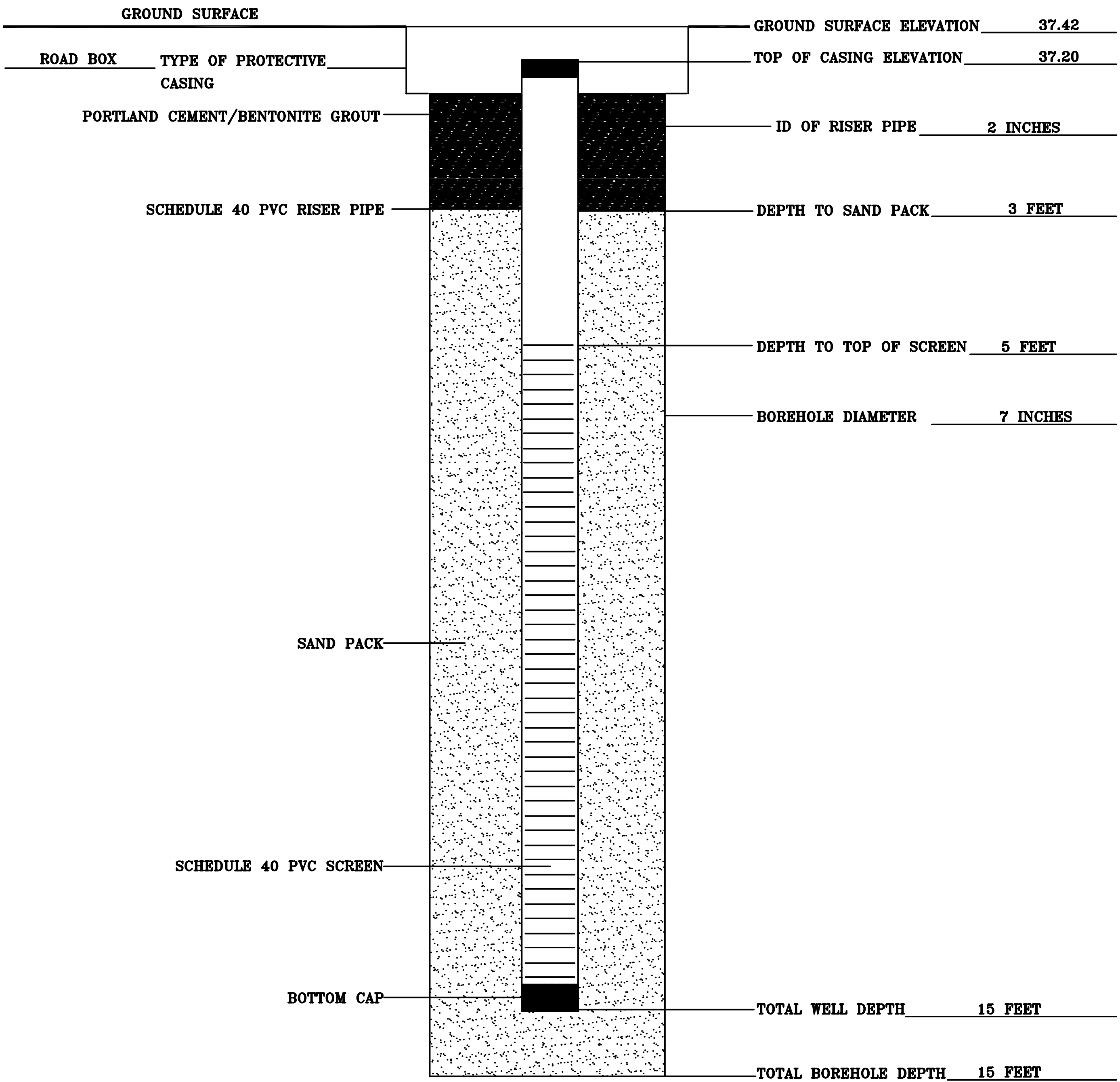
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: FEBRUARY 1, 2011

DRILLING COMPANY: ADT

WELL DESIGNATION: MP-35

WELL DESCRIPTION: GROUNDWATER MONITORING



MP-35.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

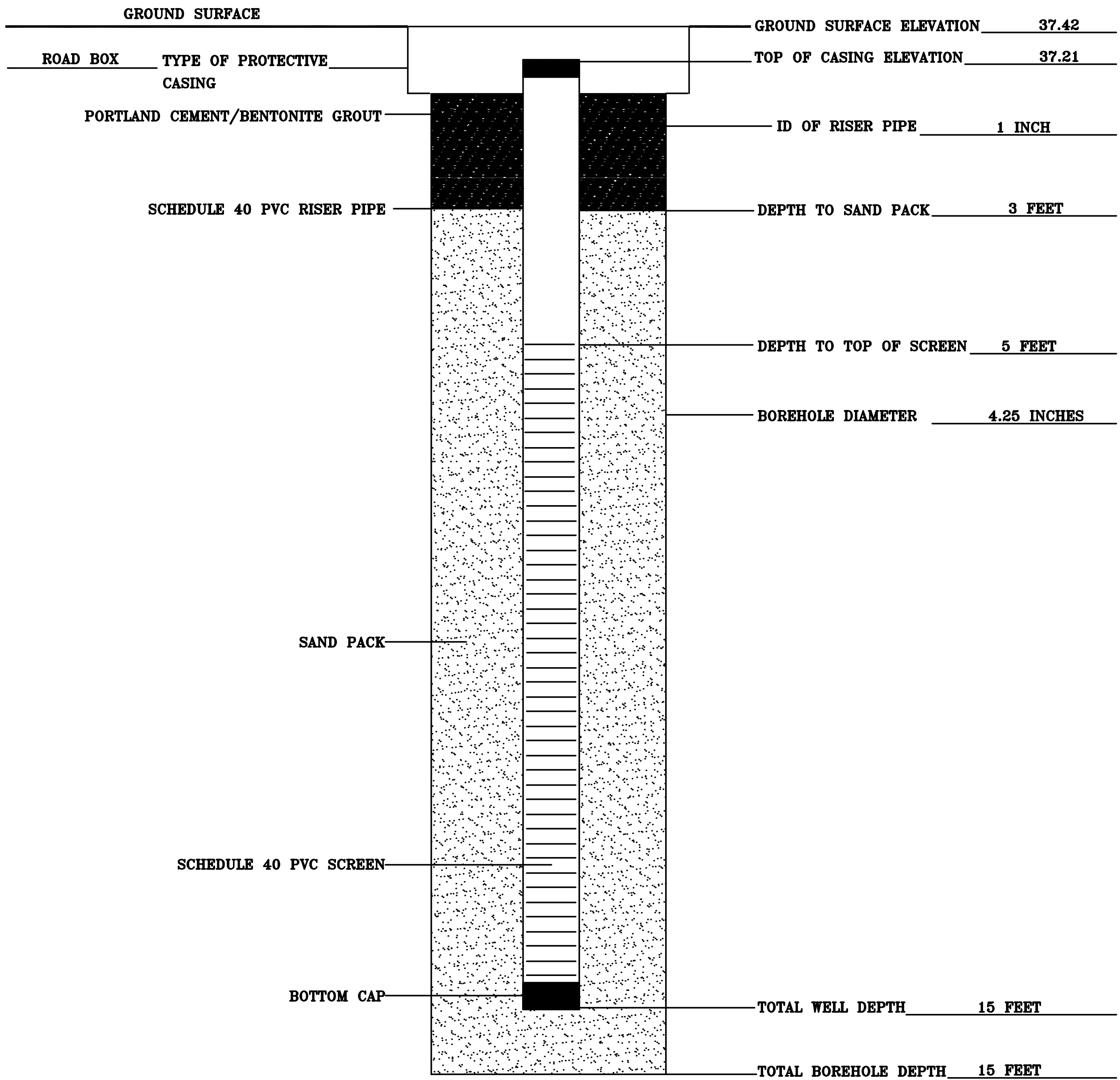
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: JULY 26, 2011

DRILLING COMPANY: ADT

WELL DESIGNATION: MP-36

WELL DESCRIPTION: GROUNDWATER MONITORING



MP-36.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

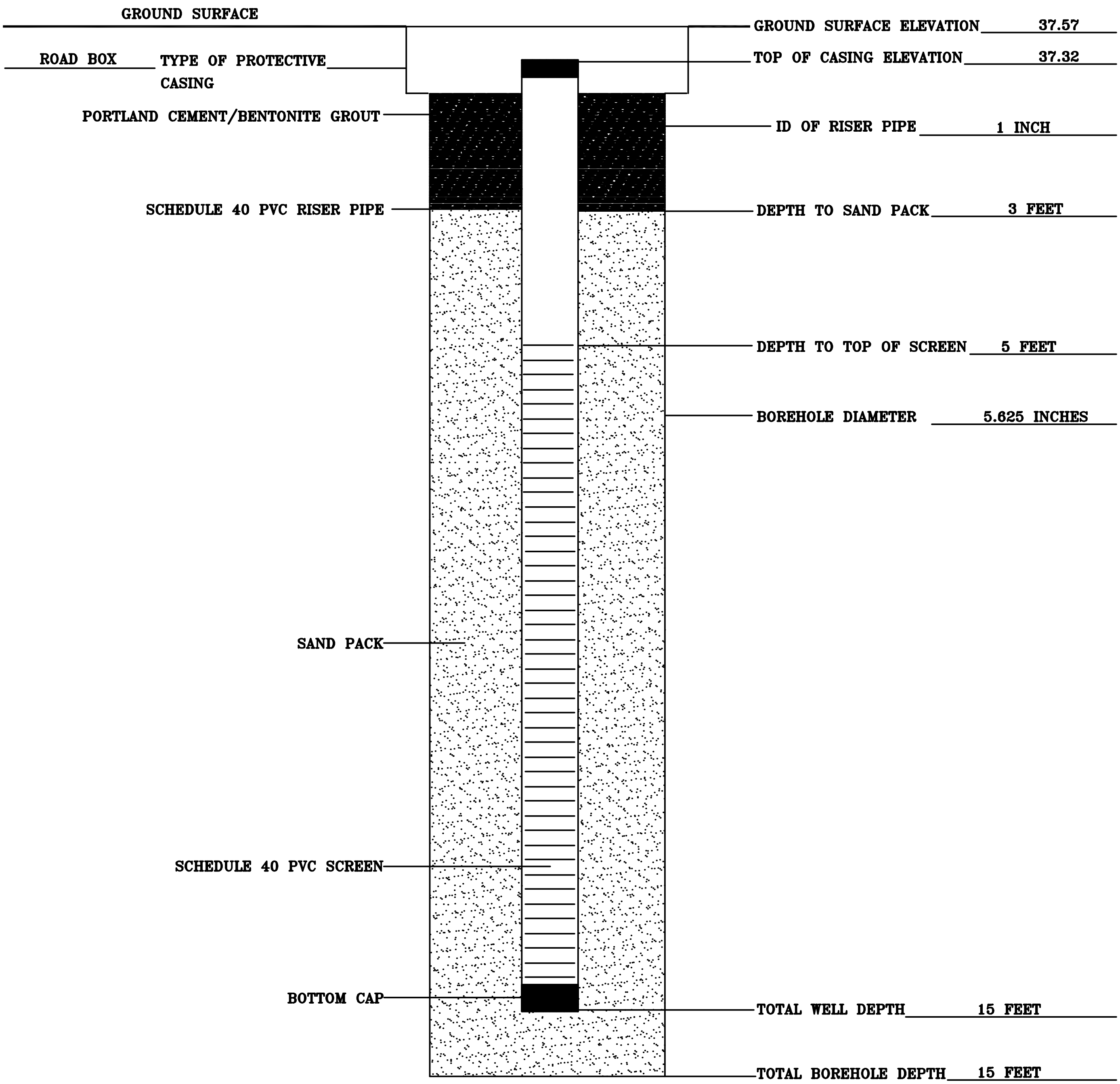
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

WELL DESIGNATION: MP-37

DATE OF INSTALLATION: JULY 27, 2011

WELL DESCRIPTION: GROUNDWATER MONITORING

DRILLING COMPANY: ADT



MP-37.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

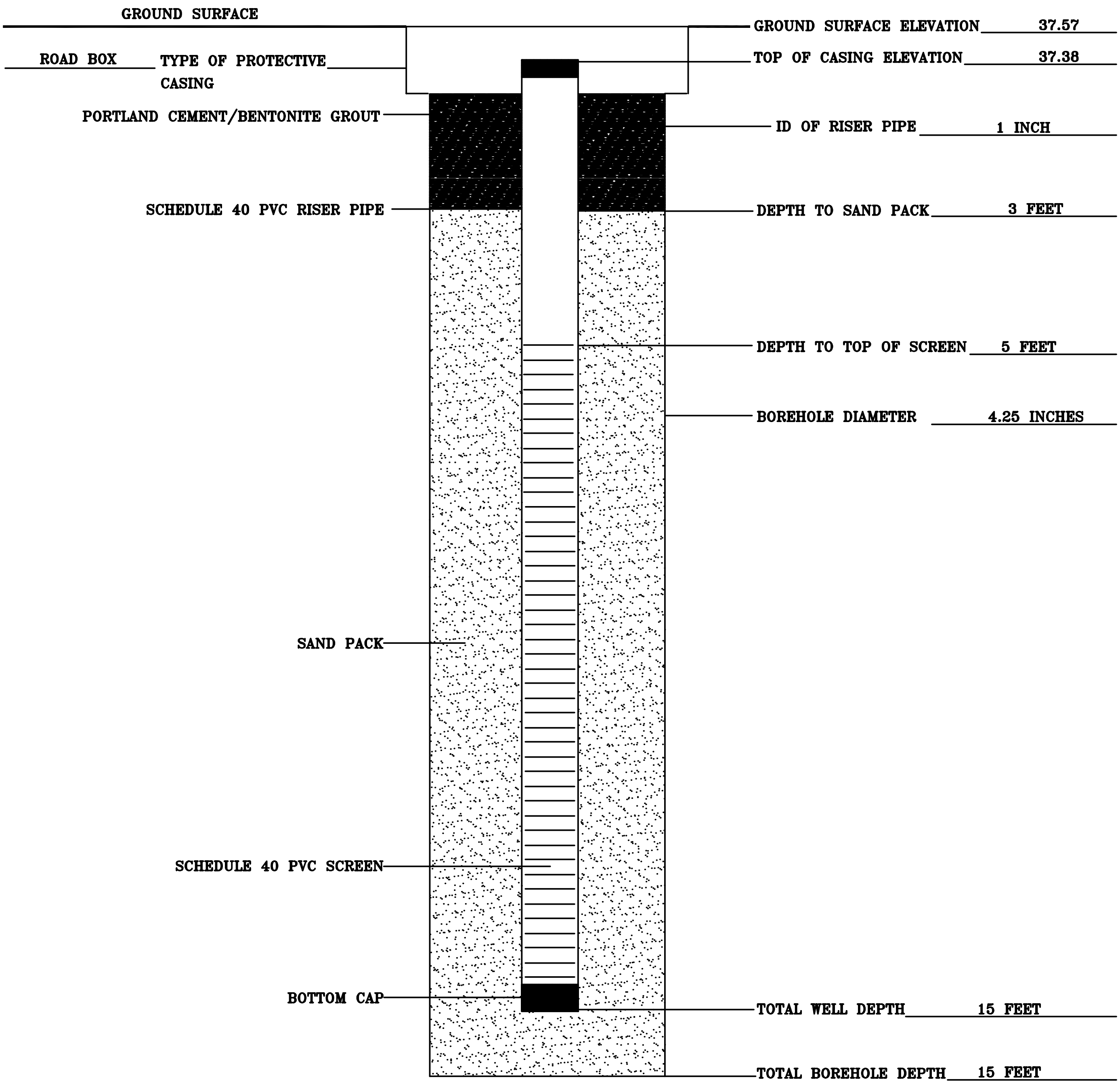
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: JULY 26, 2011

DRILLING COMPANY: ADT

WELL DESIGNATION: MP-38

WELL DESCRIPTION: GROUNDWATER MONITORING



MP-38.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

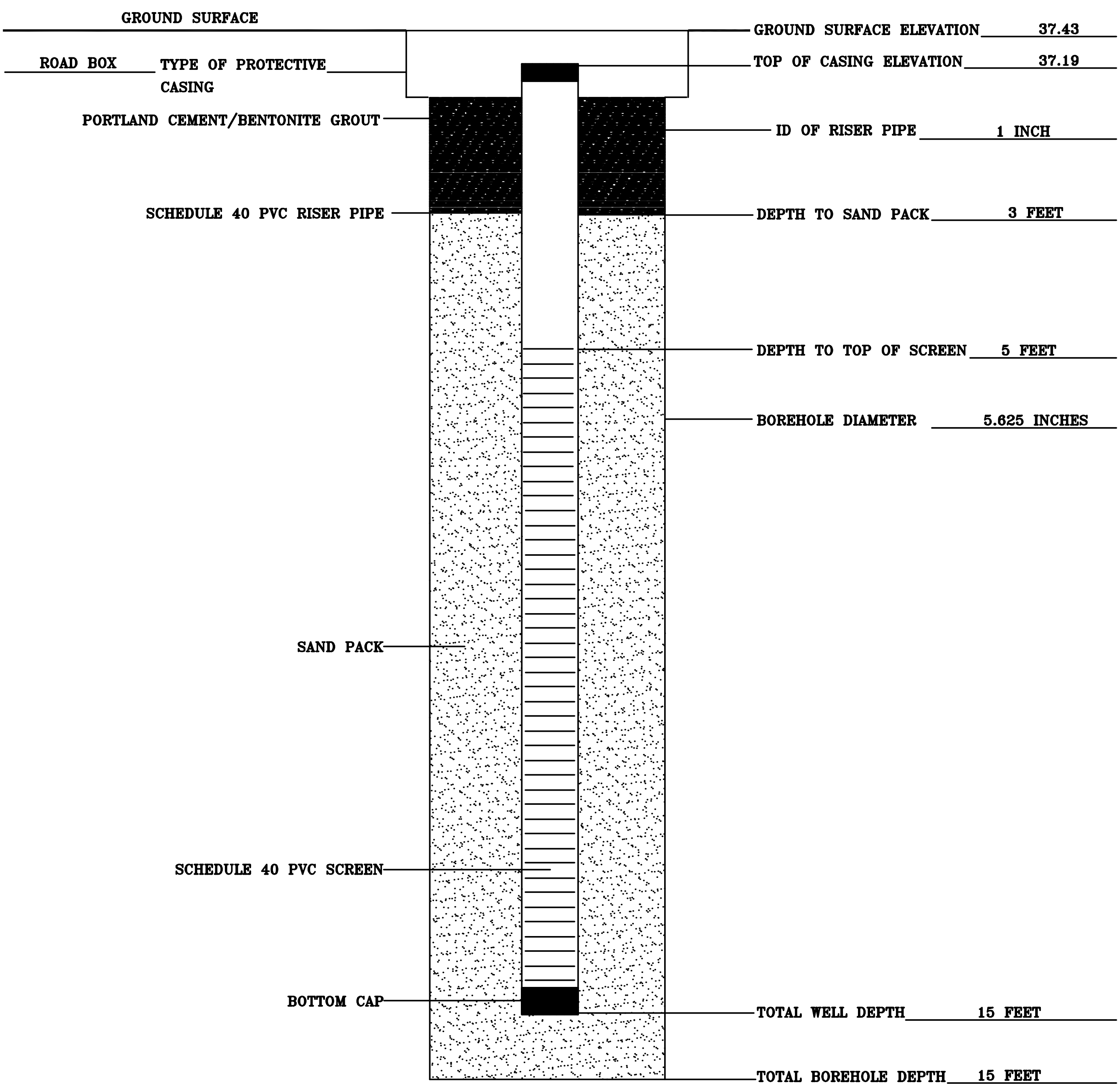
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

WELL DESIGNATION: MP-39

DATE OF INSTALLATION: JULY 27, 2011

WELL DESCRIPTION: GROUNDWATER MONITORING

DRILLING COMPANY: ADT



MP-39.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

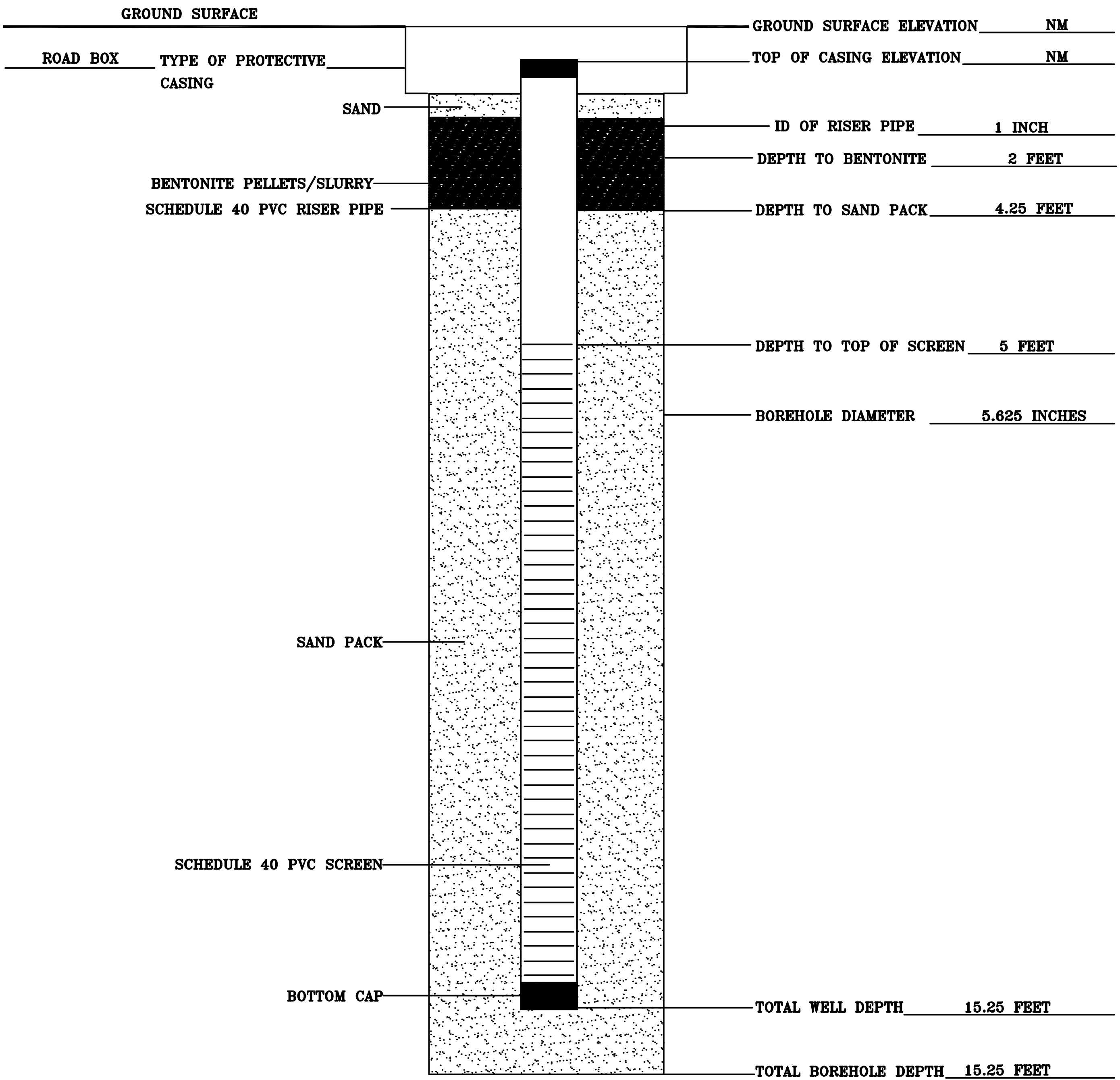
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: MAY 2, 2012

DRILLING COMPANY: ADT

WELL DESIGNATION: MP-40

WELL DESCRIPTION: GROUNDWATER MONITORING



MP-40.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

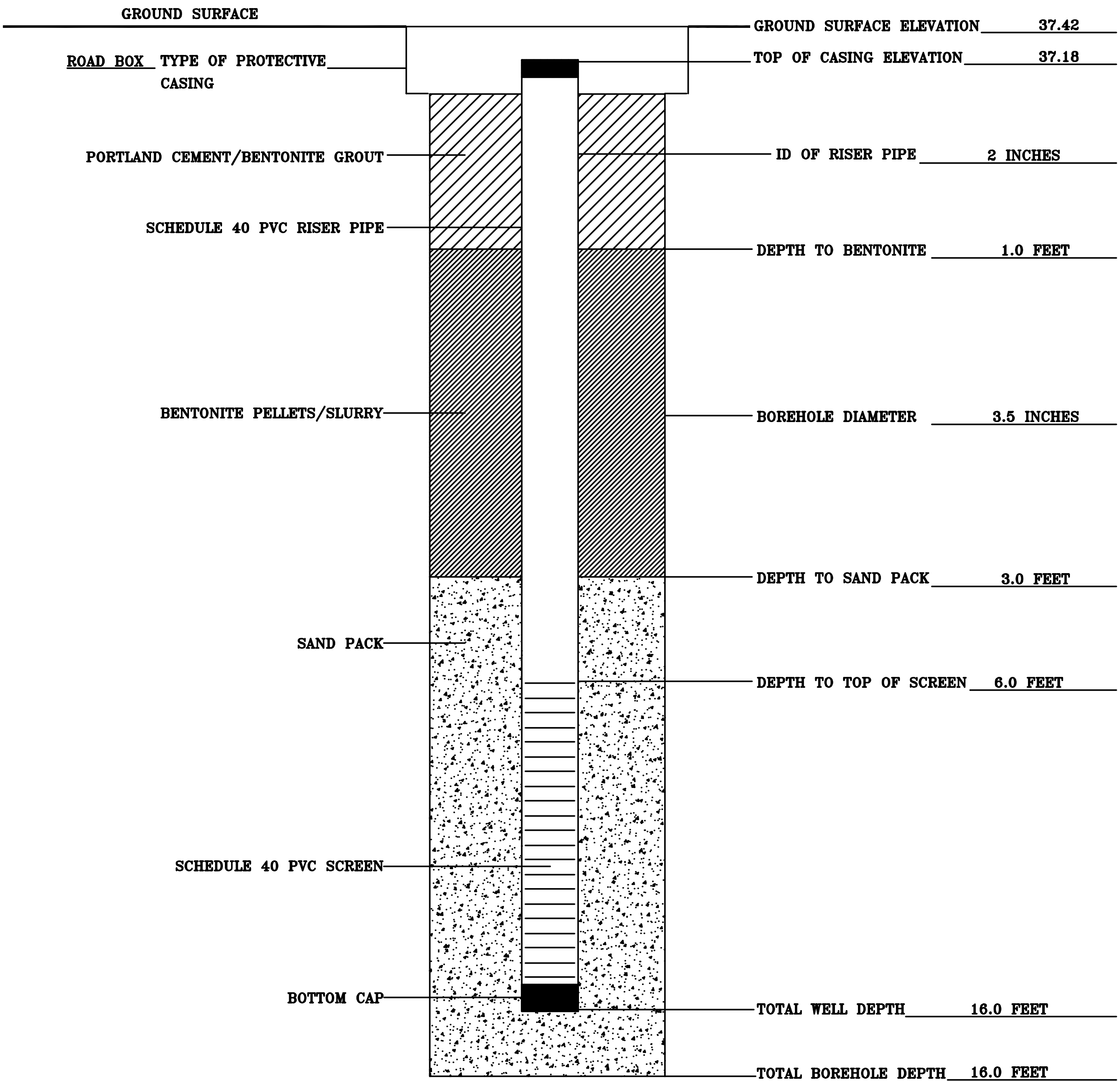
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: MAY 22, 2009

DRILLING COMPANY: ECSI

WELL DESIGNATION: IS-1

WELL DESCRIPTION: GROUNDWATER MONITORING/PILOT TESTING



IS-1.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

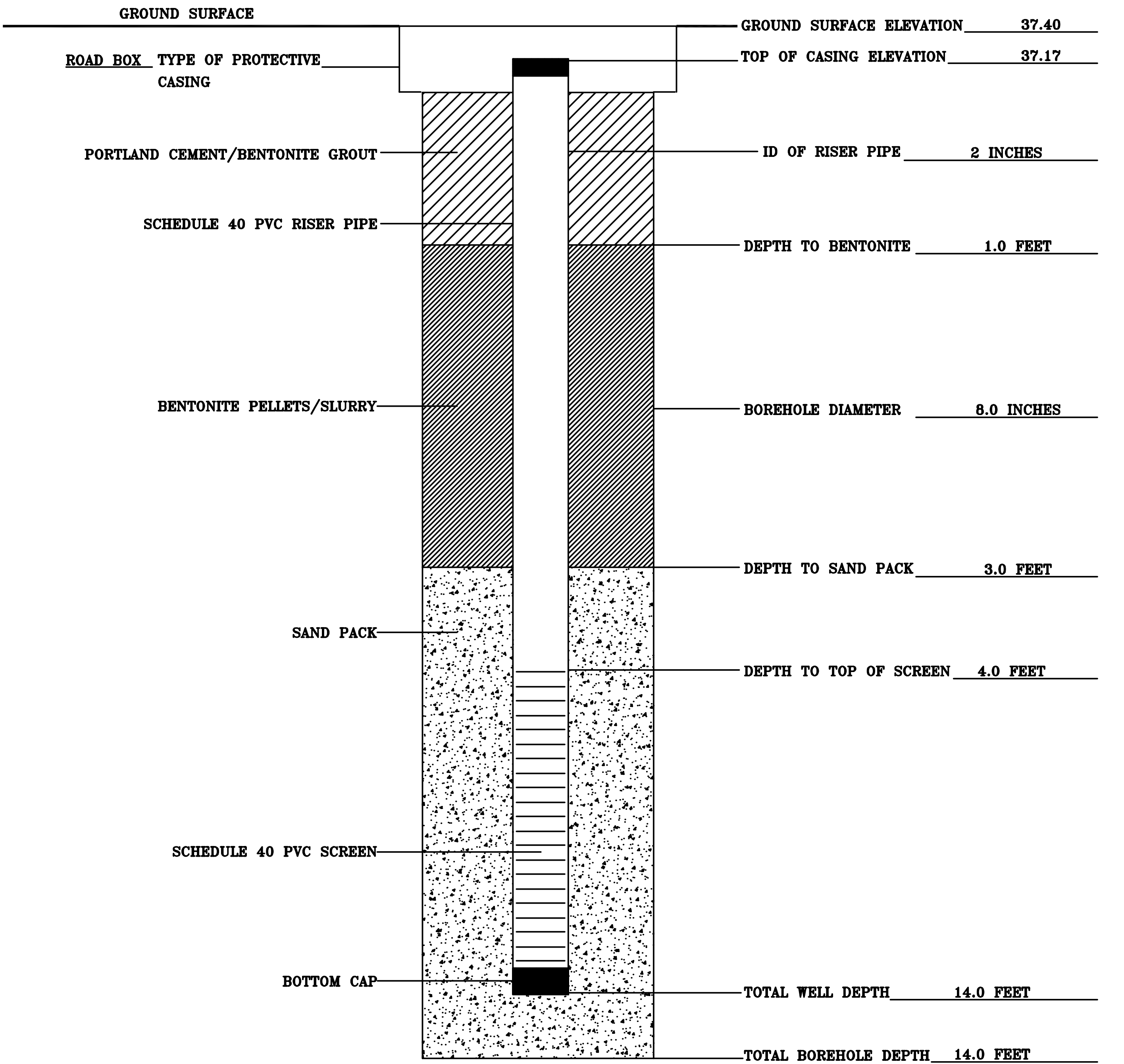
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: MAY 21, 2009

DRILLING COMPANY: ECSI

WELL DESIGNATION: IS-2

WELL DESCRIPTION: GROUNDWATER MONITORING/PILOT TESTING



IS-2.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

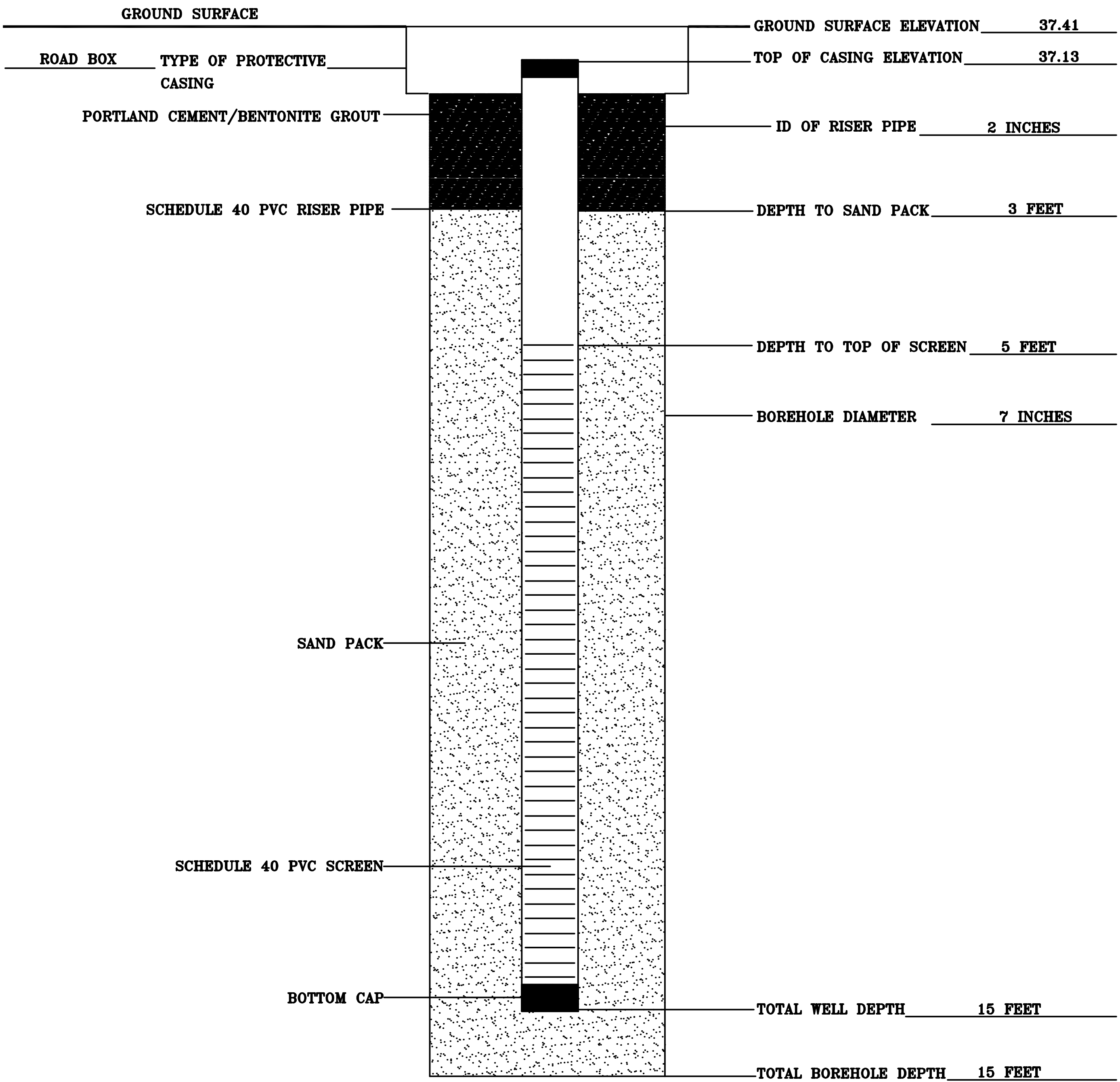
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

WELL DESIGNATION: MW-20

DATE OF INSTALLATION: FEBRUARY 2, 2011

WELL DESCRIPTION: GROUNDWATER MONITORING

DRILLING COMPANY: ADT



MW-20.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

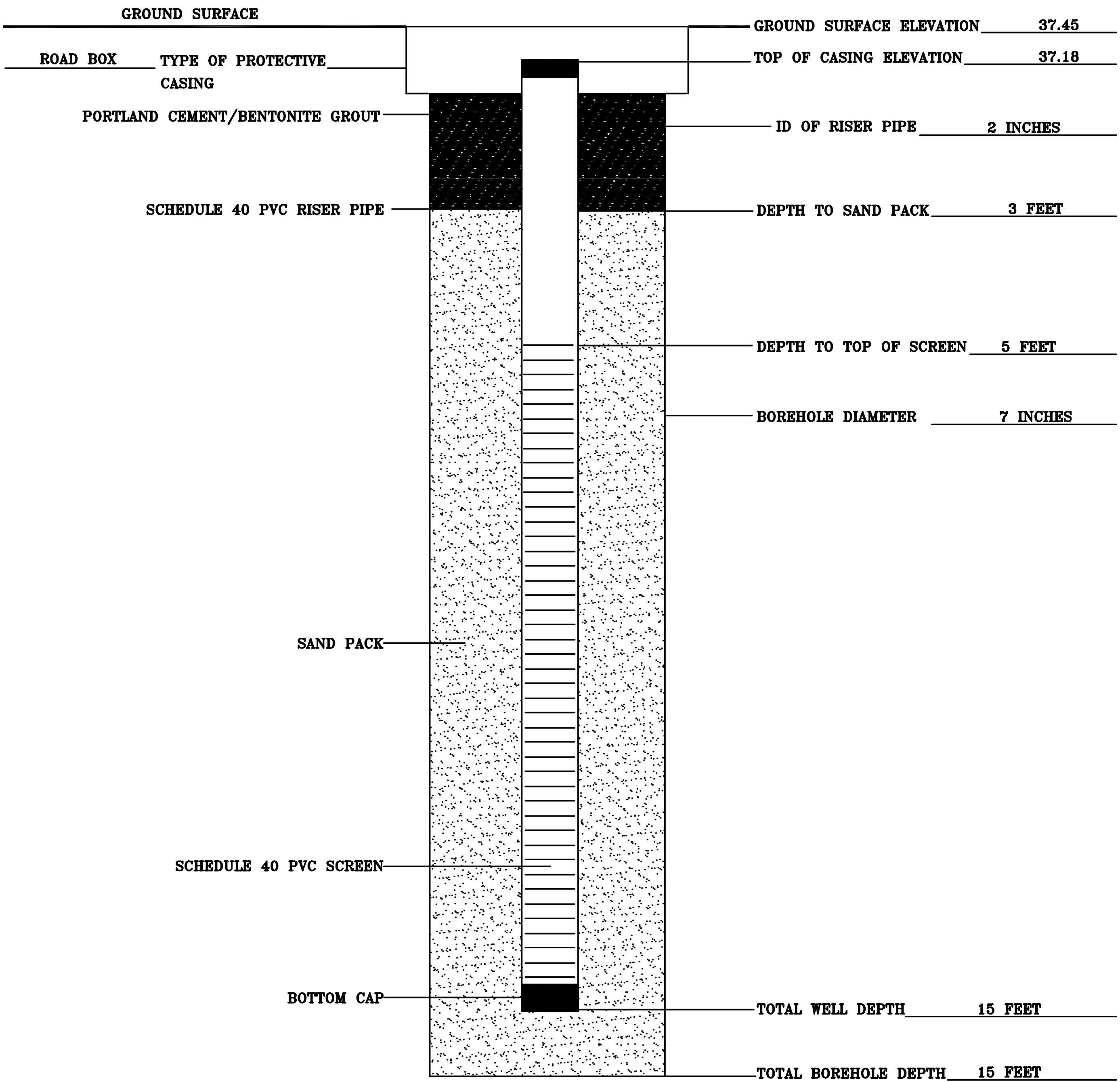
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

WELL DESIGNATION ________ MW-21

DATE OF INSTALLATION ________ FEBRUARY 1, 2011

DRILLING COMPANY ________ ADT

WELL DESCRIPTION ________ GROUNDWATER MONITORING



MW-21.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

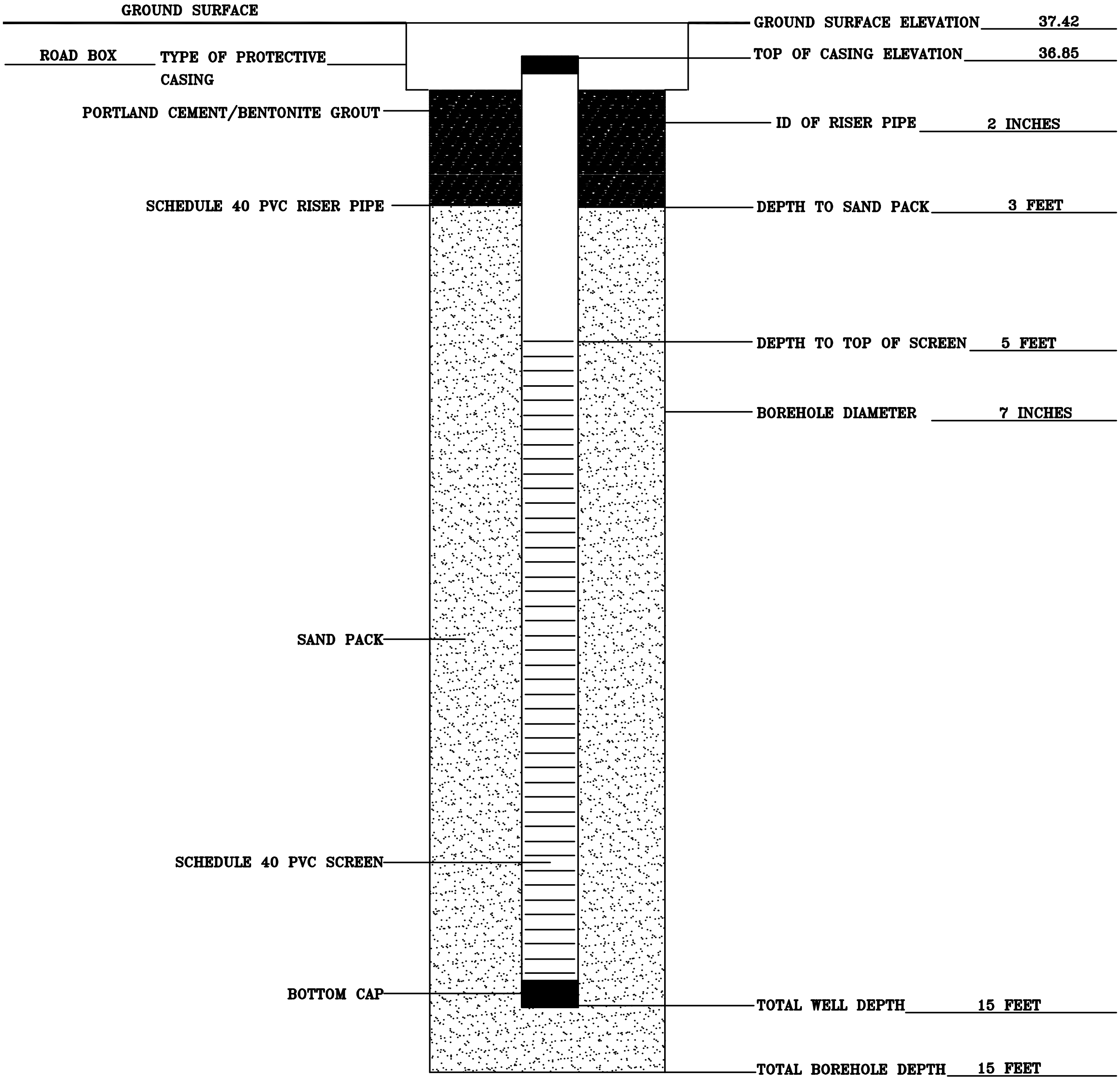
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION JANUARY 31, 2011

DRILLING COMPANY ADT

WELL DESIGNATION MW-22

WELL DESCRIPTION GROUNDWATER MONITORING



MW-22.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

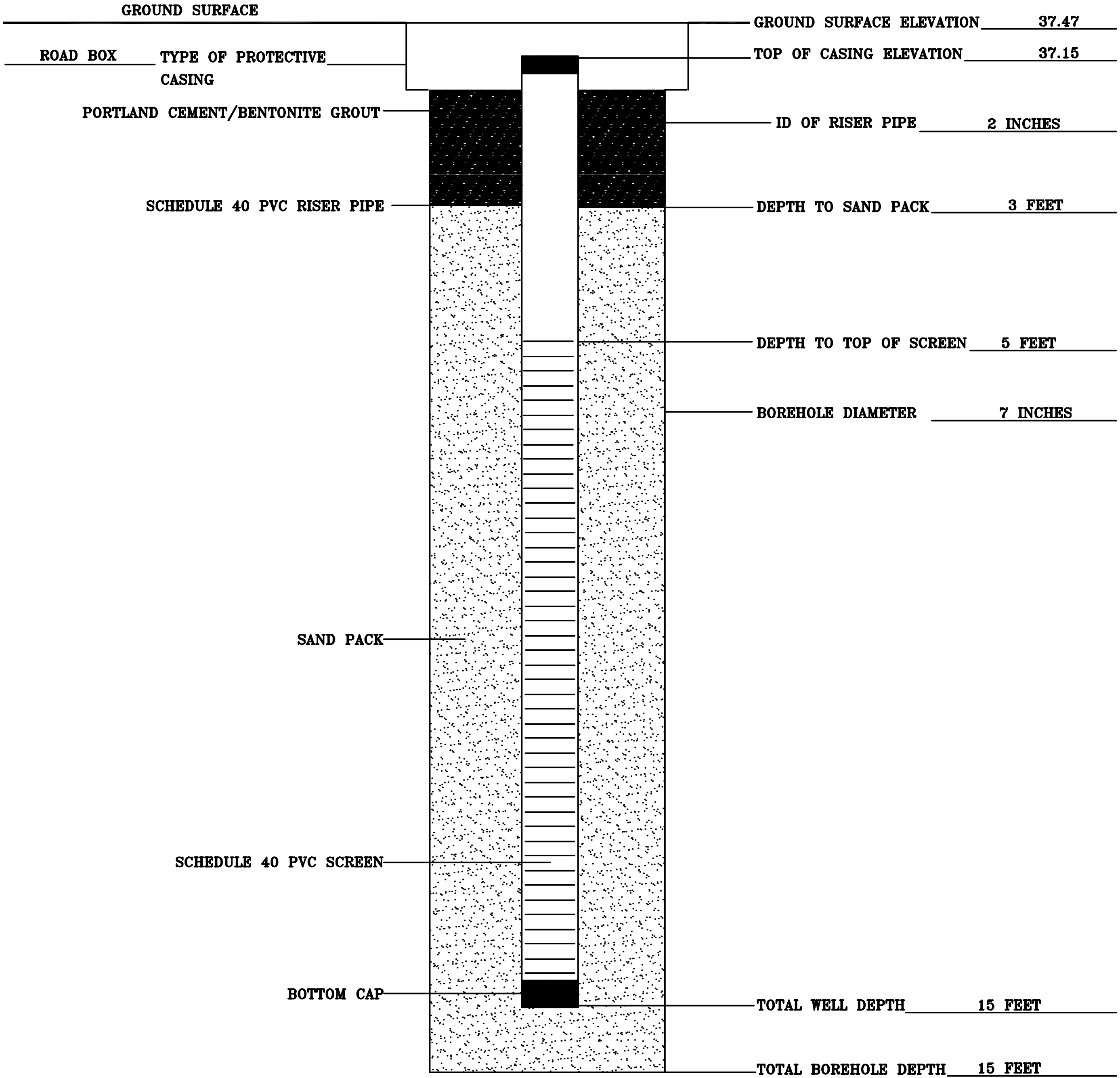
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

WELL DESIGNATION: MW-23

DATE OF INSTALLATION: FEBRUARY 3, 2011

WELL DESCRIPTION: GROUNDWATER MONITORING

DRILLING COMPANY: ADT



MW-23.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

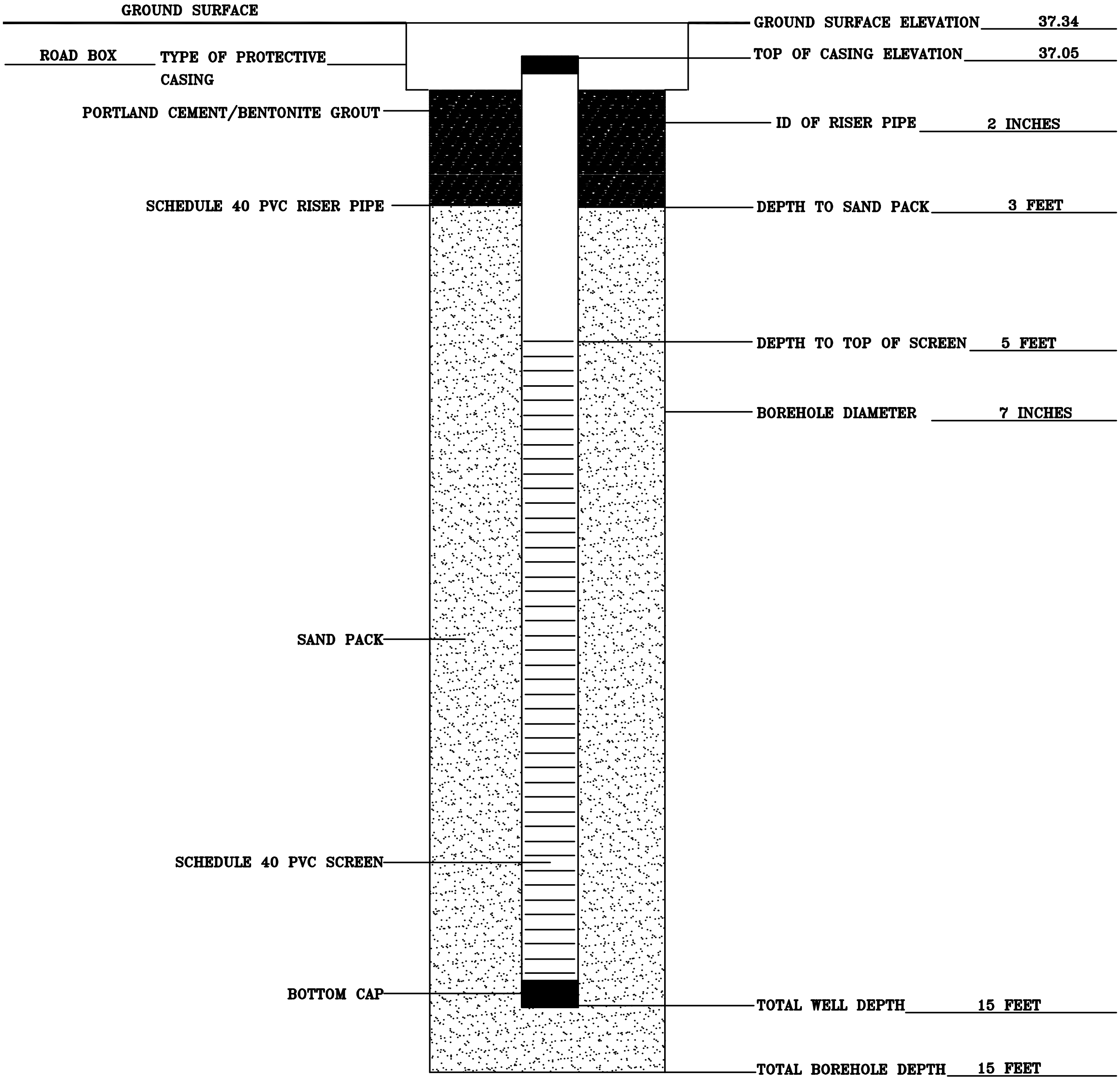
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION: FEBRUARY 2, 2011

DRILLING COMPANY: ADT

WELL DESIGNATION: MW-24

WELL DESCRIPTION: GROUNDWATER MONITORING



MW-24.DWG

MONITORING WELL CONSTRUCTION DIAGRAM

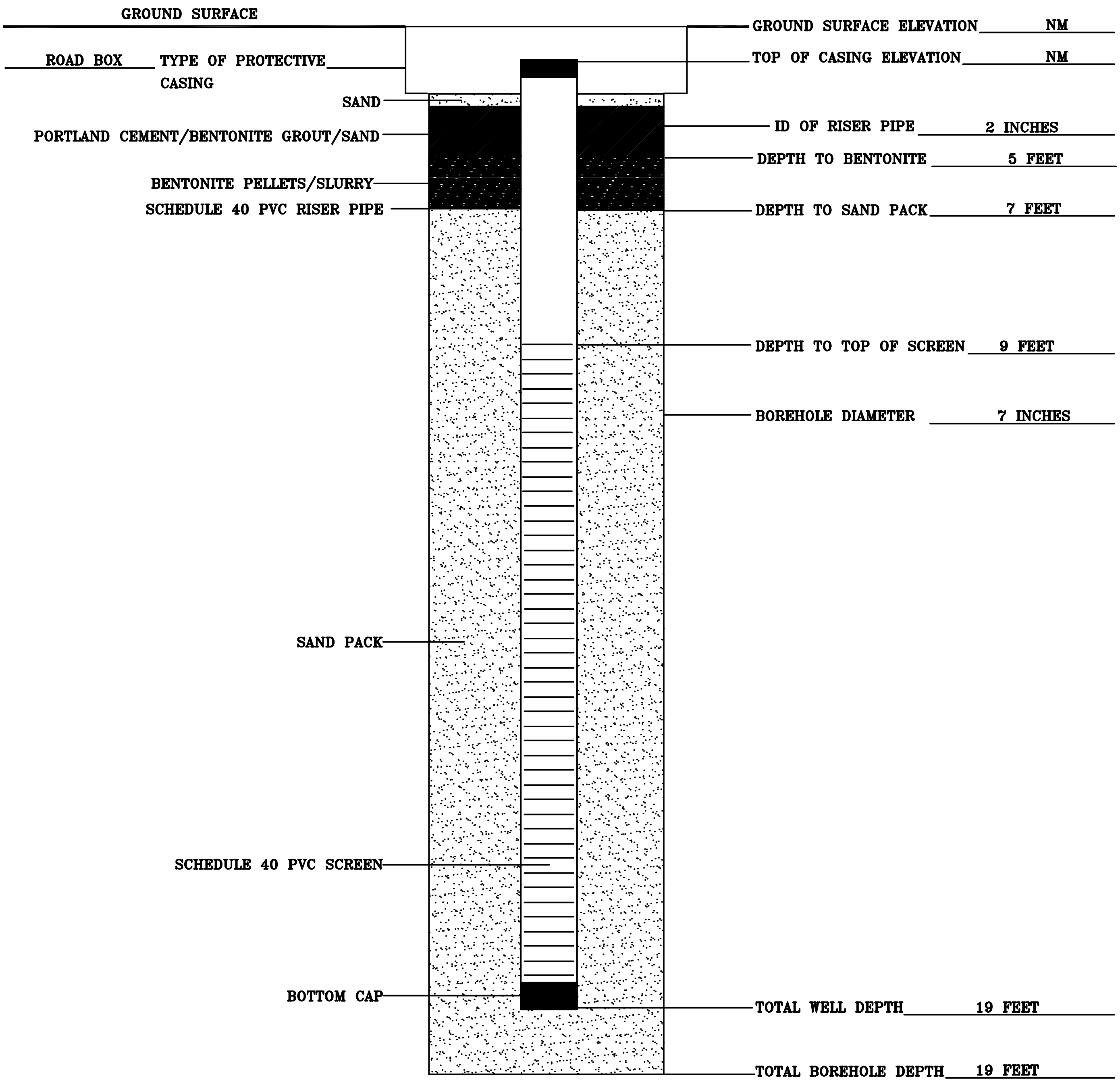
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET, NEW YORK

DATE OF INSTALLATION MAY 2 & 3, 2012

DRILLING COMPANY ADT

WELL DESIGNATION MW-37R

WELL DESCRIPTION GROUNDWATER MONITORING



MW-37R.DWG