SUPPLEMENTAL CORRECTIVE MEASURES STUDY (CMS)
PILOT TESTING WORKPLAN -
IN SITU CHEMICAL OXIDATION (ISCO)

Former Norton Company/Nashua Tape Products Facility
2600 Seventh Avenue
Watervliet, New York
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SECTION 1.0

INTRODUCTION

This workplan has been prepared to summarize activities proposed in association with Supplemental Corrective Measures Study (CMS) pilot testing at the former Norton Company (Norton)/Nashua Tape Products (Nashua) manufacturing facility located at 2600 Seventh Avenue, Watervliet, New York (see Site Location Map, Figure 1-1). A Site Layout Map is provided as Figure 1-2. Background information on the Former Norton/Nashua site was provided in the December 2007 RCRA Facility Investigation (RFI) Report submitted to the New York State Department of Environmental Conservation (NYSDEC) by Forensic Environmental Services, Inc. (FES) on behalf of Saint-Gobain Corporation (Saint-Gobain).

Toluene is the primary compound of concern (COC) at the Former Norton/Nashua site. The locations of current solid waste management units (SWMUs) and area of concerns (AOCs) at the Site are depicted on Figure 1-3.

Following the completion of initial pilot testing activities, which included enhanced fluid recovery (EFR) and in situ chemical oxidation (ISCO) as outlined in the December 2008 FES CMS Workplan, the NYSDEC, Saint-Gobain, and FES met in June 2010. At the meeting, all parties agreed that: 1) source removal would be conducted as a presumptive remedy in the Former Tank Farm Area SWMU; and 2) enhanced fluid recovery (EFR) appeared to be the most viable remedy for the Building Subslab AOC, but additional testing was required.

Following approval of the Source Removal Activities (SRA) Workplan, excavation activities were initiated in the Former Tank Farm Area SWMU in November 2010 and completed in July 2011. Following approval of the CMS Pilot Testing Extension Workplan, additional EFR pilot testing was conducted from May 2011 through June 2013, and a brief ISCO pilot test was conducted in the vicinity of well MW-27 in November 2012.

These activities results were summarized in the draft CMS Report submitted in July 2014. The CMS Report recommended long-term groundwater monitoring for remediation of the Off-Site AOC (see Figure 1-3), and EFR and ISCO, followed by long-term groundwater monitoring, for on-site remediation at the Former Norton/Nashua site.

The NYSDEC, the NYS Department of Health (NYSDOH), Saint-Gobain, and FES met in July 2015 to discuss the draft CMS Report recommendations. All parties agreed that there were significant issues associated with soil excavation such as access, possible damage to building integrity, and other logistical concerns, and effectiveness and cost.

However, the NYSDEC expressed concern regarding: 1) the ability of the recommended on-site remediation technologies (i.e., EFR and ISCO) to reach a proposed short-term toluene remedy performance goal (RPG) of 1,000 to 10,000 (micrograms per liter) µg/L, especially in "hot spot" areas (see below); and 2) the long time period of groundwater monitoring needed to reach the toluene Corrective Measures Target Concentration of 5 µg/L. Therefore, it was agreed that Saint-Gobain would conduct additional ISCO pilot testing to determine if this technology (in combination with subsequent EFR events) can reduce toluene concentrations in groundwater at the site to the RPG (and possibly, to concentrations less than the PRG, which would reduce the time required for long-term groundwater monitoring).

After the completion of the initial EFR pilot testing and subsequent interim EFR events (six events from June 2014 through August 2015), there are three areas at the Former Norton/Nashua site where dissolved toluene concentrations remain above proposed RPGs (see Figure 1-4 for locations): 1) along the northern building wall (near monitoring points MP-25, 26 & 27), where free-phase product (FPP) toluene was briefly detected in 2009; 2) monitoring point MP-37, located at the southern end of the former solvent lines, where FPP toluene was briefly detected in 2014; and 3) monitoring well MW-27, located in the northeast corner of the 2011 Former Tank Farm Area SWMU excavation.

The “hot spots” along the northern building wall and near well MP-37 are attributed to small pockets of residual toluene in the immediate vicinity of these areas because similarly elevated toluene concentrations are not present in other nearby wells. The “hot spot” at MW-27 is attributed to a small pocket of residual toluene near this well that could not be fully excavated due to the adjacent property fence and off-site railroad tracks (which are owned by the Canadian Pacific Railroad). The CMS Report indicated that toluene concentrations, which already exhibit decreasing trends at wells MP-37 & MW-27, would be expected to decline with time in these three areas (and additional EFR and/or ISCO treatments).

At the July 2015 meeting it was agreed that additional pilot testing will be conducted in two of the three recalcitrant areas: well MP-37 (an indoor location) & well MW-27 (an outdoor location). However, ISCO treatment near along the northern building wall will be deferred: 1) because simultaneous access to the adjacent indoor and outdoor areas would be difficult to coordinate with ongoing business warehousing activities at the facility; and 2) concurrent pilot testing at well MP-37 would disrupt business operations in two indoor areas of the facility.

ISCO was not previously pilot tested inside the facility (i.e., near well MP-37) due to: 1) the presence of a thick concrete slab that hampers the installation of injection points; 2) logistical issues related to ongoing business operations; 3) potential damage to warehouse inventory from indoor “daylighting” of oxidation fluids; and 4) vapor migration concerns. The proposed MP-37 ISCO pilot test will utilize five temporary borehole locations as injection points. The injection area will be limited to the immediate vicinity of well MP-37 to avoid disrupting warehouse operations. Using limited volumes/reduced concentrations of Fenton’s reagent during initial injections (see Section 4.0), and sodium persulfate as the final injection oxidant (and conducting EFRs after ISCO pilot testing), plus concurrent vapor intrusion monitoring (see Section 5.0) and warehouse venting, should mitigate oxidation reaction/vapor migration concerns.

As noted previously, a brief ISCO pilot test was conducted in the vicinity of well MW-27 in November 2012. Although there are some pilot testing restrictions in this area related to ongoing business operations (school bus parking), temporary injection points can be installed as needed, any "daylighting" oxidation fluids can be diluted and flushed with potable water, and there are no vapor intrusion concerns.

The first phase of work (summarized in Section 2.0 of this Workplan) will consist of the installation of the indoor injection points for use during ISCO pilot testing in the vicinity of well MP-37. Baseline groundwater samples will be collected during continuing interim EFR and groundwater monitoring events (see Section 3.0). The second phase of work will focus on ISCO pilot testing in the vicinity of wells MP-37 & well MW-27 as outlined in Section 4.0.

Supplemental vapor intrusion monitoring is discussed in Section 5.0, field decontamination procedures are reviewed in Section 6.0, Quality Assurance/Quality Control (QA/QC) measures are discussed in Section 7.0, and laboratory analyses are summarized in Section 8.0. The proposed supplemental workplan schedule is outlined in Section 9.0.

All field work will be performed in compliance with applicable OSHA regulations and the site-specific master Health and Safety Plan (HASP). The current HASP is provided as Appendix A. Subcontractors utilized during the proposed workplan activities will develop their own site-specific HASPs that, at a minimum, comply with conditions/protocol identified in the master HASP.

Following receipt of the analytical data from the proposed pilot testing program, Saint-Gobain will prepare appropriate data summary tables and figures, and schedule a meeting (or conference call) with the NYSDEC to discuss the pilot testing results. Based on those discussions, the NYSDEC will request that Saint-Gobain: 1) submit a revised CMS Report (or Supplement to the July 2014 CMS Report) within 60 days; 2) submit a Workplan for additional ISCO/EFR pilot testing; or 3) evaluate alternative remedies for the Former Norton/Nashua site.

SECTION 2.0

INSTALLATION OF ISCO INJECTION POINTS

Injection points are needed to provide the proper spatial array for ISCO pilot testing near target well MP-37. The only nearby existing well MW-37R, located 10 feet northwest of well MP-37 (see Figure 2-1), will be used for monitoring purposes. ISCO fluids for pilot testing near well MW-27 will be injected using temporary Geoprobe points as depicted on Figure 2-1.

2.1 Proposed Injection Borehole Locations

Proposed injection point locations are depicted on Figure 2-1. Each of the five boreholes is located approximately 15 feet from MP-37; however, the locations are biased toward the east and the former solvent lines, which may be the source for the dissolved toluene detected at well MP-37. (Dissolved toluene concentrations are significantly lower at well MW-37R, which is located to the west.)

Final injection borehole numbers and locations may be adjusted after further consultation with the proposed ISCO pilot testing contractor (see Section 4.0). Final drilling locations will also be coordinated with Stone Management (Stone), the current property owner and warehousing business operator at the Former Norton/Nashua facility. Borehole locations may be shifted slightly in the field to address various access and business operational issues without significantly affecting pilot testing requirements. The NYSDEC will be notified of the potential elimination of any boreholes or borehole relocations greater than 15 to 20 feet.

Also, if significant residual toluene impact (see Section 2.2) is detected during the installation of any injection boreholes (which may subsequently be converted into permanent monitoring points; see Section 2.3), additional ISCO pilot testing boreholes may be installed to expand the treatment zone to fully encompass the area of significant residual toluene impact.

2.2 Installation of ISCO Injection Boreholes

To provide greater access flexibility, a smaller Geoprobe drilling rig was previously used to install borings at the Former Norton/Nashua facility, but the presence of one or more subfloors and subsurface debris (i.e., bricks and cobbles) frequently interfered with borehole advancement. Therefore, the ISCO pilot testing boreholes will be installed via a larger Geoprobe rig or hollow-stem auger (HSA) rig as needed. The boreholes will be installed in advance of ISCO pilot testing to "pre-clear" each proposed injection location, so there are no field delays during the actual injection point installation (which will be immediately followed by the ISCO injections).

Additional soil characterization in the Beneath Buildings AOC is unnecessary because: 1) extensive soil characterization was performed in this AOC during previous RFI activities as documented in the December 2007 RFI Report; and 2) remedial actions under consideration for this AOC are limited to groundwater (vs. soil) treatment technologies. Therefore, soil samples will not be collected for laboratory analysis during the installation of the injection boreholes in the Beneath Buildings AOC.

Proposed borings will initially be installed to just above the water table, which is currently at a depth of approximately 9 feet. (Actual injection depths will extend deeper; see Section 4.0.) Recovered soil cuttings will be screened with a photoionization detector (PID).

Based on previous PID field screening at the Former Norton/Nashua site (see the December 2007 RFI Report), soils that field screen less than 100 parts per million by volume (ppmv) should meet target soil cleanup concentrations and will be set aside for possible reuse (see below), but soils that field screen 100 ppmv or greater may exceed target soil cleanup concentrations and will be containerized for proper disposal. If significant vadose zone impact is noted (i.e., indications of residual FPP toluene), the need to install an additional injection borehole approximately 10-15 feet more distal from well MP-37 will be evaluated.

After the target depth has been reached (based on previous drilling activities beneath the facility buildings, there should be no major obstructions at depths of nine feet or more), the bottom two to three feet (or more if shallower impact to soil is detected) of the borehole will be backfilled with recovered soil cuttings (and/or clean fine sand) and grouted to surface with hydrated bentonite. A safety cone will be placed over the sealed borehole.

Temporary boreholes (vs. permanent wells) are proposed for pilot testing because this allows the injection location to be "pre-cleared" for later use without restricting the subsequent ISCO injections to a specific depth. If permanent injection wells were installed, subsequent injections would be restricted to the screened interval of the wells. (Also, permanent injection wells would require the use of stainless steel casing and screen to prevent potential damage by the ISCO fluids.)

When the borehole is ready for injection, a Geoprobe rig can advance the injection tool through the bentonite grout and access multiple injections depths (see Section 4.0) within the native soil (up to two to three feet above the water table and five or more feet below the water table). Also, after the current round of injections is completed, the borehole can be resealed with bentonite and used for subsequent rounds of ISCO injections, if needed.

During all drilling activities, ambient air conditions will be screened with a PID in accordance with procedures in the site-specific HASP and the May 2005 Quality Assurance Project Plan (QAPP). The PID, equipped with an 11.6 eV lamp (MiniRae2000 or equivalent), will be calibrated twice-daily or after any two-hour break.

After the completion of each borehole (and prior to leaving the site), all equipment that has been exposed to site soils or groundwater will be decontaminated utilizing an Alconox wash and tap water rinse. The handling and disposal of liquids generated during the decontamination process is discussed in Section 7.0. All remaining soil cuttings will be staged for proper off-site disposal.

2.3 Installation of Contingent Monitoring Wells

As discussed elsewhere in Section 2.0, if significant residual toluene impact (i.e., indications of residual FPP toluene) is detected during the installation of any pre-clear injection boreholes, a contingent monitoring well/point may be installed for later use as an EFR extraction well or supplemental groundwater monitoring point. Also, depending upon the results obtained during the ISCO pilot testing, one or more former injection boreholes may be converted to monitoring wells/points for later use as EFR extraction wells or supplemental groundwater monitoring points. (Note: During the July 2015 meeting, the potential use of "vent" wells at the Former Norton/Nashua site was discussed. Based on soil vapor readings collected prior to EFR events, all PID readings at non-extraction wells were less than 100 ppmv. Therefore, it would be unlikely that vent wells in these areas would result in significant mass removal and no supplemental vent wells are proposed at this time.)

Contingent monitoring wells/points will be installed via a Geoprobe rig converted to advance hollow stem augers or standard HSA methods to approximately 10 feet below the water table (or to bedrock refusal). Total well depths are anticipated to range from 15 to 20 feet.

Any contingent wells will be constructed of 10 feet of Schedule 40 PVC well screen (0.010 inch slot) installed across the water table (approximate depth 8 to 10 feet) to allow for seasonal fluctuations, and completed with solid Schedule 40 PVC well riser to the surface. The final diameter of the well will be determined by its intended purpose: 4-inch (vent well), 2-inch (EFR extraction well), or 1-inch (monitoring only).

Clean silica sand (#1 or #2) will be used to fill the well annulus to at least one foot above the top of the screened interval. A one to two-foot thick bentonite seal will be installed above the gravel pack to prevent surface infiltration, and the remaining well annulus will be grouted to surface.

Alternatively, Geoprobe “pre-pack” well and filter kits constructed of one-inch diameter Schedule 40 PVC riser and screen (10 feet 0.010-inch slot size), bottom plug, and sand pack may be installed in the boreholes. Pre-packs will be sealed with one to two feet of bentonite, and then grouted to the surface.

Each groundwater monitoring well/point will be completed with a bolt-down, flush-mounted vault anchored by a concrete skirt (or cemented into the surrounding building slab), and equipped with a locking gripper-plug to prevent unauthorized access. Following installation, each well/point will be properly developed by surging and pumping to remove fine-grained sediments from the sand pack and screen, and surveyed to existing site benchmark elevations. Well development water will be staged and processed in a similar manner as other purge water (see Section 3.7). Any recovered soils will be temporarily stored in 55-gallon drums prior to characterization and proper disposal.

SECTION 3.0

GROUNDWATER MONITORING AND OTHER INTERIM ACTIVITIES

Baseline groundwater samples will be collected from proposed Supplemental CMS pilot test wells MP-37 & MW-27 during a prior interim EFR event (see Section 3.6). Post-ISCO pilot test groundwater samples will be collected from these wells during a subsequent interim EFR event scheduled at least two weeks after the completion of the ISCO pilot test injections.

During Supplemental CMS pilot testing, and the CMS internal review and public comment period, the on-site and off-site groundwater monitoring programs will continue at the Former Norton/Nashua site, as outlined in the November 2010 CMS Workplan – Pilot Testing Extension (on-site sampling) and the December 2010 SRA Workplan (off-site sampling) as modified and summarized below. Per direction of the NYSDEC, EFR events will also continue during this interim period. Additional details are provided below.

3.1 Groundwater Sample Collection

Monitoring points/wells will be sampled via the micropurge sampling method (additional details are available in the 1996 USEPA reference documents). 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 slightly above the middle of the saturated portion of the screened interval of each well. Water quality indicator parameters: temperature, pH, specific conductivity, oxidation-reduction potential (ORP), dissolved oxygen (DO), and turbidity will be monitored during purging with a continuous “flow-through” cell device (YSI-600XL).

Purge water 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 millivolts (mVs), DO ± 10%, and turbidity ± 10% or less than 10 nephelometric turbidity units (NTUs). 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 in a manner that minimizes turbulence in the samples. Groundwater samples will be collected in appropriate laboratory bottleware (see Table 3-1), properly labeled, logged on a chain-of-custody form, and maintained at 4°C until laboratory receipt via courier or overnight delivery.

3.2 Groundwater Sample Analyses

Groundwater samples will be analyzed for VOCs via EPA Method 8260 plus heptane. Relevant sampling protocol is summarized in Table 3-1. All analyses will include Category B laboratory deliverables.

3.3 Interim On-Site Groundwater Monitoring Program

A semi-annual on-site sampling event was recently completed in August 2015. The following monitoring wells/points were sampled (see Figure 3-1 for sample locations): 1) the six wells where toluene concentrations exceeded 10,000 µg/L in 2014-15 (Note: these wells were also utilized as interim EFR extraction wells; see Section 3-6): MW-22, MW-27, MP-25, MP-26, MP-27 & MP-37; and 2) "sentinel" wells MW-12 & MW-15R.

Groundwater sampling will continue at interim EFR wells (see Section 3.6); semi-annual interim sampling will continue at the two sentinel wells. In additional, post-ISCO pilot test sampling will be conducted at wells MW-24, MP-29 & MP-39 (see Figure 3-1) to monitor groundwater conditions downgradient from interim EFR extraction well MP-25.

Interim groundwater monitoring will be conducted at least annually at locations where the toluene concentration exceeds 10,000 µg/L (i.e., above the proposed RPG). However, because these locations are also interim EFR wells, sampling will actually be more frequent (see Section 3-6). 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.

3.4 Interim Off-Site Groundwater Monitoring Program

A semi-annual off-site sampling event was recently completed in August 2015 at the following seven off-site monitoring wells/points: MW-18, MW-19, MP-6, MP-14, MP-17, MP-19 & MP-22 (see Figure 3-2 for sampling locations). Interim monitoring of the seven off-site wells will continue to be conducted on a semi-annual basis unless one of the contingencies discussed below is triggered.

If toluene concentrations at any off-site well are above the NYS groundwater standard (i.e., 5 µg/L), the well will be monitored quarterly until sampling confirms concentrations are less than groundwater standard. 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 well will be monitored on a quarterly basis for at least one year.

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

3.5 Groundwater Biosupplementation

CMS biochemical nutrient analysis and supplementation (see the draft July 0214 CMS Report) 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 milligrams per liter (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 (see next section), 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 3-1). After the field measurements are completed, nitrate and/or phosphate solutions will be added to selected monitoring wells exhibiting nitrate concentrations less than 1 part per million (ppm) or phosphate concentrations less than 0.5 ppm.

3.6 Interim EFR Events

At a February 20, 2014 meeting attended by the NYSDEC, FES, and Korlipara Engineering (Korlipara), it was agreed that EFR events would be conducted at the Former Norton/Nashua site on an interim basis until the Statement of Basis is finalized. Interim EFR events will be conducted approximately every 75 days at all on-site wells exhibiting toluene concentrations exceeding 10,000 µg/L. Based on 2014-2015 sampling results, six locations meet this condition: MW-22, MW-27, MP-25, MP-26, MP-27 & MP-37. If toluene concentrations at a specific well decrease 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 Section 3.2) from the EFR extraction wells utilized during the previous event. PID readings and liquid level measurements will be obtained from each EFR extraction well before inserting a vacuum truck "stinger" (drop tube) into the well to begin removing fluids. Applied vacuum readings will be obtained via truck gauge.

Fluid removal will continue via stinger 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 EFR extraction well to apply vacuum to the entire well. Previous EFR pilot testing indicates this is the most effective method of vapor and fluid recovery at most wells. Applied vacuum readings will be obtained via truck gauge.

Whole well vacuum will continue at each EFR 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 EFR 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 EFR 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 3.7).

3.7 Purge Water Disposal

Purge water from: 1) groundwater sampling conducted in conjunction with CMS pilot testing and interim monitoring; and 2) interim EFR events will be temporarily containerized in 55-gallon drums. Drums will be stored at an approved on-site staging location pending fluid removal for proper off-site disposal (via vacuum truck in association with interim EFR events; see previous section).

SECTION 4.0

ISCO PILOT TESTING

ISCO technology utilizes injection points to introduce chemicals to the subsurface to oxidize (mineralize) target compounds. For some oxidants, such as hydrogen peroxide, the destruction of hydrocarbons (i.e., toluene) occurs rapidly (instantaneously) after the introduction of a catalyst, due to the fact the hydroxyl radical is not stable (short-lived) in the subsurface. However, oxidants will also react with naturally occurring hydrocarbons, which may deplete the oxidant mass before the target COCs are fully destroyed. For this reason, multiple ISCO applications are sometimes necessary.

In-Situ Oxidative Technologies, Inc. (ISOTEC) of West Windsor, New Jersey has served as the ISCO vendor for the Former Norton/Nashua site. ISOTEC is currently reviewing site conditions in the proposed ISCO pilot testing areas.

Based on previous work at the site, ISOTEC is recommending the use of a 15-foot radius of influence (ROI) for placement of ISCO injection points (see Figure 2-1). ISCO fluids for pilot testing near well MW-27 will be injected using temporary Geoprobe points. ISCO fluids for pilot testing near well MP-37 will be injected via temporary Geoprobe points installed in the boreholes (see Section 2.0) near the target well.

Based on previous site-specific chemical data, ISOTEC recommends a combination of Fenton's reagent chemistry, which utilizes hydrogen peroxide as the source of the hydroxyl radical and dissolved iron as the catalyst in a rapid (instantaneous) reaction, and sodium persulfate, which is much slower oxidizer and provides longer term treatment, for both target areas. Fenton's reagent will be injected during the first day of chem-ox pilot testing at each location followed by persulfate injections two days later.

Although ISOTEC does not anticipate any significant problems, ISOTEC will take extra safety precautions during ISCO injections inside the facility building. For example, the reagent and/or catalyst injection rates, and the reagent concentrations may be reduced as necessary to control the reaction rate. Hydrogen peroxide can be added to the subsurface in solutions ranging from five to fifteen percent; however, the concentration of the catalysts and the hydrogen peroxide can be adjusted to control the intensity (but not the rate) of the reaction.

During the previous round of CMS ISCO pilot testing there was significant mass destruction, but there was no significant mobilization/migration of residual mass. During the proposed ISCO pilot testing, similar monitoring will be performed to confirm there is no significant mobilization/migration of residual mass.

4.1 ISCO Pilot Test - First Day of Testing

Pilot testing will be alternated daily between the two target areas. This should allow the injection of larger volumes of oxidants in each area without backflow or breakthrough to the surface ("daylighting") due to oversaturation. Any daylighting fluids will be promptly diluted with potable water (and vacuumed from indoor areas), and injection rates or oxidant concentrations will be adjusted as necessary (see below).

Although no adverse vapor migration effects were noted in the main building during previous CMS ISCO pilot testing conducted in adjacent outdoor areas, prior to the start of ISCO injections, each monitoring point (see Figure 2-1) will be fitted with a pressure gauge. The following data will be recorded via field meter/gauge or field chemical kit:

- liquid levels
- dissolved oxygen, peroxide, and carbon dioxide concentrations
- pH, temperature, specific conductivity and turbidity
- head space concentration readings (PID, LEL, O_2, CO_2)
- pressure

A geoprobe drilling rig will be used to install temporary ISCO injection points to a maximum depth of 15 feet. The depth of the injection screen (approximately five feet in length) will be adjusted from shallow (7 to 12 feet deep) to deep (10 to 15 feet) at alternating borings to provide coverage across the entire target injection interval of 7 to 15 feet.

The mobile injection trailer used by ISOTEC allows preparation of 500-gallon batches of reagent. Based on previous CMS ISOC pilot testing, the initial hydrogen peroxide concentration for outdoor injections will be 12.5% in water, but the initial indoor ISCO injection will use relatively low concentrations of hydrogen peroxide (5.0-7.5%) in water.

If near steady-state conditions are recorded at the field monitoring points, the hydrogen peroxide concentration in each subsequent reagent batch will be increased (to a maximum of 15%). However, if there is a large increase in groundwater temperature during the injections, or there are negative visual indicators (steam and/or excessive bubbling), and/or evidence of vapor migration, the injection solution concentration may be capped or reduced (or the injection rate may be reduced) until field parameters stabilize.

Field monitoring data will be collected at least thrice daily (during the first hour, middle, and last hour of injection) during the first day of outdoor injections, and every one to two hours during the first day of indoor injections. Field monitoring data will be collected twice daily in each target area on the day following the injections.

4.2 ISCO Pilot Test - Second Day of Testing

Sodium persulfate will be used as the oxidant during the second day of pilot testing injections in each target area. The initial sodium persulfate concentration will be 12.5% in water. Maximum injection pressures and flow rates established during the first day of testing will be used to maximize the volume of oxidant injected. Prior to the start of ISCO injections, field data (same parameters; see Section 5.1) will be collected from each monitoring point.

Field monitoring data will be collected at least thrice daily (during the first hour, middle, and last hour of injection) on the second day of outdoor injections, and every one to two hours during the second day of indoor injections; however, if field parameters remain stable after three monitoring rounds, the monitoring frequency will be reduced to the middle and last hour of injection. Concurrent vapor intrusion sampling will be conducted at the Durham School Service (Durham) facility (see Section 5.0).

Similar to day one pilot testing activities, if there are any indications the injections are resulting in adverse effects (i.e., temperature increase, unfavorable visual indicators, and/or vapor migration), the concentration of the injection solution (or the injection rate) will be reduced for the remainder of the test, or testing may be terminated.

4.3 ISCO Post-Test Sampling

During the last stage of ISOC testing (restoration), subsurface conditions (i.e., pH and DO concentration) are returned to their pre-treatment condition through natural processes. Field monitoring data will be collected twice daily in each target area on the day after the injections are completed. If selected field parameters have not returned to background levels, additional monitoring of these parameters will be conducted during subsequent groundwater events (see below) until target parameters return to background levels.

Post-test groundwater samples will be collected at least two weeks after ISCO pilot testing injections are completed. If possible, sampling will be coordinated with an interim EFR event (see Section 3.0).

However, it is not unusual for dissolved COC concentrations to “rebound” after ISCO pilot testing. To allow for possible “rebound” effects, a second round of groundwater will be collected for laboratory analysis approximately four to six weeks after ISCO injection activities are completed. (Again, if possible, sampling will be coordinated with an interim EFR event.)

Results from the ISCO pilot testing will reviewed to determine if a follow-up round of pilot testing is warranted. For example, a partial rebound of toluene concentrations suggests that additional rounds of ISCO treatment will likely be effective at further reducing COC mass. However, a full rebound of toluene concentrations would suggest the pilot test was not effective; this preliminary conclusion could be confirmed by an additional round of testing. Pilot testing results will also be used to further evaluate the effectiveness of this technology, and determine the: 1) injection point density; 2) quantity and concentrations of required reagents/catalysts; 3) number of treatment rounds; and 4) cost of treatment for the potential implementation of full-phase ISCO remediation in remaining target areas at the former Norton/Nashua Site.

SECTION 5.0

SUPPLEMENTAL VAPOR INTRUSION MONITORING

Per direction of NYSDEC/NYSDOH, a vapor intrusion (VI) study was required in the new Durham facilities at the Former Norton/Nashua site (see Figure 5-1). Access was received from the current facility owner (Stone) and Durham to install and sample two sub-slab vapor monitoring points (VMPs) and conduct a concurrent indoor and outdoor ambient air sampling event. Sub-slab vapor and ambient air samples were collected in March 2015 and results were presented in the Durham School Services Vapor Intrusion (VI) Sampling Report dated April 2015.

The NYSDEC/NYSDOH have requested that Saint-Gobain conduct a supplemental VI sampling event concurrent with the proposed ISCO pilot testing (see Section 4.0). The supplemental VI sampling event will utilize the existing Durham sub-slab VMPs. Sampling procedures for the supplemental VI sampling event, which except for minor modifications will be the same as those used during the March 2015 event (see the April 2015 Durham School Services Vapor Intrusion (VI) Sampling Report), are summarized below.

5.1 Proposed VI Sampling Event

The supplemental VI sampling event will be conducted during the second day of proposed ISCO pilot testing at well MP-37. Concurrent vapor monitoring will also be conducted near well MP-37 during ISCO pilot testing (see Section 4.0). Proposed VI sampling locations (see Figure 5-1) at the Durham facility include existing VMP-1 & VMP-2 (see next section), ambient indoor air near VMP-2 (IA-3), and ambient outdoor air (OA-1). Vapor QA/QC samples (see Section 7.0) will include the collection of a trip blank. (Due to the limited number of proposed vapor samples, a field duplicate sample will not be collected.)

5.2 VMP Locations

Existing VMP locations (see Figure 5-1), which were reviewed and approved by the NYSDEC/NYSDOH, are: 1) in the bus repair area, adjacent to the Durham General Manager's office (DB-VMP-1); and 2) in Building #61, adjacent to the Durham "break room" and offices (DB-VMP-2). VMP assembly and installation (see the April 2015 Durham VI Sampling Report) generally followed the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) except six-inch long, 0.50-inch outer diameter (OD), stainless-steel vapor implants, which extend below the base of the concrete slab, were installed for greater VMP durability. Each VMP is protected with a small-diameter flush-mount manhole.

5.3 Pre-Sampling Activities and Inspection

Prior to the proposed sampling event, Durham will be sent a handout (adopted from NYSDOH, 2006) asking the facility to refrain from the following activities before/during testing:

- opening any windows or vents *(however, Durham employees will need to use access doors during the sampling period and large warehouse doors will be in use at Stone);*
- operating ventilation fans *(operation of auxiliary ventilation fans may be necessary in the bus repair area and/or in the Stone Warehouse during ISCO pilot testing);*
- using auxiliary heating equipment *(there is a portable oil-fired heater in the Durham bus repair area)*
- smoking in the facility *(smoking is not allowed in the facility, but employees smoke in adjacent outdoor areas);*
- painting in the facility *(bus parts are frequently painted);*
- using cosmetics, including hair spray, nail polish, nail polish remover, etc.;
- using perfume/cologne or air fresheners or odor eliminators;
- cleaning, waxing, or polishing furniture or floors with petroleum or oil-based products;
- engaging in any other activities that use materials containing VOCs;
- applying pesticides;
- allowing containers of gasoline or oil to remain within the facility *(open containers of oil and waste oil were previously present in the Durham bus repair area);*
- operating or storing automobiles in an attached garage *(The Durham facility [DB-VMP-1] is an active bus maintenance/repair shop and these activities will likely continue during the sampling event. The Stone facility [DB-VMP-2; DB-IA-3] is an active warehouse, and the operation of propane-fueled forklifts and other equipment will likely continue in the warehouse during the sampling event.)*

A pre-sampling inspection will be conducted at the Durham facility the day before the supplemental VI sampling event. The pre-sampling inspection will include: 1) brief interviews with the property owner (Stone) and facility manager (Durham); 2) tracer smoke testing to review air flow in the Durham facility; 3) PID field screening of the proposed sampling areas; and 4) an inventory of potentially contributing substances in the proposed sampling areas. Information obtained during the inspection will be used to complete an Indoor Air Quality Questionnaire and Building Characteristics Inventory form (IAQQ/BCIF) as provided in the 2006 NYSDOH VI Guidance.

The integrity of each VMP will also be inspected. Melted beeswax will be used to seal the surface at DB-VMP-1 (and DB-VMP-2 if necessary) where small cracks were noted in the surface of the bentonite seal during the March 2015 sampling event.

5.4 Sub-Slab VMP Sampling

A final site inspection, VMP inspection, and PID field screening survey will be performed to document conditions at the time of sampling. The plugs will be removed from each VMP assembly, which will be connected to several feet of dedicated 0.25-inch ID Teflon tubing.

A particulate filter and an 8-hour regulator preset by the laboratory will be attached to each 6-liter (6L) Summa canister. The pre-sample vacuum of each Summa canister will be recorded, compared to pre-shipping vacuum (and any loss noted), and confirmed greater than 25 inches of mercury (inHg).

Immediately prior to VMP sampling, tracer gas monitoring will be conducted per the 2006 NYSDOH guidance document and the previously approved tracer gas monitoring protocol (see Appendix B) to confirm the integrity of each VMP (and associated fittings). The flux chamber at each VMP will be enriched with helium (He) gas until a reading of at least 75% He is obtained.

A low-flow peristaltic pump (i.e., flow rate 0.2 liters per minute or less) will be connected to the open end of the Teflon tubing to purge approximately 1.5 VMP assembly volumes (0.05 to 0.06 liters per volume) from each VMP location. Following purging, a small vapor sample will be collected from each VMP for tracer gas monitoring and PID field screening.

After the tracer gas monitoring sample is obtained, the air purging pump will be deactivated. Tracer gas readings from each VMP location will be compared to the tracer gas test screening limit of 20%. If any reading exceeds 20%, the VMP assembly will be reexamined for potential leaks, resealed, and the tracer gas monitoring protocol repeated.

The Teflon tubing from the VMP will be attached to the Summa canister and the canister valve will be opened to begin sub-slab vapor collection at each VMP location. The sampling assembly will be periodically inspected during testing to determine the rate of vacuum loss (i.e., sample collection). The VMP sub-slab samples will be recovered approximately 8 hours later by closing the Summa canister valves, disconnecting the Teflon tubing from the VMP, and recording the remaining vacuum, which should exceed 2 inHg to allow the laboratory to check for leaks. Sub-slab VMP samples will be submitted for laboratory analysis of VOCs via EPA Method TO-15 with a target reporting limit of 5.0 micrograms per cubic meter ($\mu g/m^3$).

Immediately after VMP sampling is completed, tracer gas monitoring and PID field screening will be repeated as described above. VMPs will be plugged and each manhole secured.

5.5 Indoor/Outdoor Air Sampling

In conjunction with VMP sampling, concurrent ambient indoor/outdoor air samples will be collected (see Figure 5-1 for sample locations). Ambient air samples will be collected by placing certified-clean 6L Summa canisters, equipped with particulate filters and 8-hour regulators preset by the laboratory, in each sampling area approximately three feet off the floor (i.e., on a box or chair) to collect a representative “breathing air” sample.

The pre-sample vacuums of each Summa canister will be recorded, compared to pre-shipping vacuums (and any losses noted), and confirmed greater than 25 inHg. The Summa canisters will not be attached to any tubing before opening the canister valves to begin ambient air collection.

Indoor/outdoor temperatures and barometric pressure will be recorded along with current weather conditions at the time of sampling. The sampling assembly will be periodically inspected during testing to determine the rate of vacuum loss (i.e., sample collection). Ambient air samples will be recovered approximately 8 hours later by closing the Summa canister regulator valves, and recording the vacuum reading. Ambient indoor/outdoor air samples will be submitted for laboratory analysis of VOCs via EPA Method TO-15 with a target reporting limit of 0.25 $\mu g/m^3$.

SECTION 6.0

DECONTAMINATION PROCEDURES

All non-disposable sampling and data procurement equipment will be decontaminated using the following procedures:

1) manual scrub with alconox and potable water using a brush;
2) thorough rinse with potable water;
3) triple rinse with distilled water (ASTM Type II); and
4) air dry.

Any liquids generated during the decontamination process will be treated in the same manner as the purge water discussed in Section 3.7.

SECTION 7.0

QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

The objective of the sampling Quality Assurance/Quality Control (QA/QC) program is to ensure the reliability and integrity of all data generated during the pilot testing and sampling program. Unless otherwise noted in this Workplan, QA/QC for all proposed pilot testing and sampling activities will be conducted in accordance with the procedures outlined in: 1) the May 2005 Supplemental RFI Workplan QAPP; 2) the July 2003 RFI Workplan; and 3) for instances where specific QA/QC procedures were not presented in the former two documents, the April 1994 QAPP, IRM, and General RFA/RFI Sampling Investigation Work Plan prepared by Rust Environment & Infrastructure (Rust).

The QA/QC program for groundwater sampling will involve the collection of trip blanks, matrix spike/matrix spike duplicate (MS/MSD) samples, equipment (field) blanks, and field duplicate samples. Due to the limited number of vapor samples (four samples; see Section 5.0), the QA/QC program for vapor intrusion sampling will be limited to the collection of a trip blank. QA/QC sample collection is summarized in Table 7-1. Data validation will be performed in accordance with NYSDEC and USEPA procedures by a third party reviewer retained by Saint-Gobain for that purpose (see Section 8.0).

Groundwater Trip Blanks - One trip blank sample will be analyzed for each cooler utilized for the transport of groundwater samples for VOC analyses. Trip blanks will be analyzed for VOC target parameters. The trip blanks will be prepared and supplied by the laboratory, and transported and handled in the same manner as other groundwater sampling bottleware. Trip blanks will not be held at the field site for more than two days. VOC detections in the trip blank indicate possible laboratory bottleware contamination.

Vapor Trip Blank - The vapor sampling program will include the analysis of one trip blank, which will consist of a prepared gas sample (laboratory certified "clean air") provided in a laboratory supplied Summa canister. The blank will be transported and handled in the same manner as other vapor sampling equipment (i.e., Summa canisters) before analysis by the laboratory for VOC target parameters. VOC detections in the trip blank indicate possible laboratory contamination.

Groundwater Equipment (Field) Blank **-** One equipment (field) blank sample will be collected during each mobilization and analyzed for the complete list of VOC target analytes. The equipment blank samples will be obtained by pouring demonstrated analyte-free water through or over the sampling device and associated sampling materials so that the rinsate flows directly into the laboratory cleaned sample containers. VOC detections in the equipment blank indicate possible contamination due to equipment/inadequate equipment decontamination.

Groundwater Blind Field Duplicate Sample **-** One blind field duplicate sample will be collected for every 20 water samples collected and analyzed for the complete set of VOC target analytes. Because the samples will be submitted for VOC analysis, there will be no mechanical mixing of these samples. Instead, the bottleware containers for each sample pair (i.e., VOA vials) will be alternated during sample collection. The blind field duplicate(s) will be given a sample designation that is consistent with other analytical samples to prevent the analyzing laboratory from identifying the blind field duplicate sample. Identification of the blind field duplicate sample will be provided to the third-party data validator (see Section 8.0) and the NYSDEC. The relative percent difference (RPD) between the blind duplicate sample pair will be used to evaluate the consistency of field sampling (and laboratory analysis).

Groundwater MS/MSD Samples - One set of MS/MSD samples will be collected for every 20 groundwater samples and analyzed for the complete set of VOC target analytes. Because the samples will be submitted for VOC analysis, there will be no mechanical mixing of these samples. Instead, the bottleware containers for the MS/MSD (i.e., VOA vials) will be alternated during sample collection. The MS/MSD samples will be identified as such and given a sample designation that is consistent with other analytical samples.

SECTION 8.0

LABORATORY ANALYSIS

All groundwater samples will be submitted to Lancaster Laboratories/eurofins of Lancaster, PA (Lancaster) for analysis of VOCs via EPA Method 8260 plus heptane. All vapor samples will be submitted to Accutest Laboratories of Dayton, NJ (Accutest) for analysis of VOCs via EPA Method TO-15 plus heptane.

Lancaster and Accutest are NYSDOH Environmental Laboratory Approval Program (NYSDOH-ELAP) certified laboratories. Both laboratories will be requested to follow NYSDEC Analytical Services Program (ASP) Contract Laboratory Protocol (CLP) procedures and provide complete Category B laboratory deliverables

Final laboratory analytical data packages will be compared with the analyses requested on the chain-of-custody record to ensure all analyses were performed as requested. If an analytical sample exceeds the method-specific holding time (see Table 3-1), the sample will be rejected for quantitative interpretation, and the data will be utilized only in a qualitative manner.

Final laboratory data packages will be forwarded to a third-party data validator (Dataval of Syracuse, NY or similar) retained by Saint-Gobain for that purpose in accordance with the NYSDEC ASP (June 2000), CLP Organics Data Review and Preliminary Review (USEPA Region II SOP No. HW-6, Revision No. 8, January 1992), and USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (February 1994). Data validation will include a comparison of QC checks to prescribed acceptance criteria for the following major elements: equipment blanks, trip blanks, field duplicate samples, MS/MSD samples, laboratory qualifiers, holding times, detection limits, and accuracy to ensure project data quality objectives (DQOs) are met.

Practical quantitation limits (PQLs) for each analyte should meet the Contract Required Quantitation Limit (CRQL) as per NYSDEC ASP. All data will be reviewed for precision, accuracy, representativeness, completeness, and comparability (PARCC). Surrogate recoveries, GC/MS calibrations, system performance checks, and other internal laboratory QA/QC results will also be reviewed to assure the laboratory analysis met all applicable performance criteria.

As outlined in Section 7.0, one equipment blank sample will be collected during each groundwater mobilization and analyzed for all VOC parameters. A sample or sample delivery group may be qualified if the equipment blank contains detectable concentrations of target analytes; however, the data may be used qualitatively to assess the quality of the decontamination procedure or ambient site conditions. A similar procedure will be followed for the utilization of trip/travel blanks.

The laboratory report may qualify sample concentrations with a "B", which indicates that a target analyte has been detected in the laboratory method blank. Data qualified with a "B" will be utilized quantitatively only if: 1) historical data suggests this specific compound was utilized at the facility; 2) the compound was detected in previous analytical sampling; or 3) the laboratory case narrative states the presence of this compound is not the result of laboratory contamination. Consistent detection of compounds in the method blank suggests a laboratory contamination problem, and more importantly, problems with the internal laboratory QA/QC procedures.

The laboratory will often estimate analyte concentrations when samples are below, or greatly exceed, detection limits. A concentration below the laboratory method detection limit (MDL), qualified with a "J", will be used for quantitative interpretation as it represents the "best" estimate of a specific analyte concentration. Under NYSDEC ASP methods, the laboratory should not report concentrations that exceed the highest concentration within the calibration range, but instead, rerun the analysis using an appropriate dilution factor.

SECTION 9.0

SCHEDULE & REPORTING

Per the general requirements of NYSDEC CO: 4-20001205-3375, any revisions to this Workplan will be submitted within 30 days of receipt of comments from the NYSDEC. Field work will be scheduled (and initiated depending upon contractor availability) within 30 days of receipt of final Workplan approval from the NYSDEC.

The first phase of work, the injection well installations discussed in Section 2.0 will begin within 30 days (depending upon contractor availability) of receiving NYSDEC approval to proceed. The ISCO pilot testing event (Section 4.0) will be conducted within 30 days (depending upon contractor availability) of the installation of the injection wells.

Baseline groundwater sampling (see Section 3.0) will take place in association with a regularly scheduled interim EFR event. Post ISCO pilot test groundwater samples will also be collected in association with an interim EFR event that will be scheduled approximately two weeks after the completion of ISCO injections. Groundwater samples will be submitted for standard laboratory turn-around times (two weeks).

Following receipt of the analytical data from the initial round of ISCO pilot testing program, Saint-Gobain will prepare appropriate data summary tables and figures. Depending on the post-test sampling results (and contractor availability), with NYSDEC approval, a second round of ISCO pilot testing may be conducted at well MP-37 and/or well MW-27.

A meeting (or conference call) with the NYSDEC will be scheduled within 60 days of the receipt of the final pilot test analytical data to discuss the results. Based on those discussions, the NYSDEC will request that Saint-Gobain: 1) submit a revised CMS Report (or Supplement to the July 2014 CMS Report) within 60 days; 2) submit a Workplan for additional ISCO/EFR pilot testing; or 3) evaluate alternative remedies for the Former Norton/Nashua site.

Update reports summarizing the status of all activities at the Former Norton/Nashua site will continue to be submitted to the NYSDEC on a monthly basis. A tentative project schedule is provided as Table 9-1.

SECTION 10.0

REFERENCES

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USEPA, 1996a. Groundwater Issue Low Flow (Minimal Drawdown) Groundwater Sampling Procedures. USEPA Publication No. EPA/540/S-95/504, April 1996.

USEPA Region I, 1996b. Low Stress (Low-Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, July 30, 1996.

TABLES

Table 3-1
Sample Summary Matrix - Groundwater Samples
Supplemental CMS Pilot Testing
Former Norton/Nashua Facility
Watervliet, NY

Matrix	Sample Locations	Parameter	Analytical Parameter	Container and Preservative	Analysis Holding Time
Water	Selected Monitoring Points/Wells (see text)	TCL Volatiles plus heptane	EPA 8260	3 x 40 ml glass vials w/teflon lined enclosure (no headspace)	14 days

Table 8-1
QA/QC Sample Summary Matrix
Supplemental CMS Pilot Testing
Former Norton/Nashua Facility
Watervliet, NY

Matrix	Sample Type	Frequency	Analytical Parameters
Water	Equipment Blank	one sample per each mobilization	TCL Volatiles plus heptane
	MS/MSD Samples	one sample per every 20 samples	TCL Volatiles plus heptane
	Field Duplicate Sample	one sample per every 20 samples	TCL Volatiles plus heptane
	Trip Blank	one sample per cooler	TCL Volatiles plus heptane
Vapor	Trip Blank	one sample per mobilization	TCL Volatiles plus heptane

Volatile analysis via EPA Method 8260.

Table 9-1

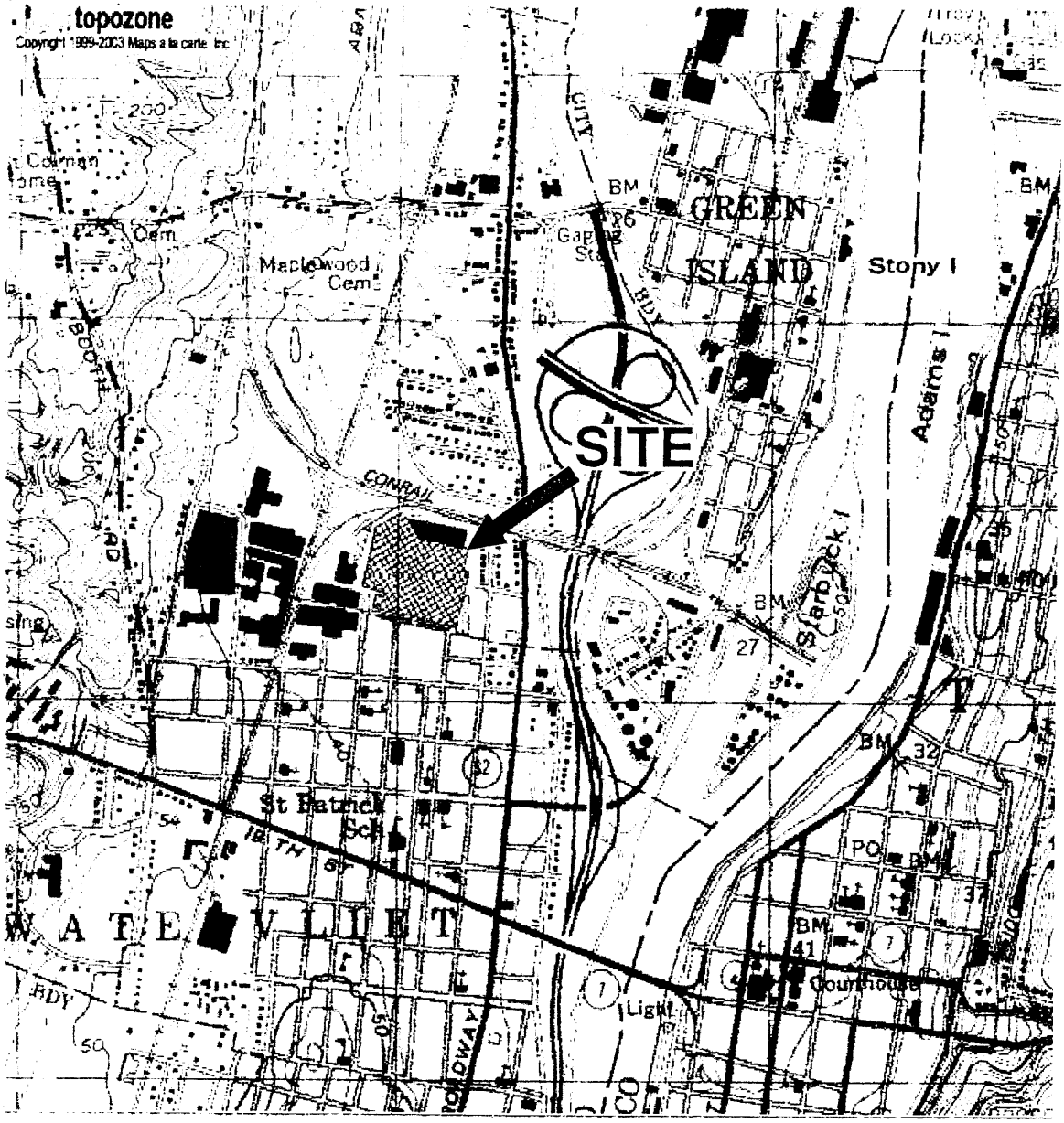
Tentative Supplemental CMS Pilot Testing Schedule

Former Norton/Nashua Tape Facility

Watervliet, New York

	3Q2015			4Q2015			1Q
	Jul	Aug	Sep	Oct	Nov	Dec	2016
Submit Chem-Ox Pilot Test Workplan							
NYSDEC Reviews/Approves Workplan							
Install Chem-Ox Pilot Test Boreholes							
Conduct Chem-Ox Pilot Test(s)							
Conduct Supplemental VI Sampling							
Prepare Pilot Test Report							
Meeting/Call with NYSDEC/NYSDOH							
Interim EFR Events							
On-Site Groundwater Sampling Events				(EFR)		(EFR)	(EFR)
Off-Site Groundwater Sampling Events							

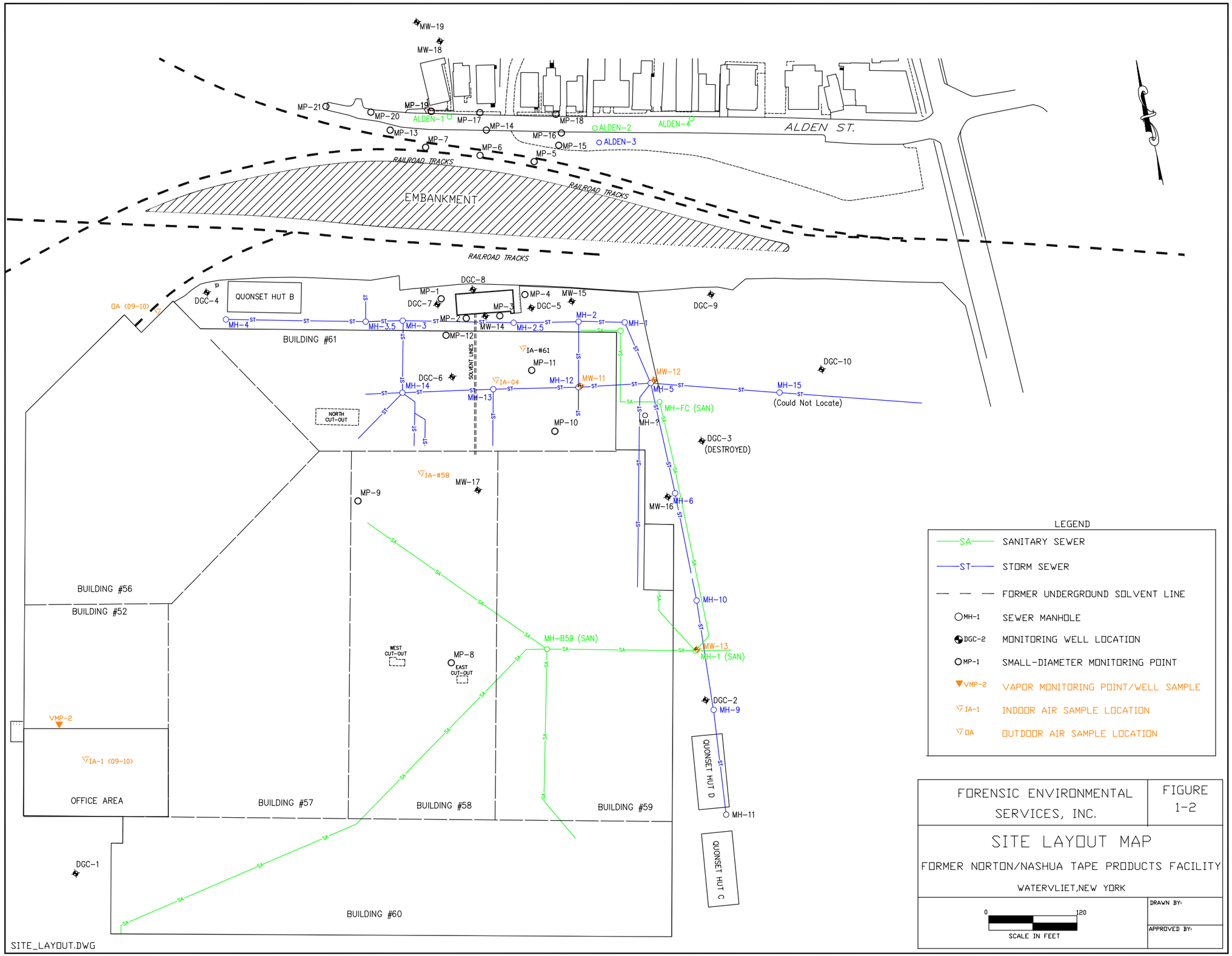
FIGURES



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:

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

WV-TOPO.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
VMP-2	VAPOR MONITORING POINT/WELL SAMPLE
IA-1	INDOOR AIR SAMPLE LOCATION
OA	OUTDOOR AIR SAMPLE LOCATION

FORENSIC ENVIRONMENTAL SERVICES, INC.

FIGURE 1-2

SITE LAYOUT MAP

FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY

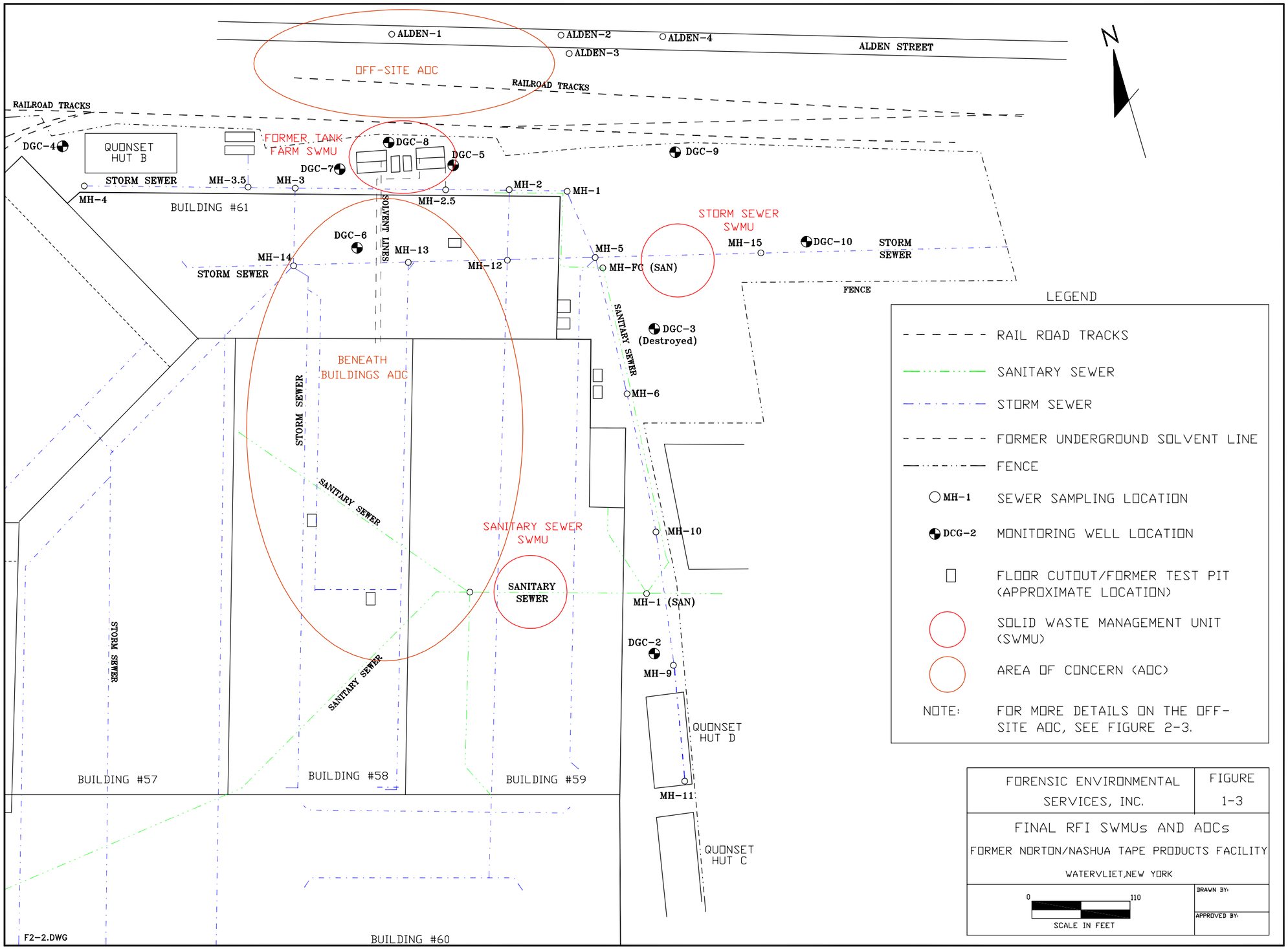
WATERVLIET, NEW YORK

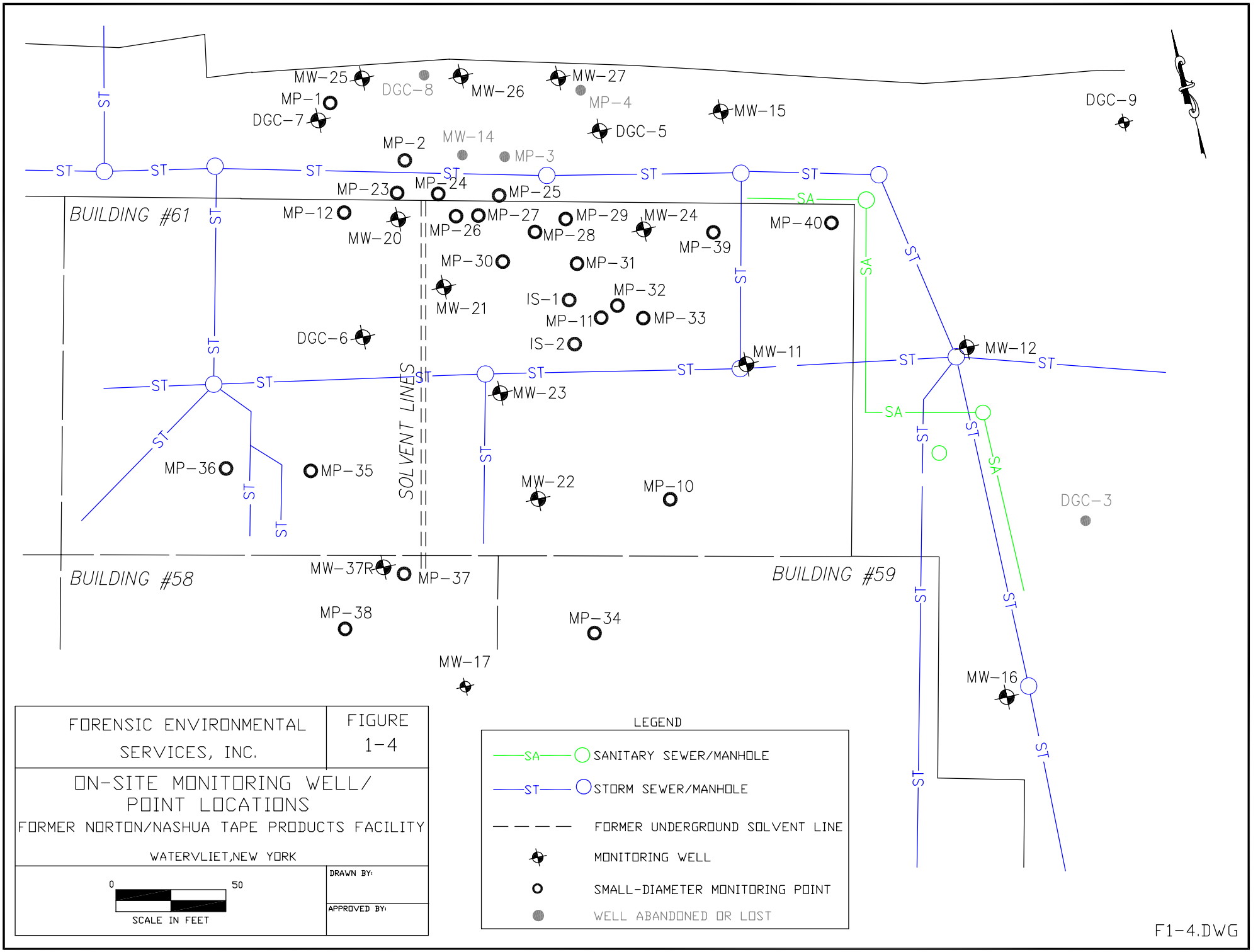
0 120

SCALE IN FEET

DRAWN BY:

APPROVED BY:


ALDEN-1
ALDEN-2
ALDEN-3
ALDEN-4
ALDEN STREET
OFF-SITE AOC
RAILROAD TRACKS
RAILROAD TRACKS
N
DGC-4
QUONSET HUT B
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
BUILDING #61
MH-2.5
SOLVENT LINES
STORM SEWER SWMU
DGC-6
MH-13
MH-15
DGC-10
STORM SEWER
MH-14
MH-12
MH-5
MH-FC (SAN)
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
STORM SEWER
SANITARY SEWER
QUONSET HUT D
MH-11
QUONSET HUT C
BUILDING #57
BUILDING #58
BUILDING #59
BUILDING #60
F2-2.DWG
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 1-3
FINAL RFI SWMUs AND AOCs
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
110
SCALE IN FEET
DRAWN BY:
APPROVED BY:

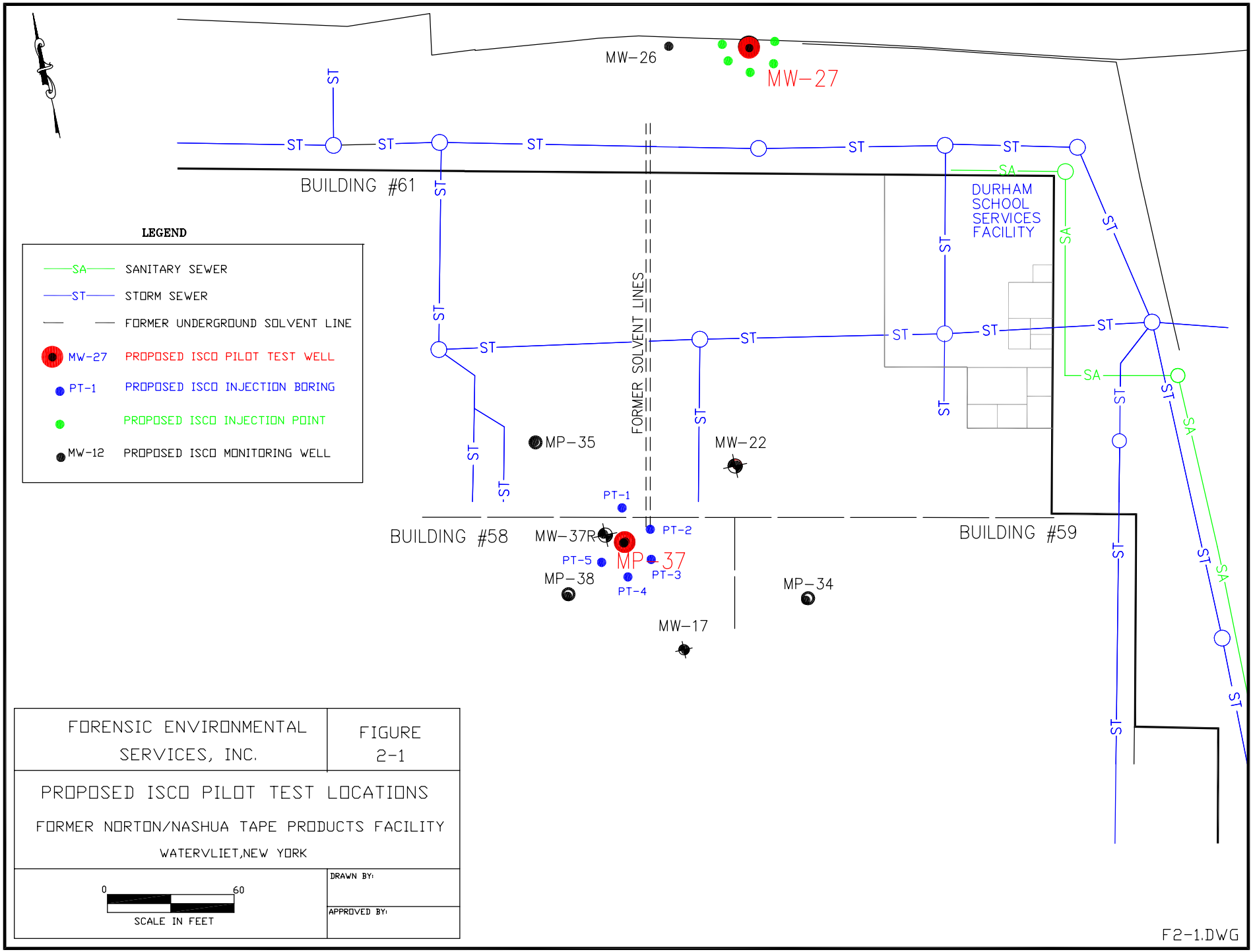


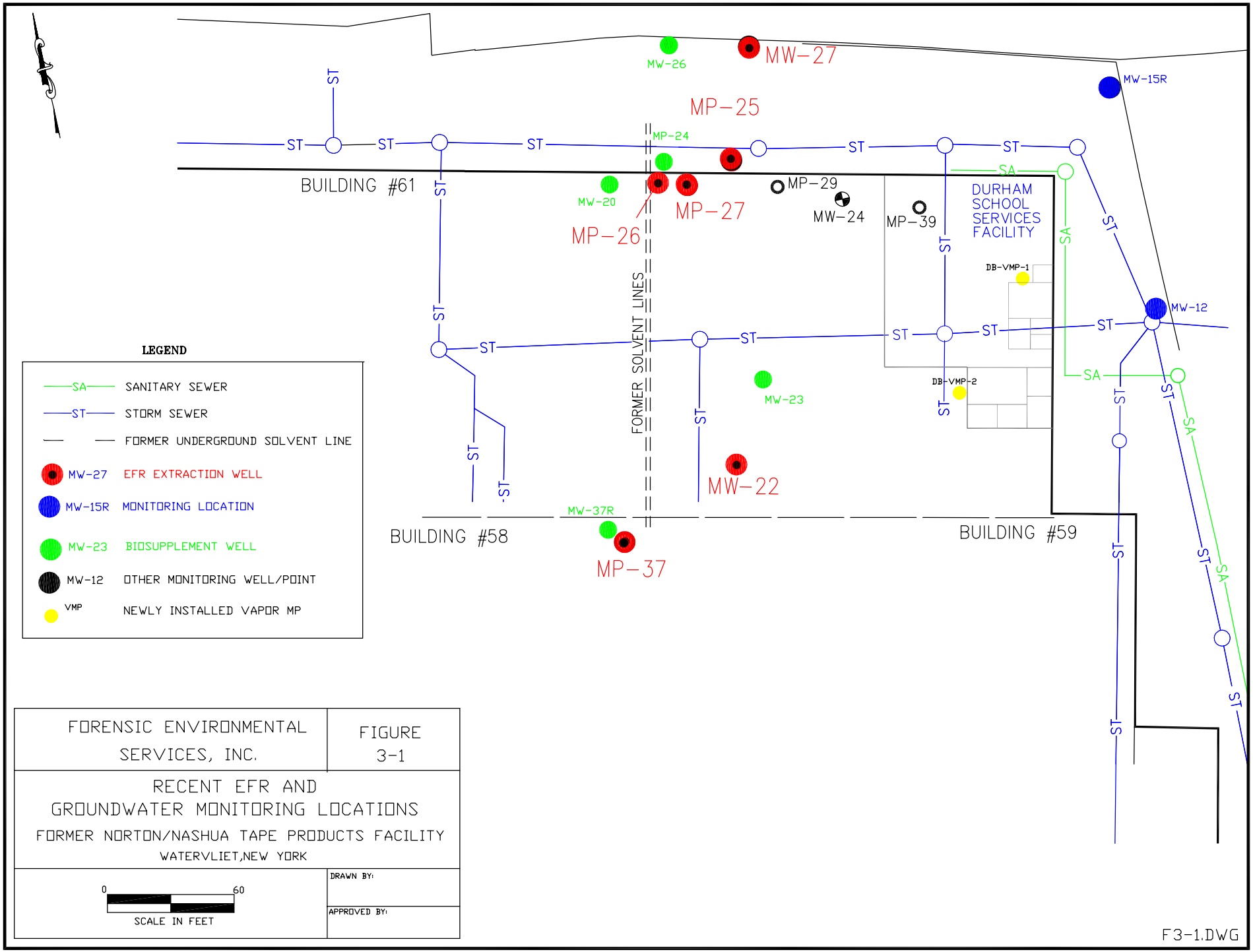
FORENSIC ENVIRONMENTAL SERVICES, INC.	FIGURE 1-4
ON-SITE MONITORING WELL/ POINT LOCATIONS FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY WATERVLIET,NEW YORK	
0 50 SCALE IN FEET	DRAWN BY: APPROVED BY:

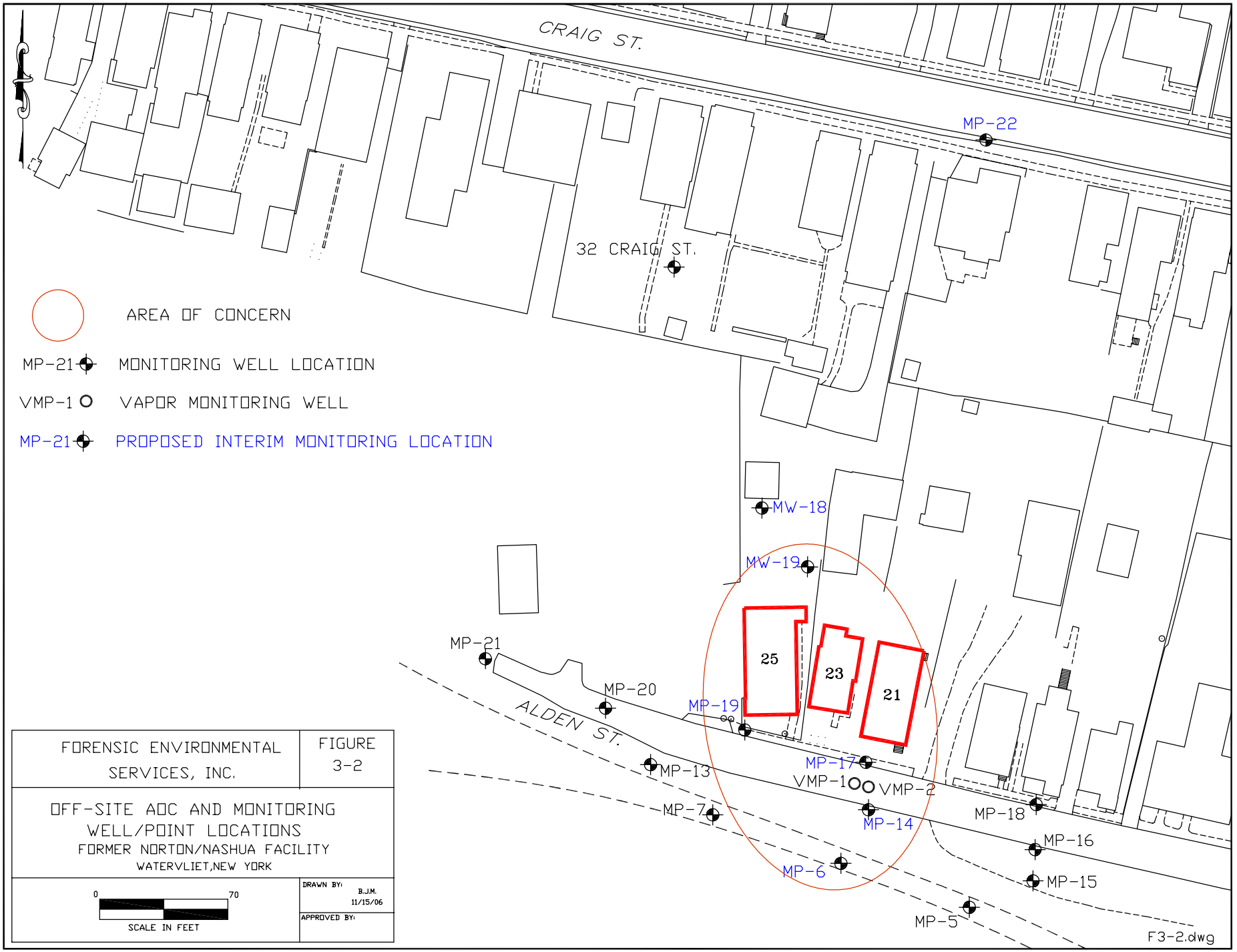
LEGEND

- SA — SANITARY SEWER/MANHOLE
- ST — STORM SEWER/MANHOLE
- FORMER UNDERGROUND SOLVENT LINE
- MONITORING WELL
- SMALL-DIAMETER MONITORING POINT
- WELL ABANDONED OR LOST

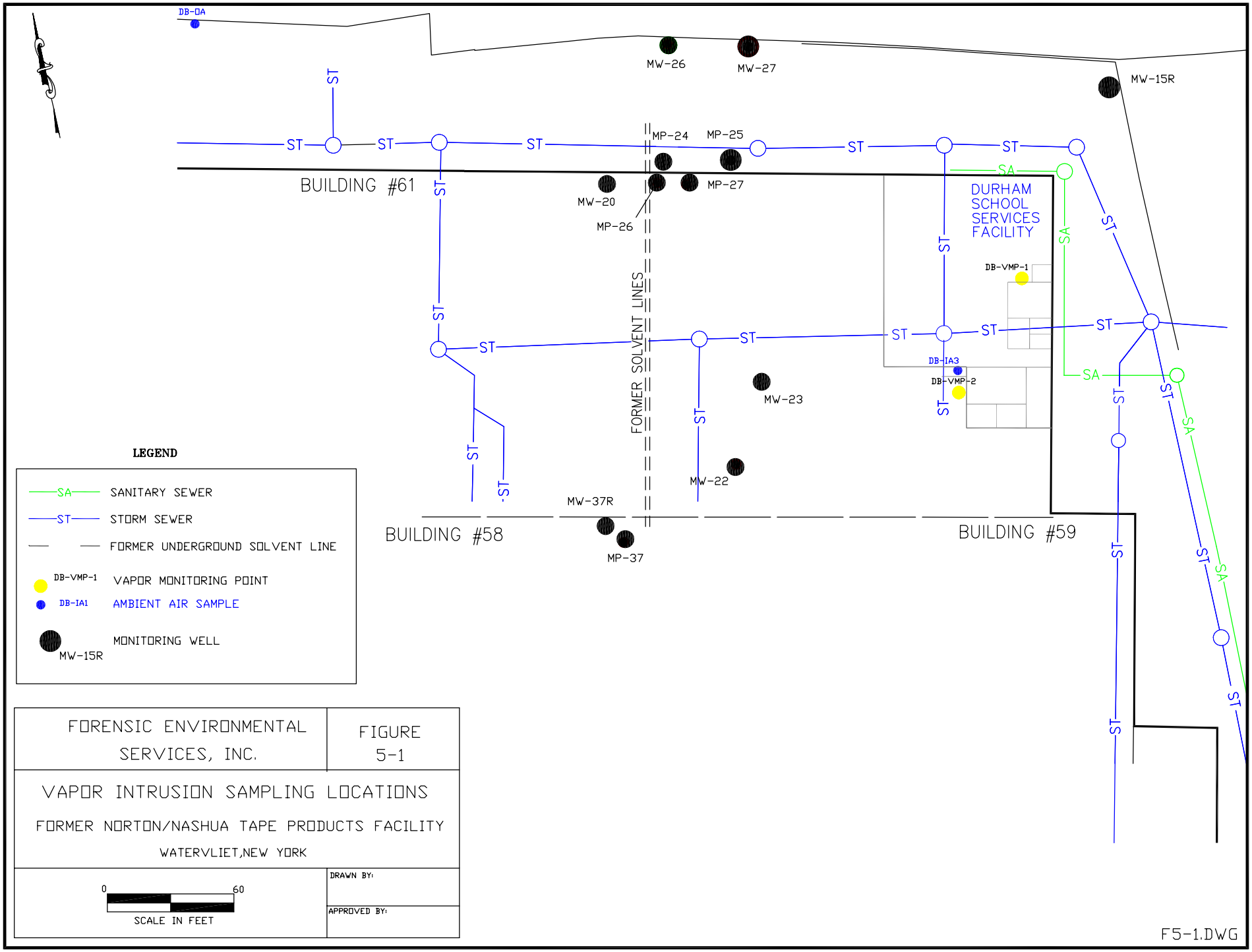
F1-4.DWG


MW-26
MW-27
BUILDING #61
DURHAM SCHOOL SERVICES FACILITY
FORMER SOLVENT LINES
MP-35
MW-22
PT-1
BUILDING #58
MW-37R
MP-37
PT-2
PT-5
PT-3
MP-38
PT-4
MP-34
MW-17
BUILDING #59
LEGEND
SA SANITARY SEWER
ST STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
MW-27 PROPOSED ISCO PILOT TEST WELL
PT-1 PROPOSED ISCO INJECTION BORING
PROPOSED ISCO INJECTION POINT
MW-12 PROPOSED ISCO MONITORING WELL
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 2-1
PROPOSED ISCO PILOT TEST LOCATIONS
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
60
SCALE IN FEET
DRAWN BY:
APPROVED BY:
F2-1.DWG


MW-26
MW-27
MW-15R
MP-25
MP-24
ST
SA
BUILDING #61
MW-20
MP-27
MP-26
MP-29
MW-24
MP-39
DURHAM SCHOOL SERVICES FACILITY
DB-VMP-1
DB-VMP-2
MW-12
FORMER SOLVENT LINES
MW-23
MW-22
MW-37R
BUILDING #58
BUILDING #59
MP-37
LEGEND
SANITARY SEWER
STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
MW-27 EFR EXTRACTION WELL
MW-15R MONITORING LOCATION
MW-23 BIOSUPPLEMENT WELL
MW-12 OTHER MONITORING WELL/POINT
VMP NEWLY INSTALLED VAPOR MP
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 3-1
RECENT EFR AND GROUNDWATER MONITORING LOCATIONS
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
60
SCALE IN FEET
DRAWN BY:
APPROVED BY:
F3-1.DWG



FORENSIC ENVIRONMENTAL SERVICES, INC.	FIGURE 3-2
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:


DB-IA
MW-26
MW-27
MW-15R
ST
SA
MP-24
MP-25
MP-27
MW-20
MP-26
BUILDING #61
DURHAM SCHOOL SERVICES FACILITY
DB-VMP-1
DB-IA3
DB-VMP-2
FORMER SOLVENT LINES
MW-23
MW-22
MW-37R
MP-37
BUILDING #58
BUILDING #59
LEGEND
SANITARY SEWER
STORM SEWER
FORMER UNDERGROUND SOLVENT LINE
VAPOR MONITORING POINT
AMBIENT AIR SAMPLE
MONITORING WELL
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 5-1
VAPOR INTRUSION SAMPLING LOCATIONS
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
60
SCALE IN FEET
DRAWN BY:
APPROVED BY:
F5-1.DWG

APPENDIX A

FES SITE-SPECIFIC
HEALTH & SAFETY PLAN (HASP)

SITE-SPECIFIC HEALTH & SAFETY PLAN

Former Norton Company Nashua Tape Products Facility
Watervliet, New York

October 2010

Prepared by:

Forensic Environmental Services, Inc.
113 John Robert Thomas Drive
The Commons at Lincoln Center
Exton, Pennsylvania, 19341

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1.0 INTRODUCTION

1.1 Introduction

The Forensic Environmental Services, Inc. (FES) Health and Safety Program (HASP) described herein presents health and safety procedures and emergency response guidelines to be implemented during the Corrective Measures Study (CMS) pilot testing and source removal activities at the former Norton (Norton)/Nashua Tape Products (Nashua) manufacturing facility located at 2600 Seventh Avenue, Watervliet, New York (Figure 1).

Site activities will be coordinated and implemented by FES and subcontractors. FES personnel will be on site to coordinate field operations related to liquid-level data collection, soil and groundwater quality sampling, sanitary/storm sewer water and sediment sampling, as well as field activities associated with CMS pilot testing and source removal (soil excavation) activities. Health and safety measures described herein are designed to protect FES personnel from site environmental hazards. This program has been designed to address issues relevant to FES personnel only. Contractors who are contracted to perform work at the site will be required to prepare and implement their own site-specific health and safety plan for their site personnel.

1.2 Summary of Environmental Scope of Work

The scope of work associated with this project is presented in the following documents: 1) CMS Workplan (FES, November 2010); and 2) Source Removal Activities Workplan (FES, November 2010). Specific elements of the above-referenced workplans include the following:

1. Installation of Enhanced Fluid Recovery (EFR) Extraction Wells and Monitoring Points;
2. Liquid-level data collection;
3. Groundwater quality sampling;

4. Sanitary/storm sewer water and sediment sampling;
5. EFR pilot testing and associated field monitoring activities;
6. Source removal (soil excavation) activities including field screening, air monitoring, and post-excavation soil sampling activities;
7. Monitoring well installation activities; and
8. In-Situ Chemical Oxidation (ISCO) activities.

During field activities, there is the potential for FES personnel to come in contact with water, and or wastes potentially containing hazardous constituents. This HASP has been developed to ensure the following:

1. FES on-site personnel are not adversely exposed to chemicals of concern.
2. FES personnel are in compliance with all applicable state, federal, and non-governmental regulations. The rules and guidelines set forth in the Occupational Safety and Health Act (OSHA) Part 1910 (Title 29 Code of Federal Regulations CFR Part 1910.120) will be implemented for all site activities.

Due to the nature of project tasks, all fieldwork activities that potentially involve contact with hazardous materials will require varying degrees of personal protective equipment (PPE). A description of the required PPE is presented in section 4.0.

This HASP applies only to FES personal on site during the CMS and source removal activities outlined above. All field activities conducted by FES personnel will be performed in accordance with the provisions set forth in this HASP.

2.0 SITE CHARACTERIZATION

2.1 Site Characterization

The former Norton/Nashua Tape Products manufacturing site occupies approximately 27 acres in Watervliet, New York. The facility was formerly used for the manufacture of floor polishing discs and adhesive tape. The area proximal to the site is residential/industrial. The structure is bordered by railroad tracks to the north and industrial/residential areas to the west, south, and east.

Previous site investigations have determined that soil and groundwater quality have been impacted at the site in several areas. The exposure routes, threshold limit values (TLV's), and IDLH concentrations set forth by OSHA and NIOSH for certain compounds of concern (COCs) at the site are presented in Table 1.

3.0 EMPLOYEE TRAINING AND TESTING

3.1 Employee Training

All site workers involved in hazardous or potentially hazardous work will have met the requirements set forth in 29 CFR 1910.120 (e). These requirements include forty hours of off-site classroom training in hazardous waste site safety, three days of on-site field experience working under a trained, experienced supervisor, eight hours of annual refresher training, and eight hours of supervisor training for employees in supervisory positions. All personnel will be required to provide documentation on the successful completion of the training requirements of 29 CFR 1910.120.

In addition, a health and safety site indoctrination session will be presented by FES prior to commencement of site activities. This session will include a review of planned work activities, known or suspected contaminants present, potential health and safety hazards, the health and safety plan, health and safety protection procedures including PPE and equipment, and the site emergence response plan.

3.2 Medical Surveillance

All FES personnel (or subcontractors) who may be exposed to hazardous substances or health hazards on-site will participate in a medical surveillance program that meets the requirements set forth in 29 CFR 1910.120 (f). These requirements specify that employees who satisfy one of the following conditions receive a medical examination at least annually:

1. engage in site operations in which they have the potential to be exposed to hazardous substances at or above the permissible exposure limits (PEL), or published exposure levels, for more than 30 days a year;
2. wear a respirator for more than 30 days a year; or

3. are injured due to overexposure involving a hazardous substance.

Additionally, employees who wear respirators must be determined to be fit to perform their work duties while wearing a respirator.

There are no site-specific medical surveillance requirements for this project. Medical examinations must be conducted by or under the direct supervision of a licensed physician. Medical records for all FES personnel are maintained in the firm's Exton, Pennsylvania office. These medical records detail the tests that were conducted and include a copy of the participating physician's written opinions and recommended limitations for the employee.

4.0 PERSONAL PROTECTIVE EQUIPMENT

4.1 Personal Protective Equipment

This section of the HASP describes the requirements for PPE and the levels of protection required for each individual work task. All site personnel are required to use PPE that is appropriate to the health and safety hazards to which they may be exposed. Basic PPE in all site areas consists of a hard hat, safety glasses, and steel-toed boots. PPE requirements will vary depending on the work task and the employee's location at the site.

All personnel on site will wear PPE when activities involve the potential for exposure to contaminated vapors, gases, or particulate, or when direct contact with a contaminated substance may occur. Chemical resistant clothing will prevent contaminants from absorbing into the skin. Respirators will protect the lungs and gastrointestinal tract. Full-face respirators will also provide eye protection. Respiratory protection levels will comply with air monitoring results collected by FES personnel, as discussed later in this HASP.

The specific protection levels for each work task is listed in Table 2. All field activities will require the use of one of the following levels of PPE:

Level B

1. Pressure demand, full-face self-contained breathing apparatus (SCBA) or pressure demand supplied air respirator with escape SCBA.
2. Chemical resistant clothing (overalls and long sleeved, hooded jacket); one or two piece chemical splash suit; or disposable, chemical resistant one piece suit.
3. Inner and outer chemical resistant gloves.
4. Steel-toed boots with chemical resistant covers.

5. Hearing protection, as needed.
6. Hard hat.

Level C

1. Half-face, air-purifying, canister equipped respirator with organic vapor and particulate cartridges.
2. Chemical resistant clothing (overalls and long sleeved, hooded jacket); one or two piece chemical splash suit; or disposable, chemical resistant one piece suit.
3. Inner and outer chemical resistant gloves.
4. Steel-toed boots with chemical resistant covers.
5. Hearing protection as needed.
6. Hard hat.

Modified Level D

1. Tyvec coveralls or poly-coated tyvec coveralls.
2. Steel-toed boots.
3. Disposable, chemical resistant inner gloves.
4. Outer, chemical resistant work gloves.
5. Safety glasses.
6. Splash shield, if necessary.
7. Hearing protection, if necessary.
8. Hard hat.

Level D

1. Standard work uniform or coveralls.
2. Steel-toed work boots.
3. Disposable, chemical resistant gloves.
4. Safety glasses.
5. Splash shield if necessary.
6. Hearing protection if necessary.
7. Hard hat, if necessary.

Miscellaneous PPE

1. Knife.
2. Flashlight or lantern.
3. Personal dosimeter (volatile organic compounds and particulates)

PPE will be stored in a designated area on-site and will be maintained in a clean sanitary condition and ready for use. All PPE will be inspected before each use to ensure that all equipment is functioning properly and is free from defects. Any coveralls which have been torn/ripped will be disposed of once the employee has left the work zone. Hard hats and respirators will be thoroughly cleaned after each use and respirator cartridges will be discarded daily.

4.2 Limitations of Protective Clothing

PPE ensembles designated for use during field activities have been selected, and will be selected, to provide protection against contaminants at known or anticipated concentrations in the soil. However, no protective garment, glove or boot is chemical proof, nor will it afford protection against all chemical materials. In order to obtain optimum usage from PPE, the following procedures will be developed:

1. Inspect all boots, gloves, and clothing for rips, tears, poorly functioning closings, etc.; and
2. Inspect all reusable garments for visible signs of chemical penetration, discoloration, cracks, punctures, and abrasions;

4.3 Respiratory Protection Program

All FES personnel will have received the proper training in the use of both supplied air and air purifying respirators, and have been fit tested for full-face respirators. All employees will be in compliance with the rules and guidelines set forth in 29 CFR 1910.134. To assure worker protection from airborne particulate and volatile organic compounds (VOC's), full-face respiratory protection will be used during certain activities, based on results of periodic air monitoring.

A photoionization detector (PID) will be used to determine if organic vapors are present in the worker breathing zone. A background PID reading will be taken prior to commencement of work activities. Air monitoring results will be used to determine action levels and dictate levels of PPE to be used based upon the known contaminants in the work area. The action levels and necessary respiratory protection for all activities are as follows:

Sustained Organic Vapor Reading Above Background Within Working Breathing Zone	**Action Levels**
Background	Respirator available
>Background - 5 ppm	Wear respirator
>5 ppm	Shut down activities, vacate area

The appropriate air-purifying respirator cartridge will be used to provide protection for both organic vapors and particulate. The respirator and respirator cartridge must be from the same manufacturer.

Additional air monitoring including PID screening and particulate monitoring will be conducted during soil excavation activities in accordance with the Community Air Monitoring Plan (CAMP).

4.4 Site Control

The majority of the former Norton/Nashua Tape Products site is surrounded by a chain-link fence. Vehicular access to the site is via Seventh Avenue.

Designated work areas at the site will be established by FES personnel to facilitate completion of field activities. The purpose of establishing work areas will be to limit access to potentially contaminated areas, and to prevent the migration of potentially hazardous materials from the areas of impact. Specific work areas to be defined at the site include:

1. Exclusion Zone (EZ): The EZ or work zone is the area immediately surrounding the active work area, with boundaries modified depending on operational requirements. Sufficient area will be provided within the EZ to allow efficient movement of personnel and equipment. The EZ will be defined by FES personnel. All personnel entering the EZ will be required to wear the appropriate PPE based on air monitoring results (Section 5.0).

2. Contaminant Reduction Zone (CRZ): The CRZ or Decontamination Area will be utilized as the location for removal of contaminated PPE, if any and final removal and decontamination of equipment. Supplementary safety equipment, such as fire extinguishers, potable eyewash and extra quantities of PPE may be stored in this area.

3. Support Zone (SZ): The SZ will be located in a non-impacted area where the threat of exposure to hazardous materials is minimal. As such, PPE other than standard construction clothing and equipment is not required.

5.0 AIR MONITORING

5.1 Monitoring Program

Periodic monitoring of organic vapors will be conducted throughout field activities by FES personnel utilizing a Photoionization detector (PID). Particulate monitoring will also be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action levels outlined the CAMP. All monitoring equipment will be calibrated daily according to the manufacturer's specifications. The date and time of instrument calibration will be logged in the field book as well as the periodic monitoring results.

All air monitoring will be conducted in the breathing zone of the workers on an hourly basis or as deemed necessary by FES personnel. Additional air monitoring will be conducted during soil excavation activities at the upwind and downwind perimeters of the designated work area and proximal to residential structures adjacent to the site (Alden Street) in accordance with the CAMP. Background measurements on all instruments will be taken at an area upwind of the work area to establish baseline levels before activities commence. Work activities resulting in organic vapor levels greater than 2.5 ppm above background at the downwind perimeter of the EZ (work zone) will temporarily be halted until levels drop to acceptable levels. Additional air monitoring requirements are described in the CAMP.

6.0 DECONTAMINATION PROCEDURES

All personnel and equipment coming into contact with potentially hazardous substances must be decontaminated or properly disposed (as appropriate) upon exit from the site. Prior to demobilization, potentially contaminated PPE and equipment will be decontaminated and inspected by the FES personnel before it is moved into the clean zone. Any material that is generated by decontamination procedures will be stored in a designated area until disposal arrangements are made. The decontamination solution for the equipment and PPE at the Former Norton Nashua Tape Products site is Alconox.

6.1 Equipment Decontamination

All equipment will be decontaminated in the CRZ (Decontamination Area) by a pressure wash cleaner. Decontamination procedures will include: removal of soil/mud by scraping or knocking; scrubbing with a hand brush; rinse using a solution of water and Alconox; and rinse by potable water. Decontamination of equipment will occur on the wash pad constructed in the Decontamination Area so that rinsates and solids can be collected for subsequent disposal. Decontamination of equipment will be performed at the same PPE level as work in the EZ.

7.0 GENERAL SAFETY AND PERSONAL HYGIENE

7.1 General Safety Protocols

In addition to those measures identified above, FES personnel will abide by general safety protocols including:

1. Designation of Eating Areas: Eating at the site is prohibited except in specifically designated areas. Designation of eating areas will be the responsibility of FES personnel. The location of these areas may change during the project to maintain adequate separation from the work area.
2. Designation of Smoking Areas: Smoking at the site is prohibited except in specifically designated areas to be identified by FES personnel.
3. Individuals getting wet to the skin with effluent from the washing operation must wash the affected area immediately. In addition, if clothes which are in contact with skin become wet then these garments must be changed.
4. Hands must be washed with a soap solution before eating, drinking, smoking, and before using toilets at the site.
5. All disposable coveralls and soiled gloves will be disposed of in a FES designated plastic bag at the end of every shift or sooner.

8.0 EMERGENCY CONTINGENCIES

8.1 Emergency Numbers and Contacts

Emergency Contacts

Fire	911
Police	911
Ambulance	911
Hospital	Saint Mary's Hospital 1300 Massachusetts Avenue Troy, New York Telephone: (518) 268-5000

Directions to Hospital:

Exit site and proceed to Route NT-32 South towards Route NY-2. Turn left onto route NY-2 East. Turn left onto Routs US-4 North. Turn right onto Hoosick Street. Turn left onto Route NY-40. St. Mary's Hospital is located on 1300 Massachusetts Avenue. (See attached map). The distance from the subject work site to the hospital is approximately 2.5 miles, with a driving time estimated to require 10 - 15 minutes.

Additional Emergency Numbers

National Response Center (NRC)	800-424-8802
Chemtrec	800-424-9300
New York State Department of Environmental Conservation (NYSDEC)	(518) 457-9255
Saint-Gobain Representative (James Smith)	(610) 341-7321
FES Exton Office	610-594-3940

8.2 Medical Emergencies

Any person who becomes ill or injured at the site will be transported to Saint Mary's Hospital. All injuries will be reported to the FES HSO or qualified alternate and documented in the FES HASP field book.

Any person transporting an injured person to the hospital for treatment will take with them a copy of the FES HASP. Any vehicle utilized to transport injured personnel to the hospital will subsequently be decontaminated as warranted.

9.0 RECORD KEEPING

9.1 Record Keeping

FES's HSO (Bryan J. Machella) or qualified alternate (Robert Zei) will maintain records of all necessary and pertinent monitoring activities as described below:

- description of each work task completed on site;
- name and position title of employees involved on each specific work task;
- names of individuals working at the site; and
- emergency report sheets describing any incidents or accidents.

All records will be maintained in a project field book dedicated for the former Norton/Nashua Tape Products Facility Site.

TABLES

Table 1
Exposure Pathways and Exposure Levels
Former Norton/Nashua Tape Products Facility
Watervliet, New York

Contaminant	Exposure Pathway	Acceptable Exposure Limits		IDLH
		NIOSH	OSHA	Concentration (OSHA)
Volatile Organic Compounds				
Benzene	INH, ING, ABS, CON	0.1 ppm	1 ppm	500 ppm
2-Butanone (MEK)	INH, ING, CON	200 ppm	200 ppm	3,000 ppm
MIBK (Hexone)	INH, ING, CON	50 ppm	100 ppm	500 ppm
n-Heptane	INH, ING, CON	85 ppm	500 ppm	750 ppm
Ethylbenzene	INH, ING, CON	100 ppm	100 ppm	800 ppm
Toluene	INH, ING, ABS, CON	100 ppm	200 ppm	500 ppm
Xylenes	INH, ING, ABS, CON	100 ppm	100 ppm	900 ppm
Methylcyclohexane	INH, ING, CON	400 ppm	500 ppm	1,200 ppm
Styrene	INH, ABS, ING, CON	50 ppm	100 ppm	700 ppm
Base Neutral Compounds				
2-Methylnaphthalene	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA
Benzo (a) Anthracene	NA	NA	NA	NA
Benzo (a) pyrene	NA	NA	NA	NA
Benzo (b) fluoranthrene	NA	NA	NA	NA
Benzo (k) fluoranthrene	NA	NA	NA	NA
Indeno-(1,2,3-cd) Pyrene	NA	NA	NA	NA
Dibenzo (a,h) Anthracene	NA	NA	NA	NA
Benzo (ghi) perylene	NA	NA	NA	NA
Bis (2-ethylhexyl) Phthalate	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA
Fluoranthracene	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA
Naphthalene	INH, ING, ABS, CON	10 ppm	10 ppm	250 ppm
Phenathrene	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA
Phenol	INH, ING, ABS, CON	5 ppm	5 ppm	250 ppm
2-Methyl phenol	INH, ING, ABS, CON	2.3 ppm	5 ppm	250 ppm
4-Methyl phenol	INH, ING, ABS, CON	2.3 ppm	5 ppm	250 ppm
1,4 Dichlorobenzene	INH, ING, ABS, CON	NA	75 ppm	150 ppm
Total Petroleum Hydrocarbons				
Gasoline Range	INH, ING, ABS, CON	NA	NA	NA

Notes:
1. Acceptable Exposure levels and IDLH concentrations were obtained from the NIOSH Pocket Guide to Chemical Hazards, June 1994
2. ppm = Parts Per Million;
3. INH = Inhalation; ING = Ingestion; ABS = Absorption; CON = Contact
4. NA = Not Available

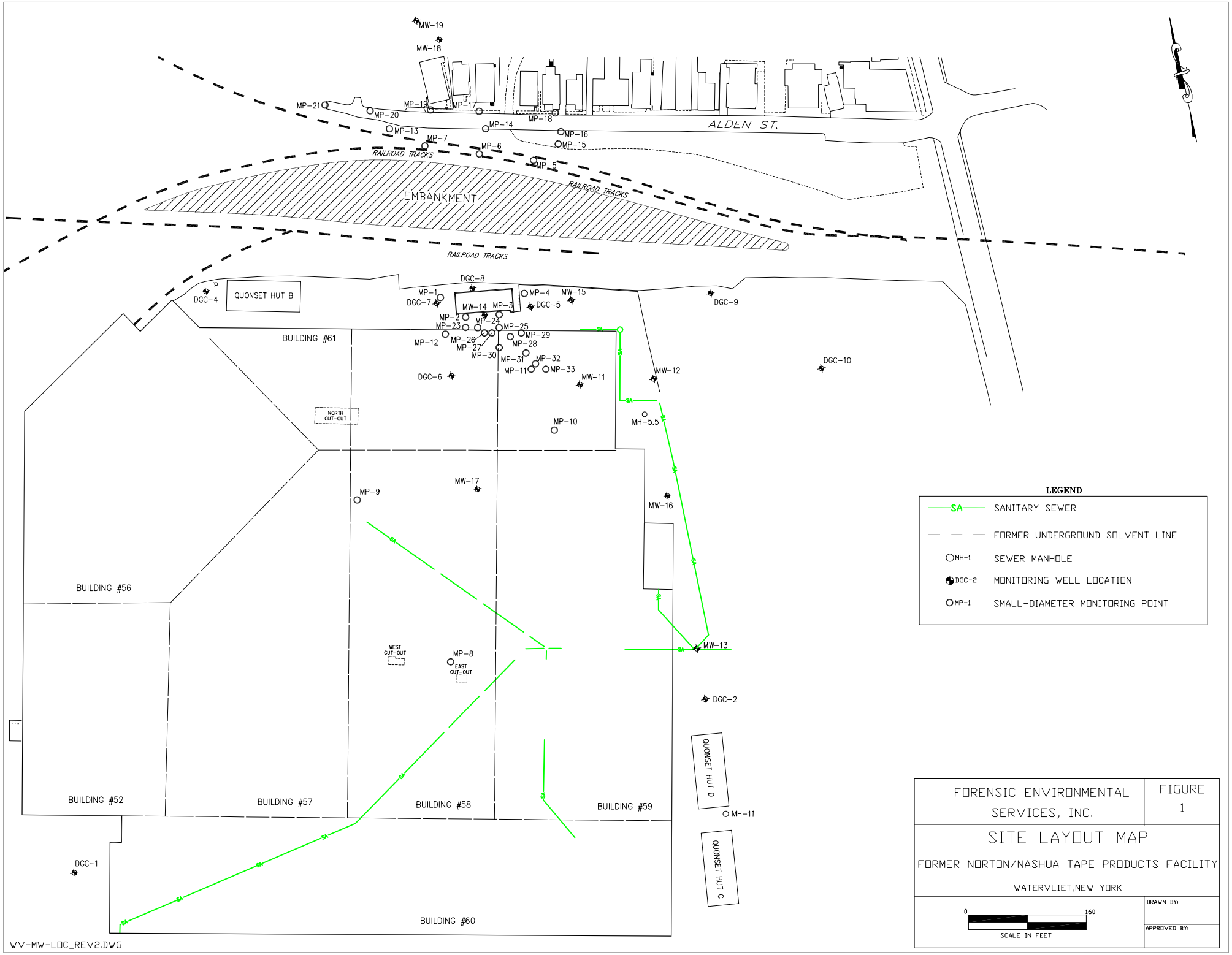
Table 2
PPE Requirements per Work Task
Former Norton/Nashua Tape Products Facility
Watervliet, New York

Work Task	Maximum Protection Level	Alternate Protection Level
Mobilization and Demobilization	Level D	Level D
Installation of EFR Extraction Wells and Monitoring Points	Level D or Level C* based on air monitoring results	Level D
Liquid-Level Data Collection	Level D	Level D
Groundwater Quality Sampling	Level D	Level D
Sanitary/Storm Sewer Water and Sediment Sampling	Level D or Level C* based on air monitoring results	Level D
EFR Pilot Testing and Associated Field Monitoring Activities	Level D or Level C* based on air monitoring results	Level D
Source Removal (Soil Excavation) Activities	Level D or Level C* based on air monitoring results	Level D
Monitoring Well Installation Activities	Level D or Level C* based on air monitoring results	Level D
In-Situ Chemical Oxidation (ISCO) Activities	Level D or Level C* based on air monitoring results	Level D

Notes:

1. Specific requirements for PPE are discussed in the HASP.
2. Alternate protection levels if monitoring levels indicate that conditions are appropriate.
3. * = Level C: to be worn when the criterion for using air-purifying respirators are met and a lesser level of skin protection is required

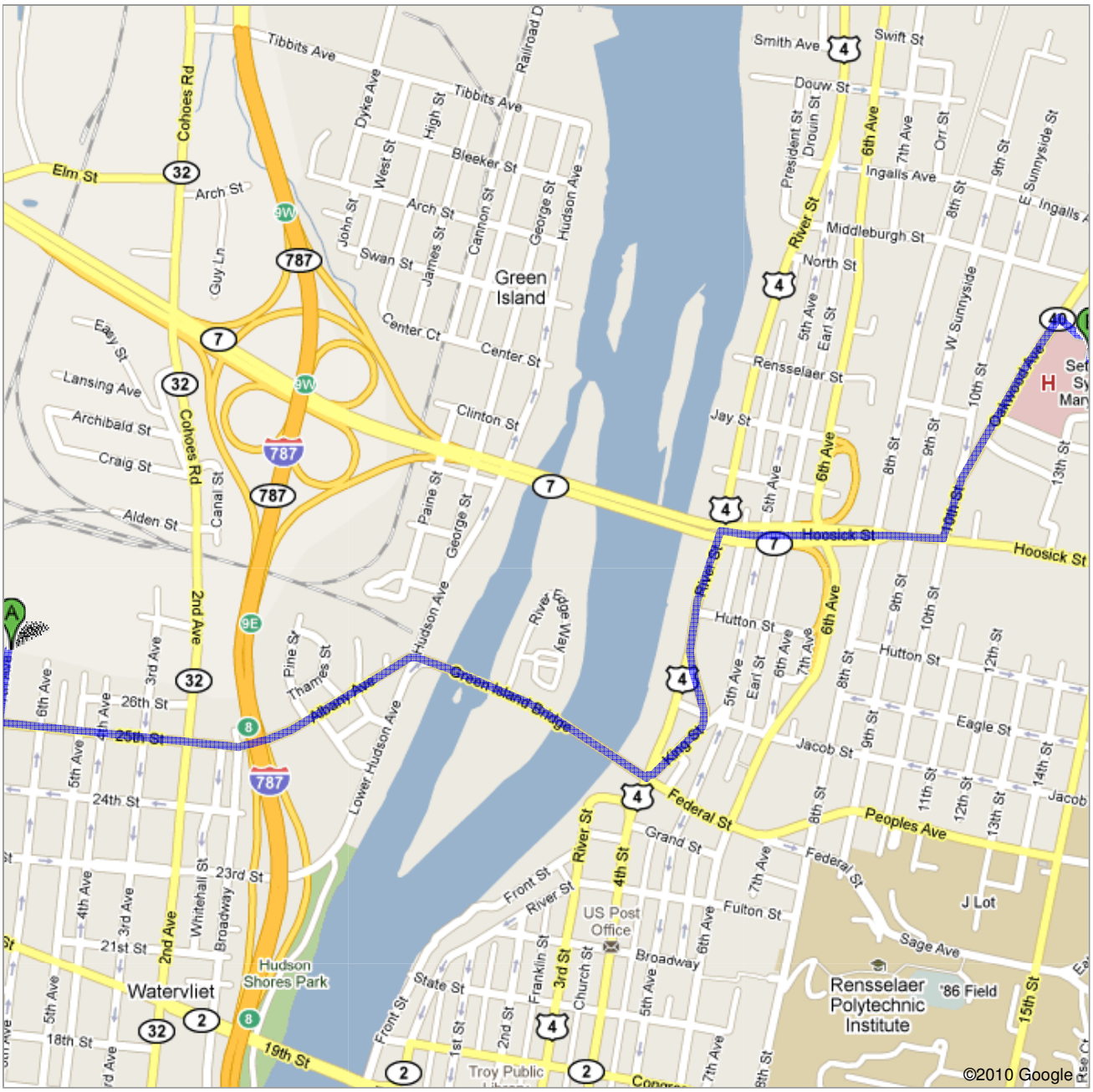
FIGURES


MW-19
MW-18
MP-21
MP-20
MP-19
MP-17
MP-18
MP-14
MP-16
MP-15
MP-13
MP-7
MP-6
MP-5
ALDEN ST.
RAILROAD TRACKS
EMBANKMENT
RAILROAD TRACKS
RAILROAD TRACKS
DGC-8
DGC-4
QUONSET HUT B
MP-1
DGC-7
MW-14
MP-3
MP-4
MW-15
DGC-5
DGC-9
MP-2
MP-24
MP-23
MP-25
MP-29
BUILDING #61
MP-12
MP-26
MP-28
MP-27
MP-30
MP-31
MP-32
MP-11
MP-33
MW-11
MW-12
DGC-10
DGC-6
NORTH CUT-OUT
MP-10
MH-5.5
MW-17
MP-9
MW-16
BUILDING #56
WEST CUT-OUT
MP-8
EAST CUT-OUT
MW-13
DGC-2
QUONSET HUT D
MH-11
BUILDING #52
BUILDING #57
BUILDING #58
BUILDING #59
DGC-1
QUONSET HUT C
BUILDING #60
SA
LEGEND
SANITARY SEWER
FORMER UNDERGROUND SOLVENT LINE
MH-1 SEWER MANHOLE
DGC-2 MONITORING WELL LOCATION
MP-1 SMALL-DIAMETER MONITORING POINT
FORENSIC ENVIRONMENTAL SERVICES, INC.
FIGURE 1
SITE LAYOUT MAP
FORMER NORTON/NASHUA TAPE PRODUCTS FACILITY
WATERVLIET,NEW YORK
0
160
SCALE IN FEET
DRAWN BY:
APPROVED BY:
WV-MW-LOC_REV2.DWG

APPENDICES

Google maps

Directions to 1300 Massachusetts Ave, Troy, NY 12180
2.2 mi – about **8 mins**



A 2600 7th Ave, Watervliet, NY 12189

	1. Head **south** on **7th Ave** toward **25th St**	go 0.1 mi total 0.1 mi
	2. Take the 1st **left** onto **25th St** About 2 mins	go 0.4 mi total 0.5 mi
	3. Continue onto **Albany Ave**	go 0.3 mi total 0.8 mi
	4. Continue onto **Green Island Bridge**	go 0.3 mi total 1.1 mi
	5. Turn **left** at **River St** About 1 min	go 33 ft total 1.1 mi
	6. Take the 1st **right** onto **King St**	go 0.2 mi total 1.3 mi
	7. Continue onto **River St**	go 0.2 mi total 1.5 mi
	8. Turn **right** at **Hoosick St** About 2 mins	go 0.3 mi total 1.8 mi
	9. Turn **left** at **10th St**	go 466 ft total 1.9 mi
	10. Continue onto **Oakwood Ave**	go 0.3 mi total 2.2 mi
	11. Turn **right** at **Massachusetts Ave**	go 292 ft total 2.2 mi
	12. Turn **right** to stay on **Massachusetts Ave** Destination will be on the right	go 164 ft total 2.2 mi

B 1300 Massachusetts Ave, Troy, NY 12180

APPENDIX B

TRACER GAS MONITORING PROTOCOL
(Appendix C of 2008 CMS Workplan)

APPENDIX C

Tracer Gas Monitoring Protocol

Tracer gas monitoring will be performed per the 2006 NYSDOH guidance document immediately before and immediately after collection of environmental samples from the sub-slab VMP to confirm the integrity of the VMP (and associated fittings). Pre-sampling tracer gas monitoring will be performed as follows:

- Remove the VMP plug and connect the open end of approximately two to three feet of dedicated ¼-inch ID Teflon tubing to the VMP compression fitting (or nipple). Use the VMP plug to seal the open end of the tubing.

- Insert the plugged end of the Teflon tubing through the opening on the top of the tracer gas flux chamber. Seal the tubing penetration with beeswax.

- Place a piece of plastic sheeting measuring approximately 2 feet by 2 feet over the VMP and seal the sheeting to the slab/floor with duct tape. Puncture the plastic sheeting to expose the VMP compression fitting (or nipple). Seal the flux chamber to the surface with beeswax.

- Open the inlet valve and outlet valve on the flux chamber and connect a short length of Teflon tubing to each.

- Connect the helium source to the inlet valve tubing and open the valve on the helium source allowing helium to enter the flux chamber. Any excess vapor pressure will be relieved via the outlet valve (see above).

- Activate the helium detector and connect it to the outlet valve tubing. Continue to introduce helium into the flux chamber until helium is detected at the outlet valve. Close the helium source valve and flux chamber inlet valve.

- Record the % helium in the flux chamber. Close the outlet valve.

- Unplug the sample tubing and connect to a low-flow peristaltic pump. Collect a one-liter (L) Tedlar bag sample at a flow rate of less than 0.2 liters per minute (lpm).

- After the Tedlar bag is filled, deactivate the pump, and seal the Tedlar bag.

- Connect the sample tubing to a 6L Summa canister positioned adjacent to the flux chamber in preparation for later sampling.

- Screen the Tedlar bag sample for helium by connecting it to the helium detector.

- If no helium is detected in the Tedlar bag sample (or if the ratio of the helium in the Tedlar bag versus the flux chamber is less than 1:5), seal the Tedlar bag sample and set it aside for later volatile organic compound (VOC) screening with a photoionization detector (PID). Proceed with VMP sampling.

- If pre-sampling tracer gas monitoring indicates a 20% leak by volume or greater, check the integrity of the VMP and all fittings, correct if possible, and return to the first step of pre-sampling tracer gas monitoring. If the integrity of the fitting cannot be corrected in the field (i.e., the VMP needs to be resealed or is defective), terminate VMP sampling (and any concurrent indoor air sampling) until the problem is corrected.

Post-sampling tracer gas monitoring will be performed as follows:

- Terminate VMP sampling by recording the post-sample vacuum, closing the Summa canister sample valve, and disconnecting and plugging the sampling tubing.

- Screen the flux chamber by connecting the helium detector to the outlet valve tubing and opening the outlet valve. If helium is not detected, recharge the flux chamber until helium is detected at the outlet valve. Close the helium source valve and flux chamber inlet and outlet valves.

- Unplug the VMP sample tubing and connect to a low-flow peristaltic pump. Collect a 1-L Tedlar bag sample at a flow rate of less than 0.2 lpm.

- After the Tedlar bag is filled, deactivate the pump, and seal the VMP and Tedlar bag.

- Screen the Tedlar bag sample for helium by connecting it to the helium detector.

- If no helium is detected in the Tedlar bag sample (or if the ratio of the helium in the Tedlar bag versus the flux chamber is less than 1:5), tracer gas monitoring is complete. Seal the Tedlar bag sample and set it aside for later VOC screening.

- Remove the sample tubing and plug the VMP. Restore the floor to its previous condition to the extent practicable. Submit the Summa canister for laboratory analysis.

- If post-sampling tracer gas monitoring indicates a 20% leak by volume or greater, set aside the Summa canister (and any concurrent ambient indoor air samples) for optional lab submittal. Check the integrity of the VMP and all fittings, correct if possible, and begin collection of a replacement VMP sample starting with pre-sample tracer gas monitoring (or schedule a follow-up sampling date). If the integrity of the fittings cannot be corrected in the field (i.e., the VMP needs to be resealed or is defective), postpone additional sampling until the problem is corrected, and restore the sampling area as described above.