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April 13, 2021

Submitted Via Email

Mr. Brian Sadowski
New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999

Subject: Former Carborundum Facility
2040 Cory Drive, Sanborn, NY
NYSDEC Site No. 932102
Sequestration Pilot Study Work Plan

Dear Mr. Sadowski,

On behalf of Elm Holdings Inc., AECOM Technical Services, Inc. (AECOM) is pleased to provide this Sequestration Pilot Study Work Plan (Work Plan) for completing a pilot study to evaluate enhancements to the groundwater control and extraction and treatment program at the former Carborundum Facility located at 2040 Cory Drive in the Village of Sanborn, Town of Wheatfield, New York (Site), New York State Department of Environmental Conservation (NYSDEC) Site No. 932102.

The pilot study will be performed to determine if an injectate (emulsified zero-valent iron [EZVI™]) can reduce the concentration, mass, and mobility of volatile organic compounds (VOCs) persistently detected in groundwater at select areas of the Site. Pending favorable results, the data collected during the pilot study will be used to upscale this enhancement approach to a site-wide basis as part of ongoing remedial efforts at the Site. The pilot test will be conducted in two areas of the Site: 1) in a suspected source area near well PW-3; and 2) near the downgradient site boundary near well P-4.

This work plan provides the following information:

- A brief summary of the Site background, including Site history, previous investigation and remediation activities, remedial action objectives (RAOs), and Site geology/hydrogeology;
- A detailed scope of work for the proposed injection pilot study including information about the injectate; and,
- A description of upcoming Site-related activities and a proposed groundwater sampling and reporting plan to monitor the effectiveness of the injection pilot study.

I. SITE BACKGROUND

The following summary presents a brief description of Site history, previous investigation and remediation activities, Site RAOs, and Site geology and hydrogeology.

Figure 1 shows the Project Location Plan and **Figure 2** shows the Site Plan. The Site property is comprised of four parcels totaling approximately 40 acres. Currently, there are two manufacturing buildings (Pyrotek, Inc. doing business as Pyrotek and a subsidiary business Metaullics, Inc.) and associated administrative buildings on the property. Construction of the most recent addition to the manufacturing facilities on the northernmost parcel was completed in November 2011. Private residences border the property along the western boundary of the Site. The property to the east is occupied by other industrial facilities. The majority of land to the north and south of the property is used for agricultural purposes. Surface topography generally slopes to the south toward the Niagara River. Surface water from the paved areas of the Site is collected by Metaullics' sewer system.

VOCs, including primarily trichloroethene (TCE), that were previously released to the environment during operations at the manufacturing facility, are being addressed under the direction of NYSDEC under a 1991 Order on Consent and associated modifications. TCE and its primary breakdown constituents, cis-1,2 dichloroethene (DCE) and vinyl chloride (VC), are present at select locations in the groundwater.

The 1991 Record of Decision (ROD) selected soil vapor extraction (SVE) for overburden soil and permitted groundwater recovery and treatment for bedrock groundwater. The recovery and treatment systems are operated with the goal of preventing off-site migration of dissolved VOCs.

The groundwater recovery system (GRS) began operation in mid-1993 and treats extracted groundwater using air stripping technology and an activated carbon polish. The GRS is operated with goals to provide on-site hydraulic containment and to prevent off-site migration of groundwater containing dissolved VOCs. Post-treatment water is discharged via a NYSDEC permitted State Pollutant Discharge Elimination System (SPDES) outfall to Cayuga Creek. Weekly discharge compliance samples are collected and analyzed in compliance with the SPDES permit.

A soil vapor extraction system was operated in conjunction with the GRS until 2001 and was subsequently decommissioned by 2007. In 2001, per discussions with NYSDEC, the bedrock groundwater recovery wells were reconfigured to extract groundwater from a shallower depth, focusing on the zones immediately at the top of bedrock (TOR) and below the top of bedrock (Zone 1). Additional deeper bedrock Zones 2, 3, 4, and 5 were found to be less impacted and suitable for monitored natural attenuation (MNA). This reconfiguration reduced the volume of bedrock groundwater extracted, reduced flow through the GRS, and focused capture of groundwater in the source area(s) and allowed deeper, less contaminated zones to be monitored for natural attenuation.

Sumps contained within three vaults in the Metaullics facility were connected to the GRS in 2012. The vault water collection and conveyance (VWCC) system was brought online on June 12, 2012.

Figure 2 shows the location of Site purge wells (P- and PW-series wells) and monitoring wells (B-series wells). **Attachment 1** presents the location of the purge wells and the three vaults in the Metaullics facility.

Quarterly groundwater sampling began in 1988. In October 2005, NYSDEC agreed to revise the groundwater sampling program and reduce the number of groundwater samples collected on an annual basis. In February 2016, NYSDEC requested that an updated groundwater monitoring program be developed. In October 2016, an updated groundwater monitoring program including transition to a semi-annual program was presented to NYSDEC. The proposed program was conditionally approved in November 2016 and was initiated in December 2016.

Site Geology/Hydrogeology

Overburden

The native soils underlying the Site generally consist of unconsolidated glacial lake sediment and till, including interbedded silts and clays with discontinuous sporadic fine sand lenses (shallow overburden). A thin coarse-grained layer is located above the bedrock (deep overburden). Based on information presented in the Remedial Investigation, the average thickness of the overburden is approximately 21 feet; ranging from 7 feet thick in the northern portion of the Site to 26 feet in the southern portion of the Site.

Overburden groundwater is first encountered as a discontinuous perched zone approximately 3 to 5 feet below ground surface (bgs). A more continuous water-bearing zone is encountered at the overburden bedrock interface (known as the “top of rock zone”, or TOR). The natural flow of groundwater at the bedrock interface is generally to the south-southeast.

Chlorinated organics in deep overburden soils may be introduced to the bedrock aquifer from fluctuations of bedrock groundwater levels on a seasonal basis. South and southwest of the Site, groundwater remains within the bedrock throughout the year. The overburden on Site is classified as an aquitard. The zone at the overburden-bedrock interface is considered “top-of-rock” and is considered bedrock groundwater.

Bedrock

Overburden at the site is underlain by the Lockport Dolomite. The Lockport Group has been described as a massive- to medium-bedded, argillaceous dolomite with minor amounts of dolomite and shale. The upper 10 to 25 feet of this unit can be heavily weathered and often contains abundant bedding planes and vertical fractures enlarged by dissolution and glacial scour.

As noted above, a number of laterally definable fracture zones have been identified at the Site, including the TOR (at the overburden interface), and Zones 1, 2, 3, 4, and 5. The TOR and Zone 1 are the bedrock groundwater recovery zones on which the GRS is focused. A MIP/HPT study conducted in September 2017 confirmed that most of the VOC impacts are limited to the TOR and Zone 1 intervals in the area around PW-3 where the study was conducted. The deeper bedrock Zones 2, 3, 4, and 5 show limited VOC impact. Bedrock groundwater flow is primarily to the south, with a southwesterly component toward a rock quarry located west-southwest of the Site

Attachment 2 presents the TOR and Zone 1 groundwater elevation contour figures developed using data collected September 29, 2020, figures presenting VOC concentrations in the TOR and Zone 1 for Spring 2020 and Fall 2020, and time-series plots for PW-3, B-8M, and B-18M (located within the PW-3 pilot study area) and for P-4, B-13M, and B-19M (located in the P-4 pilot study area).

II. SCOPE OF WORK

A pilot study is proposed in the areas near PW-3 and P-4 to evaluate the performance of emulsified zero-valent iron (EZVI™) to enhance control of VOC-impacted groundwater. The PW-3 pilot study area comprises an approximately 11,000 square-foot area east of PW-3 and north of the Metaullics manufacturing building around well B-8M. The P-4 pilot study area comprises an approximately 8,000 square-foot area between wells P-4 and B-13M. The pilot study areas are shown on **Figures 3 and 4**.

Objectives

The pilot study will be performed to determine the effectiveness of VOC mass reduction within the targeted treatment zone(s). The objectives of the pilot study include the following:

- Evaluate the reduction of VOC concentrations following pilot study injections;
- Assess the distribution and persistence of VOCs through post-injection performance monitoring;
- Evaluate the longer-term response of Site geochemistry following amendment injection;
- Identify data gaps; and
- Evaluate the use of EZVI™ for a full-scale application.

Approach

Exploratory borings will be advanced in each designated pilot test area to confirm the depth to the top of rock, and to locally characterize the fractured bedrock. Five injection points will then be advanced in each of the pilot study areas. Injectate will be delivered to the subsurface using a series of direct-push technology (DPT) injection points. In the PW-3 pilot study area, the injection points will be positioned in a radial pattern around well B-08M approximately 10 feet from B-08M (**Figure 3**). In the P-4 pilot study area, the injection points will be positioned in a staggered line approximately 10 feet southwest (downgradient) of B-13M and B-19M (**Figure 4**). Injection points will be advanced to the TOR or into Zone 1. Approximately 235 gallons of EZVI™ will be injected into each pilot study area. Each injection point will initially be planned to receive approximately 47 gallons of injectate emulsion, targeting the TOR interface and up to 2 feet above the TOR (e.g., if the TOR is 10 feet bgs, injection interval will be 8 to 10 feet bgs).

Injectate Background

EZVI™ is comprised of emulsified vegetable oil (EVO) and nano- to micro-scale zero-valent iron (ZVI) particles in which the ZVI (a powder) is surrounded by oil to form micelles (an aggregate of molecules in a colloidal solution) that are hydrophobic and denser than water. EZVI™ is therefore capable of sinking through saturated soil to, and into fractured bedrock. EZVI™ utilizes both biotic and abiotic process to sequester and degrade CVOCs.

Once injected, EZVI™ can facilitate the remediation of the site groundwater by the following processes over many years:

- The vegetable oil prevents the iron from readily oxidizing;
- VOCs (as DNAPL or dissolved-phase COCs) are hydrophobic and readily partition into the outer “shell” of oil (preferring oil to water), trapping DNAPL (if present) and reducing the concentration of VOCs in the groundwater;
- The EVO is not mobile, and therefore serves to sequester VOCs in place, reducing the mass flux of VOCs from the treated areas;
- The trapped VOCs are directly reduced to non-target, innocuous end products by the ZVI within the oil-water micelles through abiotic processes; and

- The emulsified oil degrades slowly and produces a long-term source of volatile fatty acids (VFAs) that stimulate enhanced reductive dechlorination (ERD) by indigenous bacteria (i.e., those already present).

Utilizing these processes, EZVI™ can:

1) Sequester and treat source area VOCs, including DNAPL (if present); and
2) Sequester and treat more diffuse VOCs near the downgradient property boundary, preventing off-site migration of VOCs.

Pending the successful outcome of the pilot study, a full-scale EZVI™ application can be conducted that could allow for shutdown and decommissioning of the existing GRS.

III. Pilot Study Injection Plan

Health and Safety

The approved Site-specific health and safety plan (HASP) will be updated to include task-specific health and safety concerns associated with subsurface drilling and injections. The Site-specific HASP will be updated and reviewed by the project team prior to initiating work described in this work plan. The update will include addition of the Material Safety Data Sheet (MSDS) for the injectate (EZVI™) acquired; a typical MSDS for EZVI™ is provided in **Attachment 3**.

Pre-Mobilization

A United States Environmental Protection Agency (USEPA) Region 2 Underground Injection Control (UIC) Permit is not required for Class V Remediation Wells; however, notification for inventory is required. **Attachment 4** presents a sample EPA Region 2 UIC Notification Form (accessed at https://www.epa.gov/uic/underground-injection-control-reporting-forms-owners-or-operators). The notification form will be completed and submitted EPA Region 2 prior to implementing the pilot study; see https://www.epa.gov/uic/underground-injection-control-epa-region-2-nj-ny-pr-and-vi for submittal information). A copy of the completed form will be provided to NYSDEC prior to mobilizing to the Site.

Mobilization

Prior to beginning any intrusive activities, the drilling subcontractor will contact the Underground Facilities Protection Organization (UFPO) to mark utilities in proposed pilot study areas. The proposed drilling locations (exploratory borings and injection points) will be marked with spray paint or flagging, and an independent utility-locating subcontractor will be contacted to locate utilities in drilling areas not covered by the UFPO. In addition, Pyrotek Inc. will be contacted to provide available utility information to assist in locating on-site underground utilities. If necessary, based on utility locations, drilling locations will be moved to avoid potential utilities.

Geophysical surveys will be conducted to obtain information regarding subsurface conditions or features, including utilities or obstructions. It is anticipated that ground-penetrating radar (GPR) will be the method utilized in this investigation. GPR utilizes high-frequency radio waves to acquire subsurface information. From a small antenna, which is moved slowly across the ground surface, energy is radiated downward into the subsurface. This energy is then reflected back to the receiving antenna, where variations in the return signal are continuously recorded. This produces a continuous cross-section of the shallow subsurface conditions. Radar responds well to the different electrical properties between rock units, soils, groundwater, and most importantly for this application, buried pipes, utilities, and foundations.

At the start of intrusive fieldwork, clearance of underground utilities will be performed using non-mechanical means. An air knife and vacuum or equivalent will be utilized to advance each boring from the ground surface to approximately five feet bgs to prevent disruption of any potential underground utilities. Disturbed soils will be managed in accordance with the Soil Management Plan (Revised May 2016).

Exploratory Borings

In each of the proposed pilot study areas, exploratory borings will be advanced near proposed injection point locations. Borings will be advanced using direct push methods to confirm the depth to TOR and to characterize the bedrock fractures. Borings will be advanced no more than a few feet into the fractured bedrock. The primary purpose of the exploratory borings is to ensure that EZVI™ is injected into the more probable and permeable pathways through which groundwater flows (considering seasonality and current conditions). After completion, all exploratory boring locations with be backfilled with bentonite chips to the ground surface.

Injections

The proposed pilot study will consist of five injection locations in each of the two Pilot Test Areas, as shown on **Figures 3 and 4**. The locations have been determined based on review of historical data and the results of the MIP/HPT study. The locations are subject to change based on the results of the utility clearance and the exploratory borings.

Injectate

The injectate selected for application at the Site is EZVI™, which was developed by NASA and is manufactured by Provectus of Freeport, Illinois. As discussed previously, EZVI™ contains both emulsified vegetable oil and ZVI, to promote both biotic and abiotic degradation of chlorinated VOCs. EZVI™ is provided as a liquid emulsion so no on-site mixing is required prior to injection.

Injection Procedures

The injectate solution will be applied to the subsurface via DPT injection, targeting the top two feet of fractured bedrock and the TOR interface. An appropriately sized DPT rig will be used to advance temporary injection points to the target depth, based on the evaluation of exploratory borings. Upon reaching the target depth, a burst of pressurized nitrogen gas will then be delivered through the injection rod into the subsurface to develop subsurface pathways into which EZVI™ may subsequently be injected. Nitrogen gas will be utilized rather than air to keep the subsurface environment anaerobic. Injection of the solution will be performed at a 2-foot increment starting from the bottom of the borehole and working upwards, using 1.5-inch diameter drill rods. Injectate solution will be applied to the subsurface at a target volume of approximately 47 gallons per injection point however this volume may be adjusted based on conditions encountered during field activities. Injection flow rates for this type of injection typically range from 2 to 10 gallons per minute at injection pressures ranging from 20 to 60 psi. To avoid surfacing of the injectate, injections will be conducted at the lowest pressure practical which yields an acceptable flow rate. The injection tooling will be equipped with a check valve to prevent back flow. After the material is injected, the tooling will remain in place until the pressure on the valve has dissipated. If the injectate delivery to the desired depth interval is not successful, the injectate volume not delivered to that interval will be added to an adjacent boring. **Table 1** presents a summary of the planned injection points.

After the injection is completed, the injection point (borehole) will be filled with bentonite chips and hydrated in order to minimize the potential for short circuiting of injection fluids from adjacent injection points.

The following data, associated with delivery hydraulics, will be collected during the injection process.

- Injection location;
- Injection interval;
- Injection solution flow rate;
- Injection pressure;
- Temperature, pH, and specific conductance of the injection solution; and,
- Cumulative volume of injection solution delivered to the injection point.

Attachment 5 contains an example injection log sheet that will be used to record data during injection activities.

A critical component of the pilot study will be the post-injection performance groundwater monitoring to provide data related to the efficacy of the injected amendment with respect to the previously outlined pilot study objectives. The performance monitoring program will include laboratory analysis and field measurement of selected parameters during performance monitoring events. The groundwater monitoring program established for the field test consists of three components:

- Baseline groundwater monitoring;
- Injection monitoring; and,
- Post-injection monitoring (process and performance).

Each component of the monitoring program is described in further detail below. **Table 2** summarizes the monitoring program for the pilot study.

IV. Groundwater Monitoring

Baseline Groundwater Monitoring

Baseline groundwater monitoring will be conducted prior to the initiation of injection activities. The results obtained during this sampling event will serve as the basis for evaluating the overall efficacy of the pilot study. Baseline samples will be collected from monitoring wells in the TOR and Zone 1 intervals in both pilot test areas. The wells included in the pilot test monitoring program are:

PW-3 AREA	**P-4 AREA**
B-8M	B-13M
B-18M	B-19M
PW-3	P-4

Each baseline monitoring well will be sampled using low-flow ground water sampling procedures as described in the current monitoring and maintenance plan for the site. The proposed monitoring plan is specific to the objectives of the study and includes the following parameters:

- Static water level elevations;
- Field parameters including temperature, pH, specific conductance, oxidation-reduction potential (ORP), and dissolved oxygen (DO);
- Site-specific VOCs (EPA 8260B);
- Total organic carbon (SM 510C);
- Sulfate (300.0);

- Total ferric iron (unfiltered);
- Ferrous iron (filtered, 0.45 µM) (610C);
- Dissolved gasses (methane, ethane, and ethene);

In addition to the analyses listed above, selected wells will be sampled for a microbial assay (QuantArray® -Chlor) to characterize the microbial population prior to the EZVI™ injections. Wells PW-3, B-08M, B-18M and B-13M were previously sampled for QuantArray® -Chlor in October 2020, and this data will serve as the baseline values for these specific monitoring wells since the microbial community is unlikely to have changed significantly since then. Well P-4 will be sampled for microbial assay during baseline sampling to obtain microbial data in the downgradient pilot study area.

Samples will be collected in laboratory-supplied pre-preserved glassware, placed in a cooler on ice, and transported under chain-of-custody documentation to the respective laboratories for analysis. The QuantArray® -Chlor analyses will be performed by Microbial Insights of Knoxville, Tennessee. The remaining laboratory analyses will be performed by EurofinsTestAmerica Laboratory of Buffalo, New York.

Injection Monitoring

While the injections are ongoing, water levels will be measured periodically at PW-3, B-8M, and B-18M in the PW-3 area and in wells P-4, B-13M, and B-19M in the P-4 area. Water levels will be obtained using an electronic water level indicator. Vertically discrete down-hole water quality field parameters (temperature, pH, specific conductance, DO, and ORP) will be monitored during the injection events in the same wells.

Negative values of ORP and decreases in DO concentrations reflect the reducing conditions and generally coincide with EZVI™ movement. Increases in specific conductance may be observed following EZVI™ injections and may be useful tracking of injectate dispersion.

A down-hole water quality meter (e.g., YSI Model 556 or equivalent) will be lowered into the well to the screened interval (i.e., approximately two feet above bottom of well) a minimum of four times per day (at the start of work, late morning, early afternoon, at the conclusion of work) to determine if injection solution may be influencing water quality criteria at that location. Readings will be recorded in the field notebook or on a dedicated log sheet for that well location.

Post-Injection Monitoring

Post-Injection monitoring will be conducted to evaluate the performance of the applied treatment with regards to shifts in conditions and response to injectate (i.e., contaminant reduction). Post-injection monitoring events will be conducted at intervals corresponding to approximately 30, 60, and 90 days (i.e., 1, 2, and 3 months) post-injection. During these monitoring events, PW-3, B-8M, and B-18M in the PW-3 area and in wells P-4, B-13M, and B-19M in the P-4 area will be sampled using low-flow groundwater sampling procedures. Post-Injection monitoring will include the same parameters as the baseline sampling described above. QuantArray®-Chlor analysis will be performed on samples from wells PW-3, B-08M, B-18M, P-4 and B-13M during the final (3 months) post-injection sampling round to evaluate the change in microbial population resulting from the EZVI™ injections.

Following collection, groundwater samples will be placed in laboratory supplied containers, packaged on ice, and shipped to the laboratories for analysis of the parameters specified above.

V. REPORTING

Data obtained during the pilot study will be utilized in real-time to evaluate the performance monitoring program, and evaluate the need for follow-up injections, if appropriate. Monitoring data will be tabulated, reviewed, and interpreted to evaluate the effectiveness of the pilot study injections in terms of distribution, trending of aquifer geochemical conditions (i.e., field parameter data), and contaminant reduction. If necessary, adjustments will be made to the monitoring program based on the results of the previous sampling round.

The results of the pilot study will be used to further refine the existing conceptual site model (CSM) and, if successful, the results will also be used to develop a plan to evaluate implementation of EZVI™ injections in other areas of the site. The Pilot Study Report will contain, at a minimum, the following information:

- Statement of the pilot study objective and purpose,
- Summary of the pilot study field activities including any deviations from the approved work plan,
- Summary and interpretation of the pilot study results, and
- Subsequent recommendations as to whether to move forward with additional injections or not.

The report appendices will include relevant boring logs, injection logs, sample collection logs or field notes, and analytical data reports.

VI. SCHEDULE

Following approval of this work plan, the injection pilot study will be performed. AECOM is tentatively scheduled to begin this work in early- to mid-Spring 2021. It is anticipated that the geophysical survey will require one day to complete; mobilization of materials and equipment will be completed immediately prior to implementation of the pilot study; and, the pilot study field program will require 6 to 10 working days to complete. NYSDEC will be notified at least two weeks in advance of any planned field activities.

If you have any questions regarding this submission, please do not hesitate to contact me at (716) 923-1300 or via email at james.kaczor@aecom.com.

Sincerely yours,

James L. Kaczor, PG
Sanborn Site Task Manager
James.kaczor@aecom.com

cc: Glenn May, NYSDEC

Tables

Table 1

Sequestration Pilot Study Injection Program
Former Carborundum Facility
2040 Cory Drive, Sanborn, NY
NYSDEC Site No. 932102

Pilot Test Area	Injection Point ID	Target Injection Depth (Feet)	Target Injection Volume (Gallons)	Target Injection Pressure (psi)
PW-3	PINJ-1A	TBD	47	20 - 60
PW-3	PINJ-1B	TBD	47	20 - 60
PW-3	PINJ-1C	TBD	47	20 - 60
PW-3	PINJ-1D	TBD	47	20 - 60
PW-3	PINJ-1E	TBD	47	20 - 60
P-4	PINJ-2A	TBD	47	20 - 60
P-4	PINJ-2B	TBD	47	20 - 60
P-4	PINJ-2C	TBD	47	20 - 60
P-4	PINJ-2D	TBD	47	20 - 60
P-4	PINJ-2E	TBD	47	20 - 60

Table 2

Sequestration Pilot Study Monitoring Program
Former Carborundum Facility
2040 Cory Drive, Sanborn, NY
NYSDEC Site No. 932102

Location	Matrix	Field Paramaters (1)	Analytical Testing							No. of Events
			VOCs (2)	TOC	Dissolved Gases (3)	Sulfate	Ferrous Iron	Ferric Iron	Microbial Assay (4)	
Baseline Monitoring										
PW-3 Area Wells: B-8M, BN-18M, PW-3	Water	3	3	3	3	3	3	3	0	1
P-4 Area Wells: B-13M, B-19M, P-4	Water	3	3	3	3	3	3	3	1	1
Injection Monitoring (Daily during injections)										
PW-3 Area Wells: B-8M, BN-18M, PW-3	Water	3	--	--	--	--	--	--	--	1
P-4 Area Wells: B-13M, B-19M, P-4	Water	3	--	--	--	--	--	--	--	1
Post-Injection Performance Monitoring (3 events)										
PW-3 Area Wells: B-8M, BN-18M, PW-3	Water	3	3	3	3	3	3	3	3	3
P-4 Area Wells: B-13M, B-19M, P-4	Water	3	3	3	3	3	3	3	2	3
Total Number of Analyses for Pilot Study		**NA**	**24**	**24**	**24**	**24**	**24**	**24**	**6**	**NA**

NA - Not Applicable

Notes:

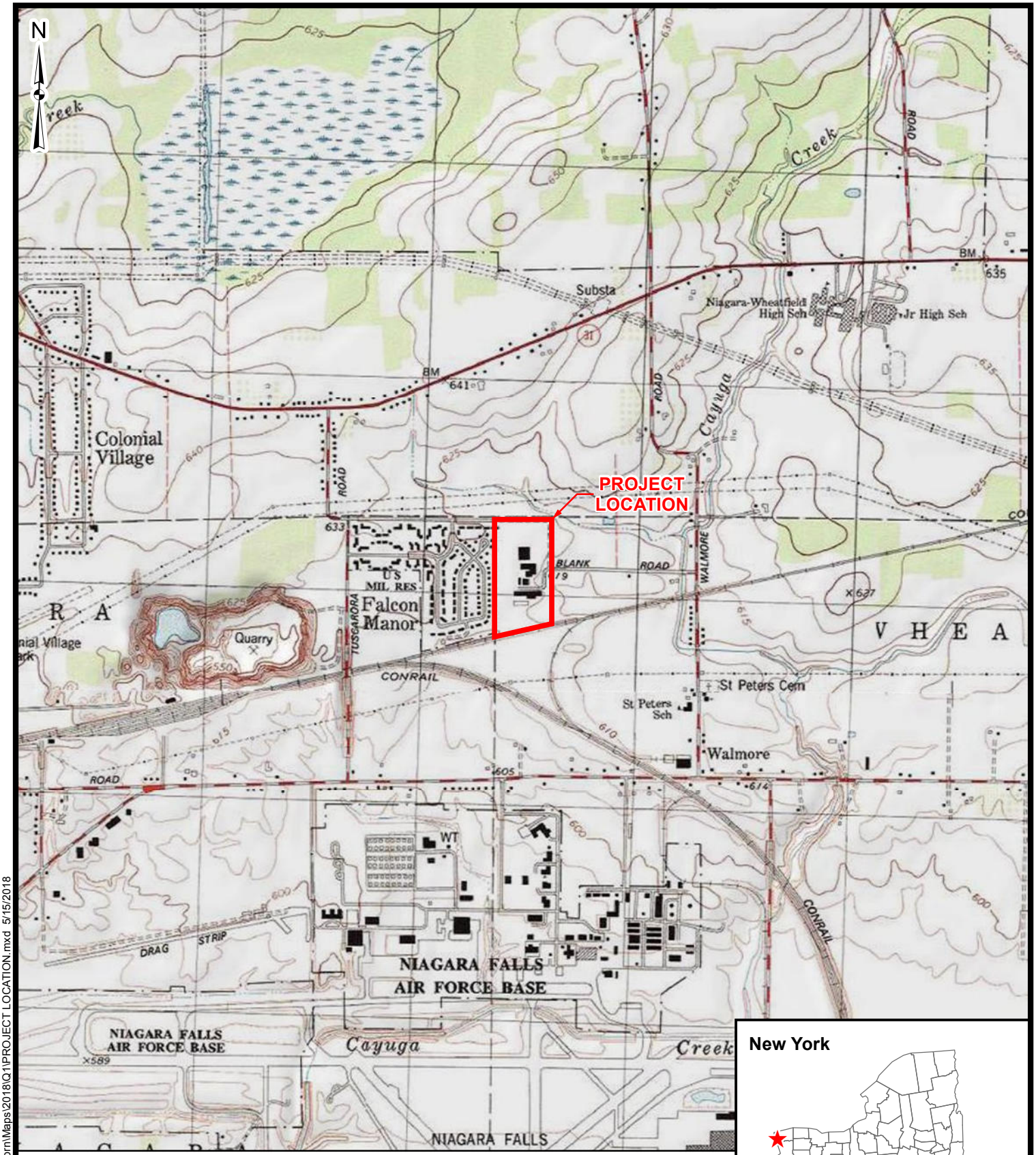
(1) Temperature, pH, specific conductivity, ORP, DO, water level

(2) Site-Specific VOCs - Method 8260B

(3) Methane, ethane, and ethene

(4) QuantArray® by Microbial Insights

Figures



Source: USA Topo Maps, ESRI Map Service;
1:24,000-scale USGS Topographic Map,
Ransomville, 1996
Tonawanda West, 1996

2,000 0 2,000 Feet

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FORMER CARBORUNDUM FACILITY
SANBORN, NEW YORK
PROJECT LOCATION PLAN

FIGURE 1

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Legend

- Pilot Test Area
- Monitoring Well
- Monitoring Well (Abandoned)
- Recovery Well
- Recovery Well (Abandoned)

Source: ESRI World Imagery

500 0 500 Feet

FORMER CARBORUNDUM FACILITY
SANBORN, NEW YORK
SITE PLAN

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FIGURE 2

J:\Projects\60481767_BPIPO\MISC\GIS\Sanborn\Maps\WorkPlan\SITE PLAN.mxd 3/1/2021

Legend

- Pilot Test Area
- Proposed Exploratory Boring Location
- Proposed Injection Point
- Monitoring Well
- Monitoring Well (Abandoned)
- Recovery Well
- Recovery Well (Abandoned)

Source: NYSDOP High Resolution Statewide Imagery, Niagara County, 2017

20 0 20 Feet

FORMER CARBORUNDUM FACILITY
SANBORN, NEW YORK
PROPOSED PW-3 PILOT TEST AREA

AECOM

FIGURE 3

J:\Projects\60481767_BPIPOMISC\GIS\Sanborn\Maps\WorkPlan\Proposed PW-3 Pilot Test Area.mxd 3/4/2021

N

PINJ-2A
B-13M
PINJ-2E
PEXP-3
PINJ-2B
B-19M
B-49M
P-04
PINJ-2D
PINJ-2C
B-48M

Legend

- Pilot Test Area
- Proposed Exploratory Boring Location
- Proposed Injection Point
- Monitoring Well
- Monitoring Well (Abandoned)
- Recovery Well
- Recovery Well (Abandoned)

Source: NYSDOP High Resolution Statewide Imagery, Niagara County, 2017

20 0 20 Feet

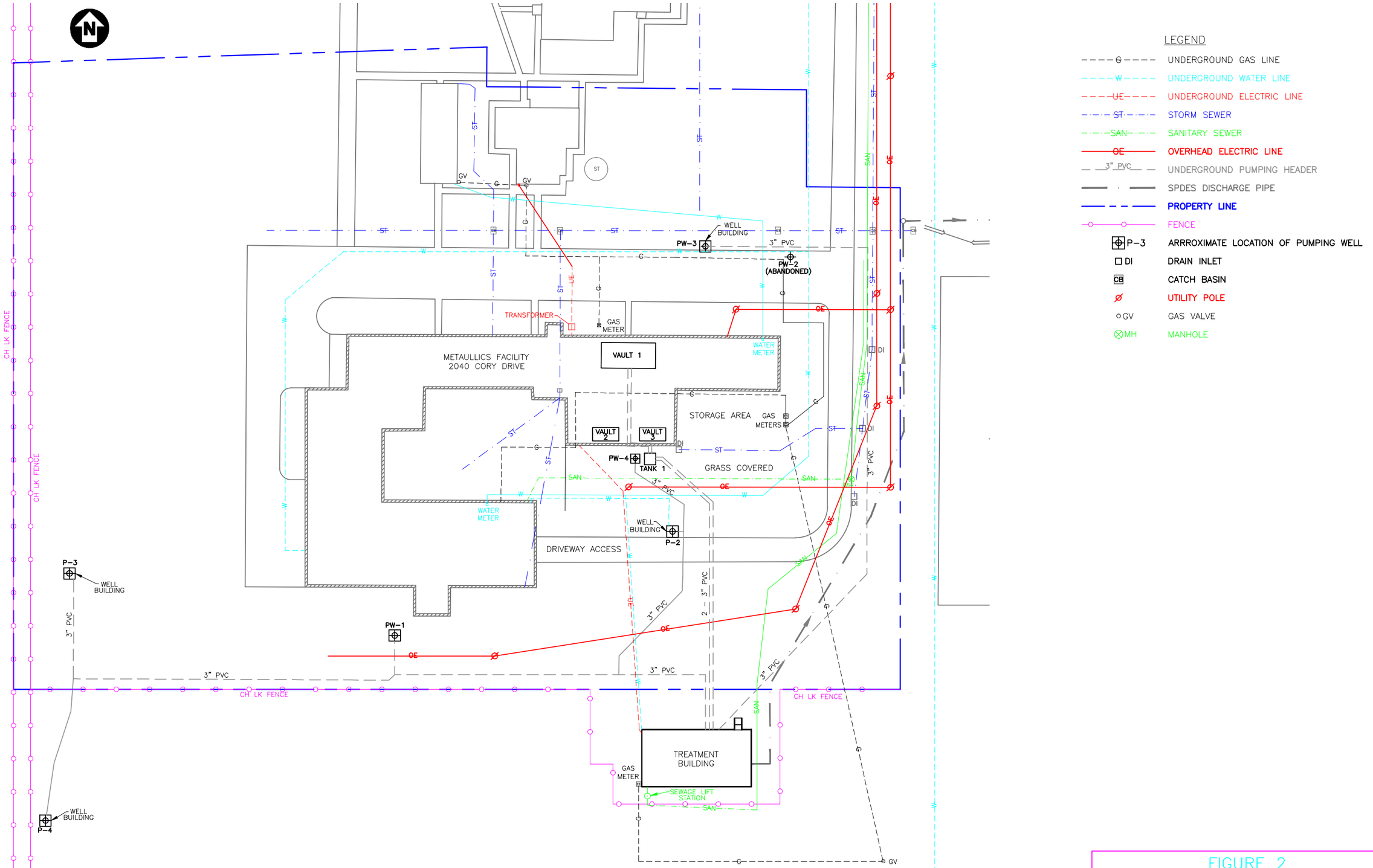
FORMER CARBORUNDUM FACILITY
SANBORN, NEW YORK
PROPOSED P-4 PILOT TEST AREA

AECOM

FIGURE 4

J:\Projects\60481767_BPIPOM\ISC\GIS\Sanborn\Maps\WorkPlan\Proposed P-4 Pilot Test Area.mxd 3/4/2021

Attachment 1



PARSONS
40 LA RIVIERE DRIVE, SUITE 350
BUFFALO, NEW YORK 14202
716-541-0730

FIGURE 2

ATLANTIC RICHFIELD COMPANY
FORMER CARBORUNDUM FACILITY

SITE PLAN – UTILITIES

P:\Sanborn\\447601\Record Drawings\SK-442156-c17_Fig2.dwg
No XREFs

Attachment 2

N

BLANK RD

TINDALE LN

TUSCARORA RD

CORY DR

B-15M, 607.60

B-16M, 601.81

B-10M, 610.11

B-14M, 602.96

B-7M, 601.66

B- 9M, 605.82

PW- 3, 604.11

B- 8M, 604.85

B-21M, 602.10

PW- 4, 601.35

B- 3M, 603.04

B-27M, 601.71

B-37M, NM

B-17M, 600.94

B-52M, 601.66

B- 6M, 601.88

B-12M, NM

B-13M, 599.57

P- 4, 597.23

B-22M, 592.23

B- 5M, 601.62

B- 4M, 599.22

B-23M, 589.34

B-25M, 601.09

B-26M, 601.58

B-24M, 598.15

608

606

610

604

602

600

598

596

594

592

590

Legend

- Monitoring Well
- Recovery Well
- Groundwater Flow Direction
- Groundwater Elevation Contour

Note: NM - Note Measured

Source: ESRI World Imagery

300 0 300 Feet

FORMER CARBORUNDUM FACILITY
SANBORN, NEW YORK
GROUNDWATER ELEVATIONS
TOP OF ROCK
(SEPTEMBER 29, 2020)

AECOM

ATTACHMENT 2
FIGURE 1

J:\Projects\60481767_BPIPOMISC\GIS\Sanborn\Maps\2020\Q3\GROUNDWATER CONTOURS - TOR.mxd 1/12/2021

N

BLANK RD

TINDALE LN

TUSCARORA RD

CORY DR

B-15M, 607.60
B-67M, 607.05
B-63M, 602.15
B-16M, 601.81
B-10M, 610.11
B-11M, 603.24
B- 8M, 604.85
B-21M, 602.10
PW- 4, 601.35
P- 2, 597.25
B-27M, 601.71
P- 3, 601.24
PW- 1, 593.66
B-17M, 600.94
B-52M, 601.66
B- 6M, 601.88
B-13M, 599.57
P- 4, 597.23
B-28M, 596.09
B-22M, 592.23
B-23M, 589.34
B-29M, 586.08
B-26M, 601.58
B-24M, 598.15
B-38M, 580.62
B-32M, NM
B-33M, 587.90
B-45M, 589.82

605
600
610
595
590
585
595

Legend

- Monitoring Well
- Recovery Well
- Groundwater Flow Direction
- Groundwater Elevation Contour

Note: NM - Note Measured

Source: ESRI World Imagery

300 0 300 Feet

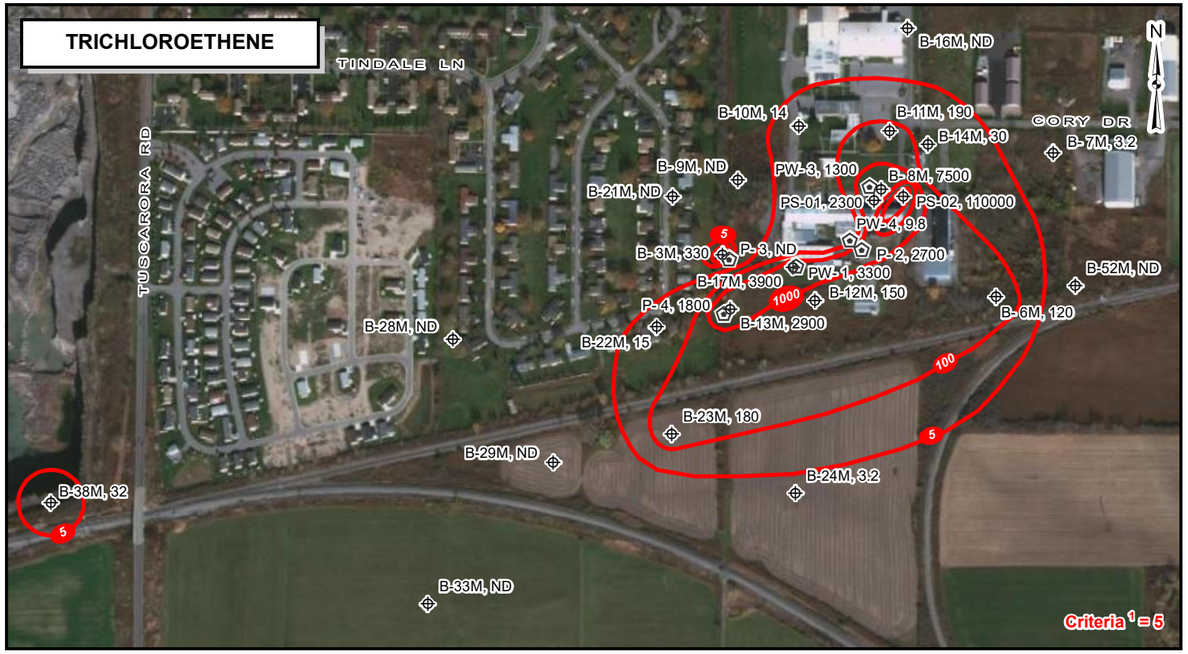
FORMER CARBORUNDUM FACILITY
SANBORN, NEW YORK
GROUNDWATER ELEVATIONS
ZONE 1
(SEPTEMBER 29, 2020)

AECOM

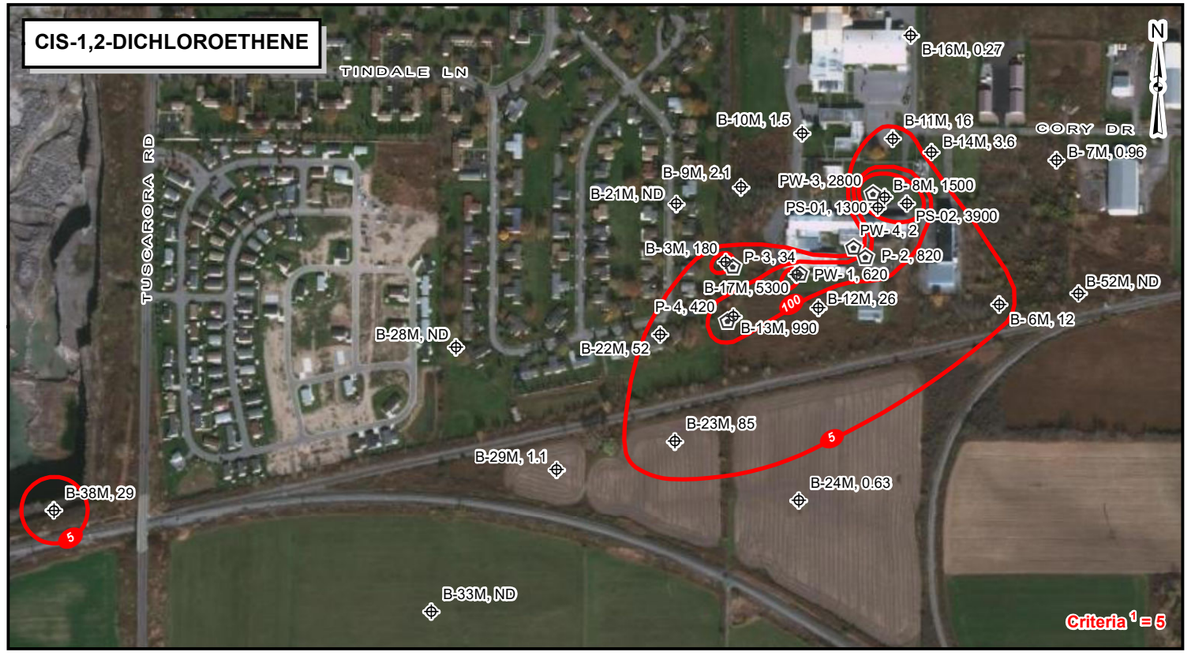
ATTACHMENT 2
FIGURE 2

J:\Projects\60481767_BPIPO\MISC\GIS\Sanborn\Maps\2020Q3\GROUNDWATER CONTOURS - Z1.mxd 1/12/2021

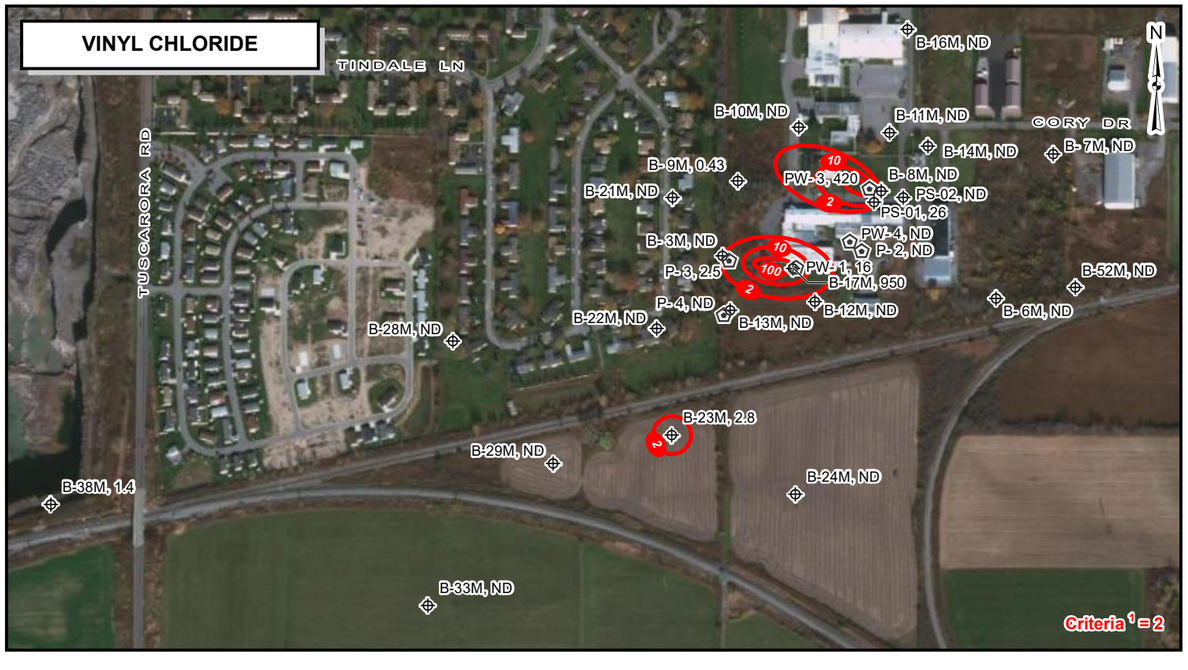
TRICHLOROETHENE



CIS-1,2-DICHLOROETHENE



VINYL CHLORIDE



TOTAL VOCs

Legend

- Monitoring Well
- Recovery Well
- Isoconcentration Contour

Notes:
1. Criteria = NYSDEC TOGS 1.1.1 Ambient Water Quality Standards, Class GA
2. Units are shown in µg/L
3. ND = Not Detected

Source:
ESRI World Imagery

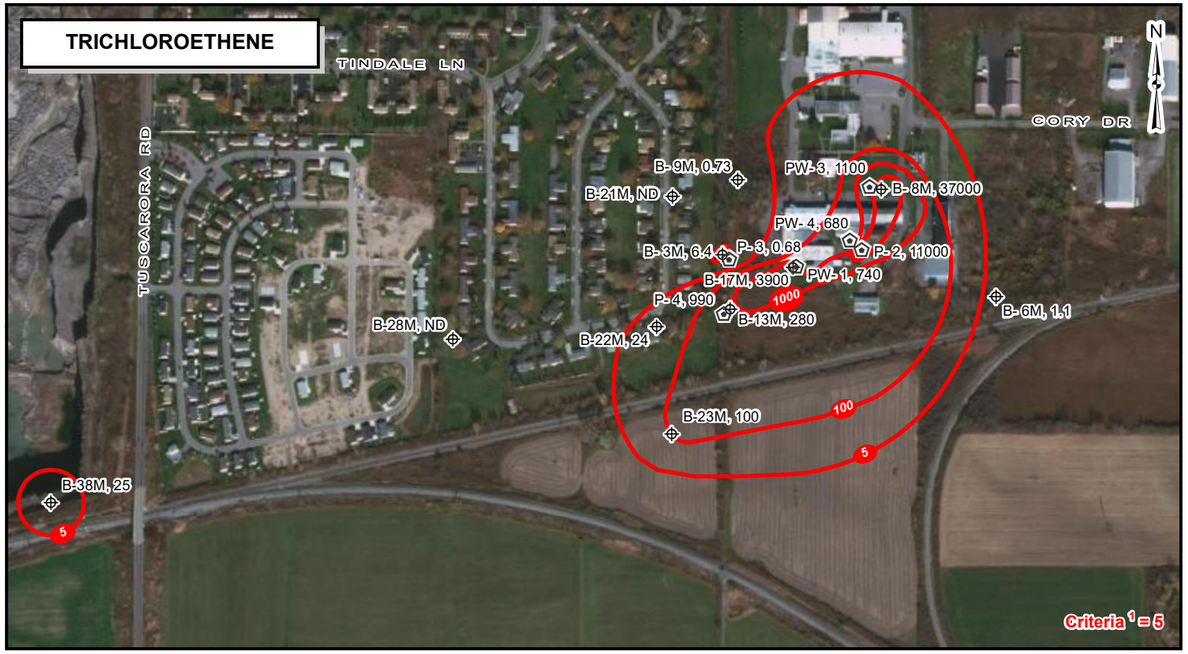
600 0 600 Feet

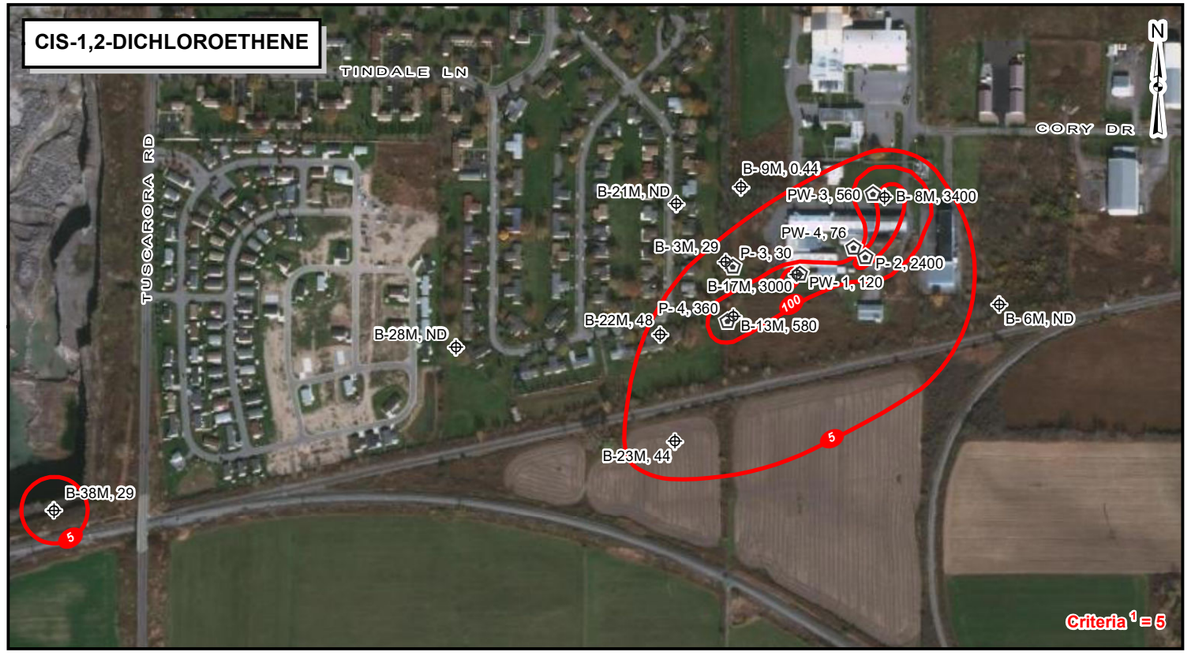
FORMER CARBORUNDUM FACILITY
SANBORN, NEW YORK
ISOCONTOURS IN TOP OF ROCK AND ZONE 1
(ANNUAL SAMPLING - SPRING 2020)

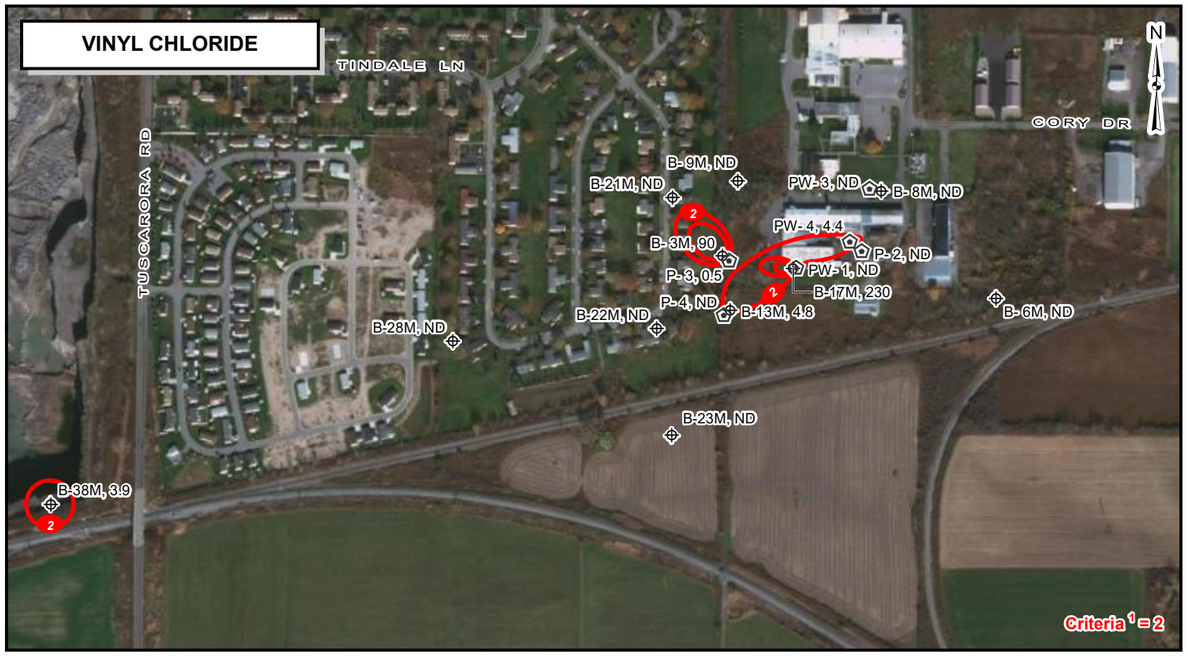
AECOM

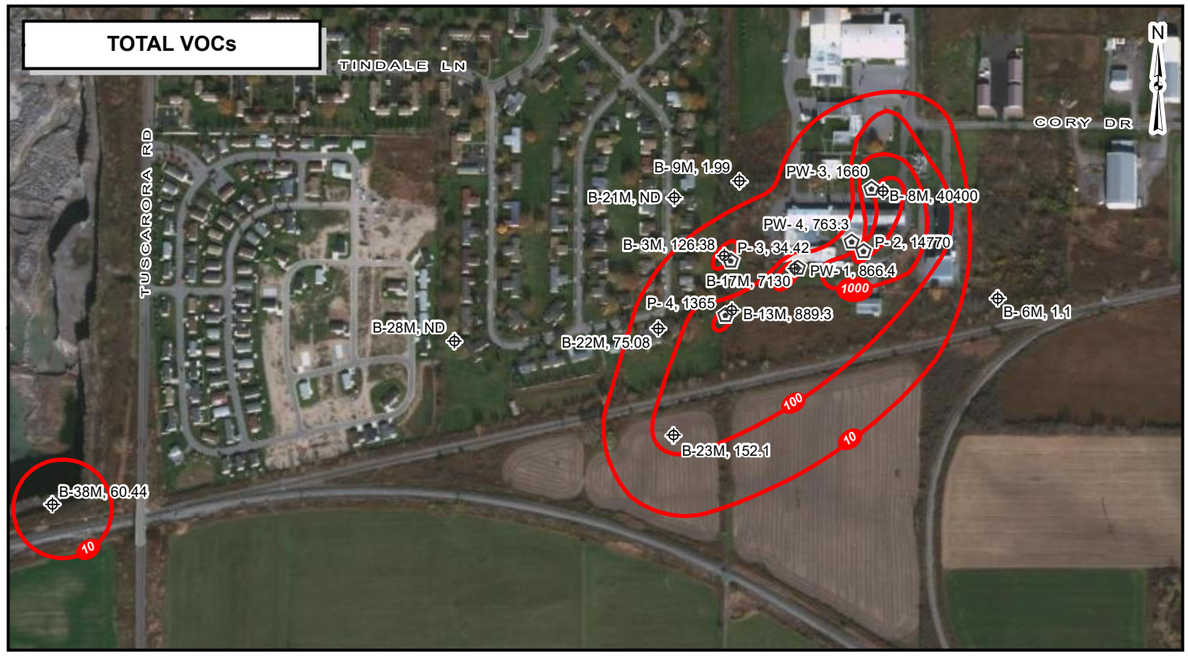
ATTACHMENT 2
FIGURE 3

J:\Projects\60481767_BPIPO\MISC\GIS\Sanborn\Maps\2020\Q2\ISOPLETHS - TOR & Z1.mxd 1/12/2021









Legend

- Monitoring Well
- Recovery Well
- Isoconcentration Contour

Notes:
1. Criteria = NYSDEC TOGS 1.1.1 Ambient Water Quality Standards, Class GA
2. Units are shown in µg/L
3. ND = Not Detected

Source:
ESRI World Imagery

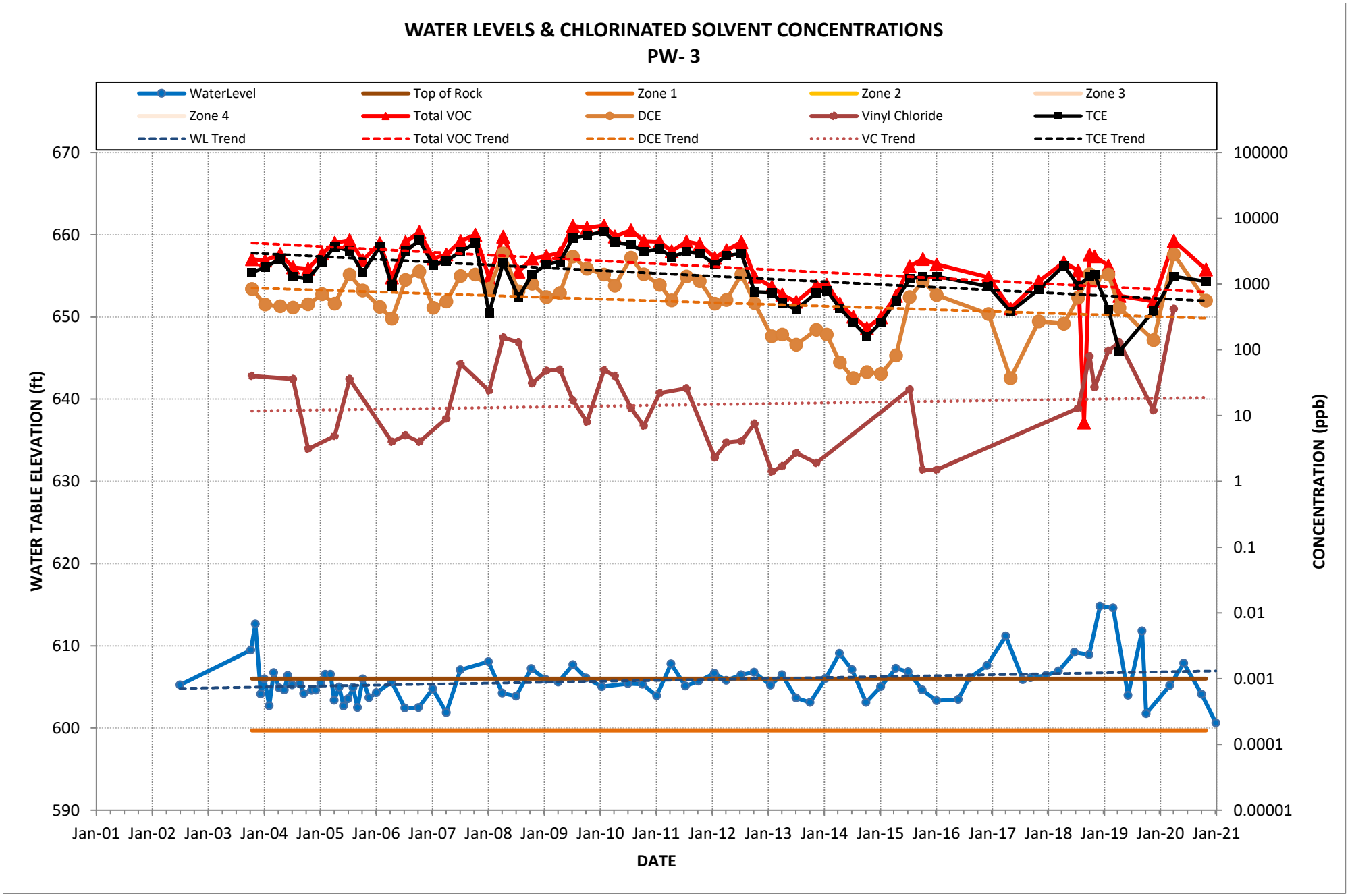
600 0 600 Feet

FORMER CARBORUNDUM FACILITY
SANBORN, NEW YORK
ISOCONTOURS IN TOP OF ROCK AND ZONE 1
(ANNUAL SAMPLING - FALL 2020)

AECOM

ATTACHMENT 2
FIGURE 4

J:\Projects\60481767_BPIPO\MISC\GIS\Sanborn\Maps\2020\Q4\ISOPLETHS - TOR & Z1.mxd 1/12/2021


WATER LEVELS & CHLORINATED SOLVENT CONCENTRATIONS
PW- 3
WaterLevel
Top of Rock
Zone 1
Zone 2
Zone 3
Zone 4
Total VOC
DCE
Vinyl Chloride
TCE
WL Trend
Total VOC Trend
DCE Trend
VC Trend
TCE Trend
WATER TABLE ELEVATION (ft)
CONCENTRATION (ppb)
DATE
670
660
650
640
630
620
610
600
590
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0001
0.00001
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
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Jan-11
Jan-12
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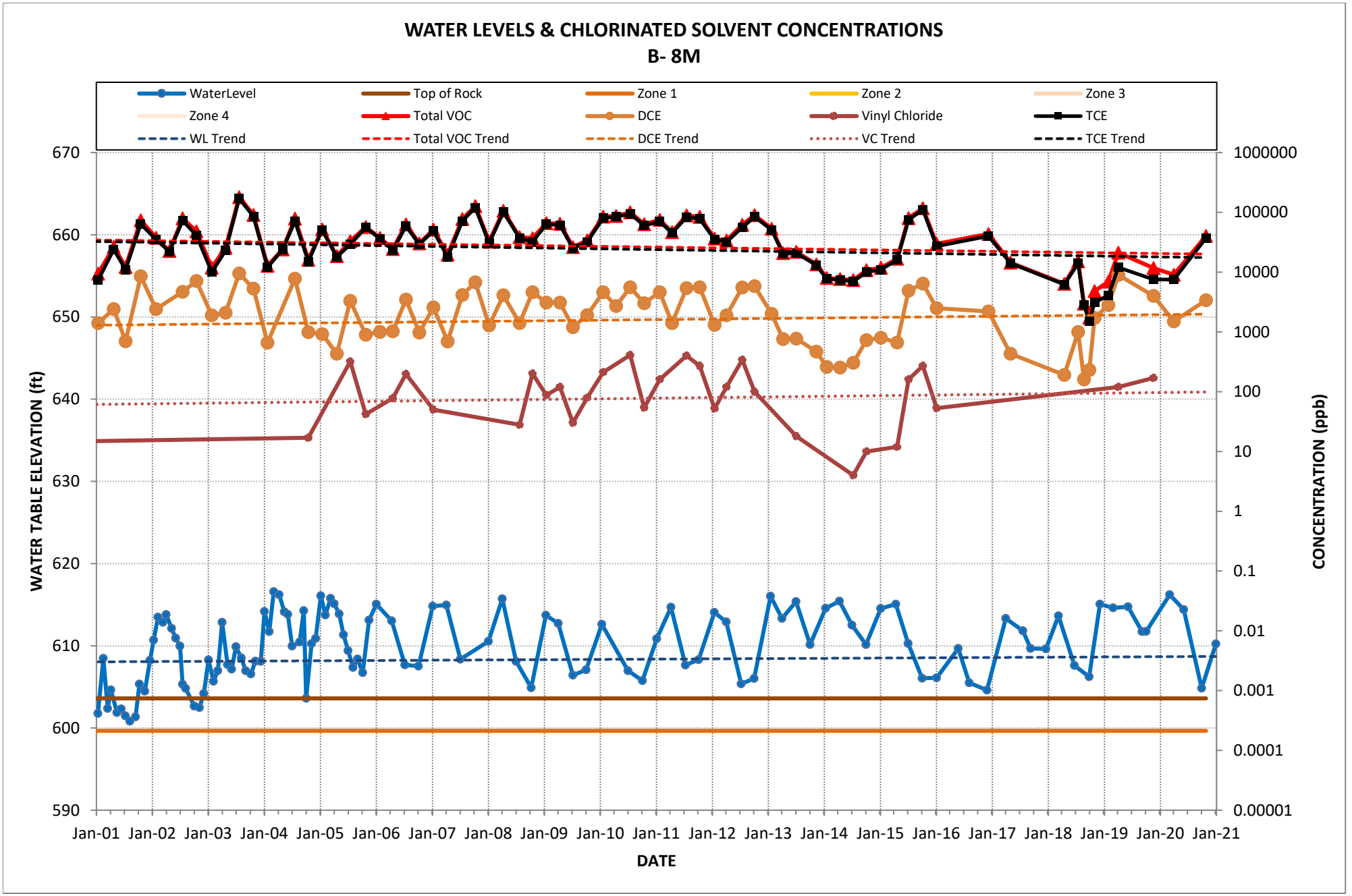
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21


WATER LEVELS & CHLORINATED SOLVENT CONCENTRATIONS
B- 8M
WaterLevel
Top of Rock
Zone 1
Zone 2
Zone 3
Zone 4
Total VOC
DCE
Vinyl Chloride
TCE
WL Trend
Total VOC Trend
DCE Trend
VC Trend
TCE Trend
WATER TABLE ELEVATION (ft)
CONCENTRATION (ppb)
DATE
670
660
650
640
630
620
610
600
590
1000000
100000
10000
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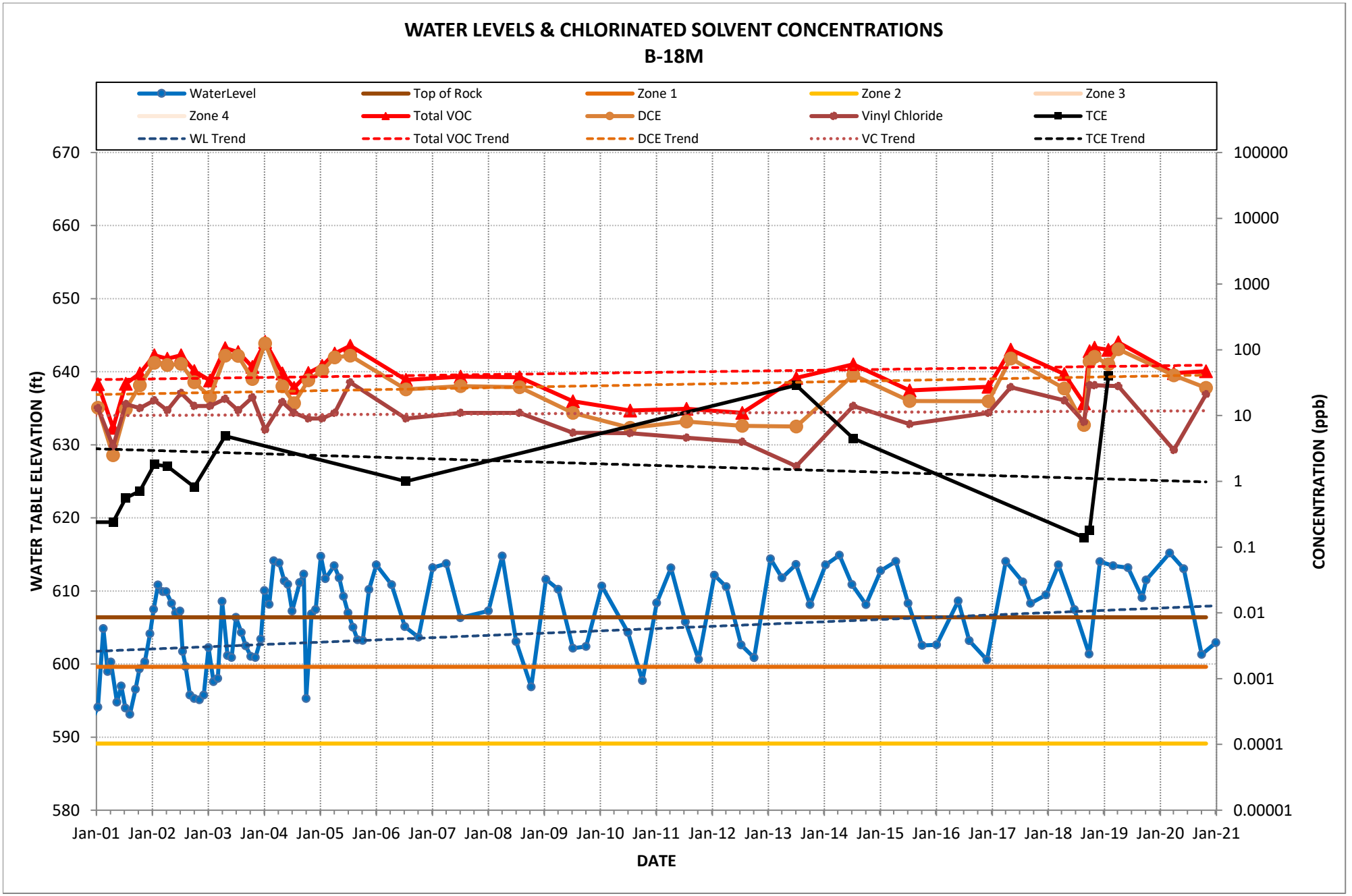
Jan-21


WATER LEVELS & CHLORINATED SOLVENT CONCENTRATIONS
B-18M
WaterLevel
Top of Rock
Zone 1
Zone 2
Zone 3
Zone 4
Total VOC
DCE
Vinyl Chloride
TCE
WL Trend
Total VOC Trend
DCE Trend
VC Trend
TCE Trend
WATER TABLE ELEVATION (ft)
CONCENTRATION (ppb)
DATE
670
660
650
640
630
620
610
600
590
580
100000
10000
1000
100
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0.01
0.001
0.0001
0.00001
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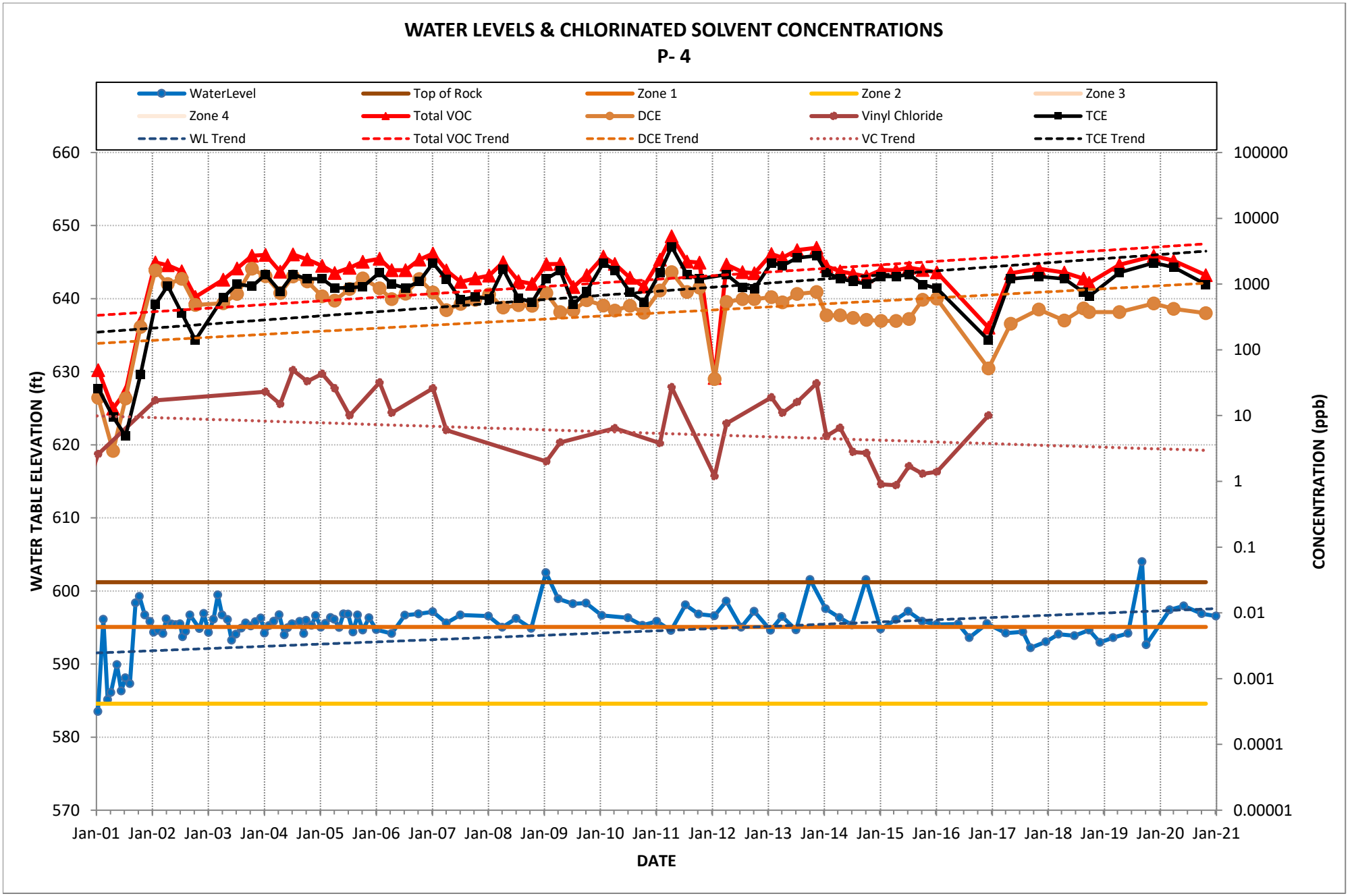
Jan-19
Jan-20
Jan-21


WATER LEVELS & CHLORINATED SOLVENT CONCENTRATIONS
P- 4
WaterLevel
Top of Rock
Zone 1
Zone 2
Zone 3
Zone 4
Total VOC
DCE
Vinyl Chloride
TCE
WL Trend
Total VOC Trend
DCE Trend
VC Trend
TCE Trend
WATER TABLE ELEVATION (ft)
CONCENTRATION (ppb)
660
650
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630
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100000
10000
1000
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Jan-02
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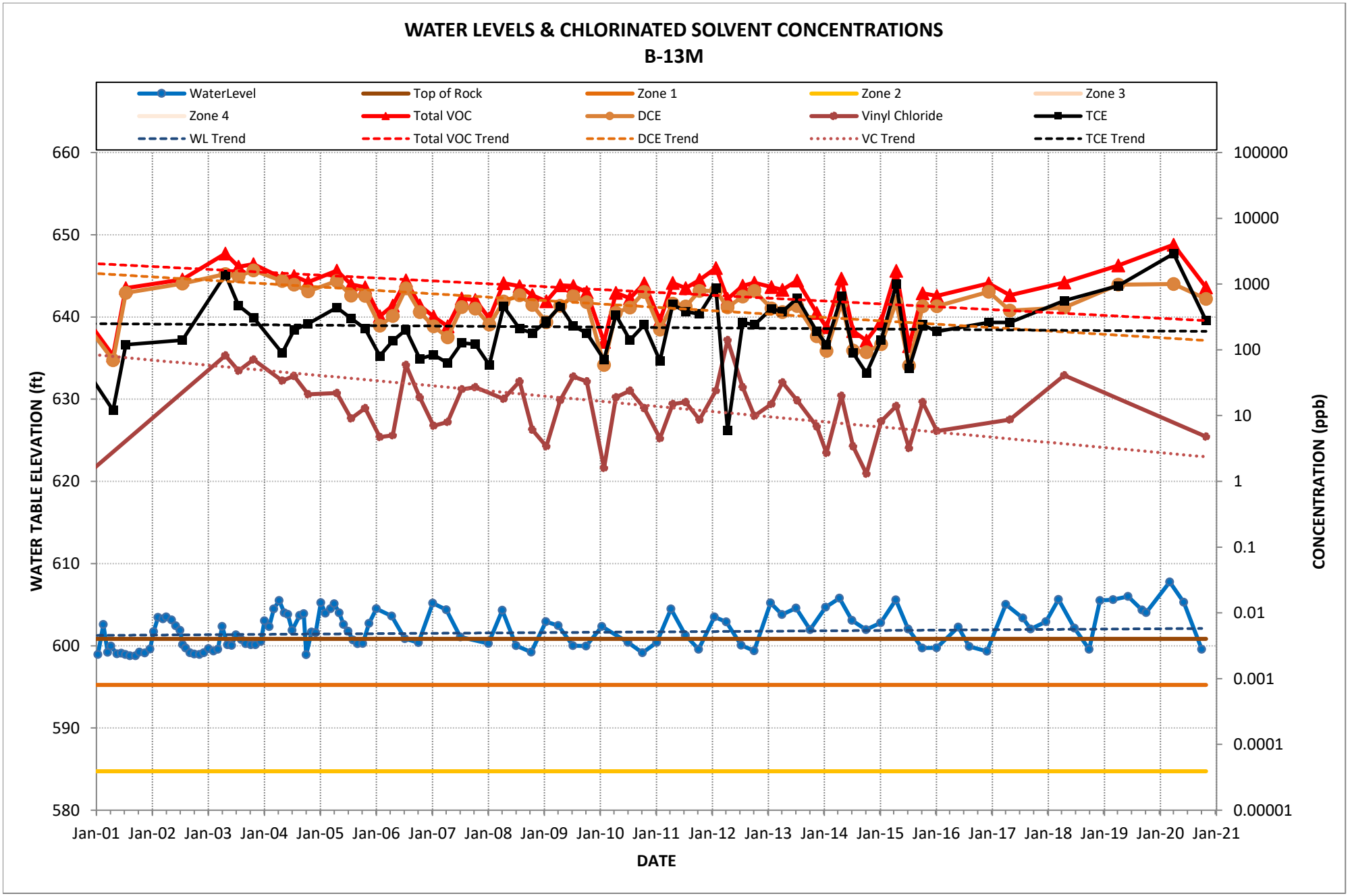
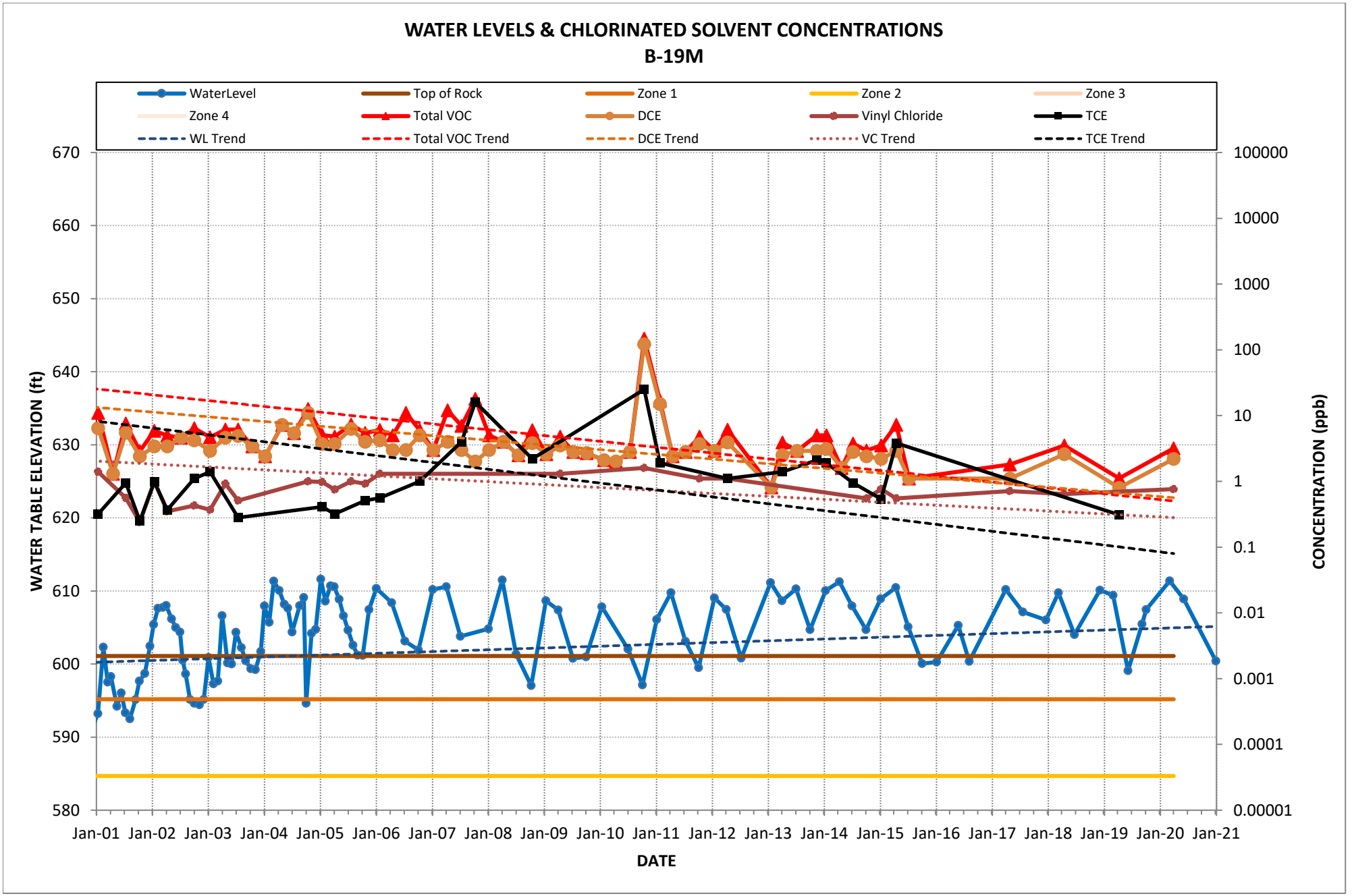
Jan-19
Jan-20
Jan-21
DATE


WATER LEVELS & CHLORINATED SOLVENT CONCENTRATIONS
B-13M
WaterLevel
Top of Rock
Zone 1
Zone 2
Zone 3
Zone 4
Total VOC
DCE
Vinyl Chloride
TCE
WL Trend
Total VOC Trend
DCE Trend
VC Trend
TCE Trend
WATER TABLE ELEVATION (ft)
CONCENTRATION (ppb)
660
650
640
630
620
610
600
590
580
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0001
0.00001
Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21
DATE


WATER LEVELS & CHLORINATED SOLVENT CONCENTRATIONS
B-19M
WaterLevel
Top of Rock
Zone 1
Zone 2
Zone 3
Zone 4
Total VOC
DCE
Vinyl Chloride
TCE
WL Trend
Total VOC Trend
DCE Trend
VC Trend
TCE Trend
WATER TABLE ELEVATION (ft)
CONCENTRATION (ppb)
DATE
670
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10000
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0.001
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0.00001
Jan-01
Jan-02
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Jan-19
Jan-20
Jan-21

Attachment 3

SDS DATE: July, 2016

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Emulsified Zero Valent Iron (antimethanogenic)
SYNONYMS: EZVI /EZVI-CH4™
PRODUCT CODES:

MANUFACTURER: Provectus Environmental Products, Inc
ADDRESS: 2871 W. Forest Road, #2
Freeport, IL 61032

EMERGENCY PHONE: (815) 650-2230
CHEMTREC PHONE: (800) 424-9300 (Domestic)
OTHER CALLS:
FAX PHONE:

CHEMICAL NAME: Emulsified Zero Valent Iron (EZVI/EZVI-CH4™)
CHEMICAL FAMILY:
CHEMICAL FORMULA:

PRODUCT USE: Soil & Groundwater Remediation (DNAPL contamination)
PREPARED BY: Provectus Environmental Products, Inc.
SECTION 1 NOTES:

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT:	CAS NO.	% WT	% VOL	SARA 313 REPORTABLE
Iron (Fe)	7439-89-6	5 – 20	NA	NA
Sorbitan Trioleate	26266-58-0	1 – 5	NA	NA
Food Grade Veg Oil	8001-22-7	30 – 40	NA	NA
Potable Water	7732-18-5	40 – 50	NA	NA
Yeast Extracts*	8013-01-2	0.5 – 5	NA	NA

*(some formulations contain - e.g. EZVI-CH4™)

	ppm	mg/m3
OSHA PEL-TWA:	NA	NA
OSHA PEL STEL :	NA	NA
OSHA PEL CEILING:	NA	NA
ACGIH TLV-TWA:	NA	NA
ACGIH TLV STEL:	NA	NA
ACGIH TLV CEILING:	NA	NA

SECTION 2 NOTES:

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

ROUTES OF ENTRY:

EYES: YES

SKIN: NO

INGESTION: YES

INHALATION: NO

ACUTE HEALTH HAZARDS: NONE KNOWN
CHRONIC HEALTH HAZARDS: NONE KNOWN
MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: NONE KNOWN
CARCINOGENICITY
OSHA: NA **ACGIH:** NA **NTP:** NA **IARC:** NA **OTHER:** NA

SECTION 3 NOTES:

SECTION 4: FIRST AID MEASURES

EYES: In case of eye contact, rinse opened eye for 15 minutes with water, then consult physician.

SKIN: In case of skin contact, immediately wash affected area(s) with soap & water and rinse thoroughly.

INGESTION: After swallowing seek immediate medical advice. Make physician aware that the following symptoms may occur; stomach cramps, nausea, gastric or intestinal disorders.

INHALATION: NA

NOTES TO PHYSICIANS OR FIRST AID PROVIDERS:

SECTION 4 NOTES:

SECTION 5: FIRE-FIGHTING MEASURES

FLAMMABLE LIMITS IN AIR, UPPER: NA
(% BY VOLUME) LOWER: NA

FLASH POINT:
F: >482 ºF
C: >250 ºC
METHOD USED: Closed Cup

AUTOIGNITION TEMPERATURE:
F: >760 ºF
C: >404 ºC

NFPA HAZARD CLASSIFICATION
HEALTH: 1 FLAMMABILITY: 2 REACTIVITY: 1
OTHER:

HMIS HAZARD CLASSIFICATION
HEALTH: 1 FLAMMABILITY: 2 REACTIVITY: 1
PROTECTION:

EXTINGUISHING MEDIA: Extinguishing Powder

SPECIAL FIRE FIGHTING PROCEDURES: DO NOT use water, CO2, or halogenated extinguishers.

UNUSUAL FIRE AND EXPLOSION HAZARDS: NA

HAZARDOUS DECOMPOSITION PRODUCTS: NA

SECTION 5 NOTES:

SECTION 6: ACCIDENTAL RELEASE MEASURES

ACCIDENTAL RELEASE MEASURES:
Personal Safety Measures: Wear protective equipment, keep unprotected persons away, ensure adequate ventilation
Environmental Safey Measures: NA
Spill/Cleanup Safety Measures: Dispose of collected waste and contaminated materials as directed in Section 7.

SECTION 6 NOTES:

SECTION 7: HANDLING AND STORAGE

HANDLING AND STORAGE: Spilled material should be contained and recovered into drums
OTHER PRECAUTIONS: Store in cool, dry, ventilated area. Do Not store near halogens, oxidizers or acidic materials. Keep ignition sources away and ensure good ventilation.

SECTION 7 NOTES:

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Block off handling or spill area from unprotected persons

VENTILATION : Ensure area is adequately ventilated.

RESPIRATORY PROTECTION: NA

EYE PROTECTION: safety goggles/splash shield

SKIN PROTECTION: tyvec suit with rubberized gloves (neoprene)

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: slip resistant footwear

WORK HYGIENIC PRACTICES: Surfaces covered with EZVI can become VERY slippery. Exercise additional care when handling/cleaning up to avoid slip and fall injury.

EXPOSURE GUIDELINES: NA

SECTION 8 NOTES:

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Black/Dark Gray viscous material
ODOR: cooking oil odor
PHYSICAL STATE: liquid

pH AS SUPPLIED:
pH (Other):
BOILING POINT:
F: >572 ºF
C: >300 ºC
MELTING POINT:
F: NA
C: NA
FREEZING POINT:
F: - 4 ºF
C: - 20 ºC
VAPOR PRESSURE (mmHg):
@
F: NA
C: NA
VAPOR DENSITY (AIR = 1):
@
F: NA
C: NA
SPECIFIC GRAVITY (H2O = 1): 1.05 – 1.13

EVAPORATION RATE: NA

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES (con't)

SOLUBILITY IN WATER: Insoluble
PERCENT SOLIDS BY WEIGHT: 5 – 20 %
PERCENT VOLATILE:
BY WT/ BY VOL @
F: NA
C: NA
VOLATILE ORGANIC COMPOUNDS (VOC):
WITH WATER: NA **LBS/GAL**
WITHOUT WATER: NA LBS/GAL
VISCOSITY: ~ 1100 cps (@ 75 ºF)

SECTION 9 NOTES:

SECTION 10: STABILITY AND REACTIVITY

	STABLE	UNSTABLE
STABILITY:	X	

CONDITIONS TO AVOID (STABILITY): AVOID IMPROPER HANDLING & STORAGE CONDITIONS
INCOMPATIBILITY (MATERIAL TO AVOID): HALOGENS, ACIDS, OXIDIZERS
HAZARDOUS DECOMPOSITION OR BY-PRODUCTS:
HAZARDOUS POLYMERIZATION: NA
CONDITIONS TO AVOID (POLYMERIZATION): NA
SECTION 10 NOTES:

SECTION 11: TOXICOLOGICAL INFORMATION

TOXICOLOGICAL INFORMATION: NA

SECTION 11 NOTES:

SECTION 12: ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION: NA

SECTION 12 NOTES: Used for environmental cleanup of contaminated soils and groundwater. EZVI is biodegradeable in the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Place waste into appropriate containers

RCRA HAZARD CLASS: NA
SECTION 13 NOTES:

SECTION 14: TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION
- PROPER SHIPPING NAME: Emulsified Zero Valent Iron (EZVI)
- HAZARD CLASS: NA
- ID NUMBER: NA
- PACKING GROUP: NONE
- LABEL STATEMENT:

WATER TRANSPORTATION
- PROPER SHIPPING NAME: Emulsified Zero Valent Iron (EZVI)
- HAZARD CLASS: NA
- ID NUMBER: NA
- PACKING GROUP: NONE
- LABEL STATEMENTS:

AIR TRANSPORTATION
- PROPER SHIPPING NAME: Emulsified Zero Valent Iron (EZVI)
- HAZARD CLASS: NA
- ID NUMBER: NA
- PACKING GROUP: NONE
- LABEL STATEMENTS:

OTHER AGENCIES:
SECTION 14 NOTES:

SECTION 15: REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS

TSCA (TOXIC SUBSTANCE CONTROL ACT): NA

CERCLA (COMPREHENSIVE RESPONSE COMPENSATION, AND LIABILITY ACT): NA

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT): NA

311/312 HAZARD CATEGORIES: NA

313 REPORTABLE INGREDIENTS: NA

STATE REGULATIONS: NA

INTERNATIONAL REGULATIONS: NA

SECTION 15 NOTES:

SECTION 16: OTHER INFORMATION

OTHER INFORMATION: NA

PREPARATION INFORMATION: NA

DISCLAIMER: The information contained herein relates only to the specific material identified. Provectus believes that such information is accurate and reliable but no representation, guarantee or warranty, express or implied, is made as to the accuracy, reliability, or completeness of the information. Provectus urges individuals receiving this information to make their own determination as to the suitability and completeness of the information for their particular application.

Attachment 4

Type or print all information. See reverse for instructions. OMB No. 2040-0042 Approval Expires 12/31/2018

INVENTORY OF INJECTION WELLS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF GROUND WATER AND DRINKING WATER

(This information is collected under the authority of the Safe Drinking Water Act)

1. DATE PREPARED *(Year, Month, Day)*

2. FACILITY ID NUMBER

PAPERWORK REDUCTION ACT NOTICE

The public reporting burden for this collection of information is estimated at about 0.5 hour per response including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, includingsuggestions for reducing this burden, Director, Collection Strategies Division (2822), U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, DC 20460, and to the Office of Management and Budget, Paperwork Reduction Project, Washington, DC20503.

3. TRANSACTION TYPE *(Please mark one of the following)*

☐ Deletion ☐ First Time Entry
☐ Entry Change ☐ Replacement

4. FACILITY NAME AND LOCATION

A. NAME *(last, first, and middle initial)*

B. STREET ADDRESS/ROUTE NUMBER

C. LATITUDE

DEG	MIN	SEC
		.

D. LONGITUDE

DEG	MIN	SEC
		.

E. TOWNSHIP/RANGE

TOWNSHIP	RANGE	SECT	1/4 SECT

F. CITY/TOWN

G. STATE

H. ZIP CODE

I. NUMERIC COUNTY CODE

J. INDIAN LAND *(mark "x")* ☐ Yes ☐ No

5. LEGAL CONTACT:

A. TYPE *(mark "x")* ☐ Owner ☐ Operator

B. NAME *(last, first, and middle initial)*

C. PHONE *(area code and number)*

D. ORGANIZATION

E. STREET/P.O. BOX

F. CITY/TOWN

G. STATE

H. ZIP CODE

I. OWNERSHIP *(mark "x")*

☐ PRIVATE ☐ PUBLIC ☐ SPECIFY OTHER
☐ STATE ☐ FEDERAL

6. WELL INFORMATION:

A. CLASS AND TYPE		B. NUMBER OF WELLS		C. TOTAL NUMBER OF WELLS	D. WELL OPERATION STATUS				
		COMM	NON-COMM		UC	AC	TA	PA	AN
				0					
				0					
				0					
				0					
				0					
				0					
				0					

COMMENTS *(Optional):*

KEY:

DEG = Degree
MIN = Minute
SEC = Second
SECT = Section
1/4 SECT = Quarter Section

COMM = Commercial
NON-COMM = Non-Commercial
AC = Active
UC = Under Construction
TA = Temporarily Abandoned
PA = Permanently Abandoned and Approved by State
AN = Permanently Abandoned and not Approved by State

INSTRUCTIONS AND DEFINITIONS

SECTION 1. DATE PREPARED: Enter date in order of year, month, and day.

SECTION 2. FACILITY ID NUMBER: In the first two spaces, insert the appropriate U.S. Postal Service State Code. In the third space, insert one of the following one letter alphabetic identifiers:

D - DUNS Number,
G - GSA Number, or
S - State Facility Number.

In the remaining spaces, insert the appropriate nine digit DUNS, GSA, or State Facility Number. For example, A Federal facility (GSA - 123456789) located in Virginia would be entered as : VAG123456789.

SECTION 3. TRANSACTION TYPE: Place an "x" in the applicable box. See below for further instructions.

Deletion. Fill in the Facility ID Number.
First Time Entry. Fill in all the appropriate information.
Entry Change. Fill in the Facility ID Number and the information that has changed.
Replacement.

SECTION 4. FACILITY NAME AND LOCATION:

A. Name. Fill in the facility's official or legal name.
B. Street Address. Self Explanatory.
C. Latitude. Enter the facility's latitude (all latitudes assume North Except for American Samoa).
D. Longitude. Enter the facility's longitude (all longitudes assume West except Guam).
E. Township/Range. Fill in the complete township and range. The first 3 spaces are numerical and the fourth is a letter (N,S,E,W) specifying a compass direction. A township is North or South of the baseline, and a range is East or West of the principal meridian (e.g., 132N, 343W).
F. City/Town. Self Explanatory.
G. State. Insert the U.S. Postal Service State abbreviation.
H. Zip Code. Insert the five digit zip code plus any extension.

SECTION 4. FACILITY NAME & LOCATION (CONT'D.):

I. Numeric County Code. Insert the numeric county code from the Federal Information Processing Standards Publication (FIPS Pub 6-1) June 15, 1970, U.S. Department of Commerce, National Bureau of Standards. For Alaska, use the Census Division Code developed by the U.S. Census Bureau.
J. Indian Land. Mark an "x" in the appropriate box (Yes or No) to indicate if the facility is located on Indian land.

SECTION 5. LEGAL CONTACT:

A. Type. Mark an "x" in the appropriate box to indicate the type of legal contact (Owner or Operator). For wells operated by lease, the operator is the legal contact.
B. Name. Self Explanatory.
C. Phone. Self Explanatory.
D. Organization. If the legal contact is an individual, give the name of the business organization to expedite mail distribution.
E. Street/P.O. Box. Self Explanatory.
F. City/Town. Self Explanatory.
G. State. Insert the U.S. Postal Service State abbreviation.
H. Zip Code. Insert the five digit zip code plus any extension.
I. Ownership. Place an "x" in the appropriate box to indicate ownership status.

SECTION 6. WELL INFORMATION:

A. Class and Type. Fill in the Class and Type of injection wells located at the listed facility. Use the most pertinent code (specified below) to accurately describe each type of injection well. For example, 2R for a Class II Enhanced Recovery Well, or 3M for a Class III Solution Mining Well, etc.
B. Number of Commercial and Non-Commercial Wells. Enter the total number of commercial and non-commercial wells for each Class/Type, as applicable.
C. Total Number of Wells. Enter the total number of injection wells for each specified Class/Type.
D. Well Operation Status. Enter the number of wells for each Class/Type under each operation status (see key on other side).

INJECTION WELL CLASS AND TYPE CODES

CLASS I Industrial, Municipal, and Radioactive Waste Disposal Wells used to inject waste below the lowermost Underground Source of Drinking Water (USDW).

TYPE	**1I**	Non-Hazardous Industrial Disposal Well.
	1M	Non-Hazardous Municipal Disposal Well.
	1H	Hazardous Waste Disposal Well injecting below the lowermost USDW.
	1R	Radioactive Waste Disposal Well.
	1X	Other Class I Wells.

CLASS II Oil and Gas Production and Storage Related Injection Wells.

TYPE	**2A**	Annular Disposal Well.
	2D	Produced Fluid Disposal Well.
	2H	Hydrocarbon Storage Well.
	2R	Enhanced Recovery Well.
	2X	Other Class II Wells.

CLASS III Special Process Injection Wells.

TYPE	**3G**	*In Situ* Gasification Well
	3M	Solution Mining Well.

CLASS III (CONT'D.)

TYPE	**3S**	Sulfur Mining Well by Frasch Process.
	3T	Geothermal Well.
	3U	Uranium Mining Well.
	3X	Other Class III Wells.

CLASS IV Wells that inject hazardous waste into/above USDWs.

TYPE	**4H**	Hazardous Facility Injection Well.
	4R	Remediation Well at RCRA or CERCLA site.

CLASS V Any Underground Injection Well not included in Classes I through IV.

TYPE	**5A**	Industrial Well.
	5B	Beneficial Use Well.
	5C	Fluid Return Well.
	5D	Sewage Treatment Effluent Well.
	5E	Cesspools (non-domestic).
	5F	Septic Systems.
	5G	Experimental Technology Well.
	5H	Drainage Well.
	5I	Mine Backfill Well.
	5J	Waste Discharge Well.

PAPERWORK REDUCTION ACT The public reporting and record keeping burden for this collection of information is estimated to average 0.5 hours per response. Burden means the total time, effort, or financial resource expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to the collection of information; search data sources; complete and review the collection of information; and, transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques to Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822), 1200 Pennsylvania Ave., NW., Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed forms to this address.

Attachment 5

Injection Field Log

Project Name: _____ **Injection Logs Recorded By:** _____

Boring ID Number	Date	Start Time	End Time	Injection Interval (ft to ft)	Maximum PSI	Average PSI	Average Flow Rate (gpm)	Volume Per Interval (gal)	Volume per Boring Running Total (gal)	Check if Reagent Surfaced	Notes
PINJ-1											

Total Volume Injected: _____

Boring ID Number	Date	Start Time	End Time	Injection Interval (ft to ft)	Maximum PSI	Average PSI	Average Flow Rate (gpm)	Volume Per Interval (gal)	Volume per Boring Running Total (gal)	Check if Reagent Surfaced	Notes
PINJ-2											

Total Volume Injected: _____

Boring ID Number	Date	Start Time	End Time	Injection Interval (ft to ft)	Maximum PSI	Average PSI	Average Flow Rate (gpm)	Volume Per Interval (gal)	Volume per Boring Running Total (gal)	Check if Reagent Surfaced	Notes
PINJ-3											

Total Volume Injected: _____