FIRST 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

Pat Evangelista, Acting Director
Superfund and Emergency Management Division

8/22/19
Date

568913

Table of Contents

LIST OF ABBREVIATIONS & ACRONYMS

BASP	Base-Activated Sodium Persulfate
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIC	Community Involvement Coordinator
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
ICs	Institutional Controls
MCL	Maximum Contaminant Level
MFR	Modified Fenton's Reagent
mg/kg	Milligrams per kilograms
µg/l	Micrograms per liter
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
ROD	Record of Decision
RPM	Remedial Project Manager
SCO	Soil Cleanup Objective
ft^2	Square Feet
SMP	Site Management Plan
TCE	Trichloroethylene
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.

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

This is the first FYR for the Crown Cleaners of Watertown, Inc. Superfund Site (Site). The triggering action for this statutory review is the on-Site construction start date of the remedial action. 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 (UU/UE).

The FYR was led by Pamela Tames, EPA Remedial Project Manager. Participants included Rachel Griffiths, EPA hydrogeologist, Michael Basile, EPA community involvement coordinator, Abbey States, human health risk assessor, Mindy Pensak, ecological risk assessor, and Lincoln Fancher, New York State Department of Environmental Conservation (NYSDEC) representative.

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 area is located immediately west of the Site and another wetland area is located approximately 800 feet southwest of the Site. The Village of Herrings public water supply well was located on the northern side of NYS Route 3 across from the Site until 2015, when it was dismantled. See the Location Map, Figure 1.

From 1890 until the mid-1960's, the former facility property was used by the St. Regis Paper Co. to produce paper bags. In the late 1970's, 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 Site grounds.

The residences in the area use either private wells or a public supply well for potable water supply. In 1991, the New York State Department of Health (NYSDOH) 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 same year, NYSDEC installed a treatment system on the Village of Herrings' water supply system and determined that the source of PCE contamination was from the Site.

Several New York State investigations were conducted at the Site during the 1990's which resulted in the Site being referred to EPA for further evaluation in 2000. On September 4, 2002, the Site was listed on EPA's Superfund National Priorities List.

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

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 ***[If "Other Federal Agency", enter Agency name]*:**		
Author name (Federal or State Project Manager): Pamela Tames		
Author affiliation: EPA		
Review period: 9/20/2014 - 8/02/2019		
Date of site inspection: 9/11/2018		
Type of review: Statutory		
Review number: 1		
Triggering action date: 9/19/2014		
Due date *(five years after triggering action date)*: 9/19/2019		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

PCE was detected in eleven of the thirty-one monitoring wells sampled during the remedial investigation (RI), with the highest concentration being 6,500 µg/l. The Maximum Contaminant Level (MCL) exceedances of the VOCs in groundwater and the conclusion of the risk assessment indicated 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 PAH

concentrations as high as 58.4 milligrams per kilogram (mg/kg). The risk assessment concluded that soils on the Site 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 also posed an unacceptable exposure risk to terrestrial and wetland plants and avian receptors.

Response Actions

In 1991, NYSDOH determined that the Village of Herrings' water supply well was contaminated with PCE at concentrations ranging from 25 to 50 µg/L. Later that same year, NYSDEC installed a treatment system on the Village of Herrings' water supply system and determined that the source of PCE contamination was from the Site. Several New York State investigations were conducted at the Site during the 1990's 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. VOCs, SVOCs, polychlorinated biphenyls, copper, iron, mercury, zinc, beryllium, arsenic, and chromium were detected in the soils above NYSDEC's soil cleanup objectives (SCOs).[1] The highest PCE concentration found in the shallow aquifer was 9,800 µg/L. In addition to this investigation, EPA secured the property, removed and disposed of VOC-contaminated sludge and debris, sump pit water, spent dry cleaning filters, removed friable asbestos containing materials, demolished an unstable portion of the main building and disposed of approximately 5,000 gallons of waste oil. EPA also demolished a large smoke stack 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.

The Record of Decision 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, to-be-considered guidance, and site-specific risk-based levels. The following remedial action objectives 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;

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

- 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];
- 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 (bgs) 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 meets 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 concentrations located outside the source areas;
- Utilization of institutional controls 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.

Soil cleanup objectives were those established pursuant to 6 NYCRR Part 375, Environmental Remediation Programs, Subpart 375-6, effective December 14, 2006. Specifically, the soil cleanup objectives were 1 mg/kg for benzo(a)pyrene (a specific PAH), based upon NYSDEC's restricted residential soil clean-up objectives and a cancer risk of 1 x 10^{-6} and 1.3 mg/kg for PCE, based upon NYSDEC's protection of groundwater soil cleanup objectives and a cancer risk of 1 x 10^{-6}. The NYSDEC's Sediment Criteria of 0.008 mg/kg for PCE was used as the cleanup level for the wetlands. These levels are the more stringent cleanup level between a human-health protection value and a value based on protection of groundwater. All of these levels fall within EPA's acceptable risk range.

MEDIA	CONTAMINANT	CLEANUP OBJECTIVE
Soil	PCE	1.3 mg/kg
Soil	PAHs (Benzo(a)pyrene)	1 mg/kg
Groundwater	PCE	5 µg/l
Sediment	PCE	.008 mg/kg

[2] Since 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.

[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).

Status of Implementation

The contractor and EPA mobilized to the Site on September 22, 2014. The fencing surrounding the Site was secured and office and storage trailers were brought to the Site. Clearing and cutting trees within the work areas was performed and the vegetation was chipped.

Following winter shutdown from the end of November 2014 thru the end of March 2015, EPA remobilized to the Site and abatement contractors removed and consolidated 1,706 tons of non-friable asbestos material/debris including roofing materials into roll-off containers for off-Site disposal at Development Authority of the North Country (DANC) Landfill in Rodman, NY. In addition, 13.6 tons of friable asbestos were loaded into closed top roll-offs for disposal at Seneca Meadows Landfill in Waterloo, NY. Steel I-beams and scrap were removed from the buildings and recycled off-Site. Beginning in June, the limestone building walls were dismantled and staged for later crushing. Concrete building slabs were also broken up and staged for future crushing operations. Non-hazardous wastewater from the building's basement was pumped out and transported to the Watertown, NY wastewater treatment plant. Areas of the basement which contained oil sludge and visible oil stains were sampled. Transformers were sampled for PCBs prior to being shipped off-Site for disposal.

Excavation of the PCE contaminated soils and sediments began at the end of September 2015 and was completed in October 2015. See Figure 2 for the areal limits of the PCE excavation. The excavated PCE contaminated soils (3,311 tons) were transported off-Site and disposed at the DANC Landfill in Rodman, NY. An additional 95.60 tons of oil contaminated soils and debris were also sent to DANC Landfill for disposal. Confirmation sampling was conducted in the excavated areas and the excavation areas were backfilled with clean soils to confirm that the remediation goals had been met. Crushing of staged limestone blocks also began at this time and continued until winter shutdown in mid-December 2015. Although the foundations of the buildings were not demolished, the perimeter walls of the foundations were removed to 2 feet below grade. The basement slabs were punctured to allow rain water and snow melt to percolate through. In late November 2015, the process of backfilling the basements with the crushed limestone and concrete from the demolition began.

The construction crew remobilized after winter shutdown at the beginning of June 2016. The excavation of the PAH-contaminated soils was initiated. See Figure 3 for the areal limits of the PAH excavation. The top two feet of PAH-contaminated soil was excavated and staged on-Site for use as additional backfill in the basements of the buildings. The excavated PAH areas were backfilled with crushed stone. The crushed stone also acts as a demarcation zone should underground work be needed in the area sometime in the future. Excavation and backfilling of PAH-contaminated areas was completed in early August 2016. The water tower was demolished in mid-August and the scrap steel was shipped off-Site for recycling. Excess crushed stone was removed by the Town of Wilna for use at another site. Clean top soil was brought in and spread over the building footprints and excavated soil areas. The top soil was laid in a 12-inch layer and then 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 Site. Demobilization from the Site was completed on September 23, 2016.

The construction of the groundwater treatment system began in 2016 with the drilling of injection wells which would serve as conduits for oxidant distribution within the contaminated aquifer. In August-September 2016, 43 shallow wells, 4 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.

A second round of injections was performed in September 2017. A total of 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.

During May 2018, additional soil samples taken in a previously inaccessible area beneath the now demolished building indicated that this area may be acting as a source of PCE to the aquifer. Approximately 1,500 cubic yards of soil was excavated in July 2018 down to the rock interface. The excavation was backfilled with 459 tons of 1-inch stone spread out in a one-foot thick 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, the third round of chemical oxidation injections was performed from September 18 to October 4, 2018. A total of 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 thirty-nine permanent injection well locations within the approximately 25,650 square-foot (ft^2) treatment area encompassing the shallow bedrock interval and twenty-one temporary direct push injection locations within the approximately 10,000 ft^2 area targeting the overburden/bedrock interface soils.

The next round of chemical oxidation injections is planned for early fall 2019.

Institutional Controls

Table 1, below, summarizes the status of the institutional controls.

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		Restrict installation of ground water wells and ground water use.	Planned Environmental easement; 12/2020
Soils	Yes	Yes		The Site Management Plan must be referred to before any soils are disturbed.	Planned Environmental easement; 12/2020

Vapor	Yes	Yes		Prevent vapor intrusion in future on-Site buildings	Planned Environmental easement; 12/2020

Systems Operations/Operation & Maintenance

Approximately 7.5 acres of the nine-acre Site have been remediated and restored. The grass in this area is mowed every year. The remainder of the Site is undergoing active remediation. 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.

Potential Site impacts from climate change have been assessed, 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.

III. PROGRESS SINCE THE LAST REVIEW

This is the first FYR for the Site.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On October 1, 2018, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 42 Superfund sites in New York and New Jersey, including the Site. The announcement can be found at the following web address: http://www.epa.gov/aboutepa/fiscal-year-2019-five-year-reviews. The results of the review and the report will be made available at the Site information repository located at EPA Region 2, 290 Broadway, 18th floor, New York, NY 10007 and at the Site webpage, www.epa.gov/superfund/crown-cleaners. For public questions related to the Site or the FYR process, the webpage also provides the contact information of the remedial project manager.

Data Review

Groundwater

Groundwater remedial action is ongoing; however, groundwater samples have been collected from 48 monitoring wells situated in the shallow, intermediate, and deep aquifer zones during the in-situ chemical oxidation (ISCO) program to delineate the extent of contamination and evaluate baseline and post-injection conditions (see Figure 5). Samples are analyzed for VOCs, total and dissolved metals, and chemical and field MNA parameters, but PCE is the primary indicator parameter being used to evaluate 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 highest in the shallow aquifer zone at monitoring well ERT-33S (see Figure 6).

There have been three ISCO events to date utilizing sodium persulfate and modified Fenton's reagent as reactants. The injections have occurred in the fall of 2016, 2017, and 2018, with slight modifications and improvements each event. The results of the 2016 injection were mixed, with monitoring wells across the Site exhibiting both increasing and decreasing contaminant concentrations despite the reactant being well-distributed. Modifications to reactant conditions were made for the 2017 injection, which also yielded mixed results. In 2018, prior to the third injection, additional source material was identified and removed from the overburden. The source removal in conjunction with an optimization of the 2018 injection event appears to have made a positive impact on contaminant concentration trends. Based on the increasing contaminant concentrations, it was speculated that the first two injection events were mobilizing source material, so the removal of the remnant source allowed the oxidant to function more effectively during the 2018 injection.

PCE concentration trends for wells across the Site indicate mixed responses to the ISCO program, but the most recent data following the 2018 injection show a more positive response. Within the plume core, monitoring well cluster ERT-33 exhibited fluctuating PCE concentrations with depth. The highest sitewide PCE concentrations have been recorded at monitoring well ERT-33S, which had a maximum concentration of 186,550 µg/L in March 2018 (see Figure 7). Concentrations at this location spiked prior to the 2018 injection event and have since decreased, whereas monitoring wells ERT-33I and ERT-33D exhibited respective peak concentrations of 14,000 µg/L and 4,200 µg/L in 2017 followed by decreasing concentrations (see Figures 8 and 9). Monitoring well ERT-42S, which is located on the eastern portion of the plume core, has exhibited a more predictable trend with a maximum concentration of 12,300 µg/L in 2016 followed by steady decreases throughout the ISCO program (Figure 10).

Downgradient monitoring wells have also exhibited a variety of concentration trends. Monitoring well cluster ERT-34 (to the west of monitoring well cluster ERT-33) exhibits overall decreasing PCE concentrations, but the specific response has varied with depth. For instance, monitoring wells ERT-34S and ERT-34D had maximum respective concentrations of 5,900 µg/L and 2,630 µg/L in 2016, followed by notable decreases through 2017 and another peak in 2018 to 2,500 µg/L and 1,395 µg/L, respectively (see Figures 11 and 12). Concentrations in monitoring well ERT-34I increased to a maximum concentration of 310 µg/L in 2017 before decreasing again to approximately 100 µg/L in 2018 (see Figure 13). To the south of the plume core, monitoring wells MW-07 and ERT-37S have exhibited overall increasing concentration trends, reaching maximum PCE concentrations of 8,620 µg/L at monitoring well MW-07 in 2019 and 3,000 µg/L at monitoring well ERT-37S in 2018 (see Figures 14 and 15).

Monitoring of MNA parameters outside of the treatment zone will not be initiated until after the completion of the ISCO injections.

At NYSDEC's request, groundwater sampling for emerging contaminants (PFAS and 1,4-dioxane) occurred at the Site in June 2019. The results were not be available for this FYR. A fourth injection event is being scheduled for early fall 2019. The rate of decline in VOC levels within this section of the plume will be reevaluated following the fourth injection. Following an analysis of the post-injection contaminant levels, additional injections may be scheduled. A long-term monitoring program will be established for groundwater after the completion of the injections.

Vapor Intrusion

Subslab, indoor air, and ambient air sampling in and around eight residences in the vicinity of the Site was conducted in March 2009. Only low levels of VOCs were detected in the soil gas and air samples, and no Site-related VOCs were detected in any of those samples. Based upon these data, EPA concluded that no further sampling or analysis of potential vapor intrusion was warranted for the Site.

Site Inspection

A FYR inspection of the Site was conducted on September 11, 2018. In attendance were Jeff Catanzarita, EPA Environmental Response Team; Jeff Bechtel, EPA On-Scene Coordinator; and Lincoln Fancher, NYSDEC. During the inspection, it was observed that the ground cover on the restored areas of the Site was in good condition with full grass coverage and the monitoring and injection wells were functional and in good condition. The fencing surrounding the Site 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 2012 ROD. The ROD called for decontamination and demolition of the on-Site building; excavation of PAH, arsenic, and PCE contaminated soils; excavation of PCE-contaminated sediments in adjacent wetlands; ISCO of contaminated groundwater in the source area; MNA for groundwater outside of the source area; and implementation of institutional controls.

Soil and sediment removal activities occurred in 2015, 2016, and 2018, and post-remediation sampling confirmed the excavation limits adequately addressed contamination consistent with NYSDEC Restricted Residential Soil Cleanup Objectives.

Implementation of the groundwater remedial action began in 2016 with the installation of injection wells to implement ISCO in the groundwater source area. The first ISCO event occurred in August-September 2016, followed by a second event in September 2017 and a third injection in September 2018. The success of each ISCO event was monitored at 48 monitoring wells before and after each injection. The overall groundwater response has been mixed, with unclear trends after the first two ISCO events and a general decreasing trend after the third ISCO event. The groundwater remedial action is ongoing, with a fourth ISCO event planned for the fall of 2019. The long-term groundwater monitoring plan will be updated and implemented for the Site following completion of the groundwater remedial action.

A Site Management Plan (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 institutional controls required by the ROD are in development. A fence currently surrounds the Site preventing access by the general public.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs 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 remedial action remains valid. The remedial action objectives 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.

Soils contaminated with benzo(a)pyrene and PCE were excavated from 2014 to 2016 to NYSDEC Residential Soil Cleanup Objectives, which have not changed during the FYR period. The cleanup levels selected in the ROD were 1.0 mg/kg for benzo(a)pyrene and 1.3 mg/kg for PCE. The soil remedy is not yet complete since institutional controls 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 2012 ROD selected in-situ chemical oxidation to reduce contaminant groundwater concentrations in the source zone, which is currently ongoing, and MNA for groundwater outside of the source area. 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 continue to exceed the cleanup level, to a maximum of 186,550 µg/L in the source zone at ERT-33S. The former water supply well for the Village of Herrings is located approximately 300 ft north of the Site, however the well was dismantled in 2016 when the Village connected to the Deferiet water system which all area residents are now connected to. Therefore, there is no direct exposure to groundwater contamination and the remedy remains protective despite exceedances of drinking water standards. Institutional controls are needed to restrict the installation of new wells to ensure long-term protectiveness.

Soil and groundwater uses are not expected to change during the next FYR period. 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. All detected contaminants in the sub-slab samples were below EPA's residential vapor intrusion screening levels (VISLs) set at a hazard quotient of 1 and a cancer risk of 10^{-6}. Several VOCs that are not considered to be Site-related were detected in indoor air samples at concentrations within the acceptable cancer risk range of 10^{-6} to 10^{-4}.

Shallow aquifer PCE concentrations during the FYR period were also compared to the residential groundwater VISL of 57.6 µg/L (set at a hazard quotient 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. All 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. PCE concentrations west of the source zone at monitoring well MW-22 (see Figure 4) were consistently above the 10^{-6} screening level (14.9 µg/L), but within the acceptable risk range; other monitoring wells in proximity to sidegradient residences located west of the source zone (with limited exceptions) have not been sampled since the 2006 remedial investigation. Based on the groundwater flow direction to the south and the previous subslab investigation,

it is unlikely that vapor intrusion is affecting these residences. A full sampling round of the monitoring wells located west of the source zone near a former town dump is recommended as part of the future MNA evaluation to ensure that the shallow groundwater contamination has not migrated and to reevaluate the potential for vapor intrusion in this area.

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

Table 2: Issues and Recommendations

Issues/Recommendations				
OU(s) without Issues/Recommendations Identified in the Five-Year Review:				
None				
Issues and Recommendations Identified in the Five-Year Review:				
OU(s):	**Issue Category:** Institutional Controls			
	Issue: Institutional controls are not in place			
	Recommendation: Institutional controls need to be implemented			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	8/29/2024

OTHER FINDINGS

There are no other findings.

VII. PROTECTIVENESS STATEMENT

Table 3, below, presents the operable unit and Sitewide protectiveness statements.

Table 3: Protectiveness Statements

Protectiveness Statement(s)		
Operable Unit:	*Protectiveness Determination:* Short-term Protective	*Planned Addendum Completion Date:* Click here to enter a date
Protectiveness Statement: 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.		
Sitewide Protectiveness Statement		
Protectiveness Determination: Short-term Protective		*Planned Addendum Completion Date:* Click here to enter a date
Protectiveness Statement: 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.		

VIII. NEXT REVIEW

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

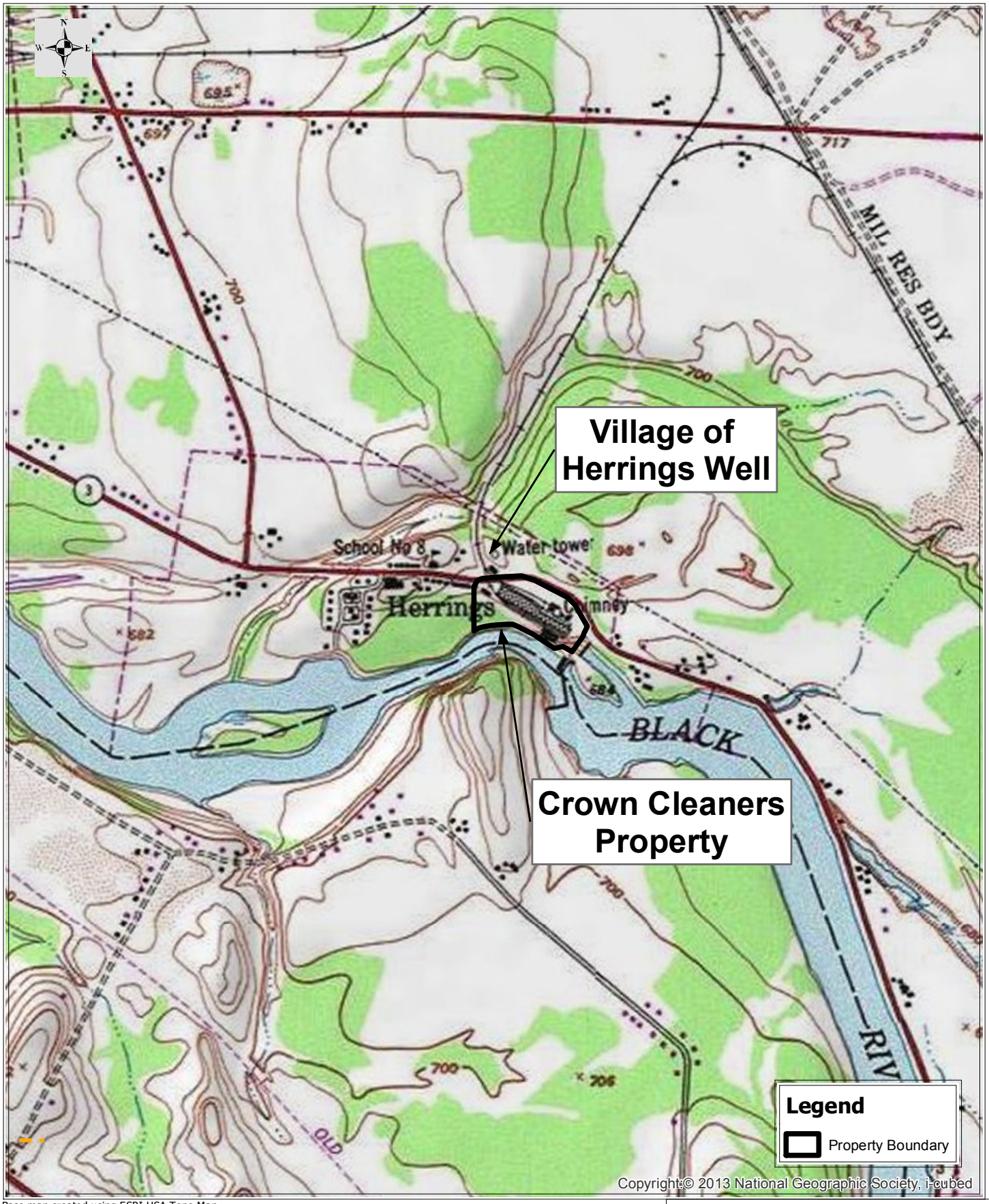
APPENDIX A – REFERENCE LIST

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
Final Design Reports for Soil – EPA	September 2013
Final Design Reports for Groundwater – EPA	September 2015
Final Design Reports for Building demolition – EPA	September 2012
Final Design Reports for Groundwater – Monitored Natural Attenuation – EPA	September 2012
Remedial Action Report – Soil and Building Demolition - EPA	September 2016
Chemical Oxidation Summary Report – Project #802137 - ISOTEC	November 2018
Optimization Evaluation Report – Office of Land and Emergency Management – ICF Inc.	March 2019
Final 2016, 2017-2018- 2019 Combined VOC Results Excel Doc.– EPA	April 2019

APPENDIX B

Chronology of Site Events	
Event	**Date(s)**
Discovery of contaminated groundwater	1991
NYSDEC action to install treatment system on the Village's public water supply	1991
EPA removal action to secure property and dispose of dry-cleaning waste	2000
Site added to the National Priorities List	2002
Remedial Investigation/ Feasibility Study	2004-2011
Record of Decision	2012
Remedial Design	2012-2015
Building Demolition	2014-2016
Soil Excavation	2014-2016
Installation of Injection Wells and first chemical oxidation injection	2016
Second chemical oxidation injection	2017
Optimization Evaluation Report	2017-2018
Third chemical oxidation injection	2018

FIGURES



Base map created using ESRI USA Topo Map.

Map Creation Date: 22 May 2018

Coordinate system: New York State Plane Central
FIPS : 3102
Datum: NAD83
Units: Feet

MXD file: g:\arcinfoprojects\SERAS01\SER00128_Crown_Cleaners\TM Report 2018\128_TM2018_Site_Location_Map_f1.mxd

0 1,200 2,400 Feet

U.S. EPA Environmental Response Team
Scientific Engineering Response and Analytical Services
EP-W-09-031
W.A.# SERAS-128

Figure 1
Site Location Map
Crown Cleaners Superfund Site
Watertown, New York

AREA	CUYDS
RA1	7,500
RA2	1,400
RA3	1,000
TOTAL	9,900

DEPTH OF EXCAVATION: 2 FEET

DEPTH OF EXCAVATION: 2 FEET

SVOC EXCAVATION AREA

PASS

UNDER REVIEW

FAIL

NO DIG AREA

NY STATE ROUTE 3

RA1

RA2

RA3

Existing Block Building

Existing Block & Stone Building

Existing Stone Building

Rubble Pile

Water Tower

Shed

Trailer

Stone Drive

Stone Driveway

Wooden Steps

BLACK RIVER

BLACK RIVER

0 40 80

FEET

N

DRAFT

U.S. EPA Environmental Response Team Center
Scientific Engineering Response And Analytical Services
EP-W-09-031
W.A.# 128

DRAFT FIGURE 2
PAH RESULTS AND EXCAVATION AREA
CROWN CLEANERS SITE
HERRINGS, NY
AUGUST 2013

DEPTH OF EXCAVATION: 4 FEET

AREA	CUYDS
RB1	3,400
RB2	150
TOTAL	3,550

VOC EXCAVATION AREA
PASS
UNDER REVIEW
FAIL
NO DIG AREA

RB1
RB2
SB01 SB02 SB03 SB04 SB05 SB06 SB07 SB08 SB13
A5-01 A5-02 A5-03 A5-04 A5-05 A5-06 A5-07 A5-08 A5-09 A5-10 A5-11 A5-12 A5-13 A5-14 A5-15 A5-16 A5-17 A5-18 A5-19 A5-20 A5-21 A5-22 A5-23 A5-24 A5-25 A5-26 A5-27 A5-28
A6-01 A6-02
A4-01 A4-02 A4-03 A4-04
A3-02 A3-03 A3-04
Trailer
Existing Building
Shed
Stone Drive
Existing Block Building
Existing Block & Stone Building
Existing Stone Building
Rubble Pile
Water Tower
Loading Dock
Loading Dock
NY STATE ROUTE 3
Stone Drive
Stone Driveway
Wooden Steps
BLACK RIVER
BLACK RIVER

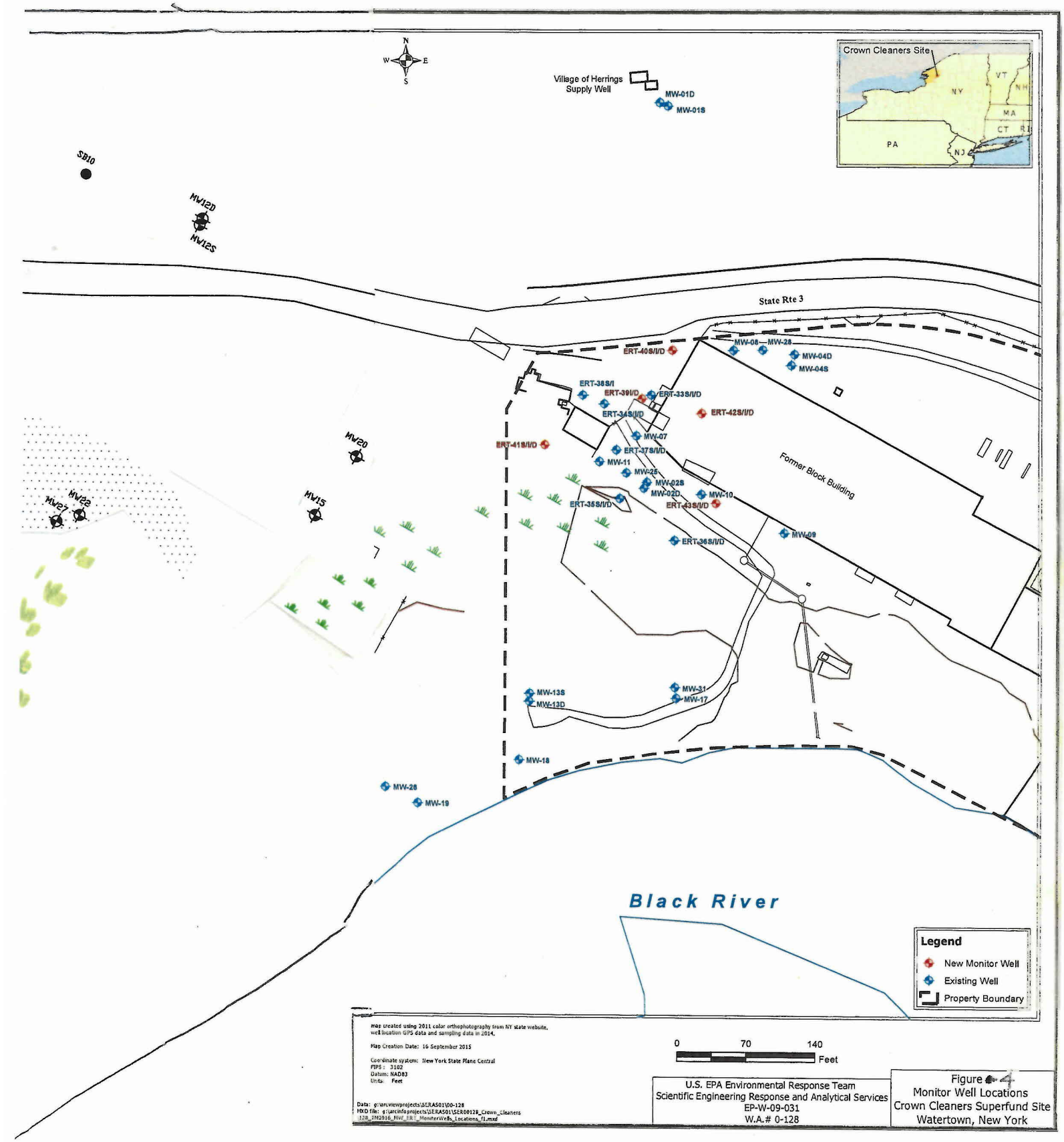
0 40 80
FEET

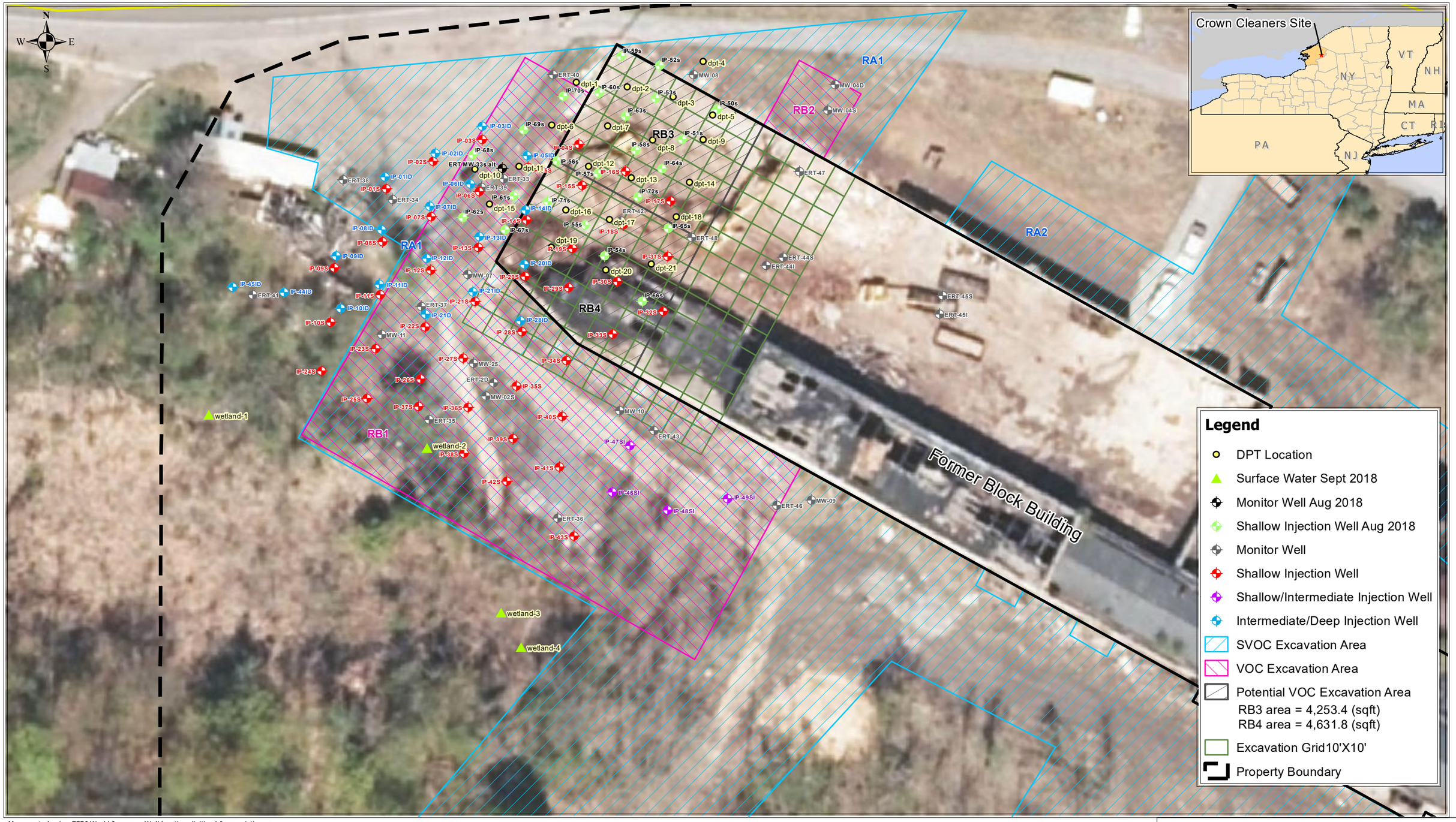
N

DRAFT

U.S. EPA Environmental Response Team Center
Scientific Engineering Response And Analytical Services
EP-W-09-031
W.A.# 128

DRAFT FIGURE 3
VOC RESULTS AND EXCAVATION AREA
CROWN CLEANERS SITE
HERRINGS, NY
AUGUST 2013


N
W
E
S
Village of Herrings
Supply Well
MW-01D
MW-01S
Crown Cleaners Site
VT
NH
NY
MA
CT
RI
PA
NJ
SB10
MW12D
MW12S
State Rte 3
ERT-40S/I/D
MW-08
MW-28
MW-04D
MW-04S
ERT-38S/I
ERT-39I/D
ERT-33S/I/D
ERT-34S/I/D
ERT-42S/I/D
MW-07
ERT-41S/I/D
ERT-37S/I/D
MW-11
MW-25
MW-02S
MW-02D
MW-10
ERT-43S/I/D
ERT-35S/I/D
ERT-36S/I/D
MW-09
Former Block Building
MW20
MW15
MW21
MW22
MW-13S
MW-13D
MW-31
MW-17
MW-18
MW-26
MW-19
Black River
Legend
New Monitor Well
Existing Well
Property Boundary
map created using 2011 color orthophotography from NY state website.
well location GPS data and sampling data in 2014.
Map Creation Date: 16 September 2015
Coordinate system: New York State Plane Central
FIPS : 3102
Datum: NAD83
Units: Feet
Data: g:\arc\myprojects\SERAS01\00-128
MXD file: g:\arcinfo\projects\SERAS01\SER00128_Crown_Cleaners
128_2M2016_NW_ERT_MonitorWells_Locations_f1.mxd
0
70
140
Feet
U.S. EPA Environmental Response Team
Scientific Engineering Response and Analytical Services
EP-W-09-031
W.A.# 0-128
Figure 4
Monitor Well Locations
Crown Cleaners Superfund Site
Watertown, New York



Map created using ESRI World Imagery, Well location digitized from existing map.

Map Creation Date: 05 October 2018

Coordinate system: New York State Plane Central
FIPS : 3102
Datum: NAD83
Units: Feet

0 40 80 Feet

U.S. EPA Environmental Response Team
Scientific Engineering Response and Analytical Services
EP-W-09-031
W.A.# SERAS-128

MXD file: g:\arcinfoprojects\SERAS01\SER00128_Crown_Cleaners\TM Report 2018\128_TM2018a_Injection_Well _Location_Map_addAugdata_addDPT_10X10Grid_f2.mxd

Figure 5
Injection Well Location Map
Sampling Grid 10'X10'
Crown Cleaners Superfund Site
Watertown, New York

Figure 6:

Figure 7:

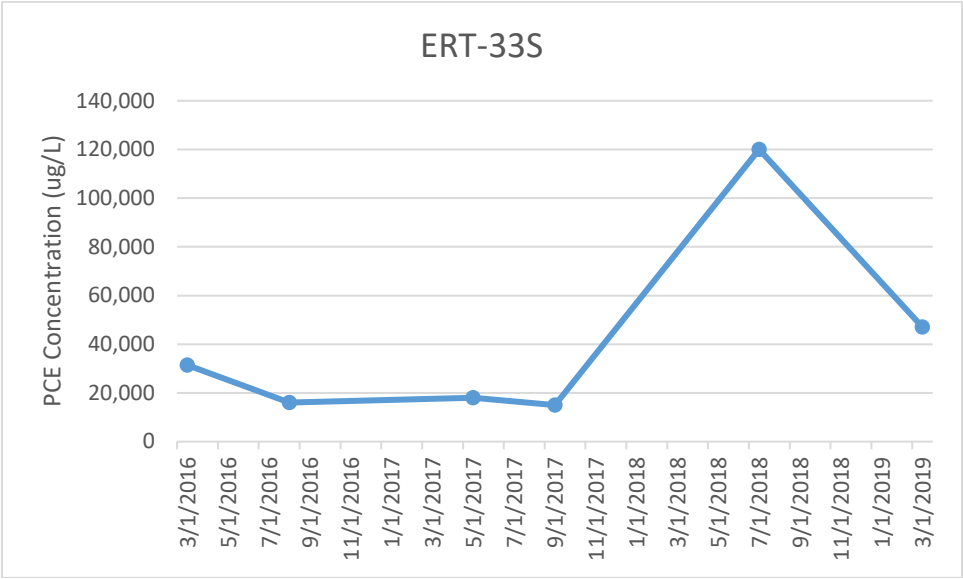


Figure 8:

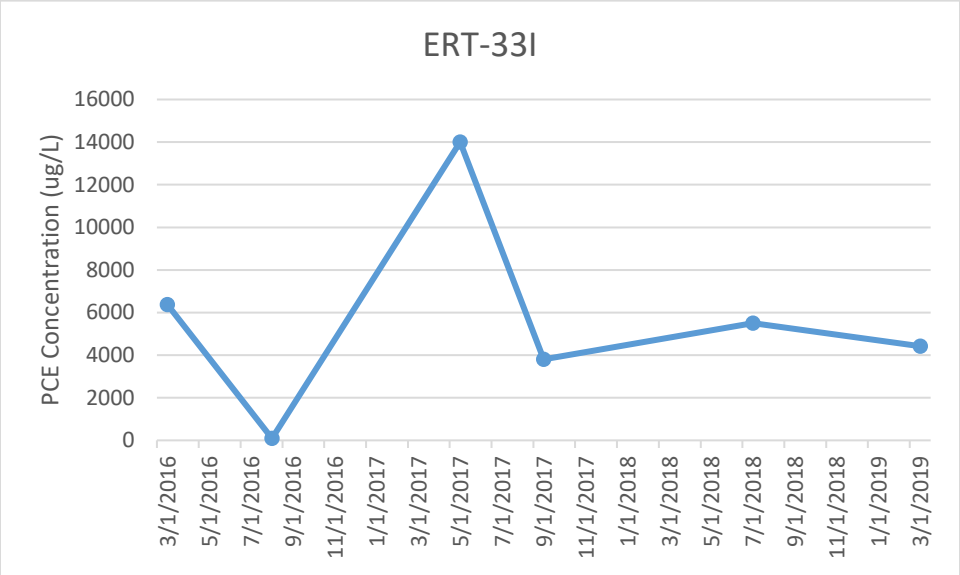


Figure 9:

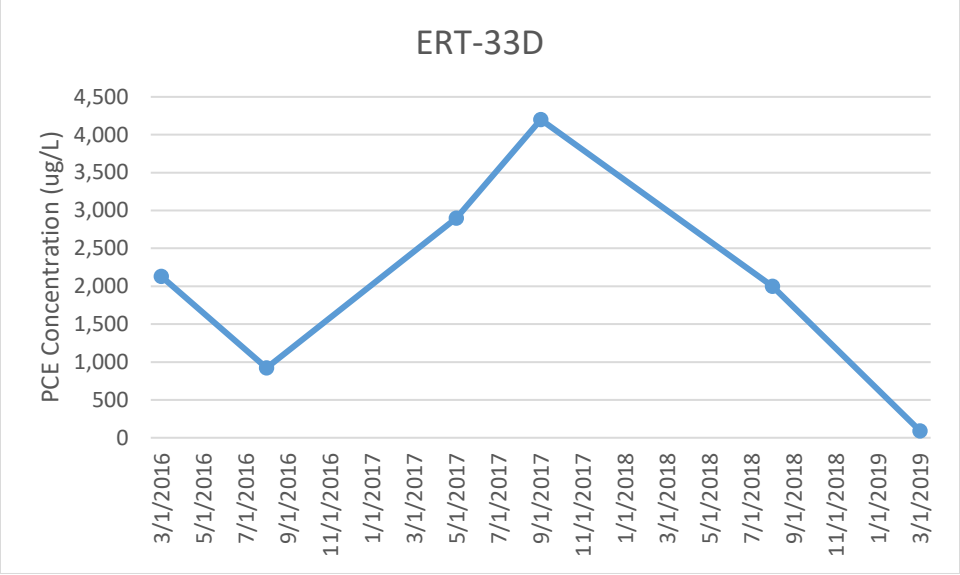


Figure 10:

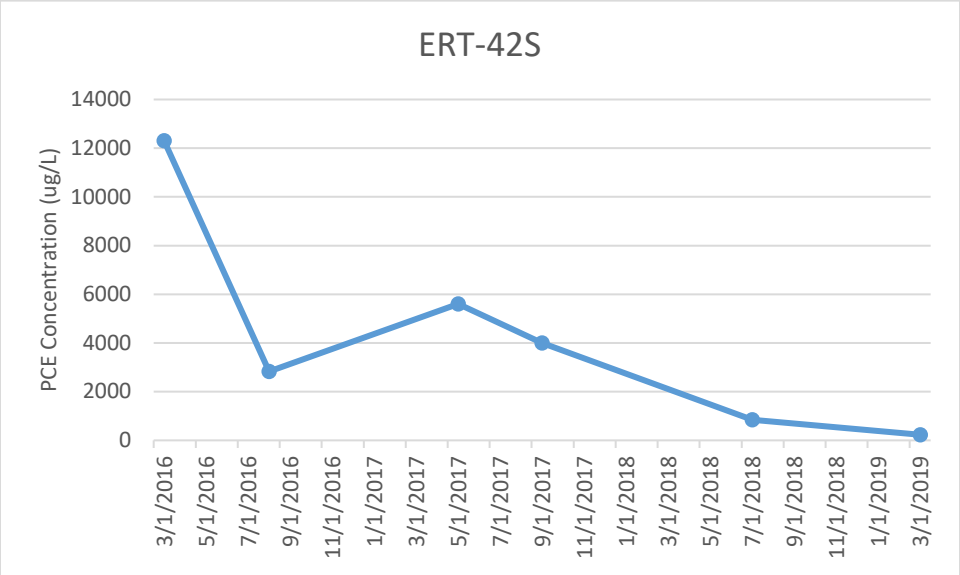


Figure 11:

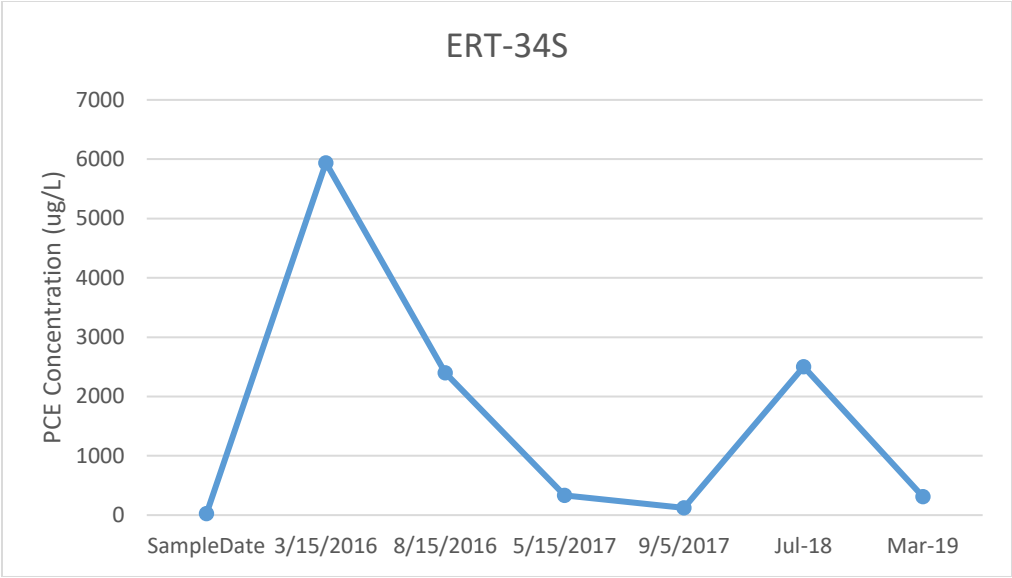


Figure 12:

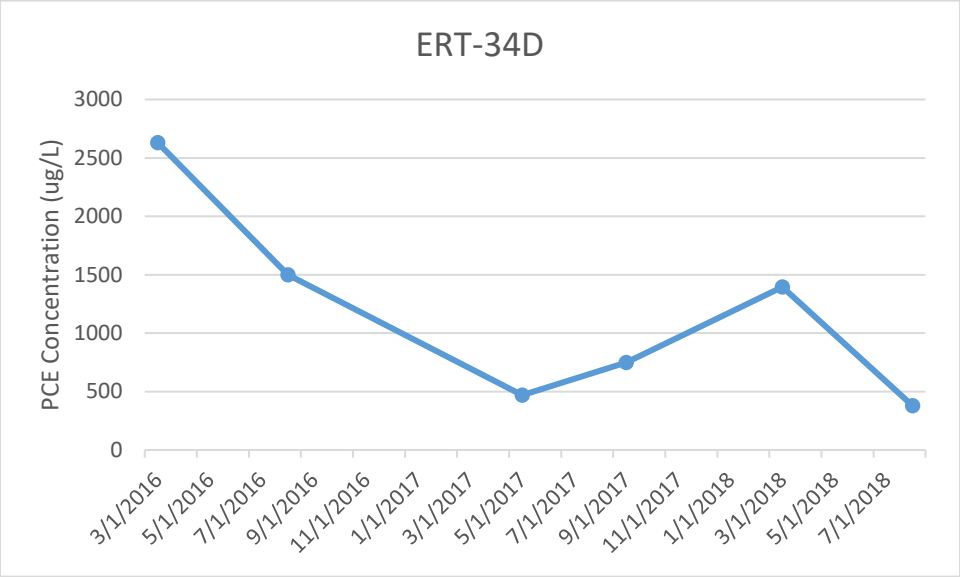


Figure 13:

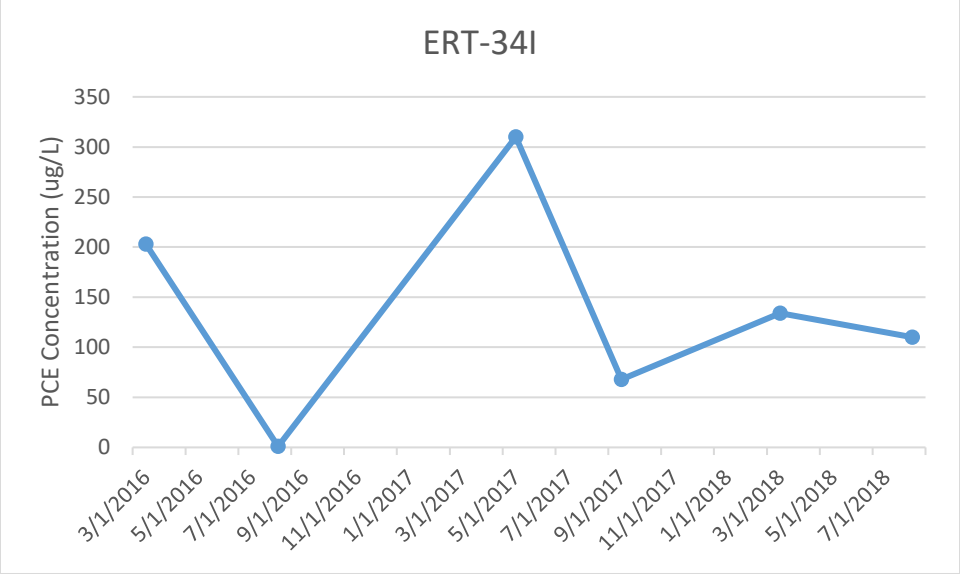


Figure 14:

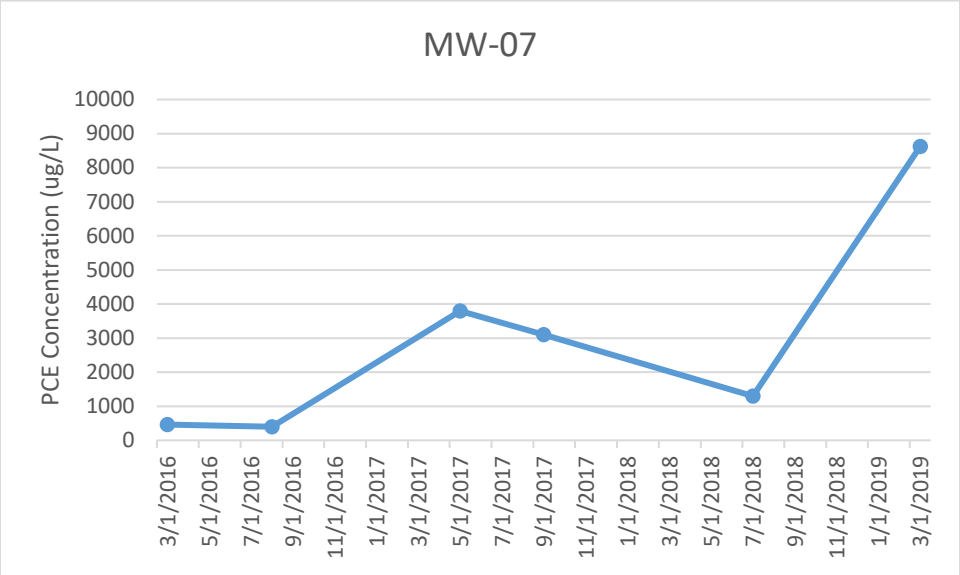


Figure 15: