2016
Periodic Review Report
Mr. C's Dry Cleaners Site
NYSDEC Site No. 915157
Village of East Aurora
Erie County, New York

January 2017

Prepared for:

NEW YORK STATE
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List of Abbreviations and Acronyms

AGC	annual guideline concentrations
Agway site	Agway Retail Store and Agway Energy Products site
AS	air sparging
ATDV	automatic tank drain valve
BGS	below ground surface
BTEX	benzene, toluene, ethyl benzene, and xylene
cVOC	chlorinated volatile organic compound
DER	Division of Environmental Remediation
EEEPC	Ecology and Environment Engineering, P.C.
EPA	(United States) Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
GAC	granular activated carbon
GES	Groundwater & Environmental Services, Inc.
gpm	gallons per minute
IAQ	indoor air quality
IC/EC	institutional controls and engineering controls
IO&MM	Inspection, Operations, Maintenance, and Monitoring
IEG	Iyer Environmental Group, PLLC
LTGM	Long-term groundwater monitoring
$\mu g/m^3$	micrograms per cubic meter
Matrix	Matrix Environmental Technologies, Inc.
MBE	minority-owned business enterprise
MPI	Malcolm-Pirnie, Inc.
MTBE	methyl tert-butyl ether
NYSDEC	New York State Department of Environmental Conservation

List of Abbreviations and Acronyms (cont.)

NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
O & M	operation and maintenance
OM&M	operations, maintenance, and monitoring
OMEI	O&M Enterprise, Inc.
PCE	perchloroethylene, or tetrachloroethene
PLC	programmable logic controller
PRR	Periodic Review Report
QIS	Quality Inspection Services, Inc.
PVC	polyvinyl chloride
RI	remedial investigation
ROD	record of decision
SGC	short-term guideline concentrations
SIM	Selected Ion Monitoring
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SSDS	subslab depressurization system
STL	Severn-Trent Laboratories, Inc.
SVE	soil vapor extraction
SVI	soil vapor intrusion
SVII	Soil Vapor Intrusion Investigation
TAGM	Technical and Administrative Guidance Memorandum
TCA	trichloroethane
TCE	trichloroethylene
TUO	temporary use and occupancy
Tyree	The Tyree Organization, Ltd.
VOC	volatile organic compound

Enclosure 1

Engineering Controls – Engineering Standby Contractor Certification Form

Mr. C's Dry Cleaners Site
NYSDEC Site Number – 915157

Executive Summary

The 2016 Periodic Review Report (PRR) describes the effectiveness of the operations, maintenance, and monitoring (OM&M) work being performed at the Mr. C's Dry Cleaners Site (Mr. C's site), New York State Department of Environmental Conservation (NYSDEC) Site No. 915157, for the period from January 1 to December 31, 2016. The groundwater pumping and treating system was shut down from February 4 through October 6, 2016 as directed by NYSDEC. The PRR also recommends additional actions to support eventual site closure.

The current OM&M work for the site is being performed by Ecology and Environment Engineering, P.C. (EEEPC) under Work Assignment D007617-11.1, which was approved by the NYSDEC Division of Environmental Remediation on May 27, 2015. The EEEPC site management work assignment is to continue until July 31, 2017.

The Mr. C's site is located at 586 Main Street in the village of East Aurora, Erie County, New York. The environmental contamination associated with the site resulted from the improper handling and management of perchloroethene (PCE), also known as tetrachloroethene, a solvent used in the dry cleaning process. The poor management practices resulted in contamination of the groundwater beneath and downgradient of the Mr. C's facility.

The groundwater pumping and treatment system has recovered and treated contaminated groundwater beneath and downgradient of the site since its installation in 2002. OM&M services for the Mr. C's site treatment system and ancillary equipment have been performed by EEEPC since November 2003. Remedial operations were also conducted at nearby properties where subslab depressurization systems (SSDS) were installed in 2004, 2005, 2013, 2014, 2015, and 2016.

A network of 26 groundwater monitoring wells, eight groundwater pumping wells, and 32 piezometers are located on the Mr. C's site and adjacent properties. Monitoring of and analytical reporting for the groundwater monitoring well network and recovery wells are performed on an annual basis. Long-term monitoring and reporting of the wells was performed in 2016 (see Appendix C).

Effectiveness of the Remedial Program in 2016

The effectiveness of the remedial systems at the Mr. C's site during the 2016 reporting period is described below.

- **Mr. C's Remedial Groundwater Pumping and Treatment System**

  The groundwater pumping and treating system was shut down from February 4, 2016 to October 6, 2016 as directed by NYSDEC in order to evaluate possible rebound of contaminants. Based on the reported hours of operation for 2016, the Mr. C's remedial groundwater pumping and treatment system effectively operated 100.0% of the time; the goal stated in the Record of Decision (ROD; NYSDEC 1997, 2000) is an uptime of 90%. The system treated 1,386,217 gallons of contaminated groundwater in 2016 and removed 6.75 pounds of volatile organic compounds (VOCs). In 2016, the treatment system had a contaminant-removal efficiency of 99.1%. The volume of contaminants removed has generally decreased over the past 14 years. This trend is directly related to the reduced volume of groundwater being removed. From treatment startup until December 2016, approximately 1,614 pounds of VOCs have been removed.

  The remedial treatment system and equipment continues to achieve the remedial objectives established by the ROD for the site.

- **Soil Vapor Intrusion Investigations (SVII), Phases I, II, and III**

  On January 16, 2016, an additional fan was added to the SSDS at 591 Main Street as a part of the Phase II SVII. The results of post-construction air sampling performed on January 21, 2016, showed the system was operating effectively. Additional SSDS units are recommended for 23 and 31 Paine Street as part of Phase III of the SVII program, and an SSDS design has been initiated for 31 Paine Street. Based on the results of conversations between NYSDEC and NYSDOH, SVIIs are proposed for nine additional properties (541 Fillmore Avenue; 527 Main Street; 17 and 33 Elm Street; 32, 36, 39, and 42 Paine Street; and 45 Savage Place). The SVII program is currently not funded and is on hold until funding has been secured.

- **Subslab Depressurization Systems**

  Subslab depressurization systems (SSDSs) were initially installed at two facilities in 2004 and 2005 based on site inspections and analytical results. Based on the results of further SVII work performed in 2013, two additional SSDSs were installed in 2014 by TREC Environmental (a subcontractor to Groundwater & Environmental Services, Inc., of Cheektowaga, New York), and one SSDS was installed by IYER Environmental Group, PLLC, of Orchard Park, New York. Based on the results of SVII work performed in 2014, four additional SSDSs were installed in 2015 by Groundwater & Environmental Services, Inc., and one additional SSDS system was installed in 2016 at 591 Main Street by the same company. The nine SSDSs currently installed in and around the site were not part of the original remedy for the Mr. C's site.

  Final Engineering Reports along with record drawings and post-installation analytical testing were submitted to NYSDEC and NYSDOH for all nine installation locations in 2016.

- **Groundwater Monitoring Well Network**

  The Long-term Groundwater Monitoring (LTGM) program was established in 2002. In 2012, eight monitoring wells were replaced, two new monitoring wells were installed, and six damaged wells were decommissioned in accordance with NYSDEC's monitoring well decommissioning policy CP-43 (NYSDEC 2009). Twenty-six monitoring wells, eight pumping wells, and 32 piezometers comprise the groundwater monitoring well network. At present, groundwater is not being used as a potable water source in the current area of concern around the site.

  In April through May 2016, 22 monitoring wells, six pumping wells, and 4 piezometers were sampled as a part of the LTGM program to assess the rebound in contaminant levels that were expected to result from the deactivation of the groundwater treatment system over a three-month period. The sampling results provided little evidence of contaminant rebound. Of the eight wells/piezometers where PCE increases were observed, only four were within 50 feet of a pumping well. The other increases most likely stemmed from reduced hydraulic control in the absence of the pump-and-treat system.

  The Groundwater Bioremediation pilot study has shown reduction in PCE concentrations in the study area, where contamination now consists of the daughter or breakdown products of PCE primarily of cis-DCE. Each PCE degradation by-product is lighter and more mobile than PCE. Contaminated groundwater beneath the site has expanded northwest in the direction of groundwater flow as a result of the greater mobility of the PCE degradation by-products and turning off of pumping wells PW-5 and PW-7 during the pilot study to limit secondary impacts of the bio-injected materials on the treatment system. The 2016 results of the LTGM program and comparison to the results from previous years are presented in Section 5.

- **Remedial Site Optimization (RSO)**

  The Bioremediation Pilot Study was initiated in May 2013 and completed in June 2014. The pilot study successfully determined that bioremediation technologies can be effective at reducing PCE concentrations at the Mr. C's site and confirmed that a complete degradation pathway exists to the non-hazardous degradation by-product of ethene. With this determination, a final RSO report was submitted to NYSDEC on September 23, 2016 (EEEPC 2016a). The report evaluated remediation alternatives consisting of one or a combination of pump-and-treat and bioremediation technologies. The alternatives were evaluated on the bases of implementability, effectiveness, cost, and time to reach the Remedial Action Objectives (RAOs). The recommendation of the report was Provect-IR® for bioremediation source control and a permeable reactive barrier for migration control.

  The RSO recommended shutdown of the groundwater pumping and treatment system as it is no longer effective as plume migration control and has declining efficiencies as a source control. The Pulsed Pumping Work Plan details a pumping and sampling plan that may support the shutdown of the groundwa-

ter pumping and treatment system. If the pulsed pumping does not show greater cVOC removal is achievable and instead continues to support asymptotic cVOC removal, then the system may be shutdown. The Pulsed Pumping Work Plan (EEEPC 2016b) was submitted to NYSDEC for review on October 31, 2016. Comments were received from NYSDEC November 23, and the plan was approved on December 6, 2016. The Pulsed Pumping Work Plan is discussed in greater detail in Section 6.4.

Site Management Plan

The Site Management plan was not updated in 2016, since no major changes in the environmental management of the site has occurred.

Compliance

Currently, the ICs and ECs outlined in the SMP remain in force, and the site is in compliance with the site remedy specified in the ROD issued in March 1997 (NYSDEC 1997) and modified by the Explanations of Significant Differences (ESD) issued in April 2000 (NYSDEC 2000). The SMP stipulates the required inspection, maintenance, and monitoring event frequency for the remedial and monitoring elements at the Mr. C's site.

EEEPC subcontracted the OM&M services to Iyer Environmental Group, PLLC (IEG), of Orchard Park, New York, for the entire period of the work assignment. EEEPC provided oversight of the OM&M work. In 2016, EEEPC issued monthly OM&M reports for the operation of the groundwater pumping and treatment system and the effluent discharge to Tannery Brook.

On February 4, 2016, the pump-and-treat system was shut down so that the possible rebound of contaminants in groundwater could be evaluated. While the system was down, no influent or effluent sampling was performed, but water level measurements were taken at monitoring wells, pumping wells, and piezometers. Groundwater sampling was performed on April 25 through May 2, 2016, to evaluate possible contaminant rebound. The system was restarted on October 6, 2016, after NYSDEC reviewed the RSO report for determination of the future treatment requirements for the site. Influent and effluent samples from the groundwater pumping and treatment system were collected on October 26, 2016, and analyzed to determine the effectiveness of the treatment system. Sample results port-start up detected 498 µg/L total VOCs, which is much less than the 692 µg/L total VOCs detected in January 2016 prior to system shutoff and does not indicate any contaminant rebound. Due to this, a proposal for a pulsed pumping plan was requested by NYSDEC that would provide a process for meeting the DER-10 requirements for closure of the site.

The remedial treatment system and ancillary equipment operated in compliance with the requirements of the SMP and the State Pollutant Discharge Elimination System (SPDES) Equivalency Permit throughout 2016. The analytical results from the effluent samples collected in January 2016 exceeded the SPDES Equivalency Permit limits. As a result, corrective actions (i.e., cleaning of air stripper

trays and adjusting differential pressures in the air stripper) were performed in accordance with the SMP. Corrective actions followed by additional influent and effluent sampling continued until compliance had been achieved. Increases in influent cis-DCE concentrations from the breakdown of PCE from the bioremediation program resulted in several failures of the remedial treatment system effluent to comply with the SPDES Equivalency Permit in 2014. cis-DCE has a lower Henry's Law constant, which made it harder to remove the contaminant by air stripping. The treatment system was adjusted by changing the blower fan speed to bring the system back into compliance. Elevated levels of cis-DCE continued throughout 2015 and 2016, but alterations of blower speed, adjustment of differential pressures in the air stripper, and system cleaning have enabled the treatment system to meet permit limits.

Recommendations

Section 6 of the PRR provides recommendations that support eventual site closure or a change in site classification. Recommended remedial actions include the following:

1. Perform the approved pulsed pumping operation of the Mr. C's remedial groundwater treatment system with continued OM&M.
2. Prepare and submit the results of the pulsed pumping plan for evaluation with regard to DER-10's remedial site closure requirements.
3. Completion of the SVIIs of nine existing structures around the Mr. C's site to evaluate the need to install SSDS units.
4. Installation of SSDS units in the existing structures around the Mr. C's site based on analytical test results and direction from NYSDEC and NYSDOH.

5 Continued inspection, maintenance and air monitoring of the existing structures with SSDS units.

6. Continue the Long Term Groundwater Monitoring program and evaluate the results on an annual basis.
7. Continue to evaluate the SMP and submit recommended changes to the SMP based on upgrades/changes in treatment system(s) at the site.

9. Continue annual PRR reporting.

1 Site Overview

In accordance with the requirements specified in the current Mr. C's Site Management Plan (SMP) (EEEPC 2015a), this PRR presents information on the operations, maintenance, monitoring, compliance activities, and associated costs for the Mr. C's Dry Cleaners Site (Mr. C's site) during calendar year 2016. Because the volatile organic compound (VOC) contaminant plume (consisting mainly of tetrachloroethene [PCE] and its degradation by-products) extends beyond the immediate Mr. C's site treatment system facility, this PRR was prepared for the following systems located in the village of East Aurora, Erie County, New York, which are collectively operated, maintained, and monitored under the overall Mr. C's site Work Assignment:

- The Mr. C's site remedial treatment system, located at 586 Main Street;
- The groundwater pumping and recovery network;
- The former Agway Retail Store and Agway Energy Products site (former Agway site) AS/SVE system, located at 566 Main Street (decommissioned in 2011, with equipment removed in 2013 and piping removed in 2014);
- Nine subslab depressurization systems located within and around the site at the following properties:
  - 9 Paine Street (First Presbyterian Church) – three-fan system units installed fall 2004;
  - 27 Whaley Avenue (private residence) – single-fan system installed fall 2004;
  - 572-576 Main Street (commercial building) – two-fan system units installed August 2014;
  - 578-580 Main Street (commercial building) – single-fan system installed August 2014;
  - 586 Main Street, (Mr. C's Treatment Building) – single-fan system installed April 2014;
  - 586 Main Street, Suite 4 (Country Cupboard) – single-fan system installed February 2015;
  - 16 Paine Street (Boys & Girls Club) – single-fan system installed February 2015;

- 591 Main Street (commercial building) – two-fan system installed February 2015 and January 2016; and
- 594 Main Street (commercial building) – two-fan system installed February 2015.

■ The groundwater monitoring well network.

These systems are described below. A general location map is provided as Figure 1-1, and a site map is provided as Figure 1-2.

1.1 Site Treatment and Monitoring Systems

Mr. C's Dry Cleaners Site – Remedial Treatment System

The remedial treatment system consists of eight groundwater pumping wells, a groundwater treatment system, and appurtenances at the Mr. C's site. The groundwater wells pump contaminated groundwater through double-walled piping to the treatment system located at the Mr. C's site. The treatment facility uses air stripping to treat the contaminated groundwater. The treated effluent is then discharged through 1,300 linear feet of double-walled polyvinyl chloride (PVC) piping to Tannery Brook, a small tributary of the East Branch of Cazenovia Creek that flows through the village of East Aurora.

Subslab Depressurization Systems

In 2004 and 2005, SSDS units were installed at the First Presbyterian Church, located at 9 Paine Avenue (three fans) (NYSDEC 2004), and in the private residence at 27 Whaley Avenue (one fan) (NYSDEC 2005). In 2014, SSDS units were installed at the following properties: 586 Main Street (one fan), 572-576 Main Street (two fans), and 578-580 Main Street (one fan). In 2015, SSDSs were installed at the following properties: 16 Paine Street (one fan), 586 Main Street - Suite 4 (one fan), 591 Main Street (one fan), and 594 Main Street (two fans). In 2016, an additional SSDS was installed at 591 Main Street on the first floor (two fans total).

As a part of the installation program, the head custodian at the First Presbyterian Church and the property owners at the other properties were instructed on the general operations of the SSDS units. Each was provided with contact information for EEEPC and the operations, maintenance, and monitoring (OM&M) subcontractor in the event electrical or mechanical issues were encountered with the unit(s). The systems operate on a continuous basis. The access agreements to facilitate inspections and maintenance for SSDS units at 27 Whaley Avenue and the First Presbyterian Church are included in the 2015 SMP (EEEPC 2015a).

Final Engineering Reports were submitted for each property upon completion of SSDS installation. The reports summarize the activities completed to install the SSDS system and the analytical results for pre- and post-installation air sampling.

Groundwater Monitoring Well Network

During the remedial investigation (RI; MPI 1995a) phase at the site, a total of 31 monitoring wells (does not include pumping wells and piezometers) were installed to evaluate the movement and extent of the contaminant plume in the groundwater beneath and around the Mr. C's site. The network of monitoring wells consisted of observation wells installed by Earth Dimensions, Inc., of East Aurora, New York, in the late 1980s for the initial site assessment, and observation wells installed by Empire Soil Investigations, Inc., of East Aurora, New York, and Malcolm-Pirnie, Inc., of Orchard Park, New York, from 1992-1996, during the remedial investigation/feasibility study (RI/FS) (MPI 1995a, 1995b, and 1996). Monitoring wells were installed by Matrix in 1992-1993 to monitor groundwater at the former Agway site. Groundwater pumping wells, piezometers, and monitoring wells were installed as part of the remedial construction performed by the Tyree Organization, Ltd., of Latham, New York, in 2001-2002. Between 2004 and 2013, EEEPC installed additional monitoring wells and replacement wells and decommissioned damaged and inactive wells around the site, as necessary. No replacement, installation, or decommissioning of wells occurred in 2016. Currently, there are 24 active monitoring wells, six active pumping wells, and four active piezometers around the Mr. C's site.

The results of the 2016 Long-term Groundwater Monitoring Report are discussed in Section 2.3 and provided in Appendix C.

1.2 Site Management Plan

The original operations and maintenance (O&M) plan was issued by the contractor as part of the remedial project plan deliverables for final completion in September 2003. The document was amended by EEEPC in March 2005 because of the removal of the vapor-phase granular activated-carbon (GAC) units from the treatment process. The GAC units were removed by EEEPC based on an air modeling study performed by EEEPC in 2004 (EEEPC 2004a) and subsequently approved by NYSDEC.

The first revision to the O&M plan was prepared and submitted in January 2008 (EEEPC 2008). The O&M plan was revised to the current SMP format in 2012 (EEEPC 2012a) to describe measures to monitor and evaluate the performance and effectiveness of the ongoing remedial action with respect to the individual remedial units at and around the site, including the following:

- Operation and maintenance of the remedial treatment units,
- Groundwater and air sampling,
- Analysis of the individual environmental matrices, and
- Reporting.

The most recent version of the SMP (EEEPC 2015a), which was submitted in February 2015, included updates and results of the Bioremediation Pilot Study

and the 2014/2015 Heating Season Indoor Air & Subslab Vapor Sampling Plan (Appendix J of the SMP), and information on the installation of additional SSDSs.

1.3 Significant Remedial Activities in 2016

In 2016 significant remedial activities at the Mr. C's site included:

1. Performance of Phases I, II, and III of the planned soil vapor intrusion investigations (SVII) (see Section 5.2);
2. Finalized report of the Remedial Site Optimization alternatives for the Mr. C's Dry Cleaners Site (see Sections 5.5 and 6.3);
3. Installation of an additional SSDS unit at 591 Main Street, which NYSDOH determined was required based on the Phase II SVII results (see Sections 5.2 and 5.3). The need for SSDS units at 23 and 31 Paine Street was discussed with NYSDEC and NYSDOH based on the Phase III SVII results, and SSDS design was initiated for 31 Paine Street. The design and installation is to be discussed with the NYSDEC Project Manager in 2017;
4. Temporary shutdown of the groundwater pumping and treatment system (February through October) to determine whether contaminant rebound would occur if the system were to be shutdown permanently; and
5. Preparation and approval of a Phased Pulsing Plan on the west portion of the site to optimize the pump-and-treat system and determine whether groundwater contaminant removal has reached an asymptotic condition. If asymptotic removal is demonstrated, then the pump-and-treat system may be considered for shutdown.

Insert Figure page 1 of 2

1-1 General Site Location Map

Figure 1-1 page 2 of 2

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1-2 Mr. C's Dry Cleaners Site Location Map

Figure 1-2 page 2 of 2

2 Remedial Systems Compliance

The regulatory compliance requirements for the remedial groundwater treatment system at the Mr. C's site deal primarily with the discharge of treated effluent waters from the system. The original State Pollutant Discharge Elimination System (SPDES) Equivalency Permit for the site's remedial treatment system was part of the remedial construction contract (MPI 1999), which expired in April 2006. Although it was not renewed, continuance of the SPDES Equivalency Permit is being handled by the NYSDEC project manager.

2.1 Mr. C's Dry Cleaners Site

Groundwater Treatment System

The data presented here indicate the remedial operating systems associated with the Mr. C's site were in compliance with the operating requirements of the SMP in 2016. Due to the system being shutdown from February 4 to October 6, 2016, influent and effluent sampling was performed only in January, October, November, and December in 2016. The results for the first monthly effluent sample collected in January did not achieve the SPDES Equivalency Discharge Permit requirements. As a result, corrective actions (i.e., cleaning of air stripper trays and adjusting differential pressures in the air stripper) were performed in accordance with the SMP. Following the corrective actions taken in January, additional samples were collected, and the results indicated that compliance with the SPDES requirements had been achieved.

The effluent discharge criteria used for the remedial treatment system at the Mr. C's site are presented in Table 2-1. The effluent criteria are based on the SPDES Equivalency Permit.

Table 2-1 Mr. C's Dry Cleaners Site Remediation, Effluent Criteria

Parameter/Analyte	Daily Maximum[1]	Units
Flow	216,000	Gpd
pH	6.0 - 9.0	standard units
1,1-Dichloroethene	10	µg/L
1,2-Dichloroethane	10	µg/L
Trichloroethene	10	µg/L
Tetrachloroethene	10	µg/L
Vinyl chloride	10	µg/L

Table 2-1 Mr. C's Dry Cleaners Site Remediation, Effluent Criteria

Parameter/Analyte	Daily Maximum[1]	Units
Benzene	5	µg/L
Ethylbenzene	5	µg/L
Methylene chloride	10	µg/L
1,1,1-Trichloroethane	10	µg/L
Toluene	5	µg/L
Methyl tert-butyl ether	NA	µg/L
o-Xylene	5	µg/L
m, p-Xylene	10	µg/L
Xylenes, total	NA	µg/L
Iron, total[2]	600	µg/L
Aluminum[2]	4,000	µg/L
Copper[2]	48	µg/L
Lead[2]	11	µg/L
Manganese[2]	2,000	µg/L
Silver[2]	100	µg/L
Vanadium[2]	28	µg/L
Zinc[2]	230	µg/L
Total dissolved solids[2]	850	mg/L
Total suspended solids[2]	20	mg/L
Hardness	NA	mg/L
Cyanide, free[2]	10	µg/L

Notes:
[1] Daily Maximum excerpted from Attachment E of Addendum 1 to Construction Contract Document D004180.
[2] Removed from the contaminant parameter list by NYSDEC Region 9 in February 2005.

Key:
gpd = Gallons per day
µg/L = Micrograms per liter
mg/L = Milligrams per liter
NA = Not applicable

In 2016, PCE and cis-DCE influent concentrations remained similar to the influent concentrations of 2015. For more information on remedial treatment operations, refer to Section 4.1.

2.2 Subslab Depressurization Systems

First Presbyterian Church. Based on historically consistent sampling results below NYSDOH guidelines, NYSDEC directed that indoor air and subslab soil vapor sampling not be conducted in 2016. See Section 4.2 for a discussion of the 2016 inspections.

27 Whaley Avenue. In 2016, no indoor air sampling was performed at the 27 Whaley Avenue residence. Air sampling at the 27 Whaley Avenue residence was last performed in November 2010 (EEEPC 2011). See Section 4.2 for a discussion of the 2016 inspections.

572-576 Main Street. See Section 4.2 for a discussion of the 2016 inspections.

578-580 Main Street. See Section 4.2 for a discussion of the 2016 inspections.

586 Main Street, Suite 4. See Section 4.2 for a discussion of the 2016 inspections.

591 Main Street. Indoor air sampling was performed on January 21, 2016, to verify the success of the SSDS put in operation on January 12, 2016. The sample results showed that TCE in the ambient air had decreased from 6.77 µg/m^3 to non-detect, and PCE in ambient air had decreased from 8,820 µg/m^3 to 1.97 µg/m^3. See Section 4.2 for a discussion of the 2016 inspections.

594 Main Street. See Section 4.2 for a discussion of the 2016 inspections.

16 Paine Street. See Section 4.2 for a discussion of the 2016 inspections.

586 Main Street - Mr. C's Treatment Building. No indoor air sampling completed because of the processing of VOC contaminated groundwater through the treatment equipment in the building. See Section 4.2 for a discussion of the 2016 inspections.

2.3 Groundwater Monitoring Well Network

Completion of the site remedy requires the groundwater quality to be remediated to meet the NYSDEC Class GA groundwater standards (NYSDEC 1998) to the extent practicable. Monitoring of the groundwater well network indicates that VOC contamination remains above the applicable standards, criteria, and guidance values.

Table 2-2 identifies the VOCs detected during the 2016 LTGM program (see Appendix C) using EPA method 8260 and compares these results to the applicable Class GA standard. The results are discussed in Section 5.4.1.

Insert table 2-2 (4 pages - xls.) 8 ½ x 11 landscape

2-2 Summary of Positive Analytical Results for Groundwater Samples

3 Site Institutional and Engineering Controls Compliance Reporting

Institutional controls (ICs) and engineering controls (ECs) are employed on the Mr. C's site to support remedial operations. Evaluations of the ICs and ECs in 2016 are provided below.

3.1 Institutional Controls

3.1.1 Mr. C's Dry Cleaners Site

Permanent easements, temporary use and occupancy (TUO) agreements, and access agreements have been obtained to provide access to nine private and public properties. The access was obtained to facilitate operation of the Mr. C's site remedial treatment system and groundwater pumping locations. Information on the permanent easements, TUO agreements, and access agreements for the Mr. C's site remedial treatment facility and groundwater pumping locations is provided in appendices to the SMP for the Mr. C's site (EEEPC 2015a).

The main ICs for the Mr. C's site are TUO agreements for the piping and treatment facility at the Mr. C's site (586 Main Street) and the former Crawford property (584 Main Street), both of which are currently owned by Deltora, LLC.

Based on a review of property ownership associated with the Mr. C's site by the Village of East Aurora Assessor (see Appendix A), as of March 1, 2016, there was one change in property ownership during the 2016 reporting year. The property at 23 Paine Street was bought from David Samuel Shapiro and sold to David Dubois, who also owns the property at 27 Whaley Avenue (Town of Aurora 2016).

3.1.2 Groundwater Monitoring Well Network

There are 26 groundwater monitoring wells, eight groundwater pumping wells, and 32 piezometers in the groundwater monitoring well network. These wells are located on private property and in the rights-of-way of village streets.

The necessary access agreements for the future maintenance and monitoring of the various recovery and monitoring wells have been obtained for each location (see Table 3-1). No changes to these access agreements were made in 2016.

The permanent easements and TUO agreements for the groundwater monitoring wells, pumping wells, and piezometers are adequate at this time; any additional ICs pursued in the future will be at the discretion of NYSDEC. Table 3-1 lists the status of the ICs for the properties across the Mr. C's Dry Cleaners site and for the off-site monitoring well network. This information can be used to facilitate future decisions regarding ICs.

Table 3-1 Institutional Controls - Review of Easements/TUOs

Location	Controls in Place?	Extent and Type of Control	Recommended TUO Actions?	
			New	Modify
Mr. C's Dry Cleaners site (586 Main Street) and the former Crawford property (584 Main Street), both owned by Deltora, LLC.	Yes	TUO agreement for piping and treatment facility. Wells MPI-7I and ESI-3 are covered under this TUO. MPI-71 was decommissioned and replaced with monitoring well MPI-7I-R in December 2011.	No	No
Former Agway site (566 Main Street)	Yes	TUO agreement for drainage pipeline, construction easement for rectangular area north of pipeline (expired), temporary vehicle parking for library patrons (2001) (expired), and vehicular parking for Department and contractor employees for the duration of the agreement (expired). No known IC for the existing wells on the corner of Whaley Avenue and Main Street, including MWs 1-14, MPI-10B, and MPI-5S and new well EE-4.	No	No
First Presbyterian Church (9 Paine Street)	Yes	Temporary access agreement for inspection and maintenance on SSDS systems. Modify existing access agreement to include monitoring wells MPI-3S, MPI-1S, ESI-6, MPI-12B, and EE-3 (new).	No	Yes
27 Whaley Avenue (DeBois property)	Yes	Temporary access agreement for inspection and maintenance on SSDS system.	No	No
East Aurora Public Library (550 Main Street)	Yes	Permanent easement for the purposes of constructing, reconstructing, and maintaining the drainage pipeline, drainage structures, and appurtenances. Well MPI-6S is covered under this easement. Modify existing access agreement to include monitoring wells MPI-4S and MPI-4I.	No	Yes
Pitt property (19 Whaley Avenue)	Yes	TUO agreement for pumping well PW-5 and piezometers PZ-5A-D.	No	No[1]
Brownschidle property (578 Main Street)	Yes	TUO agreement for pumping and force main discharge pipelines on the property.	No	No

Table 3-1 Institutional Controls - Review of Easements/TUOs

Location	Controls in Place?	Extent and Type of Control	Recommended TUO Actions?	
			New	Modify
People, Inc., property (538 Main Street)	Yes	TUO agreement for pumping pipe line on the northeast corner of the property. Modify existing TUO agreement to include monitoring well EE-2.	No	Yes
Village of East Aurora	Yes	TUO agreement for Ridge Road, outlet to Tannery Brook, and Whaley Avenue right-of-way.	No	No
Railroad property	No	No known IC for MW ESI-1; however, this well could not be found and is considered abandoned.	No	NA
Village of East Aurora – Village Hall (571 Main Street)	No	No known IC for MPI-2S. MPI-2S was decommissioned and replaced in December 2011 with MPI-2S-R.	No	NA
Future Fitness, Inc., property (594 Main Street)	No	No known IC for MW ESI-2. Well not found in 2011; replaced in December 2011.	Yes	NA
524 Main Street	No	No TUO agreement for MW MPI-11B, which has never been sampled. This well was covered with compacted stone when the property owner repaved their lot. This well is considered abandoned.	No	NA
Iwankow property (511 Fillmore Avenue)	No	No known IC for MPI-15B. Not found in 2011. This well is considered abandoned.	No	NA

Notes:
[1] Modification would be needed for any other type of remedial work.

Key:
MW = Monitoring Well
NA = Not Applicable
PW = Pumping Well
TUO = Temporary Use and Occupancy

3.2 Engineering Controls

The ECs that support remedial operations at the Mr. C's site, the First Presbyterian Church (9 Paine Avenue), and the properties at 27 Whaley Avenue, 572-576 Main Street, 578-580 Main Street, 586 Main Street (Suite 4), 591 Main Street, 594 Main Street, and 16 Paine Street are listed in Tables 3-2 through 3-4. Routine inspections confirm that the ECs are consistently operating as designed.

3.2.1 Mr. C's Dry Cleaners Site – Groundwater Treatment System

In 2016, the results of the inspections of the groundwater treatment system (while it was in use), pumping wells, and piezometers were reported monthly to NYSDEC. The monthly reports for 2016 are included in Appendix B. The OM&M service inspection requirements are described in the SMP. Table 3-2 lists the ECs for the Mr. C's site and the current status of each control.

Table 3-2 Engineering Controls – Mr. C's Dry Cleaners Site Groundwater Treatment System

EC Description	In Place?	Operating?	Still Required?
Bag filters	Yes	Yes	Yes
Air stripper	Yes	Yes	Yes
Blowers	Yes	Yes	Yes
Equalization tank	Yes	Yes	Yes
Influent/effluent conveyance piping	Yes	Yes	Yes
Groundwater pumping wells and pumps	Yes	Yes	Yes
Sequestering agents and pumps	Yes	Yes	Yes

3.2.2 Subslab Depressurization Systems

There are nine SSDS systems in and around the site, including four SSDS systems that were installed in 2015. The SSDS systems are monitored per the procedures described in the SMP (EEEPC 2015a). Table 3-3 lists the ECs for the SSDS units and the current status of each control.

The SSDS units at 572-576 Main Street, 586 Main Street (Mr. C's building and Country Cupboard), and 591 Main Street were inspected on December 7, 2016; the SSDS units at 578-580 Main Street and 16 Paine Street were inspected on December 13, 2016; and the SSDS units at the First Presbyterian Church (9 Paine Street), 27 Whaley Avenue, and 594 Main Street were inspected on December 21, 2016 (see Section 4.2 for additional information). All inspected systems were found to be operating as designed.

Table 3-3 Engineering Controls – Subslab Depressurization Systems

Property	EC Description	In Place?	Operating?	Still Required?
9 Paine Street (First Presbyterian Church)	SSDS units (3) and vapor-extraction piping	Yes	Yes	Yes
27 Whaley Avenue	SSDS units (1) and vapor-extraction piping	Yes	Yes	Yes
Mr. C's Building at 586 Main Street	SSDS units (1) and vapor extraction piping	Yes	Yes	Yes
572-576 Main Street	SSDS units (2) and vapor-extraction piping	Yes	Yes	Yes
578-580 Main Street	SSDS units (1) and vapor extraction piping	Yes	Yes	Yes
591 Main Street (Commercial Building)	SSDS units (2) and vapor extraction piping	Yes	Yes	Yes

Table 3-3 Engineering Controls – Subslab Depressurization Systems

Property	EC Description	In Place?	Operating?	Still Required?
594 Main Street (Aurora Outfitters)	SSDS units (2) and vapor extraction piping	Yes	Yes	Yes
586 Main Street, Suite 4 (Country Cupboard)	SSDS units (1) and vapor extraction piping	Yes	Yes	Yes
16 Paine Street (Boys and Girls Club)	SSDS units (1) and vapor extraction piping	Yes	Yes	Yes

3.2.3 Groundwater Monitoring Well Network

The groundwater monitoring wells, pumping wells, and piezometers were observed during sampling events under the LTGM program. The observations are documented in the purge logs provided with the long-term groundwater monitoring data in Appendix C. Table 3-4 lists the ECs for the groundwater monitoring well network and the current status of each control.

Table 3-4 Engineering Controls – Area-wide Monitoring Well and Pumping Well Network

EC Description	In Place?	Operating?	Still Required?
Groundwater monitoring wells	Yes	Yes	Yes
Groundwater pumping wells	Yes	Yes[1]	Yes
Piezometers	Yes	Yes	Yes

[1] Pumping well PW-7 was shut off due to its proximity to bioremediation pilot study injection points. All pumping wells were turned off from February 4 to October 6, 2016, to evaluate possible rebound. PW-7 remained off for the rest of the year due to technical issues.

3.3 IC/EC Certification

The completed IC/EC Certification forms for the Mr. C's site and associated remedial treatment systems are provided in Enclosure 1 of this report.

4 Monitoring Plan Compliance Report

The following section describes the remedial treatment system monitoring compliance at the Mr. C's site, the First Presbyterian Church, the Whaley Avenue residence, and the properties at 572-576 Main Street, 578-580 Main Street, 586 Main Street (Suite 4), 591 Main Street, 594 Main Street, and 16 Paine Street.

4.1 Mr. C's Dry Cleaners Site

A summary of the remedial treatment operations at the Mr. C's site for the 12-month reporting time of January 4, 2016, to January 3, 2017, is provided below.

System Operational Uptime in 2016

The operational uptime percentages were calculated based on actual monthly hours of treatment system operations in the reporting period divided by the potential hours of operation in the reporting period.

Local power outages or equipment failure will affect operations of the remedial treatment system. To limit these downtimes, the system has an auto-dialer that sends an alarm to the OM&M subcontractor, IEG, and EEEPC if an equipment failure, power outage, or a high water level in the equalization tank occurs. In addition, the treatment facility can be called to remotely check on the status of the various operating equipment in the building.

In 2016, based on information obtained from the weekly OM&M reports from IEG, the remedial treatment system operated 2,808 hours out of a possible 2,808 hours, for an uptime operation of 100%. The system was shut down from February 4 to October 6, 2016, to evaluate possible contaminant rebound in the groundwater (see Section 5.4.1.4). Table 4-1 provides details on the monthly operation of the treatment system.

Table 4-1 Treatment System Uptime in 2016, Mr. C's Dry Cleaners Site

Month	Actual Period	Reporting Hours/ Maximum Hours	Operational Uptime (%)
January 2016	1/4/16 - 2/1/16	672/672	100.0%
February 2016	2/1/16 - 2/29/16	0/0[1]	N/A
March 2016	2/29/16 - 3/31/16	0/0	N/A
April 2016	3/31/16 - 4/30/16	0/0	N/A
May 2016	4/30/16 - 6/1/16	0/0	N/A
June 2016	6/1/16 - 6/27/16	0/0	N/A
July 2016	6/27/16 - 7/31/16	0/0	N/A
August 2016	7/31/16 - 9/3/16	0/0	N/A
September 2016	9/3/16 – 10/6/16	0/0	N/A
October 2016	10/6/16 - 10/31/16	600/600	100.0%
November 2016	10/31/16 - 12/5/16	840/840	100.0%
December 2016	12/5/15 - 1/3/17	696/696	100.0%
Total Hours of Operation in 2016		**2,808/2,808**	
		Average Operational Uptime in 2016:	**100.0%**

Note:
[1]The treatment system was shut down from February 4 to October 6 2016.

Groundwater Processed and Discharged through the Remedial Treatment System in 2016

The volume of groundwater processed and discharged is read directly from the effluent discharge water meter located after the air-stripper unit. Readings are taken bi-monthly, and the volume of groundwater processed is then calculated for each monthly reporting period.

In 2016, based on information obtained from the OM&M subcontractor's weekly monitoring reports, the remedial treatment system processed and discharged 1,386,217 gallons of groundwater to Tannery Brook (see Table 4-2). This was a decrease of approximately 65% from the 4,001,315 gallons of groundwater processed and discharged in 2015. The decrease in volume resulted from the treatment system being shut down from February 4 to October 6, 2016, to evaluate possible contaminant rebound in the groundwater.

Volatile Organic Compounds Removal in 2016

The estimated amount of VOCs removed is based on the analytical results for influent and effluent samples and the total flow processed. In 2016, approximately 6.75 pounds of VOCs were removed from the groundwater by the remedial treatment system (see Table 4-3). The significant decrease of VOCs removed is the result of a 65% reduction in the volume of groundwater processed and discharged compared to the volume in 2015. The reduction in processed volume resulted from the treatment system being shut down from February 4 to October 6, 2016.

Table 4-2 Volumes of Groundwater Processed and Discharged by the Remedial Treatment System in 2016

Month	Actual Period	Gallons
January	1/4/16 - 2/1/16	305,578
February	2/1/16 - 2/29/16	0
March	2/29/16 - 3/31/16	0
April	3/31/16 -4/30/16	0
May	4/30/16 - 6/1/16	0
June	6/1/16 - 6/27/16	0
July	6/27/16 - 7/31/16	0
August	7/31/16 - 9/3/16	0
September	9/3/16 – 10/6/16	0
October	10/6/16 - 10/31/16	259,917
November	10/31/16 - 12/5/16	447,513
December	12/5/16 - 1/3/17	373,209
	Total Gallons Treated:	**1,386,217**

Table 4-3 VOCs Removal in 2016, Mr. C's Dry Cleaners Site

Month	Actual Period	Influent VOCs (µg/L)	Effluent VOCs (µg/L)	Removal Efficiency (%)	VOCs Removed (pounds)
January	1/4/16 - 2/1/16	692.00	0	100.0%	1.76
February[1]	2/1/16 - 2/29/16	N/A	N/A	N/A	0
March	2/29/16 - 3/31/16	N/A	N/A	N/A	0
April	3/31/16 -4/30/16	N/A	N/A	N/A	0
May	4/30/16 - 6/1/16	N/A	N/A	N/A	0
June[1]	6/1/16 - 6/27/16	N/A	N/A	N/A	0
July	6/27/16 - 7/31/16	N/A	N/A	N/A	0
August	7/31/16 - 9/3/16	N/A	N/A	N/A	0
September	9/3/16 – 10/6/16	N/A	N/A	N/A	0
October	10/6/16 - 10/31/16	498.0	12.2	97.6%	1.05
November	10/31/16 - 12/5/16	580.0	4.1	99.3%	2.15
December	11/30/15 - 1/4/16	580.0	4.1	99.3%	1.79
				Total Amount of VOCs Removed:	**6.75**

Notes:

[1] Two compliance samples were collected in January 2016. The results for the compliance sample collected on January 13, 2016, indicated effluent cis-DCE and PCE concentrations of 23 µg/L and 27 µg/L, respectively, which were noncompliant with the effluent discharge requirement for cis-DCE and PCE (10 µg/L). The effluent concentration used in the compliance calculations is based on the compliant results from the January 26, 2016, sample that was collected after response activities.

Key:

VOC = Volatile organic compound

µg/L = Micrograms per liter

Historical Volatile Organic Compounds Removal

The amount of VOCs removed increased from 2002 to 2003, and has been generally decreasing since 2003. The total process volume also increased from 2002 to 2003, and has generally decreased since 2003. However, in 2009 the process volume treated increased (see Figure 4-1) due to maintenance and cleaning of the

recovery wells. Between 2013 and 2014, process volumes further declined as pumping wells PW-5 and PW-7 were shut off to limit secondary impacts from the bioremediation pilot study and PW-6 remained off due to maintenance issues. PW-7 remained off throughout 2015 because of the pilot study, and in February PW-3 was turned off due to maintenance issues. PW-3 and PW-6 were fixed in September and were on throughout the remainder of 2015. Process volumes drastically declined in 2016 as all pumping wells were turned off from February 4 to October 6 to evaluate possible contaminant rebound, and PW-7 remains off due to technical issues.

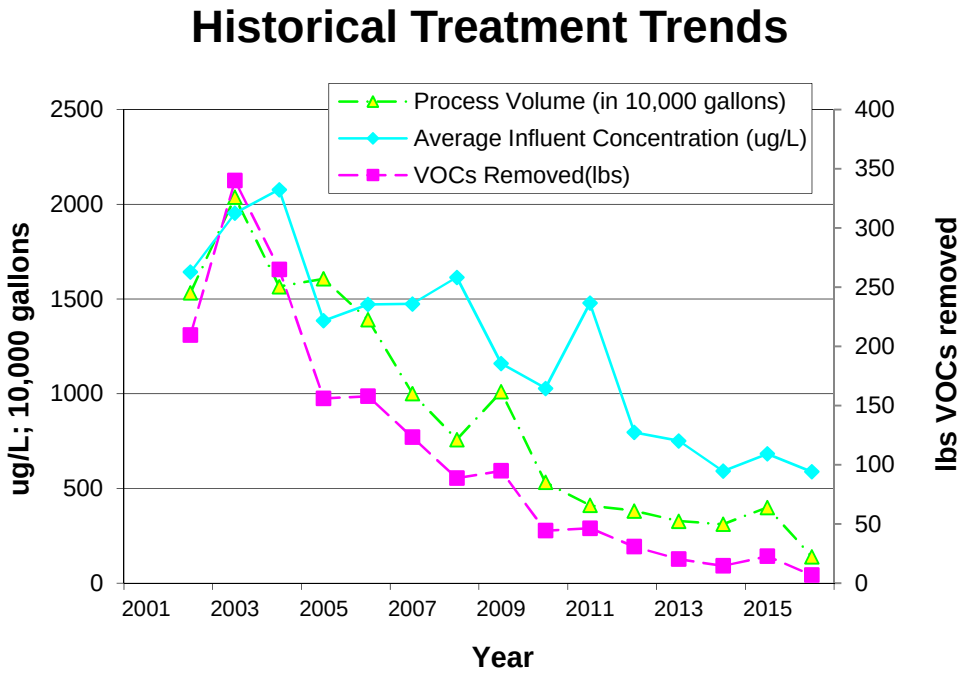

Figure 4-1 Historical Treatment Trends – Mr. C's Dry Cleaners Site

4.2 Subslab Depressurization Systems

The summary log of all the SSDS inspections since their inception and the Routine Inspection/Post-Commissioning Review/Non-Routine Maintenance Log are provided in Appendix D-1. Inspection information for each individual location is provided below.

First Presbyterian Church

Routine inspections of the SSDSs at the First Presbyterian Church were performed on December 21, 2016. The inspection results indicate the systems at the church are operating as originally designed. Completed inspection forms are provided in Appendix D-2. Air sampling was last performed in the First Presbyterian Church on February 20, 2014. No air samples were collected in the Presbyterian Church in 2016.

27 Whaley Avenue Residence

Routine inspection of the SSDS at 27 Whaley Avenue was performed on December 21, 2016. The inspection results indicate the system is operating as originally designed. Completed inspection forms are provided in Appendix D-2. The last round of air sampling at this residence was performed in 2010.

Mr. C's Treatment Building – 586 Main Street

Routine inspection of the SSDS at 586 Main Street was performed on December 7, 2016. The inspection results indicate the system is operating as originally designed. Completed inspection forms are provided in Appendix D-2.

572-576 Main Street

Routine inspection of the SSDS at 572-576 Main Street was performed on December 7, 2016. The inspection results indicate the system is operating as originally designed. Completed inspection forms are provided in Appendix D-2.

578-580 Main Street

Routine inspection of the SSDS at 578-580 Main Street was performed on December 13, 2016. The inspection results indicate the system is operating as originally designed. Completed inspection forms are provided in Appendix D-2.

586 Main Street, Suite 4

Routine inspection of the system was performed on December 7, 2016. The inspection results indicate the system is operating as originally designed. Completed inspection forms are provided in Appendix D-2.

591 Main Street

Routine inspection of the system was performed on December 7, 2016. The inspection results indicate the system is operating as originally designed. Completed inspection forms are provided in Appendix D-2. The last round of air sampling at this location was performed on January 21, 2016, as a part of post-SSDS installation monitoring.

594 Main Street

Routine inspection of the SSDS was performed on December 21, 2016. Inspection results indicate the system is operating as originally designed. Completed inspection forms are provided in Appendix D-2.

16 Paine Street

Routine inspection of the SSDS was performed on December 13, 2016. Inspection results indicate that the system is operating as originally designed. Completed inspection forms are provided in Appendix D-2.

5 General Status of Remedial Treatment Equipment and Replacement Program

Operation and maintenance for the Mr. C's Dry Cleaners site is performed on a weekly basis by EEEPC's OM&M subcontractor, IEG. In the event of a major component system malfunction, power outage, or high water level in the equalization tank, an auto-dialer on the treatment system alerts IEG of the problem and a secondary alarm alerts EEEPC. Auto-dialer alarms are not connected to the SSDS units installed in and around the site, but the maintenance manager at the church and the owners of the other properties with SSDS units have been instructed to report any apparent malfunction of their SSDS units to EEEPC.

When equipment repairs are required, IEG reports them to EEEPC, and EEEPC reports them to NYSDEC. Information regarding the repairs performed on the remedial systems is provided by IEG in the weekly OM&M report submitted to EEEPC and in the monthly report submitted to NYSDEC.

Analytical services for groundwater and indoor air analyses for the individual site and unit requirements are currently provided by Eurofins Spectrum Analytical, Inc., of North Kingstown, Rhode Island (formerly Spectrum Analytical, Inc.). The analytical frequency matrix is provided in Table 5-1.

Table 5-1 Analytical Frequency Matrix, Mr. C's Dry Cleaners Site

	Groundwater	Air	Schedule
Mr. C's compliance requirements			
a. Treatment system	X		Monthly
b. Groundwater monitoring wells network	X		Annually
First Presbyterian Church		X	Two years
27 Whaley Avenue residence		X	Two years
Mr. C's Building at 586 Main Street		X	Two years
586 Main Street, Suite 4, (Country Cupboard)		X	Two years
572-576 Main Street		X	Two years
578-580 Main Street		X	Two years

Table 5-1 Analytical Frequency Matrix, Mr. C's Dry Cleaners Site

	Groundwater	Air	Schedule
591 Main Street		X	Two years
594 Main Street		X	Two years
16 Paine Street		X	Two years

Equipment is inspected on a periodic basis, or as needed. The SSDS units are routinely inspected once annually. The need for system adjustments, equipment repair, or equipment replacement is evaluated at that time and when issues are reported by the property owners.

5.1 Mr. C's Dry Cleaners Remedial Treatment System Condition, Replacement, and Repairs in 2016

Major components of the remedial treatment system, including the chemical sequestering system, equalization tank, bag filters, blowers, air-stripping unit, and groundwater pumping system, continue to operate at a high rate of efficiency as a result of the weekly monitoring and maintenance program. In particular, regular cleaning of the air stripper trays through the ports in the side have extended the system's ability to operate efficiently with minimal disturbance to the system's uptime. Such cleaning is necessary because, with use, the orifices in the air stripper trays become occluded by the buildup of calcium and iron.

The groundwater pumping network remains in working condition, with the exception of PW-7, which remains off due to electrical issues. Items in the pumping network that have had highest maintenance requirements over the last few years have been the pumps and the level transducers for the groundwater pumping system. These two active components have been in operation for over five years. The groundwater pumps and transducers have an anticipated life expectancy of approximately two to three years. Replacement pumps and replacement transducers are, therefore, kept on hand for quick replacement after failure or for preemptive replacement.

The screens on the site's groundwater pumping well typically become clogged with soil fines and a build-up of calcium and iron, reducing the volume of contaminated groundwater that can be pumped to the treatment system. Typically, pumping wells are surged to clear the well screens based on an evaluation of the volume of influent to the treatment facility.

The repair and replacement work performed on the Mr. C's site remedial treatment system in 2016 is identified in Table 5-2.

Table 5-2 Mr. C's Dry Cleaners Site Equipment Repair and Replacement Program, 2016

Activity
Changed bag filters (January through December 2016, as needed)
Swept spruce needles and cones off the electrical J-box covers in the Library parking lot (January 2016)
Turned off SVE fan to drain water from pipe (January through December 2016, as needed)
Installed 'T' fitting on top of the exhaust pipe (January 2016)
Cleaned air stripper through access ports (January 2016)
Installed vent cover over the man door for the season (January 2016)
Cleaned redox drums, Jesco pumps, air stripper sump box, and trays (February 2016)
Repaired broken sewage line in the treatment room, and cleaned, disinfected, and repaired room (March 2016)
Repaired eight piezometers (March 2016)
Replaced damaged bolt to piezometer PZ-7D (July 2016)
Replaced leaking hose in the treatment building (July 2016)
Repaired concrete pads around some of the pumping wells (October 2016)
Performed cleaning and repairs on the slowly leaking bag filter unit and the air stripper trays after treatment system restart (October 2016)

5.2 SVI Investigations and SSDS Installation

5.2.1 Phase I

For properties 578-580 and 572-576 Main Street, EEEPC submitted construction summary reports for each SSDS on February 22 and March 2, 2016, respectively.

5.2.2 Phase II

Based on air sampling results and the NYSDOH Vapor Decision Matrix, the NYSDOH determined that SSDS units needed to be installed in the following buildings to protect human health and safety: 16 Paine Avenue, 586 Main Street (Suite 4), 594 Main Street, and 591 Main Street. Installation of the SSDS units for these buildings was completed on January 27, January 27, January 19, and February 5, 2015, respectively. EEEPC submitted construction summary reports for each system on February 18, March 2, March 2, and March 25, 2016, respectively.

5.2.3 Phase III

NYSDEC, in consultation with the NYSDOH, selected an additional 12 properties around the site for a third phase of investigations. Of those 12 properties, six owners elected to have their properties investigated in the first quarter of the 2015 heating season: 547 Fillmore Avenue, a private residence; 27 Riley Street, Riley Street Station; 23 Paine Street, a private residence; 31 Paine Street, a private residence; 45 Paine Street, a private residence; and 48 Paine Street, a private residence. More information on the Phase III SVII investigations is presented in the

2015 Soil Vapor Intrusion Sampling Report, which was submitted to NYSDEC on August 11, 2015 (see Appendix E).

Based on its review of the results, the NYSDOH determined that SSDS units needed to be installed in the buildings at 23 and 31 Paine Street to protect human health and safety. The NYSDOH issued letters to the individual property owners regarding the analytical results for air samples in 2016, but a letter must be reissued by NYSDOH to the new owner of 23 Paine Street. The SSDS installation design at 31 Paine Street is currently in process. Installation for this building is planned for 2017.

5.3 SSDS Condition, Replacement, and Repairs in 2016

No replacements or repairs were performed on the SSDS units in 2016. Property owners have been instructed to contact EEEPC if there are unusual noises or if a system shutdown occurs. The individual warranties on SSDS fans at the First Presbyterian Church and 27 Whaley Avenue residence have expired. Copies of the Field Inspection forms are provided in Appendix D-2.

5.4 Groundwater Monitoring Well Network

The groundwater monitoring well network remains in operable condition. Well construction details for the individual wells in the Mr. C's groundwater monitoring network are provided in Table 5-3.

5.4.1 Long-Term Groundwater Monitoring

Sampling was performed by EEEPC personnel from April 25 through May 2, 2016. A total of 28 wells (22 monitoring wells and six pumping wells) and four piezometers were sampled during the 2016 long-term groundwater monitoring event. Two monitoring wells could not be sampled (EE-1 and MPI-12B) because they had been paved over. The LTGM program letter report was submitted to NYSDEC on June 16, 2016, and is included in Appendix C.

5.4.1.1 Well Purging and Sampling Procedures

All sampled monitoring wells and piezometers were purged prior to sampling in accordance with Appendix I of the SMP. The Mr. C's Monitoring Well Sampling Plan (Appendix I of the SMP) requires that wells be purged and sampled using one of two methods: low-flow purging and sampling or standard purging and sampling. The bioremediation performance monitoring wells and piezometers were sampled using the low-flow sampling method, while all other wells were sampled using the standard purging and sampling method.

The monitoring wells were purged using a submersible pump with new or dedicated polyethylene tubing or disposable polyethylene bailers on new polypropylene line. New polypropylene line was used for the bioremediation performance monitoring wells and piezometers; dedicated line was used for the other monitoring wells. Prior to purging, static water levels were measured to within ±0.01 foot in each well using a Solinst water level meter.

Table 5-3 Well Construction Summary, Mr. C's Dry Cleaners Site, East Aurora, New York

Well ID[1]	Well Inner Dia.[2] (inches)	Total Well Depth (ft TOIC)	TOIC Casing Elev. (ft AMSL)	Ground Elev. (ft AMSL)	Screen Int. (ft BGS)	Sand Pack Int. (ft BGS)	Top of Seal (ft BGS)	Screened Unit	Northing[3]	Easting[3]
EE-1	2	26.37	913.46	913.63	23 - 28	21 - 28.5	15	OA	1008368.502	1140146.786
EE-2	2	31.34	916.3	916.51	22 - 32	20 - 32	15	OA	1008549.179	1139877.201
EE-3	2	28	914.64	914.9	18-28	16-28	14	OA	1008457.12	1139994.78
EE-4	2	14.25	916.69	916.9	5-15	3-15	0.5	OA	1008726.94	1140212.13
ESI-2-R	2	18.9	917.44	917.7	9-19	7-19	5	OA	1008739.35	1140418.33
ESI-3	2	15.42	915.85	916.41	7 - 17	6 - 18	4.1	OA	1008527.962	1140298.338
ESI-5-R	2	14.55	912.19	912.5	5-15	3-15	1	OA	1008162	1140146.65
ESI-6	2	15.93	914.48	914.92	7 - 17	6 - 18	3.8	OA	1008343.484	1139989.729
MPI-1S	2	18.64	915.08	915.38	9 - 19	7.2 - 19.5	5.3	OA	1008428.703	1140109.692
MPI-2S-R	2	18.4	915.63	915.9	8-18	6-18	4	OA	1008365.76	1140310.44
MPI-3S	2	17.41	914.4	914.79	8 - 18	5.7 - 18.5	3.7	OA	1008452.501	1139912.758
MPI-4S	2	20.24	914.82	915.12	11 - 21	8.8 - 21.5	6.8	OA	1008598.538	1140046.256
MPI-4I	2	41.5	915.66	916.12	32 - 42	29.8 - 42.5	4	LA	1008588.814	1140036.833
MPI-5S	2	17.34	916.45	916.78	8 - 18	5.9 - 18.4	3.9	OA	1008746.102	1140160.367
MPI-6S	2	21.65	915.03	915.35	12.3 - 22.3	10 - 23	7.9	OA	1008760.202	1139899.182
MPI-7I-R	2	38.5	915.44	915.8	28.9-38.9	26.5-39	24.5	LA	1008537.71	1140294.84
MPI-8S-R	2	17.4	913.96	914.5	8-18	6-18	4	OA	1008771.32	1140064.97
MPI-9S-R	2	16.52	913.38	914	8-18	6-18	4	OA	1008923.5	1140066.68
MPI-10B	2	31.11	915.68	916.07	16.5 - 31.5	13 - 32	11	OA	1008594.937	1140161.039
MPI-12B	2	34.62	911.19	911.44	20 - 35	15 - 35	11.5	OA	1008126.058	1139971.023
MPI-13B-R	2	29.5	912.69	913.2	16.5-31.5	14.5-31.5	12.5	LA	1009063.59	1139779.59
MPI-14B-R	2	28.2	913.71	914	15-30	13-30	11	LA	1009039.96	1139941.28
MPI-15B	2	28.15	913.72	913.7	NA	NA	NA	OA	1008815.15	1139566.43
MW-7	2	13.97	915.96	916.34	5 - 14.5	NA - 15	3	OA	1008603.486	1140170.72
MW-8	2	13.57	915.62	915.97	5 - 14.5	NA - 15	3	OA	1008719.861	1140104.112
MW-11	2	17.91	914.39	914.4	NA	NA	NA	--	1008565.98	1140177.64
RW-1	6	24.48	NA	NA	17.9 - 27.9	10 - 30	7	OA	1008563.899	1140262.844
PW-2	4	29.02	NA	NA	NA - 32	NA	NA	OA	1008601.547	1140142.874
PW-3	4	28.67	NA	NA	NA - 32	NA	NA	OA	1008646.528	1140166.174
PW-4	4	29.04	NA	NA	NA - 32	NA	NA	OA	1008657.699	1140029.129
PW-5	4	28.47	NA	NA	NA - 32	NA	NA	OA	1008691.158	1140049.864
PW-6	4	28.3	NA	NA	NA - 32	NA	NA	OA	1008713.539	1139891.103
PW-7	4	26.49	NA	NA	NA - 32	NA	NA	OA	1008749.764	1139907.169
PW-8	4	26.82	NA	NA	NA - 32	NA	NA	OA	1008792.235	1139824.621
Decommissioned Wells										
ESI-5	2	12.32	912.64	912.9	5 - 15	4 - 16	2	OA	1008162	1140146.65
MPI-2S	2	9.52	NA	NA	8 - 18	6 - 18.5	3.8	OA	1008365.76	1140310.44
MPI-4D	8	NA	NA	915.97	66-76	64-77.5	60	--	1008607.54	1140038.781
MPI-7I	2	13.37	916.14	916.42	29.5 - 39.5	27.1 - 40	5.3	LA	1008537.71	1140294.84
MPI-8S	2	6.54	NA	NA	8 - 18	6 - 18.5	4	OA	1008771.32	1140064.97
MPI-13B	2	31.43	913.25	913.49	17 - 32	15 - 32	10	OA	1009063.59	1139779.59
Abandoned or Missing Wells										
ESI-1 Replacement	2	19.74	916.99	917.35	10.5 - 20.5	8 - 21	4	OA	1008522.429	1140447.504
ESI-2	2	NA	NA	NA	9 - 19	8 - 20	6	OA	1008739.35	1140418.33
ESI-4	2	26.37	NA	NA	5 - 15	4 - 16	2	OA	NA	NA
MW-1	2	NA	NA	NA	12 - 22	10.6 - 22	9	OA	1008619.702	1140120.901
MW-2	2	NA	NA	NA	10 - 15	NA	NA	OA	1008631.906	1140098.904

Table 5-3 Well Construction Summary, Mr. C's Dry Cleaners Site, East Aurora, New York

Well ID[1]	Well Inner Dia.[2] (inches)	Total Well Depth (ft TOIC)	TOIC Casing Elev. (ft AMSL)	Ground Elev. (ft AMSL)	Screen Int. (ft BGS)	Sand Pack Int. (ft BGS)	Top of Seal (ft BGS)	Screened Unit	Northing[3]	Easting[3]
MW-3	4	NA	NA	NA	7 - 17	6.1 - 18	3.7	OA	1008584.312	1140095.979
MW-4	4	16.67	914.02	914.47	7.3 - 17.3	6.6 - 18	4.7	OA	NA	NA
MW-5	2	NA	NA	NA	10 - 15	NA	NA	OA	1008538.419	1140130.518
MW-6	2	NA	NA	NA	5 - 14.5	NA - 15	3	OA	1008586.532	1140110.819
MW-9	2	NA	NA	NA	5 - 14.5	NA - 15	3	OA	1008700.677	1140221.924
MW-10	2	NA	NA	NA	4 - 13.5	NA - 14	2	OA	1008543.146	1140160.301
MW-14	2	NA	NA	NA	NA - 18.2 (TOIC)	NA	NA	OA	1008587.34	1140174.681
MPI-1D	NA	NA	NA	NA	NA	NA	NA	--	NA	NA
MPI-5D	**Borehole only – no well construction log**									
MPI-5I	NA	NA	NA	NA	32 - 42	30 – 42.5	8	OA	1008745.758	1140168.687
MPI-7D	**Borehole only – no well construction log**									
MPI-9S	2	NA	NA	NA	8 - 18	6.5 - 18.5	4.5	OA	1008923.5	1140066.68
MPI-11B	2	NA	NA	NA	15 - 30	13 - 30.5	8.5	OA	1008806.891	1139663.098
MPI-14B	2	27.54	913.18	913.68	15 - 30	11 - 30	8.5	OA	1009039.96	1139941.28
OW-B	2	26.41	NA	NA	22.5 - 27.5	10.5 - 27.5	8	OA	1008734.848	1139901.616
RW-2	4	NA	NA	NA	18 - 28	10 - 28	8	OA	1008725.751	1139901.252

Note:
1. Wells in *italic text* were previously abandoned or destroyed, or were otherwise not locatable in 2011.
2. Well inner diameter is the same for both the casing and the well screen.
3. Coordinates system is New York State Plane West Zone (feet). Coordinates are either from the Clear Creek Land Surveying, LLC, survey on May 31, 2012, or estimated in AutoCAD based on the May 2012 surveyed locations.

Key:
AMSL = Above mean sea level
BGS = Below ground surface
dia = Diameter
elev = Elevation
ft = Feet
int = Interval
LA = Lacustrine aquifer
NA = Not available
OA = Outwash aquifer
TOIC = Top of inner casing

The monitoring wells were purged of approximately three to five times the volume (or greater) of water standing in the well. Purged water from the monitoring wells was containerized and transported to the on-site treatment facility for processing. Temperature, pH, specific conductance, turbidity, and oxygen reduction potential (ORP) were measured and recorded, at a minimum, prior to purging, after each well volume was purged, and just prior to sampling using a LaMotte 2020 turbidity meter, YSI Pro Plus quatro flow-through cell, and/or a Myron 6P Ultrameter II (water parameter kit). Purging was performed until pH, specific conductance, and temperature had stabilized and turbidity was 50 nephelometric turbidity units (NTUs) or less. Purge records are provided in Appendix C.

The six groundwater pumping wells (PW-2, PW-3, PW-4, PW-5, PW-6, and PW-8) were sampled using new bailers. The pumping wells were not purged pri-

or to sampling, because they were consistently pumped as part of the groundwater treatment system operation.

The samples collected as part of the LTGM program were analyzed for VOCs by Spectrum Analytical, Inc., using EPA method 8260. A summary of the positive detections of VOCs is presented in Table 2-2. The complete analytical results were provided in electronic form through EQuIS, and a copy of the laboratory report is provided in the 2016 LTGM Report (see Appendix C).

5.4.1.2 Quality Assurance and Quality Control

Field duplicate, matrix spike/matrix spike duplicate (MS/MSD), and rinsate blank samples were collected for QA/QC purposes. Independent data validation of the analytical results was performed by EEEPC. The data usability summary reports (DUSRs) are provided as Attachment A of the 2016 LTGM Report (see Appendix C). Several results were qualified and one QA/QC issue was noted:

- The coolers associated with SDG R0366 were received at 6.2 and 6.5°C. However, based on DUSR review, this did not impact the usability of the data.
- Sample MW-7-APR16 was analyzed one day outside of the holding time, resulting in detected compounds being qualified with J (estimated) and non-detected compounds being qualified with UR (rejected non-detect). The April 2016 sample results were within the range of historical results for MW-7. These results are applicable for the analysis.
- Surrogate recovery was above the laboratory QC limits for sample PW-2-APR16, resulting in detected compounds being qualified with J (estimated).
- PCE recovery was below the laboratory QC limits. However, the concentration was greater than four times the spike concentration; therefore, the results were reported without qualification.
- The following samples were diluted and their analytical results were reported with elevated reporting limits for all analytes: EE-2-APR16, ESI-6-APR16, MW-7-APR16, PW-5-APR16, PZ-5A-APR16, and PZ-6A-APR16. There were instances where the elevated reporting limit exceeded the screening level; therefore, analyte concentrations may exceed the screening level.

Rinsate blanks were not collected from non-dedicated equipment.

5.4.1.3 2016 Long-term Groundwater Monitoring Results

Appendix C contains the iso-contour maps created to show the 2016 total VOC and PCE contaminant plumes. These figures were generated using Surfer Modeling Software. The LTGM program letter report in Appendix C contains a groundwater contour map. A discussion on the size of the plume and level of contamination observed in 2016 versus 2015 is presented in the next section.

The results of the groundwater monitoring indicate the following:

- Seven VOCs (chloroform, PCE, TCE, cis-DCE, trans-DCE, vinyl chloride, and MTBE) were detected in the groundwater samples at levels that exceed their NYSDEC Class GA groundwater standards and the guidance values used to screen the groundwater data.
- Three VOCs (1,1,1-trichloroethane, acetone, and acetate) were detected in the groundwater samples; these compounds either have no applicable standard or guidance value, or were detected at levels below their NYSDEC Class GA groundwater standards and below the guidance values used to screen the groundwater data.
- PCE was detected above the groundwater standard (5 µg/L) in 15 wells and three piezometers across the site. The highest concentration of PCE (5,600 µg/L) was detected in a sample collected from piezometer PZ-5A. Historically, the highest concentration of PCE has been detected in samples collected from monitoring wells MPI-6S and PW-6. PCE in MPI-6S has been reduced from 6,800 µg/L in 2012, before bioremediation, to non-detectable in April/May 2016.
- TCE was detected above the groundwater standard (5 µg/L) in six well samples and three piezometer samples collected across the site. The highest concentration of TCE, 210 µg/L, was detected in a sample collected from monitoring well EE-2.
- cis-DCE was detected above the groundwater standard (5 µg/L) in 10 well samples and two piezometer samples collected across the site. The highest concentration of cis-DCE (910 µg/L) was detected in a sample collected from piezometer PZ-6A .
- trans-DCE was detected in the sample collected from MW-8 at a concentration of 13 µg/L, above the groundwater standard of 5 µg/L.
- Vinyl chloride was detected above its groundwater standard (2 µg/L) in samples collected from five wells and one piezometer. The highest concentration of vinyl chloride (110 µg/L) was detected in a sample collected from monitoring well MPI-4I. Since 2013, vinyl chloride has increased in concentration in wells MPI-8S-R and MW-8 and decreased concentration in wells EE-2, MPI-4S, MPI-6S, and PW-8.
- MTBE was detected above the groundwater standard (10 µg/L) in samples collected from four wells and one piezometer. The highest concentration of MTBE (340 µg/L) was detected in well MPI-4I.

5.4.1.4 Comparison of 2016 LTGM Program Results to Previous Years

Iso-contour maps showing the total VOC and PCE contaminant plumes were created based on long-term groundwater sampling data for 2004, 2007, 2009-2010, and 2012-2016. The iso-contour maps are provided in the individual LTGM pro-

gram reports (EEEPC 2004b, 2007, 2009, 2010, 2012b, 2014, 2015b). The 2016 Interim Groundwater Monitoring report is provided in Appendix C.

The following observations are based on comparisons to previous years:

- The 2016 groundwater isopleths shown on Figures 5A, 5B, and 5C, which were developed based on depth-to-groundwater data collected when the groundwater extraction system had been deactivated for three months, indicate groundwater flow to the west-northwest. The depth-to-groundwater measurements taken by EEEPC (Figure 5D), also with the groundwater treatment system deactivated, indicate groundwater flow to the northwest. Groundwater elevations during the April/May 2016 sampling period were approximately 1.5 to 2 feet higher than when the groundwater pumping and treatment system was operational in 2015. Groundwater flow based on the isopleths for 2015 remained in the northwest direction.
- The 2016 groundwater isopleths show additional evidence of the groundwater divide observed during the RI, which may affect transport at the edges of the contaminant plume. However, groundwater flow in the vicinity of the monitoring wells in which the highest concentrations of PCE and cis-DCE were detected in 2016 is in line with bulk groundwater flow to the west-northwest.
- The Surfer-generated concentration contours on Figures 3 and 4 (PCE and Total VOCs in Groundwater) for 2015 and 2016 were generally similar. However, the contours indicate a continued increase in the amount of PCE breakdown by-products.
- There is only limited evidence of PCE rebound stemming from the pump-and-treat system shutdown. Of the eight wells/piezometers where PCE increases were observed, only four (ESI-3, MPI-4S, PW-6A, and PZ-8C) were within about 50 feet of a pumping well.
- Increased PCE concentrations at sentinel well MPI-15B and wells on the fringe of the plume (MPI-5S and MPI-2S) are more likely to be a result of groundwater transport stemming from reduced hydraulic control in the absence of the pump-and-treat system.

5.4.1.5 Assessment of Rebound, or Increase, of Contaminant Levels

The April/May 2016 sampling was performed to assess the rebound, or increase, in contaminant levels that were expected to result from deactivation of the groundwater treatment system over a three-month period. Rebound is a phenomenon usually observed after pump-and-treat processes have stopped and sorbed chemicals equilibrate with aqueous concentrations. Pump-and-treat operations, such as those at the Mr. C's site, have several limitations, one of which is the sorption of chemicals on the soil matrix. Equilibrium is not always achieved instantaneously, but rather over a long period, which would explain why rebound occurs only after pump-and-treat stops. At the Mr. C's site, and especially in the vicinity of the recent bioremediation pilot study, rebound may also occur as PCE and its degradation products are reduced. For example, as the groundwater PCE

concentration decreases, PCE sorbed to the soil matrix will move to reestablish equilibrium with the aqueous phase and PCE concentrations will rebound.

Increases in contaminant levels may also be caused by groundwater transport. The groundwater elevation isopleths developed during active pumping operations (see Figure 5 of the 2015 Long-term Groundwater Monitoring Report, EEEPC 2015b) show groundwater drawdown and capture in the locations of active groundwater pumping systems. However, the 2016 groundwater isopleths shown on Figures 5A, 5B, and 5C, which were developed based on data collected when the groundwater extraction system had been deactivated for three months, indicate groundwater flow to the west-northwest. The depth-to-groundwater measurements taken by EEEPC (Figure 5D), also with the groundwater treatment system deactivated, indicate groundwater flow to the northwest. The groundwater elevations during the April/May 2016 sampling period were approximately 1.5 to 2 feet higher than when the system was operational in 2015. Groundwater flow based on the isopleths for 2015 remained in the northwest direction.

Prior to operation of the pump-and-treat system, the remedial investigation isopotential groundwater map showed a groundwater flow divide in the center of the site, which accounted for the branching of the contaminant plume, with one branch moving to the northwest and extending beyond the Town of Aurora Public Library, and one moving southwest to slightly beyond the First Presbyterian Church. The 2016 groundwater isopleths show additional evidence of this divide, which may affect transport at the edges of the contaminant plume. However, groundwater flow in the vicinity of the monitoring wells in which the highest concentrations of PCE and cis-DCE were detected in 2016 is in line with bulk groundwater flow to the west-northwest.

5.4.2 Maintenance Issues

EEEPC's OM&M subcontractor continued making repairs of the groundwater monitoring wells. Well maintenance issues included replacing missing or stripped bolts, replacing existing or installing new asphalt/concrete pads, replacing existing well covers, installing a new watertight well cap, and removing or replacing a portion of a cracked casing. The OM&M subcontractor will continue to address maintenance issues in the coming year.

5.5 Remedial Site Optimization

In April, May, and June of 2014, EEEPC performed the final three rounds of performance monitoring of the pilot study. E & E issued Bioremediation Pilot Progress Report No. 3 to NYSDEC on June 2, 2014 (EEEPC 2014). Progress Report No. 3 and the laboratory analytical results are included in Appendix F. A bioremediation summary report was issued to NYSDEC in January 2015 (see Appendix F).

The success of the pilot study can be demonstrated by multiple metrics or indicators. The pilot study has reduced contaminant concentrations in the pilot study area. The pilot study was successfully designed to overcome competing reactions

and to create the geochemical conditions conducive to anaerobic bioremediation of chlorinated ethenes. Electron donor injections were successfully distributed throughout the pilot study area by direct push technologies. The pilot study has augmented the subsurface with microbial populations capable of degrading PCE and each of its degradation by-products. The pilot study has provided cost information that can be used in future remedial system optimization studies to evaluate remedy alternatives and their cost effectiveness.

Throughout 2015, secondary impacts on the pumping and treatment system were observed. Monthly OM&M sampling of the treatment system routinely detected PCE degradation by-products in the influent and effluent. These secondary impacts were limited by keeping PW-7 off and adjusting the blower fan speed on the treatment system to increase removal of cis-DCE from the treated effluent. Secondary impacts are discussed further in Section 2.1. Recommendations from the bioremediation summary report are included in Section 6.

Bioremediation technologies present an opportunity to optimize the site remedy. EEEPC prepared a Remedial Site Optimization report (EEEPC 2016a) that evaluates the cost and appropriateness of implementing a full-scale bioremediation project for the Mr. C's site. This and other alternatives covered in the report were revised and accepted by NYSDEC on September 23, 2016.

It is likely that continued bioremediation will gain efficiencies during full-scale implementation, and the scope and frequency of bioaugmentation and monitoring can be reduced from the level of the pilot study efforts. For example, DNA analyses, which were the costliest of those performed under the pilot study, have shown that the microbes in the aquifer have the genes to produce the enzymes needed to reduce each degradation by-product of PCE; therefore, these analyses can be eliminated or performed annually to reduce costs. Baseline samples for competing electron acceptors have been collected at monitoring wells MPI-7I and MPI-4I, which can be used in the design of injections in areas sharing the same aerobic or anaerobic geochemical conditions.

With bioremediation, the long-term usefulness of the current pump-and-treat system is limited. The pump-and-treat system will likely face declines in groundwater pumping volumes and total cVOCs removed in line with current trends (see Section 4.1). The bioremediation pilot study has changed the aquifer's geochemistry, which can be expected to contribute to additional declines in system performance. Because of the change in groundwater geochemistry resulting from the bioremediation pilot study, the system has experienced operational issues with biofilms and inorganic precipitation within the system, which will lead to increased maintenance costs. The degradation of PCE to cis-DCE makes the contamination more difficult to remove using the air stripper. The decline in the pumping system's performance is due to biofilm buildup. In addition, the treatment system's removal efficiency and capacity has declined due to the increase in cis-1,2 DCE, which requires a longer retention time in the air stripper.

6 Actions to Support Eventual Site Closure

Per the Record of Decision (ROD) (NYSDEC, 1997) and the Explanation of Significant Differences (ESD) (NYSDEC, 2000), the overall project goal is to remediate the Mr. C's site sufficient to meet applicable standards, criteria, and guidance (SCG) values and be protective of human health and the environment. The goals selected based upon the results of the Remedial Investigation/Feasibility Study (RI/FS) (MPI 1995a, 1995b, and 1996) for the site include: (1) mitigation of human health risks by reducing the potential for inhalation of vapors in on-site and off-site basements, (2) remediation of the source area of the contaminant plume to prevent further migration of the cVOCs and reduce volatilization into adjacent basements, and (3) achieving NYSDEC groundwater quality standards to the extent practicable. Suggested future actions or modifications to improve the individual operations and shorten the time required to attain the project goals are presented below.

In 2015 NYSDEC requested that EEEPC prepare a remedial site optimization (RSO) Plan to review alternatives for eventual site closure in a shorter time frame at lower cost than the current system expectations. Sections 6.1 and 6.2 discuss the existing systems at the site. Section 6.3 discusses the RSO Plan and how the existing systems would be incorporated into the site optimization.

In 2016 EEEPC prepared a Pulsed-Pumping Work Plan (EEEPC 2016b) to support consideration of a pump-and-treat system shutdown. Section 6.4 discusses the Pulsed-Pumping Work Plan and how the plan supports eventual site closure.

6.1 Mr. C's Dry Cleaners Site Treatment System

From February 4 to October 6, 2016, the treatment system was shut down to evaluate possible contaminant rebound. From January 4 to February 3, 2016, and October 6, 2016, to January 3, 2017, the treatment system continued to collect groundwater and efficiently remove VOCs through air stripping. In January 2017, PW-7 continued to be locked-out and tagged-out to limit secondary impacts on the treatment system from the bioremediation pilot study. From October 2016 onward, PW-7 was down due to maintenance issues.

6.2 Subslab Depressurization

On January 11 and 12, 2016, a second fan was added to the system at 591 Main Street on the first floor. This fan was not installed with the rest of the system due to access issues. No other modifications to the SSDS units installed in and around the site are currently recommended.

Nine sites have active subslab systems and should be inspected, maintained, and monitored under the SMP. Inspections conducted in 2016 did not identify any issues with the SSDS. The results for indoor air samples collected at the First Presbyterian Church in February 2014 show that PCE and TCE levels in indoor air continues to be well below the NYSDOH indoor air guidance values. Therefore, the NYSDEC PM decided not to resample the building in 2016.

Due to the elevated levels of PCE in the subslab vapor in buildings around the Mr. C's site that were detected during Phase II of the SVII program (see Section 5.2.2), depressurization of the subslab and venting to above the roofline was implemented in 2015 to mitigate the concerns for vapor intrusion. Based on the analytical results from the Phase III SVII, it is recommended that additional SSDS units be installed at the following properties:

- 23 Paine Street (private residence), and
- 31 Paine Street (commercial property and private residence).

On March 17, 2016, EEEPC took basement measurements at 31 Paine Street to initiate SSDS design for the building. Installation of the SSDS system for 31 Paine Street is anticipated for 2017. The installation, maintenance, and monitoring of these subslab depressurization systems are another remedial measure towards the reclassification and closure of the remedial groundwater treatment activities at the Mr. C's Dry Cleaners site.

The following nine properties have been proposed for additional SVIIs based on conversations between NYSDEC and the NYDOH:

- 541 Fillmore Avenue;
- 527 Main Street;
- 17 and 33 Elm Street;
- 32, 36, 39, and 42 Paine Street; and
- 45 Savage Place.

The individual property owners have been sent an initial letter from NYSDEC regarding the investigations (see Appendix E). EEEPC will follow up to schedule and perform the air sampling and associated inspections. Once the analytical results have been reviewed, validated, and submitted for review, the NYSDOH will determine the need for subslab vapor mitigation for each property.

6.3 Remedial Site Optimization

Efforts to optimize the site's operation began in 2013 with the bioremediation pilot study and the SVII investigations. The pilot study successfully determined that bioremediation technologies are effective at reducing PCE concentrations at the site. The results of the bioremediation pilot study completed in 2014 provides recommendations to NYSDEC for a larger bioremediation program designed to evaluate alternatives to groundwater cleanup via the existing pumping and treatment system. In September 2016, EEEPC submitted an RSO Plan to NYSDEC that evaluated bioremediation and the current pump-and-treat system for source and migration control. The RSO Plan noted that the contaminant plume has migrated outside the radius of influence of the pumping wells, which are no longer effective for migration control. In addition, contaminant removal by the pump-and-treat system has been declining over time, in part due to the difficulty of removing lighter by-products of PCE utilizing the air stripper system. The RSO Plan concluded that injecting Provect-IR® to create downgradient permeable reactive barriers and act as a source control is the most effective way to achieve source and migration control at the site. This alternative includes shut down and decommissioning of the current pump-and-treat system. EEEPC submitted a Pulsed-Pumping Work Plan (EEEPC 2016b) to NYSDEC to support shut down of the pump-and-treat system in accordance with the chosen alternative. Implementation of this alternative would lead to site closure in a shorter timeframe and at a lower cost than the remedy currently in place.

As the remedial alternative is implemented, the SMP will be updated and revised to include the following items:

- Review of ICs and ECs,
- Groundwater monitoring, and
- Indoor air monitoring and maintenance of the SSDS units.

6.4 Pulsed-Pumping Work Plan

Operational data indicate the Mr. C's remedial groundwater pumping and air-stripping treatment system has reached asymptotic removal rates, and that to implement bioremediation for source and migration control the current pump-and-treat system must be shut down. In accordance with Section 6.4.b.1 of NYSDEC's Division of Environmental Remediation (DER) *Technical Guidance for Site Investigation and Remediation DER-10*, continued operation and pulsing of the system for a period of time must confirm that asymptotic groundwater conditions have resulted from treatment (NYSDEC 2010).

In a pulsed-pumping system, the resting phase allows time for contaminants to diffuse from low to high permeability zones where the contaminants can then be removed through the pumping phase. This operation minimizes the volume of water to be treated while maximizing contaminant concentrations in the water.

For the pulsed pumping, wells RW-1, PW-2, and PW-3 will be shut down, while wells PW-4, PW-5, PW-6, PW-7, and PW-8 will be pulsed. This configuration focuses on the plume section to the west side of Whaley Avenue, which has the highest cVOC concentrations. The influent and effluent of the treatment system will be sampled at the beginning and end of each pulsed-pumping event. The sample analytical results will be used to identify changes in the treatment system concentrations of cVOCs as well as concentrations of cVOCs at each pumping well to evaluate whether greater removal of cVOCs is achievable.

The current pump-and-treat system was shut down from February 4 to October 6, 2016, to initially evaluate potential contaminant rebound and establish an equilibrium contaminant level. Contaminant concentrations in the treatment system influent changed from 692 µg/L in January 2016 to 498 µg/L in October, after the system was restarted. This indicated neither contaminant equilibrium or contaminant rebound.

The Pulse Pumping Work Plan involves turning the pumps on for one month, off for one month, on for three weeks, off for five weeks, on for two weeks, off for six weeks, and so on until a minimum of 10 samples demonstrate, with 95% confidence, that asymptotic conditions have been reached. This will be determined using the Student t-test and hypothesis test on the mean.

If post-shutdown cVOC removal concentrations are less than or equal to pre-shutdown concentrations while meeting target levels of cVOCs, then the existing treatment system would no longer be removing a significant level of contaminants. At this point, the treatment system will have reached asymptotic removal rates, and it will be appropriate for NYSDEC to consider shutting down and dismantling the system.

7 Annual Remedial Action Costs

The total 2016 cost for work performed by EEEPC and its subcontractor, IEG, for the remedial treatment program for the Mr. C's Dry Cleaners site, including the individual the operating units, was $203,425 (see Table 7-1).

Table 7-1 2016 Remedial Action Costs, Mr. C's Dry Cleaner Site

Task Description	Cost
A. Site Management Plan - Updates and Revisions (Task 2)	
EEEPC Admin and Reporting	$0.00
Subtotal A:	**$0.00**
B. Operations, Maintenance and Monitoring Services (Task 7)	
Subcontracted - OM&M Services	$59,860
Subcontracted - Analytical Services (O&M and SVII)	$5,670
Utilities - Electric, Gas, and Telephone	$6,370
Replacement Equipment – PLC, Pumps, Well Improvement)	$8,200
SSDS Unit(s) Inspection and Reporting (9 locations)	$4,600
SVII/SSDS Air Sampling, Oversight, and Reporting	$17,300
EEEPC Admin and Reporting	$31,631
Subtotal B:	**$133,631**
C. Groundwater Sampling and Reporting (Task 4)	
Field Sampling Program	$22,245
Subcontracted - Analytical Services	$4,300
EEEPC Admin and Reporting	$6,800
Subtotal C:	**$33,345**
D. Annual Periodic Review Reporting (PRR) (Task 5)	
2016 PRR Prep and Delivery	$11,660
Subtotal D:	**$11,660**
E. Remedial System Optimization (RSO) Plan (Task 8)	
Final RSO Plan Development and Delivery	$24,789
Subtotal E:	**$24,789**
Grand Total (Items A-E)	**$203,425**

8 Local Pubic Reporting in 2016

Local newspaper articles or information was identified by EEEPC during 2016 that provided information that has or could impact the Mr. C's Dry Cleaners site. Newspaper articles related to proposed work in and around the Mr. C's site are provided in Appendix E. This information includes the following:

- **The East Aurora Bee.** East Aurora's local newspaper reports the June 8, 2016, opening of the East Aurora Co-op Market on 591 Main Street.

9 References

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