SECOND FIVE-YEAR REVIEW REPORT FOR
CROWN CLEANERS OF WATERTOWN INC. SUPERFUND SITE
JEFFERSON COUNTY, NEW YORK STATE

Prepared by

U.S. Environmental Protection Agency
Region 2
New York, New York

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Pat Evangelista, Director **Date**
Superfund and Emergency Management Division

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
BASP	Base-Activated Sodium Persulfate
BERA	Baseline Ecological Risk Assessment
CFR	Code of Federal Regulations
DANC	Development Authority of the North Country
EPA	United States Environmental Protection Agency
FS	Feasibility Study
FYR	Five-Year Review
HQ	hazard quotient
ISCO	In-Situ Chemical Oxidation
ICs	Institutional Controls
MCL	Maximum Contaminant Level
MFR	Modified Fenton's Reagent
Mg/kg	Milligrams per kilogram
µg/kg	Micrograms per kilogram
µg/l	Micrograms per liter
MNA	Monitored Natural Attenuation
ng/l	Nanograms per liter
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
OU	Operable Unit
O&M	Operation and Maintenance
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
PFAS	Per- and Poly-Fluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RI	Remedial Investigation
RA	Remedial Action
ROD	Record of Decision
RPM	Remedial Project Manager
SCO	Soil Cleanup Objective
ft^2	Square Feet
SMP	Site Management Plan
TCE	Trichloroethylene
UU/UE	Unlimited Use and Unrestricted Exposure
VOC	Volatile Organic Compounds

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy 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.

This is the second FYR for the Crown Cleaners of Watertown, Inc. Superfund site. The triggering action for this statutory review is August 22, 2019, the completion date of the previous FYR. The FYR was performed because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

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

The entire site is being addressed under one operable unit (OU).

The site's FYR team was led by Pamela Tames, EPA Remedial Project Manager. Other participants included Rachel Griffiths, EPA hydrogeologist, Michael Basile, EPA community involvement coordinator, Abbey States, human health risk assessor, Abigail Debofsky, ecological risk assessor, and Kelly Hale, New York State Department of Environmental Conservation (NYSDEC) project manager. The FYR began on July 27, 2023.

Site Background

The nine-acre site is a former dry cleaning and laundry facility located in the Town of Wilna, Jefferson County on New York State Route 3. The property is surrounded by a chain link fence. The southern boundary of the site is situated on the Black River, a park is located to the east of the site, and residences are located to the north and west. A wetland is located immediately west of the site and another wetland is located approximately 800 feet southwest of the site. The Village of Herrings public water supply well was located on the northern side of New York State Route 3 across from the site until 2015, when it was dismantled. For a site location map, see Appendix A, Figure 1.

From 1890 until the mid-1960s, the former facility property was used by the St. Regis Paper Co. to produce paper bags. In the late 1970s, the property was purchased by Crown Cleaners of Watertown, Inc. and was operated until 1991 as a dry cleaning and laundry facility. Tetrachloroethene (PCE) and machine oils and greases were used. Wastewater was discharged into basement storage pits, which then discharged through the foundation walls to the ground. Used dry cleaning machine filters were dumped on the grounds.

The residences in the area use either private wells or a public supply well for their potable water supply.

Appendix B, attached, summarizes the documents utilized to perform this FYR.

For more details related to background, physical characteristics, geology/hydrogeology, land/resource use, and history related to the site, please refer to EPA's webpage for the site, www.epa.gov/superfund/crown-cleaners.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Crown Cleaners of Watertown, Inc.		
EPA ID: NYD986965333		
Region: 2	**State:** NY	**City/County:** Wilna/Jefferson County
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Pamela Tames		
Author affiliation: EPA		
Review period: 8/23/2019 – 2/26/2024		
Date of site inspection: 10/18/2023		
Type of review: Statutory		
Review number: 2		
Triggering action date: 8/22/2019		
Due date *(five years after triggering action date)*: 8/22/2024		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

In 1991, the New York State Department of Health determined that the Village of Herrings' water supply well was contaminated with PCE at concentrations ranging from 25 to 50 micrograms per liter (µg/L). Later that year, NYSDEC installed a treatment system on the water supply system and determined that the source of PCE contamination was the Crown Cleaners of Watertown, Inc. facility. Several New York State investigations were conducted at the site during the 1990s, which resulted in the site being referred to EPA for further evaluation in 2000.

In 2000, EPA sampled the facility's storage pits, oil tanks, on- and off-property soils, and the groundwater. Volatile organic compounds (VOCs), semi-volatile organic compounds, polychlorinated biphenyls, copper, iron, mercury, zinc, beryllium, arsenic, and chromium were detected in the soils above NYSDEC's soil cleanup objectives (SCOs).[1] PCE was detected in eleven of the thirty-one monitoring wells sampled

[1] 6 NYCRR Part 375. Environmental Remediation Programs, Subpart 375-6, New York State Department of Environmental Conservation, December 14, 2006.

during the remedial investigation (RI), with the highest concentration being 6,500 µg/L (the Maximum Contaminant Level [MCL] is 5 µg/L). The risk assessment concluded that an unacceptable risk existed for nearby residents based on ingesting untreated groundwater containing PCE from the Upper Carbonate Unit aquifer in the vicinity of the site. Soils outside the former dry-cleaning facility exhibited levels of PCE as high as 59,000 micrograms per kilogram (µg/kg) and polycyclic aromatic hydrocarbon (PAH) concentrations as high as 58.4 milligrams per kilogram (mg/kg). The risk assessment concluded that soils on the facility also posed an unacceptable risk to human receptors due to PCE and PAH contamination.

The ecological risk assessment indicated that the contaminated soils and sediments posed an unacceptable exposure risk to terrestrial and wetland plants and avian receptors.

Response Actions

In addition to the above-noted investigation, EPA determined that the site posed an immediate threat and performed removal actions that included securing the property, removing and disposing of VOC-contaminated sludge and debris, sump pit water, spent dry cleaning filters, friable asbestos-containing materials, and approximately 5,000 gallons of waste oil. EPA also demolished an unstable portion of the main building and a large smokestack from which it is believed the PAHs emanated. Because of the dilapidated condition of another building located in the rear of the former facility property, it could not be safely assessed, but was assumed to contain friable asbestos.

On September 4, 2002, the site was listed on EPA's Superfund National Priorities List.

After the performance of a RI and feasibility study (FS), a Record of Decision (ROD) for the site was signed on March 29, 2012.

Remedial action objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered guidance, and site-specific risk-based levels. The following RAOs were established for the site:

- Reduce or eliminate any direct contact, ingestion, or inhalation threat associated with contaminated soils and sediments;
- Minimize exposure of wildlife to contaminated soils and sediments;
- Protect human health by preventing exposure to contaminated groundwater and soil vapor; and
- Restore groundwater to levels that meet state and federal standards within a reasonable time frame.

The selected remedy, which addresses contaminant source areas and contaminated groundwater, includes the following components:

- Decontamination and demolition of the main building;
- Excavation of PAH- and arsenic-contaminated soil to a depth of two feet and excavation of PCE-contaminated soils to a depth of four feet[2];

[2] Because the land use for the former facility property changed from commercial to recreational before the approval of the remedial design, restricted residential standards were utilized for the excavation of the PAH- and arsenic and PCE contaminated soils and sediments.

- Excavation of contaminated soils remaining within the footprint of the building;
- Excavation of PCE-contaminated sediment and soil from the adjacent wetlands to meet the protection of groundwater SCO;
- Transportation for treatment/disposal of the building debris and the PCE-contaminated soils and sediments at an off-site Resource Conservation and Recovery Act-compliant facility;
- Utilization of the excavated PAH- and arsenic-contaminated soils as backfill to a depth of not less than one foot below ground surface in the areas where PCE-contaminated soil will be excavated and within the footprint of the building;
- Backfilling with clean soil those areas where residual PAH- and arsenic contaminated soil will remain after the installation of a readily visible and permeable subsurface demarcation delineating the interface between the residually contaminated native soils and the clean backfill;
- Backfilling the excavated wetland areas with soil that meet the unrestricted SCOs;
- Injection of an oxidizing agent into the contaminated groundwater at the source areas;
- Utilization of monitored natural attenuation (MNA)[3] for the groundwater with lower contaminant concentration located outside the source areas;
- Utilization of institutional controls (ICs) in the form of an environmental easement/restrictive covenant in the property records of Jefferson County to, at a minimum, restrict intrusive activities in areas where residual contamination remains unless the activities are in accordance with an EPA approved Site Management Plan (SMP), and restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the New York State Department of Health or the County Department of Health; and
- Development of an SMP that will provide for the proper management of all postconstruction remedy components. The property owner will be responsible for implementing and maintaining the controls and NYSDEC will be responsible for enforcing them.

The ROD identified SCOs of 1 mg/kg for benzo(a)pyrene and 1.3 mg/kg for PCE. The NYSDEC's Sediment Criteria of 0.008 mg/kg for PCE was used as the cleanup level for the wetlands. An MCL of 5 µg/l for PCE in groundwater was also utilized.

Status of Implementation

In 2014, the remedial action (RA) commenced. The effort entailed the removal of 1,706 tons of non-friable asbestos material/debris, including roofing materials, and their disposal at Development Authority of the North Country (DANC) Landfill in Rodman, NY, removal of 13.6 tons of friable asbestos and disposal at Seneca Meadows Landfill in Waterloo, NY, the demolition of the water tower, excavation of 3,311 tons of PCE-contaminated soils and sediments (see Appendix A, Figure 2, for the areal limits of the PCE excavation) and disposal at the DANC Landfill, excavation of the top two feet of the PAH-contaminated soils (see Appendix A, Figure 3, for the areal limits of the PAH excavation), and excavation of 95.60 tons of oil-contaminated soils and debris and disposal at the DANC Landfill. In addition, non-hazardous wastewater from the building's basement was pumped out and transported to the Watertown, New York wastewater treatment plant, transformers were shipped off-site for disposal, and the water tower and the steel I-beams and scrap metal that were removed from the buildings were recycled off-site.

The limestone building walls were dismantled. Although the foundations of the building were not demolished, the perimeter walls of the foundations were removed to two feet below grade. The basement

[3] MNA is the process by which a natural system's ability to attenuate contaminant(s) at a specific site is confirmed, monitored and quantified. See DER-10/Technical Guidance for Site Investigation and Remediation 1.3(b)(31).

slabs were punctured to allow rainwater and snow melt to percolate through them. The limestone walls and concrete from the foundations were crushed and used with the excavated PAH-contaminated soil to backfill the basements. Excess crushed stone was removed by the Town of Wilna for use at another location. Clean topsoil was brought in and spread over the building footprints and excavated soil areas. The topsoil was laid in a 12-inch layer and seeded. Coir fiber coconut logs were used as erosion control near the Black River. Additional fencing was installed to isolate the groundwater treatment area from the rest of the property.

In 2016, wells which would serve as conduits for in-situ chemical oxidation (ISCO) injections within the contaminated aquifer were installed. Subsequently, 43 shallow wells, four nested shallow-intermediate wells, 19 nested intermediate-deep wells, and 24 locations within the overburden were injected with 32,660 gallons of sodium persulfate, an oxidant selected to break down the PCE.

During a second round of injections in 2017, 23,479 gallons of base-activated sodium persulfate (BASP) were injected into 45 shallow wells, 21 shallow-intermediate wells, and 19 intermediate-deep wells. In addition, 4,900 gallons of modified Fenton's reagent (MFR), comprised of hydrogen peroxide and chelated iron catalyst, were injected into the overburden-bedrock interface at 38 temporary direct push technology injection points.

In May 2018, soil samples were collected from a previously inaccessible area beneath the now demolished building. The results indicated that this area may be acting as a source of PCE to the aquifer. Approximately 1,500 cubic yards of soil were excavated down to the rock interface. The excavation was backfilled with 459 tons of one-inch stone spread out in a one-foot layer. The rest of the excavation was backfilled with some of the previously excavated soil which had tested clean.

In July 2018, an optimization study was initiated to review the existing site data and the results from the first two rounds of injections and make recommendations for system improvements. The study recommended modification of the existing injection wells, installation of 23 additional injection wells, adjustments to injection volume, reagent concentration, and performance monitoring.

Following the modification of the existing injection wells and the installation of 23 additional injection wells, a third round of chemical oxidation injections was performed in September/October 2018. At this time, 29,475 gallons of reagent (18,750 gallons of ~15% BASP and 10,725 gallons of MFR [7,075 gallons of ~5-10% stabilized hydrogen peroxide and 3,650 gallons of chelated iron catalyst]) were injected into 39 permanent injection well locations within the approximately 25,650 square-foot (ft^2) treatment area encompassing the shallow bedrock interval and 21 temporary direct push injection locations within the approximately 10,000 ft^2 area targeting the overburden/bedrock interface soils.

Groundwater samples were collected prior to each injection so that adjustments could be made to the final mix of the oxidation chemicals. The fourth injection round was completed in 2019. At that time, 56 wells plus eight direct push temporary wells were injected with 14,000 gallons of BASP, 8,881 gallons of hydrogen peroxide, and 4,460 gallons of chelated iron catalyst. A fifth injection covering 65 wells was performed in 2020, whereby 14,330 gallons of BASP, 12,792 gallons of hydrogen peroxide and 6,408 gallons of chelated iron catalyst were injected. Sixty-three wells were injected in 2021 during the sixth injection event, consisting of 13,920 gallons of BASP, 14,150 gallons of hydrogen peroxide, and 7,075 gallons of chelated iron catalyst. The seventh injection event was performed in 2022, where 79 wells were injected with 9,839 gallons of BASP, 19,632 gallons of hydrogen peroxide, and 9,855 gallons of chelated iron catalyst. An eighth injection event was performed in October 2023. For this event, the oxidation chemical was changed to potassium permanganate because it appeared in the pre-injection sample data that the persulfate reactions had stalled. The final report, which compiles the details of this injection event, was not completed at the time of this FYR.

Institutional Controls

Table 1, below, summarizes the status of the ICs.

Table 1: Summary of Planned and/or 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	Site	Restrict installation of groundwater wells and groundwater use.	Planned Environmental easement; 12/2026
Soils	Yes	Yes	Site	The SMP must be referred to before any soils are disturbed.	Planned Environmental easement; 12/2026
Vapor	Yes	Yes	Site	Prevent vapor intrusion in future on-site buildings	Planned Environmental easement; 12/2026

Systems Operations/Operation & Maintenance

Approximately 7.5 acres of the nine-acre property have been remediated and restored; the remainder of the property is undergoing active groundwater remediation. The grass in this area is mowed every year. There are no other ongoing maintenance activities at the site. A long-term groundwater monitoring plan has been developed and will be implemented once the remedial activities have been completed.

There were seven annual ISCO injection events from 2016 through 2022 utilizing sodium persulfate and modified Fenton's reagent (2017) as reactants, with slight modifications to the injection strategy implemented at each event. The success of each ISCO event was monitored at 48 monitoring wells before and after each injection. The results of the 2016 and 2017 injections were mixed, but the 2018 injection event in conjunction with the additional soil excavation appeared to have made a positive impact on contaminant concentrations. Groundwater monitoring results following the 2021 and 2022 injection events appear to show that the remediation stalled in some areas based on persistently high contaminant concentrations in samples that also contained significant amounts of oxidant (indicating that the oxidant may not be reacting with contaminants). Following the seven injections, the level of VOCs in the groundwater were somewhat reduced; however, PCE concentrations in several monitoring wells were still significantly elevated as of the post-2022 injection sampling event. Because the reduction of VOCs in response to the persulfate injections was not proceeding as quickly as expected, for the eighth injection, which occurred in October 2023, a different oxidant (potassium permanganate) was used. Post-injection groundwater sampling will occur in spring 2024. A ninth ISCO injection event is planned for late summer 2024.

Potential impacts from climate change have been assessed at the site using the following tools, Climate Explorer, Flood Factor, and Sea Level Rise Viewer as identified in Appendix C, attached. The performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the site.

III. PROGRESS SINCE THE LAST REVIEW

The protectiveness determinations and statements from the 2019 FYR are summarized in Table 2, below.

Table 2: **Protectiveness Determinations/Statements from the 2019 FYR Report**

OU #	Protectiveness Determination	Protectiveness Statement
01	Short-term Protective	The OU1 remedy currently protects human health and the environment in the short-term because fencing prevents access to the site by trespassers and groundwater is not being used for potable purposes. For the remedy to be protective in the long-term, institutional controls need to be implemented.
Sitewide	Short-term Protective	The remedy currently protects human health and the environment in the short-term because fencing prevents access to the site by trespassers and groundwater is not being used for potable purposes. For the remedy to be protective in the long-term, institutional controls need to be implemented.

Table 3, below, summarizes the status of the recommendations from the 2019 FYR.

Table 3: **Status of Recommendations from the 2019 FYR Report**

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
	ICs are not in place	ICs need to be implemented	Ongoing	Implementation is delayed because the groundwater remediation is still underway. EPA expects to have a path forward for the groundwater in December 2026, at which time ICs will be established.	12/31/2026

The planned ICs include restrictions on intrusive activities in areas where residual contamination remains, unless the activities are in accordance with an approved SMP and restrict the use of groundwater as a source of potable or process water without treatment. Should the change in oxidant not be effective, consideration should be given to waiving the ARARs in the contaminated groundwater at the source areas. If a technical impracticability waiver is sought and ultimately obtained, it may require adjustments to the planned ICs. Therefore, the implementation of ICs will be delayed until the path forward for the groundwater remedy is determined.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On August 7, 2023, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at Superfund sites in New York, New Jersey, Puerto Rico, and the U.S Virgin Islands, including the Crown Cleaners of Watertown Superfund site. The announcement can be found at the following web address: https://www.epa.gov/superfund/R2-fiveyearreviews.

In addition to this notification, the EPA Community Involvement Coordinator for the site, Michael Basile, posted a public notice on the EPA site webpage (https://www.epa.gov/superfund/crown-cleaners) and provided the notice to the Town of Wilna by email on October 17, 2023 with a request that the notice be posted in municipal offices and on the village/town webpages. This notice indicated that a FYR would be conducted at the Crown Cleaners of Watertown Superfund site to ensure that the cleanup at the site continues to be protective of human health and the environment. Once the FYR is completed, the results will be made available at the following repository: EPA Region 2, 290 Broadway, 18th floor, New York, NY 10007. In addition, the final report will be posted on the following website: https://www.epa.gov/superfund/crown-cleaners. Efforts will be made to reach out to local public officials to inform them of the results.

Data Review

Groundwater

Groundwater samples have been collected from 48 monitoring wells (see Appendix A, Figure 4) situated in the shallow, intermediate, and deep aquifer zones during the ISCO program to delineate the extent of contamination and evaluate baseline and post-injection conditions (see Appendix A, Figure 5). Samples are analyzed for VOCs, total and dissolved metals, and chemical and field MNA parameters. PCE is the primary contaminant and is used as an indicator parameter to evaluate the effectiveness of the remedy. Concentrations of PCE exceed its NYSDEC Ambient Water Quality Standard and ROD cleanup value of 5 µg/L across the site and are the highest in the shallow aquifer zone at monitoring wells ERT-33S and MW-07 (see Appendix A, Figure 6).

Eight injection events have been conducted at the site; five of the events were conducted during this review period. Post-injection monitoring has been completed for seven events. A limited post-injection sampling for the eighth injection event occurred in November 2023; a complete round of post-injection samples will be collected in late spring/early summer 2024. The impact of the 2019 and 2020 injections on the groundwater contaminant plume were mixed, with samples from some monitoring wells exhibiting significant concentration decreases (*i.e.,* monitoring wells ERT-33I, ERT-35S, ERT-41I) and others exhibiting significant concentration increases (*i.e.,* monitoring wells ERT-34I, ERT-37S, ERT-37I) in response to one or both injections (see Appendix A, Figure 6). Following seven total injections, the level of VOCs in the groundwater have been somewhat reduced; however, PCE concentrations in several monitoring wells are still significantly elevated as of the June 2022 sampling event (*i.e.,* monitoring wells ERT-33S (1,500 µg/L), ERT-33I (1,020 µg/L), ERT-37S (2,590 µg/L), ERT-41I (7,410 µg/L), MW-07 (12,000 µg/L), ERT-35S (1,540 µg/L), and ERT-42S (1,760 µg/L)). Pre-injection groundwater analyses for the eighth injection included the sampling and analysis of 60 wells. Two wells had PCE levels as high as 3,270 µg/L and 2,740 µg/L. Thirty-nine wells had PCE levels less than 200 µg/L and the remaining nineteen wells had PCE levels between 200 µg/L and 1,000 µg/L. Eighteen wells were sampled in November 2023 following the eighth injection. Out of the eighteen samples, eleven were less than 50 µg/L for PCE, six were less than 400 µg/L, one was at 615 µg/L, and one was at 3,940 µg/L. While this was an improvement over 2022, the groundwater still requires treatment to reduce the contamination levels further.

Emerging Contaminants Sampling

In June 2019 and September 2020, groundwater samples were collected and analyzed for the emerging contaminants per- and poly-fluoroalkyl substances (PFAS) and 1,4-dioxane. During the 2019 sampling event, groundwater samples were collected from three monitoring wells, MW-04D, ERT-33D, and ERT-41I. Exceedances of the NYSDEC MCL for perfluorooctanoic acid (PFOA) of 10 nanograms per liter (ng/L) and perfluorooctanesulfonic acid (PFOS) of 10 ng/L were observed in samples collected from monitoring wells ERT-33D and ERT-41I. The maximum concentration of PFOA was 490 ng/L in monitoring well ERT-33D. The maximum concentration of PFOS was 45 ng/L in monitoring well ERT-41I. Concentrations of 1,4-dioxane were only detected in the sample from monitoring well ERT-41I at 0.18 µg/L, which was below its NYSDEC MCL of 1 µg/L.

During the 2020 sampling event, groundwater samples were collected from six monitoring wells, MW-4D, MW-13D, MW-17, MW-18, ERT-33D, and ERT-41I. Concentrations of PFOA and PFOS were detected above their respective NYSDEC MCL in the samples collected from monitoring wells ERT-33D and ERT-41I. The maximum concentration of PFOA was 430 ng/L, detected in the duplicate sample from monitoring well ERT-33D. The maximum concentration of PFOS was 98 ng/L in monitoring well ERT-33D. The samples were not analyzed for 1,4-dioxane. Based on the results of the emerging contaminants sampling, PFAS above the NYSDEC MCLs in the groundwater appear to be localized to the former source area and are below MCLs in downgradient wells (monitoring well MW-13D, MW-17, and MW-18).

Prior to the 2019 and 2020 sampling events, teflon tubing was left in several wells to facilitate future sampling. Because teflon is known to contain PFAS, it may have affected the sampling results. The teflon tubing is no longer being used. Resampling for emerging contaminants will be included in the pre-injection sampling event prior to the ninth injection to determine whether the concentrations found are attributable to the presence of teflon tubing.

Site Inspection

An inspection of the site was conducted on October 10, 2023. In attendance were Ms. Tames, Jeff Bechtel, EPA On-Scene Coordinator, and Scott Grossman, EPA Environmental Response Team. The purpose of the inspection was to assess the protectiveness of the remedy.

During the inspection, it was observed that the ground cover on the restored areas of the property was in good condition, with full grass coverage and the monitoring and injection wells were functional and in good condition. The fencing surrounding the property was also in good condition. There were no signs of trespassing or vandalism.

V. TECHNICAL ASSESSMENT

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

The remedy is functioning as intended by the ROD, which called for decontamination and demolition of the on-site building; excavation of PAH-, arsenic-, and PCE-contaminated soils; excavation of PCE-contaminated sediments in the adjacent wetlands; ISCO to treat the contaminated groundwater in the source area; MNA for the groundwater outside of the source area; and implementation of ICs.

Post-excavation soil and sediment sampling confirmed the excavation limits adequately addressed contamination consistent with NYSDEC restricted residential SCOs.

There have been eight annual ISCO injection events from 2016 through 2023. The success of each ISCO event was monitored at 48 monitoring wells before and after each injection (post-injection groundwater sampling for the eighth injection event will occur in spring 2024). The overall groundwater response has had mixed results with unclear trends. Because the reduction of VOCs in response to the persulfate injections was not proceeding as quickly as expected, for the eighth injection, potassium permanganate was used. Although some improvements were observed after this injection, further treatment and monitoring is needed.

A SMP is being developed for the site to properly manage any future disturbance of areas where PAH-contaminated soils remain at two-feet below the ground surface. In addition, the ICs required by the ROD are in development. The implementation of the ICs will be delayed until the path forward for the groundwater remedy is determined. A fence currently surrounds the site preventing access by the general public.

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

The exposure assumptions and toxicity values that were used to estimate the potential cancer risks and noncancer hazards in the risk assessment followed the general risk assessment practice at the time. Although specific parameters and toxicity values may have changed, the risk assessment process that was used is still consistent with current practice and the need to implement a RA remains valid. The RAOs of reducing or eliminating exposure to contaminated soil and sediments, preventing exposure to contaminated groundwater and soil vapor, and groundwater restoration are still valid. There are no changes in the physical conditions of the site or site uses that would affect the protectiveness of the selected remedy. Soil and groundwater uses are not expected to change during the next FYR period.

Soils contaminated with benzo(a)pyrene and PCE were excavated to NYSDEC residential SCOs (1.0 mg/kg and 1.3 mg/kg, respectively), which have not changed during the FYR period. The soil remedy is not yet complete because ICs restricting future land use are needed for the PAH-contaminated soils which remain on-site below one foot. Currently, clean backfill with a stone demarcation layer ensures short-term protectiveness by preventing exposure to the remaining contamination.

The targeted cleanup level for PCE in groundwater is the EPA MCL of 5 µg/L, which has not changed during the review period. Groundwater concentrations of PCE in several wells in the source area continue to exceed the cleanup level by three orders of magnitude. PFAS sampling conducted in 2019 and 2020 also showed source area concentrations of PFOA and PFOS that exceeded the New York State MCL of

10 ng/L by one order of magnitude. There is, however, no direct exposure to groundwater contamination because the Village connected to the Deferiet water system in 2016 and additional sampling will be performed to determine whether the PFAS concentrations identified were related to the presence of teflon tubing. ICs are needed to restrict the installation of new wells to ensure long-term protectiveness.

Vapor Intrusion

The potential for vapor intrusion was evaluated qualitatively as part of the original risk assessment. Indoor air and sub-slab samples were collected in 2009 from several properties located north and west of the former facility. Only low levels of VOCs were detected in the soil gas and air samples. In addition, all site-related contaminants in the samples were below EPA's residential vapor intrusion screening levels set at a hazard quotient (HQ) of 1 and a cancer risk of 10^{-6}. Based upon these data, EPA concluded that no further sampling or analysis of potential vapor intrusion was warranted for the site. All the on-site buildings were demolished during the remedial action; however, the potential for vapor intrusion should be reevaluated if any development of the site is planned in the future.

Shallow aquifer PCE concentrations during the FYR period were also compared to the residential groundwater VISL (set at a HQ of 1 and cancer risk of 10^{-4}). Shallow groundwater PCE concentrations exceeded this screening level throughout the source zone, which indicates the potential for vapor intrusion if buildings were constructed above the contamination.

PCE concentrations west of the source zone at monitoring well MW-22 were above the 10^{-6} VISL, but within the acceptable risk range during the previous FYR period. All monitoring wells in proximity to sidegradient residences located west of the source zone (with limited exceptions) have not been sampled since the 2006 RI. A full sampling round of the monitoring wells located west of the source zone near a former town dump will be performed as part of the future MNA evaluation.

Ecological Risk

A Baseline Ecological Risk Assessment (BERA) was completed to identify potential risk to ecological receptors in support of the RI. The BERA identified potential risk to terrestrial and wetland plants; however, the potential risk was considered to be low based on a qualitative survey of vegetation. Additionally, risk to benthic invertebrates from exposure to contaminants of ecological concern in wetland sediments was determined to be low following a reevaluation of ecological screening values and a 28-day earthworm toxicity test. While unacceptable risk was acknowledged for exposure of avian receptors to lead, it was determined that lead was not a site-related contaminant of concern. Therefore, the RAOs identified at the time of the remedy remain protective of ecological receptors.

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

At this time there is no other information that could call into question the protectiveness of the remedy. The implementation of institutional controls will ensure long-term protectiveness.

VI. ISSUES/RECOMMENDATIONS

Table 4, below, presents the recommendations and follow-up actions for this FYR.

Table 4: Issues and Recommendations

<table>
<tr><th colspan="5">Issues/Recommendations</th></tr>
<tr><td colspan="5">OU(s) without Issues/Recommendations Identified in the Five-Year Review:</td></tr>
<tr><td colspan="5">None</td></tr>
<tr><td colspan="5">Issues and Recommendations Identified in the Five-Year Review:</td></tr>
<tr><td rowspan="3">OU(s): OU1</td><td colspan="4">Issue Category: Institutional Controls</td></tr>
<tr><td colspan="4">Issue: ICs are not in place.</td></tr>
<tr><td colspan="4">Recommendation: ICs should be implemented.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Party Responsible</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>EPA</td><td>EPA</td><td>12/31/2026</td></tr>
</table>

OTHER FINDINGS

The overall groundwater response has had mixed results, with unclear trends. In addition, the groundwater remediation in the source areas is not proceeding as quickly as expected. Unless the sampling results following the 2023 and 2024 injections indicate that the new oxidant is effective in reducing contaminant concentrations, because of the apparent technical impracticability of restoring the groundwater in the source areas, consideration should be given to waiving the ARARs in the contaminated groundwater in these areas.

Sampling for emerging contaminants in 2019 and 2020 identified the presence of PFAS compounds at elevated concentrations localized in the former source area. Prior to these events, teflon tubing was left in several wells to facilitate future sampling. Because teflon is known to contain PFAS, resampling will be included in the pre-injection data collection event prior to the ninth injection to determine whether the concentrations found are attributable to the presence of teflon tubing.

VII. PROTECTIVENESS STATEMENT

Table 5, below, presents the OU and sitewide proactiveness statements.

Table 5: Protectiveness Statements

Protectiveness Statement(s)	
Operable Unit: OU1	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The OU1 remedy currently protects human health and the environment in the short-term because the soil remedy has been completed, fencing prevents access to the site by trespassers, and groundwater is not being used for potable purposes. For the remedy to be protective in the long-term, ICs need to be implemented.	
Sitewide Protectiveness Statement	
Protectiveness Determination: Short-term Protective	
Protectiveness Statement: The remedy currently protects human health and the environment in the short-term because the soil remedy has been completed, fencing prevents access to the site by trespassers, and groundwater is not being used for potable purposes. For the remedy to be protective in the long-term, ICs need to be implemented.	

VIII. NEXT REVIEW

The next FYR report for the Crown Cleaners of Watertown Inc. Superfund site is required five years from the completion date of this review.

APPENDIX A--FIGURES

Figure 1: Site Location Map

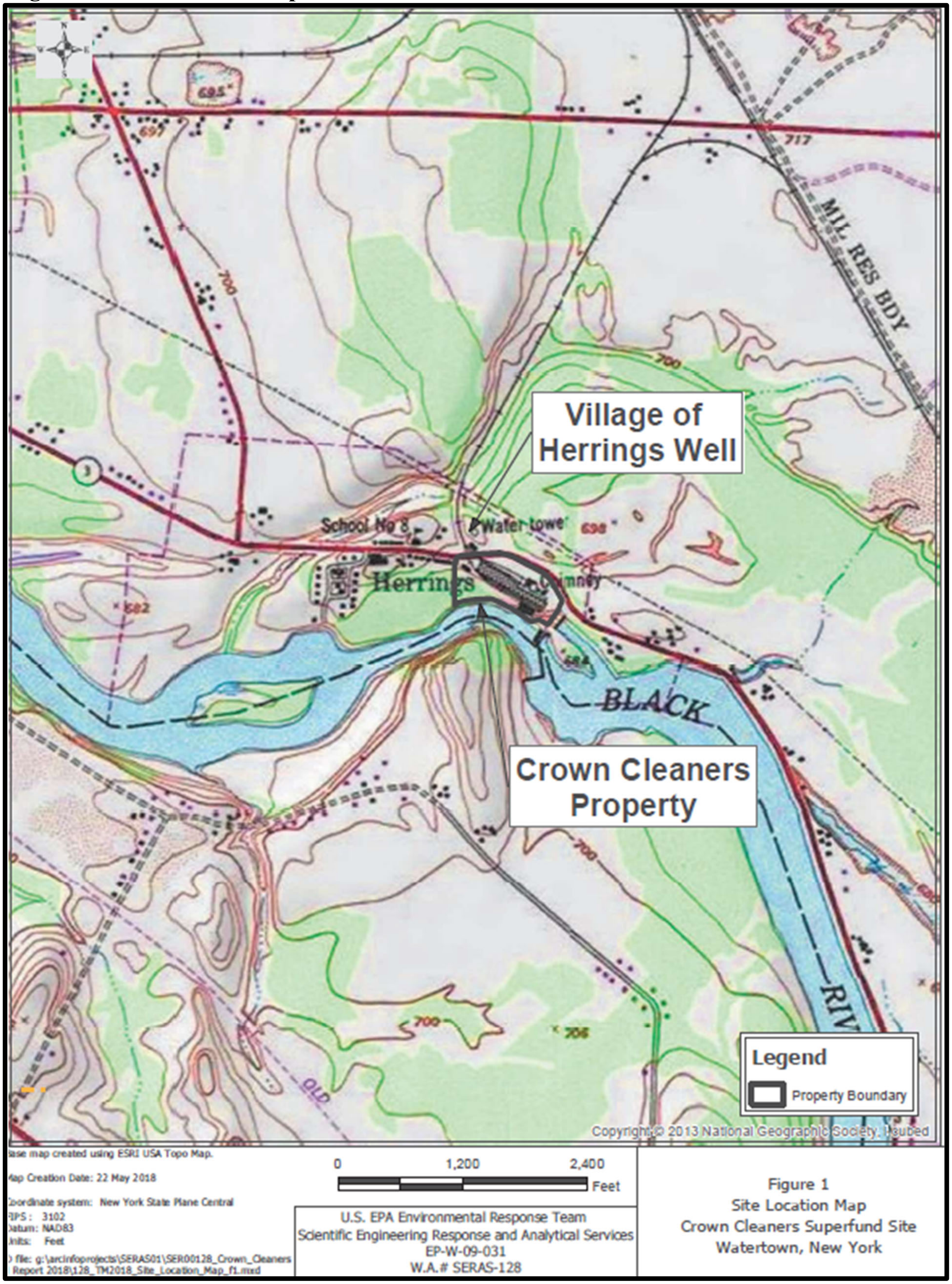


Figure 2: Areal Limits of PCE Excavation

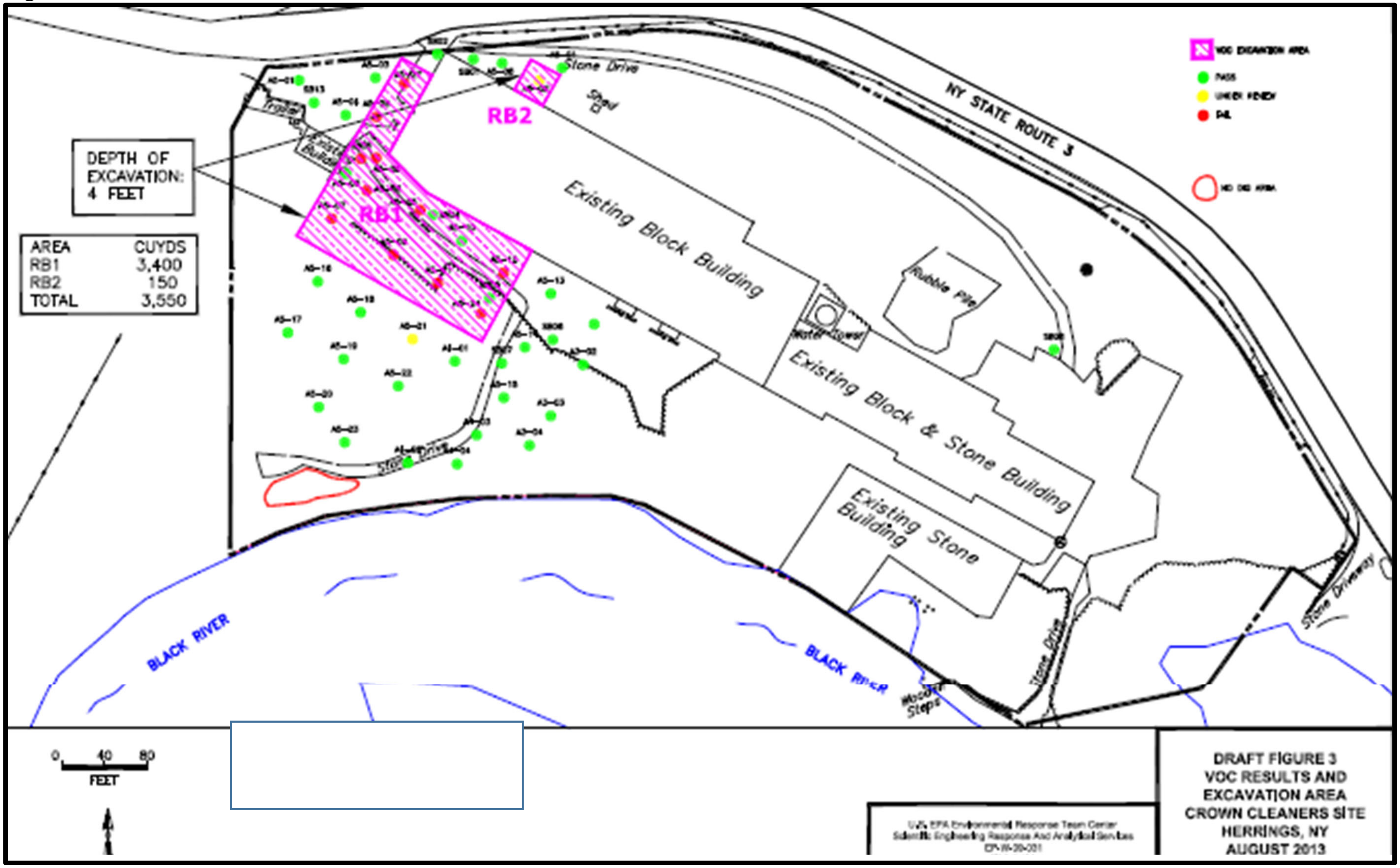


Figure 3: Areal Limits of PAH Excavation

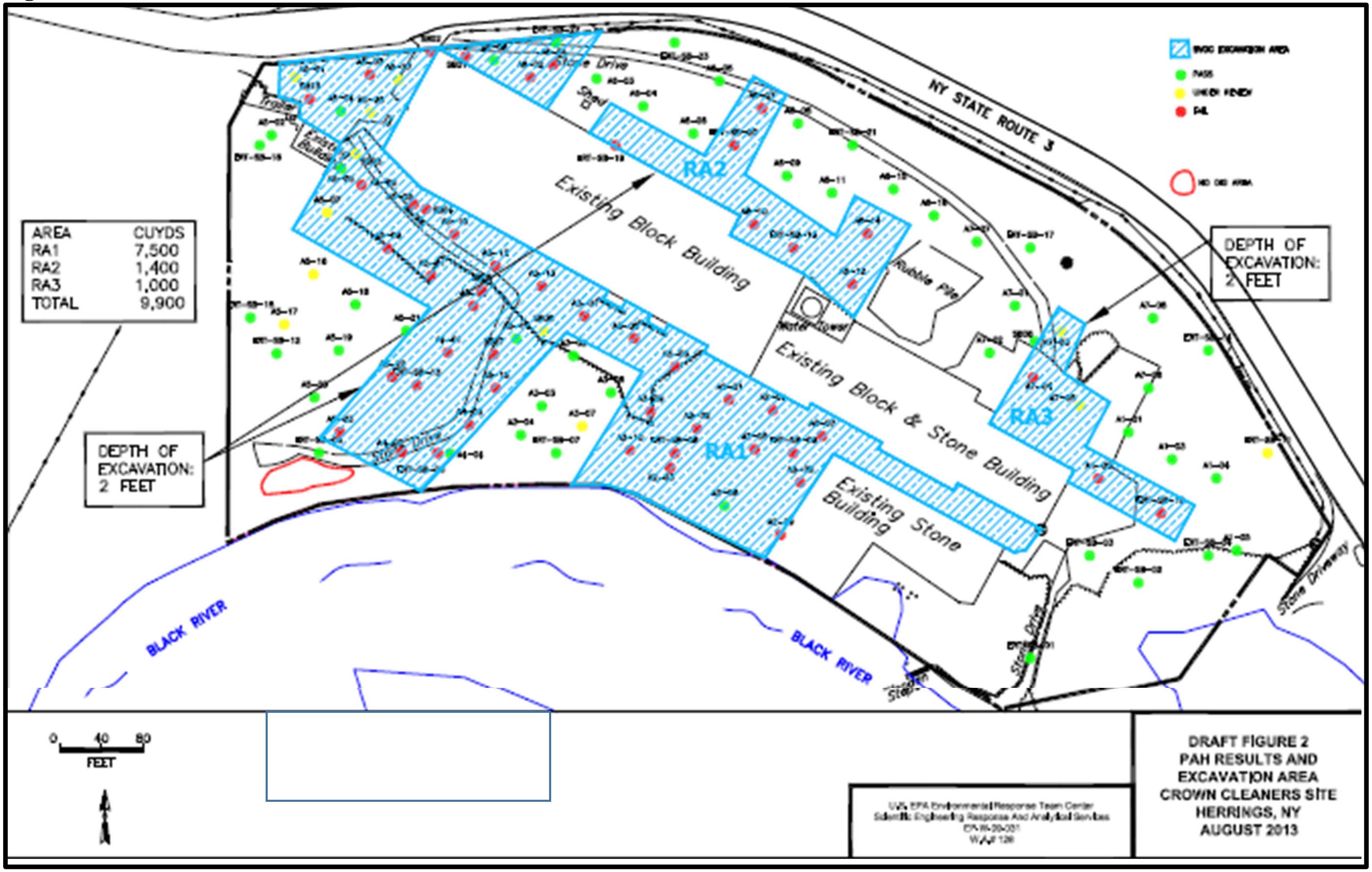


Figure 4: Monitoring Well Locations

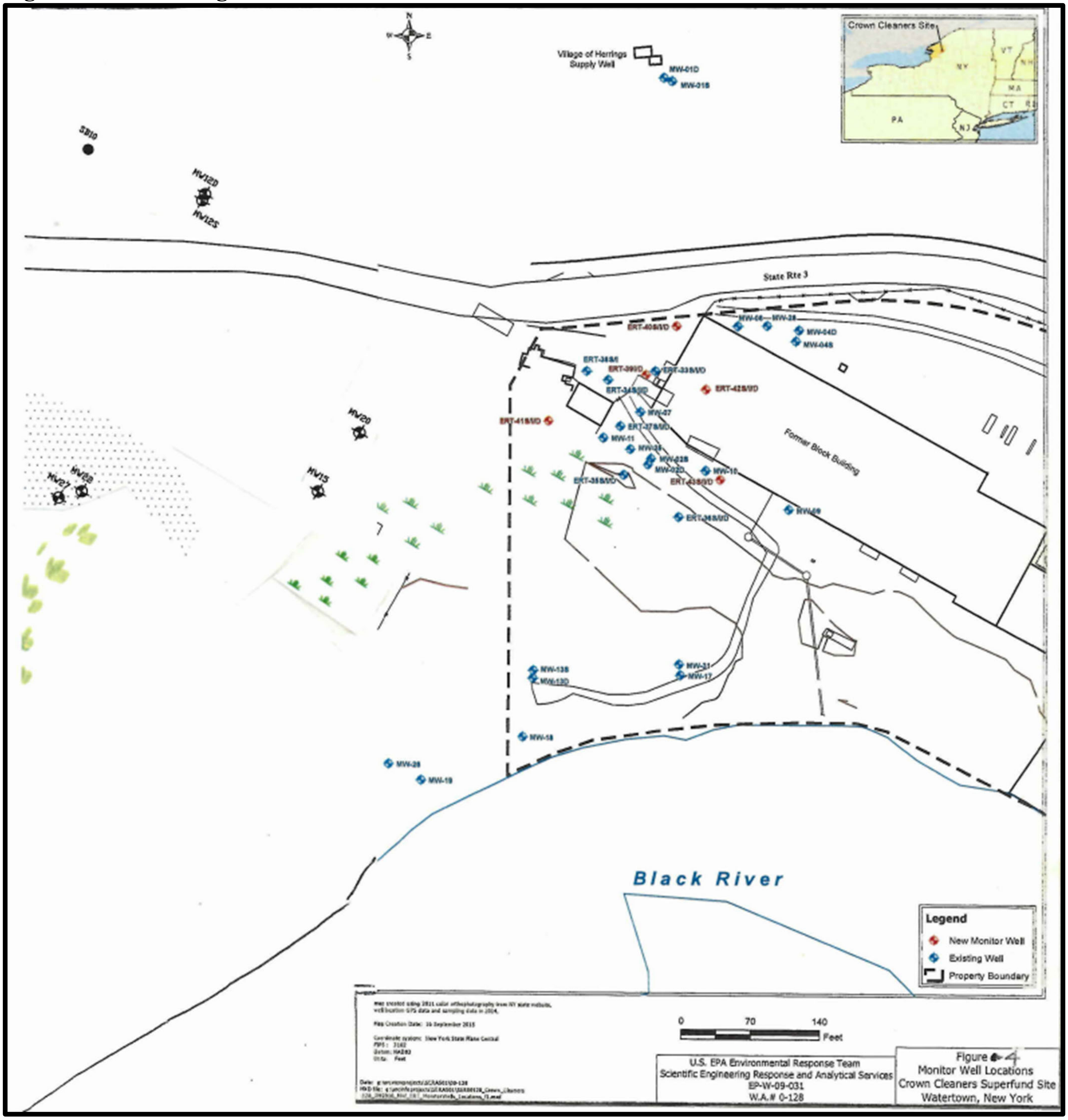
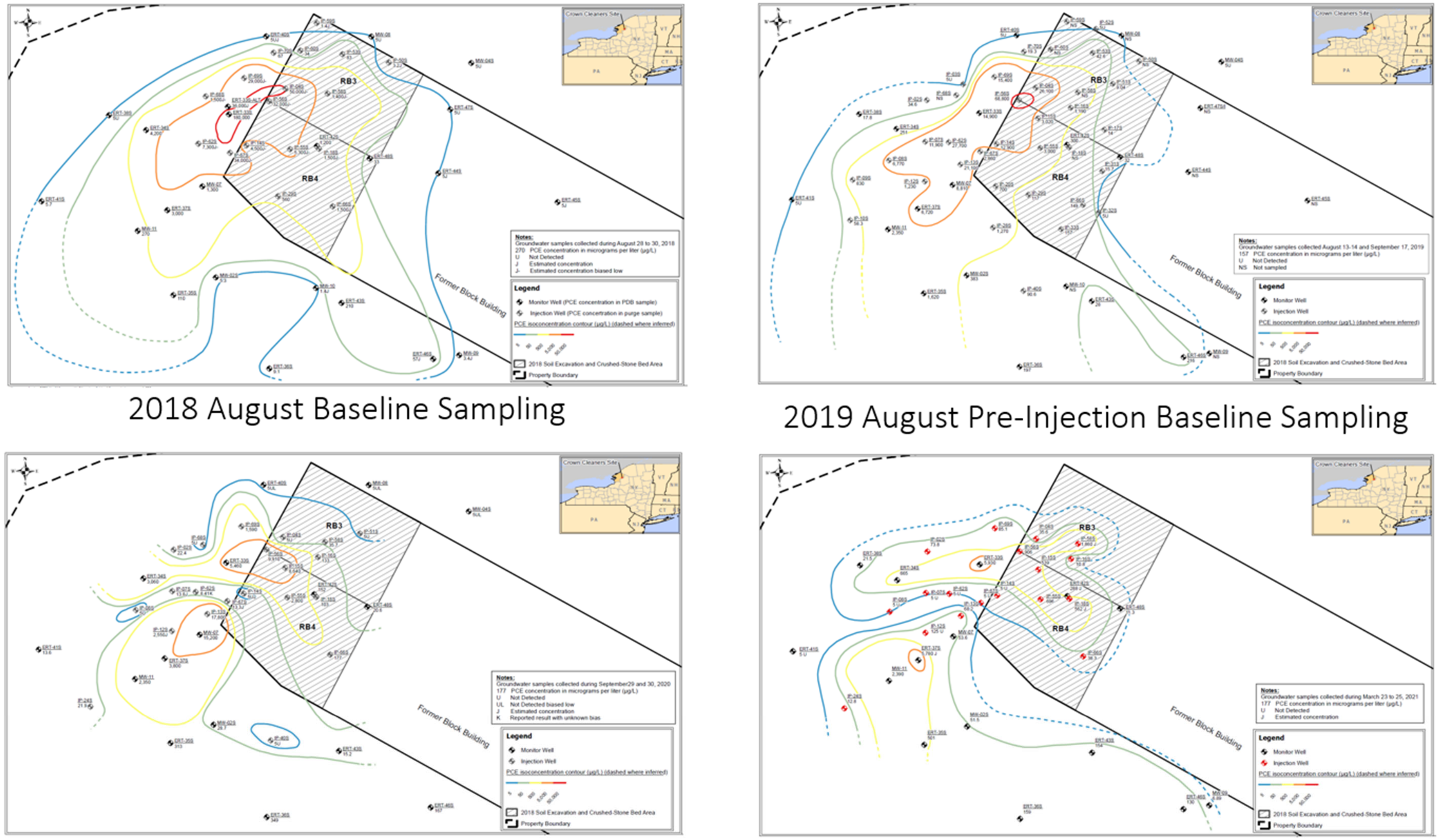


Figure 5: Select Baseline and Post-Injection Groundwater PCE Isocontours



2018 August Baseline Sampling

2019 August Pre-Injection Baseline Sampling

2020 September Pre-Injection Baseline

2021 March Post-Injection

Figure 6: Groundwater PCE Data Trends

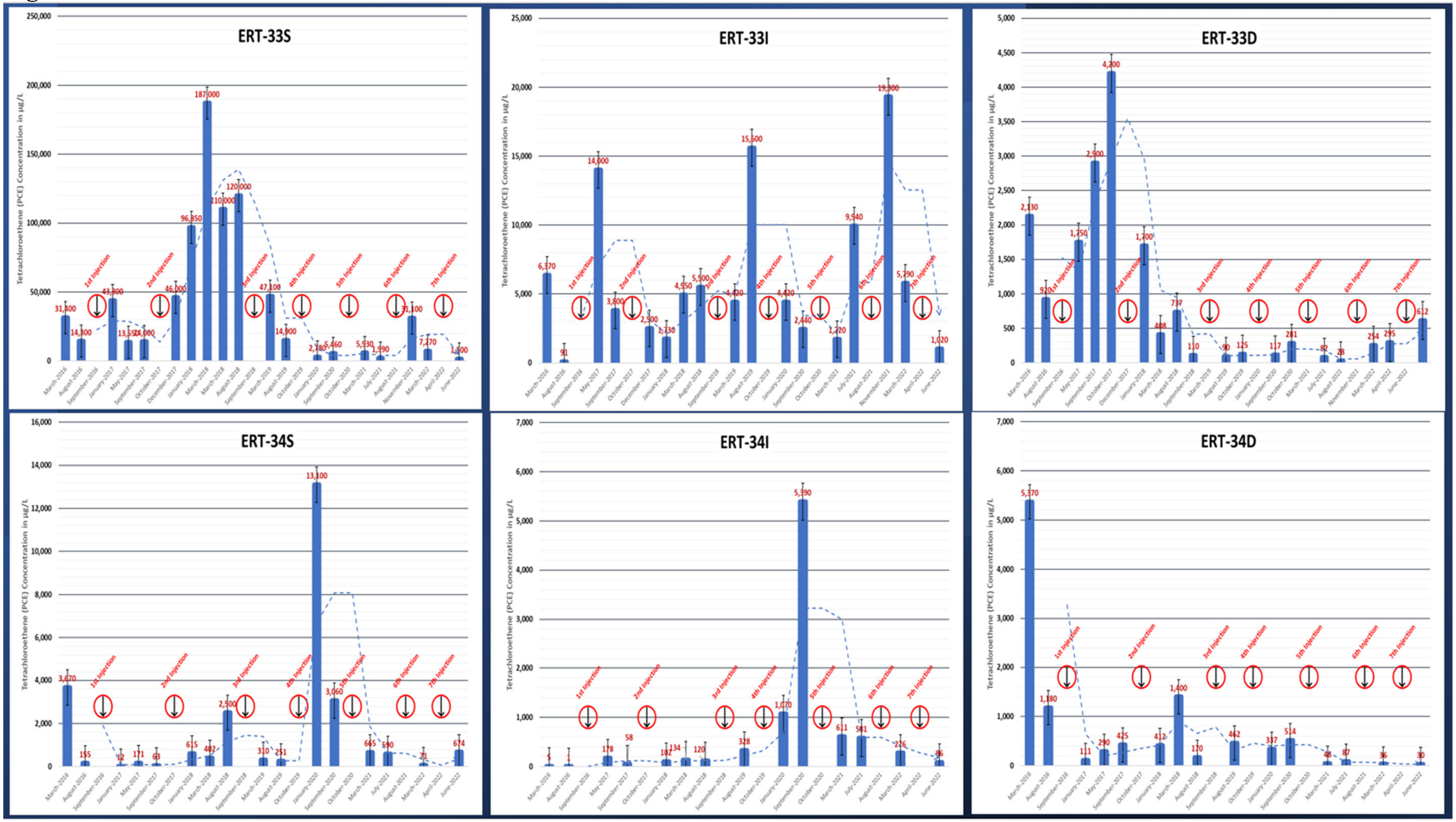
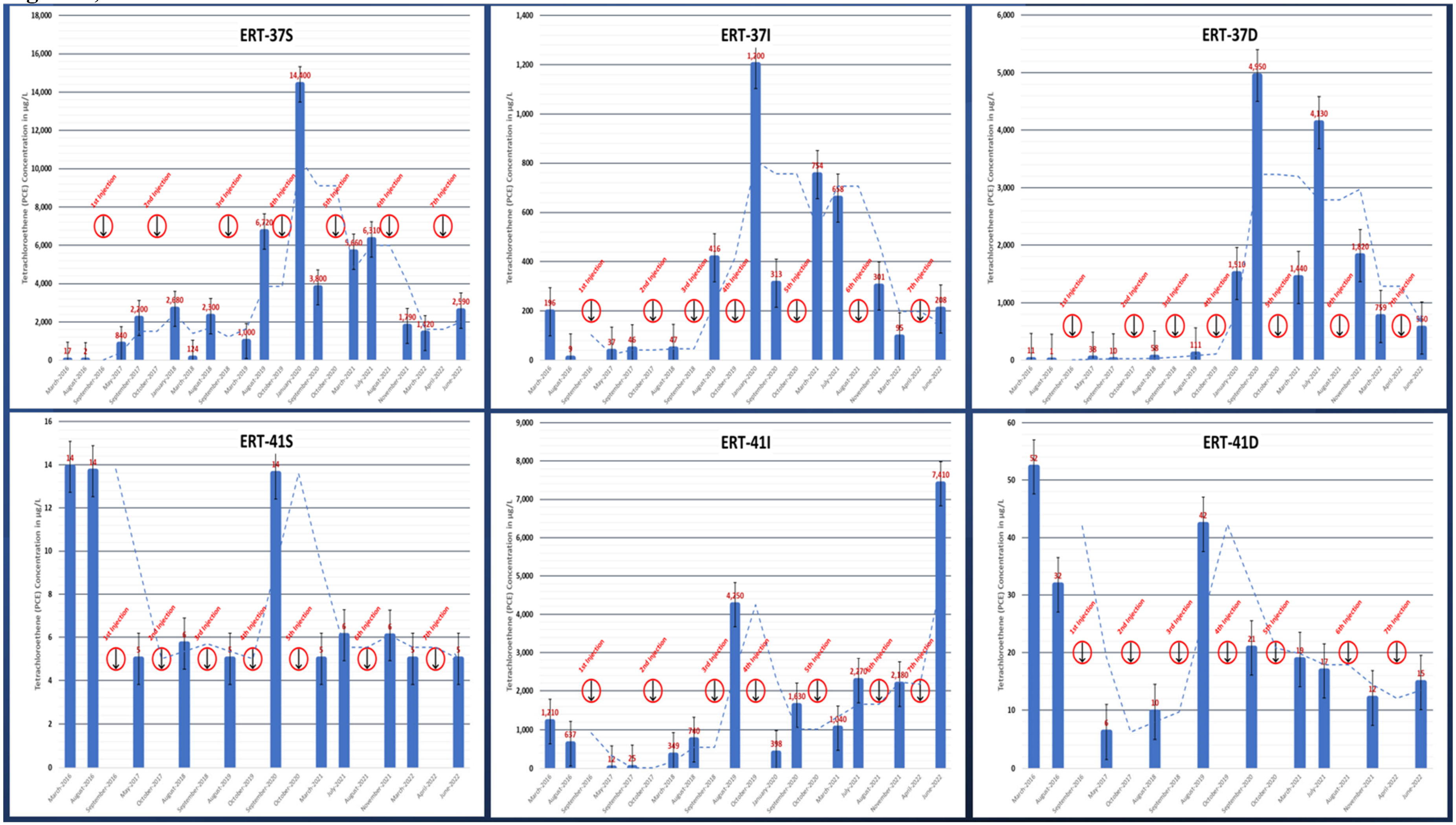


Figure 6, continued: Groundwater PCE Data Trends



APPENDIX B – REFERENCE LIST

Documents, Data, and Information Reviewed in Completing the Five-Year Review	
Document Title, Author	**Submittal Date**
Remedial Investigation/Feasibility Study, TetraTech, Inc.	March 2012
Record of Decision, EPA	March 2012
Event IV Chemical Oxidation Summary Report – Project #802137 – ISOTEC	November 2019
Event V Chemical Oxidation Summary Report – Project #802137 – ISOTEC	December 2020
Event VI Chemical Oxidation Summary Report – Project #802137 – ISOTEC	October 2021
Event VII Chemical Oxidation Summary Report – Project #802137 – ISOTEC	April 2022
Crown Cleaners Seventh Injection Results Summary	September 2022
Pre- and Post-Seventh Injection Analytical Results Summary	June 2023
Pre-Eighth Injection Analytical Results	September 2023

APPENDIX C - CLIMATE CHANGE ASSESSMENT

In accordance with the Region 2 *Guidance for Incorporating Climate Change Considerations in Five Year Reviews*, three climate change tools were utilized to assess the Crown Cleaners of Watertown Superfund site. Screenshots from each of the tools assessed are included here.

The first tool utilized was The Climate Explorer. As can be seen from Figure C-1, over the next several decades, there is not a projected increase of days per year with maximum temperatures greater than 100°F in Jefferson County. As can be seen on Figure C-2, there is little change in potential drought conditions in the coming years. A summary of the Top Climate Concerns from the tool can be seen in Figure C-3.

The second tool utilized is called the Risk Factor (for Flood Risk). As can be seen in Figure C-4, there are 18 properties in Herrings that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This is considered an extreme flood risk. However, although the site is located along the Black River, flooding is not a concern at the site because it sits at a much higher elevation than the River.

The final tool utilized is called Sea Level Rise Viewer. The site is located inland and is not anticipated to be impacted by sea level rise even in the "worst-case" scenario assuming a 10-foot rise (see Figure C-5).

Based on this information, potential impacts from climate change have been assessed at the site and the performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the site.

Figure C-1 – Jefferson County Days with Max Temperature > 100°F

Figure C-2 – Jefferson County Drought Conditions

Figure C-3 – Summary of Top Climate Concerns for Jefferson County

Herrings, NY

Explore planning tools available from our partners

Top climate concerns

Top regional hazards for Herrings, NY, according to the 2018 National Climate Assessment. These statements compare projections for the middle third of this century (2035-2064) with average conditions observed from 1961-1990.

Show full range of projections   Methodology

Changed seasonal patterns may affect rural ecosystems, environments, and economies.

Annual counts of **intense rainstorms** – those that drop two or more inches in one day – are projected to increase by 0%.
Historically, Herrings averaged 0 intense rainstorms per year.

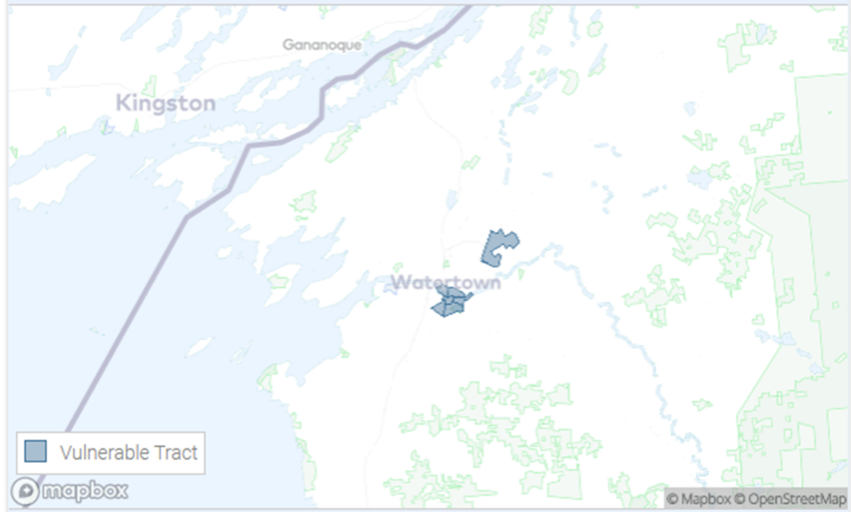
Extreme temperatures on the hottest days of the year are projected to increase by 7°F.
Historically, extreme temperatures in Herrings averaged 87°F.

Temperate guides you through assessing your vulnerability to these potential hazards.

Get started with Temperate

At Risk Neighborhoods

Jefferson County has 9 census tracts where vulnerabilities to climate change exceed the county median.



Neighborhoods at Risk provides neighborhood-level information (by census-tract) about potentially vulnerable people and climate change.

Explore Neighborhoods At Risk

Figure C-4 – Flood Factor

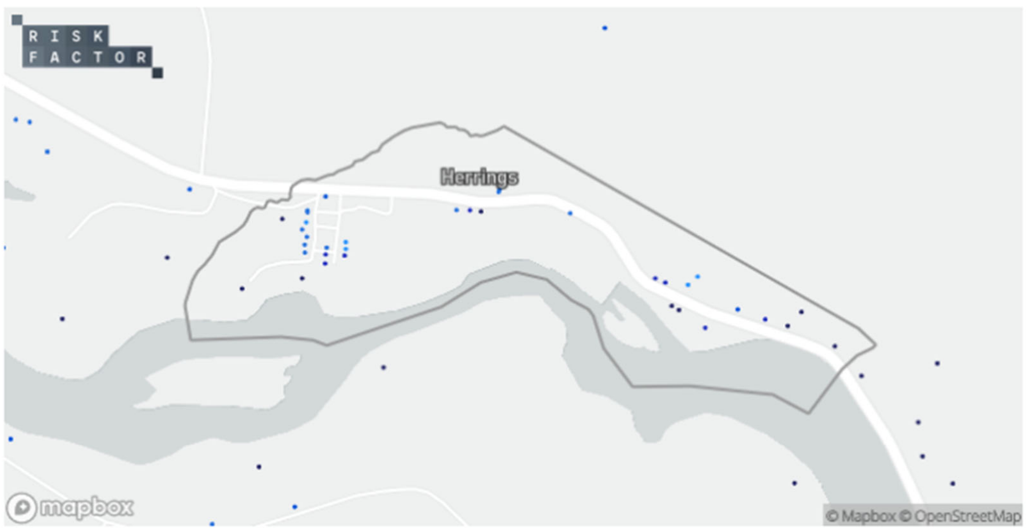
Does Herrings have Flood Risk?

Extreme

FLOOD FACTOR®

There are **18** properties in **Herrings** that have greater than a **26%** chance of being severely affected by flooding over the next 30 years. This represents **56%** of all properties in Herrings.

In addition to damage on properties, flooding can also cut off access to utilities, emergency services, transportation, and may impact the overall economic well-being of an area. Overall, **Herrings** has an **extreme risk of flooding** over the next 30 years, which means flooding is likely to impact day-to-day life within the community. This is based on the level of risk the properties face rather than the proportion of properties with risk.



Herrings Flood Risk

Residential **Severe Risk**
25 out of **47** homes

Road **Extreme Risk**
-- out of -- miles of roads

Commercial **Extreme Risk**
4 out of **6** commercial properties

Critical Infrastructure **Minor Risk**
1 out of **1** infrastructure facilities

Social Facilities **Risk - N/A**
-- out of -- social facilities

Minor Moderate Major Severe Extreme

Figure C-5– Sea Level Rise Viewer