FOURTH FIVE-YEAR REVIEW REPORT FOR LITTLE VALLEY SUPERFUND SITE CATTARAUGUS COUNTY, NEW YORK

Prepared by

U.S. Environmental Protection Agency
Region 2
New York, New York
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Table of Contents

LIST OF ABBREVIATIONS & ACRONYMS

bgs	below ground surface
BIA	Bush Industries Area
CCA	Cattaraugus Cutlery Area
CCHD	Cattaraugus County Health Department
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CY	Cubic Yards
DCE	Dichloroethene
EPA	United States Environmental Protection Agency
FFS	Focused Feasibility Study
FYR	Five-Year Review
GAC	Granular Activated Carbon
GWQS	Groundwater Quality Standards
HHRA	Human-Health Risk Assessment
ICs	Institutional Controls
ISVE	In-Situ Soil Vapor Extraction
MCL	Maximum Contaminant Level
µg/l	Micrograms per Liter
MNA	Monitored Natural Attenuation
MW	Monitoring Well
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
O&M	Operation and Maintenance
OU	Operable Unit
ppb	parts per billion
POET	Point-of-Entry Treatment system
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objectives
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SVI	Soil Vapor Intrusion
TAGM	Technical and Administrative Guidance Memorandum
TCE	Trichloroethene
VOCs	Volatile Organic Compounds

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fourth FYR for the Little Valley Superfund site. The triggering action for this policy review is the completion date of the previous FYR. The trigger for this FYR is May 14, 2012, the approval date of the last review. The FYR has been prepared due to the fact that the remedial action will not leave hazardous substances, pollutants or contaminants on site above levels that allow for unlimited use and unrestricted exposure, but requires five or more years to complete.

The site is being addressed in two phases--an interim groundwater remedy consisting of point-of-entry treatment units (POETs) (Operable Unit One [OU1]) and a final groundwater remedy, including the control of the sources of groundwater contamination (OU2). Under OU1, POETs were installed on private wells pursuant to a 1996 Record of Decision (ROD). Under Operable Unit Two (OU2), EPA selected groundwater and source control remedies and made the interim alternate water supply remedy the final remedy for the water supply in a 2005 ROD and 2006 ROD amendment. Since the interim OU1 remedy was finalized in the OU2 ROD, OU2 will be addressed in this FYR.

The Little Valley Superfund site FYR team was led by John DiMartino, the EPA Remedial Project Manager (RPM). Participants included Michael Scorca (EPA hydrogeologist), Ula Kinahan (EPA human-health risk assessor), Julie McPherson and Mindy Pensak (EPA ecological risk assessors), and Mike Basile (EPA community involvement coordinator). The FYR began on November 17, 2016.

Site Background

The Little Valley Superfund site is comprised of a plume of trichloroethene (TCE)-contaminated groundwater, which extends approximately eight miles along Route 353 between the Village of Little Valley and the northern edge of the City of Salamanca in Cattauragus County, New York (see Figure 1).

The site is located in a rural, agricultural area, with a number of small, active and inactive industries and over 200 residential properties situated in the study area along Route 353, the main transportation route between Little Valley and Salamanca. The Village of Little Valley is on public water while private residential wells supply drinking water for the properties along Route 353 in Salamanca.

The plume ranges in width from 1,000 to 2,500 feet and in elevation from nearly 1,600 feet above mean sea level (msl) in the Village of Little Valley to less than 1,400 feet above msl near the northern edge of the City of Salamanca. The plume area is bordered by steeply sloping wooded hillsides, which attain slopes of up to 25 percent and elevations of 2,200 feet above msl.

In 1982, the Cattaraugus County Health Department (CCHD) and the New York State Department of Environmental Conservation (NYSDEC), while investigating TCE contamination in the vicinity of a small manufacturing facility on Route 353, detected TCE in nearby private wells. In 1989, CCHD and New York State Department of Health (NYSDOH) determined that the TCE contamination plume extended from the Village of Little Valley to the northern edge of the City of Salamanca. NYSDEC installed a number of monitoring wells in the area to investigate possible sources of the contamination. No sources were found.

Although CCHD issued health advisories to the exposed residents in 1989, affected well owners were not provided with alternate water sources. About six property owners independently installed granular activated carbon (GAC) filter systems and others purchased bottled water.

Between 1989 and 1995, CCHD and NYSDOH sampled 74 private wells in the area; 42 of these wells had TCE concentrations equal to or greater than the federal maximum contaminant level (MCL) of 5 micrograms per liter (µg/l), which is deemed to be protective of human health.

In June 1996, EPA listed the site on the National Priorities List (NPL).

Appendix A, attached, summarizes the documents utilized to prepare this FYR.

Appendix B, attached, summarizes the site's topography, geology/hydrogeology, and land and resource use. For more details related to site background, physical characteristics, geology/hydrogeology, land/resource use, and history related to the site, please refer to:

https://www.epa.gov/superfund/little-valley

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Little Valley Superfund Site		
EPA ID: NY0001233634		
Region: 2	**State:** NY	**City/County:** Little Valley/Cattaraugus
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes	

REVIEW STATUS
Lead agency: EPA ***[If "Other Federal Agency", enter Agency name]*:**
Author name (Federal or State Project Manager): John DiMartino
Author affiliation: EPA
Review period: 5/14/2012 - 5/14/2017
Date of site inspection: 9/20/2016
Type of review: Policy
Review number: 4
Triggering action date: 5/14/2012
Due date *(five years after triggering action date)*: 5/14/2017

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

Following the listing of the site on the NPL, EPA evaluated the residential well sample results and concluded that, if not addressed, the contaminated wells would continue to present a threat to public health though ingestion. EPA prepared a focused feasibility study (FFS) to develop, screen, and evaluate alternatives for an alternative water supply system for the affected and potentially affected residences at the site.

A remedial investigation (RI), conducted from 1997 through 2005, investigated 10 potential source areas for the presence of TCE and/or TCE-related compounds. Based upon the data that were collected, five of these areas were identified as either current or likely past sources: Bush Industries Area (BIA); Cattaraugus Cutlery Area (CCA); Great Triangle Area (Drum Storage Area); Luminite Area; and Ninth Street Landfill Area. Based upon the soil data collected during the RI, the CCA was determined to be a current localized source of groundwater contamination at the site. The RI also concluded that while it is likely that the Great Triangle, Luminite, and Ninth Street Landfill Areas were sources of groundwater contamination in the past, based upon the data that was collected, they were not acting as current sources.

The RI also concluded that there was significant potential risk to commercial workers from direct exposure to TCE-contaminated soils in the CCA and to commercial workers from exposure to TCE-contaminated groundwater used as process water or commercial car washes.

Based on groundwater concentrations of TCE which exceeded the health-based screening criteria, it was concluded that there was a potential risk of soil vapor migration from groundwater to the indoor air of homes and businesses located in the site area.

Because POETs had been installed on all of the affected drinking water wells, there was no current unacceptable risk associated with exposure to the contaminated groundwater from these wells.

The findings of the ecological risk assessment indicated that the potential risks to ecological receptors from TCE were expected to be low.

Response Actions

OU1

Based upon the findings of the FFS, EPA issued a Record of Decision (ROD) on September 30, 1996. The remedial action objective that was established for this operable unit was to prevent exposure of the public to contaminated groundwater.

The selected remedy included the installation of air stripper treatment units on all affected and potentially affected private wells to ensure that drinking water standards are met. The ROD also called for an evaluation of the efficacy of the treatment systems within five years of their installation and a determination as to whether or not a more permanent system (such as a water line) would be required.

OU2

Based upon the results of a June 2005 RI/FS report, on August 19, 2005, a ROD (2005 ROD) was signed for OU2. The following RAOs were established:

- Minimize or eliminate TCE migration from contaminated soils to the groundwater;
- Minimize or eliminate any contaminant migration from contaminated soils and groundwater to indoor air;
- Restore groundwater to meet state and federal standards for TCE within a reasonable time frame;
- Mitigate the migration of the affected groundwater; and
- Reduce or eliminate any direct contact or inhalation threat associated with TCE-contaminated soils and groundwater and any inhalation threat associated with soil vapor.

The selected remedy called for the excavation and off-site treatment/disposal of an estimated 220 cubic yards (CY) of contaminated soils located at the CCA and monitored natural attenuation (MNA) for the site-wide groundwater. The 2005 ROD also called for an evaluation of the potential for soil vapor intrusion (SVI) into structures within the study area and mitigation, if necessary. In addition, the ROD included institutional controls (ICs) in the form of informational devices (*e.g.*, notifications) to alert local government agencies that if there are any unimproved parcels where the underlying groundwater is contaminated with TCE above the MCL and the property is to be developed, the groundwater should not be used without appropriate treatment. Lastly, the ROD also made the interim alternate water supply remedy (OU1) as provided for in the 1996 ROD the final remedy for the water supply.

In September and November 2005, in accordance with the selected remedy for the soil, EPA undertook pre-excavation soil sampling to define the boundaries of the soil contamination at the CCA. The results from this sampling effort indicated that the volume of contaminated soil was substantially greater than originally estimated in the 2005 ROD. The volume at the CCA increased from approximately 220 CY to approximately 3,000 CY of TCE-contaminated soil exceeding the New York State Technical and Administrative Guidance Memorandum No. 94-HWR-4046 (TAGM) objective of 700 micrograms per kilogram (µg/kg).

Because EPA believed that the increased volume of contaminated soil at the CCA would impact the feasibility, effectiveness, and overall cost effectiveness of the selected remedy, the remedial alternatives for the soil component of the remedy selected in the 2005 ROD were reevaluated in *Focused Feasibility Study Report, Presentation of Air Permeability Testing Results and Evaluation of Soil Remedial Alternatives Related to the Cattaraugus Cutlery Area, Little Valley Superfund Site, Cattaraugus County, New York, EPA, July 2006* (2006 FFS) report. Based upon the findings of the 2006 FFS and the results of a treatability study, it was determined that in-situ soil vapor extraction (ISVE) would be effective in addressing the contaminated soil at the CCA.

On September 28, 2006, a ROD amendment was approved, changing the soil remedy selected in the 2005 ROD to ISVE. The 2006 ROD amendment also called for excavation and off-site treatment/disposal as a contingency remedy should operational data indicate that ISVE will not address all of the contaminated soils.

Status of Implementation

Point-of-Entry Treatment Systems

The 1996 ROD called for the installation of air stripper treatment POETs on TCE-contaminated private wells associated with the site. Air strippers were selected because, based upon the maximum TCE concentrations that were present in the private wells at that time, they would be significantly less costly to maintain than activated carbon treatment units.[1]

The design related to the POETs was performed from December 1996 through March 1997. Of the approximately 200 private wells located in the study area, based upon sample results, air stripper treatment units were installed on 91 private wells by EPA's Removal Contractor from May 1997 through October 1997. Subsequently, 1.5 cubic foot-granular activated carbon treatment units were installed hydraulically downstream of the air strippers.

An Interim Remedial Action Report for the alternate water supply was approved on September 29, 1998.

[1] The cost of operating carbon treatment units is largely a function of the useful life of the carbon (*i.e.*, how long the carbon can effectively treat the water before it needs to be replaced). The useful life of the carbon depends on the contaminant levels in the water that is passed through the treatment unit. The greater the contamination levels, the shorter the life of the carbon, which will require more frequent replacement of the carbon in the treatment unit.

After five years of operation, it was determined that the air strippers were reaching the end of their useful life. Therefore, it was assumed that the maintenance requirements associated with these units would increase. Because of the significant reduction in contaminant concentrations in the private wells, EPA determined that GAC units alone would be able to effectively remove the contamination. EPA also determined that the activated carbon units alone would be as protective of public health as the combined air stripper/activated carbon treatment units. For these reasons, EPA decided to remove the air stripper treatment units and use only activated carbon treatment units to address the contamination in the private wells.

While the existing GAC units alone would adequately remove the TCE from the groundwater, under NYSDEC and NYSDOH standard operating procedures, the carbon in single carbon units must be replaced every two years. However, if two GAC treatment units are installed in series, the above-noted standard operating procedures allow the carbon to be replaced once sampling shows that the carbon in the primary tank (the first tank) is no longer effectively removing the contaminants (the secondary tank would remove any contaminants that pass through the primary tank, thereby continuing to protect the water supply). Since the long-term cost of installing an additional carbon unit on each well and the carbon replacement expenses related to two GAC treatment units installed in series would be significantly less than the carbon replacement expenses associated with single carbon units, when the air strippers were removed, an additional carbon unit was installed on each well. The conversion was performed from August to September 2002. All systems utilize pre-filtration for sediment removal, GAC for the removal of volatile organic compounds, and ultraviolet (UV) light for disinfection. The New York State Department of Health (NYSDOH) recommends treatment with two carbon tanks connected in series for organics removal from drinking water. This configuration provides a primary and secondary GAC unit and allows for monitoring water quality between these units.

In an April 2002 Explanation of Significant Differences (2002 ESD), EPA determined that it would be more appropriate to evaluate the need for a permanent alternative water supply during the selection of a final remedy for the site, which would address the source area(s) and the groundwater contamination. EPA also determined that because of the downward trend in contaminant concentrations in the private wells,[2] GAC units alone would effectively remove the contamination.

On October 3, 2002, the responsibility for maintaining the POETs and monitoring the private wells was transferred from EPA to NYSDEC.

In-situ Soil Vapor Extraction System & Subsequent Excavation

ISVE works best in high permeability soils. Because of concerns about the viability of ISVE at the CCA due to the predominance of silty soils, from April 15 - 16, 2006, EPA performed an air flow study to provide an indication as to whether or not ISVE could successfully be used to remediate volatile organic compound (VOC)-contaminated soils.

[2] The highest concentration of TCE in the private residential wells is now 7 μg/l, as compared to an historical high of 50 μg/l.

The ISVE system went into full-scale operation in fall 2006. Soil samples were collected during the course of the treatment. Based upon soil samples collected in November 2013, it was determined that while the volume of soil that was still above the TAGM objective for TCE had been reduced to an estimated 20 CY, the ISVE system appeared to have reached asymptotic levels (possibly attributable to concrete slabs, footings and piping that were discovered in the area which may have hindered ISVE performance).

In January 2014, in order to evaluate how to address the remaining areas of soil with elevated TCE concentrations at the CCA, EPA prepared *Little Valley Superfund Site–Cattaraugus Cutlery Area, Evaluation of Options for Addressing Remaining Contaminated Soil.* This document evaluated three treatment options: continued ISVE treatment of the soil; soil excavation with off-site disposal; and soil excavation with on-site soil vapor extraction treatment in an ex-situ treatment cell. Based upon this evaluation, EPA and NYSDEC determined that excavation with off-site disposal would be the best option.

The soil excavation work, which was performed the weeks of June 16, 2014 and August 4, 2014, removed approximately 25 CY (37 tons) of soil. The excavated soil was shipped to an approved landfill in Angelica, NY. Post-excavation soil samples indicated that TCE concentrations were below the TAGM soil cleanup objective of 700 µg/kg. The ISVE system was subsequently removed and the excavated areas were backfilled with clean fill meeting the requirements of NYSDEC's DER-10, Technical Guidance for Site Investigation and Remediation, Appendix 5.

An ESD was issued in September 2014 (2014 ESD), documenting EPA's decision to implement the contingency soil remedy. In addition, the 2014 ESD documented an EPA determination that an additional IC was needed to address the potential for SVI at properties that may be developed over the plume in the future. Specifically, the local governmental agencies are to be advised annually that if new structures are constructed over the TCE plume (including at the CCA and Bush Industries properties), vapor mitigation measures should be implemented as part of the new construction or a property-specific evaluation should be performed to demonstrate that vapor intrusion will not be a concern at the property.

Soil Vapor Intrusion Mitigation

Concerns about TCE vapors from the groundwater getting into the air inside homes in the study area prompted the 2005 ROD to call for an evaluation of the potential for SVI into structures within the study area and the installation of mitigation systems, if necessary.

To evaluate the possibility of SVI, in September 2005, EPA tested under the foundations of 23 homes and the Luminite facility as a representative sample of the more than 300 residences and businesses overlying the contaminant plume. In January 2006, EPA revisited 12 of the homes tested in September 2005 to sample the indoor air and also tested under the basement slabs of an additional four homes. Based upon these results, EPA collected subslab samples from an

additional 82 homes in July 2006.[3] In August 2006, indoor air samples were collected from 25 additional homes and subslab samples were collected from beneath two homes.

Based upon the results of the SVI sampling effort, subslab mitigation systems were installed beneath two residences in September 2006; systems were installed in two additional homes in April 2012.

In response to a request from NYSDEC and NYSDOH to further evaluate the southern extent of the SVI study area, EPA sent sampling request letters to nine residences in this area.[4] Sampling was performed during the week of March 6, 2017 at nine residences (four new residences and five from previous events). The analytical results were reviewed for the nine residences and there were no detections in the indoor air (basement and first floor) or the sub-slab samples above EPA's risk-based screening values.

Monitored Natural Attenuation

The 2005 ROD called for MNA of the TCE-contaminated groundwater underlying the BIA, CCA, Great Triangle Area, and Ninth Street Landfill Area, as well as the site-wide groundwater plume.

EPA's contractor, TetraTech, prepared an MNA plan, which was approved by EPA in May 2006. The MNA plan was implemented as a limited action for one year. The limited action commenced on July 26, 2006. After one year of MNA data collection and evidence of natural attenuation, an operational and functional determination was made. The MNA monitoring is being performed as a long-term response action. Please refer to the MNA discussion in the "Data Review – Groundwater" section below for further information.

Institutional Controls

Both the BIA and the facility located on the CCA obtain potable water from the public water supply of the Village of Little Valley. In addition, groundwater standards are expected to be achieved in these areas through natural attenuation, and monitoring in these areas allow for periodic inspections to determine whether groundwater is being used without treatment. Therefore, EPA concluded that notification of the property owners, in combination with the periodic inspections, would be sufficiently protective of public health until groundwater standards are achieved. Specifically, CCHD issues an annual notice to local governmental agencies, including the building code enforcement officers, stating that if any unimproved parcel where the underlying groundwater is contaminated with TCE above the MCL is developed, the groundwater

[3] Although soil vapor intrusion information packets and access agreements were provided to over 300 homeowners/tenants, a public meeting was held on June 14, 2006 to discuss the soil vapor intrusion program, and follow up letters were sent to those homeowners/tenants that failed to respond to the initial access agreement package, only 148 consented to the sampling program.

[4] In December 2016, a letter was mailed to nine residences provided by NYSDEC, explaining the soil vapor intrusion sampling program and requesting access to perform the sampling. Four homeowners responded affirmatively, while two letters were returned by the post office as "vacant/undeliverable." Follow-up letters were sent out in February 2017 to the three nonresponsive residences; no replies were received.

should not be used without appropriate treatment. In addition, EPA notified the BIA and CCA property owners that the underlying groundwater is contaminated and should not be used without treatment. As part of the annual natural attenuation monitoring event at the BIA and CCA, the properties are inspected to verify that wells without treatment systems have not been installed. An annual report summarizing the results of the groundwater monitoring and the findings of such inspections is prepared.

As documented in the 2014 ESD, EPA determined that an IC to prevent exposure to potential SVI at parcels that are developed in the future was needed to ensure protectiveness. Accordingly, CCHD's annual notice to the local governmental agencies also advises that if new structures are constructed over the TCE plume (including at the CCA and Bush Industries properties), vapor mitigation measures should be implemented as part of the new construction or a property-specific evaluation should be performed to demonstrate that vapor intrusion will not be a concern at the property.

All of the property owners/renters with drinking water wells that are protected with POETs are aware of the fact that the groundwater they use is contaminated and should not be used without treatment. They are reminded of this on a periodic basis when NYSDEC collects samples from their wells and/or provides maintenance related to their individual treatment units. Therefore, ICs to prevent human exposure to contaminated groundwater from these properties (until groundwater standards are met) were determined to be unnecessary.[5]

Table 1: **Summary of Implemented Institutional Controls**

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs needed?	ICs called for in the decision documents?	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Yes	BIA/CCA/un-improved parcels in Towns of Little Valley & Salamanca where underlying groundwater with TCE above the MCL	Restrict groundwater use without treatment.	BIA/CCA were informed in 2006. Annual inspection at BIA/CCA during MNA sampling event. CCHD issues annual letter to local government agencies.
Soil vapor intrusion	Yes	Yes	BIA/CCA/ unimproved parcels in Towns of Little Valley & Salamanca that may be developed in the future and contain a structure	Protect indoor air against potential soil vapor intrusion effects.	Annual inspection at BIA/CCA during MNA sampling event. CCHD issues annual letter to local government agencies.

[5] Treatment units were installed on all affected and potentially affected private wells. The homes that do not have treatment units have no well installation restrictions.

Systems Operation/Operation & Maintenance

There are approximately 200 private wells located in the study area, POET systems were installed on 90 private residential wells. Of the approximately 100 private wells that do not have POETs installed, data collected from 1989 through 2001 indicated that, with the exception of two wells that marginally exceeded the MCL at 6.24 and 6.8 µg/l, all of the wells had TCE concentrations well below the MCL (TCE was not detected in approximately half of the wells). Because the TCE concentrations in the two wells were trending downward, further sampling in these wells, as well as the other wells without treatment systems, was discontinued.

NYSDEC assumed responsibility for the annual sampling of the 90 private residential wells and the operation and maintenance (O&M) of the POETs in October 2002. Routine maintenance and repair is conducted on the POETs during the annual sampling events, and repairs are performed, as needed. As part of the ongoing maintenance of the treatment units, NYSDEC evaluates the effectiveness of the treatment units by sampling the groundwater passing through the individual treatment systems. All systems utilize pre-filtration for sediment removal, GAC (two tanks in series) for the removal of VOCs, primarily TCE, and UV light for disinfection. Final (treated), intermediate, and raw (pre-treatment) water samples are collected in that order to minimize the possibility of cross-contamination. Based on the sampling results, it was determined that carbon replenishment was required at seven locations. This was performed at all except one location during winter 2016-17 (the remaining carbon replenishment is scheduled for May 2017).

Eighty-five POETs were sampled in October 2016. Samples were not collected at five residences because the premises are either vacant or demolished and the POETs were not on-line.

Natural attenuation monitoring of the TCE-contaminated groundwater underlying the BIA, CCA, Great Triangle Area, and Ninth Street Landfill Area, as well as the site wide groundwater plume, is conducted on an annual basis, utilizing 32 monitoring wells. The monitoring wells are distributed as follows: six at the BIA; 13 at the CCA; and 13 located in the downgradient plume. The samples are analyzed for VOCs and MNA parameters.

An inspection of the monitoring wells is performed during the groundwater monitoring activities. Inspection activities conducted include ensuring that the monitoring wells are secured, locked, and in good condition. During the September 2016 monitoring event, monitoring wells PZ-32, MW-1, PZ-38, PZ-46, and PZ-55D were found to have broken hinges on their well casing covers and monitoring well LV-8 needed a new concrete collar around the base of the casing. These items were addressed by EPA's Emergency and Rapid Response Services (ERRS) contractor in January 2017.

To date, EPA has conducted SVI sampling at 139 residences plus a manufacturing facility and a NYSDEC facility. Annual sampling is typically conducted during the heating season. During the most recent sampling event of March 6, 2017, nine residences were sampled as follows: two residences were sampled because past sampling data indicated that vapors are collecting under the slabs of the homes; three residences were sampled to verify that the vapor mitigation systems are functioning properly; and four residences were sampled in response to a request from NYSDEC and NYSDOH to further evaluate the southern extent of the southern SVI study area.

Based upon the manufacturer's recommendation of a five-year useful life for the fans in the vapor mitigation system, the fans were replaced in three of the systems in January 2017 (the owner of the fourth residence did not respond to repeated attempts to schedule the maintenance appointment). The vapor mitigation systems are inspected by EPA during the annual SVI sampling events. Based upon an inspection on March 7, 2017, it was concluded that three of the four mitigation systems are functioning as intended (EPA was not able to schedule access to the fourth residence, despite repeated letters and telephone calls).

Potential impacts on the site from climate change were assessed. The performance of the remedy is currently not at risk due to the expected effects of climate change in the region near the site.

III. PROGRESS SINCE THE LAST REVIEW

The protectiveness determinations from the last FYR are presented below in Table 2. There were no recommendations identified in the 2012 FYR.

Table 2: **Protectiveness Determinations/Statements from 2012 Five-Year Review**

OU	Protectiveness Determination	Protectiveness Statement
1	Protective	The implemented actions for the alternate water supply are protective of human health and the environment. All exposure pathways that could result in unacceptable risk are being controlled by the operation of the POETs.
2	Protective	The implemented source control and groundwater actions at the site, including monitored natural attenuation and vapor mitigation systems, are expected to be protective upon completion. Currently, all exposure pathways that could result in unacceptable risks are being controlled and none are expected.
Sitewide	Protective	The implemented actions at this site are protective of human health and the environment.

Table 3, below, presents a suggestion made in the 2012 FYR and its status.

Table 3: Suggestion from 2012 Five-Year Review

Suggestion	Update
The concrete base surrounding piezometer 25 is dislodged and a new base needs to be poured.	A new concrete base was poured around the piezometer in September 2012.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On November 14, 2016, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 38 Superfund sites in New York and New Jersey, including the Little Valley Superfund site, and inviting the public to submit any comments on the FYR to EPA. The announcement can be found at the following web address:

https://www.epa.gov/sites/production/files/2016-11/documents/five_year_reviews_fy2017_final.pdf

In addition to this notification, a notice of the commencement of the FYR was posted on EPA's Region 2 website and was sent to local public officials. The notice was provided to the Town of Little Valley and the Salamanca Public Library and was posted on their respective bulletin boards on March 23, 2017. The purpose of the public notice was to inform the community that EPA would be conducting a FYR to ensure that the remedy implemented at the site remains protective of public health and is functioning as designed. In addition, the notice included contact information, including addresses and telephone numbers, for questions related to the FYR process. Once the FYR is completed, the results will be made available at the site information repositories. The site repositories are located at EPA, 290 Broadway, 18th Floor, New York, New York, 10007; Town of Little Valley Municipal Building, 201 3rd Street, Little Valley, New York, 14755; and Salamanca Public Library, 155 Wildwood Avenue, Salamanca, New York, 14779. In addition, efforts will be made to reach out local public officials to inform them of the results.

Data Review

Groundwater

The groundwater MNA program consists of 32 monitoring wells (six at the BIA; 13 at the CCA; and 13 in the downgradient plume) near the source areas and downgradient within the valley (see Figures 2 and 3). The samples are analyzed for VOCs and MNA parameters.

The most recent groundwater samples at the BIA were collected in September 2015. The highest TCE concentration (98 µg/l in duplicate sample) of any groundwater sample within the site area continues to be detected in monitoring well BIAMW-D2, located in the central portion of the BIA property. During the 2016 sampling event, another monitoring well on the BIA property (BIAMW-2) had a TCE concentration (42 ug/L) that was above the MCL. The four other monitoring wells had TCE concentrations below the MCL. The Mann-Kendall statistical trend in TCE concentration at monitoring well BIAMW-2 is decreasing, however, the trend at monitoring well BIAMW-D2 is statistically stable. The concentrations of cis-1,2-dichloroethylene (DCE) (a daughter product of the breakdown of TCE), are decreasing in monitoring wells BIAMW-2, BIAMW-6, and BIAMW-D2. Figures 4, 5, and 6 illustrate VOC concentrations in these three wells since 1999.

At the CCA, the TCE concentration exceeded the MCL in only one of the 13 monitoring wells (11 µg/l at CCA-MW-3) during the most recent sampling event in September 2016, which followed completion of the SVE remedy and targeted soil excavation The highest TCE concentration at this

well during the last five years was 33 ug/L in 2015. Figure 7 illustrates the variability and overall declining trend in TCE concentrations since 1998.

Twelve of the 13 downgradient plume monitoring wells were sampled in September 2016. The TCE concentration did not exceed the MCL in any of these monitoring wells during 2016. Monitoring well PZ-32, located in the Great Triangle area, was not sampled in 2016, however, it was last sampled in 2015 and had a TCE concentration of 5.9 ug/L, just above the MCL. Its highest value was 12 ug/L in 2008 (see Figure 8).

During the review period, NYSDEC annually sampled the residential wells that have POETs installed. These residential wells are used to effectively enhance the groundwater monitoring network of the eight-mile-long plume.

During the October 2016 event, 85 POETs out of the 90 were sampled. Concentrations in the raw water ranged from not detected at three residences to a high of 7.0 µg/l at one residence, with nine residences above the MCL of 5 µg/l. Statistically, 76 out of 85 (89%) had TCE concentrations at or below the MCL, with only nine out of 85 (11%) above the MCL.

Statistical information from the POETs as a combined dataset was generated by grouping the results for each annual sampling period and determining basic statistics. The results of this analysis are shown on Table 5 and Figure 9. Overall, each of the statistical values (maximum, minimum, median, and average concentrations) for the grouped residential-well dataset has continued to show decreasing concentrations since 1997, with minor variability. For example, the maximum TCE concentration detected in the untreated residential wells has decreased from 30 µg/l in 1998 to 7 µg/l in 2016 and the median concentration has decreased from 9.5 µg/l in 1997 to 2.5 µg/l in 2016. The results show an overall progression toward improvement of the groundwater quality.

Natural attenuation of TCE via reductive dechlorination produces daughter products such as cis-1,2-DCE and vinyl chloride. The presence of these daughter products at the BIA, and to a lesser extent the CCA, indicates that some dechlorination is occurring near the source areas. Further downgradient areas in the valley have shown limited detectable concentrations of daughter products. In 2016, cis-1,2-DCE and vinyl chloride concentrations were below their detection limit of 0.5 ug/L in samples from all of the monitoring wells sampled by EPA.

In summary, of the 117 residential and monitoring wells sampled, only 12 wells had TCE concentrations exceeding the MCL of 5 µg/l during 2016. The highest TCE concentration was 98 µg/l in 2016 at the BIA. The maximum TCE concentration in the plume downgradient from the source areas in 2016 was 7 µg/l in the raw water sample at one residential well.

Site Inspection

An inspection of the MNA monitoring wells was conducted on September 20, 2016. In attendance were John DiMartino (RPM), Mark Denno (Hazardous Waste Support Branch), Eric Hausamann

of NYSDEC (site project manager), George Momberger of NYSDEC (manages the POETs contract). Matt Holquist of AECOM (NYSDEC's POETs' O&M contractor) was also present. All monitoring wells were locked and accessible. While generally in good repair, as was noted above, five monitoring wells had broken hinges on their well casing covers and one monitoring well needed a new concrete collar around the base of the casing. These items were addressed by EPA's ERRS contractor in January 2017.

An inspection of three of the four soil vapor mitigation systems was performed on March 7, 2017 by John DiMartino and Dave Mickunas (EPA Environmental Response Team soil vapor intrusion sampling lead), as well as EPA contractor Amy Dubois. As noted above, despite multiple letters and telephone calls, EPA was not able to schedule an inspection appointment for the fourth residence. The vapor mitigation systems all have vacuum, are secure and are operating as intended.

Inspections of the POETs were performed in October 2016 by AECOM, as detailed in its "2016 Annual Report for GAC Water Treatment System, Operation & Maintenance, Little Valley," dated February 2017. All POETs were in good repair and routine O&M was performed as noted above and detailed in the report.

V. TECHNICAL ASSESSMENT

QUESTION A: *Is the remedy functioning as intended by the decision documents?*

The remedy as identified in the 1996 ROD, 2005 ROD, and 2006 ROD Amendment, as modified by 2002 and 2014 ESDs includes the installation of POETs on all affected drinking water wells; MNA of the TCE-contaminated groundwater underlying the BIA, CCA, the Great Triangle Area, the Ninth Street Landfill Area, as well as the site-wide groundwater plume; treatment of TCE-contaminated soil in the CCA by ISVE and excavation of residual contamination; soil vapor monitoring in the treatment areas and in adjacent residential areas; post-treatment confirmatory sampling to ensure the entire source area has been effectively treated to the cleanup levels, and ICs related to the utilization of groundwater at unimproved parcels that are developed in the future and the potential for vapor intrusion at properties that may be developed over the plume in the future.

The soil remedy was completed in 2014 and post excavation samples collected indicated that TCE concentrations were below the TAGM soil cleanup objective of 700 µg/kg.

While the natural attenuation process of reductive dechlorination in groundwater is generally limited to the source areas, other natural attenuation mechanisms, such as dilution, dispersion, and/or adsorption, are occurring within the valley aquifer system. The groundwater data collected at the source areas and downgradient of the source areas continues to show an overall declining trend in TCE concentrations. During 2016, only 12 wells of the 117 wells sampled in the combined Little Valley source-area and downgradient monitoring networks had TCE concentrations exceeding the MCL of 5 µg/l. The highest TCE concentration was 98 µg/l at the BIA and the maximum TCE concentration in the plume downgradient from the source areas was 7 µg/l in the raw water sample at one residential well.

The POETs continue to be effective in removing the TCE contamination from the residential wells. The treatment systems are monitored annually by NYSDEC and the GAC is replaced if breakthrough is detected.

CCHD issues an annual notice to the Little Valley and Salamanca governmental agencies, including the building code enforcement officers, stating that if any unimproved parcel where the underlying groundwater is contaminated with TCE above the MCL is developed, the groundwater should not be used without treatment. CCHD's annual notice also states that if new structures are constructed over the TCE plume (including at the CCA and BIA), vapor mitigation measures should be implemented as part of the new construction or a property-specific evaluation should be performed to demonstrate that vapor intrusion will not be a concern at the property. In addition, EPA notified the BIA and CCA property owners that the underlying groundwater is contaminated and should not be used without treatment, and as part of the annual natural attenuation monitoring at these areas, the properties are inspected to verify that wells without treatment systems have not been installed.

A comprehensive soil vapor intrusion sampling program has been conducted at the site, to date. The program started with 23 homes and a commercial facility in 2005 and was expanded to eventually include a total of 139 homes plus a manufacturing facility and an NYSDEC facility. The sampling program resulted in the installation of four mitigation systems which are annually monitored by EPA.

QUESTION B: *Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

There have been no physical changes to the site that would adversely affect the protectiveness of the remedy. Land use assumptions, exposure assumptions and pathways, and clean up levels considered in the decision documents followed the Risk Assessment Guidance for Superfund used by the Agency and remain valid. Although specific parameters and toxicity data may have changed since the time the risk assessments were completed, the process that was used remains valid.

In 1996, a preliminary public health risk assessment for the site concluded that active measures were necessary to ensure TCE concentrations in private wells did not exceed the state and federal drinking water MCL of 5 µg/L. Additionally, as part of the 2005 RI, a baseline human health risk assessment (HHRA) was conducted to characterize potential risk stemming from exposure to contaminated soil and groundwater present at suspected source areas. The results of the HHRA found unacceptable risk to commercial workers from direct exposure to TCE-contaminated soils in the CCA and to commercial workers from exposure to TCE-contaminated groundwater used as process water or commercial car washes.

The soil remedy has eliminated direct exposures to potential on-site receptors. NYSDEC's TAGM guidelines of 700 µg/kg was selected as the cleanup criteria for TCE-contaminated soils in the CCA. Although the ROD selected cleanup goal is higher than the State's current soil cleanup objective (NYSDEC Subpart 375-6) of 470 µg/kg, it does not exceed EPA's risk-based regional screening level for residential soil and, therefore, remains protective.

A groundwater cleanup level of 5 µg/l was selected for the site. This level is consistent with the current state and federal MCL for TCE and, hence, remains protective of human health.

In summary, the ongoing comprehensive SVI investigation, mitigation, and IC measures that are in place ensure that the vapor intrusion pathway remains incomplete in both the current and future timeframes at the site.
As documented in the decision documents for the site, the following RAOs were selected to protect human health and the environment: prevent exposure of the public to contaminated groundwater; minimize or eliminate TCE migration from contaminated soils to the groundwater; minimize or eliminate any contaminant migration from contaminated soils and groundwater to indoor air; restore groundwater to meet state and federal standards for TCE within a reasonable time frame; and reduce or eliminate any direct contact or inhalation threat associated with TCE-contaminated soils and groundwater and any inhalation threat associated with soil vapor. The RAOs established for the site remain valid and protective of human health.

QUESTION C: *Has any other information come to light that could call into question the protectiveness of the remedy?*

Based on the evaluation of the potential human exposures at the site, there is no new information that could call into question the protectiveness of this remedy.

VI. ISSUES/RECOMMENDATIONS

No issues or recommendations are identified for either OU.

VII. PROTECTIVENESS STATEMENT

Table 4: Protectiveness Statements

Protectiveness Statement(s)	
Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
OU2 (source control and groundwater)	**Protective**
Protectiveness Statement:	
The remedy for OU2 is protective of human health and the environment.	

Sitewide Protectiveness Statement
Protectiveness Determination: **Protective**
Protectiveness Statement: The sitewide remedy is protective of human health and the environment.

VIII. NEXT REVIEW

The next FYR report for the Little Valley Superfund site is required five years from the completion date of this review.

FIGURES

LEGEND:

NYSDEC POTENTIAL SOURCE AREAS:

- **A** BUSH INDUSTRIES AREA
- **B** NINTH STREET LANDFILL AREA
- **C** CATTARAUGUS CUTLERY AREA
- **D** KING WINDOWS (SECOND STREET) AREA
- **E** FIRST STREET AREA
- **F** GREAT TRIANGLE AREA
  - INCLUDES:
  - **F1** ENVIROTECH DRUM STORAGE
  - **F2** WESTERN BURNT HOUSE
  - **F3** WINSHIP CIRCLE/BAKER ROAD
  - **F4** TRIANGLE SOUTHWEST
- **G** WHIG STREET AREA
- **H** LUMINITE AREA
  - INCLUDES:
  - **H1** NORTH LUMINITE
  - **H2** LUMINITE PLANT AREA
  - **H3** SOUTH LUMINITE
- **I** STATE STREET AREA
- **J** RAILROAD AVENUE AREA

CDPWP CATTARAUGUS COUNTY DEPARTMENT OF PUBLIC WORKS PROPERTY

0 3000 6000

APPROXIMATE GRAPHIC SCALE

APPROX. QUADRANGLE LOCATIONS

SOURCE:
BASE MAP ADAPTED FROM U.S.G.S. LITTLE VALLEY, ELLICOTTVILLE, SALAMANCA, AND CATTARAUGUS NEW YORK QUADRANGLES, 7.5 MINUTE SERIES (TOPOGRAPHIC).

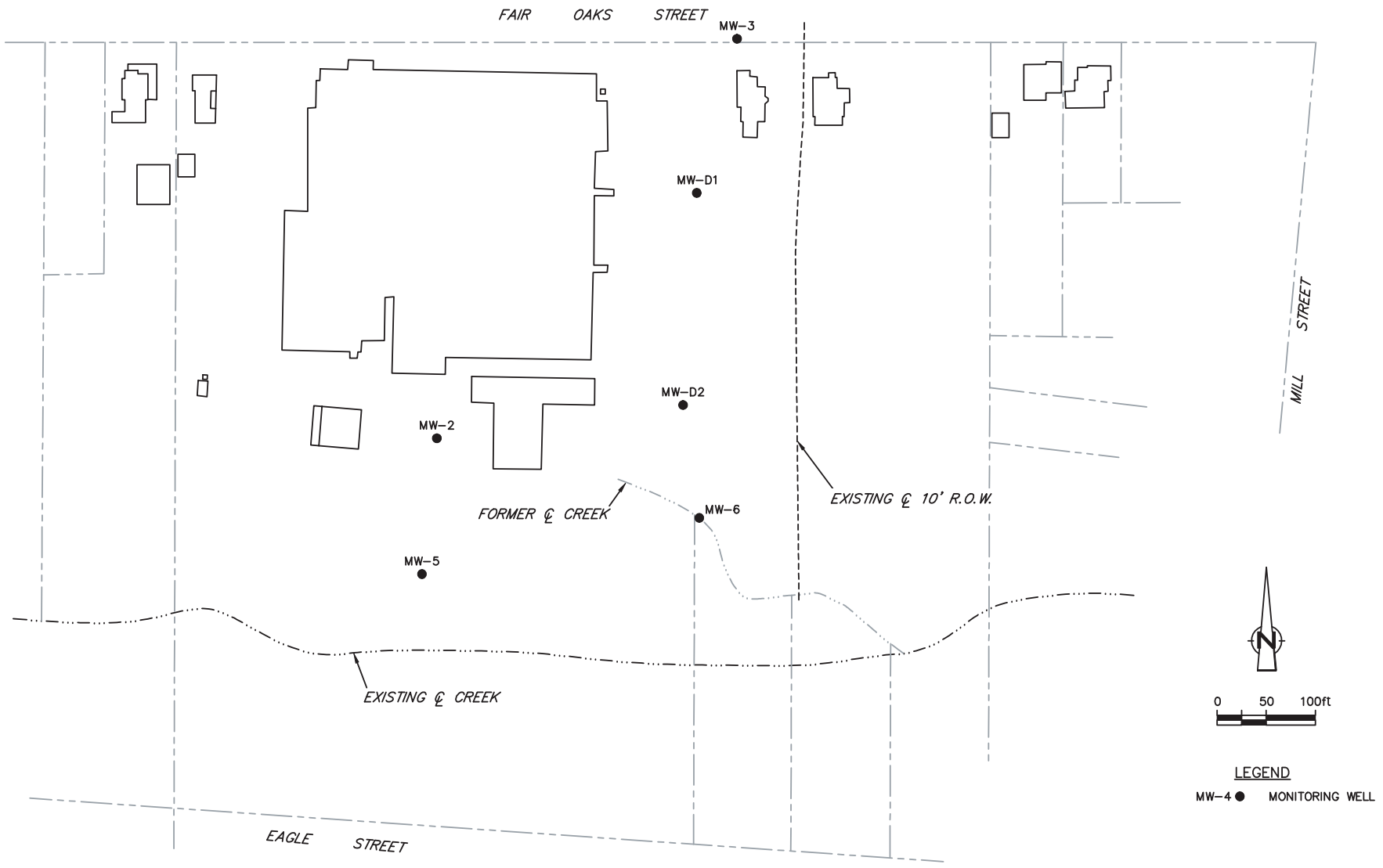
LITTLE VALLEY SUPERFUND SITE

LITTLE VALLEY
CATTARAUGUS COUNTY, NEW YORK

FIGURE 1
SITE BOUNDARY AND
POTENTIAL SOURCE AREAS

TETRA TECH FW, INC.

H:\GIS\GISKEY\GISPROJ31\EPA LITTLE VALLEY\FIGURE 1 (SPECIAL REQUEST).DWG



312 Fair Oak Street Little Valley, New York	GEI Consultants	SITE PLAN AND MONITORING WELL LOCATIONS
BUSH INDUSTRIES, INC.	Project 128910, task 1000	December 2014 Figure 2

FIGURE 3: MNA Monitoring Well Network

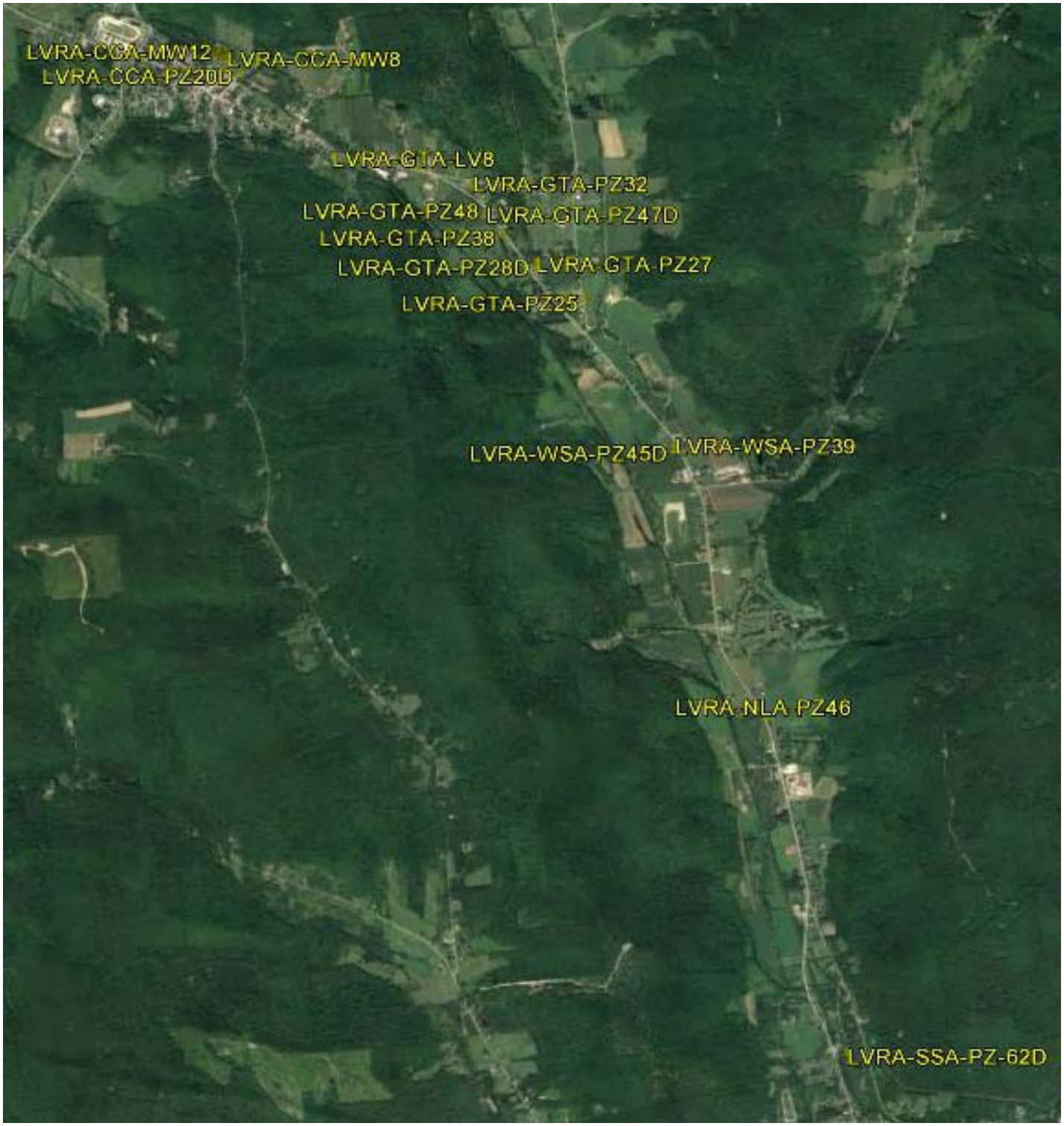
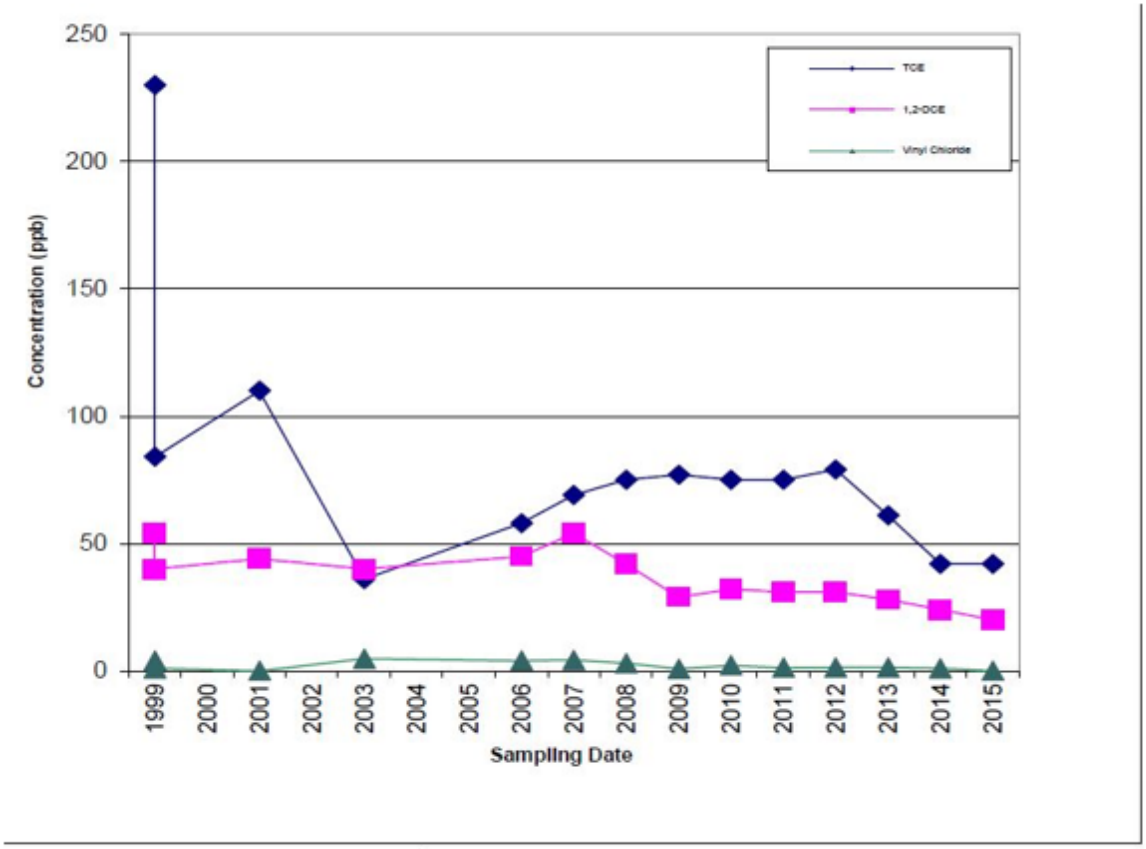
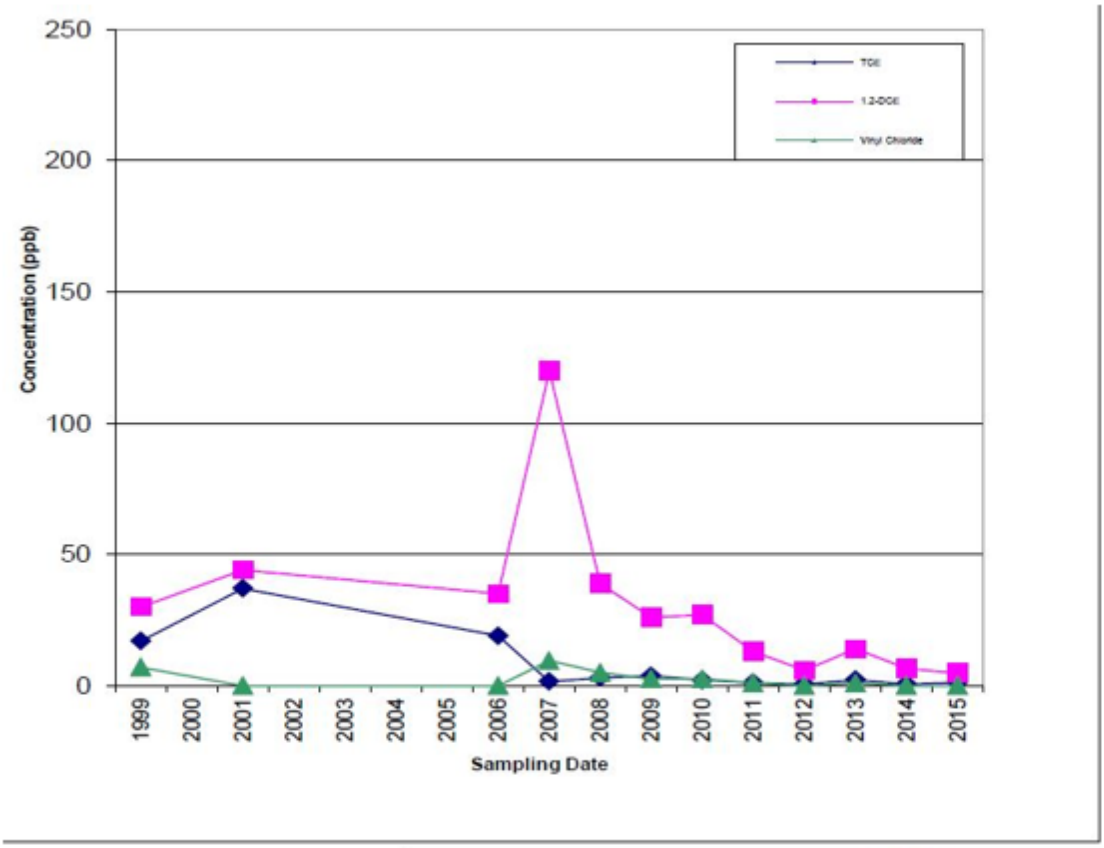


FIGURE 4 – BIAMW-2



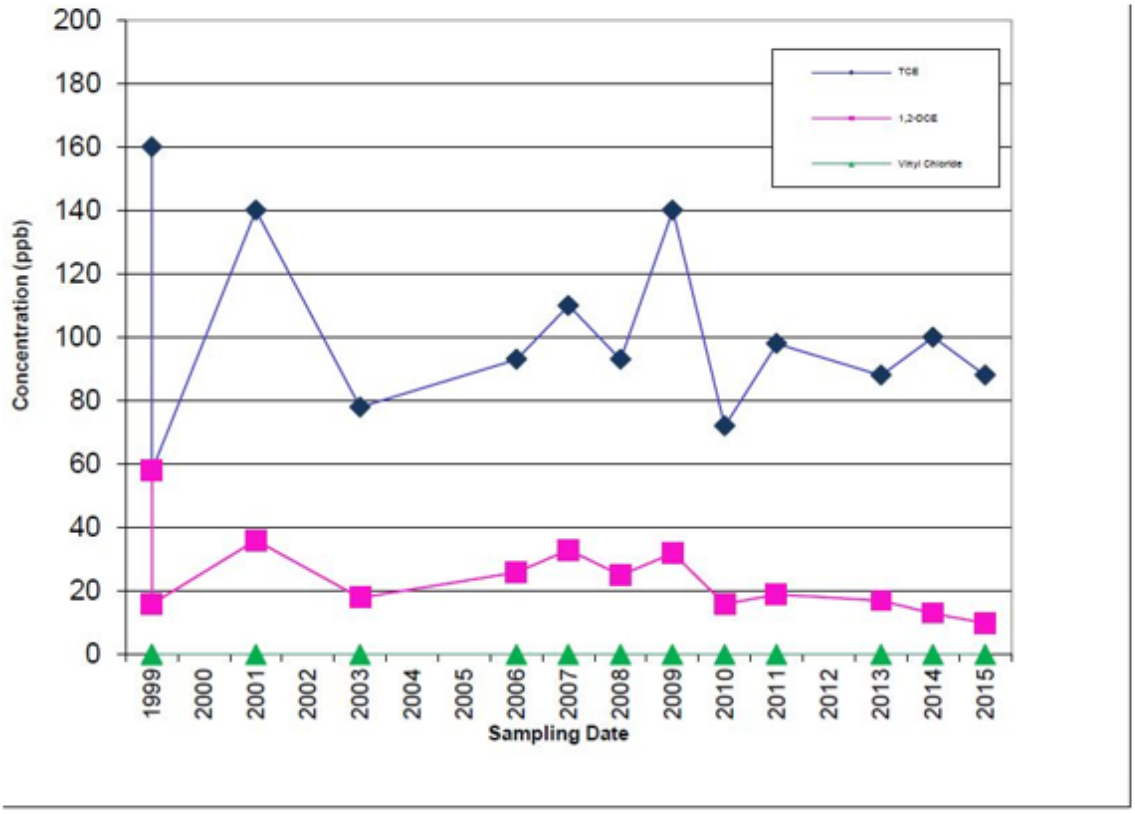
312 Fair Oak Street Little Valley, New York	GEI Consultants	MW-2 VOC TIME-CONCENTRATION PLOT

FIGURE 5 - BIAMW-6



312 Fair Oak Street Little Valley, New York	GEI Consultants	MW-6 VOC TIME-CONCENTRATION PLOT

FIGURE 6 - BIAMW-D2



312 Fair Oak Street Little Valley, New York	GEI Consultants	MW-D2 VOC TIME-CONCENTRATION PLOT
RUSH INDUSTRIES, INC.		

FIGURE 7 – CCAMW-3

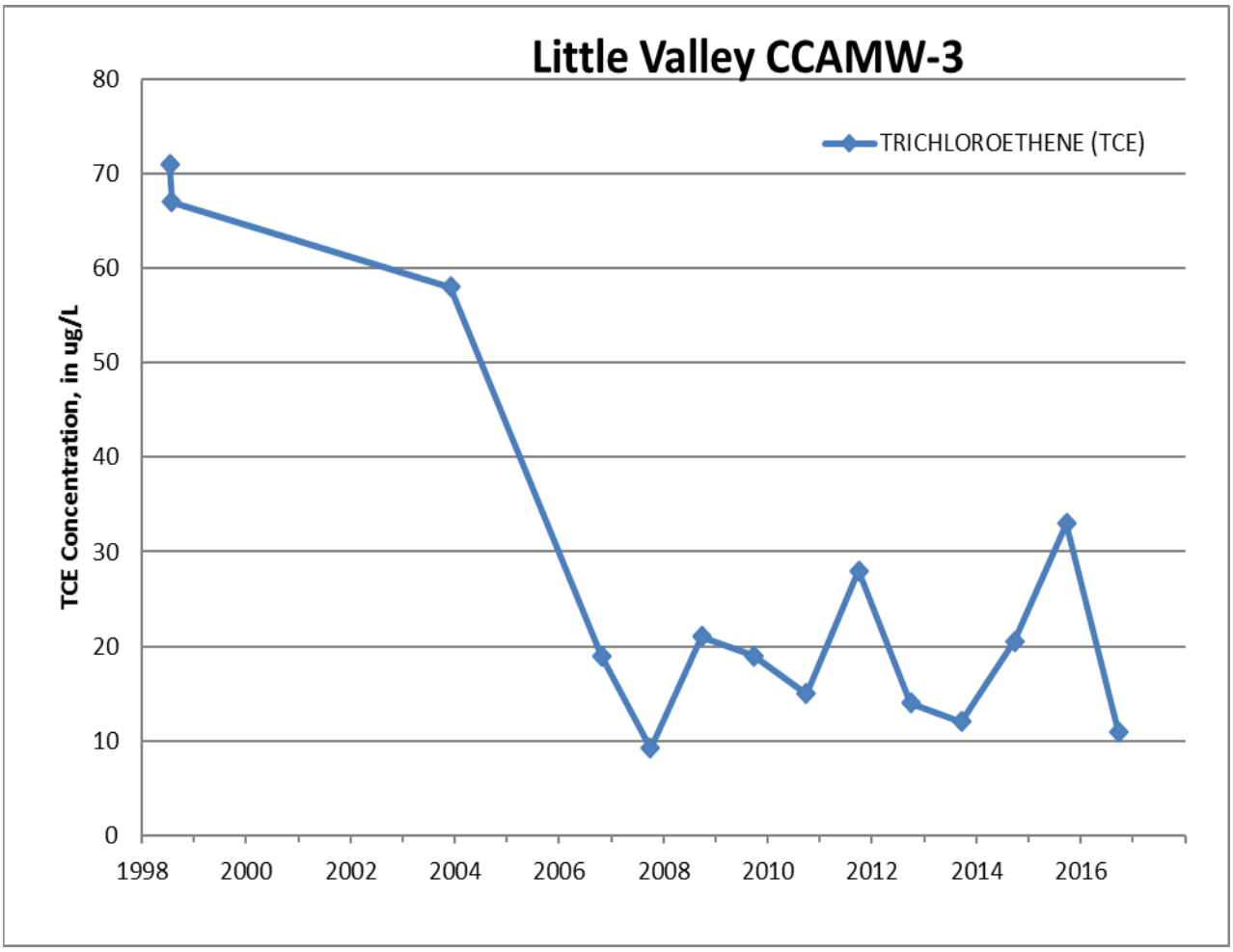


FIGURE 8 – PZ-32

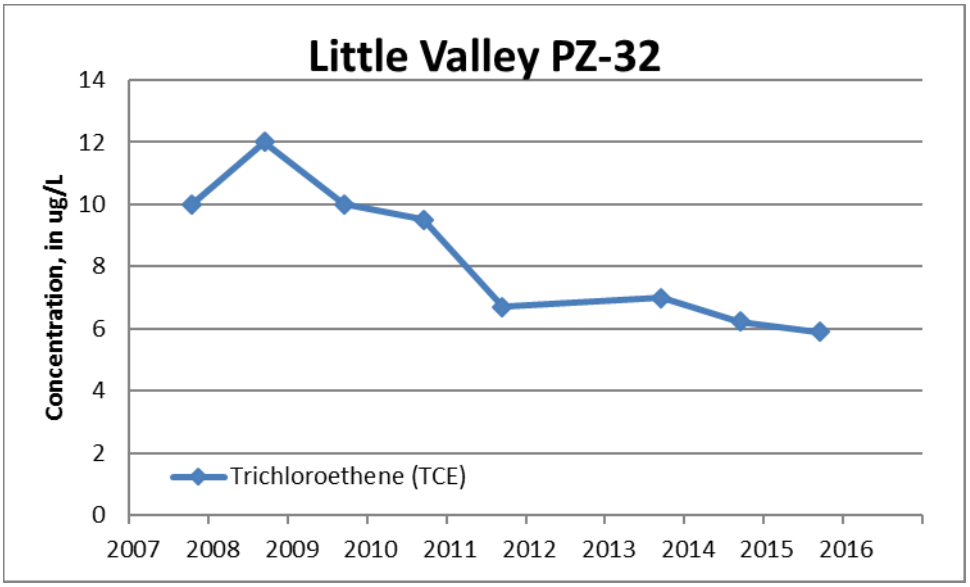
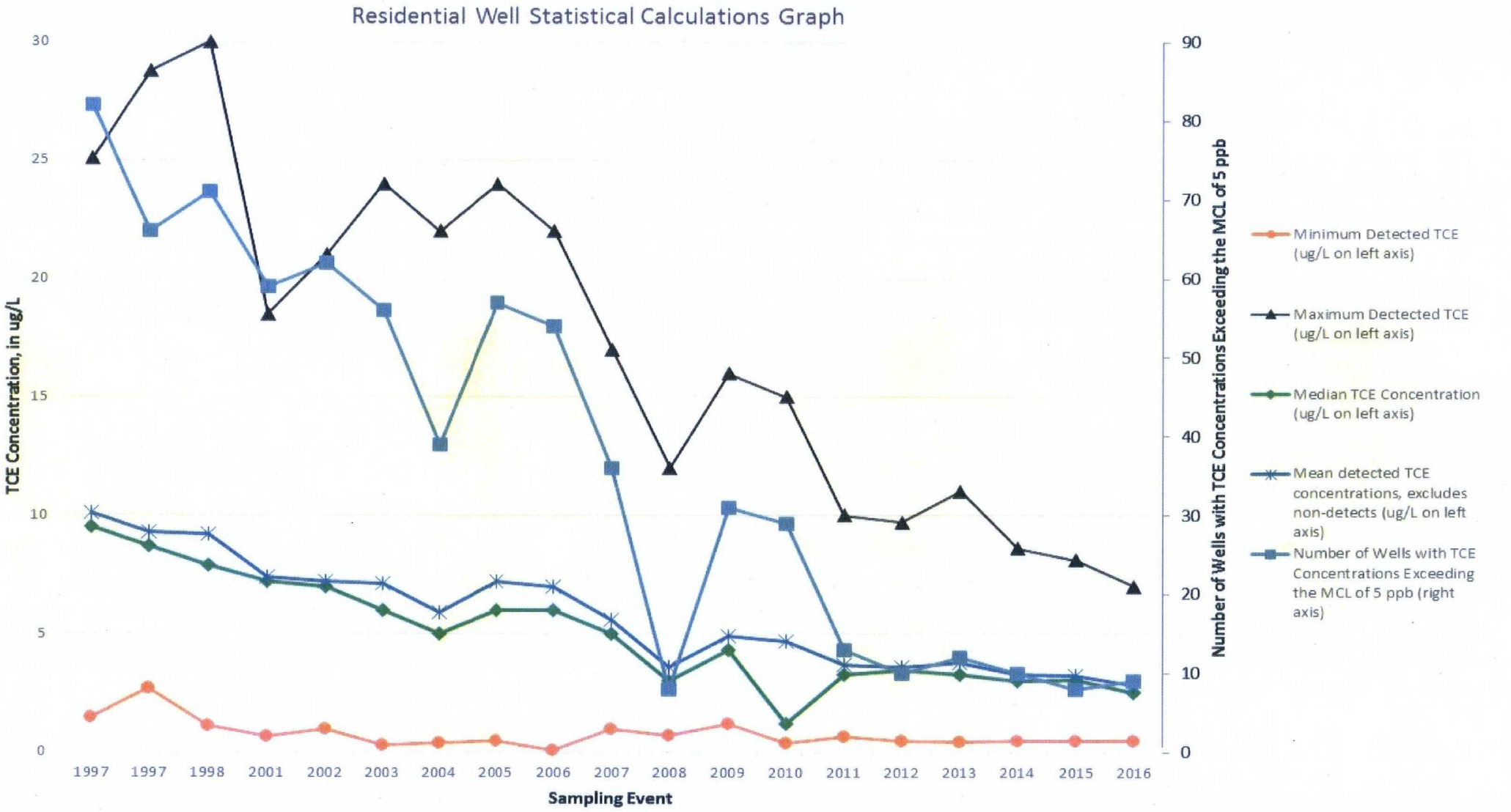


FIGURE 9


Residential Well Statistical Calculations Graph
TCE Concentration, in ug/L
Number of Wells with TCE Concentrations Exceeding the MCL of 5 ppb
Sampling Event
0
5
10
15
20
25
30
0
10
20
30
40
50
60
70
80
90
1997
1997
1998
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Minimum Detected TCE (ug/L on left axis)
Maximum Dectected TCE (ug/L on left axis)
Median TCE Concentration (ug/L on left axis)
Mean detected TCE concentrations, excludes non-detects (ug/L on left axis)
Number of Wells with TCE Concentrations Exceeding the MCL of 5 ppb (right axis)

TABLE

TABLE 5

Summary of Statistical Calculations for Residential Wells with Treatment Systems
Little Valley Superfund Site

	Number of Wells Sampled	Number of Wells with Detected TCE Concentrations	Number of Wells with TCE Concentrations Exceeding the MCL of 5 ug/L	Percentage of Wells with TCE Concentrations Exceeding the MCL of 5 ug/L	Minimum Detected TCE Concentration (ug/L)	Maximum Dectected TCE Concentration (ug/L)	Median TCE Concentration (ug/L)	Mean detected TCE concentrations, excludes non-detects (ug/L)
1997	88	86	82	93.20%	1.49	25.1	9.5	10.1
1997	77	74	66	85.70%	2.7	28.8	8.7	9.3
1998	90	88	71	78.90%	1.1	30	7.9	9.2
2001	75	72	59	78.70%	0.67	18.5	7.2	7.4
2002	87	84	62	71.30%	1	21	7	7.2
2003	85	80	56	65.90%	0.3	24	6	7.1
2004	89	88	39	43.80%	0.4	22	5	5.9
2005	90	89	57	63.30%	0.5	24	6	7.2
2006	90	89	54	60.00%	0.1	22	6	7
2007	89	88	36	40.40%	1	17	5	5.6
2008	87	86	8	9.30%	0.7	12	3	3.6
2009	89	88	31	34.83%	1.2	16	4.3	4.9
2010	89	88	29	32.58%	0.38	15	1.2	4.7
2011	89	87	13	14.60%	0.68	10	3.3	3.7
2012	88	85	10	11.36%	0.5	9.7	3.45	3.6
2013	89	86	12	13.48%	0.42	11	3.3	3.78
2014	85	82	10	11.76%	0.5	8.6	3	3.3
2015	84	82	8	9.76%	0.5	8.1	3.05	3.26
2016	85	82	9	10.58%	0.5	7	2.5	2.82

APPENDIX A – REFERENCE LIST

Documents, Data, and Information Reviewed in Completing the Five-Year Review	
Document Title, Author	**Submittal Date**
Record of Decision (Operable Unit One), EPA	1996
Remedial Investigation and Feasibility Study, Little Valley Superfund Site, Cattaraugus County, New York, Tetra Tech FW, Inc.	2005
Record of Decision (Operable Unit Two), EPA	2005
Amendment to Record of Decision (Operable Unit Two), EPA	2006
Third Five-Year Review Report for Little Valley Superfund Site, EPA	2012
Annual Sampling Reports for GAC Water Treatment Systems, Little Valley, AECOM, NYSDEC	2012-2016
Annual Summary Report for Groundwater MNA Program, prepared for Bush Industries, Inc., by GEI Consultants, Inc.	2012-2015
Annual MNA Sampling Trip Reports & Sampling Results, Hazardous Waste Support Branch, Little Valley Superfund Site, EPA	2012-2016
Soil Vapor Intrusion Sampling Trip Report, Little Valley Site, Little Valley, NY, Events 9 - 12, Lockheed Martin, EPA	2013-2016
Soil Sampling Trip Report, Little Valley Site, Little Valley, NY, Weston, EPA	2013
Evaluation of Options for Addressing Remaining Contaminated Soil, Little Valley Superfund Site – CCA, EPA	2014
Explanation of Significant Differences, EPA	2014
Soil Remedial Action Report, Little Valley Superfund Site, OU2, EPA	2014
EPA guidance for conducting five-year reviews and other guidance and regulations to determine if any new Applicable or Relevant and Appropriate Requirements relating to the protectiveness of the remedy have been developed since EPA issued the ROD.	

APPENDIX B – TOPOGRAPHY, SITE GEOLOGY/HYDROGEOLOGY, AND LAND AND RESOURCE USE

The nearest surface water bodies associated with the site are the Little Valley Creek and its tributaries. Little Valley Creek flows southeast, then south through the Little Valley site for approximately eight miles before joining the Allegheny River. Typical stream flow at Little Valley Creek ranges from 20 to 80 cubic feet per second (cfs) during normal precipitation periods and one to ten cfs during severe drought conditions. During periods of dry hydrologic conditions, the upper reach of the stream channel of Little Valley Creek can be dry between storm events since the local water table can drop below the streambed.

The site geology consists of a U-shaped glacial valley filled with glacially-derived outwash deposits that are frequently overlain by more recent alluvial deposits. The glacial-derived deposits of Little Valley are predominately coarse sand and gravel with isolated lenses of silt and clay. Typically, there are five to thirty feet of alluvial silt and fine sand over the gravel. In some areas, the sand and gravel aquifer is overlain by glaciolacustrine silty clay or clay. These thin lenses are not laterally or vertically extensive.

The water table in the valley ranges from near the surface to 50 feet below the ground surface. In general, the water table is deepest in the upper (northern) portion of the valley and gets closer to the ground surface as one moves down the valley toward the Allegheny River. The overall groundwater flow direction is from north to south, following the slope of the valley topography. The highly permeable sand and gravel aquifer combined with the observed groundwater gradients result in relatively high estimates of groundwater-flow velocity (more than five feet/day).