FIRST FIVE-YEAR REVIEW REPORT FOR
VALMONT TCE SUPERFUND SITE
LUZERNE COUNTY, PENNSYLVANIA

Prepared by

U.S. Environmental Protection Agency
Region 3
PHILADELPHIA, PENNSYLVANIA

Karen Melvin

AUG 10 2016

Dominique Lueckenhoff, Acting Director
Hazardous Sites Cleanup Division

Date

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
CSM	conceptual site model
DCE	dichloroethylene
EE/CA	Engineering Evaluations/Cost Anyalysis
EPA	Environmental Protection Agency
FS	Feasibility Study
FYR	Five Year Review
GMUC	Groundwater Migration Under Control
GRPA	Government Performance and Results Act
HI	Hazard Index
HUEC	Human Exposure Under Control
IC	institutional control
ISCO	in-situ chemical oxidation
LTRA	long term remedial action
MCL	Maximum Contaminant Level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
O&M	operation and maintenance
PADEP	Pennsylvania Department of Environmental Protection
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
ppm	part per million
RAO	remedial action objective
RI	Remedial Investigation
ROD	Record of Decision
RSL	risk-based screening level
SSC	Superfund State Contract
SSD	sub-slab depressurization system
SVE	soil vapor extraction
SWRAU	Sitewide Ready for Anticipated Use
TCA	trichloroethane
TCE	trichloroethylene
ug/L	microgram per liter
ug/m^3	microgram per cubic meter
VOC	volatile organic compound

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 Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the first FYR for the Valmont TCE Superfund Site (Site). The triggering action for this **statutory** review is the start date of on-site construction of the remedial action, which was August 12, 2011. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

The FYR was led by an EPA team including Remedial Project Manager Brad White; hydrogeologist Mindi Snoparski; EPA toxicologist Jennifer Hubbard; EPA Biological Technical Assistance Group biologist Bruce Pluta; EPA community involvement coordinator Larry Johnson; and Pennsylvania Department of Environmental Protection (PADEP) project manager Leonard Zelinka and hydrologist William Craft. The review began on October 19, 2015.

Site Background

The Site is located in Hazle Township and the borough of West Hazleton, Luzerne County, Pennsylvania (see Figure 1). The Site consists of one known source area (the Plant), a former upholstery manufacturing plant at 423 Jaycee Drive within the Valmont Industrial Park, and contaminated groundwater beneath the Plant and in the nearby residential neighborhood (see Figure 2). The Plant building is currently owned by Chromatex, Inc. (Chromatex). Chromatex vacated the building in 2001 after having operated an upholstery manufacturing and coating business from 1979 to 1993. The building is currently leased by Chromatex to Karchner Logistics, Inc., who uses the building as a warehouse to store non-hazardous materials. Chromatex used fluorocarbon stain repellants, including Scotchgard™ and Dupont Teflon, which contained trichloroethylene (TCE) and other volatile organic compounds (VOCs). It is the use of these TCE-containing products that led to the subsequent VOC contamination at the Site.

Government Performance and Results Act (GPRA) Measure Review

As part of this FYR, the GPRA Measures have also been reviewed. The GPRA Measures and their status are provided as follows:

Environmental Indicators
Human Health: Human Exposure under Control and Protective Remedy in Place (HEUC)
Groundwater Migration: Groundwater Migration under Control (GMUC)

Sitewide Ready for Anticipated Use (SWRAU)
The Site achieved Sitewide Ready for Anticipated Use (SWRAU) on March 31, 2015.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Valmont TCE Superfund Site		
EPA ID: PAD982363970		
Region: 3	**State:** PA	**City/County:** Luzerne County

SITE STATUS	
NPL Status: Final	
Multiple OUs? No	**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): Brad White
Author affiliation: EPA Region 3
Review period: 10/19/2015 - 8/1/2016
Date of site inspection: 4/4/2016
Type of review: Statutory
Review number: 1
Triggering action date: 8/12/2011
Due date *(five years after triggering action date)*: 8/12/2016

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

The following organic and inorganic compounds were identified as contaminants of concern in the 2011 Record of Decision (ROD):

Groundwater

- TCE
- cis-1,2-Dichloroethylene (DCE)
- 1,1,1-Trichloroethane (TCA)
- Vinyl chloride

Indoor Air

- TCE
- 1,1-DCE
- 1,1,1-TCA

Groundwater and subslab vapor are the remaining contaminated media at the Site. Subslab vapor in the neighborhood is being addressed by SSDs in the short term, and is expected to resolve as a result of groundwater cleanup in the long term. Contamination remains in the shallow and deeper bedrock in the Plant area, with a plume of volatile organic compound (VOC) contaminated groundwater in the Plant area and adjacent residential neighborhood. Municipal water service is provided to industrial and residential customers in the area surrounding the Site. EPA's ongoing remedial action is intended to restore groundwater to future beneficial use.

Response Actions

Groundwater contamination at the Site was discovered in October 1987 by the Pennsylvania Department of Environmental Resources (now PADEP) when conducting groundwater sampling in response to a spill of xylene at an adjacent facility. Samples collected from four private drinking water wells in the nearby neighborhood revealed the presence of elevated concentrations of chlorinated solvents in each of the wells. The presence of these solvents was unrelated to the xylene spill. Following the discovery, PADEP contacted EPA for assistance. EPA conducted further sampling that indicated the presence of TCE in 23 residential wells adjacent to the Plant. TCE was found in the residential wells at concentrations as high as 1.4 parts per million (ppm). TCE was found in the Plant production well, located on the west side of the Plant building, at a concentration of 2.2 ppm. Under an EPA removal action, bottled water and carbon filters were provided to the affected homes. Later, public water supply lines were extended into the neighborhood to supply clean drinking water to the residents. Water service is provided by Hazleton City Water Authority, which draws water from a network of wells outside of the Site area.

EPA completed a hazard ranking of the Site in May 2001 and placed on the NPL in September 2001.

To determine the nature and extent of contamination at the Site, EPA conducted a remedial investigation (RI). RI activities were conducted from 2001 to 2004, and included soil, groundwater, sediment, surface water, and residential indoor air sampling. Based on the results of indoor air samples collected as part of the RI, EPA conducted a removal action to address contaminated indoor air. Eight homes were supplied with temporary air filtration units and three additional homes were provided with custom-made sump covers between 2003 and 2004.

EPA then completed a number of Engineering Evaluations/Cost Anyalyses (EE/CAs) in support of non time-critical removal actions to address contamination present in soil, indoor air, and groundwater. Following is a brief summary:

- In August 2004, EPA completed a soil removal action at the Site where more than 18,000 tons of VOC-contaminated soil was excavated and taken off-Site for disposal. A soil vapor extraction (SVE) system was designed and constructed in 2006 to address contaminated soil beneath the Plant warehouse. The SVE system operated from March 2007 through October 2009, during which time the system recovered 234 pounds of TCE from the contaminated soil beneath the slab of the building.
- In support of an EE/CA for Indoor Air, EPA conducted sub-slab soil gas sampling at residences that overlie the known plume of groundwater contamination. While not all residents granted access for the sampling, EPA was able to assess the majority of properties over the plume. Based on that sampling, EPA identified nine homes, in addition to the original eight homes that already had air filtration devices installed in 2003-2004, that had the potential for vapor intrusion. EPA then initiated a non time-critical removal action to install sub-slab depressurization systems (which are the same as radon systems) in the 17 homes. Shallow groundwater was encountered beneath the basement slab of the ninth home, and EPA was unable to install a depressurization system. EPA subsequently conducted indoor air sampling inside the home, and found no Site-related contamination present. A total of 16 homes currently have depressurization systems installed by EPA, as described above and shown in Figure 3.

- EPA completed an EE/CA for contaminated groundwater in May 2006. The EE/CA incorporated groundwater data from the RI, and evaluated multiple alternatives for the cleanup, including groundwater pumping and treatment, and in-situ chemical oxidation. EPA then initiated pilot studies to evaluate the effectiveness of chemical oxidation.

EPA conducted a large scale pilot study in 2009 to evaluate the effectiveness of in-situ chemical oxidation (ISCO) on addressing VOC contaminated groundwater at the Site. A network of six injection wells (E-1 through E-6) were installed throughout the Plant area that consisted of 8-inch diameter boreholes drilled to an average depth of 100 feet into bedrock. EPA then injected a slurry of potassium permanganate, a chemical oxidant known to degrade the Site contaminants, under pressure into discrete water bearing zones. Following the injections, EPA observed significant decreases of Site contaminants in the Plant area, as well as decreased concentrations in monitoring wells located in the residential neighborhood.

Based on the results of the pilot study, EPA issued a ROD for the Site in January 2011 to address the final remedy for groundwater and indoor air contamination. The remedial action objectives (RAOs) of the Selected Remedy are:

<u>RAOs for Groundwater</u>

- Minimize any potential further migration of contaminated groundwater from the Site;
- Protect human health from exposure to chemical constituent concentrations above Federal maximum contaminant levels (MCLs) or Applicable or Relevant and Appropriate Requirements (ARARs); and
- Restore groundwater throughout the Site to beneficial use as a drinking water source.

<u>RAOs for Indoor Air</u>

- Protect human health from exposure to vapor intrusion through the continued operation of the existing sub-slab depressurization systems in the neighborhood adjacent to the Plant area until sub-slab vapors meet the performance standards and no longer present unacceptable risk to human health; and
- Monitor the vapor intrusion pathway, as necessary, to ensure the residents remain protected.

<u>Major Components of the Groundwater Remedy:</u>

- In-situ treatment of the entire groundwater plume will be done by conducting batch injections of a chemical oxidant, such as potassium permanganate or sodium permanganate, into the bedrock in the vicinity of the former Chromatex upholstery manufacturing plant (Plant). Injections will initially be a slurry of chemical oxidant into new injection wells, followed by periodic injections of either a slurry or more dilute solution of chemical oxidant.
- Performance monitoring will be conducted during the treatment period. Long-term groundwater monitoring for VOCs and inorganic compounds will be conducted until cleanup criteria have been met.
- Institutional controls (ICs) will be necessary to restrict the potable use of groundwater within the contaminated plume until groundwater cleanup goals are met. Use restrictions selected in this ROD could be implemented with a variety of tools, including local ordinances, orders issued by the Commonwealth of Pennsylvania or environmental covenants. IC's will also include requirements that the Plant property owner not interfere with the action, or the integrity of equipment for the duration of the remedial action.

<u>Major Components of the Indoor Air Remedy:</u>

- Operation and maintenance (O&M) of the existing sub-slab depressurization systems that have been installed in 16 residential structures in the neighborhood adjacent the Plant area will be continued until the

performance standards for sub-slab soil vapor are met. This will include annual system inspections, and monitoring at least once every five years until the cleanup goals are met.

Performance Standards:

Groundwater

1. The following MCLs for the groundwater contaminants of concern (COCs) shall be attained throughout the entire plume:

Maximum Contaminant Levels (MCLs) for Contaminants of Concern in Groundwater	
TCE	5 ug/l
cis-1,2-DCE	70 ug/l
1,1,1-TCA	200 ug/l
Vinyl chloride	2 ug/l

2. Once the above performance standards for groundwater are met for three years, a risk assessment shall be conducted that evaluates the cumulative risk presented by residual Site-related compounds, including any remaining VOCs and/or chemical oxidation breakdown products.

3. The remedial action for groundwater will continue until the MCLs are achieved, as specified above, and the cumulative risk presented by all remaining Site-related compounds, and/or chemical oxidation breakdown products, is below a 10^{-4} cancer risk level, and the noncancer HI is equal to or less than 1.

Indoor Air

1. The operation of the sub-slab depressurization systems will continue until the following performance standards for sub-slab soil vapor have been achieved for four consecutive quarters:

Performance Standards for Contaminants of Concern in Sub-slab Soil Vapor	
TCE	12 ug/m^3
1,1-DCE	1,050 ug/m^3
1,1,1-TCA	26,500 ug/m^3

1. Once the above performance standards for sub-slab soil vapor are met, a risk assessment shall be conducted that evaluates the cumulative risk presented by residual Site-related compounds, including any remaining VOCs and/or chemical oxidation breakdown products.

2. O&M of the sub-slab depressurization systems will then continue until the performance standards for the COCs in sub-slab soil vapor are met, as described above, and the cumulative risk presented by all remaining Site-related compounds and/or chemical oxidation breakdown products present in sub-slab soil vapor is below a 10^{-6} cancer risk level, and the noncancer HI is equal to or less than 1.

Institutional Controls

The 2011 ROD called for implementing ICs at the Site to achieve the following objectives:

- Groundwater within the plume boundaries shall not be used for drinking water until the groundwater attains the standards set forth within Section 20.3.1 of this ROD. The plume boundaries are defined as the

approximate area bounded by Deer Run Road to the north, the southern boundary of the Plant property to the south, Jaycee Drive to the west, and the eastern Plant boundary and Fawn Drive to the east. This area includes the residential streets of Twin Oaks Road, Bent Pine Trail, and Fawn Drive.

- The remedial action, or the integrity of equipment, shall not be interfered with for the duration of the remedial action.

Status of Implementation

Groundwater Remedy:

EPA has conducted ISCO injections into a network of injection wells and select monitoring wells located within the Plant area. Following each round of injections, EPA conducted numerous groundwater monitoring events to evaluate the success of the injections and aid in planning future rounds of injections. TCE concentrations prior to ISCO injections are shown in Figures 4 and 5 (May 2011). Figure 6 shows the network of injection wells. Following is a brief description of the remedy implementation.

In 2011, EPA drilled three additional injection wells (E7 through E9) in the Plant area as part of the remedial design. The first round of ISCO injections was completed in August and September 2011. EPA injected a slurry of oxidant into three new injection wells (E7, E8, and E9). The slurry was a super-saturated mixture of potassium permanganate that was injected under pressure into various intervals within each injection well using a packer assembly. EPA then injected a solution of sodium permanganate into well E-5. At that time, the remaining injection wells (E1, E2, E3, E4, and E6) still showed the presence of permanganate from the 2009 Pilot Study, so no additional oxidant was injected.

EPA conducted the second round of ISCO injection in May 2013. During this event, EPA injected a 10% solution of sodium permanganate into the following injection wells: E1; E2; E3; E4; E5; E6; E7; and E9. Because of issues with permanganate rising to the surface during a significant rain event following September 2011 injection, EPA did not inject into E-8. To increase the distribution of oxidant, EPA also injected relatively low volumes of sodium permanganate into the following monitoring wells: MW10A; MW11S; MW12S; MW13S; MW13I; MW18S; MW22D; and MW28S.

In June 2014, EPA drilled five additional injection wells to improve the network of injection wells and increase the areal extent of oxidant distribution (E10; E11; E12; E13; and E14). These new wells were drilled inside the Plant warehouse where the most elevated concentrations of TCE remained in the groundwater. Concentrations of TCE in excess of 100 parts per million were encountered in one area, indicating significant concentrations of TCE remained present in the aquifer beneath the building.

EPA completed the third round of ISCO injections in November-December 2014. During this event, a 10% solution of sodium permanganate was injected into the following injection wells: E1; E2; E3; E7; E9; E10; E11; E12; E13; and E14. To increase the distribution of oxidant, EPA also injected relatively low volumes of sodium permanganate into the following monitoring wells: MW-10A; MW-11S; MW13I; and MW-13S. Post-injection monitoring was conducted in early 2015, and it became apparent the ISCO injections were not reaching some areas of contamination. At that time, EPA initiated an optimization review of the remedy, which is discussed in detail later in this FYR.

EPA is currently assessing the remedy to determine the nature of additional injections or modifications to the remedy.

Indoor Air Remedy:

Sixteen residential SSD systems are in operation. EPA has conducted annual inspections of the systems to verify the SSD systems are operating properly by recording the vacuum registered on the liquid manometers, inspecting

the piping for any blockages, and met with the homeowners to address any questions or concerns. Since 2011, four fans have been replaced. Following is a brief record of the SSD inspections:

- July 2011 – annual inspection
- August/September 2012 – annual inspection
- August/September 2013 – annual inspection
- August 2014 – annual inspection
- August 2015 – annual inspection

Institutional Controls

All ICs specified in the ROD are now in place in the form of local municipal ordinances (groundwater use restrictions) and informational ICs (for continued access and protection of remedial components).

IC Summary Table

Summary of Planned and/or Implemented ICs					
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	Entire Site	Prevent the potable use of groundwater	Local ordinance, Borough of West Hazleton – July 2012 Informational IC (letter) – Hazle Township, July 2014 Local Ordinance, Hazle Township, January 2015
Access	Yes	Yes	Plant area	Continued access, protection of remedial equipment	Superfund Comfort Letter, signed June 8, 2016

Systems Operations/Operation & Maintenance

EPA is currently implementing the long term remedial action (LTRA) phase of the remedy, which is scheduled to continue until September 2022. At that point, under the terms of the current Superfund State Contract (SSC) with the Commonwealth of Pennsylvania (executed April 15, 2011), PADEP will undertake O&M at the Site. The April 2011 SSC assumes the remedy is expected to achieve performance standards within the LTRA period, but that sampling of groundwater and sub-slab vapors of the affected homes (that have SSD systems) may be required beyond the LTRA period. If monitoring is required beyond the LTRA period, PADEP will undertake O&M

responsibilities to include groundwater monitoring, SSD inspections and related sampling, and maintenance of ICs.

Problems Encountered During Implementation of the Groundwater Remedy

Following the third round of ISCO injections in the Plant area and subsequent post-injection groundwater monitoring, it became apparent the groundwater remedy was not progressing toward achievement of the cleanup goals within the timeframe anticipated in the ROD. The expectation described in the ROD was that *"multiple injections of either a slurry or solution of oxidant will periodically occur as needed for up to five years following the initial round of injections."* While TCE concentrations have generally decreased in monitoring wells in the neighborhood and some monitoring wells in the Plant area, the concentrations in most wells within the plume remain above the performance standard (5 ug/L). Further, the elevated concentrations (as high as 100 ppm) of TCE observed in the new injection wells inside the warehouse indicate a significant mass of contamination remaining within the bedrock that continues to contribute to contamination within the aquifer. The concentration and volume of contamination is greater than what was contemplated in the ROD and used to estimate the timeframe to achieve the cleanup goals.

In an effort to assess ways to improve the remedy, and in support of this FYR, EPA conducted an Optimization Review. The goal of the Optimization Review was to identify potential data gaps in Site characterization, evaluate the groundwater remedy and the progress towards meeting the RAOs, and provide recommendations in improving the overall success of the groundwater remedy. The Optimization Review was finalized in October 2015, and outlined the following:

- Critical Data Gaps
    - Spatial distribution of contaminant mass and potential source material
    - Role of diffusion-limited[1] processes in remediation
    - Path and fate of injected permanganate
    - Mass removal and progress to site closure is uncertain
    - Plume transport
- Recommendations to Improve Characterization and the Conceptual Site Model (CSM)
    - Conduct hydraulic packer testing of existing open boreholes (injection wells)
    - Convert boreholes to monitoring wells
    - Install shallow wells and additional bedrock wells
    - Incorporate new data in the CSM
- Recommendations for Remediation
    - Use recirculation system for ISCO
    - Treat from shallow to deep
    - Focus on the source area before treating the downgradient plume
    - Closely monitor remedial progress

EPA is currently in the process of implementing those recommendations deemed appropriate to improve characterization of the contamination present in the Plant area and updating the CSM. To date, the following recommendations have been implemented:

- Hydraulic packer testing has been completed on all 14 open borehole injection wells

[1] Matrix diffusion is defined as the exchange of contaminant mass, through molecular diffusion, between the fluid in fractures and the fluid in the rock matrix. In the case of this Site, the solute mass of concern is the VOC contamination. The flow velocity of water in the rock matrix is orders of magnitude slower than the flow of water in the fractures. This can translate to significantly slower contaminant transport throughout the aquifer and is therefore an important process to understand for remediation of groundwater contamination.

- The open borehole injection wells, with the exception of E-5, have been converted to shallow and/or deep monitoring wells
- Installation of shallow wells in the Plant warehouse
- Installation of additional bedrock monitoring wells in the Plant warehouse
- Sampling of new and existing monitoring wells

EPA is currently evaluating data collected from the activities described above, as well as historical data, and will update the CSM. If there are any significant or fundamental changes necessary to the groundwater remedy, EPA will address those changes in the appropriate decision document.

III. PROGRESS SINCE THE LAST REVIEW

This is the first FYR for the Site.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

A public notice was placed in the Hazleton Standard Speaker on May 20, 2016 announcing the FYR and inviting the public to submit any comments to EPA. The results of the review and the report will be made available at the following information repositories:

Hazleton Area Public Library
55 N. Church Street
Hazleton, PA 18201
Hours: Monday - Thursday 8:30 am to 9pm
Friday - Saturday 8:30 am to 5pm
Sunday closed

EPA Administrative Records Room,
Attention: Administrative Coordinator
1650 Arch Street
Philadelphia, PA
(215) 814-3157
Hours: Monday through Friday, 8:00 am to 4:30 pm; by appointment only.

During the FYR process, EPA spoke with local officials and residents to document any perceived problems or successes with the remedy that has been implemented to date.

Document Review

A list of documents reviewed in support of the FYR is provided at the end of this report.

Data Review

The Site achieved construction completion when the Preliminary Closeout Report was signed on September 7, 2011. At that time, the network of ISCO injection wells specified in the Remedial Design was in place and ISCO injections had been initiated, and the residential SSD systems had been inspected and were operational. To date, three rounds of ISCO injections have been completed and the residential SSD systems have been inspected annually.

The data review for this FYR focused on the overall effectiveness of the ISCO remedy to address contaminated groundwater at the Site, the performance of the residential SSD systems, and additional vapor intrusion sampling in the neighborhood. Following is a discussion of the remedy performance and additional vapor intrusion sampling.

Groundwater Remedy

Table 1, provided as an attachment to this FYR, provides a summary of historical TCE concentrations in monitoring wells located throughout the Site used to evaluate groundwater trends. While this table does not present all monitoring wells associated with the Site, it includes those wells that have been sampled numerous times since 2008. Recent groundwater plume maps are provided as Figures 7 and 8.

Per the recommendations provided in the Optimization Review, EPA converted the injection boreholes (designated as E-series wells) to discrete monitoring wells to better characterize contamination in the Plant area, and installed additional monitoring wells inside the warehouse (Figure 9). EPA sampled the new monitoring wells for VOCs, 1,4-dioxane, and per- and polyfluoroalkyl substances (PFAS) in May 2016. The validated VOC and PFAS results were pending at the time this report was prepared.

1,4-dioxane is a solvent stabilizer that EPA has become aware of in recent years. It may be discovered at sites where chlorinated solvents, especially 1,1,1-TCA, have been used. The 1,4-dioxane results are provided in Table 2 as an attachment to this FYR.

PFAS are a group of synthetic chemicals that do not occur naturally in the environment. These compounds, which include perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), have been used in the Scotchgard™ manufacturing process. Given the historical use of Scotchgard™ at the Site, EPA has monitored for the presence of PFOA and PFOS. These compounds have been detected in a number of monitoring wells over a risk-based screening level of 0.4 ug/L. While the groundwater remedy does not directly address PFOA and PFOS, the ICs that are in place restrict the potable use of groundwater at the Site. The ROD specified continued monitoring of PFOA and PFOS. Table 3, provided as an attachment to this FYR, has a summary of results from 2010, 2011, and 2015. Sampling of the new monitoring wells was conducted in May 2016, and the results are pending. EPA has also reviewed analytical data from public supply wells that are located in the Hazleton area. These wells, which are located over a mile from the Site, have not been impacted with PFAS.

Indoor Air Remedy

As noted earlier in this report, EPA conducted annual inspections of the 16 residential SSD systems that were installed during a non time-critical removal action. The inspections were conducted to verify the systems are operating as designed. EPA has replaced four fans that were malfunctioning. The homeowners have instructions to contact EPA in the event they notice a malfunction or suspect something is wrong with the SSD system.

In support of this FYR, EPA reviewed historical residential subslab and/or indoor data in homes that did not previously qualify for SSD systems. EPA's risk-based screening level (RSL) for TCE has been updated since the SSD systems were originally installed, so the new screening level was compared to historical data for these homes. To assess the historical subslab data against the new RSL (carcinogenic screening level of 0.48 micrograms per cubic meter (ug/m^3) at the carcinogenic target risk of 10^{-6}; noncancer screening level of 0.21 ug/m^3 for a Hazard Index of 0.1), EPA applied a default attenuation factor of 0.1 between the subslab and indoor air. Therefore, EPA used 2.1 ug/m^3 as the subslab screening criterion. Five homes were identified that had historical subslab TCE concentrations greater than or equal to 2.1 ug/m^3. EPA mailed letters to the residents of these five homes and contacted the owners via telephone to discuss the data review and offer to conduct additional sampling. Three residents granted access for additional sampling and two residents did not respond.

EPA met with the three homeowners in March 2016 to discuss the additional vapor intrusion sampling and assess the homes. One of the residences, which had a custom sump cover previously installed by EPA during a non

time-cirtical removal action, had a SSD system in place that the previous homeowner voluntarily had installed by a licensed radon mitigation firm. EPA inspected the system and determined additional sampling was not necessary; EPA will include this residence during annual SSD inspection. EPA returned to the other two homes the following week and conducted 24-hour subslab, indoor air, and ambient air sampling. Sampling included three subslab and three indoor air samples at each residence, as well as an outside ambient air sample.

The maximum TCE concentration detected in indoor air in the first home was 0.159 ug/m3, and the maximum subslab TCE concentration was 8.81 ug/m3. While the subslab TCE concentration may represent future risk, the observed attenuation/dilution between the basement slab and indoor air living space is 0.02, much lower than the default attenuation factor of 0.1, indicating more attenuation is occurring between the subslab and indoor air than default assumptions would imply. The maximum TCE concentration detected in indoor air in the second home was 0.34 ug/m3, and the maximum subslab TCE concentration was 1.44 ug/m3. Even if this vapor migrated into the living space without any dilution, it will still be within the acceptable risk range. There does not currently appear to be a vapor intrusion threat at these homes.

A round of vapor intrusion sampling was also conducted in the Plant warehouse to assess the ambient air conditions in December 2015. Eight-hour samples were collected from eight locations throughout the warehouse, including the employee office, and two samples were collected outside the warehouse. TCE concentrations inside the warehouse ranged from 1.2 ug/m^3 to 7.6 ug/m^3, while concentrations outside the warehouse ranged from non-detect to 0.27 ug/m^3. All results were below EPA's non-cancer HI for a worker of 8.8 ug/m^3, and within EPA's acceptable risk range for cancer (3.0 ug/m^3 at 1E-6 to 300 ug/m^3 at 1E-4). However, since TCE was detected at a concentration close to the HI, EPA will continue to monitor the air in the warehouse. Additional sampling was conducted in May 2016 and the results are pending.

Site Inspection

The inspection of the Site was conducted on 4/4/2016. In attendance were EPA Remedial Project Manager Brad White, PADEP project manager Leonard Zelinka, PADEP geologist William Craft, and EPA's technical support contractor. A general discussion was held with regard to the overall progress of the response action and implementation of the recommendations provided in the Optimization Review. EPA and PADEP expressed concerns with the progress of groundwater remediation and the need to optimize the remedy.

V. TECHNICAL ASSESSMENT

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

No, not entirely.

Human health is being protected from exposure to contaminated groundwater because municipal water is provided and ICs are in place, and residents are being protected from vapor intrusion through the ongoing operation of the SSD systems.

ISCO injections conducted to date have resulted in a general decrease of contaminants in the groundwater in the neighborhood, as well as some monitoring wells in the Plant area. However, EPA discovered significant contamination remains underneath the Plant warehouse that is not being adequately addressed through the ISCO injections. Because of this additional contamination, it is unlikely the current remedy will result in restoration of groundwater to beneficial use within the expected timeframe. Therefore, EPA is working to optimize the remedy.

Groundwater Remedy

While the ISCO injections have been implemented as designed and in accordance with the 2011 ROD, attainment of cleanup goals within the expected timeframe outlined in the ROD does not appear feasible. Concentrations of

TCE in the groundwater underlying the Plant area remain well above the cleanup goals, and there is strong evidence that a significant mass of contamination remains within the bedrock underneath the warehouse. The injection of oxidants into the network of injection wells has certainly destroyed some contaminant mass, as evidenced by some decreases in contaminant concentrations in some monitoring wells in the Plant area and neighborhood, but oxidant distribution and contact time have not been sufficient to address all the contamination present. Groundwater contamination will likely persist until the contaminant mass in the primary source area underneath the warehouse is addressed.

EPA is currently working to optimize the remedy. The 2015 Optimization Review outlined a number of recommendations to take to provide better characterization of contamination present within the source area (the Plant area) and EPA is implementing those recommendations. The Optimization Review also provided recommendations on ways to improve the groundwater remedy, such as modifying the injections to allow for recirculation. This would likely allow for better oxidant distribution where it is needed the most, and increase the contact time of oxidants with contaminated groundwater. The increased contact time would allow for greater diffusion of contaminants from the pore space of the bedrock and minimize "rebound" of contaminants. Once EPA has updated the CSM, an evaluation of ways to improve or modify the groundwater remedy will be conducted.

While the remedy remains protective because everyone is provided with municipal water, restoration of the groundwater for future beneficial use remains in question.

Indoor Air Remedy

The residential SSD systems are operating as designed and, provided they are left on, are working and maintaining the effectiveness of the remedy. A number of units have been replaced; the operational life expectancy of the fans is about 10 years, which is the age of the original units. A procedure is in place for homeowners to contact EPA in the event a unit fails, and replacement is a simple and relatively inexpensive process.

Once contaminant concentrations in the groundwater in the neighborhood decrease to the cleanup levels, subslab sampling will be conducted at each of the homes that have SSDs systems to assess subslab vapor concentrations. The ROD indicated that monitoring would be conducted at least every five years until the performance standards (for subslab soil vapor) are met. However, since the levels of COCs, specifically TCE, remain elevated in the groundwater underlying the neighborhood, EPA has not conducted subslab sampling beneath the homes with SSD systems. To collect a representative soil gas sample, the SSD system will need to be shut off for at least 48 hours. Operation of the SSD systems will continue until the subslab vapors have achieved the cleanup goals specified in the ROD.

The ROD did not address indoor air within the Plant warehouse. EPA has conducted a number of indoor air sampling events in the warehouse to evaluate potential worker exposure, and information to date has not indicated indoor air concentrations of Site contaminants outside of the acceptable risk range. However, concentrations in indoor air have been detected at the upper-end of the acceptable risk range, and there is potential future risk based on subslab concentrations. Therefore, EPA will continue to monitor indoor air and determine whether future action is necessary.

Implementation of Institutional Controls

All ICs called for in the ROD are in place and are effective in preventing exposure to Site contaminants.

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

While risk methodology and inputs have changed since the ROD, the cleanup levels and RAOs are still valid. This is largely because the performance standards include a total-risk goal for both cancer risk and noncancer hazard, which is protective by definition. Once the cleanup goals specified in the ROD are met, EPA will conduct a risk assessment to ensure the cumulative risk presented by all remaining Site-related compounds is below a 10^{-4} cancer risk level, and the noncancer HI is equal to or less than 1. Therefore, the remedial goals are protective.

To the extent that EPA has been able to determine, current conditions are protective. Contaminated groundwater is not being consumed. Seventeen (16 installed by EPA, 1 installed by a homeowner) residences have subslab SSDs that prevent vapor intrusion. During the RI, groundwater at the Site was not found to be discharging to Black Creek. EPA is not aware of changed Site conditions that would alter this assessment. Therefore, there should be no risk to ecological receptors in Black Creek because the groundwater does not discharge to the surface water body.

At the Plant warehouse, vapor concentrations from known Site-related chemicals were acceptable, but were at the upper end of the acceptable range. There is uncertainty as to whether one chemical in the indoor air that was associated with unacceptable risks is site-related. For both of these reasons, follow-up sampling is being performed at the warehouse.

Ideally, vapor intrusion sampling of homes that have never been sampled, or that exhibited some contamination in the past and were not sampled in the EE/CA, is recommended if the residents will grant access.

Based on available data, the soil, surface water, and sediment appear to be within acceptable human health risk ranges.

Changes in Standards and TBCs

Have standards identified in the ROD been revised, and does this call into question the protectiveness of the remedy? Do newly promulgated standards call into question the protectiveness of the remedy? Have TBCs used in selecting cleanup levels at the Site changed, and could this affect the protectiveness of the remedy?

In the ROD, four MCLs were identified for COCs in groundwater: TCE (5 ug/L), cis-12DCE (70 ug/L), 111TCA (200 ug/L), and vinyl chloride (2 ug/L). None of these MCLs have changed.

The groundwater remedy also includes a provision that "cumulative risk presented by all remaining Site-related compounds, and/or chemical oxidation breakdown products, is below a 10^{-4} cancer risk level, and the noncancer HI is equal to or less than 1." This performance standard remains protective by definition, because it specifies acceptable target risks.

Similarly, the specific performance standards for subslab vapor (ROD, Section 20.3.2) were accompanied by a risk-based standard as well, and therefore remain protective.

Changes in Toxicity and Other Contaminant Characteristics

Have toxicity factors for contaminants of concern at the Site changed in a way that could affect the protectiveness of the remedy? Have other contaminant characteristics changed in a way that could affect the protectiveness of the remedy?

Because the performance standards are based on total risk, no changes in toxicity factors could affect the protectiveness of the groundwater and vapor performance goals. The effect of changing toxicity factors on other media is discussed below.

Changes in Risk Assessment Methods

Have standardized risk assessment methodologies changed in a way that could affect the protectiveness of the remedy?

Risk assessment methodology continues to evolve. For example, standard default exposure factors were updated as recently as 2014. However, because the performance standards are based on total risk, no changes in methodology affect the protectiveness of the groundwater and vapor performance goals. The effect of changing risk assessment methods on other media is discussed below.

Changes in Exposure Pathways

Has land use or expected land use on or near the Site changed?

The Site property use is commercial/industrial (a warehouse), surrounded by residences. The groundwater is provided by a public supplier. These uses have not changed since the ROD, and are not anticipated to change in the foreseeable future.

Have human health or ecological routes of exposure or receptors been newly identified or changed in a way that could affect the protectiveness of the remedy? Are there are newly identified contaminants or contaminant sources leading to a potential/actual pathway not previously addressed by the remedy?

PFAS were identified as Site-related compounds because stain-resistant coatings were applied to fabrics at the Site. The presence of these compounds in groundwater was suspected because of this Site history, then confirmed in 2010. They were detected again in 2011 and 2015. PFAS have no MCLs, but the concentrations of PFOA and PFOS at the Site have exceeded EPA's risk-based screening level of 0.4 ug/L. However, the PFAS-contaminated wells are not used for potable purposes. Any risk associated with the PFAS would be addressed by the ROD's total risk performance standard.

Recent groundwater sampling of newly-installed monitoring wells has confirmed 1,4-dioxane to be present above a RSL in the Plant area. Groundwater is not currently consumed, so this does not compromise short-term protectiveness of the current remedy. EPA's current RSL for cancer risk at the 10^{-6} level is 0.46 ug/L, and the noncancer RSL at an HI of 1 is 57 ug/L. The highest concentration observed in the Plant area wells was 10 ug/L, which is within the acceptable risk range. EPA also reviewed data from a May/June 2008 sampling event that included 44 monitoring wells throughout the plant area and neighborhood; the highest result for 1,4-dioxane was 5.7 ug/L in the plant area, and detections of less than 2 ug/L in the neighborhood. While risks posed by 1,4-dioxane would be addressed by the ROD's total risk performance standard, EPA will continue to monitor for 1,4-dioxane and evaluate whether it affects long-term protectiveness.

Are there unanticipated toxic byproducts or daughter products of the remedy not previously addressed by the decision documents? Have physical Site conditions or the understanding of these conditions changed in a way that could affect the protectiveness of the remedy?

No.

Expected Progress Towards Meeting RAOs

Is the remedy progressing as expected?

No, not completely. The groundwater treatment has not reduced contamination to the extent that was expected. Therefore, the potential for vapor intrusion is also an ongoing issue, for which the SSDs must be maintained to continue to prevent exposure. As a result, EPA is optimizing the groundwater remedy.

ICs are fully in place, and use of contaminated groundwater is prevented now and in the foreseeable future. The eventual goal of the remedy is to restore the aquifer and eliminate the threat of vapor intrusion.

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

No.

In order to ensure that the remedy is protective of human health and the environment in a changing climate, climate change vulnerabilities at the Site have been considered. Average temperatures in the region are expected to increase, but this will not have an impact on our groundwater remedy or protectiveness.

VI. ISSUES/RECOMMENDATIONS

Issues and Recommendations Identified in the Five-Year Review:

OU(s):1	**Issue Category:** Remedy Performance			
	Issue: The groundwater remedy is not progressing toward achievement of the cleanup goals in the expected timeframe.			
	Recommendation: Implement remaining Optimization Review recommendations and evaluate modifications to the current remedy; issue appropriate remedy decision document.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	12/1/2017

OU(s):1	**Issue Category:** Changed Site Conditions			
	Issue: PFAS are present in groundwater and may be above EPA's risk-based screening levels.			
	Recommendation: Evaluate whether the presence of PFAS necessitates modification of the decision document and whether additional actions are warranted to address them.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	12/1/2017

OU(s):1	**Issue Category:** Monitoring			
	Issue: Vapor intrusion sampling has not been conducted in some residences that overlie the plume.			
	Recommendation: Request access to conduct vapor intrusion sampling.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	5/30/2017

VII. PROTECTIVNESS STATEMENT

Protectiveness Statement(s)	
Operable Unit:01 1	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The remedy is considered protective in the short term because the residential subslab depressurization units are operational and ICs are in place, and therefore there is no current or potential exposure. Follow-up actions are necessary to address long-term protectiveness because RAOs are not expected to be met within the timeframe estimated in the ROD. These include implementation of optimization review recommendations; analysis of possible remedy modifications to address both the remaining VOC contamination and PFAS; and pursuing access to some residences to perform additional vapor intrusion sampling.	

VIII. NEXT REVIEW

The next FYR report for the Valmont TCE Site is required five years from the completion date of this review.

ATTACHMENTS

TABLE 1
Historical TCE Concentrations (ug/L)

WELL	AREA	2008/9	PS	2011	R1 , R2	2014	R3	2015	2016
MW-6S	NEIGHBORHOOD - SHALLOW	33		--		23		26	--
MW-6I	NEIGHBORHOOD - DEEP	100		--		19		16	--
MW-7S	NEIGHBORHOOD - SHALLOW	170		210		67		--	--
MW-7I	NEIGHBORHOOD - DEEP	67		36		21		--	--
MW-8S	NEIGHBORHOOD - SHALLOW	17		26		14		--	--
MW-8D	NEIGHBORHOOD - DEEP	3.5		3.9		--		--	--
MW-27	NEIGHBORHOOD - DEEP	--		--		--		--	--
MW-29	NEIGHBORHOOD - DEEP	170		73		60		--	--
GW-09	NEIGHBORHOOD - DEEP	430		190		230		250	--
GW-21	NEIGHBORHOOD - DEEP	335		160		85		83	--
GW-23	NEIGHBORHOOD - DEEP	400		120		57		--	--
GW-24	NEIGHBORHOOD - DEEP	110		86		73		--	--
GW-28	NEIGHBORHOOD - DEEP	18		12		59		--	--
MW-1A	PLANT- SHALLOW	0.5		--		--		--	--
MW-2S	PLANT - SHALLOW	61		53		35		40	--
MW-2I	PLANT - DEEP	--		22		11		14	--
MW-10A	PLANT - SHALLOW	870		800		820		1,000	990
MW-10B	PLANT - DEEP	ND		ND		4.3		--	--
MW-10C	PLANT - DEEP	ND		PERM --		ND		--	--
MW-11S	PLANT - SHALLOW	640		1,200		4,100		--	4,500
MW-11D	PLANT - DEEP	10,000		570		PERM --		--	180
MW-12S	PLANT - SHALLOW	4,000		530		ND		--	--
MW-12I	PLANT - DEEP	29		PERM --		7.1		5.7	7.9
MW-13S	PLANT - SHALLOW	490		205		180		240	--
MW-13I	PLANT - DEEP	315		290		38		37	40
MW-13D	PLANT - DEEP	ND		0.34		--		--	--
MW-14S	PLANT - SHALLOW	ND		0.51		ND		--	--
MW-14I	PLANT - DEEP	ND		0.2		ND		--	--
MW-14D	PLANT - DEEP	ND		0.33		ND		--	--
MW-15S	PLANT - SHALLOW	33		21		18		--	12
MW-15D	PLANT - DEEP	1.1		0.91		ND		--	ND
MW-16S	PLANT - SHALLOW	ND		--		--		--	--
MW-16I	PLANT - DEEP	3		--		--		--	--
MW-16D	PLANT - DEEP	ND		--		--		0.5	--
MW-21S	PLANT - SHALLOW	ND		--		ND		--	--
MW-21I	PLANT - DEEP	ND		ND		ND		--	--
MW-21D	PLANT - DEEP	ND		ND		--		--	--
MW-22D	PLANT - DEEP	570		260		PERM --		--	--
MW-23S	PLANT - SHALLOW	33		19		23		--	--
MW-23I	PLANT - DEEP	4.8		3.5		3.9		--	--
MW-28S	PLANT - SHALLOW	1,100		475		760		410	550
MW-28I	PLANT - DEEP	--		20		10		5.2	--

PERM = Permanganate present
PS = Pilot Study ISCO injection
ND = Not detected
ug/L = microgram per liter
R1 = Round 1 ISCO injection (May 2011)
R2 = Round 2 ISCO injection (May 2013)
R3 = Round 3 ISCO injection (December 2014)
- - = Not sampled
44 = ISCO injection event

TABLE 2
1,4-Dioxane results
May 2016

Well ID	Location	Result (ug/L)	Data Qualifier
MW-27	Neighborhood	2.0	UJ
GW-28	Neighborhood	2.0	UJ
E-1S	former injection well - Plant	2.0	UJ
E-1I	former injection well - Plant	2.0	U
E-2S	former injection well - Plant	2.0	U
E-2I	former injection well - Plant	2.0	U
E-3S	former injection well - Plant	2.0	U
E-3I	former injection well - Plant	4.3	J
E-4S	former injection well - Plant	2.0	UJ
E-7S	former injection well - Plant	2.0	U
E-7I	former injection well - Plant	2.0	U
E-8S	former injection well - Plant	2.0	U
E-9S	former injection well - Plant	6.6	
E-9I	former injection well - Plant	7.0	J
E-10S	former injection well - Plant	2.0	UJ
E-11S	former injection well - Plant	7.1	J
E-11I	former injection well - Plant	7.9	J
E-12S	former injection well - Plant	2.0	U
E-13S	former injection well - Plant	7.9	J
E-13I	former injection well - Plant	5.4	J
E-14S	former injection well - Plant	2.0	U
E-14I	former injection well - Plant	2.0	U
MW-10A	Plant	2.0	U
MW-11S	Plant	2.0	U
MW-11D	Plant	2.0	U
MW-12I	Plant	2.0	U
MW-13I	Plant	2.0	U
MW-15S	Plant	2.0	U
MW-15D	Plant	2.0	U
MW-28S	Plant	3.9	J-
MW-31S	Plant	2.0	U
MW-31I	Plant	5.8	J
MW-32S	Plant	4.0	J
MW-33S	Plant	3.4	J
MW-34S	Plant	4.5	
MW-35S	Plant	10	

J = value is estimated
U = analyte not detected
ug/L = microgram per liter

TABLE 3
Historical Perfluorinated Compound Results (ug/L)

Well ID	Location	2010				2011				2015			
		PFOA		PFOS		PFOA		PFOS		PFOA		PFOS	
GW28	Neighborhood	--		--		0.016	J	0.038		0.023		0.032	
MW-06S	Neighborhood	0.16	J	0.37	J	--		--		0.068		0.29	
MW-06I	Neighborhood	--		--		--		--		ND		ND	
MW-25S	Neighborhood	--		--		0.036	J	0.0065	J	ND		ND	
MW-10A	Plant - Shallow	**1.9**	J	**1.7**	J	**0.77**		**2.1**		--		--	
MW-10B	Plant - Deep	0.075	J	0.005	UJ	0.0061	J	ND		0.014		ND	
MW-11S	Plant - Shallow	0.086	J	0.07	J	0.059		0.072		--		--	
MW-12S	Plant - Shallow	0.31	J	0.14	J	0.083		0.019		--		--	
MW-13S	Plant - Shallow	0.35	J	0.23	J	0.063		0.14		0.09		0.23	
MW-14S	Plant - Shallow	0.005	UJ	0.005	UJ	0.0036	J	0.02		ND		ND	
MW-15S	Plant - Shallow	0.005	UJ	0.005	UJ	0.0034	J	0.0049	J	ND		ND	
MW-18S	Plant - Shallow	**0.44**	J	**0.91**	J	--		--		--		--	
MW-22D	Plant - Deep	0.038	J	ND		0.013	J	0.09	J	--		--	
MW-28S	Plant - Shallow	**0.5**	J	0.2	J	0.27		**0.42**		0.14		0.15	
MW-31I	Plant - Deep	--		--		--		--		0.14		0.16	
MW-31S	Plant - Shallow	--		--		--		--		0.26		**0.68**	
MW-17I	Offsite – Deep	0.005	UJ	0.005	UJ	ND		ND		ND		ND	
MW-17S	Offsite - Shallow	0.005	UJ	0.005	UJ	0.0016	J	0.0017	J	ND		ND	
MW-21I	Offsite - Deep	0.005	UJ	0.11	J	0.0021	J	ND		0.018		ND	
MW-21S	Offsite - Shallow	0.086	J	0.005	UJ	0.0099	J	0.0046	J	--		--	

Bold = concentration above risk-based screening level of 0.4 ug/L
J = value is estimated
ND = Not detected
PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctane sulfonate
U = Analyte not detected
ug/L = Microgram per liter

FIGURES

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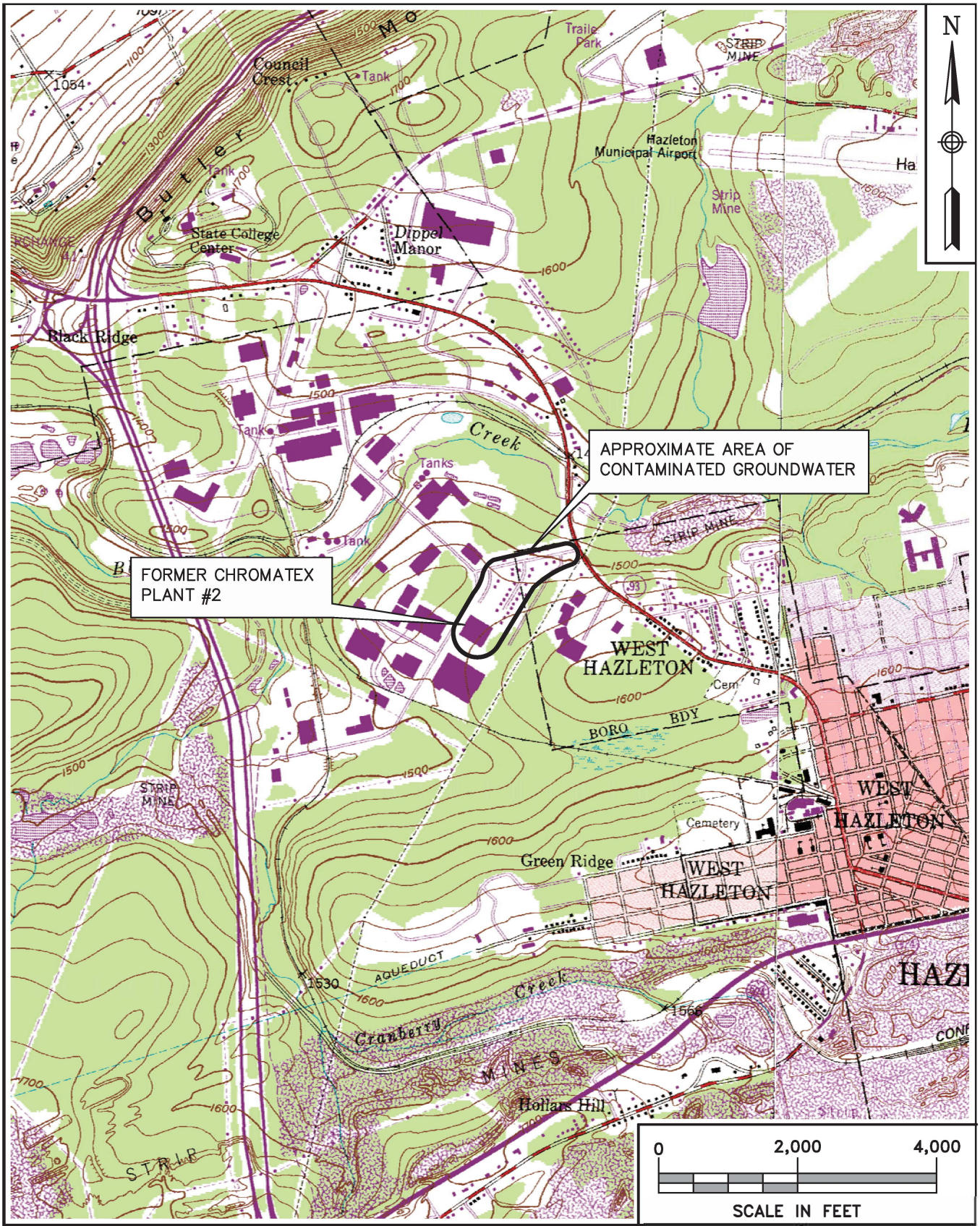

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

SITE LOCATION MAP
VALMONT TCE SITE
HAZLE TOWNSHIP AND
WEST HAZLETON BOROUGH
LUZERNE COUNTY, PENNSYLVANIA

SCALE	AS NOTED
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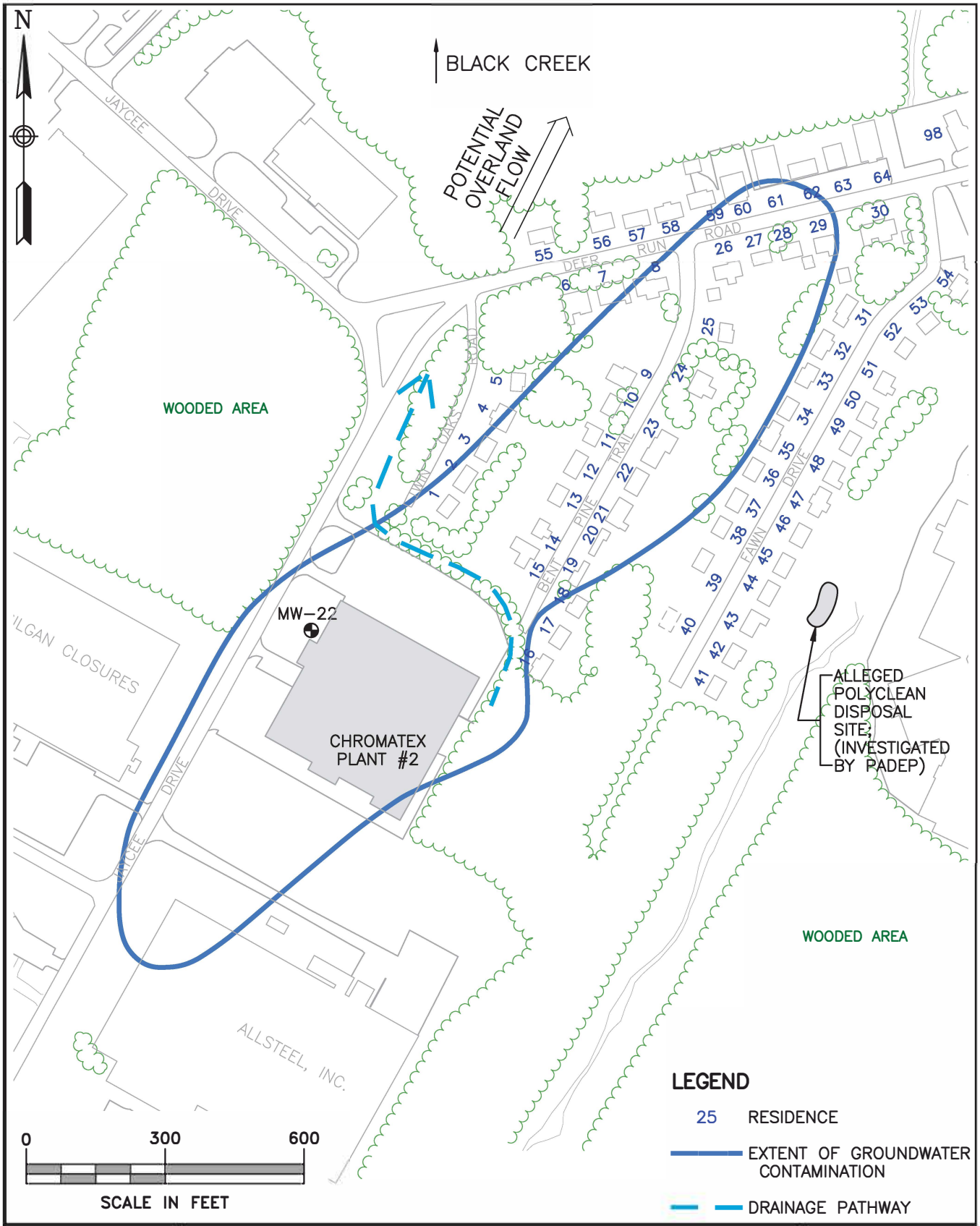
REV	0
DATE	06/14/16
FIGURE NUMBER	FIGURE 1



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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

SITE MAP
VALMONT TCE SITE
HAZLE TOWNSHIP AND
WEST HAZLETON BOROUGH
LUZERNE COUNTY, PENNSYLVANIA

SCALE	AS NOTED
FILE	112G01920GM20
REV	0
DATE	6/14/16
FIGURE NUMBER	FIGURE 2

112G03485\1120\112G03485GM02.DWG 05/11/12 MKB

N

DEER RUN ROAD
JAYCEE DRIVE
TWIN OAKS ROAD
BENT PINE TRAIL
FAWN DRIVE

FORMER
CHROMATEX
PLANT #2

LEGEND

- 22 RESIDENCE
- 25 RESIDENCE WITH SSD SYSTEM
- 27* RESIDENCE WITH CUSTOM SUMP COVER
- 6** RESIDENCE WITH NON-EPA SSD SYSTEM AND CUSTOM SUMP COVER
- GROUNDWATER DIVIDE

0 150 300
SCALE IN FEET

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

RESIDENCES WITH SUBSLAB DEPRESSURIZATION (SSD) SYSTEMS AND SUMP COVERS VALMONT TCE SITE HAZLE TOWNSHIP AND WEST HAZLETON BOROUGH LUZERNE COUNTY, PENNSYLVANIA

SCALE	AS NOTED
REV	0
DATE	7/28/16
FILE	112G04635GM11
FIGURE NUMBER	FIGURE 3

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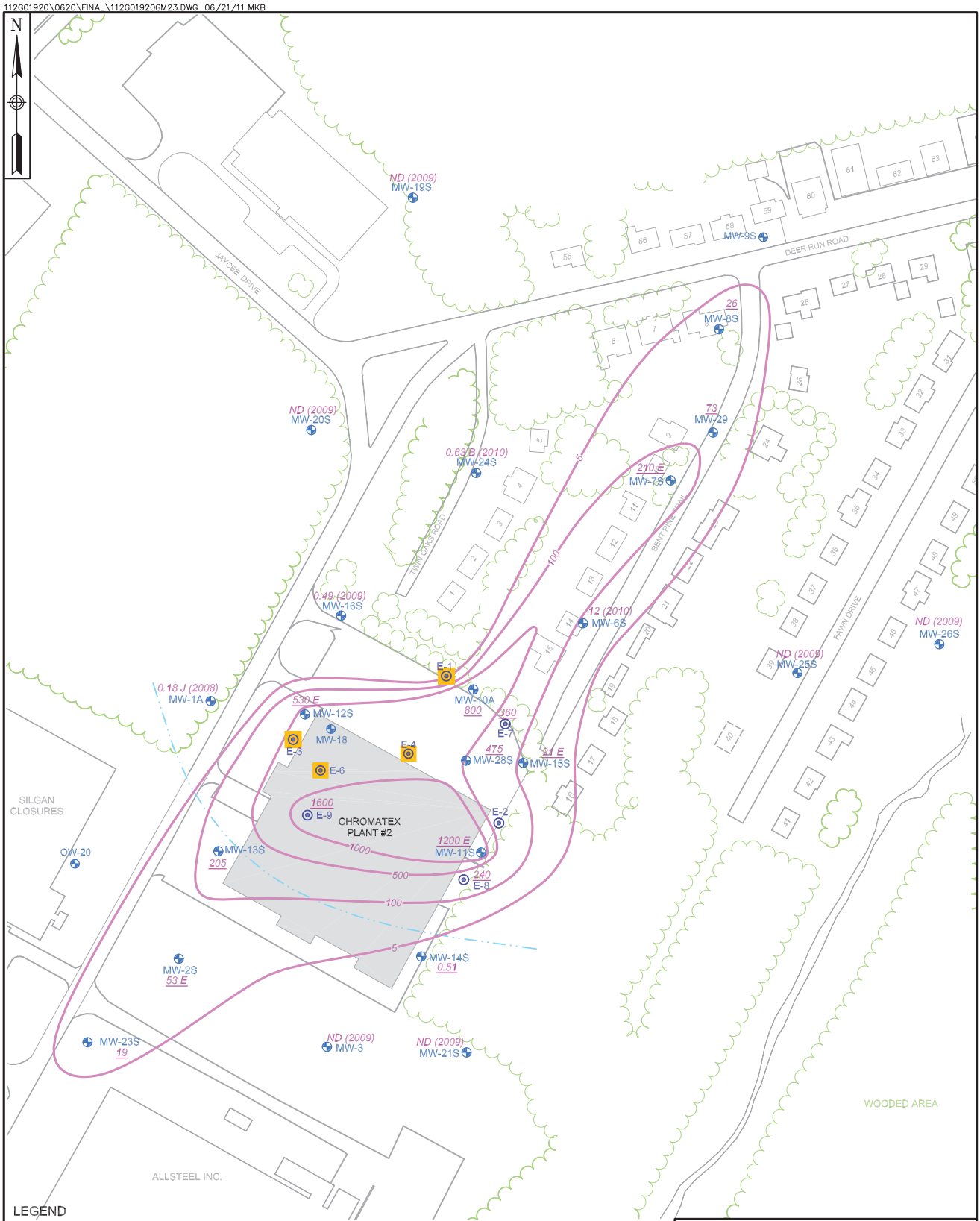


LEGEND

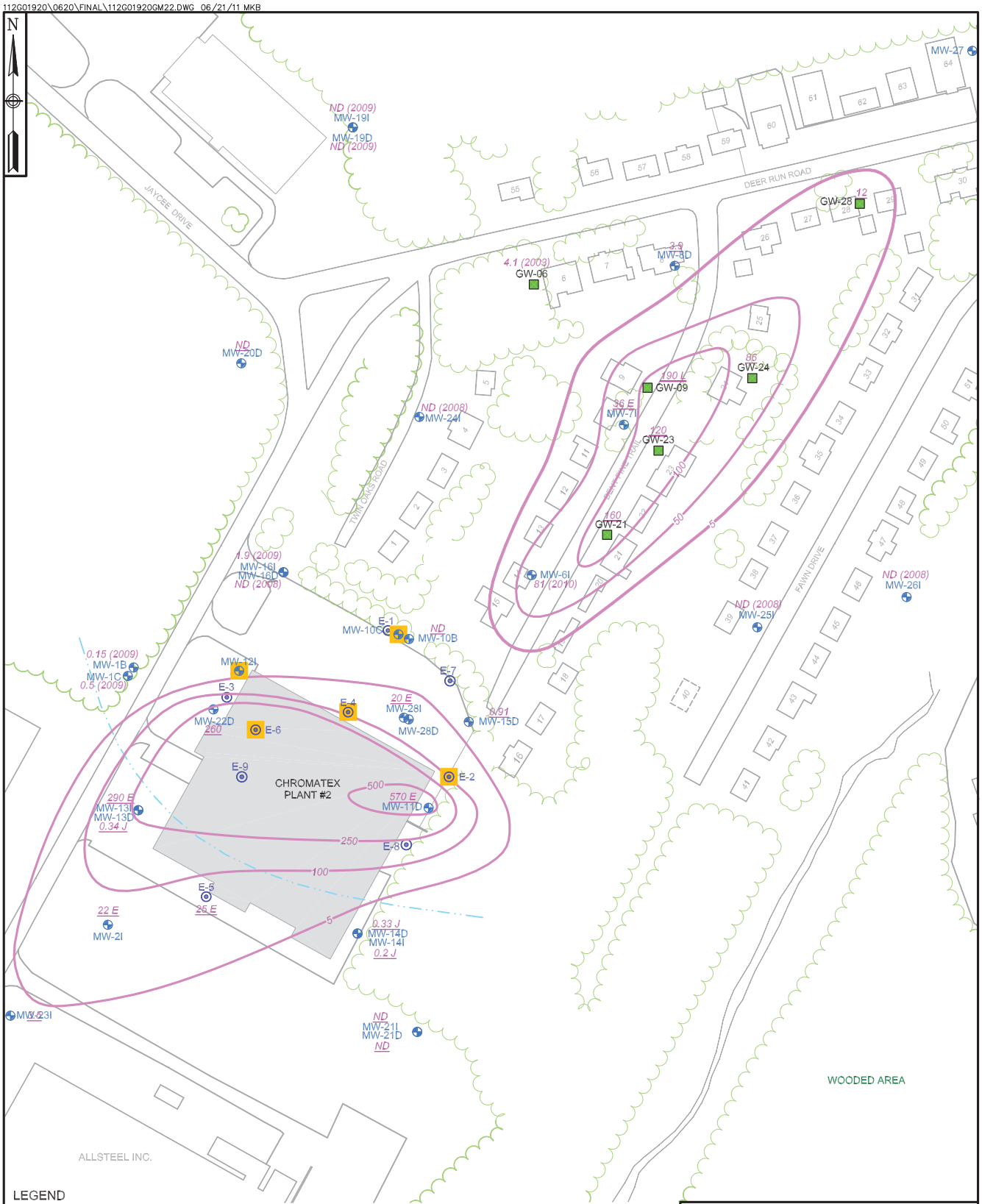
- MONITORING WELL
- INJECTION WELL
- RESIDENTIAL WELL
- PRESENCE OF PERMANGANATE
- 25 RESIDENCE
- GROUNDWATER DIVIDE
- 100 TCE CONCENTRATION (ug/L)
- 240 SPRING 2011 TCE CONCENTRATION
- 1.9 PRE-SPRING 2011 TCE CONCENTRATION
- ND NON-DETECT
- J,E,D ANALYTE PRESENT, MAY NOT BE ACCURATE OR PRECISE
- K VALUE MAY BE BIASED HIGH
- B BLANK CONTAMINATION

0 160 320
SCALE IN FEET

TETRA TECH NUS, INC.

MAY 2011 SHALLOW GROUNDWATER MONITORING RESULTS VALMONT TCE SITE HAZLE TOWNSHIP AND WEST HAZLETON BOROUGH LUZERNE COUNTY, PENNSYLVANIA

FILE	SCALE
112G01920GM23	AS NOTED
FIGURE NUMBER: FIGURE 4	REV: 0 DATE: 06/21/11



LEGEND

- MONITORING WELL
- INJECTION WELL
- RESIDENTIAL WELL
- PRESENCE OF PERMANGANATE
- 25 RESIDENCE
- GROUNDWATER DIVIDE
- 50 TCE CONCENTRATION (ug/L)
- 240 SPRING 2011 TCE CONCENTRATION
- 1.9 PRE-SPRING 2011 TCE CONCENTRATION
- ND NON-DETECT
- J,E,D ANALYTE PRESENT, MAY NOT BE ACCURATE OR PRECISE
- K VALUE MAY BE BIASED HIGH
- B BLANK CONTAMINATION

0 150 300
SCALE IN FEET

TETRA TECH NUS, INC.

MAY 2011 DEEPER GROUNDWATER MONITORING RESULTS VALMONT TCE SITE HAZLE TOWNSHIP AND WEST HAZLETON BOROUGH LUZERNE COUNTY, PENNSYLVANIA

FILE	SCALE
112G01920GM22	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE 5	0 / 06/21/11

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N

MW-19(3)
DEER RUN ROAD
JAYCEE DRIVE
GW-28
GW-6
MW-8(2)
MW-20(2)
MW-29
GW-9
GW-24
MW-24(2)
MW-7(2)
GW-23
TWIN OAKS ROAD
BENT PINE TRAIL
FAWN DRIVE
WOODED AREA
GW-21
MW-16(3)
MW-6(2)
MW-26(2)
E-1
MW-10A
MW-25(2)
MW-1(3)
MW-12S
E-7
E-3
MW-18S
E-4
MW-22D
MW-15(2)
E-6
MW-28(3)
E-10
E-11
E-12
E-13
E-2
E-9
E-14
MW-13S
MW-13I
MW-31S
MW-31I
MW-11S
FORMER CHROMATEX PLANT #2
E-8
E-5
MW-14(3)
MW-2(2)
MW-23(2)
MW-3
MW-21(3)
ALLSTEEL, INC.

LEGEND

- MONITORING WELL
- PAST INJECTION WELL
- ROUND 3 INJECTION WELL
- RESIDENTIAL WELL
- PRESENCE OF PERMANGANATE
- 25 RESIDENCE

0 50 100
SCALE IN FEET

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROPOSED ROUND 3 INJECTION WELL LOCATIONS VALMONT TCE SITE HAZLE TOWNSHIP AND WEST HAZLETON BOROUGH LUZERNE COUNTY, PENNSYLVANIA

SCALE: AS NOTED
REV: 0
DATE: 10/07/14
FILE: 112G03485GM33
FIGURE NUMBER: FIGURE 6

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N

ND (2008)
MW-19S

JAYCEE DRIVE

DEER RUN ROAD

MW-8S
13.5 (2014)

MW-20S
ND (2008)

0.63 B (2008)
MW-24S

67 (2014)
MW-7S

TWIN OAKS ROAD

BENT PINE TRAIL

FAWN DRIVE

0.5 J
MW-16S

11 J
MW-6S

ND (2008)
MW-26S

ND (2014)
MW-25S

10
100
1,000

0.18 J (2008)
MW-1A

ND (2013)
MW-12S

MW-18S
240

MW-10A
1,000

410
MW-28S

MW-15S
18 (2014)

130
E-9

MW-31S
240

4,100
(2014)
MW-11S

240
MW-13S

FORMER
CHROMATEX
PLANT #2

ND (2014)
MW-14S

MW-2S
40

23 (2014)
MW-23S

ND (2014)
MW-21S

WOODED AREA

ALLSTEEL INC.

0 200 400
SCALE IN FEET

LEGEND

MONITORING WELL	J VALUE MAY NOT BE ACCURATE OR PRECISE
INJECTION WELL	GROUNDWATER DIVIDE
RESIDENTIAL WELL	410 TCE CONCENTRATION
25 RESIDENCE	1500 TCE CONTOUR (µg/L) (DASHED WHERE INFERRED)
ND NON-DETECT	

TETRA TECH

MARCH AND JUNE 2015 SHALLOW GROUNDWATER MONITORING RESULTS VALMONT TCE SITE HAZLE TOWNSHIP AND WEST HAZLETON BOROUGH LUZERNE COUNTY, PENNSYLVANIA

FILE	SCALE
112G03485GM09.dwg	AS NOTED
FIGURE NUMBER: FIGURE 7	REV: 0 / DATE: 4/29/16

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N

ND (2008)
MW-19D
MW-19I
ND (2008)

ND (2014)
MW-27

59 (2014)
GW-28

3.9 (2011)
MW-8D

ND (2008)
MW-20D

60 (2014)
MW-29

73 (2014)
GW-24

GW-09
200 J

ND (2008)
MW-24I

21 (2014)
MW-7I

57 (2014)
GW-23

83
GW-21

1.9 (2009)
MW-16I
MW-16D
ND (2008)

18 J
MW-6I

ND (2008)
MW-26I

ND (2008)
MW-25I

1,100 (2014)
E-1
MW-10C ND (2014)
MW-10B
4.3 J (2014)

0.15 (2008)
MW-1B
MW-1C
0.58 (2008)

5.7
MW-12I

790 (2013)
E-7

4,000 (2009)
E-3

MW-22D
260 E (2011)

ND (2012)
E-6

950
E-4

5.2
MW-28I

ND (2014)
MW-15D

140,000 (2014)
E-11

2,800
E-13

E-10
3,450 (2014)

E-12
4,800 (2014)

160
E-14

E-2
110

37
MW-13I

MW-31I
5,000

MW-11D
ND (2013)

E-8
39

17
E-5

FORMER
CHROMATEX
PLANT #2

14
MW-2I

ND (2014)
MW-14D
MW-14I
ND (2014)

MW-23I
3.9 J (2014)

ND (2014)
MW-21I
MW-21D
ND (2011)

ALLSTEEL INC.

JAYCEE DRIVE

DEER RUN ROAD

TWIN OAKS ROAD

BENT PINE TRAIL

FAWN DRIVE

10

50

100

100,000

1,000

WOODED AREA

0 200 400
SCALE IN FEET

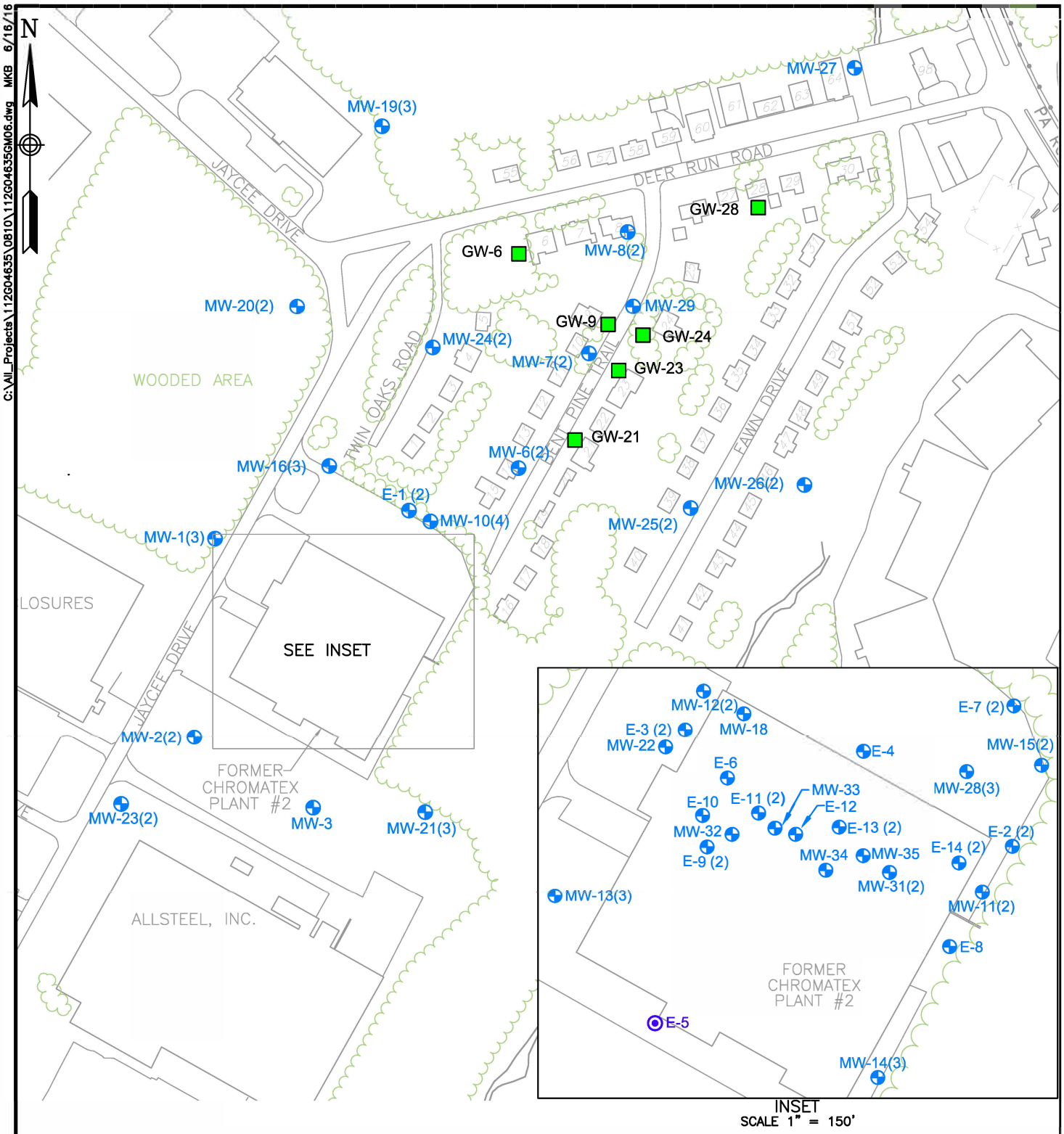
LEGEND

	MONITORING WELL	*J* or *E*	VALUE MAY NOT BE ACCURATE OR PRECISE
	INJECTION WELL		GROUNDWATER DIVIDE
	RESIDENTIAL WELL	*39*	TCE CONCENTRATION
25	RESIDENCE	*1500*	TCE CONTOUR (µg/L) (DASHED WHERE INFERRED)
ND	NON-DETECT		

TETRA TECH

MARCH AND JUNE 2015 DEEP GROUNDWATER MONITORING RESULTS VALMONT TCE SITE HAZLE TOWNSHIP AND WEST HAZLETON BOROUGH LUZERNE COUNTY, PENNSYLVANIA

FILE	SCALE
112G03485GM09.dwg	AS NOTED
FIGURE NUMBER: FIGURE 8	REV: 0 / DATE: 4/29/16



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

EXISTING WELL NETWORK
VALMONT TCE SITE
HAZLE TOWNSHIP AND
WEST HAZLETON BOROUGH
LUZERNE COUNTY, PENNSYLVANIA

SCALE	AS NOTED
FILE	112G04635GM06
REV	0
DATE	6/16/16
FIGURE NUMBER	**FIGURE 9**

REFERENCE LIST

Comprehensive Five Year Review Guidance, U.S. EPA, OSWER No. 9355.7-03B-P, June 2001.

Optimization Review, Valmont TCE Site, October 2015.

Operational and Functional Determination, Residential Subslab Depressurization Systems, Concurrence Letter from PADEP to EPA, February 2012.

Operational and Functional Determination, In-situ Chemical Oxidation Well Network, Concurrence Letter from PADEP to EPA, May 2012.

Post-injection Monitoring Reports, Valmont TCE Site, 2011-2015.

Record of Decision, Valmont TCE Superfund Site, January 2011.

Remedial Design Package, Valmont TCE Site, July 2011.

State Superfund Contract for the Valmont TCE Site, April 2011.

SUPPORTING TOXICOLOGICAL INFORMATION

The human receptors at the Site are discussed below, grouped by the various media to which they might be exposed.

GROUNDWATER

Groundwater is not currently used. It has been treated and is being monitored for compliance with performance standards, in order to restore it to beneficial use. The most recent monitoring data show that MCLs have not yet been met, and therefore risk-based standards have not yet been met. The groundwater remedy is currently undergoing optimization review.

"Garage well" GW-71, which was sampled historically, has been included under a State site (Polyclean) and is no longer followed as part of the Valmont TCE site. GW-70, 1 Dessen Drive, was sampled historically. This well had a carbon treatment system on it. This well no longer exists.

VAPOR INTRUSION

Commercial/Industrial

The warehouse that is located over the original source area was most recently sampled in December 2015 to determine whether unacceptable risks were present due to vapor intrusion.[2] TCE was detected in indoor air near the limit of the acceptable risks for workers (an HI of 1). Fluctuations in concentrations could conceivably result in concentrations above the HI of 1, and TCE is of special concern because one of its critical effects, fetal cardiac malformation, occurs within a relatively short window of exposure time (a few weeks). Therefore, follow-up monitoring is recommended to ensure that indoor concentrations do not exceed the acceptable range.

The only chemical in warehouse air that was associated with an unacceptable HI or cancer risk was acrolein, which was also detected in outdoor air at concentrations associated with HIs above 1.

Acrolein has several uses, some of which are related to textiles, adhesives, and coatings, suggesting that a link to the Site cannot be immediately ruled out. However, the ATSDR Toxicological Profile for this chemical reports that it is also produced from burning fuels, and can have significant background concentrations in indoor air. The ultimate determinant of whether acrolein is related to Site-specific vapor intrusion would be whether significant concentrations of acrolein are present in the subslab.

The warehouse was resampled in spring 2016, with the inclusion of subslab sampling, to follow up on these issues; the results are pending.

Residential

There are 64 residential buildings in the source area's immediate neighborhood (the roads named Twin Oaks, Bent Pine, Fawn, and Deer Run). A few additional buildings outside the immediate neighborhood were initially sampled for vapor intrusion, but due to the lack of significant site-related results and the distance from the source area, sampling of these locations did not continue beyond 2002. The remainder of this vapor intrusion discussion focuses on the 64 buildings in the immediate neighborhood.

Sixteen homes have received subslab depressurization systems (SSDs) installed by EPA to mitigate vapor intrusion (Residences 1, 8, 9, 12, 13, 15, 16, 23, 24, 25, 27, 28, 29, 34, 56, and 60). Residence 14 has a sump cover to minimize vapors from the sump. Residence 6 has a sump cover; the resident also installed an SSD voluntarily. While the SSDs are in place and operating, they are protective. The operational status of the SSD systems is monitored regularly. No subslab sampling for attainment of the subslab performance standards has occurred to date, because the groundwater contaminants have not yet met performance standards.

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[2] Sampling of the warehouse in 2010 found Site-related chemicals, although they were below levels of concern at the time.

Residence 33 had subslab concentrations that met the requirements for an EPA-installed SSD, but due to water beneath the house, the system could not be installed. Therefore, EPA planned to monitor this home to make sure indoor air concentrations did not reach levels of concern. The house was last sampled in 2007. At that time, the indoor concentrations were acceptable. Using current exposure and toxicity factors, the concentrations would still be acceptable. EPA has attempted follow-up monitoring since 2007, but the homeowner has not responded to access requests.

Residences 19 and 35 have only been sampled for soil gas in the yard. Chlorinated ethenes, including PCE, were detected in both yards; vinyl chloride was also detected at Residence 19. However, EPA was never able to sample the subslab or indoor air at these residences, nor at the following residences: 7, 30, 31, 32, 50, 57, 58, 61, 62, 63, 64.

Residences 38 through 48 were excluded from the Site, because subsurface contamination did not appear to underlie these homes.

Subslab, indoor and outdoor air were sampled at two residences (10 and 22) in March 2016. A vapor intrusion threat was not observed at these homes.

Of the remaining homes that were sampled prior to the ROD but did not qualify for mitigation, the most recent results for each residence were reassessed to determine whether they would now warrant protective action:

> Residences 2, 5, 11, 14, 17, 18, 20, 21, 22, 26, 36, 37, 49, 52, 54, and 59 were last sampled in 2006 for the Indoor Air EE/CA. Using current exposure and toxicity factors, the risks from the subslab concentrations would be within the acceptable range even if the vapors migrated into indoor air without attenuation at houses 2, 5, 11, 18, 20, 21, 26, 36, 37, 49, 52, 54, and 59. For residences 14, 17, and 22, the subslab concentrations are acceptable even if there is only ten-fold attenuation from the subslab into the living space (i.e., an attenuation factor of 0.1). In the Valmont neighborhood, site-specific attenuation factors were measured during the EE/CA. The attenuation factors at residences 14, 17, and 22 ranged from approximately 0.003 to 0.007, indicating there is a further margin of protectiveness.[3]
>
> Residences 3, 4, 51, 53, and 55 were last sampled in 2001 or 2002. Chlorinated ethanes and/or ethenes were detected at Residences 4, 51, and 53, but not at 3 or 55. Indoor air risks from site-related chemicals were within the acceptable range for these houses at the time of sampling. However, the current concentrations and subslab concentrations at these houses are unknown.

Ideally, vapor intrusion sampling of homes that have never been sampled, or that exhibited some contamination in the past and were not sampled in the EE/CA, is recommended if the residents will grant access.

SOIL

Soil data from the industrial property were included in the RI, but they did not receive a quantitative risk assessment because a soil removal action was already planned to address the VOCs. Post-removal-action soil data from the industrial property were obtained in 2010. The cleanup goals for this soil were 5 ug/kg TCE and 39 ug/kg cis-12DCE; these goals were met. (The soil confirmation samples were actually non-detect for cis-12DCE.) These concentrations would still be protective for direct contact with the soil and for vapor emission into ambient outdoor air. The other two exposure pathways of interest would be vapor intrusion into the warehouse and migration of VOCs to groundwater. Those pathways are being dealt with more directly (see discussions of groundwater and vapor intrusion, above).

During the RI, soil samples were also obtained from residential properties. These soils did not undergo removal. Therefore, this FYR examined the residential soil RI data to determine whether they would now warrant protective action due to changes in exposure factors, toxicity factors, and/or risk methodology. Using current

[3] The attenuation factor of 0.1 is the previous default and was used in site documents such as the EE/CA. The factor of 0.1 is fairly conservative, and the median attenuation factor measured at the site was 0.014. However, five houses did have attenuation factors higher than 0.1, ranging from 0.11 to 0.84, possibly due to preferential flow paths. For this reason, EPA does not automatically resort to the new default attenuation factor of 0.03 when evaluating the Valmont site.

toxicity factors and default exposure factors, the risks from these soils would still be within the acceptable range.

SURFACE WATER / SEDIMENT

Black Creek surface water and sediment were sampled for the RI; the risks were acceptable at the time. The data were rescreened for this FYR to determine whether any chemicals would now be chemicals of concern due to updated risk factors or methodology. Surface water data were screened using the November 2015 Regional Screening Level (RSL) tap water concentrations X 10 (on the assumption that exposure to surface water would be at least 10 times less frequent than exposure to residential tap water). Similarly, sediment was screened using the residential soil RSLs X 10.

No surface water chemicals exceeded screening levels. In sediment, chromium (maximum 6.8 mg/kg) and benzo[a]pyrene (maximum 0.65 mg/kg) exceeded screening levels. These concentrations were used in the RSL calculator for recreational sediment exposure, at an exposure time of 4 hours/day and a conservative exposure frequency of 180 days/yr. Even under this conservative scenario, cancer risks would be within the acceptable 1E-6 to 1E-4 risk range, and the HI would be well below 1. Therefore, EPA concludes that surface water and sediment conditions would still be protective for human health.