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TRANE TECHNOLOGIES

JUNE 2019 – JUNE 2020 ANNUAL SITE MANAGEMENT-PERIODIC REVIEW REPORT

D.C. Rollforms Site

Jamestown, New York

NYSDEC Site No. 907019

July 14, 2020 (Revised September 2020)

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CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

AC	air compressor
acfm	actual cubic feet per minute
AGC	annual guideline concentration
Arcadis	Arcadis of New York, Inc.
AS	air stripper
B	blower
BPU	Board of Public Utilities
CAMP	Community Air Monitoring Plan
CF	cartridge filters
cis-1,2-DCE	cis-1,2-dichloroethene
cm/s	centimeters per second
DCE	Total dichloroethene (cis and trans)
DNAPL	dense non-aqueous phase liquid
DRO	Diesel Range Organics
DUSR	Data Usability Summary Report
EDD	EQuIS Electronic Data Deliverable
ERD	Enhanced Reductive Dechlorination
ESA	Environmental Site Assessment
GP	Geoprobe® sample location
g/L	grams per liter
gpm	gallons per minute
GRO	Gasoline Range Organics
HASP	Health and Safety Plan
IRM	interim remedial measure
ISCO	In-Situ Chemical Oxidation
kg	kilograms
LNAPL	light non-aqueous phase liquid
mg/kg	milligrams per kilogram
mg/L	milligrams per liter

MW	monitoring well
NAPL	non-aqueous phase liquid
ND	non-detect
ng/L	nanogram per liter
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	Operation and Maintenance
OM&M	Operation, Maintenance, and Monitoring
OW	observation well
OWS	oil/water separator
%	percent
PAH	polycyclic aromatic hydrocarbon
PCBs	polychlorinated biphenyls
PCE	tetrachloroethene
PFAS	per- and polyfluoroalkyl substances
PFC	Perfluorinated Compounds
PFOA	Perfluorooctanoic Acid
PID	photo-ionization detector
PRR	Periodic Review Report
RI	Remedial Investigation
SGC	short-term guideline concentration
SMP	Site Management Plan
SP	sample port
SVE	soil vapor extraction
SVOC	semi-volatile organic compound
TAGM	Technical Administrative Guidance Memorandum
TCE	trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TP	transfer pump
TPH	total petroleum hydrocarbons
µg/L	micrograms per liter

µg/m^3	micrograms per cubic meter
USEPA	United States Environmental Protection Agency
VC	vinyl chloride
VEP	Vacuum Enhanced Pumping
VOC	volatile organic compound
VPGAC	vapor phase granular activated carbon

1 EXECUTIVE SUMMARY

Arcadis of New York, Inc. (Arcadis), on behalf of Trane Technologies Company LLC (formerly Ingersoll Rand Company), has prepared this Annual Site Management Periodic Review Report (PRR) for the former D.C. Rollforms (New York State Department of Environmental Conservation [NYSDEC] Site Code 907019) Site (referred to hereafter as the Site) located in Jamestown, Chautauqua County, New York (Figure 1). This PRR summarizes the operational and performance monitoring data generated during the period from June 2019 through June 2020 (the reporting period) for the remedial program at the Site. The purpose of this report is to satisfy the requirements set forth in the Annual Site Management PRR, as requested by NYSDEC in a letter dated May 15, 2020.

A groundwater and soil vapor extraction (SVE) treatment system (referred to herein as “the system”) was installed at the Site in 2007. The system has been operational since 2008 (12 years) and consists of a vacuum enhanced pumping (VEP) system that recovers and treats site constituents of concern, which mainly consist of chlorinated volatile organic compounds (VOCs), trichloroethene (TCE), dichloroethene (DCE), and vinyl chloride (VC).

Overall, the current remedial program has been effective in achieving the remedial goals at the Site by containing and eliminating off-site migration of contaminated soils and groundwater and reducing the VOC concentrations in soil and groundwater. During the reporting period, the system recovered 1,694,970 gallons of impacted groundwater. Total VOC mass removal included 13.8 kilograms (kg) in the dissolved phase, 0.7 kg in the vapor phase, and 6.4 gallons of dense non-aqueous phase liquid (DNAPL).

Based on the trends in site VOC concentrations in groundwater and soil vapor, the remedial program, including the groundwater and soil vapor recovery system which has been in operation for 12 years, and the in-situ chemical oxidation (ISCO) remedial enhancement implemented between 2016 and 2018, have been successful at reducing the overall VOC mass in the subsurface at the Site.

All the elements defined in the Groundwater Collection and Treatment System Operation, Maintenance, and Monitoring Plan (OM&M Plan; Arcadis 2008a) and Site Management Plan (SMP; Arcadis 2008b) were in compliance during the reporting period. The remedial system was operated continuously during the reporting period, except for noted routine and/or non-routine maintenance activities. No substantial changes were made regarding site management and remedial system operation during the reporting period.

The PRR is organized as follows:

- Section 2 provides a brief overview of the site location and physical description, site geology/hydrogeology, extent of contamination, and a summary of remedial actions.
- Section 3 summarizes the system operation and maintenance (O&M) and site inspections.
- Section 4 discusses the system performance.
- Section 5 provides an evaluation of the system performance.
- Section 6 summarizes the system groundwater monitoring.

- Section 7 provides conclusions and summarizes the system performance and groundwater monitoring results.
- Section 8 discusses the future goals for the Site.
- Section 9 discusses the institutional and engineering controls.
- Section 10 provides a list of references.

2 SITE OVERVIEW

2.1 Site Location and Description

The Site is located at 583 Allen Street in Jamestown, Chautauqua County, New York (Figure 1). The Site is approximately 2.38 acres in size and is a vacant parcel. The vacant parcel is owned by All Metal Press and Fabrication, Inc., which acquired the property from the Jamestown Allen Co. in 2016, and is bounded by Allen Street on the east, the Weber-Knapp Company (active manufacturing plant in the State Brownfield Cleanup Program, Site No. C907048) and Jamestown Urban Renewal Agency properties on the south, and the Chadakoin River on the west and northwest. The adjacent northern parcel is owned by AllMetal Press and Fabrication, Inc. This parcel contains a two-story building and a parking lot (Figure 2). The Site is located in a mixed residential and commercial area, which is served by a public water supply and sanitary sewer.

2.2 Summary of Site Geology and Hydrogeology

The subsurface geologic conditions at the Site consist mainly of two overburden units: a surficial layer of fill material and an underlying dense till. Along the western side of the Site and adjacent to the Chadakoin River, an approximately 2- to 4-foot-thick layer of native deposits consisting of sand, silt, and gravel occurs between the fill and till layers. The fill layer consists of sand, gravel, cinders, bricks, concrete, and slag and varies in thickness from 7 to 15 feet. The thickness of till varies from less than 1 foot to over 15 feet. The till is underlain by shale bedrock. The on-site surface water and groundwater flow in a west-northwesterly direction toward the Chadakoin River.

The horizontal hydraulic conductivity of the surficial fill material, based on slug tests in monitoring wells, is in the range of 10^{-3} to 10^{-4} centimeters per second (cm/s). The underlying till is generally dense silt and clay-rich soil with a horizontal hydraulic conductivity, based on slug tests, on the order of 10^{-6} cm/s.

2.3 Nature and Extent of Contamination

The following sections describe the historical nature and extent of the contamination on site identified during the initial and previous remedial investigations (RIs). Previous investigations at the Site include Phase I and Phase II Environmental Site Assessments (ESAs) and a supplemental environmental investigation. Empire Soils Investigations performed these investigations for Dowcraft Corporation in 1990 and 1991 (Empire Soils Investigations 1990a, 1990b, 1991). The Phase II ESA consisted of a subsurface soil and groundwater investigation. Eight test pits were excavated, and subsurface soil samples were collected from several of these test pits for analysis. Seven monitoring wells were installed, and

groundwater samples were analyzed. To determine the nature and extent of contamination, a RI was conducted. The RI was completed by Arcadis G&M in two phases; the first phase was completed in April 1998 and the second in February 1999. The RI results are summarized in the following sections.

2.3.1 Surface Soil

During the initial RI, surface soil samples were collected at 15 locations throughout the Site. VOCs were not detected in any of the surface soil samples. Analysis of semi-volatile organic compounds (SVOCs) indicated total SVOC concentrations ranging from 2.8 milligrams per kilogram (mg/kg) to 89 mg/kg. The surface soils from select areas on site were removed during the remedial construction in 2007. All other remaining site surface areas were covered with 1 foot of clean fill.

2.3.2 Subsurface Soil

During the initial 1991 investigation, eight test pits were excavated, and subsurface soil samples were collected from six locations where visual contamination was present. Analytical results indicated contamination of metals above the regulatory guidance levels (Technical Administrative Guidance Memorandum 4046 [TAGM]; NYSDEC 1994), at that time, for arsenic, cadmium, chromium, copper, mercury, nickel, and zinc. No VOCs were detected in unsaturated subsurface soil samples. Oil and grease varied from 0.21% to 7.1% while cyanide ranged from non-detect (ND) to 15.4 mg/kg.

During the first phase of the RI, a subsurface soil sample collected from location GP-13 in the delisted northern parcel indicated metals contamination, primarily due to lead (86,900 mg/kg). In February 2000, 19 additional test pits were excavated to determine the extent of lead contamination in the northern parcel. Samples collected from the test pits indicate that total lead levels ranged from 20 to 33,100 mg/kg. The results of Technical Administrative Guidance Memorandum (TCLP) lead analysis determined that soils were not a hazardous waste as the TCLP levels for lead were below the regulatory limit of 5 milligrams per liter (mg/L).

Eighteen test pits were excavated in 2000. Total VOCs ranged from 0.024 to 66 mg/kg compared to the regulatory cleanup guidance value at the time (TAGM) of 10 mg/kg. Total VOCs in excess of 10 mg/kg were identified in TP-11, TP-12, and TP-15. SVOCs concentrations ranged from ND to 79 mg/kg.

2.3.3 Groundwater

Fifteen groundwater monitoring wells and 27 temporary Geoprobe® sample locations were installed and sampled during the RI between 1997 and 2000. VOCs including TCE, DCE, and VC were reported in several groundwater samples. The highest level of chlorinated solvents was reported in monitoring wells MW-8 S/D and GP-5 located in the former TCE, paint, and thinner storage area. At GP-5, concentrations of TCE and DCE were 830 mg/L and 34 mg/L, respectively. At MW-8S/D, levels of TCE, DCE, and VC varied from 0.096 to 920 mg/L, 7.1 to 18 mg/L, and ND to 1.6 mg/L, respectively. Tetrachloroethene (PCE) was also found in MW-8D at a concentration of 1.1 mg/L. In October 1999, five additional temporary Geoprobe® sample locations were installed and were sampled during the investigation to determine the extent of total VOCs. Samples collected from these Geoprobe® samples indicated elevated levels of VOCs. The highest levels were found in GP-30 with VC, DCE, and TCE concentrations of 17 mg/L, 40 mg/L, and ND, respectively.

Total SVOCs, consisting primarily of polycyclic aromatic hydrocarbons (PAHs), were present in most of the groundwater samples. Due to high detection limits, the comparison of individual SVOC contaminant levels to groundwater standards is not, however, feasible. The highest concentrations of PAHs were in GP-5 (61 mg/L) and GP-6 (249 mg/L). The concentrations of SVOCs in the remaining wells varied from ND to 3.6 mg/L.

Non-aqueous phase liquid (NAPL) consisting primarily of total petroleum hydrocarbons (TPH) was observed in ESI-3, ESI-4, and MW-8S. The highest concentrations of TPH were recorded in GP-6 (2,406 mg/L), ESI-3 (421 mg/L), and GP-5 (333 mg/L).

2.3.4 Soil Vapor

Off-site soil vapor intrusion was raised as a concern by the New York State Department of Health (NYSDOH) in a letter dated May 5, 2014, citing the possibility of a preferential pathway for vapor movement via the on-site treatment systems' discharge pipeline bedding material. A soil vapor investigation was completed in accordance with the *Soil Vapor Investigation Work Plan* (Arcadis 2014a) and the *Response to Comments of the Soil Vapor Investigation Work Plan* (Arcadis 2014b), which were approved by the NYSDEC in an email received August 11, 2015.

Of the three site-related chemicals (e.g., cis-1,2-dichloroethene [cis-1,2-DCE), TCE, and VC), only TCE was detected in soil vapor. Cis-1,2-DCE and VC were not detected in any soil vapor sample. Although TCE was detected in soil vapor samples, all concentrations were below the soil vapor screening values calculated using the NYSDOH Air Guideline Value for TCE.

2.4 Summary of Remedial Actions

2.4.1 Summary of Interim Remedial Measures

The interim remedial measures (IRMs) conducted onsite are listed and briefly summarized below. Further details for each IRM can be found in the referenced historical documents.

- Manual free product recovery activities were initiated in September 1998 to collect light non-aqueous phase liquid (LNAPL) and DNAPL in wells ESI-3 and ESI-4. In addition, manual bailing of periodic trace DNAPL detected in well MW-8D was initiated in February 1999 (Arcadis G&M 1999).
- Lead-impacted soil removal in the area of GP-13 (located on the delisted parcel north of the building) was completed in October 1999. Approximately 18 tons of soil were removed. Following an additional investigation in January 2000, to further delineate the lead impacts, approximately 929 tons of lead-impacted soils were removed and disposed of off site in May 2000.
- Polychlorinated biphenyls- (PCBs-) impacted soils were identified/delineated near surface sample locations SS-1 and SS-1A (located near monitoring wells ESI-1, ESI-2, and ESI-7), and subsequently excavated and disposed of off site in August 2000.
- An enhanced reductive dechlorination (ERD) pilot test was selected and implemented in 1998 in the area of monitoring wells MW-7 and MW-8S to address the total VOC impacts in groundwater. Following the initial pilot test period, the reagent injections were continued through 2004. The

injection program was discontinued following the October 2004 injection event in anticipation of the design and implementation of the remedy (Arcadis G&M 2005).

2.4.2 Summary of Full-Scale Remedy

The approved remedy for the Site was documented in the NYSDEC-approved 100% Remedial Design Work Plan (Arcadis 2006). The final remedy for this Site was documented in the Engineering Construction Completion Report (Arcadis 2008), which documented the remedial construction activities that were initiated in September 2006 and completed in June 2008. The SMP was finalized and approved by NYSDEC in 2009. The final remedy implemented for the D.C. Rollforms Site includes the following elements:

- Installation of a steel interlocking sheet-pile wall (i.e., vertical barrier wall) at the top of the riverbank between the Chadakoin River and the Site;
- VEP technology utilizing submersible pneumatic pumps and a regenerative blower to remediate NAPL and VOCs in groundwater and soil;
- A groundwater and soil vapor treatment system comprised an oil/water separator (OWS), solids filtration units, carbon filtration, and air stripping technologies;
- Excavation of the soil between the vertical barrier wall and the Chadakoin River;
- Removal of abandoned site storm water outfalls;
- Riverbank reconstruction/stabilization and restoration including live plantings;
- Covering and reseeding disturbed areas with 12 inches of clean soil;
- The removal of sediment from the Chadakoin River; and
- Fish habitat construction (e.g., wingwall structure) in the Chadakoin River.

The remedial system layout is shown on the site plan on Figure 2. The groundwater collection system is designed to extract groundwater impacted by NAPL and VOCs consisting primarily of TCE, DCE, and VC. The extracted groundwater is treated via an OWS, filtration, and air stripping prior to discharge to the publicly owned treatment works sanitary sewer under an Industrial Wastewater Discharge Permit with the Jamestown Board of Public Utilities (BPU).

2.4.3 Engineering Controls

As part of the remedy, engineering controls implemented and maintained at the D.C. Rollforms Site include:

- Installation of a steel interlocking sheet-pile wall (i.e., vertical barrier wall) at the top of the riverbank between the Chadakoin River and the Site;
- VEP technology utilizing submersible pneumatic pumps and a regenerative blower to remediate NAPL and VOCs in groundwater and soil; and

- A groundwater and soil vapor treatment system comprised an OWS, solids filtration units, carbon filtration, and air stripping technologies.

2.4.4 Institutional Controls

Institutional controls have been implemented as part of the Remedial Action. The Declaration of Covenants and Restrictions dated June 2005 addresses prohibitions on the property. The prohibitions set forth in the declaration are summarized as follows:

- The property is prohibited from ever being used for purposes other than commercial or industrial;
- The use of groundwater underlying the property is prohibited without rendering it safe for drinking water or industrial/commercial purposes; and
- The owner of the property shall continue to not interfere with any institutional and engineering controls the NYSDEC required Trane Technologies Company LLC (formerly Ingersoll-Rand Company) to put into place and maintain.

The covenants and restrictions run with the land and are binding upon all future owners of the property.

2.4.5 Remedial Enhancements

An in-situ chemical oxidation (ISCO) pilot study, utilizing alkaline activated sodium persulfate as the oxidant, was conducted on-site in the area of monitoring wells MW-8, MW-12, MW-13, and MW-14 from October 2016 through April 2017. The objective of the ISCO pilot test implementation was to destroy VOC mass in groundwater while gathering information that can be used to improve its effectiveness of a full-scale application. As a result of the successful ISCO pilot study, a second, and expanded, ISCO injection event was implemented at the Site in July 2018. This ISCO injection event targeted the original pilot study area and areas upgradient of monitoring wells OW-5 and OW-6. Reduction in total VOCs, as of May 2020, continue to range from 92% to 99% in five of the six targeted wells. Total VOC concentrations at monitoring well MW-14 initially reduced 99%, however, have since rebounded greater than 100% after one-year of post-injection monitoring.

3 SITE OPERATION AND MAINTENANCE SUMMARY

The system is operated as documented in the OM&M Plan (Arcadis 2008a). The following sections summarize the remedial system O&M program. The remedial system was operated during the June 2019 through June 2020 reporting period with brief periods of shutdown due to scheduled O&M and/or alarm conditions, as well as repairs and non-routine maintenance activities.

Monthly O&M site visits consisted of system inspection, recording of operating parameters, influent and effluent system sampling, and investigation/troubleshooting of any alarm conditions. System alarm verification was performed remotely via desktop software. The O&M data generated during each monthly visit are documented in field notes. O&M related to each of the major system components (collection system, liquid and vapor treatment) is discussed below.

3.1 Collection and Treatment System O&M

The following O&M tasks were performed monthly on the remedial system (pneumatic pumps, air compressor, regenerative blower, transfer pump, and related equipment).

3.1.1 Liquid Phase Treatment

The following OM&M tasks were performed monthly and/or quarterly with regard to the liquid phase extraction and treatment portion of the system:

- Inspect all pipes and fittings for potential leaks.
- Check air compressor (AC-600) oil level and pressure to assure proper operation.
- Inspect pneumatic recovery pumps for proper operation and repair/cleaning, as needed.
- Inspect and clean air stripper (AS-700), as needed.
- Inspect flow meter (FQI-700) to assure proper operation.
- Monitor and record the system field gauge readings to determine if the system is operating within the designed operational ranges.
- Check and record pressure readings at inlet and outlet of cartridge filters (CF-400 and 401) to assure proper operation.
- Change-out cartridge filters (CF-400 and 401), as needed.
- Record total volume of groundwater recovered and average recovery flow rates.
- Maintain sequestering agent dosing rate and change-out drum as needed.
- Collect system influent liquid phase samples and submit for laboratory analysis of site-specific VOCs. These results are summarized in Section 4.3.
- Collect system effluent liquid phase samples and submit for laboratory analysis as per the Industrial Wastewater Discharge Permit, as set forth by the Jamestown BPU. These results are summarized in Section 4.4.

3.1.2 Vapor Phase Treatment

The following OM&M tasks were performed monthly and/or quarterly with regard to the vapor extraction and treatment portion of the system:

- Inspect all pipes and fittings for potential leaks.
- Record the blower outlet temperature (TI-901 and TI-902).
- Record the extracted air flow rate (FIT-501).
- Check and record pressure readings at inlet and outlet of the heat exchanger and vapor phase activated carbon vessels (ASC-501 and ASC-502) to assure proper operation.
- Monitor the regenerative blower (B-900) for proper operation pressures and temperatures.

- Collect and submit influent vapor samples for laboratory analysis of site-specific VOCs. These results are summarized in Section 4.5.
- Collect and submit effluent vapor samples for laboratory analysis to monitor the system VOC emissions. These results are summarized in Section 4.6.

3.1.3 Recovery Well Inspections

The following O&M tasks were performed quarterly or as needed with regard to the system recovery wells:

- Record applied vacuum readings at individual VEP wells.
- Observe pump operation at each recovery well.
- Conduct recovery well integrity surveys to observe the surface conditions around each well, the condition of the concrete surface seal, and presence of a secure bolt-down road box.

3.1.4 Recordkeeping and Reporting

Monitoring data were recorded on OM&M checklists. Influent and effluent liquid and vapor samples were submitted quarterly for laboratory analysis. The analytical results are used to evaluate system performance and to estimate the contaminant mass removal.

3.2 Non-Routine O&M

During the June 2019 through June 2020 reporting period, the following system non-routine O&M activities were performed:

- Several non-fatal low flow alarms were received for the sequestering agent dosing pump. Each of these alarms was cleared by re-priming the dosing pump and/or by changing out the sequestering agent drum.
- Several power fault alarms were received during the reporting period. These alarms were determined to be the result of a local storm events or due to Jamestown BPU electrical grid maintenance. The system was restarted remotely.
- During the August and October 2019 monthly system inspections, the pump in recovery well VEP-12 was found not to be operational. The pump was pulled and cleaned and brought back online during the monthly inspections.
- The air stripper circuit breaker was found tripped on November 22, 2019. The motor amperage and voltages were inspected by Ahlstrom Schaeffer Electric and confirmed to operating within normal range. Two fuses were also found blown and were replaced.
- A high-level liquid alarm in storage tank ST-301 was received on March 13, 2020. The alarm was due to transfer pump TP-300 batch time alarm. The alarms were cleared remotely, and the system was restarted March 16, 2020.

- A high-level liquid alarm in storage tank ST-301 was received on April 17, 2020. The alarm was due to transfer pump TP-300 batch time alarm. The alarms were cleared remotely, and the system was restarted April 24, 2020.
- The system was temporarily taken offline May 19 and 20, 2020 in order to perform the following non-routine maintenance activities:
    - Repair/rebuild the VEP-8 manifold connection inside the treatment building.
    - Replace several broken bolts on transfer pump TP-700's pump-end.
    - Repair leak on transfer pump TP-900.
- On June 15, 2020, an SVE KOT high alarm was received. The alarm was cleared remotely and the SVE system was subsequently restarted.

No system process modifications were made during the reporting period. It should be noted that groundwater recovery at recovery wells VEP-1 through VEP-6 remained offline during the reporting period while the ISCO remedy is being evaluated.

3.3 Riverbank and Cover System Inspections

As outlined in the SMP, the following remedial design elements were constructed at the Site:

- Twelve inches of clean soil cover/grass seed in areas disturbed during construction
- Riverbank reconstruction including stabilization/erosion controls
- Wingwall structure
- Riverbank plantings.

Each of these areas is inspected quarterly to certify that the engineering controls are in place and functioning as designed.

The cover system, riverbank, and wingwall structure were inspected for erosion, sloughing, settlement, or other indication of loss of integrity. The riverbank plantings were observed for any signs of distress or lack of growth.

During the June 2019 through June 2020 reporting period, the site cover material and riverbank were inspected on a quarterly basis and recorded on inspection checklists, which are provided as Appendix A.

3.3.1 Site Cover

No erosion of the site cover was observed during the reporting period. The vegetation growth across the Site was observed to be in good condition.

3.3.2 Riverbank Inspections

The riverbank plantings were inspected quarterly. During the June 2019 through June 2020 reporting period, the plants continued to indicate growth and the previous measures taken to deter wildlife have appeared to be partially successful. The local beaver population continue to periodically break through the

wire mesh fencing and damage, or completely remove, select black willow plantings. Based on the site inspections and observations, the riprap stone and wingwall deflector appeared to be in place and functional.

4 REMEDIAL SYSTEM PERFORMANCE SUMMARY

The operational data collected during the monthly inspections of the system operation are summarized in the following sections. System O&M data are provided in Table 1, and system liquid phase influent and vapor phase sample results have been submitted to NYSDEC's EIMS Administrator in the required EQuIS Electronic Data Deliverable (EDD) format. System liquid phase effluent analytical results have been provided with the Industrial Wastewater Discharge Monitoring Reports, which are submitted monthly to the Jamestown BPU.

4.1 Objectives of Monitoring

During operation of the system, various data were collected and analyzed to evaluate the overall performance and effectiveness of the system. This performance monitoring is intended to achieve the following objectives:

- Evaluate total dissolved and vapor phase VOCs and TPH, as well as NAPL recovered during the operational period.
- Evaluate performance of the remedial system.
- Determine if any modifications to the system are required to enhance the system performance.
- Ultimately determine when remedial milestones or endpoints have been achieved.

The performance monitoring results for the June 2019 through June 2020 reporting period are summarized below.

4.2 System Performance Data

The system operational data for the reporting period are summarized in Table 1. These data include the average and cumulative recovered groundwater and soil vapor flows, average applied vacuums to the recovery well network, and recovery well status.

4.2.1 Groundwater Recovery/Extracted Liquid Data

4.2.1.1 Liquid Flows

Total extracted groundwater flow readings were collected from the totalizing flowmeter (FQI-700). The average monthly system groundwater extraction flow rates are included in Table 1. A cumulative total of 20,584,540 gallons of groundwater has been recovered by the system from startup (January 2008) through May 2020 (Table 1). The total flow recovered between June 27, 2019 and May 18, 2020 was 1,694,970 gallons, which corresponds to an average recovery rate of approximately 3.6 gallons per minute (gpm).

4.2.1.2 System Influent Liquid Phase Analytical Results

The liquid phase quarterly influent concentrations of TCE, DCE, VC, TPH-GRO, TPH-DRO, and PCBs in groundwater are provided in Table 2 and are illustrated graphically on Figure 3. Recovery well status during influent liquid phase sampling events have been included in Table 2.

Liquid phase influent concentrations during July 2019 through April 2020 ranged from non-detect to 19.9 micrograms per liter (μg/L) for TCE, 11.1 to 46.9 μg/L for DCE, and 2.6 to 26.7 μg/L for VC. Influent concentrations of TPH-DRO ranged from 1.01 to 3.60 mg/L.

4.2.1.3 System Effluent Treated Liquid Phase Analytical Results

Pursuant to the effluent standards set by the Jamestown BPU Industrial Wastewater Discharge Permit (Permit No. 037), sampling consists of the monthly collection of four grab groundwater samples over an 8-hour period during a typical operational day. These samples are analyzed for VOCs using United States Environmental Protection Agency (USEPA) Method 624, oil and grease using USEPA Method 1664A, total suspended solids using USEPA Method 2540D, and PCBs using USEPA Method 608. All samples were submitted to SGS Laboratory in Dayton, New Jersey. Prior to final discharge to local sanitary sewer manhole 3T6, the system effluent sample is collected from sample port SP-702 located post air stripper (AS-700).

During the June 2019 through June 2020 reporting period, the effluent discharge monitoring parameters were non-detect or reported at quantities below the permitted effluent limits. The effluent sample results are provided in Table 3.

4.2.2 Soil Vapor Extraction Data

4.2.2.1 Vapor Flows

The SVE (i.e., vapor phase) system was operational during the June 2019 through June 2020 reporting period except for isolated shutdowns and/or temporary recovery well configuration changes due to routine O&M activities, as well as non-routine O&M activities discussed in Sections 3.1 and 3.2, respectively.

Total (i.e., extracted soil vapor and fresh air dilution) vapor flow rate readings were collected from the flowmeter (FIT-501) located in the vapor treatment system exhaust post the vapor phase granular activated carbon (VPGAC) vessel ASC-502 (i.e., post-blower/fresh air dilution valve) and ranged from 159 to 286 actual cubic feet per minute (acfm) during the operational months for the vapor phase extraction system during the reporting period (Table 1). These flow ranges correspond to an average recovery rate of approximately 241 acfm over the operational period for the vapor phase extraction system during the reporting period.

4.2.2.2 Applied and Induced Vacuum

The applied vacuum at the system knockout tank generated by regenerative blower B-900 generally ranged from 22 to 60 inches of water column. The applied vacuum to the VEP wellheads was adjusted based on several factors, including observed vacuum at the wellhead, induced vacuum at select monitoring points, and

seasonal groundwater elevations. The average monthly VEP applied wellhead vacuums are included in Table 1.

Induced vacuum measurements were recorded periodically throughout the reporting period at select monitoring wells.

4.2.2.3 System Vapor Influent Sampling and Analytical Results

The influent vapor concentrations of TCE, DCE, VC, and TPH-GRO are presented in Table 4 and are illustrated graphically on Figure 4. The two predominant compounds detected in the influent vapor samples have been TCE and DCE. TCE was detected in influent vapor samples with concentrations ranging from non-detect to 345 micrograms per cubic meter ($\mu g/m^3$). Influent DCE vapor concentrations were non-detect with the exception of the July 31, 2019 sample (237 $\mu g/m^3$). Influent TPH-GRO vapor concentrations ranged from non-detect to 3.49 $\mu g/m^3$. Influent VC vapor samples were below the method detection limit for each influent vapor sampling event. All samples were submitted to Pace Analytical Laboratories in Pittsburgh Pennsylvania.

4.2.2.4 System Vapor Effluent Sampling and Analytical Results

The purpose of the continued effluent vapor sample collection is to ensure that the permit equivalent standards/guidance values are met as an air permit is not required for the Site.

It should be noted that the previous NYSDEC DAR-1 guidelines for the evaluation and control of air contaminants, dated November 12, 1997 was replaced on August 10, 2016. The latest version no longer utilizes the NYSDEC developed Basic Cavity Impact Method or Impact Method using Stack Height, but rather the USEPA AERSCREEN air quality model.

Based on the latest DAR-1 documents Flowchart #1 diagram, the SVE and air stripper systems operation are exempt and considered trivial under NYSDEC Title 6 CRR-NY Section 201-3.3 (29) Trivial Activities. However, the VOC concentrations discharged by the SVE and air stripper exhausts during the reporting period were ran through the model and the air dispersion results were compared to the DAR-1 allowable short-term guideline concentration (SGC) and annual guideline concentration (AGC) values. The emissions for both the SVE and air stripper were found to be well below the allowable concentration percentages.

The effluent vapor concentrations of TCE, DCE, VC, and TPH-GRO are presented in Table 4.

4.2.3 Non-Aqueous Phase Liquid Recovery

During the June 2019 through June 2020 reporting period, the VEP recovery well network recovered approximately 6.4 gallons of DNAPL, primarily from recovery wells VEP-7, VEP-9, VEP-10, VEP-11, VEP,12, VEP-13, and VEP-14. Measurable LNAPL was not observed within any of the VEP wells or OWS during the reporting period. Since starting the system in January 2008, an estimated cumulative total of 369.6 gallons of DNAPL have been recovered. A summary of annual DNAPL removal is provided in Table 7.

5 SYSTEM EVALUATION

The following sections summarize the remedial system performance monitoring data from June 2019 through June 2020.

5.1 Mass Recovery

The estimated total mass recovered was calculated using the system influent dissolved and vapor phase analytical sampling results with the corresponding extraction flow rates and the NAPL volumes collected.

5.1.1 Dissolved Phase

Influent groundwater laboratory analytical data were used to estimate dissolved phase VOC and TPH-DRO mass recovery rates. As shown in Table 5, influent VOC and TPH-DRO levels and groundwater recovery rates were used to calculate the overall mass of VOCs recovered in the dissolved phase. As indicated in Table 5, a total estimated mass of approximately 10.9 kg of VOCs and TPH-DRO were recovered in the dissolved phase during the reporting period.

As the data presented in Table 5 indicate, total dissolved phase mass recovery rate estimates ranged from 6 to 90 grams per day. The fluctuation in dissolved phase mass recovery rate is related to variability in influent mass concentrations in the extracted groundwater due to VEP well configurations, extraction rate, and precipitation recharge to the groundwater system. The annual dissolved phase mass recovery rates of VOCs and TPH-DRO are shown on Figure 3.

5.1.2 Vapor Phase

Influent vapor sampling results, molecular weights, and total vapor extraction flow rates were utilized to estimate the vapor phase VOC and TPH-GRO mass recovery rate for the reporting period. As the data presented in Table 6 indicate, the vapor phase mass recovery rate ranged from 1 to 3 grams per day during the operational period for the vapor extraction system. As mentioned in the discussion of dissolved phase mass recovery rates, the fluctuation in vapor phase mass recovery rate is related to the VEP well configuration and groundwater elevations. As Table 6 shows, a total estimated mass of 0.36 kg of VOCs were removed in the vapor phase during July 2019 through April 2020. As expected, the mass transfer of VOCs from soil to vapor is predominantly limited to desorption and diffusion processes. Therefore, mass removal rates in the vapor phase are declining over time as the Site is remediated. No detectable concentrations of TPH-GRO were detected in the system influent, which indicates that the lighter fraction VOCs that were historically present have been remediated from the subsurface. The annual vapor phase mass recovered for VOCs and TPH-GRO is shown on Figure 4.

5.1.3 Non-Aqueous Phase Liquid

As noted in Section 4.2.3, approximately 6.4 gallons of DNAPL were recovered during the reporting period.

5.1.4 Total Mass Removal Trend

The VEP system has recovered a cumulative total of approximately 432.4 kg (953 pounds) and 182.9 kg (402.4 pounds) of dissolved and vapor phase VOCs, respectively, during the period of operation from startup in 2008 through May 2020 (Table 7). The mass removal rate had fluctuated for the liquid phase mass removed during each year of the operation from 2008 through 2012. However, in 2013 the liquid phase VOC/TPH mass removal rates dropped an order of magnitude, and continued to decrease through 2017, and then slightly increased from 2018 through 2019 and 2019 through 2020 as a result of increased pumping/extraction rates. The variation and overall decreasing trend in mass removal rates are largely attributable to the decrease in TPH-DRO in the system influent water samples. As indicated in previous reports, the rate of recovery is expected to decrease as the mass removal becomes more dependent on desorption and diffusion processes rather advective movement and capture of VOCs.

The mass removal rate for the vapor phase VOC/TPH had generally dropped off after the first year of operation in 2008, plateaued during each year of operation from 2010 through 2012, and subsequently continued to drop through 2017, with a slight increase in 2018 and a slight decrease in 2019 and 2020. The variation and overall decreasing trend in mass removal rates are mostly attributable to the decrease in TPH-GRO in the system influent vapor samples, as well as lighter fraction VOC concentrations. As indicated in previous reports, the rate of recovery has decreased, and is expected to continue to decrease, as the mass removal becomes more dependent on desorption and diffusion processes rather than advective movement and capture of VOCs, particularly for any lighter fraction VOCs and TPH-GRO compounds.

As presented in Table 7, the dissolved and vapor phase mass recovered during March 2019 through May 2020 is estimated at 13.8 and 0.7 kg, respectively. Figure 5 also depicts annual mass recovery through May 2020 for both the dissolved and vapor phases and for DNAPL.

6 GROUNDWATER MONITORING

Groundwater monitoring activities were conducted in December 2019 and May 2020. Groundwater monitoring consisted of collecting groundwater samples from monitoring wells and measuring water levels in monitoring wells to evaluate the hydraulic influence of the system.

Sampling was conducted at 13 monitoring wells to evaluate VOC concentration trends at the Site and overall remedial progress.

Collection of groundwater samples was performed in accordance with the OM&M Plan's Field Sampling Plan and consisted of purging three volumes of water from each well or purging until the well was dry. Samples were then collected using low flow sampling techniques where feasible, and select wells were sampled using disposable bailers due to lack of water. It should be noted that all groundwater sampling was conducted with the VEP system offline (i.e., static conditions). All samples were submitted to SGS Laboratories in Dayton, New Jersey, for analysis of VOCs using USEPA Method 8260. Groundwater analytical results are discussed in Section 6.2.2.

6.1 Well Inspections

Recovery well and monitoring well integrity inspections are conducted quarterly to observe the surface conditions around each well, the condition of the concrete surface seal, and the presence of a secure locking cap and/or bolt-down road box. Periodically, the depth to bottom in all the wells is measured and compared to the original constructed well depth. All stickup monitoring wells were in good working condition and secured with padlocks. Each VEP well was also is good working condition, and each manhole cover was securely bolted down in place.

6.2 Groundwater Monitoring Results

The results of the groundwater monitoring program are summarized in the following sections. The groundwater monitoring program was performed in accordance with the OM&M Plan (Arcadis 2008a) and as approved by NYSDEC.

6.2.1 Groundwater Elevation Data

Water level data collected from the site monitoring wells during the reporting period are summarized in Table 8. The groundwater elevations reflect the position of the water table within the fill material layer at the Site under pumping conditions for the sampling events conducted during the reporting period. Overall, the water level data indicated that the system influences water levels near the active VEP recovery wells, with drawdown typically in the range of 1 to 5 feet in adjacent monitoring wells.

6.2.2 Groundwater Analytical Results

During the reporting period, groundwater samples were collected from 13 monitoring wells to monitor groundwater quality and evaluate the performance of the system. A summary of the groundwater monitoring analytical results, along with historical data, is provided in Table 9. Historical TCE, DCE, and VC concentration trends in groundwater for monitoring wells are depicted on Figures 6A, 6B, 6C, and 6D.

The following selected observations were made with respect to the groundwater analytical data:

Farthest Upgradient and Downgradient Site Monitoring Wells:

- Consistent with the historical site results since the startup of the remedial system, TCE and DCE remain below the NYSDEC Class GA groundwater standards in upgradient monitoring well ESI-6. TCE, DCE, and VC were non-detect for the December 2019 and May 2020 sampling events.
- Consistent with the historical site results since the startup of the remedial system, TCE, DCE, and VC have remained below the NYSDEC Class GA groundwater standards in monitoring well MW-9, which is located at the northwestern (farthest downgradient) corner of the Site near the Chadakoin River.

Central/Upgradient Site Monitoring Wells:

- TCE, DCE and VC concentrations at monitoring well OW-5 continue to remain below NYSDEC Class GA groundwater standards.

- TCE (6.4 and 11 µg/L), DCE (13 and 52.3 µg/L), and VC (non-detect and 1.6 µg/L) concentrations at monitoring well OW-6 have each dropped an order of magnitude following the July 2018 ISCO injection event. Overall, the total VOC reduction post-ISCO remains at approximately 92%.
- Total chlorinated VOC concentrations at monitoring wells MW-8S (83.4 and 100.53 µg/L) and MW-13 (0.69 J and 6.1 µg/L) continue to decrease as compared to historical (pre-ISCO) detections. Overall, the total VOC reduction post-ISCO remains at approximately 98% for both of these well locations.
- Total chlorinated VOC concentrations at monitoring well MW-12 (445.6 and 13.83 µg/L) continue to decrease as compared to historical (pre-ISCO) detections. Overall, the total VOC reduction post-ISCO remains at approximately 98%.
- Consistent with the historical results for the Site, the highest dissolved phase concentrations remain isolated at monitoring well MW-14. The current total VOC concentrations, as compared to the pre-ISCO 2014-2015, have rebounded 100%. However, the total VOC concentrations overall, as compared to the pre-system operation (2008), have dropped an order of magnitude.

Adjacent Riverbank/Hydraulic Barrier Monitoring Wells:

- Concentrations of TCE, DCE, and VC at monitoring well ESI-1, which is located adjacent to the Chadakoin River and upgradient from the vertical barrier wall, continue to remain below the NYSDEC Class GA groundwater standards since startup of the remedial system.
- TCE, DCE, and VC at monitoring well ESI-2 during the December 2019 sampling event were below the NYSDEC Class GA groundwater standards. An increase in total chlorinated VOC concentrations was observed in May 2020 but have continued to decrease, as compared to the pre-system operation 2003 concentrations.
- VOC concentrations at monitoring well ESI-4R continue to fluctuate within ranges established since being installed in 2010. TCE was detected at 11.6 and 7.2 µg/L, DCE at 102.82 J and 130.7 µg/L, and VC at 14.9 and 10.1 µg/L during the reporting period.
- Concentrations of TCE, DCE, and VC at monitoring well ESI-7 were below the NYSDEC Class GA groundwater standards in samples collected in December 2019. An increase in total chlorinated VOC concentrations was observed in May 2020 but have continued to decrease, as compared to the pre-system operation 2002 concentrations.
- VOC concentrations at monitoring well MW-10R continue to fluctuate within ranges established since being installed in 2010. In December 2019, TCE was detected at 791 µg/L, DCE at 185 µg/L, and VC was non-detect. The December 2019 TCE concentration represents the highest concentrations observed to date. In May 2020, total VOC concentrations decreased in comparison to the December 2019 concentrations. The slight increase in concentrations may be attributable to recovery well VEP-12 being offline between monthly system inspections leading up to the sampling event.

7 CONCLUSIONS

The following sections summarize the conclusion of the system operation and groundwater data during the reporting period.

7.1 System Performance Summary

Data from the June 2019 through June 2020 reporting period indicate that the VEP system has been effective at recovering dissolved and vapor phase VOC mass and NAPL from the subsurface at the Site.

The performance effectiveness of the remedial system is summarized through the following metrics:

- The sustained average groundwater extraction rate from the VEP well network was approximately 3.6 gpm.
- An average SVE rate of 241 acfm was achieved from the VEP well network. It should be noted that this extracting rate includes fresh air dilution (i.e., makeup air).
- The groundwater elevation data indicate that the VEP well network is effective at dewatering the fill material near the recover wells, thus making more adsorbed phase mass available via vacuum extraction through in-situ stripping and bio-venting processes.
- As indicated by the ND, or near detection limits, extraction soil vapor concentrations, the induced lateral air flows in the subsurface have remediated the VOCs and lighter fraction petroleum compounds (e.g., TPH-GRO).
- Approximately 6.4 gallons of DNAPL were recovered by the remedial system. Since startup, the system has recovered approximately 369.6 gallons of DNAPL.
- An estimated total mass of 13.8 kg and 0.7 kg was recovered in the dissolved and vapor phase in March 2019 through May 2020, respectively. Since system startup in January 2008, an estimated cumulative total mass of approximately 432.4 kg and 182.9 kg has been recovered in the dissolved and vapor phases, respectively.

7.2 Groundwater Data Summary

The analytical results continue to show improvement in groundwater quality in several of the monitoring wells. VOC concentrations continue to remain below the NYSDEC Class GA groundwater standards in the upgradient and downgradient monitoring wells. The following highlights the groundwater analytical data for specific monitoring wells at the Site:

- VOC concentrations in monitoring wells ESI-1, ESI-6, and MW-9 continue to remain below NYSDEC Class GA groundwater standards.
- In December 2019, monitoring wells ESI-2, ESI-7, MW-13, and OW-5 VOC concentrations were below applicable NYSDEC Class GA groundwater standards.
- Monitoring wells MW-8S and MW-12 responded favorably to the 2018 ISCO injections and continue to show significant decreases in total chlorinated VOC concentrations ranging from 98% to 99%.
- VOC concentrations in MW-14 have rebounded to 2018 baseline/pre-injection concentrations. However, total VOC concentrations from the May 2020 groundwater sampling event continue to decrease, as compared to the baseline values pre-2008.
- Monitoring well OW-6 responded favorably to the 2018 ISCO injections and continues to show significant decreases in total chlorinated VOC concentrations ranging from 92% to 97%.

8 2020-2021 GOALS

The information presented in this section indicates that the system will continue to operate as designed and outlined within the NYSDEC-approved OM&M Plan (Arcadis 2008a), except for reduced VEP well operations near the ISCO treatment area.

System operation goals and performance monitoring will continue to focus on optimizing mass removal rates through the operation of the VEP well network, evaluating individual recovery well mass removal rates, and continued O&M of the remedial system process equipment and components.

The goals for system operational activities during 2020 through 2021, as well as activities already conducted in the first half of 2020, are as follows:

- Measure water level at all monitoring wells to monitor hydraulic influence of the system.
- Collect groundwater samples on a semi-annual basis from monitoring wells ESI-1, ESI-2, ESI-4R, ESI-6, ESI-7, MW-8S, MW-9, MW-10R, MW-12, MW-13, MW-14, OW-5, and OW-6.
- Collect a biennial groundwater sample from monitoring well ESI-4R and analyze for PFAS contaminants.
- Continue to monitor the treatment system for mass removal efficiency and VOC breakthrough based on field screening and/or laboratory analysis of samples collected from the system influent and effluent sample points.
- Collect system effluent samples as required by the Jamestown BPU Industrial Wastewater Discharge Permit.
- Continue DNAPL recovery efforts.
- Perform O&M activities (e.g., liquid phase cartridge filter change-outs, pneumatic pump cleaning as needed, sequestering agent drum replacement, air stripper cleaning). Replace pneumatic pumps as needed to maintain VEP well operation.
- Review alternative deterrent methods to prevent further damage to the riverbank plantings from the local beaver population.

9 INSTITUTIONAL AND ENGINEERING CONTROLS COMPLIANCE

As part of the annual certification under the SMP and OM&M Plan, the site engineering controls have been maintained and remain in place functioning as designed except for noted shutdowns due to non-routine system maintenance. The engineering controls include the following:

- Soil cover and vegetative growth across the Site.
- Riverbank and stabilization erosion controls, and Wingwall deflector.
- Vertical hydraulic barrier wall.
- Groundwater and soil vapor recovery via the VEP (i.e., recovery) well network.

- Remedial system O&M.

No changes in site use were observed during the reporting period, as per the SMP, which includes land and groundwater use restrictions. A copy of the signed Institutional and Engineering Controls Certification Forms is included in Appendix B.

10 REFERENCES

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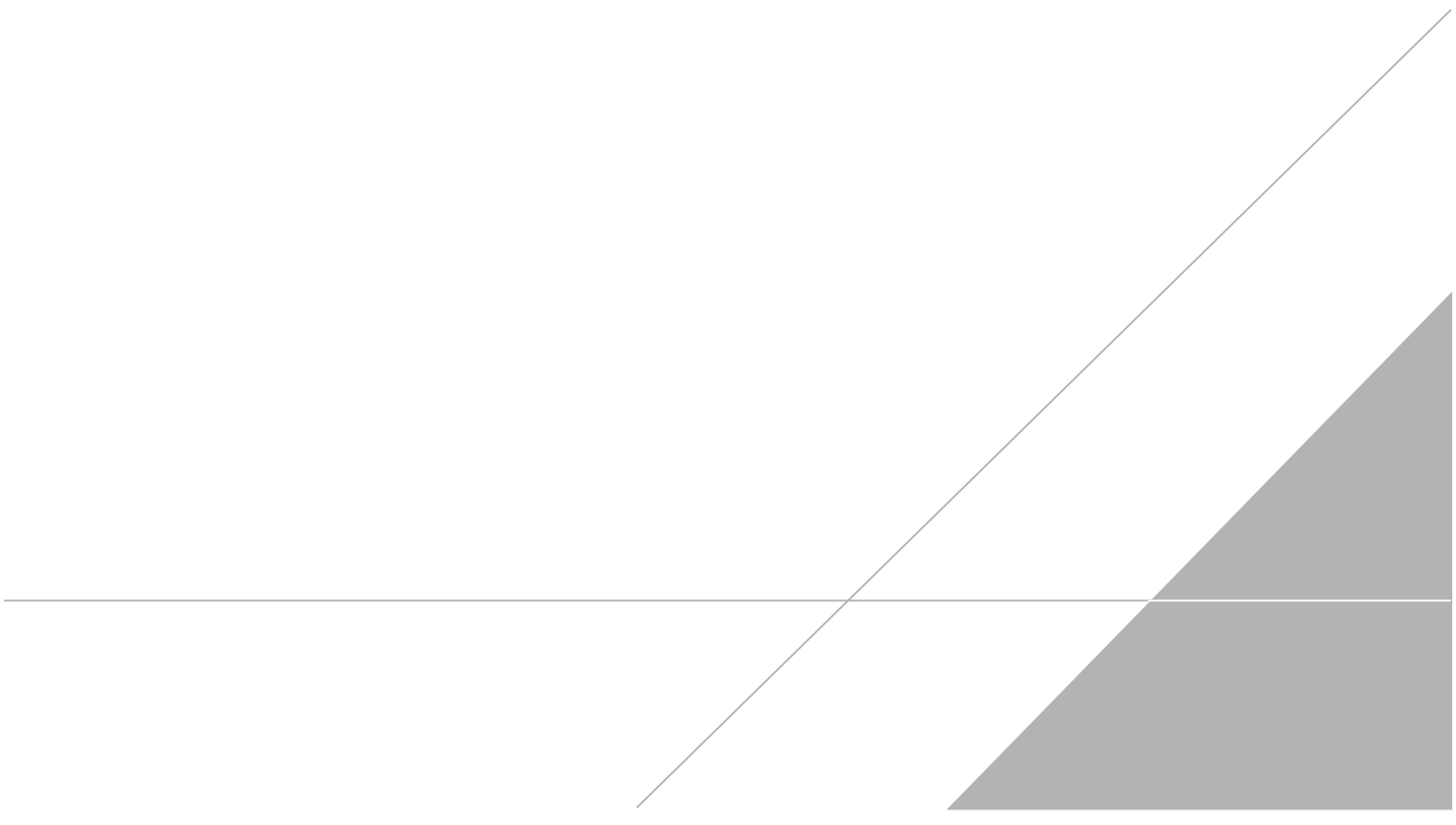


Table 1
System Operational Data, 2019-2020
D.C. Rollforms Site, Jamestown, New York
NYSDEC Site # 907019

System Parameters			Date											
			6/27/2019	7/31/2019	8/16/2019	9/12/2019	10/31/2019	11/22/2019	12/19/2019	1/30/2020	2/10/2020	3/18/2020	4/30/2020	5/18/2020
SVE Blower Applied Vacuum (in.W.C.)			60	24	22	38	46	50	52	52	52	60	40	40
Vapor Extraction Flow Rate (acfm)			219	282	286	280	232	237	237	236	159	201	263	265
Cumulative Groundwater Recovered and Treated			18,889,570	19,003,740	19,060,890	19,097,750	19,154,170	19,186,410	19,349,700	19,781,780	19,838,840	20,022,400	20,427,930	20,584,540
Monthly System Flow (gallons)			202,620	114,170	57,150	36,860	56,420	32,240	163,290	432,080	57,060	183,560	405,530	156,610
Monthly System Influent (gpm)			3.2	2.3	2.5	0.9	0.8	1.0	4.2	7.1	3.6	3.4	6.5	6.0
Recovery Well Status[1]														
Vacuum Enhanced Pumping (VEP) Wells	VEP-1	Liquid Phase On (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
		Vapor Phase On (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
	VEP-2	Liquid Phase On (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
		Vapor Phase On (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
	VEP-3	Liquid Phase On (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
		Vapor Phase On (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
	VEP-4	Liquid Phase On (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
		Vapor Phase On (Y/N)	Y	Y	Y	N	N	N	N	Y	N	N	N	N
	VEP-5	Liquid Phase On (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
		Vapor Phase On (Y/N)	Y	Y	Y	N	N	N	N	Y	N	N	N	N
	VEP-6	Liquid Phase On (Y/N)	Y	Y	Y	N	N	N	N	N	N	N	N	N
		Vapor Phase On (Y/N)	Y	Y	Y	N	N	N	N	Y	N	N	N	N
	VEP-7	Liquid Phase On (Y/N)	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-8	Liquid Phase On (Y/N)	N	N	N	Y	N	N	N	N	N	N	N	Y
		Vapor Phase On (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
	VEP-9	Liquid Phase On (Y/N)	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y
		Vapor Phase On (Y/N)	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y	Y
	VEP-10	Liquid Phase On (Y/N)	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-11	Liquid Phase On (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y
	VEP-12	Liquid Phase On (Y/N)	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y
	VEP-13	Liquid Phase On (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	VEP-14	Liquid Phase On (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Vapor Phase On (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes:

1. Recovery wells for which total fluids pneumatic pumps were online but observed to be in need of routine cleaning and/or repairs and therefore not recovering groundwater are considered to have liquid phases on in this table. Recovery well status does not necessarily reflect the recovery well configuration for the corresponding monthly influent sampling events.

Definitions:

acfm - actual cubic feet per minute
gpm - gallons per minute
in.W.C. - Inches of Water Column
N - No
Y - Yes
SVE - Soil Vapor Extraction
VEP - Vacuum Enhanced Pumping

Table 2
TCE, DCE (total), VC, and TPH in System Influent Water Samples, 2019-2020
D.C. Rollforms Site, Jamestown, New York
NYSDEC Site # 907019

Date	VOCs (µg/L)[1]			DRO (mg/L)	VEP Wells Online During Quarterly System Influent Sampling Event
	TCE	DCE (total)[2]	VC		
7/31/2019[3]	NA	NA	NA	1.28	VEP-4 through VEP-7, VEP-9 through VEP-14
8/16/2019	ND	11.1	17	NA[4]	VEP-4 through VEP-6, VEP-9, VEP-11, VEP-13, VEP-14
12/19/2019	7.4	46.9	2.6	1.39	VEP-7, VEP-9 through VEP-14
2/10/2020	19.9	33.8	26.7	3.60	VEP-7, VEP-10 through VEP-14
4/30/2020	3.5	34.6	18.1	1.01	VEP-7, VEP-9 through VEP-14

Notes:

1. Samples analyzed for VOCs using USEPA Method 624. Samples analyzed for TPH-GRO-] and TPH-DRO using USEPA Method 8015 B. Samples analyzed for PCBs using USEPA Method 608.
2. DCE (total) includes the sum of 1,1-dichloroethene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene.
3. VOCs were not analyzed due to insufficient sample volume received by the laboratory.
4. A DRO sample was collected on October 31, 2019 to verify/confirm any significant changes in concentrations.

Definitions:

D - Identifies an analysis that used a secondary dilution factor
E - Sample concentration exceeded calibration range
GRO - Gasoline Range Organics
µg/L - micrograms per liter
mg/L - milligrams per liter
NA - Not analyzed
NS - Not Sampled for
TCE - Trichloroethene
TPH - Total Petroleum Hydrocarbons
USEPA - United States Environmental Protection Agency
VC - Vinyl Chloride
VEP - Vacuum Enhanced Pumping
VOCs - Volatile Organic Compounds

Table 3
TCE, DCE (total), VC, PCBs, TSS, Oil and Grease, and pH in System Effluent Water Samples, 2019-2020
D.C. Rollforms Site, Jamestown, NY
NYSDEC Site # 907119

Date	Analyte[1]						
	Total VOCs (µg/L)	PCB (µg/L)	TSS (mg/L)	Oil & Grease (mg/L)		pH (s.u.)	
	Local Discharge Limit						
	2130	ND	350	100		5.5 - 10	
6/27/2019	ND	<0.050	7.1	<5.0	<5.0	7.0	7.1
				<5.0	<5.0	7.4	7.4
7/31/2019	ND	<0.050	<4.0	<5.0	<5.0	8.4	8.0
				<5.0	<5.0	8.1	8.1
8/16/2019	ND	<0.050	<4.0	<5.0	<5.0	7.9	8.1
				<5.0	<5.0	8.2	8.0
9/12/2019	ND	<0.050	<4.0	<5.0	<5.0	8.4	8.3
				<5.0	<5.0	8.4	8.6
10/31/2019	ND	<0.063	<4.0	<5.0	<5.0	7.9	8.0
				<5.0	<5.0	8.0	7.9
11/22/2019	ND	<0.051	17.8	<5.0	<5.0	7.7	7.8
				<5.0	<5.0	7.9	7.9
12/29/2019	ND	<0.049	<4.0	<5.0	<5.0	8.6	7.9
				<5.0	<5.0	7.9	8.3
1/30/2020	0.77	<0.053	9.8	<5.0	<5.0	7.8	8.0
				<5.0	<5.0	8.2	8.2
2/10/2020	ND	<0.051	5.8	<5.0	<5.0	7.2	7.2
				<5.0	<5.0	7.3	7.4
3/18/2020	ND	<0.050	<4.0	<5.0	<5.0	7.9	8.0
				<5.0	<5.0	7.9	8.0
4/30/2020	ND	<0.048	<4.0	<5.0	<5.0	8.0	8.1
				<5.0	6.0	8.1	8.2
5/18/2020	ND	<0.050	<4.0	<5.0	<5.0	8.4	8.2
				<5.0	<5.0	8.3	8.3

Notes:

1. System effluent water samples collected via sample port SP-702 located after the air stripper. Samples analyzed for TCE, DCE (total), VC, PCB, and TSS consisted of four effluent samples collected during a typical operating day that were composited at the laboratory. Samples analyzed for Oil & Grease and pH were not composited. Samples analyzed for TCE, DCE (total), and VC using USEPA Method 624. Samples analyzed for PCB using USEPA Method 608. Samples analyzed for TSS using USEPA Method 160.2. Samples analyzed for Oil & Grease using USEPA Method 1664. pH

2. DCE (total) includes the sum of 1,1-dichloroethene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene.

Definitions:

< - Indicates less the reporting limit
DCE - Dichloroethene
µg/L - micrograms per liter
mg/L - milligrams per liter
ND - Non-detect
PCB - Polychlorinated Biphenyls
s.u. - standard units
TCE - Trichloroethene
TSS - Total Suspended Solids
USEPA - United States Environmental Protection Agency
VC - Vinyl Chloride

Table 4
TCE, DCE (total), VC and TPH in System Influent and Effluent Vapor Samples, 2019-2020
D.C. Rollforms Site, Jamestown, New York
NYSDEC Site # 907019

Date	Sample Location	TCE		DCE (total)[(2)]		VC		TPH-GRO		VEP Wells Online During Monthly System Influent Sampling Event
		ppmv	µg/m^3	ppmv	µg/m^3	ppmv	µg/m^3	ppmv	µg/m^3	
7/31/2019	Influent	0.018	97	0.06	237	<1.0	<2,598	<0.7	<1,280	VEP-4 through VEP-7, VEP-9 through VEP-14
	Effluent	0.100	539	<0.05	<79	<1.0	<2,598	0.99	3.49	
10/31/2019	Influent	<0.010	<54	<0.05	<79	<1.0	<2,598	<0.7	<1,280	VEP-4 through VEP-6, VEP-9, VEP-11, VEP-13, VEP-14
	Effluent	0.098	528	<0.05	<79	<1.0	<2,598	<0.7	<1,280	
12/30/2019	Influent	0.011	59	<0.05	<79	<1.0	<2,598	<0.7	<1,280	VEP-7, VEP-9 through VEP-14
	Effluent	0.022	119	<0.05	<79	<1.0	<2,598	<0.7	<1,280	
2/10/2020	Influent	0.064	345	<0.05	<79	<1.0	<2,598	<0.7	<1,280	VEP-7, VEP-10 through VEP-14
	Effluent	0.023	124	<0.05	<79	<1.0	<2,598	<0.7	<1,280	
4/30/2020	Influent	0.022	119	<0.05	<79	<1.0	<2,598	<0.7	<1,280	VEP-7, VEP-9 through VEP-14
	Effluent	0.052	280	<0.05	<79	<1.0	<2,598	<0.7	<1,280	

Notes:
1. Influent vapor sample collected via sample port SP-900 located before the liquid knockout tank. Effluent vapor sample collected via sample port SP-503 located after VPGAC vessel ASC-502. Samples analyzed using Microseeps, Inc. Method AM 4.02.
2. DCE (total) includes the sum of 1,1-dichloroethene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene.

Definitions:
< - Indicates less the reporting limit
DCE - Dichloroethene
GRO - Gasoline Range Organics
µg/m^3 - micrograms per cubic meter
ppmv - parts per million by volume
TCE - Trichloroethene
TPH - Total Petroleum Hydrocarbons
VC - Vinyl Chloride
VEP - Vacuum Enhanced Pumping
VPGAC - Vapor Phase Granular Activated Carbon

Table 5
Cumulative Dissolved Phase VOC and TPH Mass Recovery, 2019-2020
D.C. Rollforms Site, Jamestown, New York
NYSDEC Site # 907019

Date	VOC and TPH [DRO] Mass Removed																		
	Influent VOC and TPH [DRO] Concentrations				TPH converted to ug/L. AVERAGES OF THESE RESPECTIVE CONCENTRATIONS OVER TWO MONTHS ARE USED TO ESTIMATE MASS REMOVAL				Total Cumulative Flow (gallons)[1]	Total Flow Per Reporting Period (L)	Estimated Mass Removed Per Reporting Period (kg)[3]				Estimated Cumulative Mass Removed (kg)				Estimated Cumulative Mass Removal (kg)	Cumulative Days Operating	Estimated Mass Removal Rate Per Reporting Period (kg/day)
	TCE (µg/L)	DCE (total) (µg/L)[2]	VC (µg/L)	TPH [DRO] (mg/L)	TCE	DCE (total)	VC	TPH [DRO]			TCE	DCE (total)[2]	VC	TPH [DRO]	TCE	DCE (total)[2]	VC	TPH [DRO]			
7/31/20193	NA	NA	NA	1.28	**0**	**0**	**0**	**1280**	19,003,740	1,895,203	0.003	0.022	0.005	2.814	0.017	0.166	0.034	6.632	6.849	0	0.022
8/16/2019	0.0	11.1	17	NA	**0**	**11.1**	**17**	**0**	19,060,890	216,336	0.000	0.001	0.002	0.138	0.017	0.167	0.036	6.771	6.991	#VALUE!	#VALUE!
12/19/2019	7.4	46.9	2.6	1.39	**7.4**	**46.9**	**2.6**	**1390**	19,349,700	1,093,264	0.004	0.032	0.011	0.760	0.021	0.199	0.046	7.531	7.797	#VALUE!	#VALUE!
2/10/2020	19.9	33.8	26.7	3.60	**19.9**	**33.8**	**26.7**	**3600**	19,838,840	1,851,595	0.025	0.075	0.027	4.620	0.047	0.273	0.074	12.150	12.544	#VALUE!	#VALUE!
4/30/2020	3.5	34.6	18.1	1.01	**3.5**	**34.6**	**18.1**	**1010**	20,427,930	2,229,947	0.026	0.076	0.050	5.140	0.073	0.350	0.123	17.290	17.836	#VALUE!	#VALUE!
Groundwater Recovered 7/31/2019 - 4/30/2020 (gal)									**1,424,190**					**Total VOCs & TPH-DRO Recovered July 2019-April 2020 (kg):**					**10.987**		
Average Groundwater Recovery Rate (gpm)									**#VALUE!**					**Total VOCs & TPH-DRO Recovered 2019-2020 (kg):**					**14.955**		

Notes:

1. Total cumulative flow is estimated based on the system flowmeter FQI-700.
2. DCE (total) is the sum of 1,1-dichloroethene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene.
3. Estimated mass removed per reporting period is calculated from influent mass concentration and volume of groundwater recovered. Influent mass concentrations used for calculations are the average of the concentrations from the previous and current monthly events.

Definitions:

DCE - Dichloroethene
DRO - Diesel Range Organics
gal - gallons
gpm - gallons per minute
kg - kilograms
L - Liters
µg/L - micrograms per liter
mg/L - milligrams per liter
NA - Not analyzed
ND - Non-detect
TCE - Trichloroethene
TPH - Total Petroleum Hydrocarbons
VC - Vinyl Chloride
VOC - Volatile Organic Compounds

Table 6
Cumulative Vapor Phase VOC and TPH Mass Recovery, 2019-2020
D.C. Rollforms Site, Jamestown, New York
NYSDEC Site # 907019

Date	Influent VOC and TPH [GRO] Concentrations (ppmv)				Influent VOC and TPH [GRO] Concentrations (µg/m^3)[1]				Influent VOC and TPH [GRO] Concentrations (µg/L)				Vapor Extraction Flow Rate (acfm)	Reporting Period			Mass of Component Recovered[3] Per Reporting Period (kg)				Cumulative Mass Recovered (kg)				Estimated[2] Cumulative Mass Recovery (kg)	Cumulative Days Operating	Estimated[2] Mass Recovery Rate Per Reporting Period (kg/day)
	TCE	DCE (total)[4]	VC	TPH [GRO]	TCE	DCE (total)[4]	VC	TPH [GRO]	TCE	DCE (total)[4]	VC	TPH[5] [GRO]		Period Duration (days)	Period Duration (min)	Volume Of Air Treated (L)[2]	TCE	DCE (total)[4]	VC	TPH [GRO]	TCE	DCE (total)[4]	VC	TPH [GRO]			
7/31/2019	0.018	0.06	<1	<0.7	97	238	ND	ND	0.097	0.238	ND	ND	282	132	190,080	1,517,852,971	0.167	0.180	0.000	0.000	1.896	0.180	0.000	0.000	2.08	0	0.003
10/31/2019	<0.010	<0.05	<1	<0.7	ND	ND	ND	ND	ND	ND	ND	ND	232	92	132,480	870,327,042	0.084	0.103	0.000	0.000	1.980	0.284	0.000	0.000	2.26	92	0.002
12/20/2019	0.011	<0.05	<1	<0.7	59	ND	ND	ND	0.059	ND	ND	ND	237	50	72,000	483,197,875	0.029	0.000	0.000	0.000	2.009	0.284	0.000	0.000	2.29	142	0.001
2/10/2020	0.064	<0.05	<1	<0.7	345	ND	ND	ND	0.344	ND	ND	ND	159	52	74,880	337,137,555	0.068	0.000	0.000	0.000	2.077	0.284	0.000	0.000	2.36	194	0.001
4/30/2020	0.022	<0.05	<1	<0.7	119	ND	ND	ND	0.118	ND	ND	ND	263	80	115,200	858,355,152	0.078	0.000	0.000	0.000	2.155	0.284	0.000	0.000	2.44	274	0.001
									Average SVE Extraction Rate (cfm)				235					July 2019 - April 2020 Cumulative Mass Recovery Rate (kg)								0.36		

Notes:

1. Vapor results were converted to mg/m^3 and mg/L using Microseeps unit conversion factors, assuming a temperature of 25 ^{o}C (+ 273.15 K), and gas constant, 0.08206 l*atm/(mol*K).
2. Volumes of air treated are estimated values.
3. Estimated mass recovery rate calculated from monthly influent mass concentration and estimated vapor extraction rate. Influent concentrations used are averages of those from the previous and current monthly events.
4. DCE (total) is the sum of 1,1-dichloroethene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene.
5. Conversion of TPH [GRO] from ppmv to µg/L assumes molecular weight approximately equal to hexane, temperature of 25ºC, and pressure of 1 atmosphere.
6. Laboratory detection limits used for March 2016 sample results for the reporting period average.

Definitions:

acfm - actual cubic feet per minute
cfm - cubic feet per minute
DCE - Dichloroethene
GRO - Gasoline Range Organics
kg - kilograms
L - Liters
mg/L - milligrams per liter
mg/m^3 - milligrams per cubic meter
min - minutes
ND - Non-detect
NS - Not Sampled
ppmv - parts per million by volume
SVE - soil vapor extraction
TCE - Trichloroethene
TPH - Total petroleum hydrocarbons
µg/L - micrograms per liter
VC - Vinyl Chloride
VOC - Volatile Organic Compounds

Table 7
Annual and Cumulative Mass Recovery Summary
D.C. Rollforms Site, Jamestown, New York
NYSDEC Site # 907019

Year	Estimated Annual Mass Recovery		
	Dissolved Phase (kg)	Vapor Phase (kg)	DNAPL (gallons)
2008	30.4	116.2	117
2009	90.7	27.5	135
2010	72	8.1	39
2011	133.2	8.8	18
2012	39.9	9.3	12.5
2013	8.6	3.4	2.5
December 2014	11.7	2.2	12
January 2015 - April 2016	8.1	0.6	13
April 2016 - March 2017	5.0	0.8	1.5
March 2017 - May 2018	15	3.5	4.3
May 2018 - March 2019	4.0	1.7	8.5
March 2019 - May 2020	13.8	0.7	6.4
Total	**432.4**	**182.9**	**369.6**

Notes:

1. Estimated cumulative mass recovery includes mass recovered since the system was brought online at the beginning of 2008.
2. Total volume of DNAPL recovered is based on volumes removed and containerized from oil/water separator (OWS-200) during the reporting period.
3. The vapor phase mass removal value for 2014 was corrected from 1.1 kg to 2.2 kg.

Definitions:

DNAPL - Dense Non-Aqueous Phase Liquid

kg - kilograms

Table 8
Summary of Groundwater Elevation Data
D.C. Rollforms Site, Jamestown, New York
NYSDEC Site # 907019

Well ID	Measuring [1] Point Elevation (ft amsl)	Operational Conditions 12/30/2019		Operational Conditions 5/21/2020	
		Depth to [2] Water	Water-Level Elevation [3]	Depth to [2] Water	Water-Level Elevation [3]
ESI-1	1296.37	7.23	1289.14	7.41	1288.96
ESI-2	1295.08	7.17	1287.91	7.18	1287.90
ESI-3[4]	1295.75	5.40	1290.35	6.19	1289.56
ESI-4R	1294.96	10.60	1284.36	10.28	1284.68
ESI-5	1293.08	NM	NA	4.72	1288.36
ESI-6	1295.24	6.04	1289.20	7.12	1288.12
ESI-7	1295.12	7.12	1288.00	7.19	1287.93
MW-4S	1295.75	4.86	1290.89	10.07	1285.68
MW-7D	1295.37	7.42	1287.95	8.18	1287.19
MW-8S	1295.21	6.00	1289.21	6.92	1288.29
MW-8D	1295.48	5.89	1289.59	6.17	1289.31
MW-9	1291.95	4.59	1287.36	7.24	1284.71
MW-10R	1295.11	7.74	1287.37	8.32	1286.79
MW-12	1294.91	5.71	1289.20	6.06	1288.85
MW-13	1294.20	4.69	1289.51	5.49	1288.71
MW-14	1294.59	5.53	1289.06	6.08	1288.51
OW-1	1292.59	8.20	1284.39	8.17	1284.42
OW-2	1293.96	9.17	1284.79	9.19	1284.77
OW-3	1292.01	3.32	1288.69	2.90	1289.11
OW-4	NM	7.31	NA	6.95	NA
OW-5	1295.59	7.41	1288.18	7.64	1287.95
OW-6	1295.67	7.63	1288.04	7.75	1287.92
OW-7	NM	7.02	NA	7.00	NA

Notes:

1. Wells ESI-1, ESI-2, ESI-4R, ESI-5, ESI-6, OW-1, OW-2, MW-9, and MW-10R: water level elevations have been estimated based on field measurements following well casing repairs made in June 2008 and 2010.
2. Depths to water are presented as feet below the measuring point.
3. Water level elevations are presented as feet above mean sea level.
4. Well ESI-3: Oil absorbent sock used for LNAPL recovery during 2014.

Definitions:

ft amsl - feet above mean sea level
NA - Not Available
NM - Not Measured

Table 9
Summary of TCE, DCE, and VC in Groundwater Samples
D.C. Rollforms Site, Jamestown, New York
NYSDEC Site # 907019

Well ID	MW-8S			Well ID	MW-9			Well ID	MW-10R[4]			Well ID	MW-12		
Date	Analyte (µg/L)[1]			Date	Analyte (µg/L)[1]			Date	Analyte (µg/L)[1]			Date	Analyte (µg/L)[1]		
	TCE	DCE (total)[2]	VC		TCE	DCE (total)[2]	VC		TCE	DCE (total)[2]	VC		TCE	DCE (total)[2]	VC
December 1998	< 5	8,500	1,100	March 2008	3.4 J	6.9 J	3.6 J	June 2010	3.9	12	< 2	December 1998	81	524 J	260
January 1999	< 5	9,300	2,100	June 2008	10	< 5	< 5	October 2010	56	260	< 2	January 1999	60	460	120
February 1999	3,000	2,500	< 10	September 2008	9.8 J	2.2 J	< 25	December 2010	22	9.4	< 1	February 1999	4,400 B	9,800	< 10
March 1999	120	1,406	330	December 2008	6.8	0.52 J	< 1	March 2011	76	17	< 1	March 1999	66 J	4,516	380
April 1999	130	4,416	480	March 2009	4.8	2.7	1.4	June 2011	9.3	273	1.8	April 1999	510	9,200	710 J
May 1999	320	2,110 J	62 J	June 2009	7.2	< 1	< 1	October 2011	86	143	< 1	May 1999	300	7,438 J	360 J
July 1999	35 J	1,600	290	September 2009	11	< 1	< 1	December 2011	11	31	< 1	July 1999	6.0	29 J	83
September 1999	96 J	7,100	1,600	December 2009	4.1	< 1	< 1	March 2012	17	111	< 1	September 1999	56	1,000	120
January 2000	9.0	50	72	March 2010	2.1	2.7	1.9	May 2012	13.2	157	< 1	January 2000	12 J	1,100	920
July 2000	< 5	1,107 J	820	June 2010	5.3	< 1	< 1	October 2012	< 1	1.7	< 1	July 2000	< 5	< 5	< 10
December 2001	85	11 J	1 J	October 2010	8.4	< 1	< 1	December 2012	1.1	41	< 1	December 2001	< 5	15 J	< 10
March 2002	6.0	51 J	18	December 2010	4.7	< 1	< 1	March 2013	79.3	38.6	< 1	March 2002	7.0	172 J	120
July 2002	< 5	4.6 J	5 J	March 2011	4.0	4.2	1.5	June 2013	9.6	19.4	< 1	July 2002	< 5	35	24
October 2002	< 20	410	130	June 2011	9.0	< 1	< 1	August 2013	< 1	23	< 1	October 2002	10	48 J	37
December 2002	3 J	37 J	23	October 2011	8.6	< 1	< 1	November 2013	1.5	2.1	< 1	December 2002	64	301 J	130
August 2003	9.0	8.8	3.0	December 2011	6.7	< 1	< 1	March 2014	31.4	25.8	< 1	August 2003	42	40	100
December 2003	< 5	50 J	49	March 2012	4.4	1.4	< 1	May 2014	53.4	26.7	< 1	December 2003	22	140	220
June 2004	< 5	9.6 J	35	October 2012	3.4	3.0	4.4	August 2014	13.2	41.9	1.1	June 2004	< 5	11	26
November 2004	< 20	400	93	March 2013	3.0	< 1	< 1	December 2014	13	16.2	< 1	November 2004	32	140	140
July 2005	< 20	320	180	August 2013	4.0	2.4	< 1	March 2015	19.3	7.1	< 1	July 2005	0.76	51	86
March 2008	150 D	758 DJ	60 DJ	March 2014	1.9	< 1	< 1	May 2015	22.4	96	< 1	March 2008	44	1,808 DJ	400
June 2008	< 100	3,100 D	910	August 2014	3.9	< 1	< 1	August 2015	< 1	12	< 1	June 2008	< 100	1,900	470
September 2008	46 J	6,029 DJ	1,800	March 2015	1.9	< 1	< 1	May 2016	2.6	89.9 J	3.7	September 2008	< 50	810	410
December 2008	26	69 J	1.5	August 2015	2.3	3.5	0.75 J	November 2016	109	54.6	< 1	December 2008	1,600 D	1,808 D	30
March 2009	23	92	< 1	May 2016	2.2	1.0	< 1	June 2017	53.7	91.9	< 1	March 2009	540	760	14
June 2009	42	3,000	350	November 2016	3.9	< 1	< 1	November 2017	96.6	39.9	< 1	June 2009	280	2,300	140
September 2009	57	7,800 D	870	June 2017	4.5	< 1	< 1	June 2018	29.1	66.3	< 1	September 2009	< 20	5,800 D	230
December 2009	67	4,400	270	November 2017	3.2	< 1	< 1	October 2018	20.3	6.9	< 1	December 2009	470	3,500	59
March 2010	< 25	4,700	580	June 2018	3.0	< 1	< 1	May 2019	232	112	< 1	March 2010	510	3,800	140
June 2010	< 25	5,400 D	690	October 2018	4.2	< 1	< 1	December 2019	791 b	185 b	< 1	June 2010	110	4,800	440
October 2010	58	1,811	57	May 2019	2.0	< 1	< 1	May 2020	190	77.1	< 1	October 2010	36	970	310
December 2010	14	66	< 1	December 2019	1.5	< 1	< 1					December 2010	230	1,200	< 10
March 2011	25	145	3.0	May 2020	1.1	< 1	< 1					March 2011	127	620.4	9.4
June 2011	10	3,902 D	334 D									June 2011	194	3,843 D	364 D
October 2011	12	2,744 D	115 D									October 2011	1,750 D	1,942 D	15
December 2011	16	158	< 1									December 2011	828 D	2,032 D	25
March 2012	29.5	399.5	24.2									March 2012	188	1,580	25.3
October 2012	< 1	809	1,270									May 2012	5,870	9,958	106
March 2013	16.7	121	< 1									October 2012	< 1	2,685	3,860
August 2013	1.6	3410.1	242									December 2012	692	1,244	5.8
March 2014	16.5	134.1	< 1									March 2013	130	745	< 1
August 2014	11	4,137	631									June 2013	393	2,092	76.7
March 2015	9.3	34.9	<1									August 2013	198	1,016	460
August 2015	2.3	1,440	0.32 J									November 2013	1,010	1,810	58.4
May 2016	11.2	7,446	648									March 2014	202	809	< 5
November 2016	< 1	39.7	< 1									May 2014	140	998.9	< 5
January 2017	2.9	10	2.9									August 2014	< 5	1,387.3	1,200
April 2017	2.0	9.9	2.2									December 2014	262	1,064.9	14.3
June 2017	30.2	72.1	6.6									March 2015	92.1	629.2	< 5
November 2017	3.2	32.55	15.5									May 2015	390	2,272	176
June 2018	0.9	642.9 J	291									August 2015	38.7	1,541.8	389
October 2018	86.1	283.7 J	14.8									May 2016	149	1,857.5	230
May 2019	20.3	80.8	7.0									November 2016	58.6	510.3	64
December 2019	20.3	61.2 J	1.9									January 2017	26.2	163	15.2
May 2020	1.8	49.73	49									April 2017	14.4	125	19.9
												June 2017	8.2	245	81.1
												November 2017	16.6	235.5	86
												June 2018	3.2	223.6	138
												October 2018	128	489.2	67.3
												May 2019	4.2	41.6	10.3
												December 2019	68.8	353 b	23.8
												May 2020	0.68 J	5.05	8.1

Notes:

1. Samples analyzed for VOCs using USEPA Method 8260. Samples analyzed for TPH-GRO and TPH-DRO using USEPA Method 8015 B. Samples analyzed for PCBs using USEPA Method 608.
2. DCE (total) includes the sum of 1,1-dichloroethene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene.

Definitions:

B - indicates a results > = MDL but < RL
b - results run from Run #2
c - results run from Run #3
D - Identifies an analysis that used a secondary dilution factor
DCE - Dichloroethene
J - Indicates an estimated value
µg/L - micrograms per liter
TCE - Trichloroethene
VC - Vinyl Chloride

Table 9
Summary of TCE, DCE, and VC in Groundwater Samples
D.C. Rollforms Site, Jamestown, New York
NYSDEC Site # 907019

Well ID	MW-13			Well ID	MW-14			Well ID	ESI-1			Well ID	ESI-2		
Date	Analyte (µg/L)[1]			Date	Analyte (µg/L)[1]			Date	Analyte (µg/L)[1]			Date	Analyte (µg/L)[1]		
	TCE	DCE (total)[2]	VC		TCE	DCE (total)[2]	VC		TCE	DCE (total)[2]	VC		TCE	DCE (total)[2]	VC
July 2000	< 5	6.0	4.0 J	July 2000	13 J	4,700	1,400	July 2002	< 100	210	2,300	July 2002	< 20	21	390
December 2001	24	< 5	< 5	December 2001	< 5	3,000	610	October 2002	< 20	21	460	October 2002	< 10	< 10	52
July 2002	0.9 J	< 5	< 5	March 2002	< 5	6,600	1,100	August 2003	< 20	16	420	August 2003	< 5	< 5	36
October 2002	< 5	< 5	< 5	July 2002	NA	14,000	3,800	December 2003	< 5	1.0 J	1.0 J	December 2003	< 20	230	500
December 2002	51	3 J	< 5	October 2002	< 500	8,400	2,000	June 2004	< 500	92 J	1,300	June 2004	< 5	5.0 J	190
August 2003	3.0	< 5	< 5	December 2002	< 250	6,816 J	1,400	December 2004	< 5	< 5	< 5	December 2004	< 5	< 5	12
December 2003	< 5	< 5	< 5	August 2003	< 1,200	20,000	1,900	July 2005	< 50	70	1,200	July 2005	< 5	< 5	75
June 2004	< 5	< 5	< 5	December 2003	< 500	16,000	2,200	March 2008	< 50	< 50	< 50	March 2008	< 25	< 25	< 25
November 2004	< 5	< 5	< 5	June 2004	< 1,000	19,000	2,500	June 2008	< 50	< 50	< 50	December 2008	< 1	< 1	< 1
July 2005	< 5	< 5	< 5	December 2004	< 500	16,000	2,300	September 2008	< 50	< 50	< 50	March 2009	< 1	< 1	< 1
March 2008	2.7 J	48 J	24	March 2008	1.7 J	1,009 DJ	340	December 2008	< 1	< 1	< 1	March 2010	< 1	< 1	< 1
June 2008	6.7	1,306 DJ	85	June 2008	< 100	1,800	550	March 2009	< 1	< 1	< 1	June 2010	< 1	< 1	< 1
September 2008	< 100	1,700 D	890	September 2008	< 100	1,814 J	3,900 D	June 2009	< 1	< 1	< 1	October 2010	< 1	< 1	< 1
December 2008	61	523 DJ	200 D	December 2008	3.7	975 DJ	390 D	September 2009	< 1	3.2	< 1	December 2010	< 1	< 1	< 1
March 2009	41	1,700	630	March 2009	< 5	620	150	December 2009	< 1	< 1	< 1	March 2011	< 1	< 1	< 1
June 2009	< 50	6,200	1,700	June 2009	< 10	1,100	450	March 2010	< 1	3.6	< 1	June 2011	4.1	< 1	1.1
September 2009	< 25	2,600	170	September 2009	< 2.5	190	300	June 2010	< 1	< 1	< 1	October 2011	< 1	< 1	< 1
December 2009	< 5	900	400	December 2009	< 2.5	710 D	310	October 2010	< 1	< 1	< 1	December 2011	< 1	< 1	< 1
March 2010	< 5	510	170	March 2010	< 5	1,307 D	510	December 2010	< 1	< 1	< 1	March 2012	< 1	< 1	< 1
June 2010	< 5	1,400 D	530	June 2010	< 2	220	280	March 2011	< 1	< 1	< 1	October 2012	< 1	< 1	< 1
October 2010	< 10	5,157 D	4,500 D	October 2010	< 1	85	170	June 2011	< 1	< 1	< 1	March 2013	< 1	< 1	< 1
December 2010	< 25	4,500 D	4,300	December 2010	3.4	1,607 D	390 D	October 2011	< 1	< 1	< 1	August 2013	< 1	< 1	< 1
March 2011	5.8	363	612	March 2011	66	1,809	451	December 2011	< 1	< 1	< 1	March 2014	< 1	< 1	< 1
June 2011	5.7	325	377	June 2011	< 1	1,419 D	544	March 2012	< 1	< 1	< 1	August 2014	0.54 J	< 1	0.89 J
October 2011	85	1,538 D	1,310 D	October 2011	3.4	2,230 D	476 D	October 2012	< 1	10.9	11.8	March 2015	0.47 J	< 1	< 1
December 2011	79	916 D	494 D	December 2011	3.1	1,282 D	353	March 2013	< 1	< 1	< 1	August 2015	< 1	2.8	1.4
March 2012	36.7	392	243	March 2012	< 1	3,401.3	1,260	August 2013	< 1	< 1	< 1	May 2016	< 1	0.76 J	1.2
May 2012	495	3,116	682	May 2012	< 1	568	209	March 2014	< 1	< 1	< 1	November 2016	3.7	< 1	< 1
October 2012	< 1	2,554	3,100	October 2012	< 1	24.9	65	August 2014	< 1	< 1	< 1	June 2017	<1	2.3	1.3
December 2012	72.2	316	15	December 2012	2.9	1,828.7	194	March 2015	< 1	< 1	< 1	November 2017	<1	0.64 J	<1
March 2013	52.8	350	27.7	March 2013	< 1	801	158	August 2015	< 1	< 1	< 1	June 2018	30.6	169.4	6.6
June 2013	40.9	971.3	60.2	June 2013	< 1	2,512.5	611	May 2016	< 1	< 1	< 1	October 2018	5.6	48.4 J	9.9
August 2013	< 1	1,564	1,000	August 2013	< 1	888.2	526	November 2016	< 1	< 1	< 1	May 2019	2.4	39.16 J	14.9
November 2013	29.5	125	8.2	November 2013	< 1	2310	1,190	June 2017	< 1	< 1	< 1	December 2019	< 1	0.93	< 1
March 2014	25.6	277.6	180	March 2014	< 4	1,044.9	590	November 2017	< 1	< 1	< 1	May 2020	57.5	171.4 b	1.0
May 2014	46.5	321.6	18.1	May 2014	< 10	1,640.2	1,030	June 2018	< 1	< 1	< 1				
August 2014	46	2,395	236	August 2014	912	4,016 J	204	October 2018	< 1	< 1	< 1				
December 2014	11.2	198	350	December 2014	< 5	1,494.2	1,970	May 2019	< 1	< 1	< 1				
March 2015	12.1	175.3	27	March 2015	< 5	1,236	954	December 2019	< 1	< 1	< 1				
May 2015	1.9	2.2	326	May 2015	1.6	427	523	May 2020	< 1	< 1	< 1				
August 2015	< 1	10,009	5,910	August 2015	< 5	285	453								
May 2016	< 1	145	181	May 2016	< 5	788.1	871								
November 2016	25	121	48	November 2016	1.7	194.7	303								
January 2017	< 2	7.0	9.3	January 2017	0.6	105	150								
April 2017	< 1	1.9	2.4	April 2017	0.5	59	98.5								
June 2017	< 2	1.4	1.4	June 2017	< 1	413	766								
November 2017	< 1	0.85 J	1.1	November 2017	1.1	615	697								
June 2018	< 1	1.1	1.1	June 2018	< 5	392.3 J	911								
October 2018	< 5	2.9 J	< 1	October 2018	3.4	2,626	446								
May 2019	< 1	1.7	0.9 J	May 2019	1.2	416.4 J	755								
December 2019	< 1	0.69 J	< 1	December 2019	8.8	3,017.8 b	1,020 c								
May 2020	< 1	3.7	2.4	May 2020	< 2.5	1,545.9 c	939 c								

Notes:

1. Samples analyzed for VOCs using USEPA Method 8260. Samples analyzed for TPH-GRO and TPH-DRO using USEPA Method 8015 B. Samples analyzed for PCBs using USEPA Method 608.
2. DCE (total) includes the sum of 1,1-dichloroethene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene.

Definitions:

B - indicates a results > = MDL but < RL
b - results run from Run #2
c - results run from Run #3
D - Identifies an analysis that used a secondary dilution factor
DCE - Dichloroethene
J - Indicates an estimated value
µg/L - micrograms per liter
TCE - Trichloroethene
VC - Vinyl Chloride

Table 9
Summary of TCE, DCE, and VC in Groundwater Samples
D.C. Rollforms Site, Jamestown, New York
NYSDEC Site # 907019

Well ID	ESI-4R[3]			Well ID	ESI-6			Well ID	ESI-7			Well ID	OW-5		
Date	Analyte (µg/L)[1]			Date	Analyte (µg/L)[1]			Date	Analyte (µg/L)[1]			Date	Analyte (µg/L)[1]		
	TCE	DCE (total)[2]	VC		TCE	DCE (total)[2]	VC		TCE	DCE (total)[2]	VC		TCE	DCE (total)[2]	VC
October 2010	150	186	38	December 1998	2.0 J	19	13	December 1998	320	8.0	< 10	March 2008	< 5	< 5	< 5
December 2010	12	410	39	January 1999	< 5	30	34	January 1999	< 5	3.0	< 10	June 2008	< 5	6,656 DJ	11,000 D
March 2011	134	410	52	February 1999	360	22	< 10	February 1999	16	19	< 10	September 2008	< 25	7,213 DJ	11,000 D
June 2011	15	1,165 D	248 D	March 1999	390	82	50	March 1999	100	40	2.0 J	December 2008	< 1	< 1	< 1
October 2011	4.2	391	102	April 1999	520	75	45 J	April 1999	180	37	4.0 J	March 2009	< 1	< 1	< 1
December 2011	2.5	480 D	101	May 1999	280	39	42	May 1999	77	83 J	88	June 2009	< 5	930	780
March 2012	3.5	2,070	825	July 1999	120	12	11	July 1999	89	2.5 J	4.0 J	September 2009	< 5	3,200 D	5,400 D
August 2013	< 1	98	9.2	September 1999	610	8.0 J	< 10	September 1999	190	4.0 J	< 10	December 2009	< 1	130	130
March 2014	1.2	315	51.9	January 2000	130	46	24	January 2000	33	49.7 J	3.0 J	March 2010	< 1	1,709 D	1,400 D
August 2014	1.1	253.5	33.6	July 2000	< 5	< 5	< 10	July 2000	4.0 J	14	< 10	June 2010	< 10	5,100 D	4,200 D
March 2015	10.1	230.8	86	December 2001	3.0	14	5.0	December 2001	7.0	17 J	2.0 J	October 2010	< 2	46	110
August 2015	2.1	180	29.1	March 2002	< 5	49	26	March 2002	65	261 J	2.0 J	December 2010	< 1	< 1	< 1
May 2016	2.1	194	39.5	July 2002	1.0 J	4.0 J	2.0 J	July 2002	9.0	204 J	33	March 2011	< 1	< 1	< 1
November 2016	< 1	330	431	October 2002	< 5	1 J	< 5	October 2002	1.0 J	7.0	2.0 J	June 2011	1.0	2,558 D	1,650
June 2017	11	143	35.7	December 2002	< 5	14	9.0	December 2002	24	83 J	1.0 J	October 2011	< 1	187	137 D
November 2017	56.7	83.81	7.7	August 2003	< 5	2.0	< 5	August 2003	10	93	5.0	December 2011	< 1	< 1	< 1
June 2018	NS	NS	NS	December 2003	4.0 J	67	23	December 2003	13	171 J	4.0 J	March 2012	< 1	1,207.5	1,030
October 2018	27.3	103	3.9	June 2004	< 5	6.0	12	July 2004	< 5	17 J	11	October 2012	< 1	2,554.2	4,060
May 2019	20.9	102.63 J	1.0	November 2004	< 5	43	11	November 2004	10	66	< 5	March 2013	< 1	9.3	< 1
December 2019	11.6	102.82 J	14.9	July 2005	< 5	14	6.0	July 2005	< 5	19	18	August 2013	< 1	1,868.8	2,710
May 2020	7.2	130.7	10.1	March 2008	< 5	1.6 J	3.6 J	March 2008	2.2 J	20	2.4 J	March 2014	< 1	22.9	25
				June 2008	< 5	< 5	1.5 J	June 2008	< 5	< 5	< 5	August 2014	< 1	385.7 J	1,000
				September 2008	< 5	2.6 J	3.2 J	September 2008	< 5	1.1 J	0.55 J	March 2015	3.2	< 1	< 1
				December 2008	< 1	2.2	1.1	December 2008	0.79 J	3.2	< 1	August 2015	0.56 J	98	262
				March 2009	9.1	6.8	2.4	March 2009	7.9	5.7	< 1	May 2016	< 1	171	463
				June 2009	1.4	1.1	< 1	June 2009	< 1	< 1	< 1	November 2016	< 1	< 1	< 1
				September 2009	< 1	< 1	< 1	September 2009	< 1	1.4	< 1	June 2017	< 1	514	660
				December 2009	< 1	2.1	< 1	December 2009	< 1	1.8	1.4	November 2017	< 1	57	84
				March 2010	< 1	< 1	< 1	March 2010	1.1	5.6	3.2	June 2018	< 1	101	303
				June 2010	< 1	< 1	< 1	June 2010	< 1	1.1	1.2	October 2018	0.68 J	< 1	< 1
				October 2010	< 1	< 1	< 1	October 2010	< 1	2.6	1.2	May 2019	< 1	0.81 J	1.3
				December 2010	< 1	1.6	< 1	December 2010	7.3	13	< 1	December 2019	< 1	< 1	< 1
				March 2011	1.1	2.5	< 1	March 2011	44	168	6.8	May 2020	< 1	< 1	1.3
				June 2011	< 1	< 1	< 1	June 2011	< 1	1.3	1.6				
				October 2011	< 1	< 1	< 1	October 2011	< 1	1.2	< 1				
				December 2011	< 1	1.5	< 1	December 2011	1.2	9.1	< 1				
				March 2012	< 1	< 1	< 1	March 2012	8.5	10.1	1.5				
				October 2012	< 1	< 1	< 1	October 2012	< 1	2.1	4.4				
				March 2013	< 1	< 1	< 1	March 2013	< 1	< 1	< 1				
				August 2013	< 1	1.3	< 1	August 2013	< 1	< 1	< 1				
				March 2014	< 1	< 1	< 1	March 2014	10.2	8.0	1.5				
				August 2014	< 1	< 1	< 1	August 2014	< 1	1.3	0.79				
				March 2015	0.51 J	1.6	< 1	March 2015	5.5	14.1	< 1				
				August 2015	< 1	0.87 J	0.21 J	August 2015	< 1	3.6	0.51 J				
				May 2016	< 1	< 1	< 1	May 2016	33.1	62.4	3.4				
				November 2016	< 1	1.5	< 1	November 2016	1.9	4.8	< 1				
				June 2017	< 1	< 1	< 1	June 2017	< 1	4.1	<1				
				November 2017	< 1	4.6	26.8	November 2017	2.7	7.3	<1				
				June 2018	< 1	0.80 J	2.6	June 2018	56.8	143.67 J	2.0				
				October 2018	< 1	3.1	14.6	October 2018	17.8	101.5	11.2				
				May 2019	< 1	< 1	< 1	May 2019	17.6	157.2	2.3				
				December 2019	< 1	< 1	< 1	December 2019	0.72	1.7	< 1				
				May 2020	< 1	< 1	< 1	May 2020	49.1	171.99 b	< 1				

Notes:

1. Samples analyzed for VOCs using USEPA Method 8260. Samples analyzed for TPH-GRO and TPH-DRO using USEPA Method 8015 B. Samples analyzed for PCBs using USEPA Method 608.
2. DCE (total) includes the sum of 1,1-dichloroethene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene.

Definitions:

B - indicates a results > = MDL but < RL
b - results run from Run #2
c - results run from Run #3
D - Identifies an analysis that used a secondary dilution factor
DCE - Dichloroethene
J - Indicates an estimated value
µg/L - micrograms per liter
NS - Not sampled
TCE - Trichloroethene
VC - Vinyl Chloride

Table 9
Summary of TCE, DCE, and VC in Groundwater Samples
D.C. Rollforms Site, Jamestown, New York
NYSDEC Site # 907019

Well ID	OW-6		
Date	Analyte (µg/L)[1]		
	TCE	DCE (total)[2]	VC
March 2008	42	343 DJ	76
June 2008	11 J	100	310
September 2008	14 J	130	330
December 2008	230 D	98 D	0.8 J
March 2009	480	210	< 2.5
June 2009	94	290	40
September 2009	35	300	120
December 2009	200	640 D	9.8
March 2010	59	606	150
June 2010	20	420	120
October 2010	32	223	220
December 2010	190 D	180	1.4
March 2011	3.6	6.1	< 1
June 2011	15	249	17
October 2011	2.7	11.7	< 1
December 2011	610 D	362 D	< 1
March 2012	298	314	4.3
May 2012	66.8	414	57.5
October 2012	9.6	93.6	100
December 2012	13.8	85.5	57.6
March 2013	27.8	46	< 1
June 2013	35	157	87.5
August 2013	28.5	207.0	290
November 2013	1.0	2.1	1.6
March 2014	827	544	< 4
May 2014	672	358.1	1.8
August 2014	67	450.3	47.1
December 2014	17.1	48.2	0.46 J
March 2015	214	283	< 4
May 2015	197	5.6 J	176
August 2015	30.6	420.3	190
May 2016	68.1	600.2	108
November 2016	45.3	522	12
June 2017	16	479.9	405
November 2017	160	537.2	8.9
June 2018	47.2	336.2	84.2
October 2018	17	120.3	16.4
May 2019	5.4	98.66 J	15.7
December 2019	6.4	13	< 1
May 2020	11	52.3	1.6

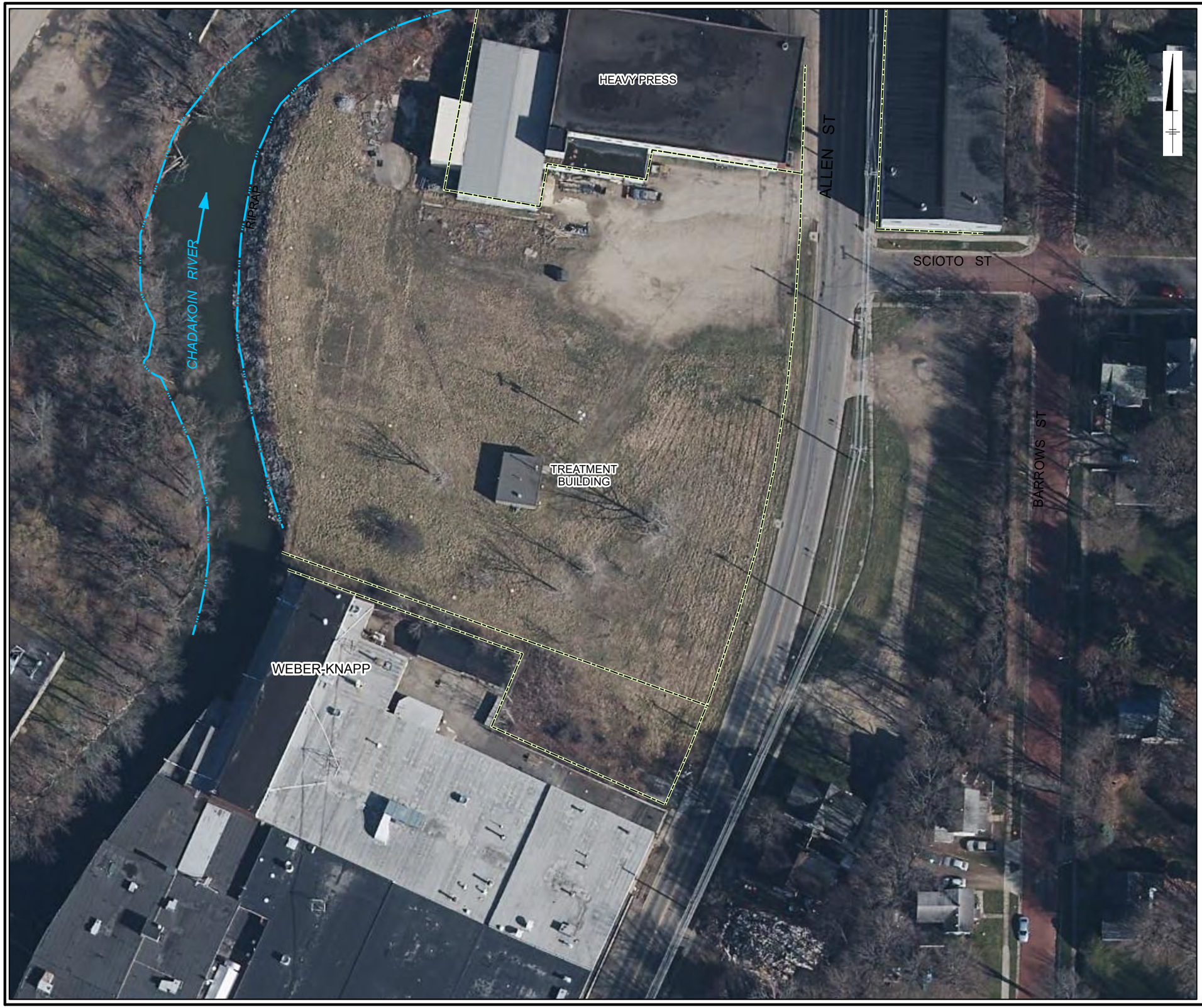
Notes:

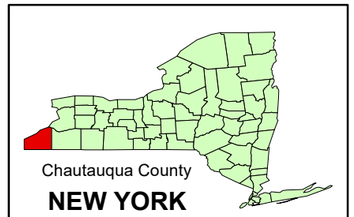
1. Samples analyzed for VOCs using USEPA Method 8260. Samples analyzed for TPH-GRO and TPH-DRO using USEPA Method 8015 B. Samples analyzed for PCBs using USEPA Method 608.
2. DCE (total) includes the sum of 1,1-dichloroethene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene.

Definitions:

B - indicates a results > = MDL but < RL
b - results run from Run #2
c - results run from Run #3
D - Identifies an analysis that used a secondary dilution factor
DCE - Dichloroethene
J - Indicates an estimated value
µg/L - micrograms per liter
TCE - Trichloroethene
VC - Vinyl Chloride

FIGURES





LEGEND

- Property Line
- Riverbank
- Flow Direction

0 60 120

SCALE IN FEET

PROJECTION: NAD 1983 StatePlane New York West FIPS 3103 Feet

SOURCE: NYS Orthos Online (2016).

INGERSOLL RAND - D.C. ROLLFORMS SITE
NYSDEC SITE NO. 907019, JAMESTOWN, NEW YORK

2019 - 2020 PRR

Site Location Map

ARCADIS Design & Consultancy for natural and built assets

FIGURE **1**

PROJECT: AY000219.0024 PATH: Z:\GISPROJECTS_ENV\INGERSOLRAND\DC_ROLLOVER\MAPDOCS\2019SEMIANNUALREPORT\F1 DCR_GWMON REG SITE LOC.MXD SAVED: 7/9/2019

LEGEND

- Injection Well
- Monitoring Well
- Recovery Well (passive)
- Injection Well (inactive)
- Observation Well
- Vacuum Enhanced Pumping (VEP) Well
- VEP Valve Box
- Property Line
- Interlocking Sheet Pile/Hydraulic Barrier Wall
- High Water Mark
- Bundled Process Line
- Discharge Line
- Recovery Well Piping
- Vacuum Line
- Overhead Electrical/Telecom Line
- Sanitary Sewer Line
- Bollard Pipe
- Effluent Pipe Clean Out
- Fire Hydrant
- Sewer Manhole
- Utility Pole

NOTE: All locations are approximate.

0 40 80

SCALE IN FEET

PROJECTION: NAD 1983 STATEPLANE NEW YORK WEST FIPS 3103 FEET

SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

INGERSOLL RAND - D.C. ROLLFORMS SITE
NYSDEC SITE NO. 907019, JAMESTOWN, NEW YORK

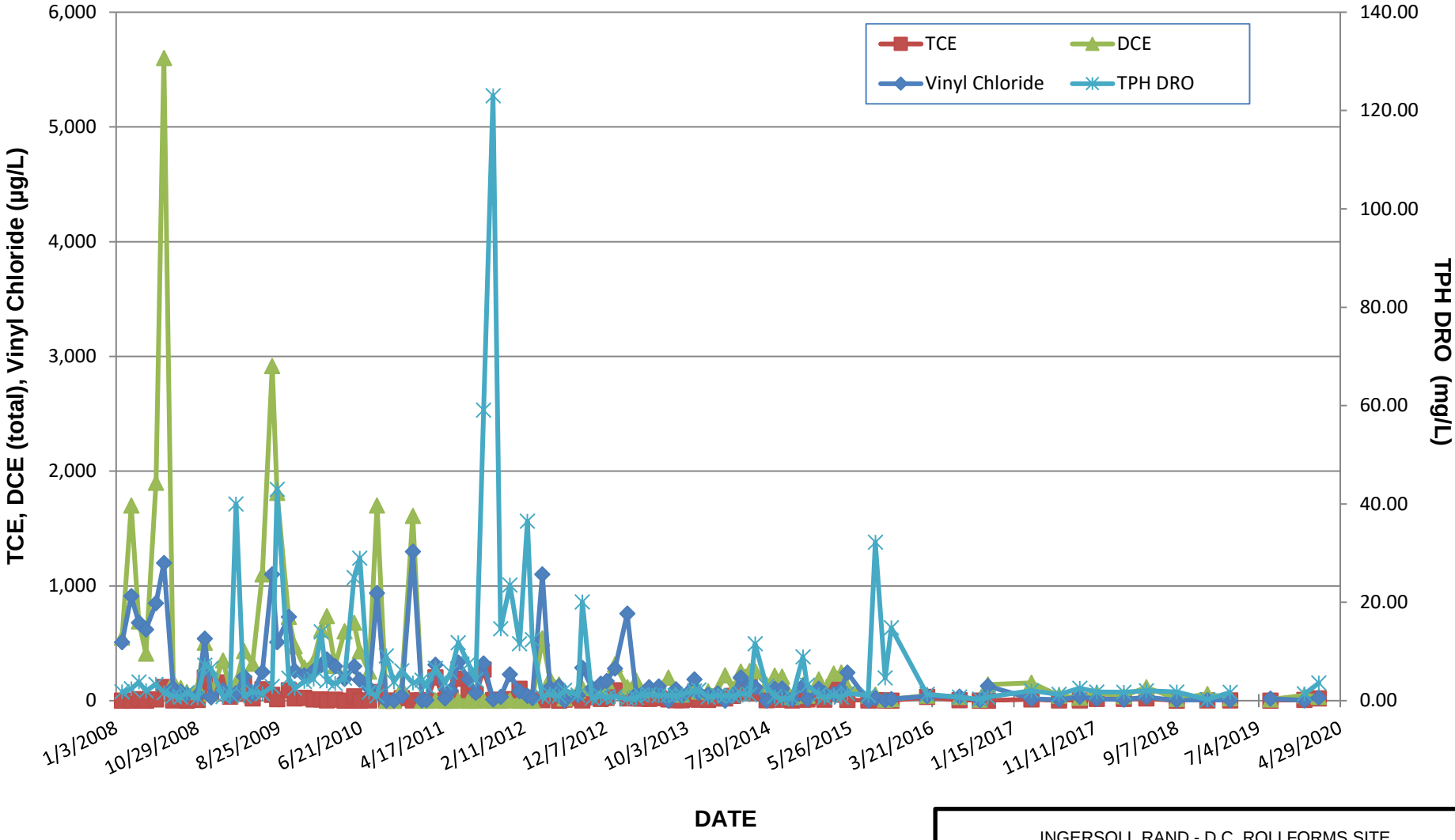
2019 - 2020 PRR

Site Plan/Remedial System Layout

ARCADIS Design & Consultancy for natural and built assets

FIGURE **2**

PROJECT: AY000219.0024 PATH: Z:\GISPROJECTS_ENVINGERSOLRANDIDC_ROLLOVERIMAPDOCS\2019\SEMIANUALREPORT\F2 DCR_GWMON SITE PLAN.MXD SAVED: 7/9/2019



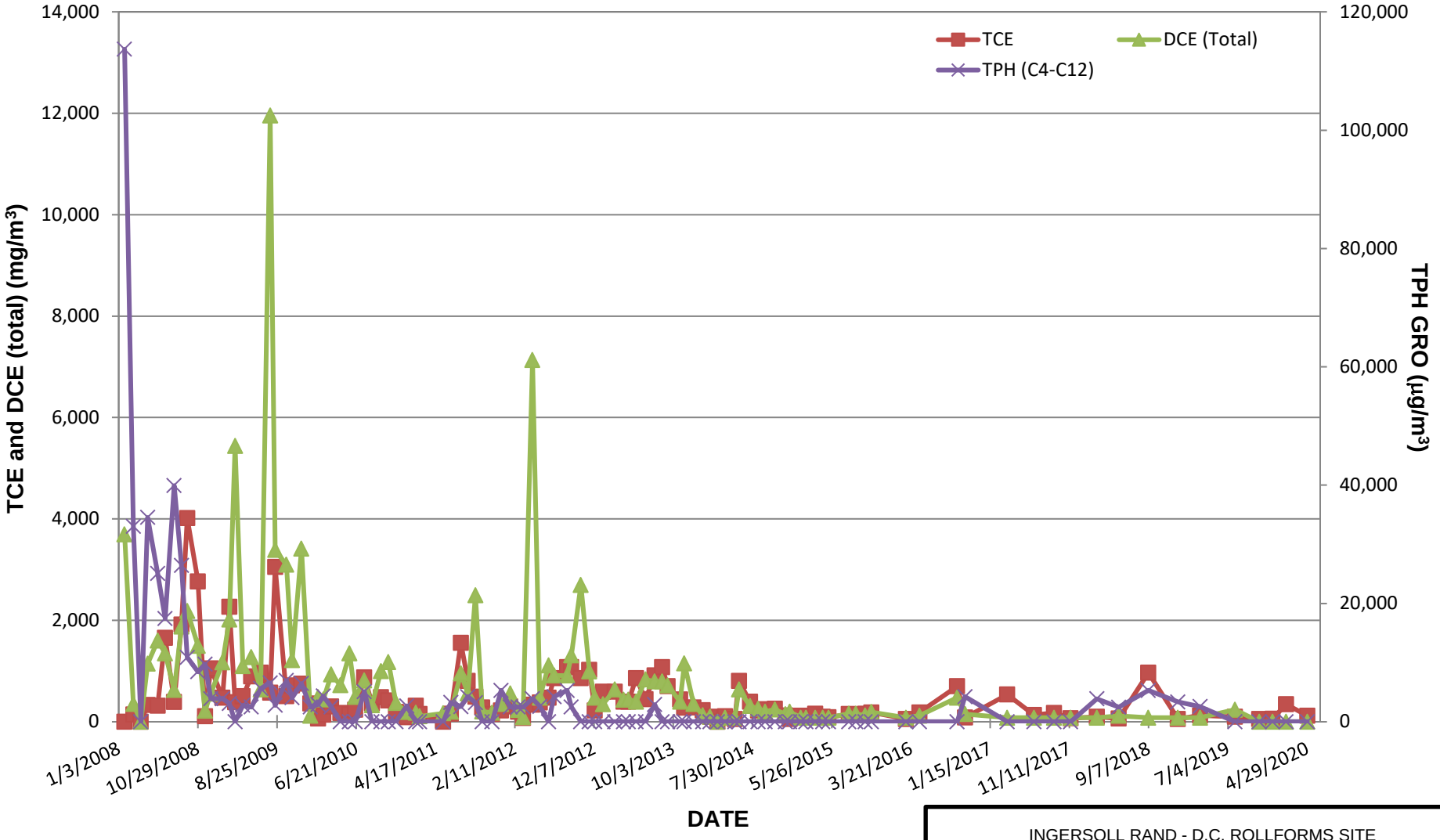
Definitions:
DCE – Dichloroethene
DRO – Diesel Range Organics
mg/L – milligrams per liter
TCE – Trichloroethene
TPH – Total Petroleum Hydrocarbons
µg/L – micrograms per liter

INGERSOLL RAND - D.C. ROLLFORMS SITE
NYSDEC SITE NO. 907019, JAMESTOWN, NEW YORK
2019 - 2020 PRR

System Influent Dissolved Phase Concentrations

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3



Definitions:

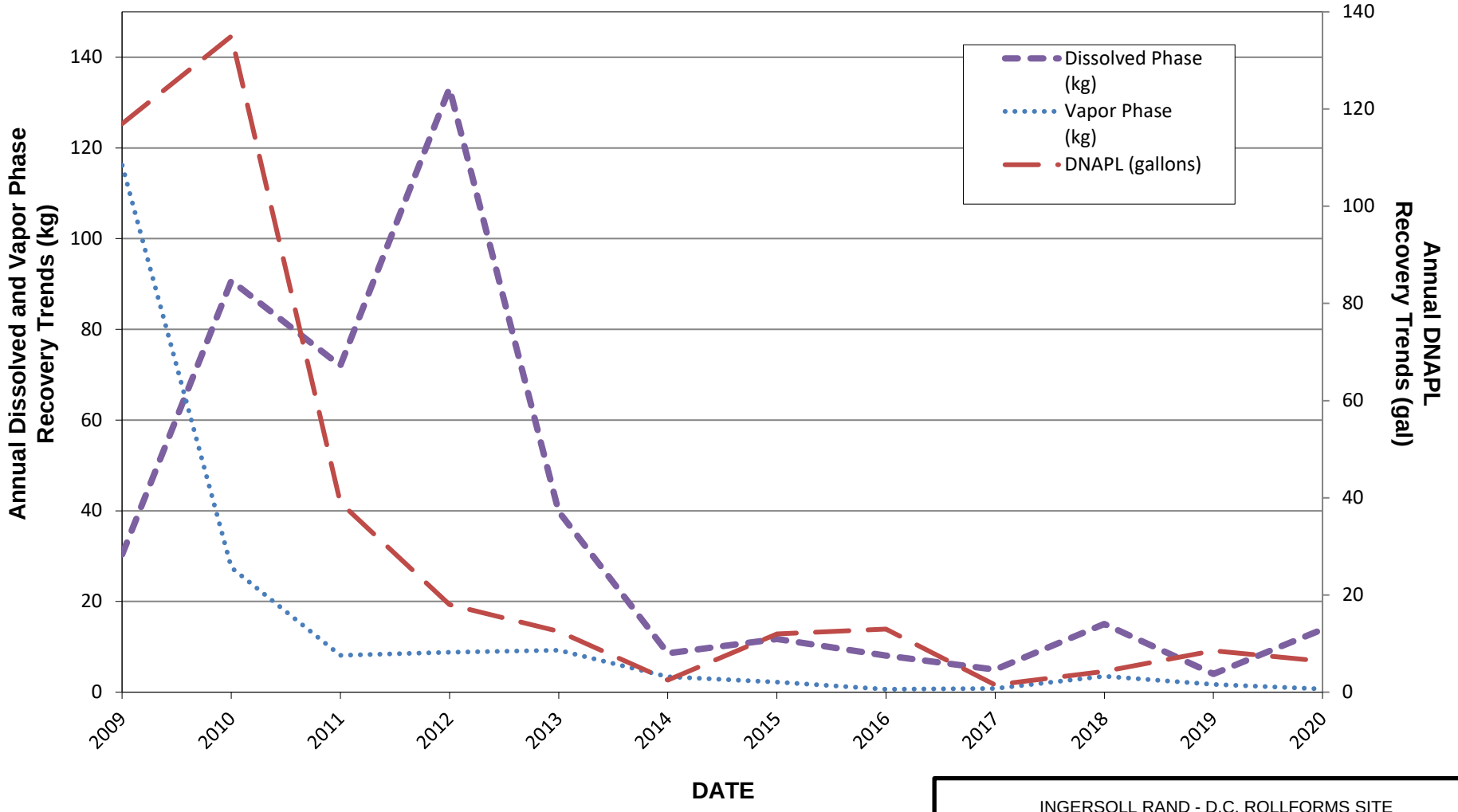
DCE – Dichloroethene
GRO – Gasoline Range Organics
mg/m^3 – milligram per cubic meters
µg/m^3 – micrograms per cubic meters
TCE – Trichloroethene
TPH – Total Petroleum Hydrocarbons

INGERSOLL RAND - D.C. ROLLFORMS SITE
NYSDEC SITE NO. 907019, JAMESTOWN, NEW YORK
2019 - 2020 PRR

System Influent Vapor Phase Concentrations

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4



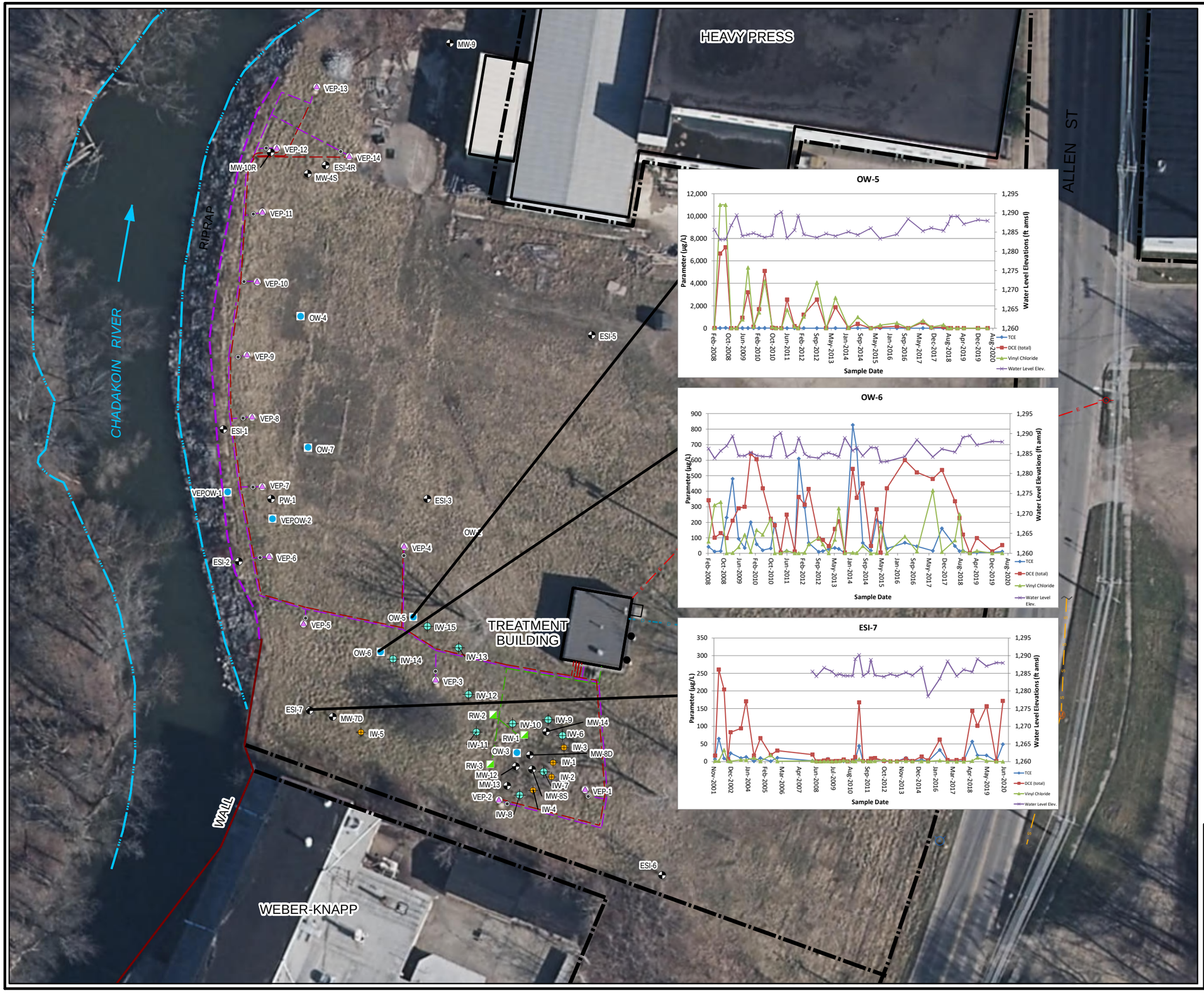
Definitions:
Gal – gallons
kg – kilograms

INGERSOLL RAND - D.C. ROLLFORMS SITE
NYSDEC SITE NO. 907019, JAMESTOWN, NEW YORK
2019 - 2020 PRR

Annual Mass Recovery Trends vs. Time

ARCADIS Design & Consultancy for natural and built assets

FIGURE
5



LEGEND

- Injection Well
- Monitoring Well
- Recovery Well (passive)
- Injection Well (inactive)
- Observation Well
- Vacuum Enhanced Pumping (VEP) Well
- VEP Valve Box
- Property Line
- Interlocking Sheet Pile/Hydraulic Barrier Wall
- High Water Mark
- Bundled Process Line
- Discharge Line
- Recovery Well Piping
- Vacuum Line
- Overhead Electrical/Telecom Line
- Sanitary Sewer Line
- Bollard Pipe
- Effluent Pipe Clean Out
- Fire Hydrant
- Sewer Manhole
- Utility Pole

NOTE: All locations are approximate.

0 40 80

SCALE IN FEET

PROJECTION: NAD 1983 STATEPLANE NEW YORK WEST FIPS 3103 FEET

SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

INGERSOLL RAND - D.C. ROLLFORMS SITE
NYSDEC SITE NO. 907019, JAMESTOWN, NEW YORK

2019 - 2020 PRR

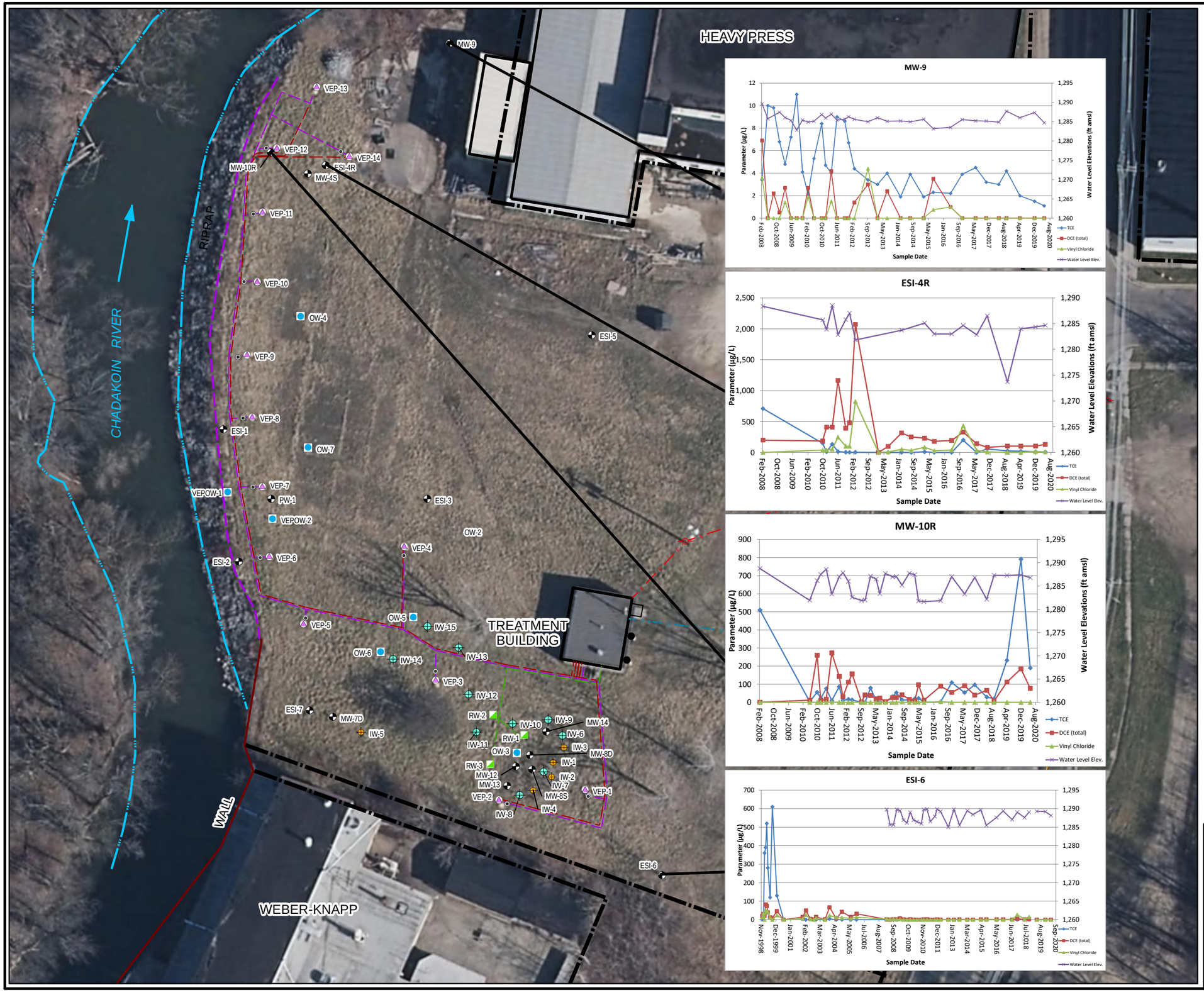
Summary of Groundwater Monitoring Analytical Results

ARCADIS Design & Consultancy for natural and built assets

FIGURE

6A

PROJECT: AY000219.0024 PATH: T:_ENV\INGERSOLRAND\DC_ROLLOVER\MAPDOCS\2020\F6A _GW MONITORING RESULTS_JUNE2020.MXD SAVED: 6/15/2020



LEGEND

- Injection Well
- Monitoring Well
- Recovery Well (passive)
- Injection Well (inactive)
- Observation Well
- Vacuum Enhanced Pumping (VEP) Well
- VEP Valve Box
- Property Line
- Interlocking Sheet Pile/Hydraulic Barrier Wall
- High Water Mark
- Bundled Process Line
- Discharge Line
- Recovery Well Piping
- Vacuum Line
- Overhead Electrical/Telecom Line
- Sanitary Sewer Line
- Bollard Pipe
- Effluent Pipe Clean Out
- Fire Hydrant
- Sewer Manhole
- Utility Pole

NOTE: All locations are approximate.

0 40 80

SCALE IN FEET

PROJECTION: NAD 1983 STATEPLANE NEW YORK WEST FIPS 3103 FEET

SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

INGERSOLL RAND - D.C. ROLLFORMS SITE
NYSDEC SITE NO. 907019, JAMESTOWN, NEW YORK

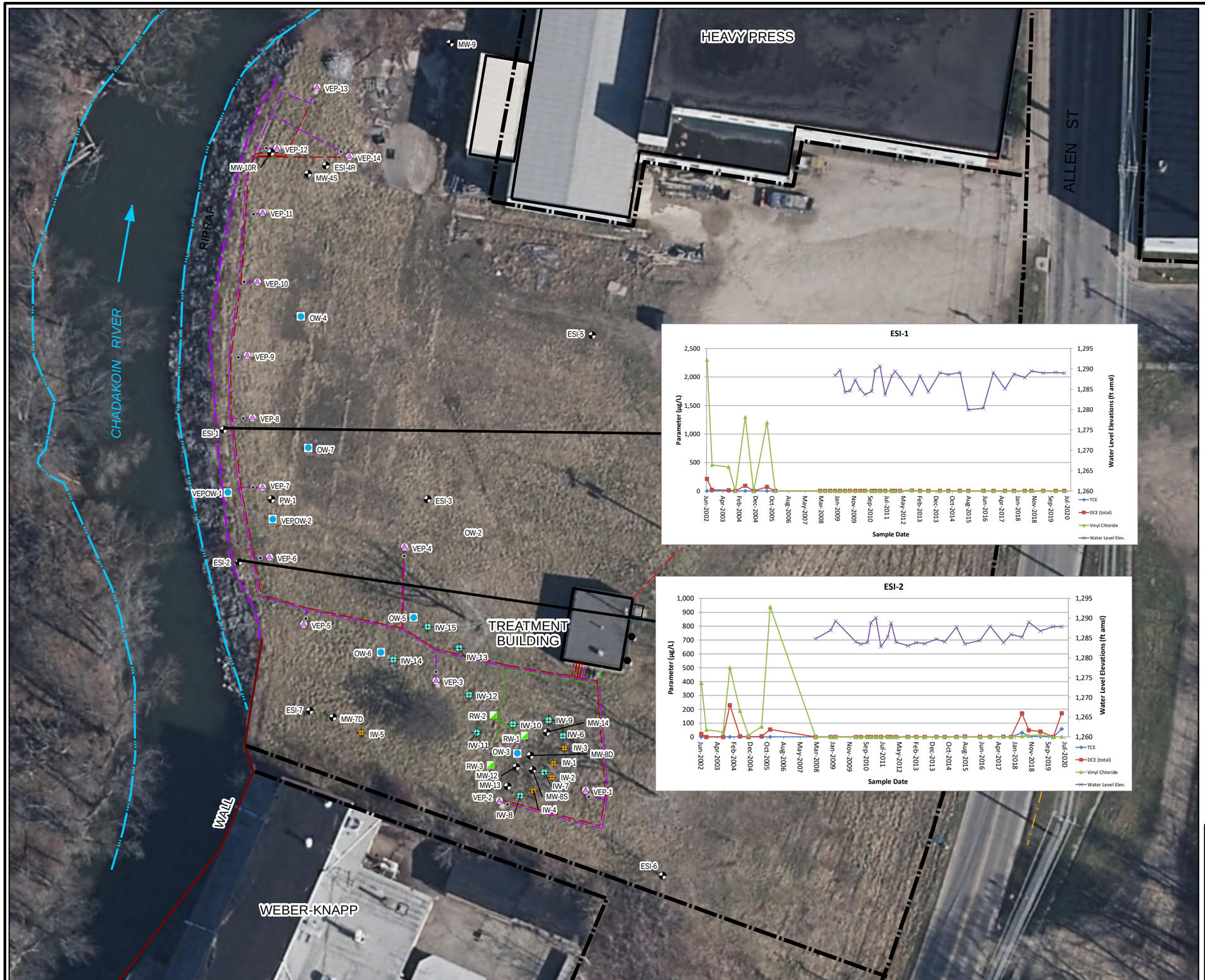
2019 - 2020 PRR

Summary of Groundwater Monitoring Analytical Results

ARCADIS Design & Consultancy for natural and built assets

FIGURE **6B**

PROJECT: AY000219.0024 PATH: T:_ENV\INGERSOLRAND\DC_ROLLOVER\MAPDOCS\2020\F6B _GW MONITORING RESULTS_JUNE2020.MXD SAVED: 6/15/2020



LEGEND

- Injection Well
- Monitoring Well
- Recovery Well (passive)
- Injection Well (inactive)
- Observation Well
- Vacuum Enhanced Pumping (VEP) Well
- VEP Valve Box
- Property Line
- Interlocking Sheet Pile/Hydraulic Barrier Wall
- High Water Mark
- Bundled Process Line
- Discharge Line
- Recovery Well Piping
- Vacuum Line
- Overhead Electrical/Telecom Line
- Sanitary Sewer Line
- Bollard Pipe
- Effluent Pipe Clean Out
- Fire Hydrant
- Sewer Manhole
- Utility Pole

NOTE: All locations are approximate.

0 40 80

SCALE IN FEET

PROJECTION: NAD 1983 STATEPLANE NEW YORK WEST FIPS 3103 FEET

SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

INGERSOLL RAND - D.C. ROLLFORMS SITE
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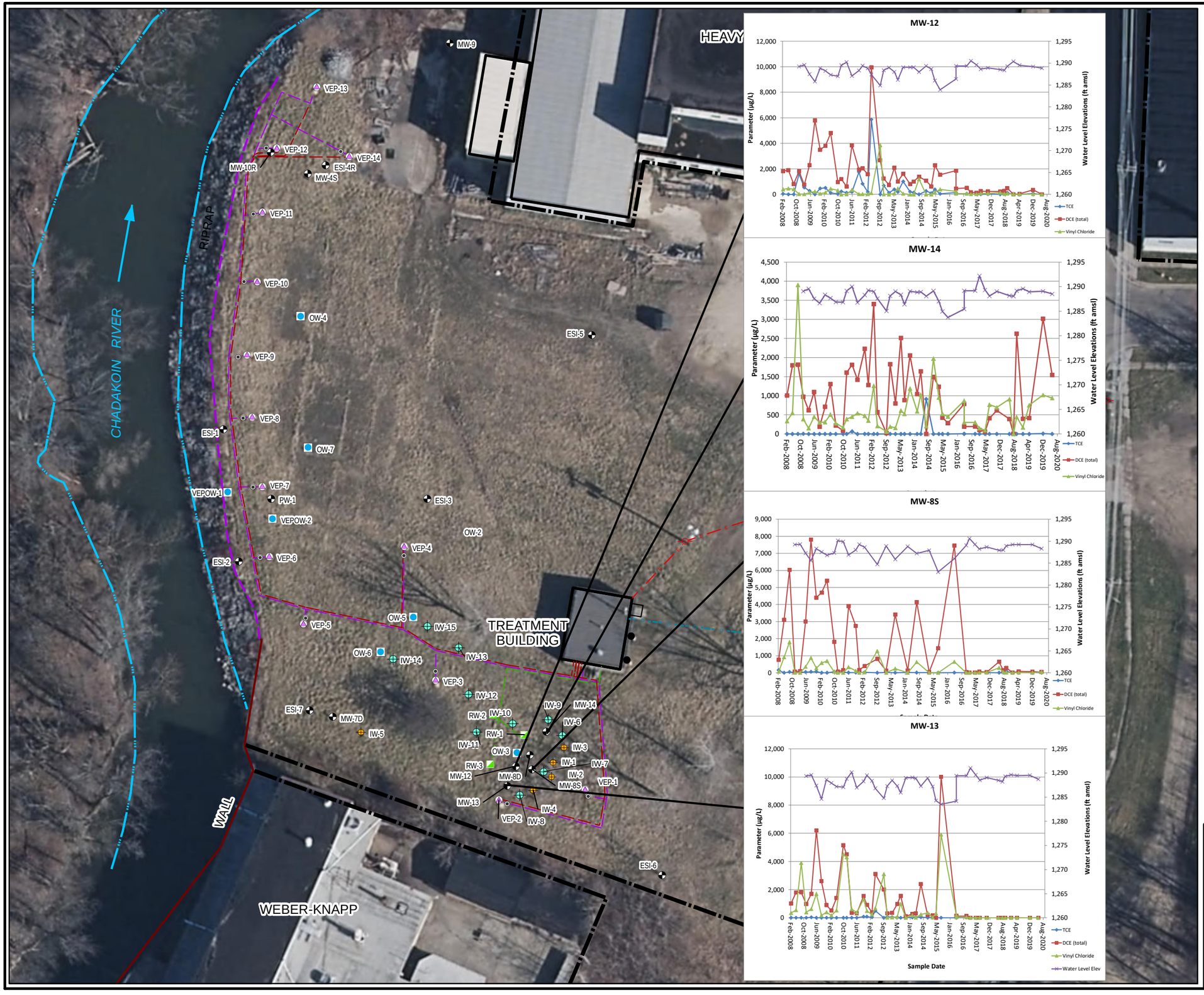
2019 - 2020 PRR

Summary of Groundwater Monitoring Analytical Results

ARCADIS Design & Consultancy for natural and built assets

FIGURE **6C**

PROJECT: AY000219.0024 PATH: T:_ENVIN\GERSOLRAND\DC_ROLLOVER\MAPDOCS\2020\F6C _GW MONITORING RESULTS_JUNE2020.MXD SAVED: 6/15/2020



LEGEND

- Injection Well
- Monitoring Well
- Recovery Well (passive)
- Injection Well (inactive)
- Observation Well
- Vacuum Enhanced Pumping (VEP) Well
- VEP Valve Box
- Property Line
- Interlocking Sheet Pile/Hydraulic Barrier Wall
- High Water Mark
- Bundled Process Line
- Discharge Line
- Recovery Well Piping
- Vacuum Line
- Overhead Electrical/Telecom Line
- Sanitary Sewer Line
- Bollard Pipe
- Effluent Pipe Clean Out
- Fire Hydrant
- Sewer Manhole
- Utility Pole

NOTE: All locations are approximate.

0 40 80

SCALE IN FEET

PROJECTION: NAD 1983 STATEPLANE NEW YORK WEST FIPS 3103 FEET

SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

INGERSOLL RAND - D.C. ROLLFORMS SITE
NYSDEC SITE NO. 907019, JAMESTOWN, NEW YORK

2019 - 2020 PRR

Summary of Groundwater Monitoring Analytical Results

ARCADIS Design & Consultancy for natural and built assets

FIGURE **6D**

PROJECT: AY000219.0024 PATH: T:_ENV\INGERSOLRAND\DC_ROLLOVER\MAPDOCS\2020\F6D _GW MONITORING RESULTS_JUNE2020.MXD SAVED: 6/15/2020

APPENDIX A

Site Inspection Forms

Site Cover and Riverbank Inspection Checklist

DC Rollforms Site, Jamestown, New York

Section 1: General Information

Figure Reference:

Weather: Sunny 58°F

Date / Time Monitoring Performed: 6/14/19

Cover material(s) ☑ Soil ☑ Vegetated Topsoil ☑ Rip Rap Stone

Section II. Observations

Observation	Yes	No	N/A	Provide Comments As Necessary (use additional space below if needed)
Erosion and Sedimentation Controls				
Are erosion and sedimentation (E&S) controls present? If yes:			✓	
Are they functioning as intended?			✓	
Are they still required (i.e., has a healthy stand of vegetation been established)?			✓	
Vegetated Topsoil Isolation Cover				
Are there areas of scour?		✓		
Is any geotextile fabric exposed?		✓		
Is vegetation effectively covering the intended area? Provide percent growth for seeded areas.	✓			
Is there any sign of distressed vegetation?		✓		
Do any areas require seeding?		✓		
Photograph Numbers (if applicable)				
Rip Rap Stone Cover				
Are there areas of scour?		✓		
Is any geotextile fabric exposed?		✓		
Photograph Numbers (if applicable)				
Wing Wall Deflector				
Are there areas of scour?		✓		
Is 30" dia. Rip Rap in place?	✓			
Photograph Numbers (if applicable)				
Riverbank Plantings				
Are the live stake cuttings thriving?	✓	✓		South End on North End Beaver Marsh
Photograph Numbers				
Chadakoin River (USGS)				
Discharge, Cubic Feet Per Second?				
Gage Height, Feet?				

Other Observations: Describe any other relevant observations noted during this monitoring period.

Performed by: Todd Corrigan Signature: Date: 6/14/19

Site Cover and Riverbank Inspection Checklist

DC Rollforms Site, Jamestown, New York

Section 1: General Information

Figure Reference: Site Plan	Weather: 60°F Cloudy, Rain
Date / Time Monitoring Performed: 10/31/2019	

Cover material(s)	□ Soil	X Vegetated Topsoil	X Rip Rap Stone

Section II: Observations

Observation	Yes	No	N/A	Provide Comments As Necessary (use additional space below if needed)
Erosion and Sedimentation Controls				
Are erosion and sedimentation (E&S) controls present? If yes:			X	
Are they functioning as intended?			X	
Are they still required (i.e., has a healthy stand of vegetation been established)?	X			Dormant
Vegetated Topsoil Isolation Cover				
Are there areas of scour?		X		
Is any geotextile fabric exposed?		X		
Is vegetation effectively covering the intended area? Provide percent growth for seeded areas.	X			
Is there any sign of distressed vegetation?		X		
Do any areas require seeding?		X		
Photograph Numbers (if applicable)				
Rip Rap Stone Cover				
Are there areas of scour?		X		
Is any geotextile fabric exposed?		X		
Photograph Numbers (if applicable)				
Wing Wall Deflector				
Are there areas of scour?		X		
Is 30" dia. Rip Rap in place?	X			
Photograph Numbers (if applicable)				
Riverbank Plantings				
Are the live stake cuttings thriving?	X	X		Signs of beaver damage
Photograph Numbers				
Chadakoin River (USGS 03014500, Falconer, NY)				
Discharge, Cubic Feet Per Second?	500			
Gage Height, Feet?	1.75			

Other Observations: Describe any other relevant observations noted during this monitoring period.

Performed by: Todd Carlgren	Signature: T. Carlgren	Date: 10/31/2019

Site Cover and Riverbank Inspection Checklist

DC Rollforms Site, Jamestown, New York

Section 1: General Information

Figure Reference:

Weather: Clear 25-45°

Date / Time Monitoring Performed: 3-18-20 14:00

Cover material(s) | □ Soil | X Vegetated Topsoil | X Rip Rap Stone

Section II. Observations

Observation	Yes	No	N/A	Provide Comments As Necessary (use additional space below if needed)
Erosion and Sedimentation Controls				
Are erosion and sedimentation (E&S) controls present? If yes:	X			Rip Rap Stone on bank
Are they functioning as intended?	X			No erosion observed
Are they still required (i.e., has a healthy stand of vegetation been established)?		X	X	
Vegetated Topsoil Isolation Cover				
Are there areas of scour?		X		
Is any geotextile fabric exposed?		X		
Is vegetation effectively covering the intended area? Provide percent growth for seeded areas.		X		≈ 25%
Is there any sign of distressed vegetation?	X			Vegitation that has been attacked by a beaver
Do any areas require seeding?		X		
Photograph Numbers (if applicable)				
Rip Rap Stone Cover				
Are there areas of scour?		X		
Is any geotextile fabric exposed?		X		
Photograph Numbers (if applicable)				
Wing Wall Deflector				
Are there areas of scour?		X		
Is 30" dia. Rip Rap in place?	X			
Photograph Numbers (if applicable)				
Riverbank Plantings				
Are the live stake cuttings thriving?		X		Plantings are dead due to beaver activity
Photograph Numbers				
Chadakoin River (USGS 03014500, Falconer, NY)				
Discharge, Cubic Feet Per Second?				
Gage Height, Feet?				

Other Observations: Describe any other relevant observations noted during this monitoring period.

Heavy beaver activity in the area. The beaver has cut down much of the standing willow put in place as river bank planting.

Performed by: J. Baker | Signature: [signature] | Date: 3-18-20

APPENDIX B

Institutional and Engineering Controls Certification Forms

Enclosure 2
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Site Management Periodic Review Report Notice
Institutional and Engineering Controls Certification Form

Site Details **Box 1**

Site No. **907019**

Site Name D.C. (Dow Craft) Rollforms

Site Address: 583 Allen Street Zip Code: 14701
City/Town: Jamestown
County: Chautauqua
Site Acreage: 2.380

Reporting Period: June 15, 2019 to June 15, 2020

	YES	NO
1. Is the information above correct?	X	☐
If NO, include handwritten above or on a separate sheet.		
2. Has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period?	☐	X
3. Has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))? *Change of use form submitted on March 19, 2020.*	X	☐
4. Have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period?	☐	X
If you answered YES to questions 2 thru 4, include documentation or evidence that documentation has been previously submitted with this certification form.		
5. Is the site currently undergoing development?	☐	X

Box 2

	YES	NO
6. Is the current site use consistent with the use(s) listed below? Commercial and Industrial	X	☐
7. Are all ICs/ECs in place and functioning as designed?	X	☐

IF THE ANSWER TO EITHER QUESTION 6 OR 7 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

Signature of Owner, Remedial Party or Designated Representative Date

SITE NO. 907019 **Box 3**

Description of Institutional Controls

Parcel	Owner	Institutional Control
307-13-2.2	~~Jamestown Alliance, Inc.~~ *AllMetal Press and Fabrication, Inc. (Purchase Date 6/29/2016)*	Site Management Plan Landuse Restriction Ground Water Use Restriction Soil Management Plan

Deed Restrictions (7/19/2005) Recorded - 11/29/2005:
1. Property use: Commercial or Industrial
2. Prohibition of use of groundwater.

Site Management Plan:Soils Management Plan and Inspections of Cover System, Rip Rap, Plantings, and Erosion.

Groundwater Collection and Treatment System Operation, Maintenance, and Monitoring.

Box 4

Description of Engineering Controls

Parcel	Engineering Control
307-13-2.2	Groundwater Containment Subsurface Barriers Groundwater Treatment System

Box 5

Periodic Review Report (PRR) Certification Statements

1. I certify by checking "YES" below that:

   a) the Periodic Review report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

   b) to the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and the information presented is accurate and compete.

YES	NO
X	☐

2. If this site has an IC/EC Plan (or equivalent as required in the Decision Document), for each Institutional or Engineering control listed in Boxes 3 and/or 4, I certify by checking "YES" below that all of the following statements are true:

   (a) the Institutional Control and/or Engineering Control(s) employed at this site is unchanged since the date that the Control was put in-place, or was last approved by the Department;

   (b) nothing has occurred that would impair the ability of such Control, to protect public health and the environment;

   (c) access to the site will continue to be provided to the Department, to evaluate the remedy, including access to evaluate the continued maintenance of this Control;

   (d) nothing has occurred that would constitute a violation or failure to comply with the Site Management Plan for this Control; and

   (e) if a financial assurance mechanism is required by the oversight document for the site, the mechanism remains valid and sufficient for its intended purpose established in the document.

YES	NO
X	☐

IF THE ANSWER TO QUESTION 2 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

Signature of Owner, Remedial Party or Designated Representative

Date

IC CERTIFICATIONS
SITE NO. 907019

Box 6

SITE OWNER OR DESIGNATED REPRESENTATIVE SIGNATURE

I certify that all information and statements in Boxes 1,2, and 3 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I Todd Carignan (print name) at 855 Route 146, Clifton Park, NY 12065 (print business address),

am certifying as Remedial Party, Arcadis of New York, Inc. (Owner or Remedial Party)

for the Site named in the Site Details Section of this form.

Signature of Owner, Remedial Party, or Designated Representative Rendering Certification

7/14/2020
Date

IC/EC CERTIFICATIONS

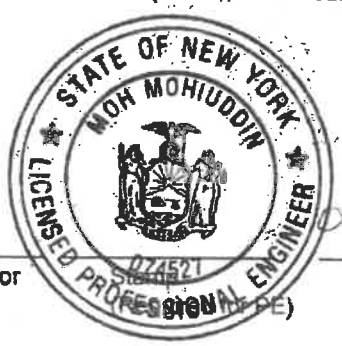
Box 7

Professional Engineer Signature

I certify that all information in Boxes 4 and 5 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I Moh Mohiuddin (print name) at 50 Millstone Rd, East Windsor, NJ 08520 (print business address),

am certifying as a Professional Engineer for the Remedial Party, Arcadis of New York, Inc. (Owner or Remedial Party)



Signature of Professional Engineer, for the Owner or Remedial Party, Rendering Certification

07/06/2020
Date

Arcadis of New York, Inc.

855 Route 146

Suite 210

Clifton Park, New York 12065

Tel 518 250 7300

Fax 518 250 7301

www.arcadis.com