INVENTUM ENGINEERING, PC

Corrective Measures Evaluation

Brownfield Cleanup Program Site #C915230

Buffalo Color Corporation Site

Area A

1337 South Park Avenue, Buffalo, NY

December 18, 2020

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1 Introduction

On behalf of HDC Holding LLC (HDC) and South Buffalo Development Corporation LLC (SBD), Inventum Engineering, P.C. (Inventum) has prepared this Corrective Measures Evaluation Report (CMS) for Area A (Site) of the former Buffalo Color Corporation (BCC) property located at 1337 South Park Avenue in the City of Buffalo, County of Erie, New York. The Site is part of five areas that comprised the former BCC, which produced dyes and organic chemicals until it filed for bankruptcy protection in 2005. South Buffalo Development LLC (SBD) entered into a Brownfield Cleanup Agreement (BCA, Index No. B9-0783-08-06) with the New York State Department of Environmental Conservation (NYSDEC) in April 2009 to investigation and remediate the 10.2-acre Area A Site (NYSDEC Site No. C915230).

Previous remedial investigations determined that Site soil samples contained concentrations of certain metals and organic substances that exceeded the NY Commercial Soil Cleanup Objectives (SCOs). Shallow soil and shallow groundwater samples collected on the southwestern portion of Area A were found to contain concentrations of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) that exceeded applicable NY groundwater standards. It was determined that no remedial action was necessary for deep aquifer groundwater.

In December 2013, following completion of remedial construction activities and the subsequent issuance of a certificate of completion (COC) from the NYSDEC, ownership of Area A was transferred to HDC and an agreement between SBD and HDC granting SBD, and its contractors, indefinite access to the Site in order to perform all continuing obligations and requirements under the Site Management Plan (SMP) and established environmental easement was executed.

1.1 Site Description

Area A is situated on 10.2 acres and bounded by South Park Avenue to the north, the Buffalo River to the east, former/abandoned railroad tracks on an elevated embankment to the south, and active railroad lines to the west (Figure 1). The northeast corner of the Site is adjacent to a bridge abutment for the South Park Avenue bridge that extends over the Buffalo River.

The following is a summary of the Remedial Actions (RAs) performed at the Site:

- A vertical hydraulic barrier (VHB) consistent of slag, cement, and bentonite was installed using slurry trench and jet grout methods.
- The pre-existing Area A groundwater extraction system (GWTF), which was installed in 2006 as an interim corrective measure, was repurposed to extract groundwater for treatment and to provide hydraulic control behind the VHB;
- The Area A riverbank was stabilized through closure of the former water intake structure, establishment of vegetation along segments of the riverbank, and stabilization of existing concrete retaining walls to remain in place;
- Installation of an integrated Site-wide cover system to prevent human exposure to remaining soils containing compounds of concern at the Site;
- Abandonment/plugging of unused process sewers and installation of a new storm water conveyance system;
- Execution and recording of an environmental easement to restrict land use and address future exposure to any remaining contamination at the Site; and
- Development and implementation of an SMP for long term management of the site remedy.

More detailed summaries and descriptions of the Site's historical operational uses, historical investigations, and RAs as well as the Site Management (SM) and Operation and Maintenance (O&M) requirements can be found in the following documents:

- Remedial Investigation Report. Buffalo Color Corporation. Area ABCE Site. NYSDEC Site No. 915184. Buffalo, NY. MACTEC Engineering and Consulting. August 2008.
- Alternatives Analysis Report. Former Buffalo Color Corporate Site. Buffalo, New York. MACTEC Engineering and Consulting, Inc. February 11, 2009.
- Final Engineering Report. Buffalo Color Site – Area A/B. Erie County, New York. MACTEC Engineering and Consulting, P.C. December 2013.
- Former Buffalo Corporation Color Sites Areas A and D Groundwater Extraction System OM&M Manual. Buffalo Color Areas A and D. Buffalo, New York. MACTEC Engineering and Consulting, P.C. Updated March 2015.
- Site Management Plan – Former Buffalo Color Corporation Site – Areas A and B. *B*uffalo, NY. MACTEC Engineering and Consulting, P.C. (May 1, 2015).

1.2 Remedial Action Objectives

The Remedial Action Objectives (RAOs) identified for the Site guided the selection and implementation of RAs, and subsequent site-specific management requirements (SM) followed to document progress towards meeting those RAOs. Progress towards meeting the RAOs as well as compliance with SM requirements and Site Institutional Controls (ICs) and Engineering Controls (ECs) are documented in the annual Periodic Review Reports (PRRs). The RAOs were established as follows.

1.2.1 Groundwater RAOs

- Protect construction workers, Site workers, visitors and terrestrial biota from inhalation of vapors associated with contaminants in the shallow aquifer exceeding the NY Class GA standards.
- Protect construction workers, Site workers, and visitors from dermal contact with contaminants in the shallow aquifer exceeding the Class GA standards.
- Protect construction workers, Site workers, visitors, and terrestrial and aquatic biota from direct contact with groundwater from the shallow aquifer leaving the site at concentrations that exceed the applicable water quality-based standards of the receiving water.

1.2.2 Soil RAOs

1.2.2.1 Surface Soil

- Protect potential current and future construction workers, Site workers, visitors, and terrestrial biota at the Site from unacceptable risk resulting from direct-contact (via dermal contact or ingestion) with Site surface soils containing contaminants at concentrations exceeding the Site-specific background, or Commercial Soil Cleanup Objectives (SCOs), as applicable.
- Reduce the potential leaching of contaminants from Site surface soils at concentrations exceed the Protection of Groundwater SCOs.
- Prevent potential inhalation by current or future construction workers, site workers, and visitors, as well as terrestrial biota, of particulates due to dispersion of contaminants in Site surface soils exceeding the Site-specific background or the Commercial SCOs, as applicable.
- Reduce the potential for overland transport of contaminated soil to the Buffalo River via erosion and storm water runoff.

1.2.2.2 Subsurface Soil

- Protect potential current and future construction workers, site workers, visitors, and terrestrial biota at the Site from unacceptable risk resulting from direct contact (via dermal contact, ingestion, or inhalation of vapors) with Site subsurface soils containing contaminants at concentrations exceeding the Commercial SCOs, as applicable.
- Reduce the potential leaching of contaminants from Site subsurface soils at concentrations exceeding the Protection of Groundwater SCOs.
- Prevent potential inhalation by current or future construction workers to particulates due to dispersion of contaminants in Site subsurface soils at concentrations exceeding the Commercial SCOs, as applicable.

1.3 Corrective Measures Evaluation Scope

The PRR for the reporting period of October 5, 2018 to October 5, 2019 provided notice that all SM requirements may not have been met. Three conditions were identified potentially requiring implementation of corrective measures to existing ECs in order to maintain progress with the established RAOs:

- Despite numerous attempts to clear obstructions, flush lines and replace equipment, there is periodically an apparent outward gradient along the Buffalo River near the north end of Area A. Table 1 shows groundwater elevation monitoring data from the six (6) observation well pairs installed on the interior and exterior of the VHB during the reporting period. Inventum noted in the PRR that while there may be a gradient at times, due to the presence of the VHB, it is unlikely the small and periodic gradient induced any flow.
- Riverbank inspection reports and survey monitoring data indicated that although the shoreline is intact and did not experience any displacement during the reporting period, the pea gravel continues to migrate from the behind the sheet pile wall in the northeast corner of the Site.
- The Site storm water analytical results were largely below the laboratory reporting limits and /or New York State Groundwater Effluent Limits for discharges to Class GA waters (Table 2). However, in the fourth quarter sample of 2018 Nitrobenzene was detected at 0.99 and 0.81 micrograms per liter (µg/L) which exceeded the Class GA Standard of 0.4 µg/L. During the second quarter of 2019 2,6-Dinotrotoluene was detected in the sample and duplicate at 5.3 and 5.5 µg/L exceeding the Class GA Standard of 5 µg/L and Nitrobenzene was detected at 0.57 and 0.58 µg/L.

Inventum provided a work plan to the NYSDEC for tasks related to evaluating the above referenced SM conditions and resulting need, if applicable, for any reconditioning or overhaul of existing ECs in order to maintain progress toward meeting Site RAOs. The April 13, 2020 work plan included:

- An evaluation of the need for additional hydraulic control measures behind (upgradient) of the existing VHB.
- Replacement of gravel behind the existing sheet piling wall along the Buffalo River in the northeasterly corner of the site.
- A visual evaluation of flow and potential infiltration in the Site storm sewer network.

2 Corrective Measures Evaluation

The corrective measures activities were conducted in the spring and summer of 2020 as described below.

2.1 Sheet Pile Wall Backfill

SBD and the NYSDEC had noted the loss of granular fill between the steel sheet pile and the displaced concrete retaining wall adjacent to the South Park Avenue bridge over the past several years. Inventum believes the pea gravel that was installed behind the sheet pile wall to allow drainage may be too small diameter and had washed out of the drainage pathways over time.

OSC, Inc. emplaced #2 coarse aggregate stone between the sheet pile wall and the concrete retaining wall on July 23, 2020 and the top of the aggregate was marked for reference. Import approval of the fill material was approved by the NYSDEC in an e-mail dated July 24, 2020. The emplaced material conforms to the New York State Department of Transportation requirements for Section 703-02 Coarse Aggregate. The NYSDEC approved *Request to Import/Reuse Fill or Soil Form* and photographs of sheet pile wall pre- and post-placement of the stone is provided for reference in Appendix A.

No additional corrective measures are proposed at this time. Inspection of the area for subsidence will be added to the EC inspections completed as part of the SMP and documented in the annual PRR.

2.2 Storm Sewer Inspection

As noted previously, analytical results (Table 2) for samples collected of the storm water conveyance system discharge as part of routine site monitoring showed detections of 2,6-dinitrotoluene,nitrobenzene, and other constituents above the Class GA standards. Inventum conducted a video pipe inspection of the storm sewer network on the site (Figure 1) on June 25, 2020 in an effort to find any points of breakage, seepage, or punctures where groundwater may be infiltrating the system.

The video inspection was conducted on June 25, 2020 by J.A. Brundage The Drain Doctor Inc of Niagara Falls, New York. (Appendix B). The storm sewer was dry during the inspection and there were no identifiable points of breakage, seepage, or punctures that would indicate a potential pathway for groundwater infiltration.

Quarterly sampling of the storm water conveyance system discharge will continue to be conducted in accordance with the SMP. Additional corrective measures are proposed to include the collection of additional samples in Q1 2021 and Q2 2021 from each of the Area A surface inlets and manholes in an effort to narrow down the source of the noted exceedances. Absorbent filter socks will also be installed around each inlet. Inventum will submit a letter report to the NYSDEC within 30-days of receiving the Q2 2021 storm water system sampling results with an evaluation of the results and any necessary further corrective measures that may be required to address storm water conveyance excursions..

2.3 Hydraulic Control Measures Evaluation

Periodic groundwater level elevation collected from the six observation well sets along the length of the VHB have shown a potential for outward groundwater gradient in sets OW-A3 through OW-A6 (Figure 1; Table 1). There is a consistent inward gradient based on the data collected from OW-A1 Set and OW-A2 Set. Extracted groundwater volumes from the corresponding extraction wells follow a similar trend. Those well sets showing consistent inward groundwater gradient (OW-A1 and OW-A2) correlate to extraction wells (EW-1 and EW-2) producing over 100,000 gallons per month (gal/month). Those well sets showing potential outward gradient (OW-A3 through OW-A6) correlated to extraction wells (EW-3A through EW-5) producing under 50,000 gal/month.

The five (5) existing extraction wells (Table 3) were installed in June 2006 as part of an interim corrective measures program and were subsequently repurposed for long-term hydraulic control behind the VHB which was constructed between October 2012 and December 2013. Inventum proposed in the PRR that alternative extraction well locations and construction specifications in an attempt to maintain an inward hydraulic gradient across the full length of the VHB.

2.3.1 New Extraction Wells

Four (4) additional extraction wells (EW-4A, EW-6, EW-7, and EW-8) were installed at the approximate locations shown on Figure 1 in May 2020. The wells were installed by Earth Dimensions, Inc of Elma, New York. Each extraction well boring was completed using an 8.25-inch inside diameter hollow stem auger (12-inch outside diameter) and was keyed a minimum of 2-feet into the underlying clay formation. Each well was completed with a 4-inch diameter polyvinyl chloride (PVC) casing and screen. A 2-foot section of solid casing was installed at the bottom of the well and serves as a sump for the extraction pump. Twenty (20) feet of slotted screen (0.020 inch) was installed above the solid "sump" casing. A filter and sand pack were installed from one foot below the base of the screen to 5 foot above the top of the screened interval. A 2-foot thick layer of bentonite was installed above the sand filter pack and the remaining annual space was filled with a bentonite-cement grout.

A summary of boring and well construction details for the new extraction wells is included on Table 3. Each of the new extraction wells were completed as above-grade stick-ups with approximately 3-feet of casing above ground surface to facilitate future incorporation into the GWTF.

Soil cuttings were screened with a photoionization detector (PID) equipped with a 10.6 eV lamp. The only indication of potentially impacted soil was in the boring for EW-7 where there was field screening (58 ppm on the PID) and olfactory evidence from approximately 25-feet to 27-feet. Additionally, there was light non-aqueous phase liquid (LNAPL) noted during the development and drilling of EW-7. However, there was not a sufficiently measurable amount of LNAPL present at EW-7 to be gauged by an oil-water interface meter either during well development, sampling, or during the pumping test.

Soil cuttings generated from the borings were containerized in a double lined and covered roll-off container and stored on the asphalt area adjacent to EW-4A. These cuttings will be disposed of following the addition of any excavated soils that are generated from incorporation of the new wells into the GWTF.

2.3.2 Groundwater Sampling

Groundwater samples were collected from each of the new extraction wells two weeks following development (Table 4). Each well was purged prior to sampling with a peristaltic pump and dedicated high-density polyethylene (HDPE) tubing following low-flow sampling procedures (Appendix C). One sample was collected at EW-4A, EW-6, and EW-8 and analyzed for Target Compound List (TCL) Volatile Organic Compounds (VOCs) using EPA Method 8260, TCL Semi-Volatile Organic Compounds (SVOCs) using EPA Method 8270, and Target Analyte List (TAL) Metals using EPA Method 6010. Two (2) samples were collected from EW-7 where the globules of LNAPL were noted during development. One sample (A-EW-7A) from EW-7 was collected with the pump intake set at the bottom of the screened interval (approximately 30 feet bgs) and the second sample (A-EW-7B) was collected from the interval where evidence of contamination was noted in the soil boring (approximately 25 feet bgs).

The extraction well sampling results (Table 4) show a suite of parameters detected at concentrations similar to those seen in the quarterly monitoring conducted of the existing Site monitoring and extraction wells under the SMP. Laboratory data reports are provided for reference in Appendix D.

In the northeast corner between Areas A and B there is a corrugated HDPE sump that was reportedly installed by a contractor for construction of utilities servicing the nearby Tesla facility (the "Tesla Sump"). SBD was not notified of the construction nor did SBD participate in the installation(s). Reportedly, the water from the sump was pumped by the Tesla contractor to allow construction of a sewer line. No data from the construction period were provided to SBD.

One (1) sample of the water in the sump was collected with a disposal polyethylene bailer on June 25, 2020 and analyzed for TAL Metals using EPA Method 6010C, TCL VOCs using EPA Method 8260, and TCL SVOCs using EPA Method 8270. The Tesla Sump sampling results (Table 4) do not show any Area A or Area B constituents in excess of the Class GA standards.

2.3.3 Shallow Aquifer Test Procedures

A sequence of pumping tests and step test were conducted on the new extraction wells between June 23 and June 29, 2020.

Electric submersible pumps (Grundfos Redi-Flo 3" 22SQE07-140) were installed in each well and temporary 1-inch HPDE hosing was used to connect the pump discharge to the GWTF. A 1-inch in-line digital flow meter was installed at each well head to monitor flow rate and total flows over the pumping tests. Pump control boxes with variable frequency drives (VFD) were connected to each submersible pump to provide power and adjust flow rates during the tests. Pressure transducers were installed in each of the adjacent interior observation wells (OW-A3I, OW-A4I, OW-A5I, and OW-A6I) and programmed to monitor and record changes in groundwater elevation at 1-minute intervals prior to (baseline) and during the tests.

2.3.3.1 Pumping Tests

A series of pumping tests were conducted on June 24 and June 25, 2020 (Figure 2) to determine the pumping rates necessary to maintain consistent hydraulic control behind the VHB. During each of the tests the new extraction wells were operated at pumping rates between 5 and 13 gallons per minute (gpm) and the response in the adjacent interior observations wells were monitored and recorded with the transducers. Manual groundwater level measurements were collected frequently during the pumping from the corresponding exterior observations wells (OW-A3E, OW-A4E, OW-A5E, and OW-A6E). Surface water levels from the Buffalo River were also recorded frequently.

Initially, the pumping tests were run with the existing extraction wells EW-1 and EW-2 also operating at normal capacity; however, it became clear quickly that the GWTF was not designed or capable of treating the additional flow from the four (4) new extraction wells with either EW-1 and EW-2 also operating. The pumps in EW-1 and EW-2 were shut off for the duration of each pumping test. Similarly, as the pumping rate was increased in new extraction wells EW-4A and EW-6 during the second test on June 25, 2020 (Figure 2) the GWTF could not treat the water when the VFD controllers were adjusted up to 80-percent capacity, as a result these wells were operated at half the pump capacity for the remainder of the test. The pumps in existing wells EW-3A, EW-4, and EW-5 were turned off during all the pumping tests. The pumps in the existing wells were all turned back on and were fully operating at the completion of each test.

Baseline groundwater level monitoring from the interior observation wells (OW-A3I, OW-A4I, OW-A5I, and OW-A6I) were monitored for a 24-hour period prior to starting the test. Similarly, groundwater recovery was monitored during the overnight period between the two tests from these observation wells.

2.3.3.2 Step Test

A step test was conducted at EW-6 on June 26, 2020 at pumping intervals of 7 gpm, 11 gpm, and 14 gpm. Each step was operated for approximately 60-minutes. The groundwater elevation in the extraction well was monitored frequently during each step of the test and during a 35-minute recovery period following completion of the test (Figure 3). Groundwater elevations were also monitored with transducers at nearby interior observation wells OW-A2I, OW-A3I, and OW-A4I). An estimated hydraulic conductivity of 18.9 feet per day (6.65E-03 cm/sec) was calculated from the step test (Table 5; Figure 4). The new extraction wells are fully screened through the entire saturated interval and this value is consistent with the sand and gravel alluvium formation.

2.3.3.3 Buffalo River – Observation Well Response Monitoring

Transducers were installed in OW-A3I, OW-A3E, OW-A4I, and within the Buffalo Rover over a 63-hour period between June 26 and June 28, 2020. Transducers were programmed to monitor and record water levels at 5-minute intervals during that period (Figure 4). The goal of the monitoring was to see the response of the exterior observation wells to fluctuations in river water levels as a guide to understanding the range of pumping rates that may be required to maintain long-term hydraulic control.

2.3.4 Evaluation and Findings

The pumping tests demonstrated that the temporary extraction wells (without existing extraction wells EW-3A, EW-4, and EW-5) as designed (fully screened through the saturated interval) are capable of withdrawing groundwater at rates that create an inward gradient across the barrier wall (Figure 2).

Transducer data from the interior observation wells adjacent to the new extraction wells show an almost immediate response to pumping (Figure 2). The minimum pumping rate to affect a 0.5-foot differential across the VHB is estimated to be approximately 5 to 7 gallons per minute (gpm) per temporary well under the conditions at the time of testing. The pumping and step test data show that each well is capable of yielding over 15 gpm. For reference, the existing system is producing 150,000 gallons per month, the four new wells would be capable of producing more than 750,000 gallons per month (5 times the volume of the existing system per month).

Figure 4 shows an immediate and proportioned response in exterior observation well OW-A3E with fluctuations in river water level. The river water level fluctuated over two feet (Approximately 576.5 ft ASML to 574 ft AMSL) over the monitoring period. There was an immediate but muted response in OW-A3E of approximately 2-feet (575.5 ft AMSL to 573.5 ft AMSL) over the same monitoring period while the corresponding interior observation well (OW-A3I) trended consistently between 574 ft AMSL and 574.25 ft AMSL. The design of the permanent pumps would be capable of higher maximum flow rates to be capable of adapting to seasonal fluctuations, potentially a design capacity of 15 to 20 gpm based on the pumping test and river /observation well data observed (Figure 2 and 4).

The GWTF is comprised of two separate treatment streams. Extracted groundwater from EW-1, EW-2, and EW-5 are processed through one set of treatment controls (batch tank, bag filters, multi-media filter, and Liquid Phase Granular Activated carbon [LGAC]) prior to discharge to a Buffalo Sewer Authority (BSA) manhole located on Area B. Extracted groundwater from EW-3 and EW-4A are processed through a separate set of treatment controls (batch tank, bag filters, and LGAC) prior to discharge via a separate lateral to the same manhole. Each of these process streams is operating at a capacity of approximately 20

gpm and would not be able to support the flow volumes (approximately 100 gpm) the new wells are capable of achieving and that would produce consistent hydraulic differentials along the barrier wall.

GWTF would require substantial modifications as a corrective measure to increase the treatment capacity to a system design flow rate of 100 gpm from the current average rate of less than 5 gpm.

3 Corrective Measures Alternatives Analysis

The corrective measures evaluation described in Section 2 indicate the need for supplemental or additional measures in order to maintain compliance with EC/IC SMP requirements. Specifically, the evaluation of hydraulic control behind (upgradient) of the existing VHB (Section 2.3) showed the need for additional control measures. Inventum, OSC, Honeywell, and the NYSDEC agreed in a conference call on July 28, 2020 that an updated evaluation of corrective measure alternatives was appropriate, which include:

Alternative A – Extraction and Treatment

Alternative B – Hydraulic Barriers – VHB Extension and Capping

Alternative C – Source Treatment, Capping, and Monitored Natural Attenuation

A detailed analysis of each alternatives is presented below and includes an evaluation using criteria and guidance outlined in NYSDEC DER-10, *Technical Guidance for Site Investigation and Remediation.* A summary of the balancing criteria is provided in Table 6. Figures 5, 6, and 7 outline basic features and assumptions associated with each evaluated alternative. Tables 7, 8, and 9 provide present value (PV) estimates of each alternative including all direct and indirect capital costs and long-term O&M costs.

3.1 Alternative A – Extraction and Treatment

There has been an extraction and treatment system operating at the Site for more than 15 years. The corrective measures evaluation (Section 2.3) demonstrated that the appropriate placement and construction of four (4) new extraction wells are capable of withdrawing groundwater at a rate that creates and can maintain an inward gradient across the barrier wall. The rate of recovery however is in excess of the existing GWTF capacity. The GWTF was not designed to support the flow volumes the new extraction wells are capable of achieving and that would produce consistent hydraulic differentials along the barrier wall. The minimum pumping rate to affect a 0.5-foot differential across the wall is estimated to be approximately 5 to 7 gpm per well under the conditions at the time of the testing. The design of permanent pumps under this alternative would be capable of higher maximum flow rates to account for season fluctuations, potentially 15 to 20 gpm.

Alternative A includes:

- Engineering, Permitting, Testing, and Reporting,
- New pumps (rated for 15 to 20 gpm) and well vaults,
- Piping the new wells to the GWTF,
- Disconnecting existing extraction wells EW-3A, EW-4, and EW-5,
- GWTF upgrades to a design flow rate of 100 gpm
- Operation of EW-1, EW-2, EW-4A, EW-6, EW-7, and EW-8 for 30-years,
- Continued implementation of EC/ICs,
- Long-term GWTF O&M, EC/IC compliance, and reporting.

GWTF engineering and permitting would include an evaluation of the continued need to separate process streams for treatment as well as modification of the BSA discharge permit. Existing equipment (batch tanks, pumps, and well vault components) will be re-used as conditions allow. GWTF upgrades would likely include the addition of an oil-water separator, sand filters with backwash capability in place of

existing bag-filters, increased GAC filtration/treatment, and updated programmable logic control (PLC) monitoring capabilities.

3.1.1 Compliance with SCGs

Long-term extraction and treatment are unlikely to achieve compliance with the Class GA standards; however, Alternative A would continue to prevent off-site migration and provide treatment as needed to comply with the BSA discharge permit. Compliance with Commercial Use Soil Cleanup Objectives (SCOs) would continue to be met through the existing areas of vegetative, gravel, and asphalt cover.

3.1.2 Overall Protection of Public Health and the Environment

Alternative A would continue to provide protection of public health and the environment by reducing the offsite migration of impacted shallow groundwater. Existing ICs including groundwater use restriction and use restriction of the Site for commercial purposes will remain in place.

3.1.3 Short-term Impacts and Effectiveness

Only limited new construction activities are necessary to implement Alternative A; therefore, short-term impacts and effects on the community, workers, or the environment would be minimal.

3.1.4 Long-term Effectiveness and Permanence

Alternative A would continue to meet the established RAOs for groundwater. The long-term impact of the increased pumping rate would be to lower groundwater surface on the property. The current flow rate is likely less than the average annual infiltration on the site. The increased flow rate would exceed the annual rate of infiltration, ultimately resulting in a decreasing groundwater surface across the property.

3.1.5 Reduction of Toxicity, Mobility, and Volume

Quarterly groundwater monitoring shows concentrations of total VOCs in groundwater greater than 50 mg/L in some areas (Figure 5; ICM-101) after 15 years of GWTF operation. This indicates that the ability to realize any additional mass removal is likely limited through conventional means. Although some reduction of toxicity and volume is solely achievable in the partitioning of constituents from Site media and the mobility of the plume through extraction and treatment.

3.1.6 Implementability

No technical impediments exist to implementing the modifications comprehended under Alternative A are anticipated. The alternative uses conventional and available technologies.

3.1.7 Sustainability

The evaluated alternatives were qualitatively assessed for sustainability and compared against each other. Alternative A would create the largest carbon footprint due to sustained 24-hour energy use associated with the long-term operation of the treatment system and subsequent indirect energy use from the BSA treatment system as well as O&M and support staff.

3.1.8 Cost Effectiveness

The PV of Alternative A (Table 7) is estimated to be $8,260,000 (Capital Cost: $730,000; Long-Term O&M: $7,530,000 [Discounted at 2%/year for 30-years]). A 15-percent contingency was applied to the capital costs and 20-percent on long-term O&M. No taxes were added.

3.2 Alternative B – Hydraulic Barriers – VHB Extension and Capping

Alternative B (Figure 6, Table 8) includes extending the VHB to fully encircle Area A and placement of an impermeable capping systems on existing vegetative areas. Extension of the VHB and installation of

an impermeable cover will serve to significantly reduce groundwater flow into Area A and eliminate surface water infiltration thus reducing the volume of long-term groundwater extraction. The type of wall used (slurry wall, jet grout, or combination thereof) would be determined based on a pre-design study; however, the design would rely heavily on the construction as-builts and batch mix designs from the existing VHB. Therefore, the VHB extension would likely be a cement-bentonite slurry wall toed into the glaciolacustrine clay layer which is anticipated to range between 25 and 30 feet bgs.

The new extraction wells would be tied into the GWTF and the system would continue to operate within the limits of the existing BSA discharge permit (55,000 gpd) until operations suggest the need for active hydraulic control is no longer necessary or can be achieved with few wells. Existing ECs and ICs would remain in place.

Alternative B includes:

- Engineering, Permitting, Testing, and Reporting,
- New pumps (rated for 10 to 15 gpm) and well vaults,
- Piping the new wells to the GWTF,
- 1,750 linear feet (LF) of new VHB [cement-bentonite] to an average depth of 30-feet bgs.
- Geomembrane and two (2) foot clay cover over existing vegetated areas inside of VHB,
- Coating/sealing of existing pavement,
- Disconnecting existing extraction wells EW-3A, EW-4, and EW-5,
- GWTF upgrades to increase operational efficiency,
- Operation of EW-1, EW-2, EW-4A, EW-6, EW-7, and EW-8 for 15 years,
- Continued implementation of EC/ICs compliance and reporting for 30 years.

3.2.1 Compliance with SCGs

Groundwater extraction and treatment will continue until the VHB and cap have eliminated the need for hydraulic control through reduced groundwater and surface water infiltration. Alternative B would continue to prevent off-site migration and provide treatment as needed to comply with the BSA discharge permit while the GWTF is in operation. Compliance with Commercial Use SCOs would continue to be met through the existing areas of gravel and asphalt cover and would be enhanced through placement of an impermeable clay cap on existing vegetative areas.

3.2.2 Overall Protection of Public Health and the Environment

Alternative B would continue to provide protection of public health and the environment by reducing the offsite migration of impacted shallow groundwater. Existing ICs including groundwater use restriction and use restriction of the Site for commercial purposes will remain in place.

3.2.3 Short-term Impacts and Effectiveness

Significant construction activities are necessary to implement Alternative B but they will contained within the limits of the Site; therefore, short-term impacts and effects on the community, workers, or the environment would be minimal.

3.2.4 Long-term Effectiveness and Permanence

Alternative B would continue to meet the established RAOs for groundwater. The addition of the capping and surrounding hydraulic barrier would result in a similar reduction in the groundwater surface as the increase in pumping rate (Alternative A), through a reduction of inflow from the upgradient areas and reduced infiltration from the surface.

3.2.5 Reduction of Toxicity, Mobility, and Volume

The primary reduction mechanism is in the mobility and volume of the plume as groundwater and surface water are impeded from entering the subsurface and the alluvium water bearing zone is effectively dewatered from continued operation of the GWTF.

3.2.6 Implementability

No difficulties that cannot be overcome in implementing the modifications comprehended under Alternative B are anticipated. Some subsurface obstructions are anticipated and can complicate installation; however, these were also encountered during construction of the existing VHB and addressed through competent design and construction procedures.

3.2.7 Sustainability

Alternative B would create a similar carbon footprint in the near term as Alternative A; however, this option would be considered more sustainable from a reduction in energy use as pumping and treatment rates are reduced over time.

3.2.8 Cost Effectiveness

The PV of Alternative B (Table 8) is estimated to be $6,993,000 (Capital Cost: $3,605,000; Long-Term O&M: $3,388,000 [Discounted at 2%/year for 30-years]). A 20-percent contingency was applied to the capital costs and long-term O&M. No taxes were added.

3.3 Alternative C – Source Treatment, Capping, and Monitored Natural Attenuation

Alternative C (Figure 7, Table 9) includes source treatment using In Situ Chemical Oxidation (ISCO), capping of existing gravel and vegetative areas with an impermeable asphalt cover and monitored natural attenuation of residual contaminants in groundwater. ISCO would be designed to address source and residual contamination in soil and groundwater and capping eliminates the potential mobilization of contaminants from unidentified/unidentifiable source areas.

The initial steps of implementing Alternative C would be to conduct a pre-design investigation and pilot scale test. The pre-design investigation would consist of a direct-push and Membrane Interface Probe (MIP) survey to define current conditions. There has been over 15 years of groundwater extraction and ongoing natural attenuation of the plume since widespread groundwater data has been collected. A pilot-test would be conducted in the vicinity of ICM-101 where recent groundwater samples contained total concentrations of VOCs greater than 50 mg/L. The PV cost analysis for Alternative C assumes the injection of a proprietary ISCO reagent based on sodium persulfate chemistry and it is anticipated that multiple injections would be required to achieve a source area treatment goal of 1 mg/L total VOCs.

The new extraction wells would be tied into the GWTF and the system would continue to operate within the limits of the existing BSA discharge permit (55,000 gpd) until source treatment is completed and residual groundwater concentrations have become asymptotic at concentrations less than 1 mg/L total VOCs within an approved compliance monitoring well network.

Alternative C includes:

- Engineering, Permitting, Testing, and Reporting,
- New pumps (rated for 10 to 15 gpm) and well vaults,
- Piping the new wells to the GWTF,
- ISCO pilot test in the vicinity of ICM-101 to refine treatment goals, scope, and cost estimate,
- Source delineation (MIP) investigation and direct-push investigation of historical source areas,

- Primary and secondary reagent injections,
- Limited excavation and non-hazardous disposal of soil source areas,
- Asphalt cover of existing gravel and vegetative areas,
- Disconnecting existing extraction wells EW-3A, EW-4, and EW-5,
- GWTF upgrades to increase operational efficiency,
- Installation of new monitoring wells (confirmation network),
- Operation of EW-1, EW-2, EW-4A, EW-6, EW-7, and EW-8 for 5 years,
- Long-term (15-year) quarterly/semi-annual schedule of groundwater monitoring,
- Continued implementation of EC/ICs compliance and reporting for 30 years.

3.3.1 Compliance with SCGs

Groundwater extraction and treatment will continue as source treatment progresses and would continue to prevent off-site migration and provide treatment as needed to comply with the BSA discharge permit while the GWTF is in operation. Compliance with Commercial Use SCOs would continue to be met through the existing areas of gravel and asphalt cover and would be enhanced through placement of an asphalt cover on existing vegetated areas.

3.3.2 Overall Protection of Public Health and the Environment

Alternative C would continue to provide protection of public health and the environment by reducing the offsite migration of impacted shallow groundwater. Existing ICs including groundwater use restriction and land use restriction of the Site for commercial purposes will remain in place. Alternative C would reduce the potential impact of vapor intrusion for future commercial occupants.

3.3.3 Short-term Impacts and Effectiveness

Construction activities are necessary to implement Alternative C but they will be contained within the limits of the Site and also occupy a small footprint within the Site; therefore, short-term impacts and effects on the community, workers, or the environment would be minimal.

3.3.4 Long-term Effectiveness and Permanence

Alternative C would be designed meet the established RAOs for groundwater through a reduction in toxicity. The effectiveness and permanence could be affected by the ability to create contact between the ISCO and constituents in and around buried foundations and obstructions.

3.3.5 Reduction of Toxicity, Mobility, and Volume

Alternative C would reduce the toxicity, mobility, and volume of the groundwater plume. Source treatment goals of 1 mg/L total VOCs are achievable with several readily available ISCO technologies.

3.3.6 Implementability

No major difficulties in implementing the modifications comprehended under Alternative C are anticipated. Some subsurface obstructions are anticipated and can complicate the drilling required for the investigation and reagent injection and distribution.

3.3.7 Sustainability

Alternative C would create the smallest carbon footprint of the three alternatives. Short-term impacts would be similar to Alternatives A and B as the shared components of the groundwater extraction system modifications are implemented and operated in the near term (0 to 5-years); however, source treatment is the only evaluated alternative that can achieve a significant reduction in contaminant mass load with the benefit of eliminating long-term operation of the treatment system.

3.3.8 Cost Effectiveness

The PV of Alternative C (Table 9) is estimated to be $6,465,000 (Capital Cost: $4,863,000; Long-Term O&M: $1,602,000 [Discounted at 2%/year for 30-years]). A 30-percent contingency was applied to the capital costs and a 20-percent contingency to long-term O&M. No taxes were added. A higher contingency was applied compared to other alternatives considered because of the requirement to define existing source areas and the effect of existing foundations and utilities on drilling efficiency and ability to deliver reagents to the subsurface.

4 Interim Corrective Measure Recommendations

The alternatives evaluation in Section 3 and the recommendations below were conducted in context of compliance with the existing RAOs established for groundwater:

- Protect construction workers, Site workers, visitors and terrestrial biota from inhalation of vapors associated with contaminants in the shallow aquifer exceeding the Class GA standards.
- Protect construction workers, Site workers, and visitors from dermal contact with contaminants in the shallow aquifer exceeding Class GA standards.
- Protection construction workers, Site workers, visitors, and terrestrial and aquatic biota from direct contact with groundwater from the shallow aquifer discharging to the Buffalo River at concentrations that exceed the applicable water quality-based standards of the receiving water.

The current system meets the first two RAOs; however, the gradient suggests that periodically the system may not meet the third criteria and some enhancements or refurbishments to the system, regardless of the final selected long-term treatment option, are necessary to maintain progress toward the RAOs. The current extraction system however has been in operation for over 15+ years and recent groundwater monitoring data (Figure 7) still shows consistently elevated concentrations of COCs. This indicates that conventional technologies as described/evaluated in Alternatives A and B are likely ineffective with respect to their ability for reduction of toxicity or additional appreciable mass removal.

Inventum recommends proceeding with a series of Interim Corrective Measures (ICMs) to further evaluate the feasibility of implementing Alternative C (Source Treatment, Capping, and Monitored Natural Attenuation). The ISCO treatment assumption in Alternative C (Section 3.3) rely on available historical data to determine treatment quantities and there has been 15+ years of groundwater extraction and ongoing natural attenuation since that data was collected. It is recognized that an engineering data-gap exists with respect to the current extent of the groundwater plume and also the need for site-specific treatment/design parameters for implementing an ISCO remedy. A current evaluation of existing conditions that would require ISCO treatment to reduce total VOC concentrations below 1 mg/L would be necessary to confirm the viability and scope of a source treatment RA.

4.1 Groundwater Extraction System ICM

Several permanent modifications to the existing groundwater extraction system would be implemented as an ICM to maintain compliance with the existing Site ECs and RAOs as the viability of Alternative C is further evaluated. New extraction wells (EW-4A, EW-6, EW-7, and EW-8) would be tied into the existing system and operated within the capacity of the existing BSA discharge permit limits. The system would be operated at an average flow rate of approximately 5 gpm per well (43,200 gpd). The pumping test (see EW-7 influence on Figure 2) showed rapid response in the observation wells even at 5 gpm and hydraulic differentials would be realized during the approximately 6-month period while the other ICMs to evaluate Alternative C (Section 4.2 and 4.3) are implemented.

Inventum will provide a Groundwater Extraction System ICM Work Plan to the NYSDEC for review and approval prior to implementing these system enhancements.

4.2 Source Area Delineation Investigation ICM

Inventum will provide a Source Area Delineation Investigation ICM Work Plan to the NYSDEC for review and approval. The work plan will include a program of traditional and direct sensing (MIP, or

equivalent technology) borings to define the current extent of groundwater with total VOCs above 1 mg/L and identify remnant source areas that would be targeted for ISCO.

4.3 ISCO Pilot Test ICM

Inventum will provide an ISCO Pilot Test ICM Work Plan to the NYSDEC for review and approval. A pilot test will be conducted in an area with comparatively high concentrations of Site COCs based on recent groundwater monitoring data such as the area around ICM-101 (Figure 7). The work plan will outline rationale behind the selection of the ISCO pilot technology, the results of any bench scale testing, pre- and post-injection groundwater monitoring protocols, reagent injection volumes, and a schedule for completion of the ICM.

4.4 Corrective Measures Schedule

A schedule for planning, implementing, and reporting of the above referenced ICMs is included in Figure 8. The data from the ICMs will be detailed in a Corrective Measures Report that will include final selection of one of the alternatives described in Section 3 and a schedule for implementing that selection.

Tables

Table 1
Observation Well Hydrographs - 2019
South Buffalo Development - Area A

Buffalo Color, Area A - Buffalo River Water Elevations, Observation Well Groundwater Elevations & Extraction Well Network Allocations

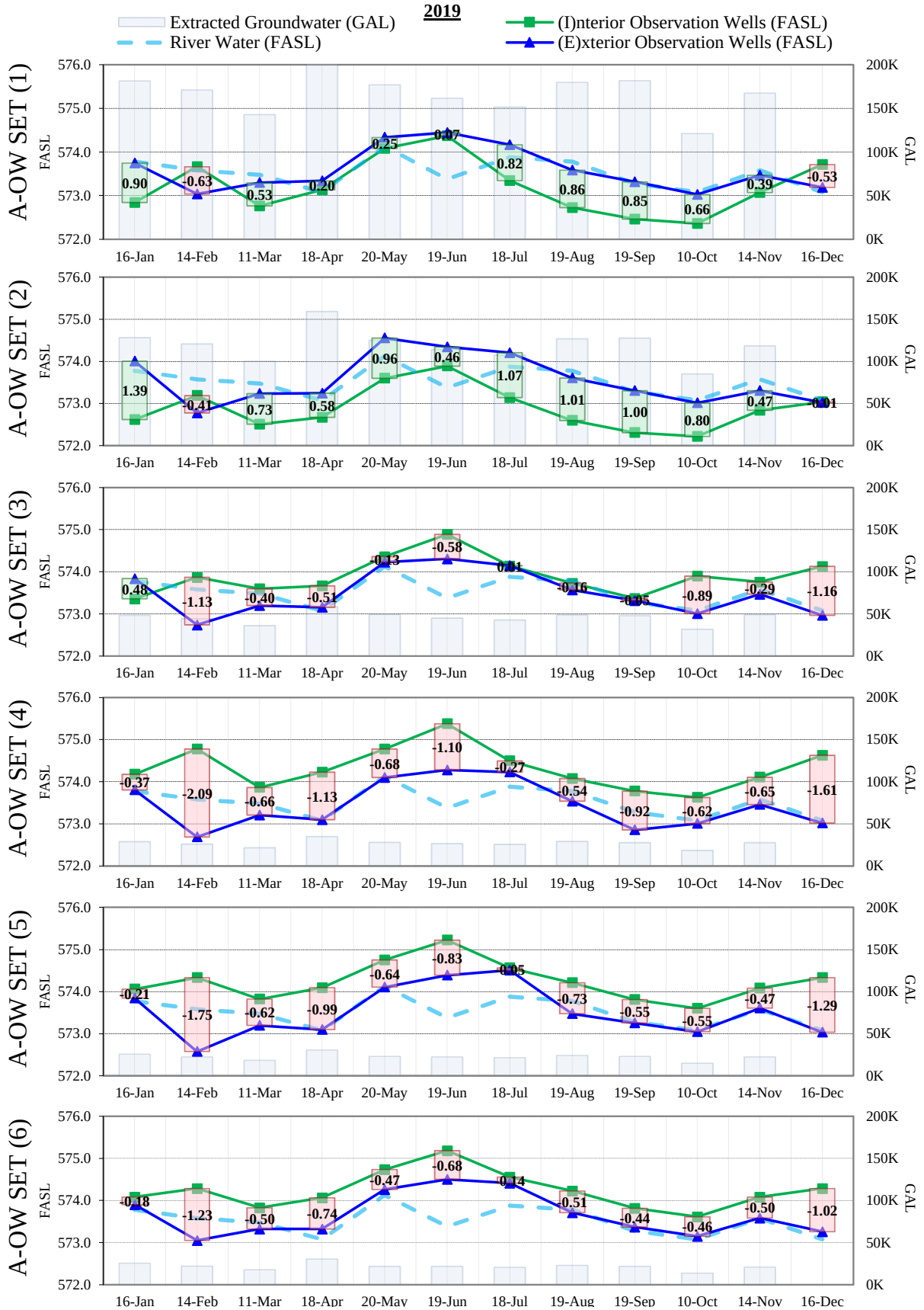


Table 2
Storm Water Discharge Results
Q3 2018 - Q1 2020
South Buffalo Properties - Area A

	ANILINE (PHENYLAMINE, AMINOBENZENE)	DIETHYL PHTHALATE	DI-N-BUTYL PHTHALATE	2,4-DINITROTOLUENE	2,6-DINITROTOLUENE	2-NITROANILINE	3-NITROANILINE	NITROBENZENE
Class GA Standard	*5*	*50*	*50*	*5*	*5*	*5*	*5*	*0.4*
Q3 2018	U	U	1.6J	U	U	U	U	U
Q4 2018	U	0.26J	U	U	U	U	U	0.99J
Duplicate	U	0.26J	0.31	U	U	U	U	0.81J
Q1 2019	U	U	U	U	U	U	U	U
Q2 2019	0.87J	0.28J	U	3.9J	5.3	0.83J	1.0J	0.57J
Duplicate	0.88J	0.31J	U	4.4J	5.5	0.83J	1.0J	0.58J
Q3 2019	U	0.32J	U	U	U	U	U	U
Duplicate	U	0.37J	0.31J	U	U	U	U	U
Q4 2020	U	0.29J	0.39J	U	3.2J	U	1.7J	0.86J
Duplicate	U	0.24J	0.31J	U	3.2J	U	1.5J	0.66J
Q1 2020	U	U	U	1.0J	0.98J	U	U	6.5
Duplicate	U	U	U	0.99J	0.98J	U	U	6.4

Notes:

U = Not Detected

J = Estimated at specified value

Table 3
Existing and New Extraction Well Construction Summary
South Buffalo Development - Area A

Existing Extraction Wells										
Well ID	Date Installed	Total Depth (ft. bgs)	Screen (ft. bgs)		Top of Casing Elevation (ft. AMSL)	Northing (a)	Easting (a)			
EW-1	Jun-06	32	22	27	582.49	1042883.93	1078036.05			
EW-2	Jun-06	34	24	29	582.64	1042989.17	1078144.74			
EW-3A	Jun-06	38	28	33	583.84	1043099.72	1078269.86			
EW-4	Jun-06	38	28	33	583.28	1043267.43	1078391.48			
EW-5	Jun-06	37	26.5	31.5	585.5	1043406.57	1078514.18			
New Extraction Wells										
Well ID (b)	Date Installed	Total Depth (ft. bgs)	First Water (ft. bgs)	Screen (ft. bgs)		Filter Pack (ft. bgs)		Sump (ft. bgs)		Static DTW (ft. bTOR)
EW-4A	May-20	34.5	10.5	13.5	33.5	8.5	34.5	33.5	34.5	11.4
EW-6	May-20	37.5	11	15.5	35.5	10.5	37.5	35.5	37.5	11.8
EW-7	May-20	34.5	12.5	13.5	33.5	8.5	34.5	33.5	34.5	10.5
EW-8	May-20	34	14	13	33	8	34	33	34	12

a/Coordinates referenced to NY State Plan (West Zone, US Survey Feet)
b/New extraction well survey to be completed if permanent installation completed.
ftbTOR: feet below top of riser

Table 4
South Buffalo Properties - Area A
New Extraction Wells
Groundwater Sample Results

Analytes	NY State Class GA Groundwater Standard/Guidance Value	Area A - Temporary New Extraction Wells (a,b) June 10, 2020					Tesla Sump June 25, 2020
		A-EW-4A	A-EW-6	A-EW-7A	A-EW-7B	A-EW-8	
Metals (mg/L)							
Aluminum	NE	0.539	1.55	0.954	0.399	1.55	1.86
Arsenic	0.025	ND	0.043	ND	ND	ND	ND
Barium	1	ND	0.137	ND	ND	ND	ND
Cadmium	0.005	ND	ND	ND	ND	0.008	ND
Calcium	NE	48.8	41.6	34.4	28.8	97.1	34.8
Chromium	0.05	0.01	ND	ND	ND	0.012	ND
Copper	0.2	0.047	0.033	0.043	0.029	0.038	ND
Iron	0.3	1.53	3.69	2.21	0.83	4.38	3.04
Lead	0.025	ND	0.027	0.026	0.016	ND	ND
Magnesium	35	19.1	32	18.2	17.1	15.7	4.3
Manganese	0.3	0.024	0.111	0.037	ND	0.144	0.388
Potassium	NE	128	211	88	84	19.7	7.52
Sodium	20	135	522	187	210	100	117
Zinc	2	ND	0.102	0.086	ND	ND	ND
SVOCs (µg/L)							
1,3-Dichlorobenzene	3	ND	ND	ND	ND	16.6	ND
1,4-Dichlorobenzene	3	ND	ND	ND	ND	15.2	ND
4-Chloroanaline	5	ND	763	ND	ND	ND	ND
Acenapthene	20	ND	ND	148	135	15.9	ND
Carbazole	NE	ND	ND	ND	94.6	ND	ND
Dibenzofuran	NE	ND	ND	141	134	ND	ND
Fluorene	50	ND	ND	112	101	ND	ND
Naphthalene	10	ND	ND	1,060	414	ND	ND
Phenanthrene	50	ND	ND	117	93.2	ND	ND
VOCs (µg/L)							
1,2-Dichlorobenzene	3	ND	ND	ND	ND	7.21	ND
1,3-Dichlorobenzene	3	ND	ND	ND	ND	27	ND
1,4-Dichlorobenzene	3	ND	ND	ND	ND	25.3	ND
Benzene	1	ND	1,500	ND	ND	ND	ND
Chlorobenzene	5	ND	8,490	ND	ND	17	ND
Toluene	5	ND	ND	ND	ND	2.48	ND

a/Only detection in at least one sample are shown. Detection in Bold
b/Highlighted indicate exceedance of Class GA standard.
"NE" - Not Established

Table 5
EW-6 Step Test Analysis
South Buffalo Development - Area A

PROJECT INFORMATION:

Project Name:	Buffalo Color Area A	Client:	Inventum Engineering, PC
Project No.:	0006-001-010	Location:	Buffalo, NY

WELL DATA:

Static Water Level (fbTOR): 13.38 Prepared By: BCH

Total Depth (fbTOR): 40.50

STEP-DRAWDOWN DATA:

Step No.	Maximum DTW (fbTOR)	Q (gpm)	s (ft)	D s (ft)	Spcific Capacity Q/s (gpm/ft)	D s/Q (ft min/gal)
1	14.62	7.38	1.24	1.24	5.950	0.17
2	15.38	11.17	2.00	0.76	5.584	0.07
3	16.02	14.36	2.64	0.64	5.438	0.04
4						

DETERMINE THE AQUIFER TRANSMISSIVITY AND HYDRAULIC CONDUCTIVITY, T AND K:

$$T = \frac{2.25Q}{4p(h_o-h_1)}$$

$$K = \frac{T}{b}$$

T = Transmissivity, gal/day-ft

h_o-h_1 = Change in head over one logarithmic cycle, feet = 0.20

Q = Pumping rate from straight portion of curve, gal/day = 7.38

K = Hydraulic Conductivity (cm/sec) = (see below)

b = saturated thickness (feet) = 27.12

Equation of Best Fit Line (see attached Figure): y = 1.0217Ln(x) + 35.539

x_1 = 1: y_1 = 14.26 = h_1

x_0 = 10: y_0 = 14.47 = h_0

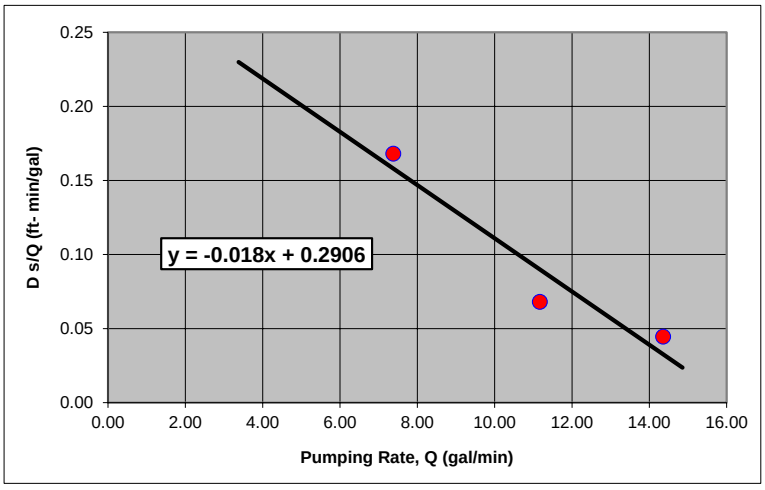
T = 3,821.66 gal/day-ft

T = 3.55E-01 ft^2/min

K = 1.31E-02 ft/min

K = 6.65E-03 cm/sec

DETERMINE HEAD LOSS COEFFICIENTS, B and C:



B = aquifer coefficient, measure of the head loss due to laminar flow

C = well coefficient, measure of the head loss due to turbulent flow in the well screen and pump inlet

L_p = ratio of laminar to total head losses, % percentage of the total head loss attributable to laminar flow

From the equation in the graph at the left:

C = -0.0180 $ft\text{-}min^2/gal^2$

B = 0.2906 ft-min/gal

$$L_p = \frac{BQ}{(BQ + CQ^2)} \times 100$$

L_p = 184.2%

TRUE WELL EFFICIENCY, E:

Theoretical Specific Capacity = $\frac{Q}{s} = \frac{T}{1500}$ = 2.55 gpm/ft

Actual Specific Capacity = $\frac{Q}{s}$ = 5.95 gpm/ft

$$E = \frac{\text{theoretical}}{\text{actual}} = 42.8\%$$

Table 6
South Buffalo Development - Area A
Alternative Comparison and Cost Summary

ALTERNATIVE	Long-Term Effectiveness and Performance	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Cost		
					Capital	Long-Term O&M	PV
Alternative A -Extraction and Treatment	* Effective at long-term hydraulic control.	*Increase to volume above existing BSA permitted limits. * Enhances mobility.	*Short-term effectiveness is high with respect to exsiting IC/EC requirements. June 2020 pumping test data shows rapid ability to comply with existing IC/EC requirements.	* High. Implementable with existing information available	$ 730,000	$ 7,530,000	$ 8,260,000
Alternative B - Hydraulic Barriers - VHB Extension and Capping	* Effective at long-term hydraulic control. * Effective at reducing/eliminating perpetual need for GW treatment.	*Reduction of volume over time as groundwater/surface water is cutt off from Area A. * Reduction in mobility as GW gradient reduced from reduction in GW/surface water infiltration * Reduction in mobility of any upgradient GW source.	*Short-term effectiveness is high with respect to exsiting IC/EC requirements.	* High. Technology already proven at site.	$ 3,605,000	$ 3,388,000	$ 6,993,000
Alternative C - Source Treatment , Capping, and Natural Attenuation	*Pilot test and current delination necessary to confirm long-term effectiveness. *Verified technology; highly conductive treatment zone. *Improves re-development ability. Reduces potential for future vapor intrusion risk. *Significantly reduces long-term O&M requirements.	*Total VOCs < 1 mg/L are achieveable. *Requires confirmation from NYSDEC on treatment goals.	*Short-term effectiveness is high with respect to exsiting IC/EC requirements as extraction will continue during ISCO treatment. * Medium short-term effectivess with respect to reduction in toxicity/mobility/volume. ISCO shows rapid reduction in contaminant concentrations with appropriate application. *Secondary/Polishing applications limit short-term effectiveness	*Medium-High with appropriate characterization of existing "source" areas. *Pilot test needed to confirm ability to delivery oxidant. *Updated soruce distribution evaluation required.	$ 4,863,000	$ 1,602,000	$ 6,465,000

Table 7
South Buffalo Development - Area A
Alternative A Cost Summary

Task	Estimate	Unit	Unit Rate	Line Item Total	Assumptions/Comments
Alternative A - Extraction and Treatment - Capital Costs					
Engineering Design, Permitting, Contracting, Oversight, and Reporting					
Principal	56	HR	$ 239	$ 13,356	Design, permitting, contracting, oversight, and reporting . Reporting assumes as-builts, final engineering report revisions, and site management plan revisions. Direct Expenses (travel, lodging, shipping, document production, misc. equipment) set at 12.5% of total labor estimate.
Project Director/Engineer	266	HR	$ 149	$ 39,501	
Geologist/Scientist	20	HR	$ 85	$ 1,700	
Field Tech	96	HR	$ 85	$ 8,160	
Drafting	44	HR	$ 85	$ 3,740	
Travel, Lodging, Misc. Direct Expenses	1	LS	$ 9,000	$ 9,000	
Extraction System Installation					
Extraction Well Vaults (Material/Installation)	4	EA	$ 5,000	$ 20,000	
Excavation, Double walled pipe.	250	LF	$ 65	$ 16,250	Assume tie into existing lateral piping; new 3-foot trench from EW-8 to EW-4 vault; total depth ~ 52-inch (48-inch pipe depth+bedding)
Extraction Pump	4	EA	$ 5,000	$ 20,000	3" Grundfos Red-Flo Pumps rated for min 20 gpm at 60' static head.
Double-walled pipe with mag Tape	250	LF	$ 5	$ 1,125	Assume tie into existing lateral piping. New 1.25" HDPE EW-8 to EW -4
Trench Cover Restoration	0.5	AC	$ 75,000	$ 37,500	Assume 3-foot trench; 48-inch pipe depth; geomembrane; 2-foot vegetated cover; Commercial Use approved import fill; seeding.
Repairs to cover and pavement	1	AC	$ 7,500	$ 7,500	Repairing the damage caused by tracking in equipment and sealing pavement.
Investigation Derived Waste Profiling/Disposal	1	LS	$ 1,000	$ 1,000	Assume 5 tons of non-hazardous soil disposal, lab testing, and profiling.
Pumping System Upgrades					*Assumes OSC pump/system construction and maintenance.*
Existing System Deconstruction/Equipment Removal	1	LS	$ 25,000	$ 25,000	
New Equipment/Controls	1	LS	$ 350,000	$ 350,000	Assumes re-use of existing trt. bldg; 100 gpm o/w separator; re-use 1,000 gal batch tank/equalization/discharge tanks, two (2) 3,000 lb sand filters (series/w auto backwash); two (2) 3,000 lb GAC (series/w backwash). New 5 HP transfer pumps. Influent design rate of 100 gpm for rough sizing. Re-program PLC/Well controls
Electrical/Plumbing Connections Allowance	1	LS	$ 15,000	$ 15,000	
Startup Testing	12	Each	$ 450	$ 5,400	
Field Tech (Oversite, testing, sampling)	320	HR	$ 85	$ 27,200	Assumes Tom Wagner is there full-time.
As-Builts and SMP/FER Revisions					
Survey	1	LS	$ 3,000	$ 3,000	Assumes 3-day survey
			Capital Costs Subtotal	$ 604,432	
			Project Administration/General Overhead	$ 30,222	Assumes 5% on subtotal
			Task Contingency	$ 95,198	15% Contingency
			Subtotal	$ 730,000	Subtotal rounded to nearest $1000

Table 7
South Buffalo Development - Area A
Alternative A Cost Summary

Task	Estimate	Unit	Unit Rate	Line Item Total	Assumptions/Comments
Alternative A - Extraction and Treatment - Long-Term Operations Costs					
Operations, Monitoring, and Maintenance					*Estimates assume 2% PV factor for one-time and 2% annualized annuity for continuous operation (see ref. table).*
Treatment System O&M Years 1 - 30	*22.396*	Annual Cost	$ 258,750	$ 5,794,965	Assumes 15% increase over 2019 O&M estimate as basis to account for higher pumping rates, increased material consumption, permitting fees
Engineering Controls Inspections/Reporting ($5000/yr)	*22.396*	Annual Cost	$ 5,000	$ 111,980	
Extraction Well Redevelopment/Rehabilitation (Every 5-Years @ $5,000/event)	*0.750*	Lump Sum	$ 25,000	$ 18,758	
Extraction Pump Replacement (Years 10 and 20 @ $30,000/event)	*0.747*	Lump Sum	$ 60,000	$ 44,800	
Extraction Well Abandonment (Year 30 @ $10,000)	*0.552*	Lump Sum	$ 10,000	$ 5,521	
Long-Term Operational Costs Subtotal				$ 5,976,023	
Project Administration/General Overhead				$ 298,801	Assumes 5% on subtotal
Task Contingency				$ 1,254,965	20% Contingency
Subtotal				$ 7,530,000	Subtotal rounded to nearest $1000
Alternative A - Pump & Treat PV Total				$ 8,260,000	

Table 8
South Buffalo Development - Area A
Alternative B Cost Summary

Task	Estimate	Unit	Unit Rate	Line Item Total	Assumptions/Comments
Alternative B - Hydraulic Barriers - VHB Extension and Capping - Capital Costs					
Engineering Design, Permitting, Contracting, Coordination, Oversight, and Reporting					
Principal	104	HR	$ 239	$ 24,804	Design, permitting, contracting, oversight, and reporting . Reporting assumes as-builts, final engineering report revisions, and site management plan revisions. Direct Expenses (travel, lodging, shipping, document production, misc. equipment) set at 12.5% of total labor estimate.
Project Director/Engineer	326	HR	$ 149	$ 48,411	
Geologist/Scientist	40	HR	85	$ 3,400	
Field Tech	348	HR	$ 85	$ 29,580	
Drafting	44	HR	$ 85	$ 3,740	
Travel, Lodging, Misc. Direct Expenses	1	LS	$ 14,000	$ 14,000	
Extraction System Installation					
Extraction Well Vaults (Material/Installation)	4	EA	$ 5,000	$ 20,000	
Excavation, Double walled pipe.	250	LF	$ 65	$ 16,250	Assume tie into existing lateral piping; new 3-foot trench from EW-8 to EW-4 vault; total depth ~ 52-inch (48-inch pipe depth+bedding)
Extraction Pump	4	EA	$ 5,000	$ 20,000	3" Grundfos Red-Flo Pumps rated for min 10 gpm at 60' static head.
Double-walled pipe with mag Tape	250	LF	$ 5	$ 1,125	Assume tie into existing lateral piping. New 1.25" HDPE EW-8 to EW -4 vault.
Trench Cover Restoration	0	AC	$ -	$ -	Included in low-permeability cover estimate
Investigation Derived Waste Profiling/Disposal	1	LS	$ -	$ -	Included in VHB alignment disposal.
Vertical Barrier Wall Extension & Low-Permeability Cover					
Pre Constrution Utility Alignment Survey	1	LS	$ 10,000	$ 10,000	Assumes 5-days of test pits along new alignment
Site Preparation (Mobilization/Demobilization)	1	LS	$ 200,000	$ 200,000	Geo-Solutions Budgetary Estimate
Pre-Clearing/Site Controls/Work Platform	1	LS	$ 50,000	$ 50,000	
Grout Mix Design	1	LS	$ 50,000	$ 50,000	Assumes re-use of existing VHB Wall grout design mix (no pilot test needed) and contractor review of available as-builts/CCR's. Additional cost savings may be realized if existing wall installation contractor utilized.
Slurry Wall/Jet Grout (Cement-Bentonite Mix)[Material, Placement, and Testing]	52500	VSF	$ 18	$ 945,000	Assumes 1,750 LF @ average depth of 30-feet to bottom of key in glaciolustrine clay. Geo-Solutions site specific budgetary estimate per VSF.
Trench Spoils - On-Site Grading	9100	ton	$ 30	$ 273,000	Assumes slurry wall and onsite resuse and placement beneath impermeable cover (geomembrane and clay). Assumes wet soil density of 115 lbs/cu.ft.
Impermeable Layer (Geotextile, membrane, geotextile)	260000	SF	$ 0.83	$ 215,800	Assume a three layer membrane, fabric protection, membrane, fabric marker.
Cover Soils	19360	CY	$ 40	$ 774,400	2-feet Residential Use approved fill over existing vegetated areas
Pavement (prep and placement)	32760	sf	$ 3	$ 98,280	Existing gravel areas
Site Restoration	1	LS	$ 15,000	$ 15,000	
Startup Testing	12	Each	$ 450	$ 5,400	
Field Tech (Oversite, testing, sampling)	320	HR	$ 85	$ 27,200	Assumes Tom Wagner is there full-time.
As-Builts and SMP/FER Revisions					
Survey	1	LS	$ 15,000	$ 15,000	Extraction well, VHB extension centerline, post-grading topography
			Capital Costs Subtotal	$ 2,860,400	Subtotal rounded to nearest $100
			Project Administration/General Overhead	$ 143,020	Assumes 5% on subtotal
			Task Contingency	$ 600,684	20% Contingency
			Subtotal	$ 3,605,000	

Table 8
South Buffalo Development - Area A
Alternative B Cost Summary

Task	Estimate	Unit	Unit Rate	Line Item Total	Assumptions/Comments
Alternative B - Hydraulic Barriers - VHB Extension and Capping - Long-Term Operations Costs					
Operations, Monitoring, and Maintenance					*Estimates assume 2% PV factor for one-time and 2% annualized annuity for continuous operation (see ref. table).*
Treatment System O&M Years 1 - 5	*4.713*	Annual Cost	$ 225,000	$ 1,060,425	Assumes 2019 O&M estimate as basis.
Treatment System O&M Years 6 - 15	*8.136*	Annual Cost	$ 191,250	$ 1,555,973	Assumes 15% reduction in 2019 O&M estimate as basis to account for lower flow rates, reduced material consumption, and reduced onsite O&M labor.
Engineering Controls Inspections/Reporting ($2500/yr)	*22.3965*	Annual Cost	$ 2,500	$ 55,991	
Extraction Well Redevelopment/Rehabilitation (Year 5 and 10 @ $5,000/event)	*0.863*	Lump Sum	$ 10,000	$ 8,630	
Extraction Well Abandonment (Year 15 @ $10,000)	*0.743*	Lump Sum	$ 10,000	$ 7,430	
			Long-Term Operational Costs Subtotal	$ 2,688,500	
			Project Administration/General Overhead	$ 134,425	Assumes 5% on subtotal
			Task Contingency	$ 564,585	20% Contingency
			Subtotal	$ 3,388,000	
			Alternative B - VHB Extension PV Total	$ 6,993,000	

Table 9
South Buffalo Development - Area A
Alternative C Cost Summary

Task	Estimate	Unit	Unit Rate	Line Item Total	Assumptions/Comments
Alternative C - Source Treatment, Capping, and Monitored Natural Attenuation - Capital Costs					
Engineering Design, Permitting, Pilot Test Contracting, Coordination, Oversight, and Reporting					
Principal	84	HR	$ 239	$ 20,034	Design, permitting, contracting, oversight, and reporting . Reporting assumes as-builts, final engineering report revisions, and site management plan revisions. Direct Expenses (travel, lodging, shipping, document production, misc. equipment) set at 12.5% of total labor estimate.
Project Director/Engineer	406	HR	$ 149	$ 60,291	
Geologist/Scientist	200	HR	$ 85	$ 17,000	
Field Tech	288	HR	$ 85	$ 24,480	
Drafting	98	HR	$ 85	$ 8,330	
Travel, Lodging, Misc. Direct Expenses	1	LS	$ 17,000	$ 17,000	
Extraction System Installation					
Extraction Well Vaults (Material/Installation)	4	EA	$ 5,000	$ 20,000	
Excavation, Double walled pipe.	250	LF	$ 60	$ 15,000	Assume tie into existing lateral piping; new 3-foot trench from EW-8 to EW-4 vault; total depth ~ 52-inch (48-inch pipe depth+bedding)
Extraction Pump	4	EA	$ 3,000	$ 12,000	3" Grundfos Red-Flo Pumps rated for min 10 gpm at 60' static head.
Double-walled pipe with mag Tape	250	LF	$ 5	$ 1,125	Assume tie into existing lateral piping. New 1.25" HDPE EW-8 to EW -4 vault.
Trench Cover Restoration	0.1	AC	$ 7,500	$ 750	
Investigation Derived Waste Profiling/Disposal	1	LS	$ 750	$ 750	
Source Area Delineation/Treatment					
Pre-Delineation Survey	1	LS	$ 9,500	$ 9,500	Flagging of former bldg limits
Source Delineation (Direct-Push Program/Profiling)	1	LS	$ 38,500	$ 38,500	Assumes 30 DPT/Profiling borings to 30-feet bgs. 25% DP confirmation sample.
Source Delineation (Test Pit/Trench Program)	1	LS	$ 10,000	$ 10,000	Assumes 5 days of Test Pitting to delineate residual soil source areas
Source Delineation (Laboratory Analysis)	1	LS	$ 18,375	$ 18,375	Assumes 100 samples (TCL/TAL List - volatiles, semivolatiles, and metals)
InSitu Chemical Oxidation (Pilot Test)	1	LS	$ 50,000	$ 50,000	ISCO Pilot Test to refine primary/secondary source treatment design.
InSitu Chemical Oxidation (Primary - Material)	97000	CY	$ 18	$ 1,746,000	ISCO (feasibility scale) estimate based on historical limits of chlorobenzene and aniline GW plume + contingency for additional source areas.
InSitu Chemical Oxidation (Primary Injection)	1	LS	$ 133,500	$ 133,500	Assumes 25 foot ROI .
InSitu Chemical Oxidation (Secondary/Polishing - Material)	29100	CY	$ 18	$ 523,800	Secondary/Polishing treatment. Assuming 80 to 90% reduction on primary treatment. Treatment goals of <1 mg/L total VOCs
InSitu Chemical Oxidation (Secondary/Polishing Injection)	1	LS	$ 46,500		Assumes 25 foot ROI .
Post-ISCO Confirmation	1	LS	$ 14,500	$ 14,500	Assumes 15 profile borings to 30-feet. Confirmation of source treatment and placement of confirmation network wells
Excavation and Non-Hazardous Offiste Disposal (Soil Source Treatment)	200	Ton	$ 50	$ 10,000	Assumes 4 "source" areas identified based on historical operation drawings and GW plume delineation. Assume 100 sq.ft excavation to 8 feet bgs for each source area. Non-Hazardous disposal
New Monitoring Wells (Delineation/Confirmation Network)	1	LS	$ 16,600	$ 16,600	
Pavement Cover (prep, grading and placement)	6	Acre	$ 130,000	$ 780,000	Asphalt cover for all of Area A. Assume $3/sf
As-Builts and SMP/FER Revisions					
Survey	1	LS	$ 15,000	$ 15,000	Extraction well, VHB extension centerline, post-grading topography
			Capital Costs Subtotal	$ 3,562,600	Subtotal rounded to nearest $100
			Project Administration/General Overhead	$ 178,130	Assumes 5% on subtotal
			Task Contingency	$ 1,122,219	30% Contingency
			Subtotal	$ 4,863,000	

Table 9
South Buffalo Development - Area A
Alternative C Cost Summary

Task	Estimate	Unit	Unit Rate	Line Item Total	Assumptions/Comments
Alternative C - Source Treatment, Capping, and Monitored Natural Attenuation - Long-Term Operations Costs					
Operations, Monitoring, and Maintenance					*Estimates assume 2% PV factor for one-time and 2% annualized annuity for continuous operation (see ref. table).*
Treatment System O&M Years 1 - 5	*4.713*	Annual Cost	$ 225,000	$ 1,060,528	Assumes 2019 O&M estimate as basis. Operate as existing until completion of quarterly monitoring program
Groundwater Monitoring and Reporting (Quarterly; Years 1-4)	*3.808*	Annual Cost	$ 19,200	$ 73,108	Assume 8 monitoring wells in compliance network @ $600/well (labor and analysis)
Groundwater Monitoring and Reporting (Semi-Annually; Years 4-15)	*9.042*	Annual Cost	$ 9,000	$ 81,374	Assume 8 monitoring wells in compliance network @ $600/well (labor and analysis)
Engineering Controls Inspections/Reporting ($2500/yr) (Years 1 - 30)	*22.396*	Annual Cost	$ 2,500	$ 55,990	Pavement cap inspection.
				$ -	
				$ -	
Long-Term Operational Costs Subtotal				$ 1,271,100	
Project Administration/General Overhead				$ 63,555	Assumes 5% on subtotal
Task Contingency				$ 266,931	20% Contingency
Subtotal				$ 1,602,000	
Alternative C - Source Treament PV Total				$ 6,465,000	

Figures

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SITE LAYOUT

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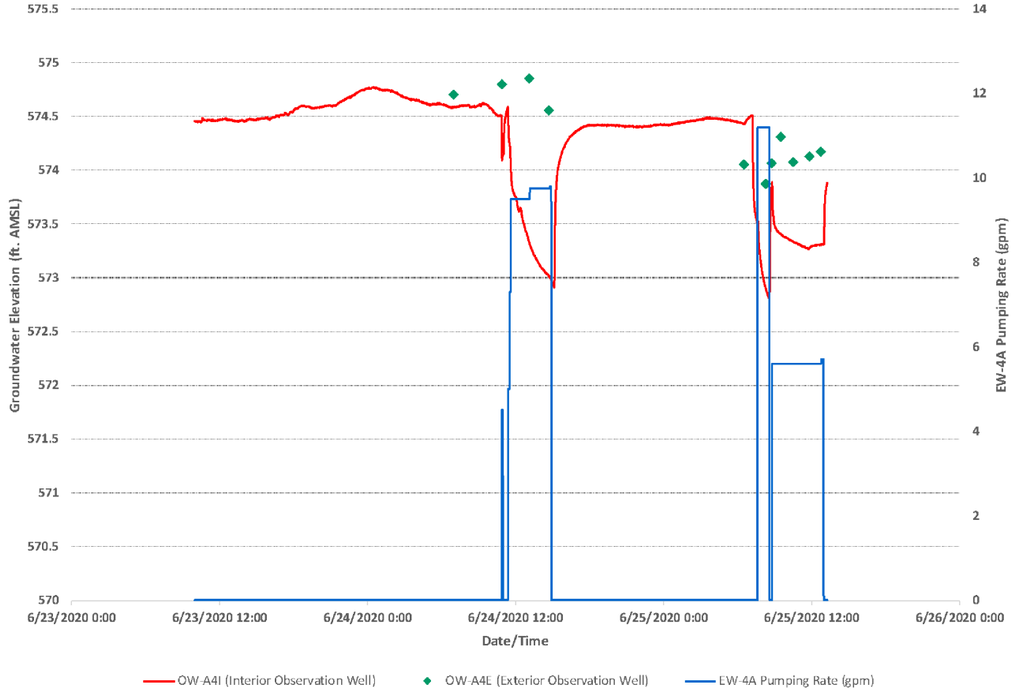
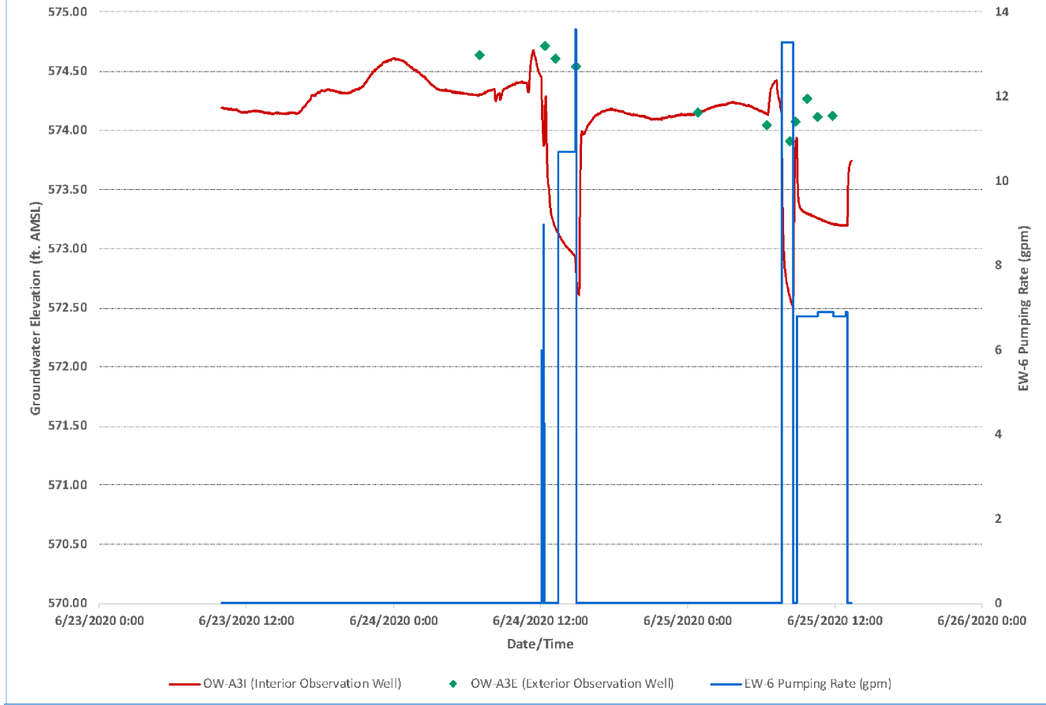
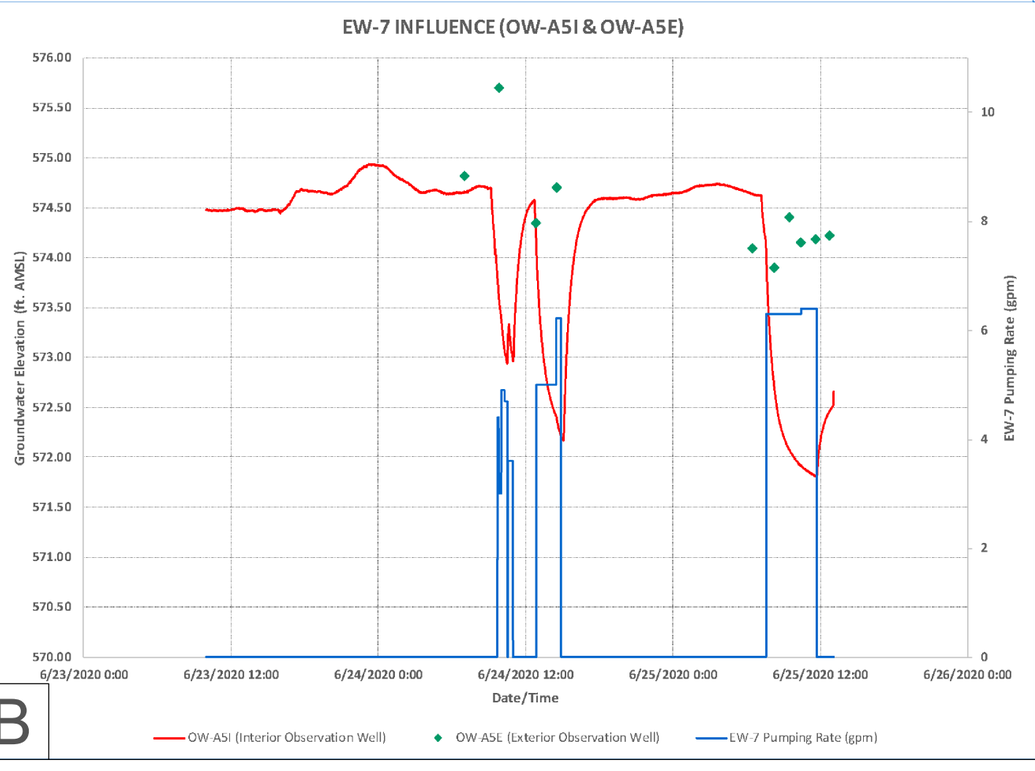
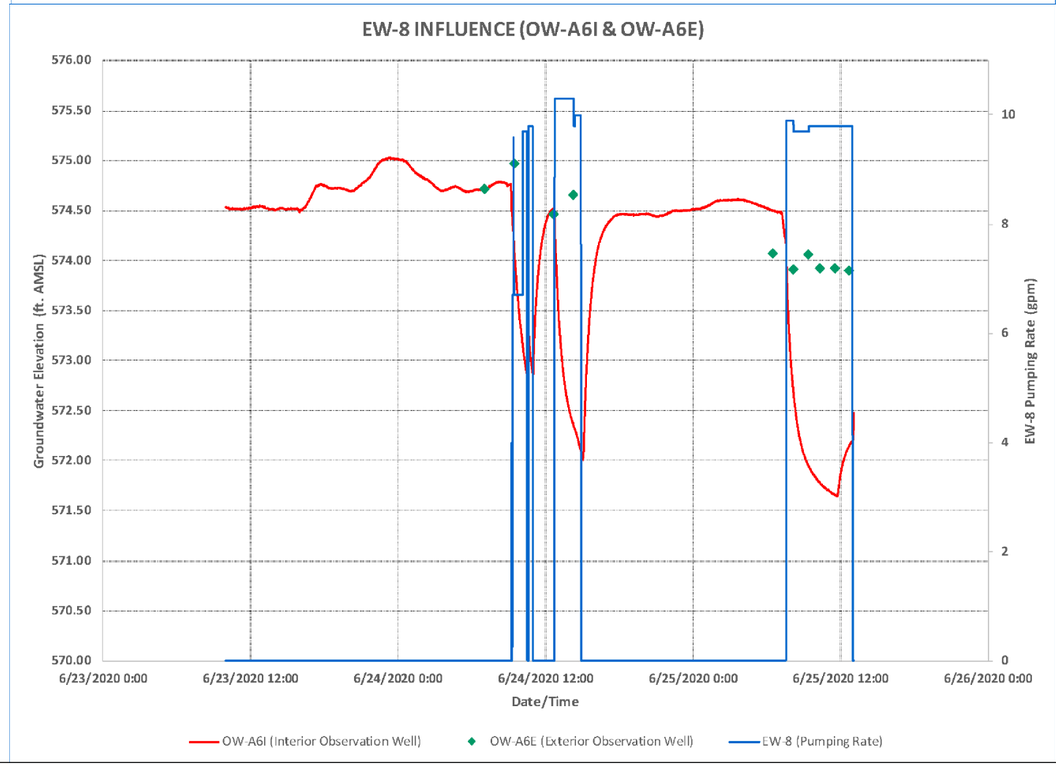
FIGURE 1

DRAWING NUMBER









B

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FIGURE 2
CORRECTIVE MEASURES PUMPING TEST EVALUATION
SOUTH BUFFALO DEVELOPMENT - AREA A

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FIGURE 1

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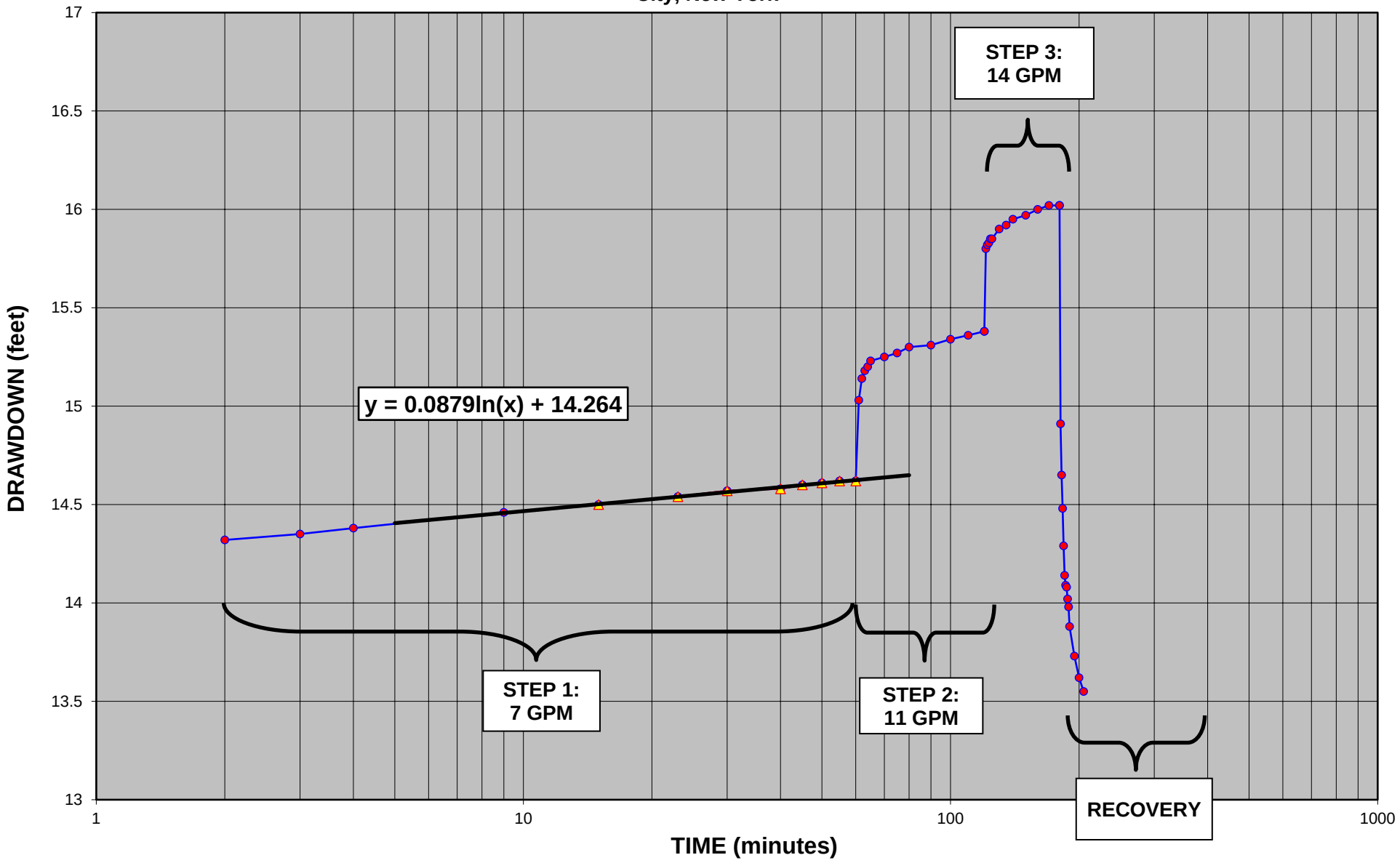
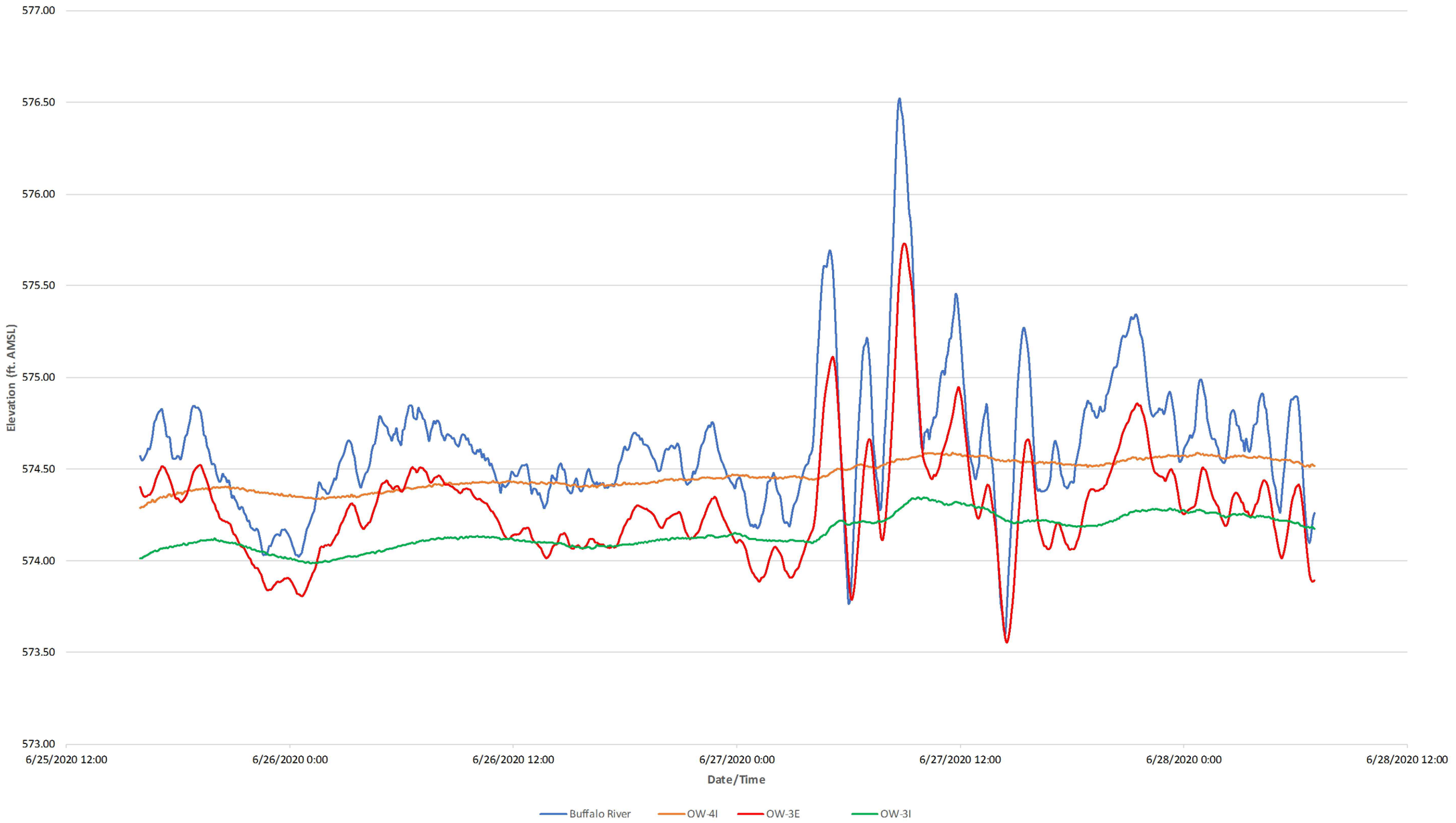
Figure 3
[EW-6]
STEP-DRAWDOWN TEST (SEMI-LOG)

Buffalo Color Area A
Inventum Engineering, PC
City, New York



Buffalo River - Groundwater Elevation Influence
June 25th (4PM) - June 28th (7AM)



B

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FIGURE 4

BUFFALO RIVER TRANSDUCER MONITORING SUMMARY

SOUTH BUFFALO DEVELOPMENT-AREA A

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FIGURE 4

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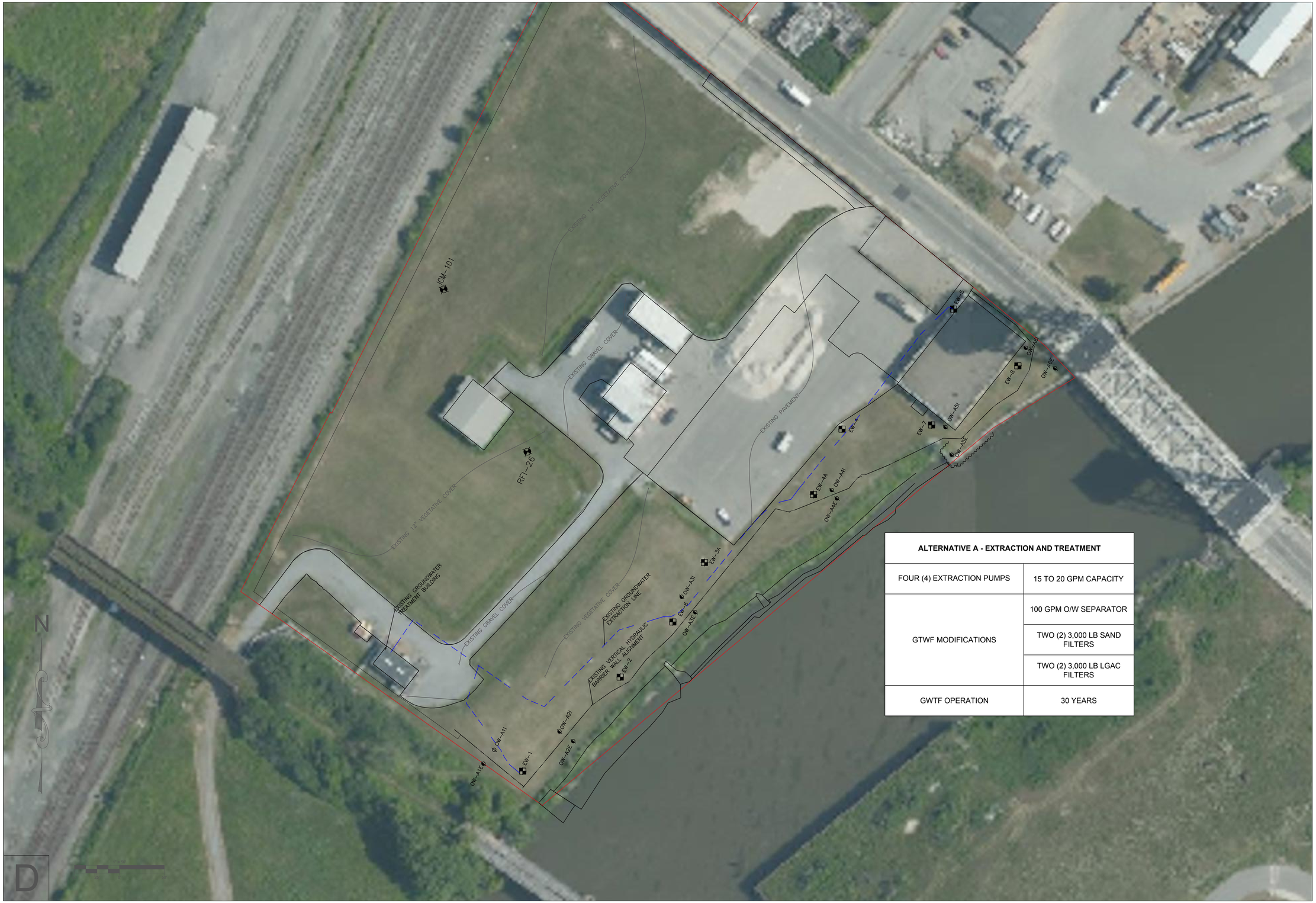

ALTERNATIVE A - EXTRACTION AND TREATMENT	
FOUR (4) EXTRACTION PUMPS	15 TO 20 GPM CAPACITY
GTWF MODIFICATIONS	100 GPM O/W SEPARATOR
	TWO (2) 3,000 LB SAND FILTERS
	TWO (2) 3,000 LB LGAC FILTERS
GWTF OPERATION	30 YEARS

FIGURE 5
ALTERNATIVE A
EXTRACTION AND TREATMENT

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FIGURE 5

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ALTERNATIVE B - VHB EXTENSION FEATURES

C-B BARRIER WALL ALIGNMENT	1,750 LINEAR FEET
C-B BARRIER WALL DEPTH	35-FEET (AVG)
C-B BARRIER WALL SQ. FT	52,500 SQ. FT.
C-B TRENCH SPOILS ONSITE DISPOSAL	9,056 TON
2' CLAY COVER W/GEOMEMBRANE LINER	6 ACRE
NEW ASPHALT PAVEMENT CAP	0.75 ACRE
PUMP AND TREAT OPERATION	15 YEARS

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FIGURE 6

ALTERNATIVE B
HYDRAULIC BARRIERS - VHB
EXTENSION AND CAPPING

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FIGURE 6

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ISCO Pilot Test Area

Approximate Extent Chlorobenzene & other VOCs > 1 mg/L
~4.4 Acres

Approximate area of overlap = 0.75 Ac

Approximate Extent Anlines > 1 mg/L
~1.46 Acres

GW Flow

PROPOSED ASPHALT COVER

EXISTING PAVEMENT

EXISTING GROUNDWATER TREATMENT BUILDING

EXISTING GROUNDWATER EXTRACTION LINE

EXISTING VERTICAL HYDRAULIC BARRIER WALL ALIGNMENT

ICM-101

RFI-26

EW-1 EW-2 EW-3A EW-4 EW-4A EW-5 EW-6 EW-7

OW-A1E OW-A1I OW-A2E OW-A2I OW-A3E OW-A3I OW-A4E OW-A4I OW-A5E OW-A5I

Class GA Standard**	3	3	3	5	1	5
ICM-101 (ug/L) 16/06/17	320 J	<400	1,100	5,000	9,600	39,000
ICM-101 (ug/L) 05/31/18	<100	94 J	1,000	4,400	10,000	36,000
ICM-101 (ug/L) 06/26/19	<800	<800	1,100	4,100	9,900	38,000

Class GA Standard**	3	3	3	5	1	5
RFI-26 (ug/L) 16/06/17	<5	85	<5	<500	35	280
RFI-26 (ug/L) 05/31/18	130	12	150	1,300	76	16,000
RFI-26 (ug/L) 06/26/19	<400	<400	<400	1,600	3,200	17,000

Class GA Standard**	3	3	3	5	1	5
EW-5 (ug/L) 16/06/17	<2	<2	<2	<100	1.2 J	3
EW-5 (ug/L) 06/01/18	<2	<2	<2	<100	<2	3
EW-5 (ug/L) 06/26/19	<2	<2	<2	<5	<2	1.9 J

Class GA Standard**	3	3	3	5	1	5
EW-3A (ug/L) 16/06/17	<50	<50	<50	96 J	230	2,000
EW-3A (ug/L) 06/01/18	<50	<50	<50	150	180	1,600
EW-3A (ug/L) 06/26/19	<20	<20	<20	68	150	990

Class GA Standard**	3	3	3	5	1	5
EW-2 (ug/L) 16/06/17	<100	<100	<100	160	320	4,200
EW-2 (ug/L) 06/01/18	<100	<100	<100	73	380	3,900
EW-2 (ug/L) 06/26/19	<100	<100	<100	96	460	4,400

Class GA Standard**	3	3	3	5	1	5
EW-1 (ug/L) 16/06/17	210	160 J	1,300	18 J	120 J	13,000
EW-1 (ug/L) 06/01/18	<200	<200	1,300	14 J	110 J	13,000
EW-1 (ug/L) 06/26/19	<200	<200	1,200	12	100 J	12,000

ALTERNATIVE C - SOURCE TREATMENT FEATURES	
GROUNDWATER TREATMENT GOALS	TOTAL VOCs < 1 mg/L
IN-SITU CHEMICAL OXIDATION PRIMARY INJECTION	97,000 CY
IN-SITU CHEMICAL OXIDATION SECONDARY/POLISHING INJECTION	29,100 CY
NEW ASPHALT PAVEMENT COVER	6 ACRE
PUMP AND TREAT OPERATION	5 YEARS

N

D

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FIGURE 7

ALTERNATIVE C
SOURCE TREATMENT, CAPPING, AND
MONITORED NATURAL ATTENUATION

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FIGURE 7

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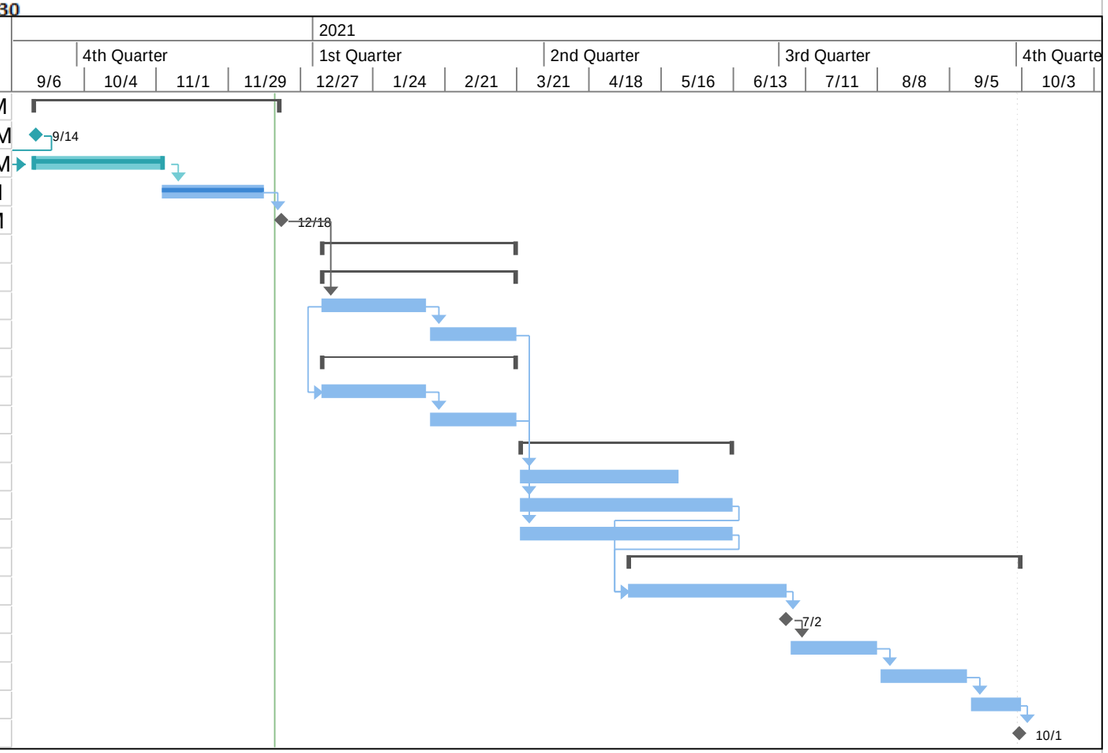
Figure 8
Corrective Measures Project Schedule
Former Buffalo Color Corporation Site - Area A
NYSDEC Site No. C915230

	Task Name	Duration	Start	Finish
1	Corrective Measures Evaluation	69 days	Mon 9/14/20 8:00 AM	Fri 12/18/20 8:00 AM
2	CMS Evaluation Report DRAFT Submittal	0 days	Mon 9/14/20 8:00 AM	Mon 9/14/20 8:00 AM
3	NYSDEC Review and Comment	36 days	Mon 9/14/20 8:00 AM	Mon 11/2/20 5:00 PM
4	CMS Evaluation Report Revisions	29 days	Tue 11/3/20 8:00 AM	Fri 12/11/20 5:00 PM
5	CMS Evaluation Report FINAL Submittal	0 days	Fri 12/18/20 8:00 AM	Fri 12/18/20 8:00 AM
6	Interim Corrective Measure Work Plans	55 days	Mon 1/4/21 8:00 AM	Fri 3/19/21 5:00 PM
7	Groundwater Extraction System ICM Work Plan	55 days	Mon 1/4/21 8:00 AM	Fri 3/19/21 5:00 PM
8	Work Plan Preparation and Submittal	30 days	Mon 1/4/21 8:00 AM	Fri 2/12/21 5:00 PM
9	NYSDEC Review and Approval	25 days	Mon 2/15/21 8:00 AM	Fri 3/19/21 5:00 PM
10	Existing Conditions & ISCO Pilot Study Work Plan Preparation	55 days	Mon 1/4/21 8:00 AM	Fri 3/19/21 5:00 PM
11	Work Plan Preparation and Submittal	30 days	Mon 1/4/21 8:00 AM	Fri 2/12/21 5:00 PM
12	NYSDEC Review and Approval	25 days	Mon 2/15/21 8:00 AM	Fri 3/19/21 5:00 PM
13	Interim Corrective Measures Implementation	60 days	Mon 3/22/21 8:00 AM	Fri 6/11/21 5:00 PM
14	Groundwater Extraction System ICM	45 days	Mon 3/22/21 8:00 AM	Fri 5/21/21 5:00 PM
15	Source Area Delineation Investigation	60 days	Mon 3/22/21 8:00 AM	Fri 6/11/21 5:00 PM
16	ISCO Pilot Test	60 days	Mon 3/22/21 8:00 AM	Fri 6/11/21 5:00 PM
17	Corrective Measures Report	110 days	Mon 5/3/21 8:00 AM	Fri 10/1/21 5:00 PM
18	ICM Data Evaluation	45 days	Mon 5/3/21 8:00 AM	Fri 7/2/21 5:00 PM
19	NYSDEC/SBD/Honeywell Site Meeting - Remedial Option Selection	0 days	Fri 7/2/21 5:00 PM	Fri 7/2/21 5:00 PM
20	Corrective Measures Report DRAFT Submittal	25 days	Mon 7/5/21 8:00 AM	Fri 8/6/21 5:00 PM
21	NYSDEC Review and Comment	25 days	Mon 8/9/21 8:00 AM	Fri 9/10/21 5:00 PM
22	Correctives Measures Report Revisions	15 days	Mon 9/13/21 8:00 AM	Fri 10/1/21 5:00 PM
23	Corrective Measures Report FINAL Submittal	0 days	Fri 10/1/21 5:00 PM	Fri 10/1/21 5:00 PM



Task		Project Summary		Manual Task		Start-only		Deadline	
Split		Inactive Task		Duration-only		Finish-only		Progress	
Milestone		Inactive Milestone		Manual Summary Rollup		External Tasks		Manual Progress	
Summary		Inactive Summary		Manual Summary		External Milestone			

Appendix A – Soil Import Forms and Photolog (on CD)

Client Name: South Buffalo Development Corporation LLC	Photo Date: July 24, 2020	Project: Former Buffalo Color Corporation Site – Area A BCP Site No. C915230
Photo No. 1 Direction Photo Taken: Looking South Description: Washed out pea gravel behind sheet pile wall prior to new stone placement		
Client Name: South Buffalo Development Corporation LLC	Photo Date: July 24, 2020	Project: Former Buffalo Color Corporation Site – Area A BCP Site No. C915230
Photo No. 2 Direction Photo Taken: Looking north east Description: Washed out pea gravel behind sheet pile wall prior to new stone placement .		

Client Name: South Buffalo Development Corporation LLC	Photo Date: July 24, 2020	Project: Former Buffalo Color Corporation Site – Area A BCP Site No. C915230
Photo No. 3 Direction Photo Taken: Looking east Description: #2 Stone placement to top of sheet pile wall (typical of entire length) Exterior observation well OW-A5E seen in foreground.		
Client Name: South Buffalo Development Corporation LLC	Photo Date: July 24, 2020	Project: Former Buffalo Color Corporation Site – Area A BCP Site No. C915230
Photo No. 4 Direction Photo Taken: Looking north Description: #2 Stone placement to top of sheet pile wall (typical of entire length)		

Todd Waldrop

From:	Kuczka, Megan E (DEC) <Megan.Kuczka@dec.ny.gov> on behalf of Kuczka, Megan E (DEC)
Sent:	Monday, July 27, 2020 9:08 AM
To:	todd.waldrop@inventumeng.com
Cc:	John Black; John Yensan; Melnyk, Eugene W (DEC)
Subject:	Re: Former BCC Area A - Corrective Measures Work/Schedule Update
Attachments:	SBD_Area A_Request to Import_07 24 2020.pdf; SBD_Area A_Post-Placement.jpg; SBD_Area A_Pre-Placement.jpg

Todd -

I have reviewed the Import Request form and find it acceptable for use at Buffalo Color Area A. Thank you for the pictures as well.

Sincerely,

Megan Kuczka
Environmental Program Specialist 1, Division of Environmental Remediation

New York State Department of Environmental Conservation
270 Michigan Avenue, Buffalo, NY 14203
P: (716) 851-7220 | F: (716) 851-7226 | Megan.Kuczka@dec.ny.gov
www.dec.ny.gov |

From: Todd Waldrop <todd.waldrop@inventumeng.com>
Sent: Friday, July 24, 2020 5:06 PM
To: Kuczka, Megan E (DEC) <Megan.Kuczka@dec.ny.gov>
Cc: John Black <john.black@inventumeng.com>; John Yensan <jyensan@oscinc.com>
Subject: RE: Former BCC Area A - Corrective Measures Work/Schedule Update

Megan –

There was miscommunication regarding the ordering/scheduling for the stone placement and it was placed yesterday prior to me being able to submit the attached form. Please let me know if you have any questions (571.217.3627) or if I need to provide any additional information from the fill source. I've attached one pre- and post- placement photo as well.

Todd Waldrop, P.E.
Partner
INVENTUM ENGINEERING
481 Carlisle Drive

Suite 202
Herndon, Virginia 20170
todd.waldrop@inventumeng.com
Cell: 571.217.3627
Office: 571.752.6562
www.inventumeng.com

From: Kuczka, Megan E (DEC) <Megan.Kuczka@dec.ny.gov>
Sent: Wednesday, July 22, 2020 1:47 PM
To: Melnyk, Eugene W (DEC) <eugene.melnyk@dec.ny.gov>; todd.waldrop@inventumeng.com
Cc: John Black <john.black@inventumeng.com>; Caprio, Andrea (DEC) <Andrea.Caprio@dec.ny.gov>; Galloway, Rich <rich.galloway@honeywell.com>; John Yensan <jyensan@oscinc.com>
Subject: Re: Former BCC Area A - Corrective Measures Work/Schedule Update

Todd -

In addition to Gene's email, please submit a Request to Import/Reuse Fill or Soil for the gravel.

Sincerely,

Megan Kuczka
Environmental Program Specialist 1, Division of Environmental Remediation

New York State Department of Environmental Conservation
270 Michigan Avenue, Buffalo, NY 14203
P: (716) 851-7220 | F: (716) 851-7226 | Megan.Kuczka@dec.ny.gov
www.dec.ny.gov |

From: Melnyk, Eugene W (DEC) <eugene.melnyk@dec.ny.gov>
Sent: Wednesday, July 22, 2020 1:44 PM
To: todd.waldrop@inventumeng.com <todd.waldrop@inventumeng.com>; Kuczka, Megan E (DEC) <Megan.Kuczka@dec.ny.gov>
Cc: John Black <john.black@inventumeng.com>; Caprio, Andrea (DEC) <Andrea.Caprio@dec.ny.gov>; Galloway, Rich <rich.galloway@honeywell.com>; John Yensan <jyensan@oscinc.com>
Subject: Re: Former BCC Area A - Corrective Measures Work/Schedule Update

Todd;
Please send information and analysis completed to date so that we have an opportunity to evaluate before a conference call.
Please provide some dates and times for a conference call.
Thanks
Gene

Eugene Melnyk, PE
Remediation Engineer

NYSDEC Region 9

LAFARGE

David Youngblood
400 Hinman Rd.
Lockport, NY 14094
571-752-1111 (cell)
716-433-4930 (fax)

7/24/20

Pariso

Att:
Re:
Email:

To whom it may concern:

This is to certify that the material being supplied to the above project conforms to the outlined NYSDOT requirements for Section 703-02 Coarse Aggregate. Below is a gradation for Clear #2 Stone

Location: Lockport Source #: 5-5R
Material Type: #2 Stone Test No. 19AR021

Sieve Size	Weight	% Ret	% Pass	Spec
1 1/2"	0.0	0.0	100.0	100
1"	150.2	1.5	98.5	90-100
3/4"	3315.0	33.1	65.4	
5/8"	4036.1	40.3	25.1	
1/2"	1832.8	18.3	6.8	0-15
3/8"	510.8	5.1	1.7	
1/4"	70.1	0.7	1.0	
pan	100.2	1.0		
Total	10015.2			

Sincerely,

David Youngblood
Quality Control Manager
Lafarge AC&A

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e). Use of this form is not a substitute for reading the applicable Technical Guidance document.

SECTION 1 – SITE BACKGROUND

The allowable site use is: Commercial or Industrial Use

Have Ecological Resources been identified? no

Is this soil originating from the site? no

How many cubic yards of soil will be imported/reused? 0-50

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone? yes

Does it contain less than 10%, by weight, material that would pass a size 80 sieve? yes

Is this virgin material from a permitted mine or quarry? yes

Is this material recycled concrete or brick from a DEC registered processing facility? no

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

No Chemical analysis has been obtained but the material meets NYSDOT requirements for section 703-02 Course Aggregate. Materials were imported from LaFarge Lockport facility, Lockport, NY.

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

N/A

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Pariso Logistics, purchasing fill from the source (LaFarge - Lockport, NY)

Location where fill was obtained:

LaFarge - 400 Hinman Road, Lockport, NY 14094

Identification of any state or local approvals as a fill source:

NYSDOT Designation

If no approvals are available, provide a brief history of the use of the property that is the fill source:

N/A

Provide a list of supporting documentation included with this request:

Most current gradation report of # 2 Stone issued by LaFarge

The information provided on this form is accurate and complete.

Signature

7/24/2020

Date

Todd Waldrop

Print Name

Inventum Engineering, P.C.

Firm

LAFARGE

David Youngblood
400 Hinman Rd.
Lockport, NY 14094
571-752-1111 (cell)
716-433-4930 (fax)

7/24/20

Pariso

Att:
Re:
Email:

To whom it may concern:

This is to certify that the material being supplied to the above project conforms to the outlined NYSDOT requirements for Section 703-02 Coarse Aggregate. Below is a gradation for Clear #2 Stone

Location: Lockport Source #: 5-5R
Material Type: #2 Stone Test No. 19AR021

Sieve Size	Weight	% Ret	% Pass	Spec
1 1/2"	0.0	0.0	100.0	100
1"	150.2	1.5	98.5	90-100
3/4"	3315.0	33.1	65.4	
5/8"	4036.1	40.3	25.1	
1/2"	1832.8	18.3	6.8	0-15
3/8"	510.8	5.1	1.7	
1/4"	70.1	0.7	1.0	
pan	100.2	1.0		
Total	10015.2			

Sincerely,

David Youngblood
Quality Control Manager
Lafarge AC&A

Appendix B – Storm Sewer Video Survey (on CD)

Appendix C – Field Sampling Forms (on CD)

ORION Environmental Solutions, LLC

FIELD BOREHOLE LOG

PROJECT: Buffalo Color Area A Extraction Well Installation		**Log of Boring No.: A-EW-4A**	
BORING LOCATION: Buffalo Color Area A, Buffalo, New York		ELEVATION AND DATUM: Mean Sea Level	
DRILLING CONTRACTOR: Earth Dimensions, Inc.		DATE STARTED: 05/28/20	FINISHED: 05/28/20
DRILLING METHOD: 4.25" ID Hollow Stem Auger (then 8.25" ID for well)		TOTAL DEPTH: 35.5 fbgs	SCREEN: 13.5-33.5 fbgs
DRILLING EQUIPMENT: Dietrich D-120 Rear-Mounted Rig		DEPTH TO WATER: FIRST: 10.5 fbgs; COMPL.: 11.3 fbgs	CASING: Sch. 40 PVC
SAMPLING METHOD: Continuous split spoon sampling		LOGGED BY: BCH	
HAMMER WEIGHT: 140 pounds	DROP: 30 inches	RESPONSIBLE PROFESSIONAL: BCH	REG. NO. NY000270

Depth (fbgs)	SAMPLES: Field Sample No.	Lab Sample	Blows (per 6")	SPT N-Value	Recovery (ft)	MAX PID Scan (ppm)	SAMPLE DESCRIPTION (ASTM D 2488)	REMARKS
							USCS Classification: Color, Moisture Condition, Primary Soil Type, Secondary Soil Type (<5% Trace, 5-10% Few, 15-25% Little, 30-45% Some), Structure (varved, stratified, thinly bedded, bedded, thickly bedded, laminated, fissured, blocky, lensed, massive), Consistency/Density (Standard Penetration Test, SPT), Weathering/Fracturing, Odor, Fill Materials (if present), Other	
							SURFACE ELEVATION (FMSL): NA	
0								
1	NA		NA	NA	NA	NA	*Augered to 10.0 fbgs* *(0-1 fbgs - cover soils with grass)*	
2								
3	NA		NA	NA	NA	NA		
4								
5	NA		NA	NA	NA	NA		
6								
7	NA		NA	NA	NA	NA		
8								
9	NA		NA	NA	NA	NA		
10								
11	S1		9 6 3 3	9	0.8	0.0	SILT (ML): Dark orange/brown grading to black, moist to wet, mostly low plasticity fines, some fine gravel, firm to stiff, grading to FILL: black, wet, mostly medium sand, some brick fragments	*wet @ 10.5*
12								
13	NA		NA	NA	NA	NA	*Augered to 15 fbgs*	
14								

ABANDONMENT:

Volume of cement/bentonite grout required:	$V = \pi r^2 \times 7.48 =$ gallons	borehole depth =	ft.
Volume of cement/bentonite grout installed:	gallons	borehole diameter =	ft.
Has bridging of grout occurred? ☐ yes ☐ no		borehole radius =	ft.
If yes, explain resolution:			
Method of installation:			

Project No: 0006-001-008	**Orion Environmental Solutions, LLC**	

ORION Environmental Solutions, LLC

FIELD BOREHOLE LOG

PROJECT: Buffalo Color Area A Extraction Well Installation		**Log of Boring No.: A-EW-4A**	
BORING LOCATION: Buffalo Color Area A, Buffalo, New York		ELEVATION AND DATUM: Mean Sea Level	
DRILLING CONTRACTOR: Earth Dimensions, Inc.		DATE STARTED: 05/28/20	FINISHED: 05/28/20
DRILLING METHOD: 4.25" ID Hollow Stem Auger (then 8.25" ID for well)		TOTAL DEPTH: 35.5 fbgs	SCREEN: 13.5-33.5 fbgs
DRILLING EQUIPMENT: Dietrich D-120 Rear-Mounted Rig		DEPTH TO WATER: FIRST: 10.5 fbgs / COMPL.: 11.3 fbgs	CASING: Sch. 40 PVC
SAMPLING METHOD: Continuous split spoon sampling		LOGGED BY: BCH	
HAMMER WEIGHT: 140 pounds	DROP: 30 inches	RESPONSIBLE PROFESSIONAL: BCH	REG. NO. NY000270

Depth (fbgs)	SAMPLES: Field Sample No.	Lab Sample	Blows (per 6")	SPT N-Value	Recovery (ft)	MAX PID Scan (ppm)	SAMPLE DESCRIPTION (ASTM D 2488)	REMARKS
							USCS Classification: Color, Moisture Condition, Primary Soil Type, Secondary Soil Type (<5% Trace, 5-10% Few, 15-25% Little, 30-45% Some), Structure (varved, stratified, thinly bedded, bedded, thickly bedded, laminated, fissured, blocky, lensed, massive), Consistency/Density (Standard Penetration Test, SPT), Weathering/Fracturing, Odor, Fill Materials (if present), Other	
							SURFACE ELEVATION (FMSL): NA	
15								
16	S2		7 3 6 6	9	1.0	0.0	FILL: Black, wet, as above	
17								
18	NA		NA	NA	NA	NA	*Augered to 20.0 fbgs*	
19								
20								
21	S3		3 39 27 10	66	1.0	1.4	FILL: Black, wet, as above	*Slight petroleum-like odor*
22								
23	NA		NA	NA	NA	NA	*Augered to 25.0 fbgs*	
24								
25								
26	S4		NA	NA	1.8	0.0	CLAYEY SAND (SC): Dark grey, wet, mostly fine sand, some medium plasticity fines, medium dense to dense	
27								
28	NA		NA	NA	NA	NA	*Augered to 30.0 fbgs*	
29								

ABANDONMENT:

Volume of cement/bentonite grout required:	$V = \pi r^2 \times 7.48 =$ gallons	borehole depth =	ft.
Volume of cement/bentonite grout installed:	gallons	borehole diameter =	ft.
Has bridging of grout occurred? ☐ yes ☐ no		borehole radius =	ft.
If yes, explain resolution:			
Method of installation:			

Project No: 0006-001-008	**Orion Environmental Solutions, LLC**	

ORION Environmental Solutions, LLC

FIELD BOREHOLE LOG

PROJECT: Buffalo Color Area A Extraction Well Installation		**Log of Boring No.: A-EW-4A**	
BORING LOCATION: Buffalo Color Area A, Buffalo, New York		ELEVATION AND DATUM: Mean Sea Level	
DRILLING CONTRACTOR: Earth Dimensions, Inc.		DATE STARTED: 05/28/20	FINISHED: 05/28/20
DRILLING METHOD: 4.25" ID Hollow Stem Auger (then 8.25" ID for well)		TOTAL DEPTH: 35.5 fbgs	SCREEN: 13.5-33.5 fbgs
DRILLING EQUIPMENT: Dietrich D-120 Rear-Mounted Rig		DEPTH TO WATER: FIRST: 10.5 fbgs; COMPL.: 11.3 fbgs	CASING: Sch. 40 PVC
SAMPLING METHOD: Continuous split spoon sampling		LOGGED BY: BCH	
HAMMER WEIGHT: 140 pounds	DROP: 30 inches	RESPONSIBLE PROFESSIONAL: BCH	REG. NO. NY000270

Depth (fbgs)	SAMPLES: Field Sample No.	Lab Sample	Blows (per 6")	SPT N-Value	Recovery (ft)	MAX PID Scan (ppm)	SAMPLE DESCRIPTION (ASTM D 2488)	REMARKS
							USCS Classification: Color, Moisture Condition, Primary Soil Type, Secondary Soil Type (<5% Trace, 5-10% Few, 15-25% Little, 30-45% Some), Structure (varved, stratified, thinly bedded, bedded, thickly bedded, laminated, fissured, blocky, lensed, massive), Consistency/Density (Standard Penetration Test, SPT), Weathering/Fracturing, Odor, Fill Materials (if present), Other	
							SURFACE ELEVATION (FMSL): NA	
30								
31	S5		7 11 15 29	26	1.8	0.0	POORLY GRADED GRAVEL w/ SAND (GP): Dark grey, wet, mostly fine subangular gravel, some fine to coarse sand, trace, non-plastic fines, medium dense to dense	
32	NA		NA	NA	NA	NA	*Augered to 33.0 fbgs*	
33								
34	S6		5 2 1 2	3	1.2	0.0	0.0 - 0.2 POORLY GRADED GRAVEL w/ SAND (GP) as above, wet 0.2 - 1.2 LEAN CLAY (CL): Dark grey, wet to moist, mostly medium to high plasticity fines, trace fine sand and fine gravel, soft to firm	*Drilling quieted, suspected clay (±33.5 fbgs)*
35								
36	NA		NA	NA	NA	NA	*Augered to 35.5 fbgs*	
37							*End of boring at 35.5 fbgs* *Installed 4-inch ID Schedule 40 PVE Extraction Well* *See Well Completion Detail for construction*	
38								
39								
40								
41								
42								
43								
44								

ABANDONMENT:

Volume of cement/bentonite grout required:	$V = \pi r^2 \times 7.48 =$ gallons	borehole depth =	ft.
Volume of cement/bentonite grout installed:	gallons	borehole diameter =	ft.
Has bridging of grout occurred? ☐ yes ☐ no		borehole radius =	ft.
If yes, explain resolution:			
Method of installation:			

Project No: 0006-001-008 | **Orion Environmental Solutions, LLC**

ORION Environmental Solutions, LLC

FIELD BOREHOLE LOG

PROJECT: Buffalo Color Area A Extraction Well Installation		**Log of Boring No.: A-EW-6**	
BORING LOCATION: Buffalo Color Area A, Buffalo, New York		ELEVATION AND DATUM: Mean Sea Level	
DRILLING CONTRACTOR: Earth Dimensions, Inc.		DATE STARTED: 05/27/20	FINISHED: 05/27/20
DRILLING METHOD: 4.25" ID Hollow Stem Auger (then 8.25" ID for well)		TOTAL DEPTH: 38.0 fbgs	SCREEN: 15.5-35.5 fbgs
DRILLING EQUIPMENT: Dietrich D-120 Rear-Mounted Rig		DEPTH TO WATER: FIRST: 11.0 fbgs; COMPL.: 11.8 fbgs	CASING: Sch. 40 PVC
SAMPLING METHOD: Continuous split spoon sampling		LOGGED BY: BCH	
HAMMER WEIGHT: 140 pounds	DROP: 30 inches	RESPONSIBLE PROFESSIONAL: BCH	REG. NO. NY000270

Depth (fbgs)	SAMPLES: Field Sample No.	Lab Sample	Blows (per 6")	SPT N-Value	Recovery (ft)	MAX PID Scan (ppm)	SAMPLE DESCRIPTION (ASTM D 2488)	REMARKS
							USCS Classification: Color, Moisture Condition, Primary Soil Type, Secondary Soil Type (<5% Trace, 5-10% Few, 15-25% Little, 30-45% Some), Structure (varved, stratified, thinly bedded, bedded, thickly bedded, laminated, fissured, blocky, lensed, massive), Consistency/Density (Standard Penetration Test, SPT), Weathering/Fracturing, Odor, Fill Materials (if present), Other	
							SURFACE ELEVATION (FMSL): NA	
0								
1	NA		NA	NA	NA	NA	*Augered to 8.0 fbgs* *(0-1 fbgs - cover soils with grass)*	
2								
3	NA		NA	NA	NA	NA		
4								
5	NA		NA	NA	NA	NA		
6								
7	NA		NA	NA	NA	NA		
8								
9	S1		8 7 5 4	12	0.4	0.0	SILT (ML): Dark orange/brown, moist, mostly non-plastic fines, trace fine gravel, stiff, trace rootletts, wet in shoe with a piece of slag-like material	
10								
11	S2		1 2 2 2	4	1.0	0.0	0.0 - 0.6 SILT (ML): As above 0.6 - 1.0 SLAG-FILL: Black, wet, mostly coarse slag with some non-plastic fines, loose when disturbed	*wet @ 11.0*
12								
13	NA		NA	NA	NA	NA	*Augered to 15 fbgs*	
14								

ABANDONMENT:

Volume of cement/bentonite grout required:	$V = \pi r^2 \times 7.48 =$ gallons	borehole depth =	ft.
Volume of cement/bentonite grout installed:	gallons	borehole diameter =	ft.
Has bridging of grout occurred? ☐ yes ☐ no		borehole radius =	ft.
If yes, explain resolution:			
Method of installation:			

Project No: 0006-001-008	**Orion Environmental Solutions, LLC**	

ORION Environmental Solutions, LLC

FIELD BOREHOLE LOG

PROJECT: Buffalo Color Area A Extraction Well Installation		**Log of Boring No.: A-EW-6**	
BORING LOCATION: Buffalo Color Area A, Buffalo, New York		ELEVATION AND DATUM: Mean Sea Level	
DRILLING CONTRACTOR: Earth Dimensions, Inc.		DATE STARTED: 05/27/20	FINISHED: 05/27/20
DRILLING METHOD: 4.25" ID Hollow Stem Auger (then 8.25" ID for well)		TOTAL DEPTH: 38.0 fbgs	SCREEN: 15.5-35.5 fbgs
DRILLING EQUIPMENT: Dietrich D-120 Rear-Mounted Rig		DEPTH TO WATER: FIRST: 11.0 fbgs; COMPL.: 11.8 fbgs	CASING: Sch. 40 PVC
SAMPLING METHOD: Continuous split spoon sampling		LOGGED BY: BCH	
HAMMER WEIGHT: 140 pounds	DROP: 30 inches	RESPONSIBLE PROFESSIONAL: BCH	REG. NO. NY000270

Depth (fbgs)	SAMPLES: Field Sample No.	Lab Sample	Blows (per 6")	SPT N-Value	Recovery (ft)	MAX PID Scan (ppm)	SAMPLE DESCRIPTION (ASTM D 2488)	REMARKS
							USCS Classification: Color, Moisture Condition, Primary Soil Type, Secondary Soil Type (<5% Trace, 5-10% Few, 15-25% Little, 30-45% Some), Structure (varved, stratified, thinly bedded, bedded, thickly bedded, laminated, fissured, blocky, lensed, massive), Consistency/Density (Standard Penetration Test, SPT), Weathering/Fracturing, Odor, Fill Materials (if present), Other	
							SURFACE ELEVATION (FMSL): NA	
15								
16	S3		1 1 1 3	2	1.8	0.0	0.0 - 0.4 SLAG-FILL: As above 0.4 - 1.8 LEAN CLAY (CL): Dark grey, moist-wet, mostly medium to high plasticity fines, trace of fine sand, soft to firm	
17								
18	NA		NA	NA	NA	NA	*Augered to 20.0 fbgs*	
19								
20								
21	S4		6 17 7 15	24	1.5	0.0	Interbedded LEAN CLAY (CL) and FILL as above, black to dark grey, wet	
22								
23	NA		NA	NA	NA	NA	*Augered to 25.0 fbgs*	
24								
25								*Slight sheen*
26	S5		22 50	NA	0.8	0.0	SLAG-FILL as above: Black, wet, very dense, loose when disturbed, some sub-rounded fine gravel	
27								
28	NA		NA	NA	NA	NA	*Augered to 30.0 fbgs*	
29								

ABANDONMENT:

Volume of cement/bentonite grout required:	$V = \pi r^2 \times 7.48 =$ gallons	borehole depth =	ft.
Volume of cement/bentonite grout installed:	gallons	borehole diameter =	ft.
Has bridging of grout occurred? ☐ yes ☐ no		borehole radius =	ft.
If yes, explain resolution:			
Method of installation:			

Project No: 0006-001-008	**Orion Environmental Solutions, LLC**	

ORION Environmental Solutions, LLC

FIELD BOREHOLE LOG

PROJECT: Buffalo Color Area A Extraction Well Installation		**Log of Boring No.: A-EW-6**	
BORING LOCATION: Buffalo Color Area A, Buffalo, New York		ELEVATION AND DATUM: Mean Sea Level	
DRILLING CONTRACTOR: Earth Dimensions, Inc.		DATE STARTED: 05/27/20	FINISHED: 05/27/20
DRILLING METHOD: 4.25" ID Hollow Stem Auger (then 8.25" ID for well)		TOTAL DEPTH: 38.0 fbgs	SCREEN: 15.5-35.5 fbgs
DRILLING EQUIPMENT: Dietrich D-120 Rear-Mounted Rig		DEPTH TO WATER: FIRST: 11.0 fbgs; COMPL.: 11.8 fbgs	CASING: Sch. 40 PVC
SAMPLING METHOD: Continuous split spoon sampling		LOGGED BY: BCH	
HAMMER WEIGHT: 140 pounds	DROP: 30 inches	RESPONSIBLE PROFESSIONAL: BCH	REG. NO. NY000270

Depth (fbgs)	SAMPLES: Field Sample No.	Lab Sample	Blows (per 6")	SPT N-Value	Recovery (ft)	MAX PID Scan (ppm)	SAMPLE DESCRIPTION (ASTM D 2488)	REMARKS
							USCS Classification: Color, Moisture Condition, Primary Soil Type, Secondary Soil Type (<5% Trace, 5-10% Few, 15-25% Little, 30-45% Some), Structure (varved, stratified, thinly bedded, bedded, thickly bedded, laminated, fissured, blocky, lensed, massive), Consistency/Density (Standard Penetration Test, SPT), Weathering/Fracturing, Odor, Fill Materials (if present), Other	
							SURFACE ELEVATION (FMSL): NA	
30								
31	S6		10 6 11 11	17	1.5	0.0	POORLY GRADED SAND (SP): Black, wet, mostly fine to medium sand, some subrounded fine gravel, trace non-plastic fines, medium dense	
32								
33	NA		NA	NA	NA	NA	*Augered to 35.0 fbgs*	
34								
35								
36	S7		4 3 3 4	6	1.8	0.0	0.0 - 0.4 POORLY GRADED SAND (SP) as above, wet 0.4 - 1.8 LEAN CLAY (CL): Dark orange/brown, wet to moist, mostly medium to high plasticity fines, trace fine sand, few fine gravel, soft to stiff	
37	NA		NA	NA	NA	NA	*Augered to 38.0 fbgs*	
38								
39							*End of boring at 38.0 fbgs* *Installed 4-inch ID Schedule 40 PVE Extraction Well*	
40							*See Well Completion Detail for construction*	
41								
42								
43								
44								

ABANDONMENT:

Volume of cement/bentonite grout required:	$V = \pi r^2 \times 7.48 =$ gallons	borehole depth =	ft.
Volume of cement/bentonite grout installed:	gallons	borehole diameter =	ft.
Has bridging of grout occurred? ☐ yes ☐ no		borehole radius =	ft.
If yes, explain resolution:			
Method of installation:			

Project No: 0006-001-008	**Orion Environmental Solutions, LLC**	

ORION Environmental Solutions, LLC

FIELD BOREHOLE LOG

PROJECT: Buffalo Color Area A Extraction Well Installation		**Log of Boring No.: A-EW-7**	
BORING LOCATION: Buffalo Color Area A, Buffalo, New York		ELEVATION AND DATUM: Mean Sea Level	
DRILLING CONTRACTOR: Earth Dimensions, Inc.		DATE STARTED: 05/29/20	FINISHED: 05/29/20
DRILLING METHOD: 4.25" ID Hollow Stem Auger (then 8.25" ID for well)		TOTAL DEPTH: 35.5 fbgs	SCREEN: 13.5-33.5 fbgs
DRILLING EQUIPMENT: Dietrich D-120 Rear-Mounted Rig		DEPTH TO WATER: FIRST: 12.5 fbgs; COMPL.: 10.5 fbgs	CASING: Sch. 40 PVC
SAMPLING METHOD: Continuous split spoon sampling		LOGGED BY: BCH	
HAMMER WEIGHT: 140 pounds	DROP: 30 inches	RESPONSIBLE PROFESSIONAL: BCH	REG. NO. NY000270

Depth (fbgs)	SAMPLES: Field Sample No.	Lab Sample	Blows (per 6")	SPT N-Value	Recovery (ft)	MAX PID Scan (ppm)	SAMPLE DESCRIPTION (ASTM D 2488)	REMARKS
							USCS Classification: Color, Moisture Condition, Primary Soil Type, Secondary Soil Type (<5% Trace, 5-10% Few, 15-25% Little, 30-45% Some), Structure (varved, stratified, thinly bedded, bedded, thickly bedded, laminated, fissured, blocky, lensed, massive), Consistency/Density (Standard Penetration Test, SPT), Weathering/Fracturing, Odor, Fill Materials (if present), Other	
							SURFACE ELEVATION (FMSL): NA	
0								
1	NA		NA	NA	NA	NA	*Augered to 10.0 fbgs* *(0-1 fbgs - cover soils with grass)*	
2								
3	NA		NA	NA	NA	NA		
4								
5	NA		NA	NA	NA	NA		
6								
7	NA		NA	NA	NA	NA		
8								
9	NA		NA	NA	NA	NA		
10								
11	S1		1 1 8 5	9	0.9	0.0	SILTY SAND (SM) w/ FILL: Black, moist to wet, mostly fine sand and slag-fill, some non-plastic fines, medium dense, loose when disturbed	
12								*wet @ 12.5, (observed on drill rods)*
13	NA		NA	NA	NA	NA	*Augered to 15 fbgs*	
14								

ABANDONMENT:

Volume of cement/bentonite grout required:	$V = \pi r^2 \times 7.48 =$ gallons	borehole depth =	ft.
Volume of cement/bentonite grout installed:	gallons	borehole diameter =	ft.
Has bridging of grout occurred? ☐ yes ☐ no		borehole radius =	ft.
If yes, explain resolution:			
Method of installation:			

Project No: 0006-001-008 | **Orion Environmental Solutions, LLC**

ORION Environmental Solutions, LLC

FIELD BOREHOLE LOG

PROJECT: Buffalo Color Area A Extraction Well Installation		**Log of Boring No.: A-EW-7**	
BORING LOCATION: Buffalo Color Area A, Buffalo, New York		ELEVATION AND DATUM: Mean Sea Level	
DRILLING CONTRACTOR: Earth Dimensions, Inc.		DATE STARTED: 05/29/20	FINISHED: 05/29/20
DRILLING METHOD: 4.25" ID Hollow Stem Auger (then 8.25" ID for well)		TOTAL DEPTH: 35.5 fbgs	SCREEN: 13.5-33.5 fbgs
DRILLING EQUIPMENT: Dietrich D-120 Rear-Mounted Rig		DEPTH TO WATER: FIRST: 12.5 fbgs / COMPL.: 10.5 fbgs	CASING: Sch. 40 PVC
SAMPLING METHOD: Continuous split spoon sampling		LOGGED BY: BCH	
HAMMER WEIGHT: 140 pounds	DROP: 30 inches	RESPONSIBLE PROFESSIONAL: BCH	REG. NO. NY000270

Depth (fbgs)	SAMPLES: Field Sample No.	Lab Sample	Blows (per 6")	SPT N-Value	Recovery (ft)	MAX PID Scan (ppm)	SAMPLE DESCRIPTION (ASTM D 2488)	REMARKS
							USCS Classification: Color, Moisture Condition, Primary Soil Type, Secondary Soil Type (<5% Trace, 5-10% Few, 15-25% Little, 30-45% Some), Structure (varved, stratified, thinly bedded, bedded, thickly bedded, laminated, fissured, blocky, lensed, massive), Consistency/Density (Standard Penetration Test, SPT), Weathering/Fracturing, Odor, Fill Materials (if present), Other	
							SURFACE ELEVATION (FMSL): NA	
15								
16	S2		1 2 3 7	5	0.4	0.0	SILTY SAND (SM) w/ FILL, as above, wet	
17								
18	NA		NA	NA	NA	NA	*Augered to 20.0 fbgs*	
19								
20								
21	S3		7 6 2 5	8	0.8	0.0	POORLY GRADED GRAVEL w/ SILT & SAND (GP-GM): Black, wet, fine to coarse gravel, some fine to coarse sand, little non-plastic fines, loose	
22								
23	NA		NA	NA	NA	NA	*Augered to 25.0 fbgs*	
24								
25								*Slight sheen/odor*
26	S4		2 4 8 11	12	1.0	0.0	SILTY SAND (SM): Black, wet, mostly fine sand, some non-plastic fines, medium dense	
27								
28	NA		NA	NA	NA	NA	*Augered to 30.0 fbgs*	
29								

ABANDONMENT:

Volume of cement/bentonite grout required:	$V = \pi r^2 \times 7.48 =$ gallons	borehole depth =	ft.
Volume of cement/bentonite grout installed:	gallons	borehole diameter =	ft.
Has bridging of grout occurred? ☐ yes ☐ no		borehole radius =	ft.
If yes, explain resolution:			
Method of installation:			

Project No: 0006-001-008	**Orion Environmental Solutions, LLC**	

ORION Environmental Solutions, LLC

FIELD BOREHOLE LOG

PROJECT: Buffalo Color Area A Extraction Well Installation		**Log of Boring No.: A-EW-7**	
BORING LOCATION: Buffalo Color Area A, Buffalo, New York		ELEVATION AND DATUM: Mean Sea Level	
DRILLING CONTRACTOR: Earth Dimensions, Inc.		DATE STARTED: 05/29/20	FINISHED: 05/29/20
DRILLING METHOD: 4.25" ID Hollow Stem Auger (then 8.25" ID for well)		TOTAL DEPTH: 35.5 fbgs	SCREEN: 13.5-33.5 fbgs
DRILLING EQUIPMENT: Dietrich D-120 Rear-Mounted Rig		DEPTH TO WATER: FIRST: 12.5 fbgs; COMPL.: 10.5 fbgs	CASING: Sch. 40 PVC
SAMPLING METHOD: Continuous split spoon sampling		LOGGED BY: BCH	
HAMMER WEIGHT: 140 pounds	DROP: 30 inches	RESPONSIBLE PROFESSIONAL: BCH	REG. NO. NY000270

Depth (fbgs)	SAMPLES: Field Sample No.	Lab Sample	Blows (per 6")	SPT N-Value	Recovery (ft)	MAX PID Scan (ppm)	SAMPLE DESCRIPTION (ASTM D 2488)	REMARKS
							USCS Classification: Color, Moisture Condition, Primary Soil Type, Secondary Soil Type (<5% Trace, 5-10% Few, 15-25% Little, 30-45% Some), Structure (varved, stratified, thinly bedded, bedded, thickly bedded, laminated, fissured, blocky, lensed, massive), Consistency/Density (Standard Penetration Test, SPT), Weathering/Fracturing, Odor, Fill Materials (if present), Other	
							SURFACE ELEVATION (FMSL): NA	
30								
31	S5		8 24 37 53	61	1.3	0.0	SILTY SAND (SM), as above, wet, very dense	
32	NA		NA	NA	NA	NA	*Augered to 33.0 fbgs*	*Drilling quieted, suspected clay (±33.0 fbgs)*
33								
34	S6		13 5 6 5	11	1.8	58.4	0.0 - 0.3 SILTY SAND (SM), as above, wet 0.3 - 1.8 LEAN CLAY (CL): Dark grey, wet to moist, mostly medium to high plasticity fines, little fine sand, trace fine gravel, firm to stiff	*Strong petroleum-like odor, driller reported approx. 1 foot of LNAPL within boring during well installation*
35								
36	NA		NA	NA	NA	NA	*Augered to 35.5 fbgs*	*Orion observed LNAPL in cuttings*
37							*End of boring at 35.5 fbgs* *Installed 4-inch ID Schedule 40 PVE Extraction Well* *See Well Completion Detail for construction*	
38								
39								
40								
41								
42								
43								
44								

ABANDONMENT:

Volume of cement/bentonite grout required:	$V = \pi r^2 \times 7.48 =$ gallons	borehole depth =	ft.
Volume of cement/bentonite grout installed:	gallons	borehole diameter =	ft.
Has bridging of grout occurred? ☐ yes ☐ no		borehole radius =	ft.
If yes, explain resolution:			
Method of installation:			

Project No: 0006-001-008 | **Orion Environmental Solutions, LLC**

ORION Environmental Solutions, LLC

FIELD BOREHOLE LOG

PROJECT: Buffalo Color Area A Extraction Well Installation		**Log of Boring No.: A-EW-8**	
BORING LOCATION: Buffalo Color Area A, Buffalo, New York		ELEVATION AND DATUM: Mean Sea Level	
DRILLING CONTRACTOR: Earth Dimensions, Inc.		DATE STARTED: 06/01/20	FINISHED: 06/01/20
DRILLING METHOD: 4.25" ID Hollow Stem Auger (then 8.25" ID for well)		TOTAL DEPTH: 35.0 fbgs	SCREEN: 13.0-33.0 fbgs
DRILLING EQUIPMENT: Dietrich D-120 Rear-Mounted Rig		DEPTH TO WATER: FIRST: 14.0 fbgs / COMPL.: 12.0 fbgs	CASING: Sch. 40 PVC
SAMPLING METHOD: Continuous split spoon sampling		LOGGED BY: BCH	
HAMMER WEIGHT: 140 pounds	DROP: 30 inches	RESPONSIBLE PROFESSIONAL: BCH	REG. NO. NY000270

Depth (fbgs)	SAMPLES: Field Sample No.	Lab Sample	Blows (per 6")	SPT N-Value	Recovery (ft)	MAX PID Scan (ppm)	SAMPLE DESCRIPTION (ASTM D 2488)	REMARKS
							USCS Classification: Color, Moisture Condition, Primary Soil Type, Secondary Soil Type (<5% Trace, 5-10% Few, 15-25% Little, 30-45% Some), Structure (varved, stratified, thinly bedded, bedded, thickly bedded, laminated, fissured, blocky, lensed, massive), Consistency/Density (Standard Penetration Test, SPT), Weathering/Fracturing, Odor, Fill Materials (if present), Other	
							SURFACE ELEVATION (FMSL): NA	
0								
1	NA		NA	NA	NA	NA	*Augered to 10.0 fbgs* *(0-1 fbgs - cover soils with grass)*	
2								
3	NA		NA	NA	NA	NA		
4								
5	NA		NA	NA	NA	NA		
6								
7	NA		NA	NA	NA	NA		
8								
9	NA		NA	NA	NA	NA		
10								
11	S1		12 11 4 4	15	0.3	0.0	Dark grey, wet, mostly fine to medium sand, some fine gravel, little non-plastic fines, medium dense, loose when disturbed	
12								
13	NA		NA	NA	NA	NA	*Augered to 15 fbgs*	*wet @ 14.0, (observed on drill rods)*
14								

ABANDONMENT:

Volume of cement/bentonite grout required:	$V = \pi r^2 \times 7.48 =$	gallons	borehole depth = ft.
Volume of cement/bentonite grout installed:		gallons	borehole diameter = ft.
Has bridging of grout occurred? ☐ yes ☐ no			borehole radius = ft.
If yes, explain resolution:			
Method of installation:			

Project No: 0006-001-008	**Orion Environmental Solutions, LLC**	

ORION Environmental Solutions, LLC

FIELD BOREHOLE LOG

PROJECT: Buffalo Color Area A Extraction Well Installation		**Log of Boring No.: A-EW-8**	
BORING LOCATION: Buffalo Color Area A, Buffalo, New York		ELEVATION AND DATUM: Mean Sea Level	
DRILLING CONTRACTOR: Earth Dimensions, Inc.		DATE STARTED: 06/01/20	FINISHED: 06/01/20
DRILLING METHOD: 4.25" ID Hollow Stem Auger (then 8.25" ID for well)		TOTAL DEPTH: 35.0 fbgs	SCREEN: 13.0-33.0 fbgs
DRILLING EQUIPMENT: Dietrich D-120 Rear-Mounted Rig		DEPTH TO WATER: FIRST: 14.0 fbgs / COMPL.: 12.0 fbgs	CASING: Sch. 40 PVC
SAMPLING METHOD: Continuous split spoon sampling		LOGGED BY: BCH	
HAMMER WEIGHT: 140 pounds	DROP: 30 inches	RESPONSIBLE PROFESSIONAL: BCH	REG. NO. NY000270

Depth (fbgs)	SAMPLES: Field Sample No.	Lab Sample	Blows (per 6")	SPT N-Value	Recovery (ft)	MAX PID Scan (ppm)	SAMPLE DESCRIPTION (ASTM D 2488)	REMARKS
							USCS Classification: Color, Moisture Condition, Primary Soil Type, Secondary Soil Type (<5% Trace, 5-10% Few, 15-25% Little, 30-45% Some), Structure (varved, stratified, thinly bedded, bedded, thickly bedded, laminated, fissured, blocky, lensed, massive), Consistency/Density (Standard Penetration Test, SPT), Weathering/Fracturing, Odor, Fill Materials (if present), Other	
							SURFACE ELEVATION (FMSL): NA	
15								
16	S2		2 1 1 2	2	1.3	0.0	SILTY SAND (SM): Dark grey/black, wet, mostly fine to medium sand, some fine gravel, little non-plastic fines, medium dense, loose when disturbed	
17								
18	NA		NA	NA	NA	NA	*Augered to 20.0 fbgs*	
19								
20								
21	S3		6 3 3 3	6	1.1	0.0	SILTY SAND (SM), as above, dark grey, wet	
22								
23	NA		NA	NA	NA	NA	*Augered to 25.0 fbgs*	
24								
25								*Slight sheen/odor*
26	S4		4 3 2 5	5	1.3	0.0	SILTY SAND (SM), as above, dark grey, wet	
27								
28	NA		NA	NA	NA	NA	*Augered to 30.0 fbgs*	
29								

ABANDONMENT:

Volume of cement/bentonite grout required:	$V = \pi r^2 \times 7.48 =$	gallons	borehole depth = ft.
Volume of cement/bentonite grout installed:		gallons	borehole diameter = ft.
Has bridging of grout occurred? ☐ yes ☐ no			borehole radius = ft.
If yes, explain resolution:			
Method of installation:			

Project No: 0006-001-008	**Orion Environmental Solutions, LLC**	

ORION Environmental Solutions, LLC

FIELD BOREHOLE LOG

PROJECT: Buffalo Color Area A Extraction Well Installation		**Log of Boring No.: A-EW-8**	
BORING LOCATION: Buffalo Color Area A, Buffalo, New York		ELEVATION AND DATUM: Mean Sea Level	
DRILLING CONTRACTOR: Earth Dimensions, Inc.		DATE STARTED: 06/01/20	FINISHED: 06/01/20
DRILLING METHOD: 4.25" ID Hollow Stem Auger (then 8.25" ID for well)		TOTAL DEPTH: 35.0 fbgs	SCREEN: 13.0-33.0 fbgs
DRILLING EQUIPMENT: Dietrich D-120 Rear-Mounted Rig		DEPTH TO WATER: FIRST: 14.0 fbgs; COMPL.: 12.0 fbgs	CASING: Sch. 40 PVC
SAMPLING METHOD: Continuous split spoon sampling		LOGGED BY: BCH	
HAMMER WEIGHT: 140 pounds	DROP: 30 inches	RESPONSIBLE PROFESSIONAL: BCH	REG. NO. NY000270

Depth (fbgs)	SAMPLES: Field Sample No.	Lab Sample	Blows (per 6")	SPT N-Value	Recovery (ft)	MAX PID Scan (ppm)	SAMPLE DESCRIPTION (ASTM D 2488)	REMARKS
							USCS Classification: Color, Moisture Condition, Primary Soil Type, Secondary Soil Type (<5% Trace, 5-10% Few, 15-25% Little, 30-45% Some), Structure (varved, stratified, thinly bedded, bedded, thickly bedded, laminated, fissured, blocky, lensed, massive), Consistency/Density (Standard Penetration Test, SPT), Weathering/Fracturing, Odor, Fill Materials (if present), Other	
							SURFACE ELEVATION (FMSL): NA	
30								
31	S5		11 4 4 4	8	0.6	0.0	SILTY SAND (SM), as above, dark orange brown, wet	
32	NA		NA	NA	NA	NA	*Augered to 33.0 fbgs*	*Drilling quieted, suspected clay (±33.0 fbgs)*
33								
34	S6		1 1 2 3	3	1.3	0.0	LEAN CLAY (CL): Dark brown, wet to moist, mostly medium to high plasticity fines, little fine sand and fine gravel, soft to firm	
35							*End of boring at 35.0 fbgs*	
36							*Installed 4-inch ID Schedule 40 PVE Extraction Well*	
							See Well Completion Detail for construction	
37								
38								
39								
40								
41								
42								
43								
44								

ABANDONMENT:

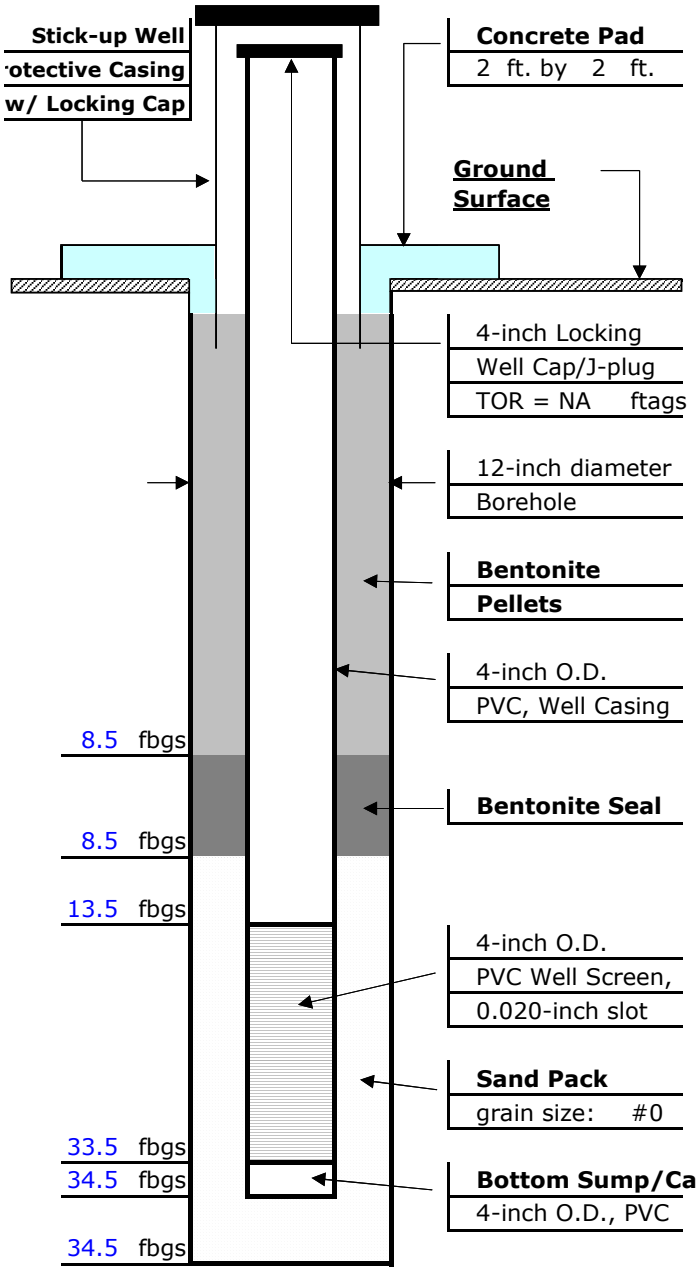
Volume of cement/bentonite grout required:	$V = \pi r^2 \times 7.48 =$ gallons	borehole depth =	ft.
Volume of cement/bentonite grout installed:	gallons	borehole diameter =	ft.
Has bridging of grout occurred? ☐ yes ☐ no		borehole radius =	ft.
If yes, explain resolution:			
Method of installation:			

Project No: 0006-001-008 | **Orion Environmental Solutions, LLC**

ORION Environmental Solutions, LLC

STICK-UP MONITORING WELL COMPLETION DETAIL

Project Name:	Buffalo Color Area A Extraction Well Installation	WELL NUMBER:	**A-EW-4A**
Client:	Inventum Engineering, PC	Date Installed:	05/28/20
Boring Location:	Buffalo Color Area A	Project Number:	0006-001-008



Driller Information

Company:	Earth Dimensions, Inc.
Driller:	Phil Benz
Helper:	Jason Kryszak
Permit Number:	*NA*
Drill Rig Type:	Dietrich D-120 Rear-Mounted Rig

Well Information

Land Surface Elevation:	NA	fmsl (approximate)
Drilling Method:	4.25 / 8.25 Hollow Stem Auger	
Soil Sample Collection Method:	continuous split spoon	
Drilling Fluid	none	
Fluid Loss During Drilling:	*0*	gallons (approximate)

Material of Well Construction

Casing:	Schedule 40 PVC
Screen:	Schedule 40 PVC
Sump:	Schedule 40 PVC
Sand Pack:	#0 sand
Annular Seal:	Medium bentonite pellets

Well Development

Well Purpose:	groundwater extraction	
Technique(s):	Venturi air-lift pump w/ compressor	
Date Completed:	06/02/20	
Orion Personnel:	BCH	
Total Volume Purge:	225	gallons
Static Water Level (SWL):	11.4	fbTOR
Pump Depth	bottom of well	
Purge Duration:	36	minutes
Yield:	10.1	gpm
Specific Capacity:	4.81	gpm/ft

Comments:

saturated thickness: SWL - stickup = 8.17 fbgs

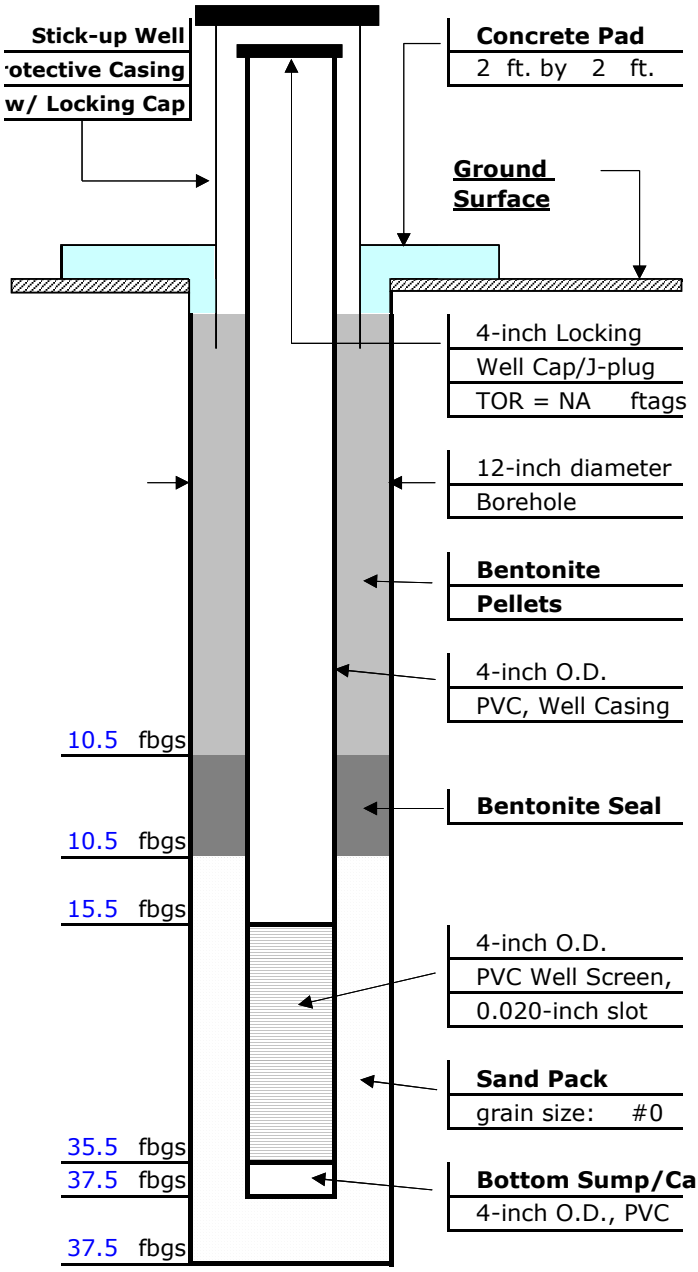
Total Depth =	37.73	fbTOR	Total Depth - SWL =	26.33	feet
stick-up =	3.23	feet			
Total Depth =	34.50	fbgs			

PREPARED BY: BCH DATE: 06/02/20

ORION Environmental Solutions, LLC

STICK-UP MONITORING WELL COMPLETION DETAIL

Project Name:	Buffalo Color Area A Extraction Well Installation	WELL NUMBER:	**A-EW-6**
Client:	Inventum Engineering, PC	Date Installed:	05/27/20
Boring Location:	Buffalo Color Area A	Project Number:	0006-001-008



Driller Information

Company:	Earth Dimensions, Inc.
Driller:	Phil Benz
Helper:	Jason Kryszak
Permit Number:	*NA*
Drill Rig Type:	Dietrich D-120 Rear-Mounted Rig

Well Information

Land Surface Elevation:	NA	fmsl (approximate)
Drilling Method:	4.25 / 8.25 Hollow Stem Auger	
Soil Sample Collection Method:	continuous split spoon	
Drilling Fluid	none	
Fluid Loss During Drilling:	*0*	gallons (approximate)

Material of Well Construction

Casing:	Schedule 40 PVC
Screen:	Schedule 40 PVC
Sump:	Schedule 40 PVC
Sand Pack:	#0 sand
Annular Seal:	Medium bentonite pellets

Well Development

Well Purpose:	groundwater extraction	
Technique(s):	Venturi air-lift pump w/ compressor	
Date Completed:	06/02/20	
Orion Personnel:	BCH	
Total Volume Purge:	250	gallons
Static Water Level (SWL):	11.8	fbTOR
Pump Depth	bottom of well	
Purge Duration:	45	minutes
Yield:	21.6	gpm
Specific Capacity:	54.00	gpm/ft

Comments:

saturated thickness: SWL - stickup = 9.30 fbgs

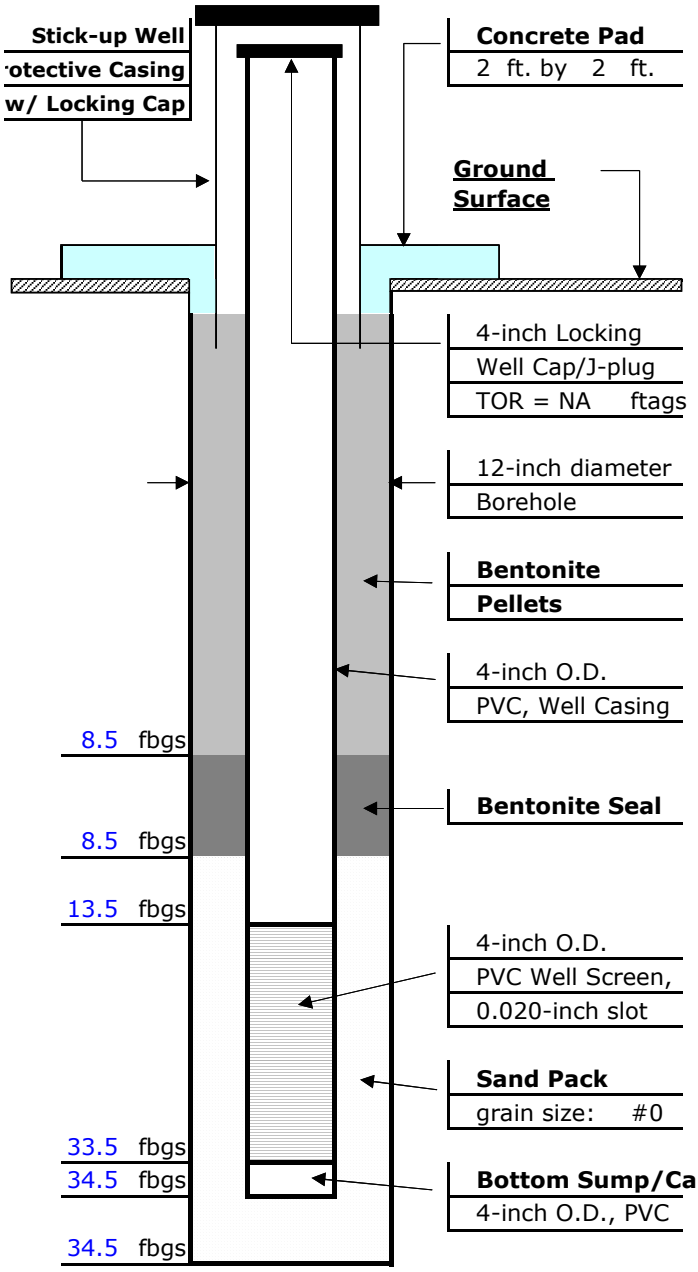
Total Depth =	40.00	fbTOR	Total Depth - SWL =	28.20	feet
stick-up =	2.50	feet			
Total Depth =	37.50	fbgs			

PREPARED BY: BCH DATE: 06/02/20

ORION Environmental Solutions, LLC

STICK-UP MONITORING WELL COMPLETION DETAIL

Project Name:	Buffalo Color Area A Extraction Well Installation	WELL NUMBER:	**A-EW-7**
Client:	Inventum Engineering, PC	Date Installed:	05/29/20
Boring Location:	Buffalo Color Area A	Project Number:	0006-001-008



Driller Information

Company:	Earth Dimensions, Inc.
Driller:	Phil Benz
Helper:	Jason Kryszak
Permit Number:	*NA*
Drill Rig Type:	Dietrich D-120 Rear-Mounted Rig

Well Information

Land Surface Elevation:	NA	fmsl (approximate)
Drilling Method:	4.25 / 8.25 Hollow Stem Auger	
Soil Sample Collection Method:	continuous split spoon	
Drilling Fluid	none	
Fluid Loss During Drilling:	*0*	gallons (approximate)

Material of Well Construction

Casing:	Schedule 40 PVC
Screen:	Schedule 40 PVC
Sump:	Schedule 40 PVC
Sand Pack:	#0 sand
Annular Seal:	Medium bentonite pellets

Well Development

Well Purpose:	groundwater extraction	
Technique(s):	Venturi air-lift pump w/ compressor	
Date Completed:	06/03/20	
Orion Personnel:	BCH	
Total Volume Purge:	375	gallons
Static Water Level (SWL):	10.5	fbTOR
Pump Depth	bottom of well	
Purge Duration:	120	minutes
Yield:	17.9	gpm
Specific Capacity:	17.90	gpm/ft

Comments:

saturated thickness: SWL - stickup = 8.15 fbgs

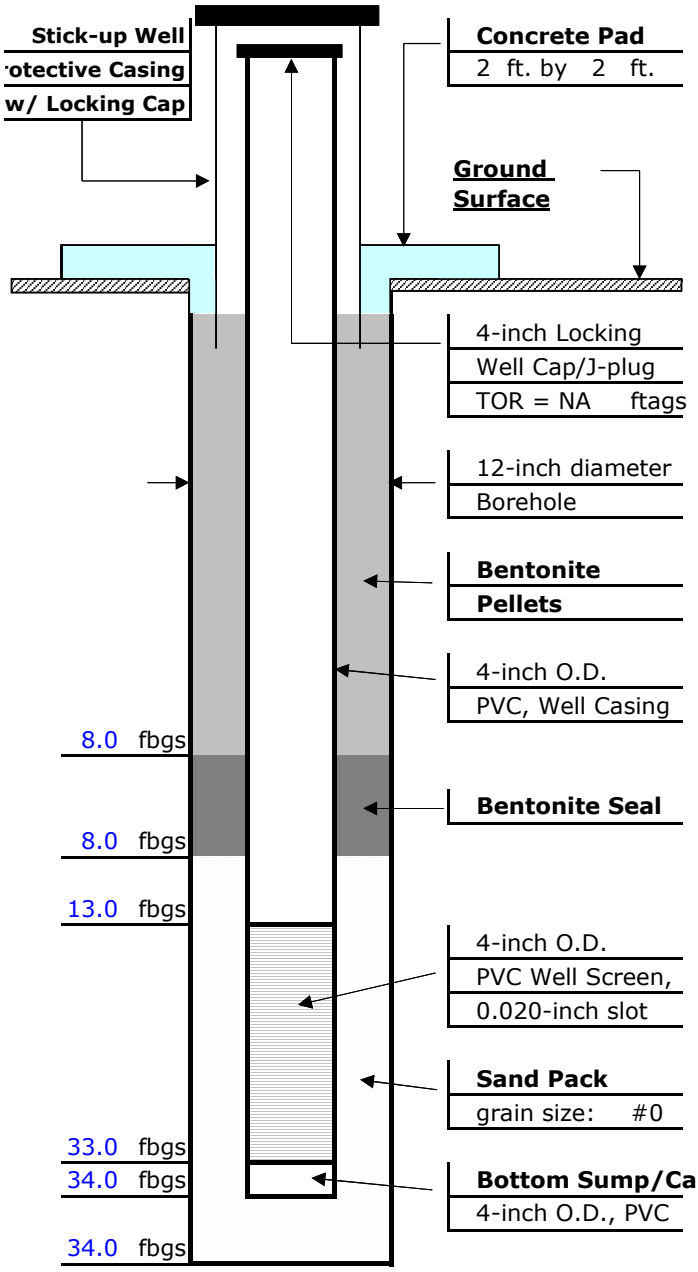
Total Depth =	36.85	fbTOR	Total Depth - SWL =	26.35	feet
stick-up =	2.35	feet			
Total Depth =	34.50	fbgs			

PREPARED BY: BCH DATE: 06/03/20

ORION Environmental Solutions, LLC

STICK-UP MONITORING WELL COMPLETION DETAIL

Project Name:	Buffalo Color Area A Extraction Well Installation	WELL NUMBER:	**A-EW-8**
Client:	Inventum Engineering, PC	Date Installed:	06/01/20
Boring Location:	Buffalo Color Area A	Project Number:	0006-001-008



Driller Information

Company:	Earth Dimensions, Inc.
Driller:	Phil Benz
Helper:	Jason Kryszak
Permit Number:	*NA*
Drill Rig Type:	Dietrich D-120 Rear-Mounted Rig

Well Information

Land Surface Elevation:	NA	fmsl (approximate)
Drilling Method:	4.25 / 8.25 Hollow Stem Auger	
Soil Sample Collection Method:	continuous split spoon	
Drilling Fluid	none	
Fluid Loss During Drilling:	*0*	gallons (approximate)

Material of Well Construction

Casing:	Schedule 40 PVC
Screen:	Schedule 40 PVC
Sump:	Schedule 40 PVC
Sand Pack:	#0 sand
Annular Seal:	Medium bentonite pellets

Well Development

Well Purpose:	groundwater extraction	
Technique(s):	Venturi air-lift pump w/ compressor	
Date Completed:	06/02/20	
Orion Personnel:	BCH	
Total Volume Purge:	200	gallons
Static Water Level (SWL):	12.0	fbTOR
Pump Depth	bottom of well	
Purge Duration:	120	minutes
Yield:	18	gpm
Specific Capacity:	45.00	gpm/ft

Comments:

saturated thickness:	SWL - stickup =	9.33	fbgs		
Total Depth =	36.67	fbTOR	Total Depth - SWL =	24.67	feet
stick-up =	2.67	feet			
Total Depth =	34.00	fbgs			

PREPARED BY: BCH DATE: 06/02/20

ORION Environmental Solutions, LLC

GROUNDWATER FIELD FORM

Project Name: Buffalo Color Area A - Extraction Well Sampling Date: 6/10/2020

Location: Buffalo, NY Project No.: 0006-001-008 Field Team: BCH

Well No. A-EW-6 | Diameter (inches): 4" | Sample Date / Time: 6/10/2020 1115

Product Depth (fbTOR): NA | Water Column (ft): 27.58 | DTW when sampled: 1301

DTW (static) (fbTOR): 12.92 | One Well Volume (gal): 18.0 | Purpose: ☐ Development ☒ Sample ☐ Purge & Sample

Total Depth (fbTOR): 40.50 | Total Volume Purged (gal): 4.0 | Purge Method: Low Flow

Time		Water Level (fbTOR)	Acc. Volume (gallons)	pH (units)	Temp. (deg. C)	SC (µS/cm)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor
1025	0	Initial	0.0	8.03	17.2	4.317	42.9	1.46	-95.8	cloudy, sulfur
1108	1	12.98	1.0	8.02	15.6	4.254	185.7	1.53	-107.7	" "
1110	2	12.98	1.5	8.02	14.6	4.111	43.2	2.08	-93.7	clear "
1113	3	12.99	3.0	8.06	15.3	3.822	94.6	1.86	-93.6	cloudy, "
	4									
	5									
	6									
	7									
	8									
	9									
	10									
Sample Information:										
1115	S1	13.01	3.0	8.05	14.8	2.004	99.6	1.62	-108.8	cloudy, sulfur
1119	S2	12.99	4.0	8.06	14.8	1.973	62.3	1.86	-95.3	" "

Well No. A-EW-4A | Diameter (inches): 4" | Sample Date / Time: 6/20/2020 1155

Product Depth (fbTOR): NA | Water Column (ft): 23.68 | DTW when sampled: 14.48

DTW (static) (fbTOR): 14.32 | One Well Volume (gal): 15.5 | Purpose: ☐ Development ☒ Sample ☐ Purge & Sample

Total Depth (fbTOR): 38.00 | Total Volume Purged (gal): 3.5 | Purge Method: Low Flow

Time		Water Level (fbTOR)	Acc. Volume (gallons)	pH (units)	Temp. (deg. C)	SC (µS/cm)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor
11:48	0	Initial	0.0	8.33	16.0	1.351	74.2	2.34	-35.5	sl cloudy, sulfur
11:51	1	14.44	1.0	8.20	14.4	1.275	56.3	3.41	-16.3	clear, "
11:52	2	14.44	1.5	8.17	13.5	1.273	40.0	2.80	-31.6	" "
11:53	3	14.45	2.0	8.19	13.2	1.267	33.3	3.03	-32.2	" "
	4									
	5									
	6									
	7									
	8									
	9									
	10									
Sample Information:										
1155	S1	14.48	3.0	8.31	14.2	1.274	19.3	3.65	-19.5	clear, sulfur
1200	S2	14.49	3.5	8.38	13.7	1.290	15.6	2.40	-60.2	" "

REMARKS:

A-EW-6: stickup = 2.50 ft, 18-36 screen

A-EW-4A: stickup = 3.23 ft;

Note: All water level measurements are in feet, distance from top of riser.

Volume Calculation

Diam.	Vol. (g/ft)
1"	0.041
2"	0.163
4"	0.653
6"	1.469

Stabilization Criteria

Parameter	Criteria
pH	± 0.1 unit
SC	± 3%
Turbidity	± 10%
DO	± 0.3 mg/L
ORP	± 10 mV

PREPARED BY: BCH

ORION Environmental Solutions, LLC

GROUNDWATER FIELD FORM

Project Name: Buffalo Color Area A - Extraction Well Sampling Date: 6/10/2020

Location: Buffalo, NY Project No.: 0006-001-008 Field Team: BCH

Well No. A-EW-8			Diameter (inches): 4"			Sample Date / Time: 6/10/2020 12:31			
Product Depth (fbTOR): NA			Water Column (ft): 23.29			DTW when sampled: 14.47			
DTW (static) (fbTOR): 14.45			One Well Volume (gal): 15.2			Purpose: ☐ Development ☒ Sample ☐ Purge & Sample			
Total Depth (fbTOR): 37.74			Total Volume Purged (gal):			Purge Method: Low Flow			

Time		Water Level (fbTOR)	Acc. Volume (gallons)	pH (units)	Temp. (deg. C)	SC (µS/m)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor
1219	0	Initial	0.0	7.53	17.7	1.095	73.8	2.68	-120.0	sl. cloudy, sulfur
1222	1	14.45	1.0	7.56	15.1	1.068	81.5	2.66	-108.7	
1227	2	14.45	2.0	7.58	14.6	1.064	55.9	3.39	-45.3	clear, "
1229	3	14.46	2.5	7.56	14.4	1.068	57.1	2.90	-105.8	" "
	4									
	5									
	6									
	7									
	8									
	9									
	10									
Sample Information:										
1231	S1	14.47	3.0	7.56	15.3	0.615	41.8	3.54	-99.1	clear, sulfur
1236	S2	14.48	4.0	7.60	15.7	1.088	33.4	3.07	-93.5	" "

Well No. A-EW-7*			Diameter (inches): 4"			Sample Date / Time: 6/10/2020 15:18			
Product Depth (fbTOR): ~~gloomer~~			Water Column (ft): 24.69			DTW when sampled: 13.15			
DTW (static) (fbTOR): 12.95			One Well Volume (gal): 16.1			Purpose: ☐ Development ☒ Sample ☐ Purge & Sample			
Total Depth (fbTOR): 37.64			Total Volume Purged (gal): 8.0			Purge Method: Low Flow			

Time		Water Level (fbTOR)	Acc. Volume (gallons)	pH (units)	Temp. (deg. C)	SC (µS/m)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor
1508	0	Initial	0.0	8.31	15.0	1.216	465.4	2.95	-135.6	turbid, sl. petro
1509	1	13.10	1.0	8.31	13.8	1.214	399.8	2.32	-141.4	" "
1511	2	13.12	1.5	8.25	13.4	1.207	272.3	2.45	-148.1	" "
1513	3	13.12	3.0	8.31	13.5	1.210	160.4	2.30	-143.7	" "
1515	4	13.12	4.0	8.29	13.5	1.213	131.3	2.72	-134.3	" "
	5									
	6									
	7									
	8									
	9									
	10									
Sample Information:										
1518	S1	13.15	6.0	8.28	14.2	1.212	85.6	2.99	-130.1	sl. turbid, petro
1523	S2	13.15	8.0	8.26	15.3	1.217	62.6	2.47	-126.0	clear, "

REMARKS:

A-EW-8: stickup = 2.67 ft

A-EW-7: stickup = 2.35 ft

* Sampled @ bottom of Screen A-EW-7A

Note: All water level measurements are in feet, distance from top of riser.

Volume Calculation

Diam.	Vol. (g/ft)
1"	0.041
2"	0.163
4"	0.653
6"	1.469

Stabilization Criteria

Parameter	Criteria
pH	± 0.1 unit
SC	± 3%
Turbidity	± 10%
DO	± 0.3 mg/L
ORP	± 10 mV

PREPARED BY: BCH

ORION Environmental Solutions, LLC

GROUNDWATER FIELD FORM

Project Name: Buffalo Color Area A - Extraction Well Sampling Date: 6/10/2020

Location: Buffalo, NY Project No.: 0006-001-008 Field Team: BCH

Well No. A-EW-7*			Diameter (inches): 4"			Sample Date / Time: 6/10/2020 15:36			
Product Depth (fbTOR): globules			Water Column (ft): 24.69			DTW when sampled: 13.14			
DTW (static) (fbTOR): 12.95			One Well Volume (gal): 16.1			Purpose: ☐ Development ☒ Sample ☐ Purge & Sample			
Total Depth (fbTOR): 37.64			Total Volume Purged (gal): 3.0			Purge Method: Low Flow			
Time	Water Level (fbTOR)	Acc. Volume (gallons)	pH (units)	Temp. (deg. C)	SC (uS) mS	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor
1532	0 Initial	0.0	8.21	15.4	1.193	27.9	3.09	-132.3	clear, petro
1533	1 13.11	1.0	8.25	14.2	1.186	23.5	2.87	-144.1	" "
1534	2 13.12	1.5	8.25	13.8	1.187	22.4	3.18	-139.0	" "
1535	3 13.13	2.0	8.26	13.9	1.174	18.2	2.90	-147.1	" "
	4								
	5								
	6								
	7								
	8								
	9								
	10								
Sample Information:									
1536	S1 13.14	2.5	8.24	13.8	1.170	16.7	2.60	-148.3	clear, petro
1539	S2 13.15	3.0	8.17	14.4	1.178	13.0	2.30	-132.9	" "

Well No.			Diameter (inches):			Sample Date / Time:			
Product Depth (fbTOR):			Water Column (ft):			DTW when sampled:			
DTW (static) (fbTOR):			One Well Volume (gal):			Purpose: ☐ Development ☐ Sample ☐ Purge & Sample			
Total Depth (fbTOR):			Total Volume Purged (gal):			Purge Method:			
Time	Water Level (fbTOR)	Acc. Volume (gallons)	pH (units)	Temp. (deg. C)	SC (uS)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor
	0 Initial								
	1								
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								
Sample Information:									
	S1								
	S2								

REMARKS:

A-EW-7: Stickup = 2.35 feet

* sampled at mid-screen (B) ~25 fbgs A-EW-7B

Note: All water level measurements are in feet, distance from top of riser.

Volume Calculation

Diam.	Vol. (g/ft)
1"	0.041
2"	0.163
4"	0.653
6"	1.469

Stabilization Criteria

Parameter	Criteria
pH	± 0.1 unit
SC	± 3%
Turbidity	± 10%
DO	± 0.3 mg/L
ORP	± 10 mV

PREPARED BY: BCH

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

PARADIGM
ENVIRONMENTAL SERVICES, INC.

CHAIN OF CUSTODY

REPORT TO:		INVOICE TO:		
CLIENT: Inventum Engineering PC		CLIENT:		LAB PROJECT ID
ADDRESS: 181 Carlisle Drive Ste 202		ADDRESS:		
CITY: Herndon STATE: VA ZIP 20170		CITY: STATE: ZIP:		Quotation #:
PHONE: (571) 217-3627		PHONE:		Email:
ATTN: Todd Waldrop		ATTN:		

PROJECT REFERENCE: Buffalo Color Area A

Matrix Codes:
AQ - Aqueous Liquid; NQ - Non-Aqueous Liquid; WA - Water; WG - Groundwater; DW - Drinking Water; WW - Wastewater; SO - Soil; SL - Sludge; SD - Solid; PT - Paint; WP - Wipe; CK - Caulk; OL - Oil; AR - Air

REQUESTED ANALYSIS

DATE COLLECTED	TIME COLLECTED	COMPOSITE	GRAB	SAMPLE IDENTIFIER	MATRIX CODES	NUMBER OF CONTAINERS	TCL VOCs 8260	TCL SVOCs 8270	TAL Metals	REMARKS	PARADIGM LAB SAMPLE NUMBER
6/10/2020	1155		X	A-EW-4A	WA	4	2	1	1		
	1115		X	A-EW-6		4	2	1	1		
	1518		X	A-EW-7A		4	2	1	1		
	1536		X	A-EW-7B		4	2	1	1		
	1231		X	A-EW-8		4	2	1	1		
				Trip Blank		2	2	1	1		

Turnaround Time		Report Supplements			
Availability contingent upon lab approval; additional fees may apply.					
Standard 5 day	X	None Required		None Required	
10 day		Batch QC		Basic EDD	
Rush 3 day		Category A		NYSDEC EDD	
Rush 2 day		Category B			
Rush 1 day					
Date Needed _____ please indicate date needed:		Other please indicate package needed:		Other EDD please indicate EDD needed :	

Sampled By — Date/Time: 6/10/2020 5:00

Relinquished By — Date/Time: 6/10/2020 5:00

Received By — Date/Time: 6-10-2020 5:00

Received @ Lab By — Date/Time

Total Cost:

P.I.F.

By signing this form, client agrees to Paradigm Terms and Conditions (reverse).

See additional page for sample conditions.

Appendix D – Laboratory Data Reports (on CD)

PARADIGM

PARADIGM
ENVIRONMENTAL SERVICES, INC

Analytical Report For

Inventum Engineering, P.C.

For Lab Project ID

202601

Referencing

Buffalo Color Area A

Prepared

Tuesday, June 23, 2020

Any noncompliant QC parameters or other notes impacting data interpretation are flagged or documented on the final report or are noted below.

Certifies that this report has been approved by the Technical Director or Designee

179 Lake Avenue • Rochester, NY 14608 • (585) 647-2530 • Fax (585) 647-3311 • ELAP ID# 10958

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-4A		
Lab Sample ID:	202601-01	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Mercury

Analyte	Result	Units	Qualifier	Date Analyzed
Mercury	< 0.000200	mg/L		6/15/2020 09:09

Method Reference(s): EPA 7470A
Preparation Date: 6/12/2020
Data File: Hg200615A

TAL Metals (ICP)

Analyte	Result	Units	Qualifier	Date Analyzed
Aluminum	**0.539**	mg/L		6/17/2020
Antimony	< 0.0600	mg/L		6/17/2020
Arsenic	< 0.0100	mg/L		6/17/2020
Barium	< 0.100	mg/L		6/17/2020
Beryllium	< 0.00500	mg/L		6/17/2020
Cadmium	< 0.00500	mg/L		6/17/2020
Calcium	**48.8**	mg/L		6/17/2020
Chromium	**0.0100**	mg/L		6/17/2020
Cobalt	< 0.0500	mg/L		6/17/2020
Copper	**0.0470**	mg/L		6/17/2020
Iron	**1.53**	mg/L		6/17/2020
Lead	< 0.0100	mg/L		6/17/2020
Magnesium	**19.1**	mg/L		6/17/2020
Manganese	**0.0240**	mg/L		6/17/2020
Nickel	< 0.0400	mg/L		6/17/2020
Potassium	**128**	mg/L		6/17/2020
Selenium	< 0.0200	mg/L		6/17/2020
Silver	< 0.0100	mg/L		6/17/2020
Sodium	**135**	mg/L		6/17/2020
Thallium	< 0.0250	mg/L		6/17/2020
Vanadium	< 0.0250	mg/L		6/17/2020

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-4A		
Lab Sample ID:	202601-01	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Zinc	< 0.0600	mg/L		6/17/2020

Method Reference(s): EPA 6010C
EPA 3005A
Preparation Date: 6/12/2020
Subcontractor ELAP ID: 10709

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed
1,1-Biphenyl	< 9.77	ug/L		6/16/2020 07:14
1,2,4,5-Tetrachlorobenzene	< 9.77	ug/L		6/16/2020 07:14
1,2,4-Trichlorobenzene	< 9.77	ug/L		6/16/2020 07:14
1,2-Dichlorobenzene	< 9.77	ug/L		6/16/2020 07:14
1,3-Dichlorobenzene	< 9.77	ug/L		6/16/2020 07:14
1,4-Dichlorobenzene	< 9.77	ug/L		6/16/2020 07:14
2,2-Oxybis (1-chloropropane)	< 9.77	ug/L		6/16/2020 07:14
2,3,4,6-Tetrachlorophenol	< 9.77	ug/L		6/16/2020 07:14
2,4,5-Trichlorophenol	< 9.77	ug/L		6/16/2020 07:14
2,4,6-Trichlorophenol	< 19.5	ug/L		6/16/2020 07:14
2,4-Dichlorophenol	< 9.77	ug/L		6/16/2020 07:14
2,4-Dimethylphenol	< 9.77	ug/L		6/16/2020 07:14
2,4-Dinitrophenol	< 19.5	ug/L		6/16/2020 07:14
2,4-Dinitrotoluene	< 9.77	ug/L		6/16/2020 07:14
2,6-Dinitrotoluene	< 9.77	ug/L		6/16/2020 07:14
2-Chloronaphthalene	< 9.77	ug/L		6/16/2020 07:14
2-Chlorophenol	< 9.77	ug/L		6/16/2020 07:14
2-Methylnapthalene	< 9.77	ug/L		6/16/2020 07:14
2-Methylphenol	< 9.77	ug/L		6/16/2020 07:14
2-Nitroaniline	< 19.5	ug/L		6/16/2020 07:14
2-Nitrophenol	< 9.77	ug/L		6/16/2020 07:14
3&4-Methylphenol	< 9.77	ug/L		6/16/2020 07:14
3,3'-Dichlorobenzidine	< 9.77	ug/L		6/16/2020 07:14
3-Nitroaniline	< 19.5	ug/L		6/16/2020 07:14

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-4A		
Lab Sample ID:	202601-01	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

4,6-Dinitro-2-methylphenol	< 19.5	ug/L	6/16/2020	07:14
4-Bromophenyl phenyl ether	< 9.77	ug/L	6/16/2020	07:14
4-Chloro-3-methylphenol	< 9.77	ug/L	6/16/2020	07:14
4-Chloroaniline	< 9.77	ug/L	6/16/2020	07:14
4-Chlorophenyl phenyl ether	< 9.77	ug/L	6/16/2020	07:14
4-Nitroaniline	< 19.5	ug/L	6/16/2020	07:14
4-Nitrophenol	< 19.5	ug/L	6/16/2020	07:14
Acenaphthene	< 9.77	ug/L	6/16/2020	07:14
Acenaphthylene	< 9.77	ug/L	6/16/2020	07:14
Acetophenone	< 9.77	ug/L	6/16/2020	07:14
Anthracene	< 9.77	ug/L	6/16/2020	07:14
Atrazine	< 9.77	ug/L	6/16/2020	07:14
Benzaldehyde	< 9.77	ug/L	6/16/2020	07:14
Benzo (a) anthracene	< 9.77	ug/L	6/16/2020	07:14
Benzo (a) pyrene	< 9.77	ug/L	6/16/2020	07:14
Benzo (b) fluoranthene	< 9.77	ug/L	6/16/2020	07:14
Benzo (g,h,i) perylene	< 9.77	ug/L	6/16/2020	07:14
Benzo (k) fluoranthene	< 9.77	ug/L	6/16/2020	07:14
Bis (2-chloroethoxy) methane	< 9.77	ug/L	6/16/2020	07:14
Bis (2-chloroethyl) ether	< 9.77	ug/L	6/16/2020	07:14
Bis (2-ethylhexyl) phthalate	< 9.77	ug/L	6/16/2020	07:14
Butylbenzylphthalate	< 9.77	ug/L	6/16/2020	07:14
Caprolactam	< 9.77	ug/L	6/16/2020	07:14
Carbazole	< 9.77	ug/L	6/16/2020	07:14
Chrysene	< 9.77	ug/L	6/16/2020	07:14
Dibenz (a,h) anthracene	< 9.77	ug/L	6/16/2020	07:14
Dibenzofuran	< 9.77	ug/L	6/16/2020	07:14
Diethyl phthalate	< 9.77	ug/L	6/16/2020	07:14
Dimethyl phthalate	< 19.5	ug/L	6/16/2020	07:14
Di-n-butyl phthalate	< 9.77	ug/L	6/16/2020	07:14

Sample Identifier:	A-EW-4A		
Lab Sample ID:	202601-01	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Di-n-octylphthalate	< 9.77	ug/L		6/16/2020 07:14
Fluoranthene	< 9.77	ug/L		6/16/2020 07:14
Fluorene	< 9.77	ug/L		6/16/2020 07:14
Hexachlorobenzene	< 9.77	ug/L		6/16/2020 07:14
Hexachlorobutadiene	< 9.77	ug/L		6/16/2020 07:14
Hexachlorocyclopentadiene	< 9.77	ug/L		6/16/2020 07:14
Hexachloroethane	< 9.77	ug/L		6/16/2020 07:14
Indeno (1,2,3-cd) pyrene	< 9.77	ug/L		6/16/2020 07:14
Isophorone	< 9.77	ug/L		6/16/2020 07:14
Naphthalene	< 9.77	ug/L		6/16/2020 07:14
Nitrobenzene	< 9.77	ug/L		6/16/2020 07:14
N-Nitroso-di-n-propylamine	< 9.77	ug/L		6/16/2020 07:14
N-Nitrosodiphenylamine	< 9.77	ug/L		6/16/2020 07:14
Pentachlorophenol	< 19.5	ug/L		6/16/2020 07:14
Phenanthrene	< 9.77	ug/L		6/16/2020 07:14
Phenol	< 9.77	ug/L		6/16/2020 07:14
Pyrene	< 9.77	ug/L		6/16/2020 07:14

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
2,4,6-Tribromophenol	**85.1**	61.4 - 115		6/16/2020 07:14
2-Fluorobiphenyl	**73.0**	38.4 - 101		6/16/2020 07:14
2-Fluorophenol	**41.0**	12.7 - 105		6/16/2020 07:14
Nitrobenzene-d5	**83.7**	57.3 - 100		6/16/2020 07:14
Phenol-d5	**27.6**	10 - 107		6/16/2020 07:14
Terphenyl-d14	**84.6**	58.1 - 117		6/16/2020 07:14

Method Reference(s): EPA 8270D
EPA 3510C
Preparation Date: 6/15/2020
Data File: B47130.D

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed
1,1,1-Trichloroethane	< 2.00	ug/L		6/16/2020 17:46

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-4A		
Lab Sample ID:	202601-01	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

1,1,2,2-Tetrachloroethane	< 2.00	ug/L	6/16/2020	17:46
1,1,2-Trichloroethane	< 2.00	ug/L	6/16/2020	17:46
1,1-Dichloroethane	< 2.00	ug/L	6/16/2020	17:46
1,1-Dichloroethene	< 2.00	ug/L	6/16/2020	17:46
1,2,3-Trichlorobenzene	< 5.00	ug/L	6/16/2020	17:46
1,2,4-Trichlorobenzene	< 5.00	ug/L	6/16/2020	17:46
1,2-Dibromo-3-Chloropropane	< 10.0	ug/L	6/16/2020	17:46
1,2-Dibromoethane	< 2.00	ug/L	6/16/2020	17:46
1,2-Dichlorobenzene	< 2.00	ug/L	6/16/2020	17:46
1,2-Dichloroethane	< 2.00	ug/L	6/16/2020	17:46
1,2-Dichloropropane	< 2.00	ug/L	6/16/2020	17:46
1,3-Dichlorobenzene	< 2.00	ug/L	6/16/2020	17:46
1,4-Dichlorobenzene	< 2.00	ug/L	6/16/2020	17:46
1,4-Dioxane	< 20.0	ug/L	6/16/2020	17:46
2-Butanone	< 10.0	ug/L	6/16/2020	17:46
2-Hexanone	< 5.00	ug/L	6/16/2020	17:46
4-Methyl-2-pentanone	< 5.00	ug/L	6/16/2020	17:46
Acetone	< 10.0	ug/L	6/16/2020	17:46
Benzene	< 1.00	ug/L	6/16/2020	17:46
Bromochloromethane	< 5.00	ug/L	6/16/2020	17:46
Bromodichloromethane	< 2.00	ug/L	6/16/2020	17:46
Bromoform	< 5.00	ug/L	6/16/2020	17:46
Bromomethane	< 2.00	ug/L	6/16/2020	17:46
Carbon disulfide	< 2.00	ug/L	6/16/2020	17:46
Carbon Tetrachloride	< 2.00	ug/L	6/16/2020	17:46
Chlorobenzene	< 2.00	ug/L	6/16/2020	17:46
Chloroethane	< 2.00	ug/L	6/16/2020	17:46
Chloroform	< 2.00	ug/L	6/16/2020	17:46
Chloromethane	< 2.00	ug/L	6/16/2020	17:46
cis-1,2-Dichloroethene	< 2.00	ug/L	6/16/2020	17:46

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-4A		
Lab Sample ID:	202601-01	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

cis-1,3-Dichloropropene	< 2.00	ug/L	6/16/2020	17:46
Cyclohexane	< 10.0	ug/L	6/16/2020	17:46
Dibromochloromethane	< 2.00	ug/L	6/16/2020	17:46
Dichlorodifluoromethane	< 2.00	ug/L	6/16/2020	17:46
Ethylbenzene	< 2.00	ug/L	6/16/2020	17:46
Freon 113	< 2.00	ug/L	6/16/2020	17:46
Isopropylbenzene	< 2.00	ug/L	6/16/2020	17:46
m,p-Xylene	< 2.00	ug/L	6/16/2020	17:46
Methyl acetate	< 2.00	ug/L	6/16/2020	17:46
Methyl tert-butyl Ether	< 2.00	ug/L	6/16/2020	17:46
Methylcyclohexane	< 2.00	ug/L	6/16/2020	17:46
Methylene chloride	< 5.00	ug/L	6/16/2020	17:46
o-Xylene	< 2.00	ug/L	6/16/2020	17:46
Styrene	< 5.00	ug/L	6/16/2020	17:46
Tetrachloroethene	< 2.00	ug/L	6/16/2020	17:46
Toluene	< 2.00	ug/L	6/16/2020	17:46
trans-1,2-Dichloroethene	< 2.00	ug/L	6/16/2020	17:46
trans-1,3-Dichloropropene	< 2.00	ug/L	6/16/2020	17:46
Trichloroethene	< 2.00	ug/L	6/16/2020	17:46
Trichlorofluoromethane	< 2.00	ug/L	6/16/2020	17:46
Vinyl chloride	< 2.00	ug/L	6/16/2020	17:46

Surrogate	**Percent Recovery**	**Limits**	**Outliers**	**Date Analyzed**	
1,2-Dichloroethane-d4	**132**	80.8 - 132		6/16/2020	17:46
4-Bromofluorobenzene	**86.6**	56.6 - 130		6/16/2020	17:46
Pentafluorobenzene	**97.6**	87.4 - 113		6/16/2020	17:46
Toluene-D8	**94.0**	82.2 - 115		6/16/2020	17:46

Method Reference(s): EPA 8260C
EPA 5030C

Data File: x71008.D

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-6		
Lab Sample ID:	202601-02	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Mercury

Analyte	Result	Units	Qualifier	Date Analyzed
Mercury	< 0.000200	mg/L		6/15/2020 09:11

Method Reference(s): EPA 7470A
Preparation Date: 6/12/2020
Data File: Hg200615A

TAL Metals (ICP)

Analyte	Result	Units	Qualifier	Date Analyzed
Aluminum	**1.55**	mg/L		6/17/2020
Antimony	< 0.0600	mg/L		6/17/2020
Arsenic	**0.0430**	mg/L		6/17/2020
Barium	**0.137**	mg/L		6/17/2020
Beryllium	< 0.00500	mg/L		6/17/2020
Cadmium	< 0.00500	mg/L		6/17/2020
Calcium	**41.6**	mg/L		6/17/2020
Chromium	< 0.0100	mg/L		6/17/2020
Cobalt	< 0.0500	mg/L		6/17/2020
Copper	**0.0330**	mg/L		6/17/2020
Iron	**3.69**	mg/L		6/17/2020
Lead	**0.0270**	mg/L		6/17/2020
Magnesium	**32.0**	mg/L		6/17/2020
Manganese	**0.111**	mg/L		6/17/2020
Nickel	< 0.0400	mg/L		6/17/2020
Potassium	**211**	mg/L		6/17/2020
Selenium	< 0.0200	mg/L		6/17/2020
Silver	< 0.0100	mg/L		6/17/2020
Sodium	**552**	mg/L		6/22/2020
Thallium	< 0.0250	mg/L		6/17/2020
Vanadium	< 0.0250	mg/L		6/17/2020

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-6		
Lab Sample ID:	202601-02	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Zinc	**0.102**	mg/L	6/17/2020

Method Reference(s): EPA 6010C
EPA 3005A
Preparation Date: 6/12/2020
Subcontractor ELAP ID: 10709

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed
1,1-Biphenyl	< 97.4	ug/L		6/16/2020 16:59
1,2,4,5-Tetrachlorobenzene	< 97.4	ug/L		6/16/2020 16:59
1,2,4-Trichlorobenzene	< 97.4	ug/L		6/16/2020 16:59
1,2-Dichlorobenzene	< 97.4	ug/L		6/16/2020 16:59
1,3-Dichlorobenzene	< 97.4	ug/L		6/16/2020 16:59
1,4-Dichlorobenzene	< 97.4	ug/L		6/16/2020 16:59
2,2-Oxybis (1-chloropropane)	< 97.4	ug/L		6/16/2020 16:59
2,3,4,6-Tetrachlorophenol	< 97.4	ug/L		6/16/2020 16:59
2,4,5-Trichlorophenol	< 97.4	ug/L		6/16/2020 16:59
2,4,6-Trichlorophenol	< 195	ug/L		6/16/2020 16:59
2,4-Dichlorophenol	< 97.4	ug/L		6/16/2020 16:59
2,4-Dimethylphenol	< 97.4	ug/L		6/16/2020 16:59
2,4-Dinitrophenol	< 195	ug/L		6/16/2020 16:59
2,4-Dinitrotoluene	< 97.4	ug/L		6/16/2020 16:59
2,6-Dinitrotoluene	< 97.4	ug/L		6/16/2020 16:59
2-Chloronaphthalene	< 97.4	ug/L		6/16/2020 16:59
2-Chlorophenol	< 97.4	ug/L		6/16/2020 16:59
2-Methylnapthalene	< 97.4	ug/L		6/16/2020 16:59
2-Methylphenol	< 97.4	ug/L		6/16/2020 16:59
2-Nitroaniline	< 195	ug/L		6/16/2020 16:59
2-Nitrophenol	< 97.4	ug/L		6/16/2020 16:59
3&4-Methylphenol	< 97.4	ug/L		6/16/2020 16:59
3,3'-Dichlorobenzidine	< 97.4	ug/L		6/16/2020 16:59
3-Nitroaniline	< 195	ug/L		6/16/2020 16:59

Sample Identifier:	A-EW-6		
Lab Sample ID:	202601-02	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

4,6-Dinitro-2-methylphenol	< 195	ug/L	6/16/2020	16:59
4-Bromophenyl phenyl ether	< 97.4	ug/L	6/16/2020	16:59
4-Chloro-3-methylphenol	< 97.4	ug/L	6/16/2020	16:59
4-Chloroaniline	**763**	ug/L	6/16/2020	16:59
4-Chlorophenyl phenyl ether	< 97.4	ug/L	6/16/2020	16:59
4-Nitroaniline	< 195	ug/L	6/16/2020	16:59
4-Nitrophenol	< 195	ug/L	6/16/2020	16:59
Acenaphthene	< 97.4	ug/L	6/16/2020	16:59
Acenaphthylene	< 97.4	ug/L	6/16/2020	16:59
Acetophenone	< 97.4	ug/L	6/16/2020	16:59
Anthracene	< 97.4	ug/L	6/16/2020	16:59
Atrazine	< 97.4	ug/L	6/16/2020	16:59
Benzaldehyde	< 97.4	ug/L	6/16/2020	16:59
Benzo (a) anthracene	< 97.4	ug/L	6/16/2020	16:59
Benzo (a) pyrene	< 97.4	ug/L	6/16/2020	16:59
Benzo (b) fluoranthene	< 97.4	ug/L	6/16/2020	16:59
Benzo (g,h,i) perylene	< 97.4	ug/L	6/16/2020	16:59
Benzo (k) fluoranthene	< 97.4	ug/L	6/16/2020	16:59
Bis (2-chloroethoxy) methane	< 97.4	ug/L	6/16/2020	16:59
Bis (2-chloroethyl) ether	< 97.4	ug/L	6/16/2020	16:59
Bis (2-ethylhexyl) phthalate	< 97.4	ug/L	6/16/2020	16:59
Butylbenzylphthalate	< 97.4	ug/L	6/16/2020	16:59
Caprolactam	< 97.4	ug/L	6/16/2020	16:59
Carbazole	< 97.4	ug/L	6/16/2020	16:59
Chrysene	< 97.4	ug/L	6/16/2020	16:59
Dibenz (a,h) anthracene	< 97.4	ug/L	6/16/2020	16:59
Dibenzofuran	< 97.4	ug/L	6/16/2020	16:59
Diethyl phthalate	< 97.4	ug/L	6/16/2020	16:59
Dimethyl phthalate	< 195	ug/L	6/16/2020	16:59
Di-n-butyl phthalate	< 97.4	ug/L	6/16/2020	16:59

Sample Identifier:	A-EW-6		
Lab Sample ID:	202601-02	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Di-n-octylphthalate	< 97.4	ug/L		6/16/2020 16:59
Fluoranthene	< 97.4	ug/L		6/16/2020 16:59
Fluorene	< 97.4	ug/L		6/16/2020 16:59
Hexachlorobenzene	< 97.4	ug/L		6/16/2020 16:59
Hexachlorobutadiene	< 97.4	ug/L		6/16/2020 16:59
Hexachlorocyclopentadiene	< 97.4	ug/L		6/16/2020 16:59
Hexachloroethane	< 97.4	ug/L		6/16/2020 16:59
Indeno (1,2,3-cd) pyrene	< 97.4	ug/L		6/16/2020 16:59
Isophorone	< 97.4	ug/L		6/16/2020 16:59
Naphthalene	< 97.4	ug/L		6/16/2020 16:59
Nitrobenzene	< 97.4	ug/L		6/16/2020 16:59
N-Nitroso-di-n-propylamine	< 97.4	ug/L		6/16/2020 16:59
N-Nitrosodiphenylamine	< 97.4	ug/L		6/16/2020 16:59
Pentachlorophenol	< 195	ug/L		6/16/2020 16:59
Phenanthrene	< 97.4	ug/L		6/16/2020 16:59
Phenol	< 97.4	ug/L		6/16/2020 16:59
Pyrene	< 97.4	ug/L		6/16/2020 16:59

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
2,4,6-Tribromophenol	NC	61.4 - 115		6/16/2020 16:59
2-Fluorobiphenyl	NC	38.4 - 101		6/16/2020 16:59
2-Fluorophenol	NC	12.7 - 105		6/16/2020 16:59
Nitrobenzene-d5	NC	57.3 - 100		6/16/2020 16:59
Phenol-d5	NC	10 - 107		6/16/2020 16:59
Terphenyl-d14	NC	58.1 - 117		6/16/2020 16:59

Method Reference(s): EPA 8270D
EPA 3510C
Preparation Date: 6/15/2020
Data File: B47160.D

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed
1,1,1-Trichloroethane	< 200	ug/L		6/17/2020 14:25

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-6		
Lab Sample ID:	202601-02	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

1,1,2,2-Tetrachloroethane	< 200	ug/L	6/17/2020	14:25
1,1,2-Trichloroethane	< 200	ug/L	6/17/2020	14:25
1,1-Dichloroethane	< 200	ug/L	6/17/2020	14:25
1,1-Dichloroethene	< 200	ug/L	6/17/2020	14:25
1,2,3-Trichlorobenzene	< 500	ug/L	6/17/2020	14:25
1,2,4-Trichlorobenzene	< 500	ug/L	6/17/2020	14:25
1,2-Dibromo-3-Chloropropane	< 1000	ug/L	6/17/2020	14:25
1,2-Dibromoethane	< 200	ug/L	6/17/2020	14:25
1,2-Dichlorobenzene	< 200	ug/L	6/17/2020	14:25
1,2-Dichloroethane	< 200	ug/L	6/17/2020	14:25
1,2-Dichloropropane	< 200	ug/L	6/17/2020	14:25
1,3-Dichlorobenzene	< 200	ug/L	6/17/2020	14:25
1,4-Dichlorobenzene	< 200	ug/L	6/17/2020	14:25
1,4-Dioxane	< 2000	ug/L	6/17/2020	14:25
2-Butanone	< 1000	ug/L	6/17/2020	14:25
2-Hexanone	< 500	ug/L	6/17/2020	14:25
4-Methyl-2-pentanone	< 500	ug/L	6/17/2020	14:25
Acetone	< 1000	ug/L	6/17/2020	14:25
Benzene	**1500**	ug/L	6/17/2020	14:25
Bromochloromethane	< 500	ug/L	6/17/2020	14:25
Bromodichloromethane	< 200	ug/L	6/17/2020	14:25
Bromoform	< 500	ug/L	6/17/2020	14:25
Bromomethane	< 200	ug/L	6/17/2020	14:25
Carbon disulfide	< 200	ug/L	6/17/2020	14:25
Carbon Tetrachloride	< 200	ug/L	6/17/2020	14:25
Chlorobenzene	**8490**	ug/L	6/17/2020	14:25
Chloroethane	< 200	ug/L	6/17/2020	14:25
Chloroform	< 200	ug/L	6/17/2020	14:25
Chloromethane	< 200	ug/L	6/17/2020	14:25
cis-1,2-Dichloroethene	< 200	ug/L	6/17/2020	14:25

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-6		
Lab Sample ID:	202601-02	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

cis-1,3-Dichloropropene	< 200	ug/L	6/17/2020	14:25
Cyclohexane	< 1000	ug/L	6/17/2020	14:25
Dibromochloromethane	< 200	ug/L	6/17/2020	14:25
Dichlorodifluoromethane	< 200	ug/L	6/17/2020	14:25
Ethylbenzene	< 200	ug/L	6/17/2020	14:25
Freon 113	< 200	ug/L	6/17/2020	14:25
Isopropylbenzene	< 200	ug/L	6/17/2020	14:25
m,p-Xylene	< 200	ug/L	6/17/2020	14:25
Methyl acetate	< 200	ug/L	6/17/2020	14:25
Methyl tert-butyl Ether	< 200	ug/L	6/17/2020	14:25
Methylcyclohexane	< 200	ug/L	6/17/2020	14:25
Methylene chloride	< 500	ug/L	6/17/2020	14:25
o-Xylene	< 200	ug/L	6/17/2020	14:25
Styrene	< 500	ug/L	6/17/2020	14:25
Tetrachloroethene	< 200	ug/L	6/17/2020	14:25
Toluene	< 200	ug/L	6/17/2020	14:25
trans-1,2-Dichloroethene	< 200	ug/L	6/17/2020	14:25
trans-1,3-Dichloropropene	< 200	ug/L	6/17/2020	14:25
Trichloroethene	< 200	ug/L	6/17/2020	14:25
Trichlorofluoromethane	< 200	ug/L	6/17/2020	14:25
Vinyl chloride	< 200	ug/L	6/17/2020	14:25

Surrogate	**Percent Recovery**	**Limits**	**Outliers**	**Date Analyzed**	
1,2-Dichloroethane-d4	**140**	80.8 - 132	*	6/17/2020	14:25
4-Bromofluorobenzene	**97.8**	56.6 - 130		6/17/2020	14:25
Pentafluorobenzene	**103**	87.4 - 113		6/17/2020	14:25
Toluene-D8	**122**	82.2 - 115	*	6/17/2020	14:25

Method Reference(s): EPA 8260C
EPA 5030C

Data File: x71032.D

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-7A		
Lab Sample ID:	202601-03	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Mercury

Analyte	Result	Units	Qualifier	Date Analyzed
Mercury	< 0.000200	mg/L		6/15/2020 09:13

Method Reference(s): EPA 7470A
Preparation Date: 6/12/2020
Data File: Hg200615A

TAL Metals (ICP)

Analyte	Result	Units	Qualifier	Date Analyzed
Aluminum	**0.954**	mg/L		6/17/2020
Antimony	< 0.0600	mg/L		6/17/2020
Arsenic	< 0.0100	mg/L		6/17/2020
Barium	< 0.100	mg/L		6/17/2020
Beryllium	< 0.00500	mg/L		6/17/2020
Cadmium	< 0.00500	mg/L		6/17/2020
Calcium	**34.4**	mg/L		6/17/2020
Chromium	< 0.0100	mg/L		6/17/2020
Cobalt	< 0.0500	mg/L		6/17/2020
Copper	**0.0430**	mg/L		6/17/2020
Iron	**2.21**	mg/L		6/17/2020
Lead	**0.0260**	mg/L		6/17/2020
Magnesium	**18.2**	mg/L		6/17/2020
Manganese	**0.0370**	mg/L		6/17/2020
Nickel	< 0.0400	mg/L		6/17/2020
Potassium	**88.0**	mg/L		6/17/2020
Selenium	< 0.0200	mg/L		6/17/2020
Silver	< 0.0100	mg/L		6/17/2020
Sodium	**187**	mg/L		6/17/2020
Thallium	< 0.0250	mg/L		6/17/2020
Vanadium	< 0.0250	mg/L		6/17/2020

Sample Identifier:	A-EW-7A		
Lab Sample ID:	202601-03	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Zinc	**0.0860**	mg/L		6/17/2020

Method Reference(s): EPA 6010C
EPA 3005A
Preparation Date: 6/12/2020
Subcontractor ELAP ID: 10709

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed
1,1-Biphenyl	< 98.5	ug/L		6/16/2020 17:28
1,2,4,5-Tetrachlorobenzene	< 98.5	ug/L		6/16/2020 17:28
1,2,4-Trichlorobenzene	< 98.5	ug/L		6/16/2020 17:28
1,2-Dichlorobenzene	< 98.5	ug/L		6/16/2020 17:28
1,3-Dichlorobenzene	< 98.5	ug/L		6/16/2020 17:28
1,4-Dichlorobenzene	< 98.5	ug/L		6/16/2020 17:28
2,2-Oxybis (1-chloropropane)	< 98.5	ug/L		6/16/2020 17:28
2,3,4,6-Tetrachlorophenol	< 98.5	ug/L		6/16/2020 17:28
2,4,5-Trichlorophenol	< 98.5	ug/L		6/16/2020 17:28
2,4,6-Trichlorophenol	< 197	ug/L		6/16/2020 17:28
2,4-Dichlorophenol	< 98.5	ug/L		6/16/2020 17:28
2,4-Dimethylphenol	< 98.5	ug/L		6/16/2020 17:28
2,4-Dinitrophenol	< 197	ug/L		6/16/2020 17:28
2,4-Dinitrotoluene	< 98.5	ug/L		6/16/2020 17:28
2,6-Dinitrotoluene	< 98.5	ug/L		6/16/2020 17:28
2-Chloronaphthalene	< 98.5	ug/L		6/16/2020 17:28
2-Chlorophenol	< 98.5	ug/L		6/16/2020 17:28
2-Methylnapthalene	< 98.5	ug/L		6/16/2020 17:28
2-Methylphenol	< 98.5	ug/L		6/16/2020 17:28
2-Nitroaniline	< 197	ug/L		6/16/2020 17:28
2-Nitrophenol	< 98.5	ug/L		6/16/2020 17:28
3&4-Methylphenol	< 98.5	ug/L		6/16/2020 17:28
3,3'-Dichlorobenzidine	< 98.5	ug/L		6/16/2020 17:28
3-Nitroaniline	< 197	ug/L		6/16/2020 17:28

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-7A		
Lab Sample ID:	202601-03	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

4,6-Dinitro-2-methylphenol	< 197	ug/L	6/16/2020	17:28
4-Bromophenyl phenyl ether	< 98.5	ug/L	6/16/2020	17:28
4-Chloro-3-methylphenol	< 98.5	ug/L	6/16/2020	17:28
4-Chloroaniline	< 98.5	ug/L	6/16/2020	17:28
4-Chlorophenyl phenyl ether	< 98.5	ug/L	6/16/2020	17:28
4-Nitroaniline	< 197	ug/L	6/16/2020	17:28
4-Nitrophenol	< 197	ug/L	6/16/2020	17:28
Acenaphthene	**148**	ug/L	6/16/2020	17:28
Acenaphthylene	< 98.5	ug/L	6/16/2020	17:28
Acetophenone	< 98.5	ug/L	6/16/2020	17:28
Anthracene	< 98.5	ug/L	6/16/2020	17:28
Atrazine	< 98.5	ug/L	6/16/2020	17:28
Benzaldehyde	< 98.5	ug/L	6/16/2020	17:28
Benzo (a) anthracene	< 98.5	ug/L	6/16/2020	17:28
Benzo (a) pyrene	< 98.5	ug/L	6/16/2020	17:28
Benzo (b) fluoranthene	< 98.5	ug/L	6/16/2020	17:28
Benzo (g,h,i) perylene	< 98.5	ug/L	6/16/2020	17:28
Benzo (k) fluoranthene	< 98.5	ug/L	6/16/2020	17:28
Bis (2-chloroethoxy) methane	< 98.5	ug/L	6/16/2020	17:28
Bis (2-chloroethyl) ether	< 98.5	ug/L	6/16/2020	17:28
Bis (2-ethylhexyl) phthalate	< 98.5	ug/L	6/16/2020	17:28
Butylbenzylphthalate	< 98.5	ug/L	6/16/2020	17:28
Caprolactam	< 98.5	ug/L	6/16/2020	17:28
Carbazole	< 98.5	ug/L	6/16/2020	17:28
Chrysene	< 98.5	ug/L	6/16/2020	17:28
Dibenz (a,h) anthracene	< 98.5	ug/L	6/16/2020	17:28
Dibenzofuran	**141**	ug/L	6/16/2020	17:28
Diethyl phthalate	< 98.5	ug/L	6/16/2020	17:28
Dimethyl phthalate	< 197	ug/L	6/16/2020	17:28
Di-n-butyl phthalate	< 98.5	ug/L	6/16/2020	17:28

Sample Identifier:	A-EW-7A		
Lab Sample ID:	202601-03	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Di-n-octylphthalate	< 98.5	ug/L	6/16/2020	17:28
Fluoranthene	< 98.5	ug/L	6/16/2020	17:28
Fluorene	**112**	ug/L	6/16/2020	17:28
Hexachlorobenzene	< 98.5	ug/L	6/16/2020	17:28
Hexachlorobutadiene	< 98.5	ug/L	6/16/2020	17:28
Hexachlorocyclopentadiene	< 98.5	ug/L	6/16/2020	17:28
Hexachloroethane	< 98.5	ug/L	6/16/2020	17:28
Indeno (1,2,3-cd) pyrene	< 98.5	ug/L	6/16/2020	17:28
Isophorone	< 98.5	ug/L	6/16/2020	17:28
Naphthalene	**1060**	ug/L	6/16/2020	17:28
Nitrobenzene	< 98.5	ug/L	6/16/2020	17:28
N-Nitroso-di-n-propylamine	< 98.5	ug/L	6/16/2020	17:28
N-Nitrosodiphenylamine	< 98.5	ug/L	6/16/2020	17:28
Pentachlorophenol	< 197	ug/L	6/16/2020	17:28
Phenanthrene	**117**	ug/L	6/16/2020	17:28
Phenol	< 98.5	ug/L	6/16/2020	17:28
Pyrene	< 98.5	ug/L	6/16/2020	17:28

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
2,4,6-Tribromophenol	NC	61.4 - 115		6/16/2020	17:28
2-Fluorobiphenyl	NC	38.4 - 101		6/16/2020	17:28
2-Fluorophenol	NC	12.7 - 105		6/16/2020	17:28
Nitrobenzene-d5	NC	57.3 - 100		6/16/2020	17:28
Phenol-d5	NC	10 - 107		6/16/2020	17:28
Terphenyl-d14	NC	58.1 - 117		6/16/2020	17:28

Method Reference(s): EPA 8270D
EPA 3510C
Preparation Date: 6/15/2020
Data File: B47161.D

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed	
1,1,1-Trichloroethane	< 20.0	ug/L		6/16/2020	19:16

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-7A		
Lab Sample ID:	202601-03	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

1,1,2,2-Tetrachloroethane	< 20.0	ug/L	6/16/2020	19:16
1,1,2-Trichloroethane	< 20.0	ug/L	6/16/2020	19:16
1,1-Dichloroethane	< 20.0	ug/L	6/16/2020	19:16
1,1-Dichloroethene	< 20.0	ug/L	6/16/2020	19:16
1,2,3-Trichlorobenzene	< 50.0	ug/L	6/16/2020	19:16
1,2,4-Trichlorobenzene	< 50.0	ug/L	6/16/2020	19:16
1,2-Dibromo-3-Chloropropane	< 100	ug/L	6/16/2020	19:16
1,2-Dibromoethane	< 20.0	ug/L	6/16/2020	19:16
1,2-Dichlorobenzene	< 20.0	ug/L	6/16/2020	19:16
1,2-Dichloroethane	< 20.0	ug/L	6/16/2020	19:16
1,2-Dichloropropane	< 20.0	ug/L	6/16/2020	19:16
1,3-Dichlorobenzene	< 20.0	ug/L	6/16/2020	19:16
1,4-Dichlorobenzene	< 20.0	ug/L	6/16/2020	19:16
1,4-Dioxane	< 200	ug/L	6/16/2020	19:16
2-Butanone	< 100	ug/L	6/16/2020	19:16
2-Hexanone	< 50.0	ug/L	6/16/2020	19:16
4-Methyl-2-pentanone	< 50.0	ug/L	6/16/2020	19:16
Acetone	< 100	ug/L	6/16/2020	19:16
Benzene	< 10.0	ug/L	6/16/2020	19:16
Bromochloromethane	< 50.0	ug/L	6/16/2020	19:16
Bromodichloromethane	< 20.0	ug/L	6/16/2020	19:16
Bromoform	< 50.0	ug/L	6/16/2020	19:16
Bromomethane	< 20.0	ug/L	6/16/2020	19:16
Carbon disulfide	< 20.0	ug/L	6/16/2020	19:16
Carbon Tetrachloride	< 20.0	ug/L	6/16/2020	19:16
Chlorobenzene	< 20.0	ug/L	6/16/2020	19:16
Chloroethane	< 20.0	ug/L	6/16/2020	19:16
Chloroform	< 20.0	ug/L	6/16/2020	19:16
Chloromethane	< 20.0	ug/L	6/16/2020	19:16
cis-1,2-Dichloroethene	< 20.0	ug/L	6/16/2020	19:16

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-7A		
Lab Sample ID:	202601-03	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

cis-1,3-Dichloropropene	< 20.0	ug/L	6/16/2020	19:16
Cyclohexane	< 100	ug/L	6/16/2020	19:16
Dibromochloromethane	< 20.0	ug/L	6/16/2020	19:16
Dichlorodifluoromethane	< 20.0	ug/L	6/16/2020	19:16
Ethylbenzene	< 20.0	ug/L	6/16/2020	19:16
Freon 113	< 20.0	ug/L	6/16/2020	19:16
Isopropylbenzene	< 20.0	ug/L	6/16/2020	19:16
m,p-Xylene	< 20.0	ug/L	6/16/2020	19:16
Methyl acetate	< 20.0	ug/L	6/16/2020	19:16
Methyl tert-butyl Ether	< 20.0	ug/L	6/16/2020	19:16
Methylcyclohexane	< 20.0	ug/L	6/16/2020	19:16
Methylene chloride	< 50.0	ug/L	6/16/2020	19:16
o-Xylene	< 20.0	ug/L	6/16/2020	19:16
Styrene	< 50.0	ug/L	6/16/2020	19:16
Tetrachloroethene	< 20.0	ug/L	6/16/2020	19:16
Toluene	< 20.0	ug/L	6/16/2020	19:16
trans-1,2-Dichloroethene	< 20.0	ug/L	6/16/2020	19:16
trans-1,3-Dichloropropene	< 20.0	ug/L	6/16/2020	19:16
Trichloroethene	< 20.0	ug/L	6/16/2020	19:16
Trichlorofluoromethane	< 20.0	ug/L	6/16/2020	19:16
Vinyl chloride	< 20.0	ug/L	6/16/2020	19:16

Surrogate	**Percent Recovery**	**Limits**	**Outliers**	**Date Analyzed**	
1,2-Dichloroethane-d4	**125**	80.8 - 132		6/16/2020	19:16
4-Bromofluorobenzene	**97.2**	56.6 - 130		6/16/2020	19:16
Pentafluorobenzene	**101**	87.4 - 113		6/16/2020	19:16
Toluene-D8	**106**	82.2 - 115		6/16/2020	19:16

Reporting limit elevated due to non-target compounds

Method Reference(s): EPA 8260C
EPA 5030C

Data File: x71012.D

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-7B		
Lab Sample ID:	202601-04	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Mercury

Analyte	Result	Units	Qualifier	Date Analyzed
Mercury	< 0.000200	mg/L		6/15/2020 09:15

Method Reference(s): EPA 7470A
Preparation Date: 6/12/2020
Data File: Hg200615A

TAL Metals (ICP)

Analyte	Result	Units	Qualifier	Date Analyzed
Aluminum	**0.399**	mg/L		6/17/2020
Antimony	< 0.0600	mg/L		6/17/2020
Arsenic	< 0.0100	mg/L		6/17/2020
Barium	< 0.100	mg/L		6/17/2020
Beryllium	< 0.00500	mg/L		6/17/2020
Cadmium	< 0.00500	mg/L		6/17/2020
Calcium	**28.8**	mg/L		6/17/2020
Chromium	< 0.0100	mg/L		6/17/2020
Cobalt	< 0.0500	mg/L		6/17/2020
Copper	**0.0290**	mg/L		6/17/2020
Iron	**0.830**	mg/L		6/17/2020
Lead	**0.0160**	mg/L		6/17/2020
Magnesium	**17.1**	mg/L		6/17/2020
Manganese	< 0.0200	mg/L		6/17/2020
Nickel	< 0.0400	mg/L		6/17/2020
Potassium	**84.0**	mg/L		6/17/2020
Selenium	< 0.0200	mg/L		6/17/2020
Silver	< 0.0100	mg/L		6/17/2020
Sodium	**210**	mg/L		6/17/2020
Thallium	< 0.0250	mg/L		6/17/2020
Vanadium	< 0.0250	mg/L		6/17/2020

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-7B		
Lab Sample ID:	202601-04	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Zinc	< 0.0600	mg/L		6/17/2020

Method Reference(s): EPA 6010C
EPA 3005A
Preparation Date: 6/12/2020
Subcontractor ELAP ID: 10709

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed
1,1-Biphenyl	< 48.8	ug/L		6/16/2020 17:57
1,2,4,5-Tetrachlorobenzene	< 48.8	ug/L		6/16/2020 17:57
1,2,4-Trichlorobenzene	< 48.8	ug/L		6/16/2020 17:57
1,2-Dichlorobenzene	< 48.8	ug/L		6/16/2020 17:57
1,3-Dichlorobenzene	< 48.8	ug/L		6/16/2020 17:57
1,4-Dichlorobenzene	< 48.8	ug/L		6/16/2020 17:57
2,2-Oxybis (1-chloropropane)	< 48.8	ug/L		6/16/2020 17:57
2,3,4,6-Tetrachlorophenol	< 48.8	ug/L		6/16/2020 17:57
2,4,5-Trichlorophenol	< 48.8	ug/L		6/16/2020 17:57
2,4,6-Trichlorophenol	< 97.7	ug/L		6/16/2020 17:57
2,4-Dichlorophenol	< 48.8	ug/L		6/16/2020 17:57
2,4-Dimethylphenol	< 48.8	ug/L		6/16/2020 17:57
2,4-Dinitrophenol	< 97.7	ug/L		6/16/2020 17:57
2,4-Dinitrotoluene	< 48.8	ug/L		6/16/2020 17:57
2,6-Dinitrotoluene	< 48.8	ug/L		6/16/2020 17:57
2-Chloronaphthalene	< 48.8	ug/L		6/16/2020 17:57
2-Chlorophenol	< 48.8	ug/L		6/16/2020 17:57
2-Methylnapthalene	< 48.8	ug/L		6/16/2020 17:57
2-Methylphenol	< 48.8	ug/L		6/16/2020 17:57
2-Nitroaniline	< 97.7	ug/L		6/16/2020 17:57
2-Nitrophenol	< 48.8	ug/L		6/16/2020 17:57
3&4-Methylphenol	< 48.8	ug/L		6/16/2020 17:57
3,3'-Dichlorobenzidine	< 48.8	ug/L		6/16/2020 17:57
3-Nitroaniline	< 97.7	ug/L		6/16/2020 17:57

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-7B		
Lab Sample ID:	202601-04	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

4,6-Dinitro-2-methylphenol	< 97.7	ug/L	6/16/2020	17:57
4-Bromophenyl phenyl ether	< 48.8	ug/L	6/16/2020	17:57
4-Chloro-3-methylphenol	< 48.8	ug/L	6/16/2020	17:57
4-Chloroaniline	< 48.8	ug/L	6/16/2020	17:57
4-Chlorophenyl phenyl ether	< 48.8	ug/L	6/16/2020	17:57
4-Nitroaniline	< 97.7	ug/L	6/16/2020	17:57
4-Nitrophenol	< 97.7	ug/L	6/16/2020	17:57
Acenaphthene	**135**	ug/L	6/16/2020	17:57
Acenaphthylene	< 48.8	ug/L	6/16/2020	17:57
Acetophenone	< 48.8	ug/L	6/16/2020	17:57
Anthracene	< 48.8	ug/L	6/16/2020	17:57
Atrazine	< 48.8	ug/L	6/16/2020	17:57
Benzaldehyde	< 48.8	ug/L	6/16/2020	17:57
Benzo (a) anthracene	< 48.8	ug/L	6/16/2020	17:57
Benzo (a) pyrene	< 48.8	ug/L	6/16/2020	17:57
Benzo (b) fluoranthene	< 48.8	ug/L	6/16/2020	17:57
Benzo (g,h,i) perylene	< 48.8	ug/L	6/16/2020	17:57
Benzo (k) fluoranthene	< 48.8	ug/L	6/16/2020	17:57
Bis (2-chloroethoxy) methane	< 48.8	ug/L	6/16/2020	17:57
Bis (2-chloroethyl) ether	< 48.8	ug/L	6/16/2020	17:57
Bis (2-ethylhexyl) phthalate	< 48.8	ug/L	6/16/2020	17:57
Butylbenzylphthalate	< 48.8	ug/L	6/16/2020	17:57
Caprolactam	< 48.8	ug/L	6/16/2020	17:57
Carbazole	**94.6**	ug/L	6/16/2020	17:57
Chrysene	< 48.8	ug/L	6/16/2020	17:57
Dibenz (a,h) anthracene	< 48.8	ug/L	6/16/2020	17:57
Dibenzofuran	**134**	ug/L	6/16/2020	17:57
Diethyl phthalate	< 48.8	ug/L	6/16/2020	17:57
Dimethyl phthalate	< 97.7	ug/L	6/16/2020	17:57
Di-n-butyl phthalate	< 48.8	ug/L	6/16/2020	17:57

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-7B		
Lab Sample ID:	202601-04	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Di-n-octylphthalate	< 48.8	ug/L	6/16/2020	17:57
Fluoranthene	< 48.8	ug/L	6/16/2020	17:57
Fluorene	**101**	ug/L	6/16/2020	17:57
Hexachlorobenzene	< 48.8	ug/L	6/16/2020	17:57
Hexachlorobutadiene	< 48.8	ug/L	6/16/2020	17:57
Hexachlorocyclopentadiene	< 48.8	ug/L	6/16/2020	17:57
Hexachloroethane	< 48.8	ug/L	6/16/2020	17:57
Indeno (1,2,3-cd) pyrene	< 48.8	ug/L	6/16/2020	17:57
Isophorone	< 48.8	ug/L	6/16/2020	17:57
Naphthalene	**414**	ug/L	6/16/2020	17:57
Nitrobenzene	< 48.8	ug/L	6/16/2020	17:57
N-Nitroso-di-n-propylamine	< 48.8	ug/L	6/16/2020	17:57
N-Nitrosodiphenylamine	< 48.8	ug/L	6/16/2020	17:57
Pentachlorophenol	< 97.7	ug/L	6/16/2020	17:57
Phenanthrene	**93.2**	ug/L	6/16/2020	17:57
Phenol	< 48.8	ug/L	6/16/2020	17:57
Pyrene	< 48.8	ug/L	6/16/2020	17:57

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
2,4,6-Tribromophenol	**69.4**	61.4 - 115		6/16/2020	17:57
2-Fluorobiphenyl	**60.1**	38.4 - 101		6/16/2020	17:57
2-Fluorophenol	**42.6**	12.7 - 105		6/16/2020	17:57
Nitrobenzene-d5	**77.8**	57.3 - 100		6/16/2020	17:57
Phenol-d5	**28.5**	10 - 107		6/16/2020	17:57
Terphenyl-d14	**75.8**	58.1 - 117		6/16/2020	17:57

Method Reference(s): EPA 8270D
EPA 3510C
Preparation Date: 6/15/2020
Data File: B47162.D

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed	
1,1,1-Trichloroethane	< 20.0	ug/L		6/16/2020	19:38

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-7B		
Lab Sample ID:	202601-04	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

1,1,2,2-Tetrachloroethane	< 20.0	ug/L	6/16/2020	19:38
1,1,2-Trichloroethane	< 20.0	ug/L	6/16/2020	19:38
1,1-Dichloroethane	< 20.0	ug/L	6/16/2020	19:38
1,1-Dichloroethene	< 20.0	ug/L	6/16/2020	19:38
1,2,3-Trichlorobenzene	< 50.0	ug/L	6/16/2020	19:38
1,2,4-Trichlorobenzene	< 50.0	ug/L	6/16/2020	19:38
1,2-Dibromo-3-Chloropropane	< 100	ug/L	6/16/2020	19:38
1,2-Dibromoethane	< 20.0	ug/L	6/16/2020	19:38
1,2-Dichlorobenzene	< 20.0	ug/L	6/16/2020	19:38
1,2-Dichloroethane	< 20.0	ug/L	6/16/2020	19:38
1,2-Dichloropropane	< 20.0	ug/L	6/16/2020	19:38
1,3-Dichlorobenzene	< 20.0	ug/L	6/16/2020	19:38
1,4-Dichlorobenzene	< 20.0	ug/L	6/16/2020	19:38
1,4-Dioxane	< 200	ug/L	6/16/2020	19:38
2-Butanone	< 100	ug/L	6/16/2020	19:38
2-Hexanone	< 50.0	ug/L	6/16/2020	19:38
4-Methyl-2-pentanone	< 50.0	ug/L	6/16/2020	19:38
Acetone	< 100	ug/L	6/16/2020	19:38
Benzene	< 10.0	ug/L	6/16/2020	19:38
Bromochloromethane	< 50.0	ug/L	6/16/2020	19:38
Bromodichloromethane	< 20.0	ug/L	6/16/2020	19:38
Bromoform	< 50.0	ug/L	6/16/2020	19:38
Bromomethane	< 20.0	ug/L	6/16/2020	19:38
Carbon disulfide	< 20.0	ug/L	6/16/2020	19:38
Carbon Tetrachloride	< 20.0	ug/L	6/16/2020	19:38
Chlorobenzene	< 20.0	ug/L	6/16/2020	19:38
Chloroethane	< 20.0	ug/L	6/16/2020	19:38
Chloroform	< 20.0	ug/L	6/16/2020	19:38
Chloromethane	< 20.0	ug/L	6/16/2020	19:38
cis-1,2-Dichloroethene	< 20.0	ug/L	6/16/2020	19:38

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-7B		
Lab Sample ID:	202601-04	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

cis-1,3-Dichloropropene	< 20.0	ug/L	6/16/2020	19:38
Cyclohexane	< 100	ug/L	6/16/2020	19:38
Dibromochloromethane	< 20.0	ug/L	6/16/2020	19:38
Dichlorodifluoromethane	< 20.0	ug/L	6/16/2020	19:38
Ethylbenzene	< 20.0	ug/L	6/16/2020	19:38
Freon 113	< 20.0	ug/L	6/16/2020	19:38
Isopropylbenzene	< 20.0	ug/L	6/16/2020	19:38
m,p-Xylene	< 20.0	ug/L	6/16/2020	19:38
Methyl acetate	< 20.0	ug/L	6/16/2020	19:38
Methyl tert-butyl Ether	< 20.0	ug/L	6/16/2020	19:38
Methylcyclohexane	< 20.0	ug/L	6/16/2020	19:38
Methylene chloride	< 50.0	ug/L	6/16/2020	19:38
o-Xylene	< 20.0	ug/L	6/16/2020	19:38
Styrene	< 50.0	ug/L	6/16/2020	19:38
Tetrachloroethene	< 20.0	ug/L	6/16/2020	19:38
Toluene	< 20.0	ug/L	6/16/2020	19:38
trans-1,2-Dichloroethene	< 20.0	ug/L	6/16/2020	19:38
trans-1,3-Dichloropropene	< 20.0	ug/L	6/16/2020	19:38
Trichloroethene	< 20.0	ug/L	6/16/2020	19:38
Trichlorofluoromethane	< 20.0	ug/L	6/16/2020	19:38
Vinyl chloride	< 20.0	ug/L	6/16/2020	19:38

Surrogate	**Percent Recovery**	**Limits**	**Outliers**	**Date Analyzed**	
1,2-Dichloroethane-d4	**122**	80.8 - 132		6/16/2020	19:38
4-Bromofluorobenzene	**92.3**	56.6 - 130		6/16/2020	19:38
Pentafluorobenzene	**101**	87.4 - 113		6/16/2020	19:38
Toluene-D8	**98.8**	82.2 - 115		6/16/2020	19:38

Reporting limit elevated due to non-target compounds

Method Reference(s): EPA 8260C
EPA 5030C

Data File: x71013.D

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-8		
Lab Sample ID:	202601-05	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Mercury

Analyte	Result	Units	Qualifier	Date Analyzed
Mercury	< 0.000200	mg/L		6/15/2020 09:17

Method Reference(s): EPA 7470A
Preparation Date: 6/12/2020
Data File: Hg200615A

TAL Metals (ICP)

Analyte	Result	Units	Qualifier	Date Analyzed
Aluminum	**1.55**	mg/L		6/17/2020
Antimony	< 0.0600	mg/L		6/17/2020
Arsenic	< 0.0100	mg/L		6/17/2020
Barium	< 0.100	mg/L		6/17/2020
Beryllium	< 0.00500	mg/L		6/17/2020
Cadmium	**0.00800**	mg/L		6/17/2020
Calcium	**97.1**	mg/L		6/17/2020
Chromium	**0.0120**	mg/L		6/17/2020
Cobalt	< 0.0500	mg/L		6/17/2020
Copper	**0.0380**	mg/L		6/17/2020
Iron	**4.38**	mg/L		6/17/2020
Lead	< 0.0100	mg/L		6/17/2020
Magnesium	**15.7**	mg/L		6/17/2020
Manganese	**0.144**	mg/L		6/17/2020
Nickel	< 0.0400	mg/L		6/17/2020
Potassium	**19.7**	mg/L		6/17/2020
Selenium	< 0.0200	mg/L		6/17/2020
Silver	< 0.0100	mg/L		6/17/2020
Sodium	**100**	mg/L		6/17/2020
Thallium	< 0.0250	mg/L		6/17/2020
Vanadium	< 0.0250	mg/L		6/17/2020

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-8		
Lab Sample ID:	202601-05	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Zinc	< 0.0600	mg/L		6/17/2020

Method Reference(s): EPA 6010C
EPA 3005A
Preparation Date: 6/12/2020
Subcontractor ELAP ID: 10709

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed
1,1-Biphenyl	< 9.77	ug/L		6/16/2020 10:09
1,2,4,5-Tetrachlorobenzene	< 9.77	ug/L		6/16/2020 10:09
1,2,4-Trichlorobenzene	< 9.77	ug/L		6/16/2020 10:09
1,2-Dichlorobenzene	< 9.77	ug/L		6/16/2020 10:09
1,3-Dichlorobenzene	**16.6**	ug/L		6/16/2020 10:09
1,4-Dichlorobenzene	**15.2**	ug/L		6/16/2020 10:09
2,2-Oxybis (1-chloropropane)	< 9.77	ug/L		6/16/2020 10:09
2,3,4,6-Tetrachlorophenol	< 9.77	ug/L		6/16/2020 10:09
2,4,5-Trichlorophenol	< 9.77	ug/L		6/16/2020 10:09
2,4,6-Trichlorophenol	< 19.5	ug/L		6/16/2020 10:09
2,4-Dichlorophenol	< 9.77	ug/L		6/16/2020 10:09
2,4-Dimethylphenol	< 9.77	ug/L		6/16/2020 10:09
2,4-Dinitrophenol	< 19.5	ug/L		6/16/2020 10:09
2,4-Dinitrotoluene	< 9.77	ug/L		6/16/2020 10:09
2,6-Dinitrotoluene	< 9.77	ug/L		6/16/2020 10:09
2-Chloronaphthalene	< 9.77	ug/L		6/16/2020 10:09
2-Chlorophenol	< 9.77	ug/L		6/16/2020 10:09
2-Methylnapthalene	< 9.77	ug/L		6/16/2020 10:09
2-Methylphenol	< 9.77	ug/L		6/16/2020 10:09
2-Nitroaniline	< 19.5	ug/L		6/16/2020 10:09
2-Nitrophenol	< 9.77	ug/L		6/16/2020 10:09
3&4-Methylphenol	< 9.77	ug/L		6/16/2020 10:09
3,3'-Dichlorobenzidine	< 9.77	ug/L		6/16/2020 10:09
3-Nitroaniline	< 19.5	ug/L		6/16/2020 10:09

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-8		
Lab Sample ID:	202601-05	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

4,6-Dinitro-2-methylphenol	< 19.5	ug/L	6/16/2020	10:09
4-Bromophenyl phenyl ether	< 9.77	ug/L	6/16/2020	10:09
4-Chloro-3-methylphenol	< 9.77	ug/L	6/16/2020	10:09
4-Chloroaniline	< 9.77	ug/L	6/16/2020	10:09
4-Chlorophenyl phenyl ether	< 9.77	ug/L	6/16/2020	10:09
4-Nitroaniline	< 19.5	ug/L	6/16/2020	10:09
4-Nitrophenol	< 19.5	ug/L	6/16/2020	10:09
Acenaphthene	**15.9**	ug/L	6/16/2020	10:09
Acenaphthylene	< 9.77	ug/L	6/16/2020	10:09
Acetophenone	< 9.77	ug/L	6/16/2020	10:09
Anthracene	< 9.77	ug/L	6/16/2020	10:09
Atrazine	< 9.77	ug/L	6/16/2020	10:09
Benzaldehyde	< 9.77	ug/L	6/16/2020	10:09
Benzo (a) anthracene	< 9.77	ug/L	6/16/2020	10:09
Benzo (a) pyrene	< 9.77	ug/L	6/16/2020	10:09
Benzo (b) fluoranthene	< 9.77	ug/L	6/16/2020	10:09
Benzo (g,h,i) perylene	< 9.77	ug/L	6/16/2020	10:09
Benzo (k) fluoranthene	< 9.77	ug/L	6/16/2020	10:09
Bis (2-chloroethoxy) methane	< 9.77	ug/L	6/16/2020	10:09
Bis (2-chloroethyl) ether	< 9.77	ug/L	6/16/2020	10:09
Bis (2-ethylhexyl) phthalate	< 9.77	ug/L	6/16/2020	10:09
Butylbenzylphthalate	< 9.77	ug/L	6/16/2020	10:09
Caprolactam	< 9.77	ug/L	6/16/2020	10:09
Carbazole	< 9.77	ug/L	6/16/2020	10:09
Chrysene	< 9.77	ug/L	6/16/2020	10:09
Dibenz (a,h) anthracene	< 9.77	ug/L	6/16/2020	10:09
Dibenzofuran	< 9.77	ug/L	6/16/2020	10:09
Diethyl phthalate	< 9.77	ug/L	6/16/2020	10:09
Dimethyl phthalate	< 19.5	ug/L	6/16/2020	10:09
Di-n-butyl phthalate	< 9.77	ug/L	6/16/2020	10:09

Sample Identifier:	A-EW-8		
Lab Sample ID:	202601-05	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Di-n-octylphthalate	< 9.77	ug/L		6/16/2020 10:09
Fluoranthene	< 9.77	ug/L		6/16/2020 10:09
Fluorene	< 9.77	ug/L		6/16/2020 10:09
Hexachlorobenzene	< 9.77	ug/L		6/16/2020 10:09
Hexachlorobutadiene	< 9.77	ug/L		6/16/2020 10:09
Hexachlorocyclopentadiene	< 9.77	ug/L		6/16/2020 10:09
Hexachloroethane	< 9.77	ug/L		6/16/2020 10:09
Indeno (1,2,3-cd) pyrene	< 9.77	ug/L		6/16/2020 10:09
Isophorone	< 9.77	ug/L		6/16/2020 10:09
Naphthalene	< 9.77	ug/L		6/16/2020 10:09
Nitrobenzene	< 9.77	ug/L		6/16/2020 10:09
N-Nitroso-di-n-propylamine	< 9.77	ug/L		6/16/2020 10:09
N-Nitrosodiphenylamine	< 9.77	ug/L		6/16/2020 10:09
Pentachlorophenol	< 19.5	ug/L		6/16/2020 10:09
Phenanthrene	< 9.77	ug/L		6/16/2020 10:09
Phenol	< 9.77	ug/L		6/16/2020 10:09
Pyrene	< 9.77	ug/L		6/16/2020 10:09

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
2,4,6-Tribromophenol	**74.6**	61.4 - 115		6/16/2020 10:09
2-Fluorobiphenyl	**54.5**	38.4 - 101		6/16/2020 10:09
2-Fluorophenol	**39.5**	12.7 - 105		6/16/2020 10:09
Nitrobenzene-d5	**72.1**	57.3 - 100		6/16/2020 10:09
Phenol-d5	**27.3**	10 - 107		6/16/2020 10:09
Terphenyl-d14	**72.9**	58.1 - 117		6/16/2020 10:09

Method Reference(s): EPA 8270D
EPA 3510C
Preparation Date: 6/15/2020
Data File: B47136.D

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed
1,1,1-Trichloroethane	< 2.00	ug/L		6/16/2020 18:08

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-8		
Lab Sample ID:	202601-05	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

1,1,2,2-Tetrachloroethane	< 2.00	ug/L	6/16/2020	18:08
1,1,2-Trichloroethane	< 2.00	ug/L	6/16/2020	18:08
1,1-Dichloroethane	< 2.00	ug/L	6/16/2020	18:08
1,1-Dichloroethene	< 2.00	ug/L	6/16/2020	18:08
1,2,3-Trichlorobenzene	< 5.00	ug/L	6/16/2020	18:08
1,2,4-Trichlorobenzene	< 5.00	ug/L	6/16/2020	18:08
1,2-Dibromo-3-Chloropropane	< 10.0	ug/L	6/16/2020	18:08
1,2-Dibromoethane	< 2.00	ug/L	6/16/2020	18:08
1,2-Dichlorobenzene	**7.21**	ug/L	6/16/2020	18:08
1,2-Dichloroethane	< 2.00	ug/L	6/16/2020	18:08
1,2-Dichloropropane	< 2.00	ug/L	6/16/2020	18:08
1,3-Dichlorobenzene	**27.0**	ug/L	6/16/2020	18:08
1,4-Dichlorobenzene	**25.3**	ug/L	6/16/2020	18:08
1,4-Dioxane	< 20.0	ug/L	6/16/2020	18:08
2-Butanone	< 10.0	ug/L	6/16/2020	18:08
2-Hexanone	< 5.00	ug/L	6/16/2020	18:08
4-Methyl-2-pentanone	< 5.00	ug/L	6/16/2020	18:08
Acetone	< 10.0	ug/L	6/16/2020	18:08
Benzene	< 1.00	ug/L	6/16/2020	18:08
Bromochloromethane	< 5.00	ug/L	6/16/2020	18:08
Bromodichloromethane	< 2.00	ug/L	6/16/2020	18:08
Bromoform	< 5.00	ug/L	6/16/2020	18:08
Bromomethane	< 2.00	ug/L	6/16/2020	18:08
Carbon disulfide	< 2.00	ug/L	6/16/2020	18:08
Carbon Tetrachloride	< 2.00	ug/L	6/16/2020	18:08
Chlorobenzene	**17.0**	ug/L	6/16/2020	18:08
Chloroethane	< 2.00	ug/L	6/16/2020	18:08
Chloroform	< 2.00	ug/L	6/16/2020	18:08
Chloromethane	< 2.00	ug/L	6/16/2020	18:08
cis-1,2-Dichloroethene	< 2.00	ug/L	6/16/2020	18:08

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	A-EW-8		
Lab Sample ID:	202601-05	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

cis-1,3-Dichloropropene	< 2.00	ug/L	6/16/2020	18:08
Cyclohexane	< 10.0	ug/L	6/16/2020	18:08
Dibromochloromethane	< 2.00	ug/L	6/16/2020	18:08
Dichlorodifluoromethane	< 2.00	ug/L	6/16/2020	18:08
Ethylbenzene	< 2.00	ug/L	6/16/2020	18:08
Freon 113	< 2.00	ug/L	6/16/2020	18:08
Isopropylbenzene	< 2.00	ug/L	6/16/2020	18:08
m,p-Xylene	< 2.00	ug/L	6/16/2020	18:08
Methyl acetate	< 2.00	ug/L	6/16/2020	18:08
Methyl tert-butyl Ether	< 2.00	ug/L	6/16/2020	18:08
Methylcyclohexane	< 2.00	ug/L	6/16/2020	18:08
Methylene chloride	< 5.00	ug/L	6/16/2020	18:08
o-Xylene	< 2.00	ug/L	6/16/2020	18:08
Styrene	< 5.00	ug/L	6/16/2020	18:08
Tetrachloroethene	< 2.00	ug/L	6/16/2020	18:08
Toluene	**2.48**	ug/L	6/16/2020	18:08
trans-1,2-Dichloroethene	< 2.00	ug/L	6/16/2020	18:08
trans-1,3-Dichloropropene	< 2.00	ug/L	6/16/2020	18:08
Trichloroethene	< 2.00	ug/L	6/16/2020	18:08
Trichlorofluoromethane	< 2.00	ug/L	6/16/2020	18:08
Vinyl chloride	< 2.00	ug/L	6/16/2020	18:08

Surrogate	**Percent Recovery**	**Limits**	**Outliers**	**Date Analyzed**	
1,2-Dichloroethane-d4	**134**	80.8 - 132	*	6/16/2020	18:08
4-Bromofluorobenzene	**90.5**	56.6 - 130		6/16/2020	18:08
Pentafluorobenzene	**99.0**	87.4 - 113		6/16/2020	18:08
Toluene-D8	**89.9**	82.2 - 115		6/16/2020	18:08

Method Reference(s): EPA 8260C
EPA 5030C

Data File: x71009.D

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	Trip Blank		
Lab Sample ID:	202601-06	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed
1,1,1-Trichloroethane	< 2.00	ug/L		6/16/2020 17:23
1,1,2,2-Tetrachloroethane	< 2.00	ug/L		6/16/2020 17:23
1,1,2-Trichloroethane	< 2.00	ug/L		6/16/2020 17:23
1,1-Dichloroethane	< 2.00	ug/L		6/16/2020 17:23
1,1-Dichloroethene	< 2.00	ug/L		6/16/2020 17:23
1,2,3-Trichlorobenzene	< 5.00	ug/L		6/16/2020 17:23
1,2,4-Trichlorobenzene	< 5.00	ug/L		6/16/2020 17:23
1,2-Dibromo-3-Chloropropane	< 10.0	ug/L		6/16/2020 17:23
1,2-Dibromoethane	< 2.00	ug/L		6/16/2020 17:23
1,2-Dichlorobenzene	< 2.00	ug/L		6/16/2020 17:23
1,2-Dichloroethane	< 2.00	ug/L		6/16/2020 17:23
1,2-Dichloropropane	< 2.00	ug/L		6/16/2020 17:23
1,3-Dichlorobenzene	< 2.00	ug/L		6/16/2020 17:23
1,4-Dichlorobenzene	< 2.00	ug/L		6/16/2020 17:23
1,4-Dioxane	< 20.0	ug/L		6/16/2020 17:23
2-Butanone	< 10.0	ug/L		6/16/2020 17:23
2-Hexanone	< 5.00	ug/L		6/16/2020 17:23
4-Methyl-2-pentanone	< 5.00	ug/L		6/16/2020 17:23
Acetone	< 10.0	ug/L		6/16/2020 17:23
Benzene	< 1.00	ug/L		6/16/2020 17:23
Bromochloromethane	< 5.00	ug/L		6/16/2020 17:23
Bromodichloromethane	< 2.00	ug/L		6/16/2020 17:23
Bromoform	< 5.00	ug/L		6/16/2020 17:23
Bromomethane	< 2.00	ug/L		6/16/2020 17:23
Carbon disulfide	< 2.00	ug/L		6/16/2020 17:23
Carbon Tetrachloride	< 2.00	ug/L		6/16/2020 17:23
Chlorobenzene	< 2.00	ug/L		6/16/2020 17:23
Chloroethane	< 2.00	ug/L		6/16/2020 17:23

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	Trip Blank		
Lab Sample ID:	202601-06	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Chloroform	< 2.00	ug/L	6/16/2020	17:23
Chloromethane	< 2.00	ug/L	6/16/2020	17:23
cis-1,2-Dichloroethene	< 2.00	ug/L	6/16/2020	17:23
cis-1,3-Dichloropropene	< 2.00	ug/L	6/16/2020	17:23
Cyclohexane	< 10.0	ug/L	6/16/2020	17:23
Dibromochloromethane	< 2.00	ug/L	6/16/2020	17:23
Dichlorodifluoromethane	< 2.00	ug/L	6/16/2020	17:23
Ethylbenzene	< 2.00	ug/L	6/16/2020	17:23
Freon 113	< 2.00	ug/L	6/16/2020	17:23
Isopropylbenzene	< 2.00	ug/L	6/16/2020	17:23
m,p-Xylene	< 2.00	ug/L	6/16/2020	17:23
Methyl acetate	< 2.00	ug/L	6/16/2020	17:23
Methyl tert-butyl Ether	< 2.00	ug/L	6/16/2020	17:23
Methylcyclohexane	< 2.00	ug/L	6/16/2020	17:23
Methylene chloride	< 5.00	ug/L	6/16/2020	17:23
o-Xylene	< 2.00	ug/L	6/16/2020	17:23
Styrene	< 5.00	ug/L	6/16/2020	17:23
Tetrachloroethene	< 2.00	ug/L	6/16/2020	17:23
Toluene	< 2.00	ug/L	6/16/2020	17:23
trans-1,2-Dichloroethene	< 2.00	ug/L	6/16/2020	17:23
trans-1,3-Dichloropropene	< 2.00	ug/L	6/16/2020	17:23
Trichloroethene	< 2.00	ug/L	6/16/2020	17:23
Trichlorofluoromethane	< 2.00	ug/L	6/16/2020	17:23
Vinyl chloride	< 2.00	ug/L	6/16/2020	17:23

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202601

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color Area A

Sample Identifier:	Trip Blank		
Lab Sample ID:	202601-06	**Date Sampled:**	6/10/2020
Matrix:	Water	**Date Received:**	6/11/2020

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
1,2-Dichloroethane-d4	**128**	80.8 - 132		6/16/2020	17:23
4-Bromofluorobenzene	**83.1**	56.6 - 130		6/16/2020	17:23
Pentafluorobenzene	**99.5**	87.4 - 113		6/16/2020	17:23
Toluene-D8	**93.1**	82.2 - 115		6/16/2020	17:23

Method Reference(s): EPA 8260C
EPA 5030C

Data File: x71007.D

Analytical Report Appendix

The reported results relate only to the samples as they have been received by the laboratory.

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All soil/sludge samples have been reported on a dry weight basis, unless qualified "reported as received". Other solids are reported as received.

Low level Volatiles blank reports for soil/solid matrix are based on a nominal 5 gram weight. Sample results and reporting limits are based on actual weight, which may be more or less than 5 grams.

The Chain of Custody provides additional information, including compliance with sample condition requirements upon receipt. Sample condition requirements are defined under the 2003 NELAC Standard, sections 5.5.8.3.1 and 5.5.8.3.2.

NYSDOH ELAP does not certify for all parameters. Paradigm Environmental Services or the indicated subcontracted laboratory does hold certification for all analytes where certification is offered by ELAP unless otherwise specified. Aliquots separated for certain tests, such as TCLP, are indicated on the Chain of Custody and final reports with an "A" suffix.

Data qualifiers are used, when necessary, to provide additional information about the data. This information may be communicated as a flag or as text at the bottom of the report. Please refer to the following list of analyte-specific, frequently used data flags and their meaning:

"<" = Analyzed for but not detected at or above the quantitation limit.
"E" = Result has been estimated, calibration limit exceeded.
"Z" = See case narrative.
"D" = Sample, Laboratory Control Sample, or Matrix Spike Duplicate results above Relative Percent Difference limit.
"M" = Matrix spike recoveries outside QC limits. Matrix bias indicated.
"B" = Method blank contained trace levels of analyte. Refer to included method blank report.
"J" = Result estimated between the quantitation limit and half the quantitation limit.
"L" = Laboratory Control Sample recovery outside accepted QC limits.
"P" = Concentration differs by more than 40% between the primary and secondary analytical columns.
"NC" = Not calculable. Applicable to RPD if sample or duplicate result is non-detect or estimated (see primary report for data flags). Applicable to MS if sample is greater or equal to ten times the spike added. Applicable to sample surrogates or MS if sample dilution is 10x or higher.
"" = Indicates any recoveries outside associated acceptance windows. Surrogate outliers in samples are presumed matrix effects. LCS demonstrates method compliance unless otherwise noted.*
"(1)" = Indicates data from primary column used for QC calculation.
"A" = denotes a parameter for which ELAP does not offer approval as part of their laboratory certification program.
"F" = denotes a parameter for which Paradigm does not carry certification, the results for which should therefore only be used where ELAP certification is not required, such as personal exposure assessment.

GENERAL TERMS AND CONDITIONS
LABORATORY SERVICES

These Terms and Conditions embody the whole agreement of the parties in the absence of a signed and executed contract between the Laboratory (LAB) and Client. They shall supersede all previous communications, representations, or agreements, either verbal or written, between the parties. The LAB specifically rejects all additional, inconsistent, or conflicting terms, whether printed or otherwise set forth in any purchase order or other communication from the Client to the LAB. The invalidity or unenforceability in whole or in part of any provision, tern or condition hereof shall not affect in any way the validity or enforceability of the remainder of the Terms and Conditions. No waiver by LAB of any provision, term, or condition hereof or of any breach by or obligation of the Client hereunder shall constitute a waiver of such provision, term, or condition on any other occasion or a waiver of any other breach by or obligation of the Client. This agreement shall be administered and interpreted under the laws of the state which services are procured.

Warranty. Recognizing that the nature of many samples is unknown and that some may contain potentially hazardous components, LAB warrants only that it will perform testing services, obtain findings, and prepare reports in accordance with generally accepted analytical laboratory principles and practices at the time of performance of services. LAB makes no other warranty, express or implied.

Scope and Compensation. LAB agrees to perform the services described in the chain of custody to which these terms and conditions are attached. Unless the parties agree in writing to the contrary, the duties of LAB shall not be construed to exceed the services specifically described. LAB wi use LAB default method for all tests unless specified otherwise on the Work Order.
Payment terms are net 30 days from the date of invoice. All overdue payments are subject to an interest charge of one and one-half percent (1-1/2%) per month or a portion thereof. Client shall also be responsible for costs of collection, including payment of reasonable attorney fees if such expense is incurred. The prices, unless stated, do not include any sale, use or other taxes. Such taxes will be added to invoice prices when required.

Prices. Compensation for services performed will be based on the current Lab Analytical Fee Schedule or on quotations agreed to in writing by the parties. Turnaround time based charges are determined from the time of resolution of all work order questions. Testimony, court appearances or data compilation for legal action will be charged separately. Evaluation and reporting of initial screening runs may incur additional fees.

Limitations of Liability. In the event of any error, omission, or other professional negligence, the sole and exclusive responsibility of LAB shall be to re-perform the deficient work at its own expense and LAB shall have no other liability whatsoever. All claims shall be deemed waived unless made in writing and received by LAB within ninety (90) days following completion of services.
LAB shall have no liability, obligation, or responsibility of any kind for losses, costs, expenses, or other damages (including but not limited to any special, direct, incidental or consequential damages) with respect to LAB's services or results.
All results provided by LAB are strictly for the use of its clients and LAB is in no way responsible for the use of such results by clients or third parties. All reports should be considered in their entirety, and LAB is not responsible for the separation, detachment, or other use of any portion of these reports. Client may not assign the lab report without the written consent of the LAB.
Client covenants and agrees, at its/his/her sole expense, to indemnify, protect, defend, and save harmless the LAB from and against any and all damages, losses, liabilities, obligations, penalties, claims, litigation, demands, defenses, judgments, suits, actions, proceedings, costs, disbursements and/or expenses (including, without limitation attorneys' and experts' fees and disbursements) of any kind whatsoever which may at any time be imposed upon, incurred by or asserted or awarded against client relating to, resulting from or arising out of (a) the breach of this agreement by this client, (b) the negligence of the client in handling, delivering or disclosing any hazardous substance, (c) the violation of the Client of any applicable law, (d) non-compliance by the Client with any environmental permit or (e) a material misrepresentation in disclosing the materials to be tested.

Hazard Disclosure. Client represents and warrants that any sample delivered to LAB will be preceded or accompanied by complete written disclosure of the presence of any hazardous substances known or suspected by Client. Client further warrants that any sample containing any hazardous substance that is to be delivered to LAB will be packaged, labeled, transported, and delivered properly and in accordance with applicable laws.

Sample Handling. Prior to LAB's acceptance of any sample (or after any revocation of acceptance), the entire risk of loss or of damage to such sample remains with Client. Samples are accepted when receipt is acknowledged on chain of custody documentation. In no event will LAB have any responsibility for the action or inaction of any carrier shipping or delivering any sample to or from LAB premises.
Client authorizes LAB to proceed with the analysis of samples as received by the laboratory, recognizing that any samples not in compliance with all current DOH-ELAP-NELAP requirements for containers, preservation or holding time will be noted as such on th final report.
Disposal of hazardous waste samples is the responsibility of the Client. If the Client does not wish such samples returned, LAB may add storage and disposal fees to the final invoice. Maximum storage time for samples is 30 days after completion of analysis unless modified by applicable state or federal laws. Client will be required to give the LAB written instructions concerning disposal of these samples.
LAB reserves the absolute right, exercisable at any time, to refuse to receive delivery of, refuse to accept, or revoke acceptance of any sample, which, in the sole judgment of LAB (a) is of unsuitable volume, (b) may be or become unsuitable for or may pose a risk in handling, transport, or processing for any health, safety, environmental or other reason whether or not due to the presence in the sample of any hazardous substance, and whether or not such presence has been disclosed to LAB by Client or (c) if the condition or sample date make the sample unsuitable for analysis.

Legal Responsibility. LAB is solely responsible for performance of this contract, and no affiliated company, director, officer, employee, or agent shall have any legal responsibility hereunder, whether in contract or tort including negligence.

Assignment. LAB may assign its performance obligations under this contract to other parties, as it deems necessary. LAB shall disclose to Client any assignee (subcontractor) by ELAP ID # on the submitted final report.

Force Majeure. LAB shall have no responsibility or liability to the Client for any failure or delay in performance by LAB, which results in whole or in part from any cause or circumstance beyond the reasonable control of LAB. Such causes and circumstances shall include, but not limited to, acts of God, acts or orders of any government authority, strikes or other labor disputes, natural disasters, accidents, wars, civil disturbances, difficulties or delays in transportation, mail or delivery services, inability to obtain sufficient services or supplies from LAB's usual suppliers, or any other cause beyond LAB's reasonable control.

Law. This contract shall be continued under the laws of the State of New York without regard to its conflicts of laws provision.

1 of 2

PARADIGM ENVIRONMENTAL SERVICES, INC.

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

CHAIN OF CUSTODY

REPORT TO:	INVOICE TO:	LAB PROJECT ID
CLIENT: Inventum Engineering PC	CLIENT:	202601
ADDRESS: 481 Carlisle Drive, Ste 202	ADDRESS:	Quotation #:
CITY: Herndon STATE: VA ZIP: 20170	CITY: STATE: ZIP:	Email:
PHONE: (571) 217-3627	PHONE:	todd.waldrop@inventumeng.com
ATTN: Todd Waldrop	ATTN:	

PROJECT REFERENCE: Buffalo Color Area A

Matrix Codes:
AQ - Aqueous Liquid, NQ - Non-Aqueous Liquid, WA - Water, WG - Groundwater, DW - Drinking Water, WW - Wastewater, SO - Soil, SL - Sludge, SD - Solid, PT - Paint, WP - Wipe, CK - Caulk, OL - Oil, AR - Air

REQUESTED ANALYSIS

DATE COLLECTED	TIME COLLECTED	COMPOSITE	GRAB	SAMPLE IDENTIFIER	MATRIX CODES	NUMBER OF CONTAINERS	TCL VOCs 8260	TCL SVOCs 8270	TAL Metals	REMARKS	PARADIGM LAB SAMPLE NUMBER
6/10/2020	1155		X	A-EW-4A	WA	4	2	1	1		01
↓	1115		X	A-EW-6	↓	4	2	1	1		02
↓	1518		X	A-EW-7A	↓	4	2	1	1		03
↓	1536		X	A-EW-7B	↓	4	2	1	1		04
↓	1231		X	A-EW-8	↓	4	2	1	1		05
↓				Trip Blank	↓	~~2~~ 1	~~2~~ 1	~~1~~	~~1~~	mw 6/11/2020 per sample label + visual client prepared Trip Blank	06

Turnaround Time		Report Supplements			
Availability contingent upon lab approval; additional fees may apply.					
Standard 5 day	☒	None Required	☐	None Required	☐
10 day	☐	Batch QC	☐	Basic EDD	☐
Rush 3 day	☐	Category A	☐	NYSDEC EDD	☐
Rush 2 day	☐	Category B	☐		
Rush 1 day	☐				
Date Needed ______ please indicate date needed:		Other please indicate package needed:	☐	Other EDD please indicate EDD needed :	☐

Sampled By: [signature] Date/Time: 6/10/2020 5:00

Relinquished By: [signature] Date/Time: 6/10/2020 5:00

Received By: Brian [signature] Date/Time: 6-10-2020 5:00

Received @ Lab By: [signature] Date/Time: 6/11/2020 1742

4°C iced 6/11/2020 16:08

Total Cost:

P.I.F.

By signing this form, client agrees to Paradigm Terms and Conditions (reverse).

See additional page for sample conditions.

2062

Chain of Custody Supplement

Client: Inventum **Completed by:** Molly Kail

Lab Project ID: 202601 **Date:** 6/11/2020

Sample Condition Requirements

Per NELAC/ELAP 210/241/242/243/244

Condition	NELAC compliance with the sample condition requirements upon receipt Yes	No	N/A
Container Type	X		
Comments			
Transferred to method-compliant container			X
Headspace (<1 mL)	VOA		X
Comments			
Preservation	VOA Met		SOP
Comments			
Chlorine Absent (<0.10 ppm per test strip)			Y
Comments			
Holding Time	X		
Comments			
Temperature	X		Met
Comments	4°C; cool		
Compliant Sample Quantity/Type	Y		
Comments			

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2006160 70

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

1 of 1

NEC

CHAIN OF CUSTODY

ADIRONDACK: ELAP ID: 1

REPORT TO:		INVOICE TO:			
COMPANY:	Paradigm Environmental	COMPANY:	Same	LAB PROJECT #:	CLIENT PROJEC
ADDRESS:		ADDRESS:			
CITY: STATE: ZIP:		CITY: STATE: ZIP:		TURNAROUND TIME: (WORKING DAYS)	
PHONE: FAX:		PHONE: FAX:			STD
PROJECT NAME/SITE NAME:		ATTN:	Reporting	ATTN: Accounts Payable	1 2 3 5
		COMMENTS:	Please email results to reporting@paradigmenv.com	Date Due:	

REQUESTED ANALYSIS

	DATE	TIME	COMPOSITE	GRAB	SAMPLE LOCATION/FIELD ID	MATRIX	NUMBER CONTAINERS	6010 TAL-Hg	REMARKS	PARADIGM LAB SAMPLE NUMBER
									IV FV	
1	6/10/2020	1155		X	202601-01	Dig	1	X	50ml 50ml	001
2	6/10/2020	1115		X	202601-02		1	X		002
3	6/10/2020	1518		X	202601-03		1	X		003
4	6/10/2020	1536		X	202601-04		1	X		004
5	6/10/2020	1231		X	202601-05		1	X		005
6										
7									1ppm Y added	
8									as IS.	
9										
10										

LAB USE ONLY BELOW THIS LINE

Sample Condition: Per NELAC/ELAP 210/241/242/243/244

Receipt Parameter		NELAC Compliance	
Container Type:	NOTAC	Y ☐	N ☐
Comments:			
Preservation:		Y ☐	N ☐
Comments:			
Holding Time:		Y ☐	N ☐
Comments:			
Temperature:	3°C	Y ☐	N ☐
Comments:			

Client

Sampled By: Emily Fournier Date/Time: 6/10/2020 0830

Relinquished By: Date/Time:

Received By: Date/Time:

Received @ Lab By: Date/Time: 6/10/20 5:51 P.m.

Total Cost:

P.I.F.

PARADIGM
ENVIRONMENTAL SERVICES, INC.

Analytical Report For

Inventum Engineering, P.C.

For Lab Project ID

202897

Referencing

Buffalo Color

Prepared

Monday, July 6, 2020

Any noncompliant QC parameters or other notes impacting data interpretation are flagged or documented on the final report or are noted below.

Certifies that this report has been approved by the Technical Director or Designee

179 Lake Avenue • Rochester, NY 14608 • (585) 647-2530 • Fax (585) 647-3311 • ELAP ID# 10958

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202897

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color

Sample Identifier:	T Sump-Area A-062520		
Lab Sample ID:	202897-01	**Date Sampled:**	6/25/2020
Matrix:	Water	**Date Received:**	6/26/2020

Mercury

Analyte	Result	Units	Qualifier	Date Analyzed
Mercury	< 0.000200	mg/L		6/30/2020 07:07

Method Reference(s): EPA 7470A
Preparation Date: 6/29/2020
Data File: Hg200630A

TAL Metals (ICP)

Analyte	Result	Units	Qualifier	Date Analyzed
Aluminum	**1.86**	mg/L		6/29/2020 16:57
Antimony	< 0.0600	mg/L		6/29/2020 16:57
Arsenic	< 0.0100	mg/L		6/30/2020 17:04
Barium	< 0.100	mg/L		6/29/2020 16:57
Beryllium	< 0.00500	mg/L		6/29/2020 16:57
Cadmium	< 0.00500	mg/L		6/29/2020 16:57
Calcium	**34.8**	mg/L		6/29/2020 16:57
Chromium	< 0.0100	mg/L		6/29/2020 16:57
Cobalt	< 0.0500	mg/L		6/29/2020 16:57
Copper	< 0.0200	mg/L		6/29/2020 16:57
Iron	**3.04**	mg/L		6/29/2020 16:57
Lead	< 0.0100	mg/L		6/29/2020 16:57
Magnesium	**4.30**	mg/L		6/29/2020 16:57
Manganese	**0.388**	mg/L		6/29/2020 16:57
Nickel	< 0.0400	mg/L		6/29/2020 16:57
Potassium	**7.52**	mg/L		6/29/2020 16:57
Selenium	< 0.0200	mg/L		6/29/2020 16:57
Silver	< 0.0100	mg/L		6/29/2020 16:57
Sodium	**117**	mg/L		6/29/2020 16:57
Thallium	< 0.0250	mg/L		6/29/2020 16:57
Vanadium	< 0.0250	mg/L		6/29/2020 16:57

Lab Project ID: 202897

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color

Sample Identifier: T Sump-Area A-062520
Lab Sample ID: 202897-01 **Date Sampled:** 6/25/2020
Matrix: Water **Date Received:** 6/26/2020

Zinc	< 0.0600	mg/L		6/29/2020 16:57

Method Reference(s): EPA 6010C
EPA 3005A
Preparation Date: 6/26/2020
Data File: 200629B

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed
1,1-Biphenyl	< 9.53	ug/L		6/30/2020 04:14
1,2,4,5-Tetrachlorobenzene	< 9.53	ug/L		6/30/2020 04:14
1,2,4-Trichlorobenzene	< 9.53	ug/L		6/30/2020 04:14
1,2-Dichlorobenzene	< 9.53	ug/L		6/30/2020 04:14
1,3-Dichlorobenzene	< 9.53	ug/L		6/30/2020 04:14
1,4-Dichlorobenzene	< 9.53	ug/L		6/30/2020 04:14
2,2-Oxybis (1-chloropropane)	< 9.53	ug/L		6/30/2020 04:14
2,3,4,6-Tetrachlorophenol	< 9.53	ug/L		6/30/2020 04:14
2,4,5-Trichlorophenol	< 9.53	ug/L		6/30/2020 04:14
2,4,6-Trichlorophenol	< 19.1	ug/L		6/30/2020 04:14
2,4-Dichlorophenol	< 9.53	ug/L		6/30/2020 04:14
2,4-Dimethylphenol	< 9.53	ug/L		6/30/2020 04:14
2,4-Dinitrophenol	< 19.1	ug/L		6/30/2020 04:14
2,4-Dinitrotoluene	< 9.53	ug/L		6/30/2020 04:14
2,6-Dinitrotoluene	< 9.53	ug/L		6/30/2020 04:14
2-Chloronaphthalene	< 9.53	ug/L		6/30/2020 04:14
2-Chlorophenol	< 9.53	ug/L		6/30/2020 04:14
2-Methylnapthalene	< 9.53	ug/L		6/30/2020 04:14
2-Methylphenol	< 9.53	ug/L		6/30/2020 04:14
2-Nitroaniline	< 19.1	ug/L		6/30/2020 04:14
2-Nitrophenol	< 9.53	ug/L		6/30/2020 04:14
3&4-Methylphenol	< 9.53	ug/L		6/30/2020 04:14
3,3'-Dichlorobenzidine	< 9.53	ug/L		6/30/2020 04:14
3-Nitroaniline	< 19.1	ug/L		6/30/2020 04:14

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202897

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color

Sample Identifier:	T Sump-Area A-062520		
Lab Sample ID:	202897-01	**Date Sampled:**	6/25/2020
Matrix:	Water	**Date Received:**	6/26/2020

4,6-Dinitro-2-methylphenol	< 19.1	ug/L	6/30/2020	04:14
4-Bromophenyl phenyl ether	< 9.53	ug/L	6/30/2020	04:14
4-Chloro-3-methylphenol	< 9.53	ug/L	6/30/2020	04:14
4-Chloroaniline	< 9.53	ug/L	6/30/2020	04:14
4-Chlorophenyl phenyl ether	< 9.53	ug/L	6/30/2020	04:14
4-Nitroaniline	< 19.1	ug/L	6/30/2020	04:14
4-Nitrophenol	< 19.1	ug/L	6/30/2020	04:14
Acenaphthene	< 9.53	ug/L	6/30/2020	04:14
Acenaphthylene	< 9.53	ug/L	6/30/2020	04:14
Acetophenone	< 9.53	ug/L	6/30/2020	04:14
Anthracene	< 9.53	ug/L	6/30/2020	04:14
Atrazine	< 9.53	ug/L	6/30/2020	04:14
Benzaldehyde	< 9.53	ug/L	6/30/2020	04:14
Benzo (a) anthracene	< 9.53	ug/L	6/30/2020	04:14
Benzo (a) pyrene	< 9.53	ug/L	6/30/2020	04:14
Benzo (b) fluoranthene	< 9.53	ug/L	6/30/2020	04:14
Benzo (g,h,i) perylene	< 9.53	ug/L	6/30/2020	04:14
Benzo (k) fluoranthene	< 9.53	ug/L	6/30/2020	04:14
Bis (2-chloroethoxy) methane	< 9.53	ug/L	6/30/2020	04:14
Bis (2-chloroethyl) ether	< 9.53	ug/L	6/30/2020	04:14
Bis (2-ethylhexyl) phthalate	< 9.53	ug/L	6/30/2020	04:14
Butylbenzylphthalate	< 9.53	ug/L	6/30/2020	04:14
Caprolactam	< 9.53	ug/L	6/30/2020	04:14
Carbazole	< 9.53	ug/L	6/30/2020	04:14
Chrysene	< 9.53	ug/L	6/30/2020	04:14
Dibenz (a,h) anthracene	< 9.53	ug/L	6/30/2020	04:14
Dibenzofuran	< 9.53	ug/L	6/30/2020	04:14
Diethyl phthalate	< 9.53	ug/L	6/30/2020	04:14
Dimethyl phthalate	< 19.1	ug/L	6/30/2020	04:14
Di-n-butyl phthalate	< 9.53	ug/L	6/30/2020	04:14

Sample Identifier: T Sump-Area A-062520
Lab Sample ID: 202897-01 **Date Sampled:** 6/25/2020
Matrix: Water **Date Received:** 6/26/2020

Di-n-octylphthalate	< 9.53	ug/L	6/30/2020	04:14
Fluoranthene	< 9.53	ug/L	6/30/2020	04:14
Fluorene	< 9.53	ug/L	6/30/2020	04:14
Hexachlorobenzene	< 9.53	ug/L	6/30/2020	04:14
Hexachlorobutadiene	< 9.53	ug/L	6/30/2020	04:14
Hexachlorocyclopentadiene	< 9.53	ug/L	6/30/2020	04:14
Hexachloroethane	< 9.53	ug/L	6/30/2020	04:14
Indeno (1,2,3-cd) pyrene	< 9.53	ug/L	6/30/2020	04:14
Isophorone	< 9.53	ug/L	6/30/2020	04:14
Naphthalene	< 9.53	ug/L	6/30/2020	04:14
Nitrobenzene	< 9.53	ug/L	6/30/2020	04:14
N-Nitroso-di-n-propylamine	< 9.53	ug/L	6/30/2020	04:14
N-Nitrosodiphenylamine	< 9.53	ug/L	6/30/2020	04:14
Pentachlorophenol	< 19.1	ug/L	6/30/2020	04:14
Phenanthrene	< 9.53	ug/L	6/30/2020	04:14
Phenol	< 9.53	ug/L	6/30/2020	04:14
Pyrene	< 9.53	ug/L	6/30/2020	04:14

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
2,4,6-Tribromophenol	**68.7**	61.4 - 115		6/30/2020	04:14
2-Fluorobiphenyl	**64.7**	38.4 - 101		6/30/2020	04:14
2-Fluorophenol	**34.6**	12.7 - 105		6/30/2020	04:14
Nitrobenzene-d5	**79.9**	57.3 - 100		6/30/2020	04:14
Phenol-d5	**23.3**	10 - 107		6/30/2020	04:14
Terphenyl-d14	**75.3**	58.1 - 117		6/30/2020	04:14

Method Reference(s): EPA 8270D
EPA 3510C
Preparation Date: 6/29/2020
Data File: B47578.D

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed	
1,1,1-Trichloroethane	< 2.00	ug/L		7/2/2020	14:50

Lab Project ID: 202897

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color

Sample Identifier:	T Sump-Area A-062520		
Lab Sample ID:	202897-01	**Date Sampled:**	6/25/2020
Matrix:	Water	**Date Received:**	6/26/2020

1,1,2,2-Tetrachloroethane	< 2.00	ug/L	7/2/2020	14:50
1,1,2-Trichloroethane	< 2.00	ug/L	7/2/2020	14:50
1,1-Dichloroethane	< 2.00	ug/L	7/2/2020	14:50
1,1-Dichloroethene	< 2.00	ug/L	7/2/2020	14:50
1,2,3-Trichlorobenzene	< 5.00	ug/L	7/2/2020	14:50
1,2,4-Trichlorobenzene	< 5.00	ug/L	7/2/2020	14:50
1,2-Dibromo-3-Chloropropane	< 10.0	ug/L	7/2/2020	14:50
1,2-Dibromoethane	< 2.00	ug/L	7/2/2020	14:50
1,2-Dichlorobenzene	< 2.00	ug/L	7/2/2020	14:50
1,2-Dichloroethane	< 2.00	ug/L	7/2/2020	14:50
1,2-Dichloropropane	< 2.00	ug/L	7/2/2020	14:50
1,3-Dichlorobenzene	< 2.00	ug/L	7/2/2020	14:50
1,4-Dichlorobenzene	< 2.00	ug/L	7/2/2020	14:50
1,4-Dioxane	< 20.0	ug/L	7/2/2020	14:50
2-Butanone	< 10.0	ug/L	7/2/2020	14:50
2-Hexanone	< 5.00	ug/L	7/2/2020	14:50
4-Methyl-2-pentanone	< 5.00	ug/L	7/2/2020	14:50
Acetone	< 10.0	ug/L	7/2/2020	14:50
Benzene	< 1.00	ug/L	7/2/2020	14:50
Bromochloromethane	< 5.00	ug/L	7/2/2020	14:50
Bromodichloromethane	< 2.00	ug/L	7/2/2020	14:50
Bromoform	< 5.00	ug/L	7/2/2020	14:50
Bromomethane	< 2.00	ug/L	7/2/2020	14:50
Carbon disulfide	< 2.00	ug/L	7/2/2020	14:50
Carbon Tetrachloride	< 2.00	ug/L	7/2/2020	14:50
Chlorobenzene	< 2.00	ug/L	7/2/2020	14:50
Chloroethane	< 2.00	ug/L	7/2/2020	14:50
Chloroform	< 2.00	ug/L	7/2/2020	14:50
Chloromethane	< 2.00	ug/L	7/2/2020	14:50
cis-1,2-Dichloroethene	< 2.00	ug/L	7/2/2020	14:50

PARADIGM ENVIRONMENTAL SERVICES, INC.

Lab Project ID: 202897

Client: **Inventum Engineering, P.C.**

Project Reference: Buffalo Color

Sample Identifier:	T Sump-Area A-062520		
Lab Sample ID:	202897-01	**Date Sampled:**	6/25/2020
Matrix:	Water	**Date Received:**	6/26/2020

cis-1,3-Dichloropropene	< 2.00	ug/L	7/2/2020	14:50
Cyclohexane	< 10.0	ug/L	7/2/2020	14:50
Dibromochloromethane	< 2.00	ug/L	7/2/2020	14:50
Dichlorodifluoromethane	< 2.00	ug/L	7/2/2020	14:50
Ethylbenzene	< 2.00	ug/L	7/2/2020	14:50
Freon 113	< 2.00	ug/L	7/2/2020	14:50
Isopropylbenzene	< 2.00	ug/L	7/2/2020	14:50
m,p-Xylene	< 2.00	ug/L	7/2/2020	14:50
Methyl acetate	< 2.00	ug/L	7/2/2020	14:50
Methyl tert-butyl Ether	< 2.00	ug/L	7/2/2020	14:50
Methylcyclohexane	< 2.00	ug/L	7/2/2020	14:50
Methylene chloride	< 5.00	ug/L	7/2/2020	14:50
o-Xylene	< 2.00	ug/L	7/2/2020	14:50
Styrene	< 5.00	ug/L	7/2/2020	14:50
Tetrachloroethene	< 2.00	ug/L	7/2/2020	14:50
Toluene	< 2.00	ug/L	7/2/2020	14:50
trans-1,2-Dichloroethene	< 2.00	ug/L	7/2/2020	14:50
trans-1,3-Dichloropropene	< 2.00	ug/L	7/2/2020	14:50
Trichloroethene	< 2.00	ug/L	7/2/2020	14:50
Trichlorofluoromethane	< 2.00	ug/L	7/2/2020	14:50
Vinyl chloride	< 2.00	ug/L	7/2/2020	14:50

Surrogate	**Percent Recovery**	**Limits**	**Outliers**	**Date Analyzed**	
1,2-Dichloroethane-d4	**117**	80.8 - 132		7/2/2020	14:50
4-Bromofluorobenzene	**61.8**	56.6 - 130		7/2/2020	14:50
Pentafluorobenzene	**106**	87.4 - 113		7/2/2020	14:50
Toluene-D8	**89.5**	82.2 - 115		7/2/2020	14:50

Method Reference(s): EPA 8260C
EPA 5030C

Data File: x71509.D

PARADIGM
ENVIRONMENTAL SERVICES, INC

Method Blank Report

Client: Inventum Engineering, P.C.

Project Reference: Buffalo Color

Lab Project ID: 202897

Matrix: Water

Mercury

Analyte	Result	Units	Qualifier	Date Analyzed
Mercury	<0.000200	mg/L		6/30/2020 06:52

Method Reference(s): EPA 7470A
Preparation Date: 6/29/2020
Data File: Hg200630A
QC Batch ID: QC200629Hgwater
QC Number: 1

PARADIGM
ENVIRONMENTAL SERVICES, INC.

QC Report for Laboratory Control Sample and Control Sample Duplicate

Client: Inventum Engineering, P.C.

Project Reference: Buffalo Color

Lab Project ID: 202897

Matrix: Water

Mercury

Analyte	LCS Added	LCSD Added	Spike Units	LCS Result	LCSD Result	LCS % Recovery	LCSD % Recovery	% Rec Limits	LCS Outliers	LCSD Outliers	Relative % Difference	RPD Limit	RPD Outliers	Date Analyzed
Mercury	0.00200	0.00200	mg/L	0.00207	0.00203	104	101	85 - 115			2.21	20		6/30/2020

Method Reference(s): EPA 7470A
Preparation Date: 6/29/2020
Data File: Hg200630A
QC Number: 1
QC Batch ID: QC200629Hgwater

Report Prepared Monday, July 6, 2020

PARADIGM
ENVIRONMENTAL SERVICES, INC.

QC Report for Sample Spike and Sample Duplicate

Client: Inventum Engineering, P.C. **Lab Project ID:** 202897

Project Reference: Buffalo Color

Lab Sample ID: 202897-01 **Date Sampled:** 6/25/2020
Sample Identifier: T Sump-Area A-062520 **Date Received:** 6/26/2020
Matrix: Water

Mercury

Analyte	Sample Results	Result Units	Spike Added	Spike Result	Spike % Recovery	% Rec Limits	Spike Outliers	Duplicate Result	Relative % Difference	RPD Limit	RPD Outliers	Date Analyzed
Mercury	< 0.000200	mg/L	0.00200	0.00204	102	70 - 130		<0.000200	NC	20		6/30/2020

Method Reference(s): EPA 7470A
Preparation Date: 6/29/2020
Hg200630A
QC Batch ID: QC200629Hgwater

NC = Not Calculable. Applicable to RPD if sample or duplicate result is non-detect or estimated (see primary report for data flags). Applicable to MS if sample is greater or equal to ten times the spike added.

This report is part of a multipage document and should only be evaluated in its entirety. The Chain of Custody provides additional sample information, including compliance with the sample condition requirements upon receipt.

Report Prepared Monday, July 6, 2020

PARADIGM
ENVIRONMENTAL SERVICES, INC

Method Blank Report

Client: Inventum Engineering, P.C.
Project Reference: Buffalo Color
Lab Project ID: 202897
Matrix: Water

TAL Metals (ICP)

Analyte	Result	Units	Qualifier	Date Analyzed	
Aluminum	<0.100	mg/L		6/29/2020	15:57
Antimony	<0.0600	mg/L		6/29/2020	15:57
Arsenic	<0.0100	mg/L		6/30/2020	16:49
Barium	<0.100	mg/L		6/29/2020	15:57
Beryllium	<0.00500	mg/L		6/29/2020	15:57
Cadmium	<0.00500	mg/L		6/29/2020	15:57
Calcium	<2.50	mg/L		6/29/2020	15:57
Chromium	<0.0100	mg/L		6/29/2020	15:57
Cobalt	<0.0500	mg/L		6/29/2020	15:57
Copper	<0.0400	mg/L		6/29/2020	15:57
Iron	<0.100	mg/L		6/30/2020	16:49
Lead	<0.0100	mg/L		6/29/2020	15:57
Magnesium	<2.50	mg/L		6/29/2020	15:57
Manganese	<0.0150	mg/L		6/29/2020	15:57
Nickel	<0.0400	mg/L		6/29/2020	15:57
Potassium	<2.50	mg/L		6/29/2020	15:57
Selenium	<0.0200	mg/L		6/29/2020	15:57
Silver	<0.0100	mg/L		6/29/2020	15:57
Sodium	<2.50	mg/L		6/29/2020	15:57
Thallium	<0.0250	mg/L		6/29/2020	15:57
Vanadium	<0.0250	mg/L		6/29/2020	15:57
Zinc	<0.0600	mg/L		6/29/2020	15:57

Method Reference(s): EPA 6010C
EPA 3005A
Preparation Date: 6/26/2020
Data File: 200629B
QC Batch ID: QC200626Water
QC Number: 1

PARADIGM
ENVIRONMENTAL SERVICES, INC.

QC Report for Laboratory Control Sample and Control Sample Duplicate

Client: Inventum Engineering, P.C.

Project Reference: Buffalo Color

Lab Project ID: 202897

Matrix: Water

Metals

Analyte	LCS Added	LCSD Added	Spike Units	LCS Result	LCSD Result	LCS % Recovery	LCSD % Recovery	% Rec Limits	LCS Outliers	LCSD Outliers	Relative % Difference	RPD Limit	RPD Outliers	Date Analyzed
Aluminum	2.50	2.50	mg/L	2.43	2.46	97.0	98.4	85 - 115			1.36	20		6/29/2020
Antimony	2.50	2.50	mg/L	2.54	2.57	102	103	85 - 115			0.981	20		6/29/2020
Arsenic	2.50	2.50	mg/L	2.50	2.52	100	101	85 - 115			0.880	20		6/29/2020
Barium	2.50	2.50	mg/L	2.60	2.65	104	106	85 - 115			1.92	20		6/29/2020
Beryllium	0.500	0.500	mg/L	0.473	0.476	94.6	95.3	85 - 115			0.670	20		6/29/2020
Cadmium	1.00	1.00	mg/L	1.08	1.09	108	109	85 - 115			1.18	20		6/29/2020
Calcium	4.00	4.00	mg/L	3.90	3.93	97.5	98.3	85 - 115			0.881	20		6/29/2020
Chromium	2.50	2.50	mg/L	2.57	2.60	103	104	85 - 115			1.24	20		6/29/2020
Cobalt	1.00	1.00	mg/L	1.04	1.06	104	106	85 - 115			1.20	20		6/29/2020
Copper	2.50	2.50	mg/L	2.36	2.37	94.2	95.0	85 - 115			0.803	20		6/29/2020
Iron	2.50	2.50	mg/L	2.30	2.32	91.9	92.9	85 - 115			1.12	20		6/29/2020
Lead	2.50	2.50	mg/L	2.60	2.63	104	105	85 - 115			1.16	20		6/29/2020
Magnesium	8.00	8.00	mg/L	8.16	8.23	102	103	85 - 115			0.927	20		6/29/2020
Manganese	1.00	1.00	mg/L	1.02	1.02	102	102	85 - 115			0.737	20		6/29/2020
Nickel	5.00	5.00	mg/L	5.14	5.20	103	104	85 - 115			1.21	20		6/29/2020
Potassium	42.5	42.5	mg/L	41.5	42.1	97.6	99.0	85 - 115			1.44	20		6/29/2020

Report Prepared Monday, July 6, 2020

PARADIGM
ENVIRONMENTAL SERVICES, INC.

QC Report for Laboratory Control Sample and Control Sample Duplicate

Client: Inventum Engineering, P.C.

Project Reference: Buffalo Color

Lab Project ID: 202897

Matrix: Water

Metals

Analyte	LCS Added	LCSD Added	Spike Units	LCS Result	LCSD Result	LCS % Recovery	LCSD % Recovery	% Rec Limits	LCS Outliers	LCSD Outliers	Relative % Difference	RPD Limit	RPD Outliers	Date Analyzed
Selenium	2.50	2.50	mg/L	2.51	2.52	100	101	85 - 115			0.545	20		6/29/2020
Silver	0.250	0.250	mg/L	0.249	0.253	99.8	101	85 - 115			1.32	20		6/29/2020
Sodium	12.0	12.0	mg/L	11.5	11.7	96.1	97.2	85 - 115			1.22	20		6/29/2020
Thallium	2.50	2.50	mg/L	2.65	2.67	106	107	85 - 115			0.747	20		6/29/2020
Vanadium	1.00	1.00	mg/L	0.981	0.991	98.1	99.1	85 - 115			1.05	20		6/29/2020
Zinc	2.50	2.50	mg/L	2.60	2.63	104	105	85 - 115			0.928	20		6/29/2020

Method Reference(s): EPA 6010C
EPA 3005A
Preparation Date: 6/26/2020
Data File: 200629B
QC Number: 1
QC Batch ID: QC200626Water

Report Prepared Monday, July 6, 2020

PARADIGM
ENVIRONMENTAL SERVICES, INC

Method Blank Report

Client: Inventum Engineering, P.C.

Project Reference: Buffalo Color

Lab Project ID: 202897

Matrix: Water

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed	
1,1-Biphenyl	<10.0	ug/L		6/30/2020	03:14
1,2,4,5-Tetrachlorobenzene	<10.0	ug/L		6/30/2020	03:14
1,2,4-Trichlorobenzene	<10.0	ug/L		6/30/2020	03:14
1,2-Dichlorobenzene	<10.0	ug/L		6/30/2020	03:14
1,3-Dichlorobenzene	<10.0	ug/L		6/30/2020	03:14
1,4-Dichlorobenzene	<10.0	ug/L		6/30/2020	03:14
2,2-Oxybis (1-chloropropane)	<10.0	ug/L		6/30/2020	03:14
2,3,4,6-Tetrachlorophenol	<10.0	ug/L		6/30/2020	03:14
2,4,5-Trichlorophenol	<10.0	ug/L		6/30/2020	03:14
2,4,6-Trichlorophenol	<20.0	ug/L		6/30/2020	03:14
2,4-Dichlorophenol	<10.0	ug/L		6/30/2020	03:14
2,4-Dimethylphenol	<10.0	ug/L		6/30/2020	03:14
2,4-Dinitrophenol	<20.0	ug/L		6/30/2020	03:14
2,4-Dinitrotoluene	<10.0	ug/L		6/30/2020	03:14
2,6-Dinitrotoluene	<10.0	ug/L		6/30/2020	03:14
2-Chloronaphthalene	<10.0	ug/L		6/30/2020	03:14
2-Chlorophenol	<10.0	ug/L		6/30/2020	03:14
2-Methylnapthalene	<10.0	ug/L		6/30/2020	03:14
2-Methylphenol	<10.0	ug/L		6/30/2020	03:14
2-Nitroaniline	<20.0	ug/L		6/30/2020	03:14
2-Nitrophenol	<10.0	ug/L		6/30/2020	03:14
3&4-Methylphenol	<10.0	ug/L		6/30/2020	03:14
3,3'-Dichlorobenzidine	<10.0	ug/L		6/30/2020	03:14
3-Nitroaniline	<20.0	ug/L		6/30/2020	03:14
4,6-Dinitro-2-methylphenol	<20.0	ug/L		6/30/2020	03:14
4-Bromophenyl phenyl ether	<10.0	ug/L		6/30/2020	03:14
4-Chloro-3-methylphenol	<10.0	ug/L		6/30/2020	03:14
4-Chloroaniline	<10.0	ug/L		6/30/2020	03:14

PARADIGM

ENVIRONMENTAL SERVICES, INC

Method Blank Report

Client: Inventum Engineering, P.C.

Project Reference: Buffalo Color

Lab Project ID: 202897

Matrix: Water

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed	
4-Chlorophenyl phenyl ether	<10.0	ug/L		6/30/2020	03:14
4-Nitroaniline	<20.0	ug/L		6/30/2020	03:14
4-Nitrophenol	<20.0	ug/L		6/30/2020	03:14
Acenaphthene	<10.0	ug/L		6/30/2020	03:14
Acenaphthylene	<10.0	ug/L		6/30/2020	03:14
Acetophenone	<10.0	ug/L		6/30/2020	03:14
Anthracene	<10.0	ug/L		6/30/2020	03:14
Atrazine	<10.0	ug/L		6/30/2020	03:14
Benzaldehyde	<10.0	ug/L		6/30/2020	03:14
Benzo (a) anthracene	<10.0	ug/L		6/30/2020	03:14
Benzo (a) pyrene	<10.0	ug/L		6/30/2020	03:14
Benzo (b) fluoranthene	<10.0	ug/L		6/30/2020	03:14
Benzo (g,h,i) perylene	<10.0	ug/L		6/30/2020	03:14
Benzo (k) fluoranthene	<10.0	ug/L		6/30/2020	03:14
Bis (2-chloroethoxy) methane	<10.0	ug/L		6/30/2020	03:14
Bis (2-chloroethyl) ether	<10.0	ug/L		6/30/2020	03:14
Bis (2-ethylhexyl) phthalate	<10.0	ug/L		6/30/2020	03:14
Butylbenzylphthalate	<10.0	ug/L		6/30/2020	03:14
Caprolactam	<10.0	ug/L		6/30/2020	03:14
Carbazole	<10.0	ug/L		6/30/2020	03:14
Chrysene	<10.0	ug/L		6/30/2020	03:14
Dibenz (a,h) anthracene	<10.0	ug/L		6/30/2020	03:14
Dibenzofuran	<10.0	ug/L		6/30/2020	03:14
Diethyl phthalate	<10.0	ug/L		6/30/2020	03:14
Dimethyl phthalate	<20.0	ug/L		6/30/2020	03:14
Di-n-butyl phthalate	<10.0	ug/L		6/30/2020	03:14
Di-n-octylphthalate	<10.0	ug/L		6/30/2020	03:14
Fluoranthene	<10.0	ug/L		6/30/2020	03:14

PARADIGM
ENVIRONMENTAL SERVICES, INC

Method Blank Report

Client: Inventum Engineering, P.C.

Project Reference: Buffalo Color

Lab Project ID: 202897

Matrix: Water

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Result	Units	Qualifier	Date Analyzed	
Fluorene	<10.0	ug/L		6/30/2020	03:14
Hexachlorobenzene	<10.0	ug/L		6/30/2020	03:14
Hexachlorobutadiene	<10.0	ug/L		6/30/2020	03:14
Hexachlorocyclopentadiene	<10.0	ug/L		6/30/2020	03:14
Hexachloroethane	<10.0	ug/L		6/30/2020	03:14
Indeno (1,2,3-cd) pyrene	<10.0	ug/L		6/30/2020	03:14
Isophorone	<10.0	ug/L		6/30/2020	03:14
Naphthalene	<10.0	ug/L		6/30/2020	03:14
Nitrobenzene	<10.0	ug/L		6/30/2020	03:14
N-Nitroso-di-n-propylamine	<10.0	ug/L		6/30/2020	03:14
N-Nitrosodiphenylamine	<10.0	ug/L		6/30/2020	03:14
Pentachlorophenol	<20.0	ug/L		6/30/2020	03:14
Phenanthrene	<10.0	ug/L		6/30/2020	03:14
Phenol	<10.0	ug/L		6/30/2020	03:14
Pyrene	<10.0	ug/L		6/30/2020	03:14

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed	
2,4,6-Tribromophenol	**69.4**	61.4 - 115		6/30/2020	03:14
2-Fluorobiphenyl	**57.3**	38.4 - 101		6/30/2020	03:14
2-Fluorophenol	**40.4**	12.7 - 105		6/30/2020	03:14
Nitrobenzene-d5	**77.5**	57.3 - 100		6/30/2020	03:14
Phenol-d5	**28.5**	10 - 107		6/30/2020	03:14
Terphenyl-d14	**79.0**	58.1 - 117		6/30/2020	03:14

Method Reference(s): EPA 8270D
EPA 3510C
Preparation Date: 6/29/2020
Data File: B47576.D
QC Batch ID: QC200629ABNW
QC Number: 1

PARADIGM
ENVIRONMENTAL SERVICES, INC

QC Report for Laboratory Control Sample

Client: Inventum Engineering, P.C.
Project Reference: Buffalo Color
Lab Project ID: 202897
Matrix: Water

Semi-Volatile Organics (Acid/Base Neutrals)

Analyte	Spike Added	Spike Units	LCS Result	LCS % Recovery	% Rec Limits	LCS Outliers	Date Analyzed
1,2,4-Trichlorobenzene	50.0	ug/L	26.5	53.0	35.2 - 98.2		6/30/2020
1,4-Dichlorobenzene	50.0	ug/L	24.6	49.1	25.3 - 96.3		6/30/2020
2,4-Dinitrotoluene	50.0	ug/L	39.6	79.3	62.6 - 111		6/30/2020
2-Chlorophenol	75.0	ug/L	53.5	71.4	53.9 - 104		6/30/2020
4-Chloro-3-methylphenol	75.0	ug/L	60.4	80.5	63.1 - 111		6/30/2020
4-Nitrophenol	75.0	ug/L	28.4	37.8	10 - 125		6/30/2020
Acenaphthene	50.0	ug/L	35.2	70.5	59.2 - 103		6/30/2020
N-Nitroso-di-n-propylamine	50.0	ug/L	40.2	80.5	62.4 - 105		6/30/2020
Pentachlorophenol	75.0	ug/L	60.9	81.1	48 - 151		6/30/2020
Phenol	75.0	ug/L	25.4	33.9	10 - 112		6/30/2020
Pyrene	50.0	ug/L	38.9	77.7	63.7 - 111		6/30/2020

Method Reference(s): EPA 8270D
EPA 3510C
Preparation Date: 6/29/2020
Data File: B47587.D
QC Number: 1
QC Batch ID: QC200629ABNW

Report Prepared Thursday, July 02, 2020

PARADIGM

ENVIRONMENTAL SERVICES, INC

Method Blank Report

Client: Inventum Engineering, P.C.

Project Reference: Buffalo Color

Lab Project ID: 202897

Matrix: Water

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed	
1,1,1-Trichloroethane	<2.00	ug/L		7/2/2020	14:05
1,1,2,2-Tetrachloroethane	<2.00	ug/L		7/2/2020	14:05
1,1,2-Trichloroethane	<2.00	ug/L		7/2/2020	14:05
1,1-Dichloroethane	<2.00	ug/L		7/2/2020	14:05
1,1-Dichloroethene	<2.00	ug/L		7/2/2020	14:05
1,2,3-Trichlorobenzene	<5.00	ug/L		7/2/2020	14:05
1,2,4-Trichlorobenzene	<5.00	ug/L		7/2/2020	14:05
1,2-Dibromo-3-Chloropropane	<10.0	ug/L		7/2/2020	14:05
1,2-Dibromoethane	<2.00	ug/L		7/2/2020	14:05
1,2-Dichlorobenzene	<2.00	ug/L		7/2/2020	14:05
1,2-Dichloroethane	<2.00	ug/L		7/2/2020	14:05
1,2-Dichloropropane	<2.00	ug/L		7/2/2020	14:05
1,3-Dichlorobenzene	<2.00	ug/L		7/2/2020	14:05
1,4-Dichlorobenzene	<2.00	ug/L		7/2/2020	14:05
1,4-Dioxane	<20.0	ug/L		7/2/2020	14:05
2-Butanone	<10.0	ug/L		7/2/2020	14:05
2-Hexanone	<5.00	ug/L		7/2/2020	14:05
4-Methyl-2-pentanone	<5.00	ug/L		7/2/2020	14:05
Acetone	<10.0	ug/L		7/2/2020	14:05
Benzene	<1.00	ug/L		7/2/2020	14:05
Bromochloromethane	<5.00	ug/L		7/2/2020	14:05
Bromodichloromethane	<2.00	ug/L		7/2/2020	14:05
Bromoform	<5.00	ug/L		7/2/2020	14:05
Bromomethane	<2.00	ug/L		7/2/2020	14:05
Carbon disulfide	<2.00	ug/L		7/2/2020	14:05
Carbon Tetrachloride	<2.00	ug/L		7/2/2020	14:05
Chlorobenzene	<2.00	ug/L		7/2/2020	14:05

PARADIGM
ENVIRONMENTAL SERVICES, INC

Method Blank Report

Client: Inventum Engineering, P.C.

Project Reference: Buffalo Color

Lab Project ID: 202897

Matrix: Water

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed	
Chloroethane	<2.00	ug/L		7/2/2020	14:05
Chloroform	<2.00	ug/L		7/2/2020	14:05
Chloromethane	<2.00	ug/L		7/2/2020	14:05
cis-1,2-Dichloroethene	<2.00	ug/L		7/2/2020	14:05
cis-1,3-Dichloropropene	<2.00	ug/L		7/2/2020	14:05
Cyclohexane	<10.0	ug/L		7/2/2020	14:05
Dibromochloromethane	<2.00	ug/L		7/2/2020	14:05
Dichlorodifluoromethane	<2.00	ug/L		7/2/2020	14:05
Ethylbenzene	<2.00	ug/L		7/2/2020	14:05
Freon 113	<2.00	ug/L		7/2/2020	14:05
Isopropylbenzene	<2.00	ug/L		7/2/2020	14:05
m,p-Xylene	<2.00	ug/L		7/2/2020	14:05
Methyl acetate	<2.00	ug/L		7/2/2020	14:05
Methyl tert-butyl Ether	<2.00	ug/L		7/2/2020	14:05
Methylcyclohexane	<2.00	ug/L		7/2/2020	14:05
Methylene chloride	<5.00	ug/L		7/2/2020	14:05
o-Xylene	<2.00	ug/L		7/2/2020	14:05
Styrene	<5.00	ug/L		7/2/2020	14:05
Tetrachloroethene	<2.00	ug/L		7/2/2020	14:05
Toluene	<2.00	ug/L		7/2/2020	14:05
trans-1,2-Dichloroethene	<2.00	ug/L		7/2/2020	14:05
trans-1,3-Dichloropropene	<2.00	ug/L		7/2/2020	14:05
Trichloroethene	<2.00	ug/L		7/2/2020	14:05
Trichlorofluoromethane	<2.00	ug/L		7/2/2020	14:05
Vinyl chloride	<2.00	ug/L		7/2/2020	14:05

PARADIGM
ENVIRONMENTAL SERVICES, INC

Method Blank Report

Client: Inventum Engineering, P.C.

Project Reference: Buffalo Color

Lab Project ID: 202897

Matrix: Water

Volatile Organics

Analyte	Result	Units	Qualifier	Date Analyzed

Surrogate	Percent Recovery	Limits	Outliers	Date Analyzed
1,2-Dichloroethane-d4	**111**	80.8 - 132		7/2/2020 14:05
4-Bromofluorobenzene	**62.0**	56.6 - 130		7/2/2020 14:05
Pentafluorobenzene	**104**	87.4 - 113		7/2/2020 14:05
Toluene-D8	**83.6**	82.2 - 115		7/2/2020 14:05

Method Reference(s): EPA 8260C
EPA 5030C

Data File: x71507.D

QC Batch ID: voaw200702

QC Number: 1

PARADIGM
ENVIRONMENTAL SERVICES, INC

QC Report for Laboratory Control Sample

Client: Inventum Engineering, P.C.
Project Reference: Buffalo Color
Lab Project ID: 202897
Matrix: Water

Volatile Organics

Analyte	Spike Added	Spike Units	LCS Result	LCS % Recovery	% Rec Limits	LCS Outliers	Date Analyzed
1,1,1-Trichloroethane	20.0	ug/L	20.8	104	68.9 - 126		7/2/2020
1,1,2,2-Tetrachloroethane	20.0	ug/L	24.8	124	67.7 - 136		7/2/2020
1,1,2-Trichloroethane	20.0	ug/L	22.5	112	71.2 - 130		7/2/2020
1,1-Dichloroethane	20.0	ug/L	19.1	95.4	69.6 - 130		7/2/2020
1,1-Dichloroethene	20.0	ug/L	18.2	90.8	61.5 - 124		7/2/2020
1,2-Dichlorobenzene	20.0	ug/L	20.0	100	70.8 - 125		7/2/2020
1,2-Dichloroethane	20.0	ug/L	22.5	112	69.5 - 139		7/2/2020
1,2-Dichloropropane	20.0	ug/L	18.3	91.4	73.5 - 120		7/2/2020
1,3-Dichlorobenzene	20.0	ug/L	17.8	89.1	68.2 - 121		7/2/2020
1,4-Dichlorobenzene	20.0	ug/L	18.1	90.3	65.2 - 119		7/2/2020
Benzene	20.0	ug/L	20.7	104	75 - 128		7/2/2020
Bromodichloromethane	20.0	ug/L	21.2	106	70.1 - 126		7/2/2020
Bromoform	20.0	ug/L	21.1	106	52 - 128		7/2/2020
Bromomethane	20.0	ug/L	23.5	118	56 - 149		7/2/2020
Carbon Tetrachloride	20.0	ug/L	20.9	104	66.2 - 129		7/2/2020
Chlorobenzene	20.0	ug/L	20.9	105	71.1 - 124		7/2/2020

Report Prepared Monday, July 06, 2020

PARADIGM
ENVIRONMENTAL SERVICES, INC

QC Report for Laboratory Control Sample

Client: Inventum Engineering, P.C.
Project Reference: Buffalo Color
Lab Project ID: 202897
Matrix: Water

Volatile Organics

Analyte	Spike Added	Spike Units	LCS Result	LCS % Recovery	% Rec Limits	LCS Outliers	Date Analyzed
Chloroethane	20.0	ug/L	21.7	108	60.2 - 135		7/2/2020
Chloroform	20.0	ug/L	22.0	110	74.5 - 130		7/2/2020
Chloromethane	20.0	ug/L	24.5	123	38.6 - 159		7/2/2020
cis-1,3-Dichloropropene	20.0	ug/L	13.3	66.3	58 - 113		7/2/2020
Dibromochloromethane	20.0	ug/L	22.3	111	61.6 - 134		7/2/2020
Ethylbenzene	20.0	ug/L	19.4	96.9	70.6 - 130		7/2/2020
Methylene chloride	20.0	ug/L	21.3	107	61.4 - 143		7/2/2020
Tetrachloroethene	20.0	ug/L	20.7	103	63.4 - 139		7/2/2020
Toluene	20.0	ug/L	19.6	98.2	75.8 - 130		7/2/2020
trans-1,2-Dichloroethene	20.0	ug/L	20.5	103	67.6 - 131		7/2/2020
trans-1,3-Dichloropropene	20.0	ug/L	14.9	74.3	55.8 - 118		7/2/2020
Trichloroethene	20.0	ug/L	18.2	91.0	72.6 - 122		7/2/2020
Trichlorofluoromethane	20.0	ug/L	22.8	114	63.8 - 142		7/2/2020
Vinyl chloride	20.0	ug/L	19.4	96.8	58.5 - 142		7/2/2020

Report Prepared Monday, July 06, 2020

PARADIGM
ENVIRONMENTAL SERVICES, INC

QC Report for Laboratory Control Sample

Client: Inventum Engineering, P.C.

Project Reference: Buffalo Color

Lab Project ID: 202897

Matrix: Water

Volatile Organics

Analyte	Spike Added	Spike Units	LCS Result	LCS % Recovery	% Rec Limits	LCS Outliers	Date Analyzed

Method Reference(s): EPA 8260C
EPA 5030C
Data File: x71506.D
QC Number: 1
QC Batch ID: voaw200702

Report Prepared Monday, July 06, 2020

Analytical Report Appendix

The reported results relate only to the samples as they have been received by the laboratory.

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All soil/sludge samples have been reported on a dry weight basis, unless qualified "reported as received". Other solids are reported as received.

Low level Volatiles blank reports for soil/solid matrix are based on a nominal 5 gram weight. Sample results and reporting limits are based on actual weight, which may be more or less than 5 grams.

The Chain of Custody provides additional information, including compliance with sample condition requirements upon receipt. Sample condition requirements are defined under the 2003 NELAC Standard, sections 5.5.8.3.1 and 5.5.8.3.2.

NYSDOH ELAP does not certify for all parameters. Paradigm Environmental Services or the indicated subcontracted laboratory does hold certification for all analytes where certification is offered by ELAP unless otherwise specified. Aliquots separated for certain tests, such as TCLP, are indicated on the Chain of Custody and final reports with an "A" suffix.

Data qualifiers are used, when necessary, to provide additional information about the data. This information may be communicated as a flag or as text at the bottom of the report. Please refer to the following list of analyte-specific, frequently used data flags and their meaning:

"<" = Analyzed for but not detected at or above the quantitation limit.
"E" = Result has been estimated, calibration limit exceeded.
"Z" = See case narrative.
"D" = Sample, Laboratory Control Sample, or Matrix Spike Duplicate results above Relative Percent Difference limit.
"M" = Matrix spike recoveries outside QC limits. Matrix bias indicated.
"B" = Method blank contained trace levels of analyte. Refer to included method blank report.
"J" = Result estimated between the quantitation limit and half the quantitation limit.
"L" = Laboratory Control Sample recovery outside accepted QC limits.
"P" = Concentration differs by more than 40% between the primary and secondary analytical columns.
"NC" = Not calculable. Applicable to RPD if sample or duplicate result is non-detect or estimated (see primary report for data flags). Applicable to MS if sample is greater or equal to ten times the spike added. Applicable to sample surrogates or MS if sample dilution is 10x or higher.
"" = Indicates any recoveries outside associated acceptance windows. Surrogate outliers in samples are presumed matrix effects. LCS demonstrates method compliance unless otherwise noted.*
"(1)" = Indicates data from primary column used for QC calculation.
"A" = denotes a parameter for which ELAP does not offer approval as part of their laboratory certification program.
"F" = denotes a parameter for which Paradigm does not carry certification, the results for which should therefore only be used where ELAP certification is not required, such as personal exposure assessment.

GENERAL TERMS AND CONDITIONS
LABORATORY SERVICES

These Terms and Conditions embody the whole agreement of the parties in the absence of a signed and executed contract between the Laboratory (LAB) and Client. They shall supersede all previous communications, representations, or agreements, either verbal or written, between the parties. The LAB specifically rejects all additional, inconsistent, or conflicting terms, whether printed or otherwise set forth in any purchase order or other communication from the Client to the LAB. The invalidity or unenforceability in whole or in part of any provision, tern or condition hereof shall not affect in any way the validity or enforceability of the remainder of the Terms and Conditions. No waiver by LAB of any provision, term, or condition hereof or of any breach by or obligation of the Client hereunder shall constitute a waiver of such provision, term, or condition on any other occasion or a waiver of any other breach by or obligation of the Client. This agreement shall be administered and interpreted under the laws of the state which services are procured.

Warranty. Recognizing that the nature of many samples is unknown and that some may contain potentially hazardous components, LAB warrants only that it will perform testing services, obtain findings, and prepare reports in accordance with generally accepted analytical laboratory principles and practices at the time of performance of services. LAB makes no other warranty, express or implied.

Scope and Compensation. LAB agrees to perform the services described in the chain of custody to which these terms and conditions are attached. Unless the parties agree in writing to the contrary, the duties of LAB shall not be construed to exceed the services specifically described. LAB wi use LAB default method for all tests unless specified otherwise on the Work Order.
Payment terms are net 30 days from the date of invoice. All overdue payments are subject to an interest charge of one and one-half percent (1-1/2%) per month or a portion thereof. Client shall also be responsible for costs of collection, including payment of reasonable attorney fees if such expense is incurred. The prices, unless stated, do not include any sale, use or other taxes. Such taxes will be added to invoice prices when required.

Prices. Compensation for services performed will be based on the current Lab Analytical Fee Schedule or on quotations agreed to in writing by the parties. Turnaround time based charges are determined from the time of resolution of all work order questions. Testimony, court appearances or data compilation for legal action will be charged separately. Evaluation and reporting of initial screening runs may incur additional fees.

Limitations of Liability. In the event of any error, omission, or other professional negligence, the sole and exclusive responsibility of LAB shall be to re-perform the deficient work at its own expense and LAB shall have no other liability whatsoever. All claims shall be deemed waived unless made in writing and received by LAB within ninety (90) days following completion of services.
LAB shall have no liability, obligation, or responsibility of any kind for losses, costs, expenses, or other damages (including but not limited to any special, direct, incidental or consequential damages) with respect to LAB's services or results.
All results provided by LAB are strictly for the use of its clients and LAB is in no way responsible for the use of such results by clients or third parties. All reports should be considered in their entirety, and LAB is not responsible for the separation, detachment, or other use of any portion of these reports. Client may not assign the lab report without the written consent of the LAB.
Client covenants and agrees, at its/his/her sole expense, to indemnify, protect, defend, and save harmless the LAB from and against any and all damages, losses, liabilities, obligations, penalties, claims, litigation, demands, defenses, judgments, suits, actions, proceedings, costs, disbursements and/or expenses (including, without limitation attorneys' and experts' fees and disbursements) of any kind whatsoever which may at any time be imposed upon, incurred by or asserted or awarded against client relating to, resulting from or arising out of (a) the breach of this agreement by this client, (b) the negligence of the client in handling, delivering or disclosing any hazardous substance, (c) the violation of the Client of any applicable law, (d) non-compliance by the Client with any environmental permit or (e) a material misrepresentation in disclosing the materials to be tested.

Hazard Disclosure. Client represents and warrants that any sample delivered to LAB will be preceded or accompanied by complete written disclosure of the presence of any hazardous substances known or suspected by Client. Client further warrants that any sample containing any hazardous substance that is to be delivered to LAB will be packaged, labeled, transported, and delivered properly and in accordance with applicable laws.

Sample Handling. Prior to LAB's acceptance of any sample (or after any revocation of acceptance), the entire risk of loss or of damage to such sample remains with Client. Samples are accepted when receipt is acknowledged on chain of custody documentation. In no event will LAB have any responsibility for the action or inaction of any carrier shipping or delivering any sample to or from LAB premises.
Client authorizes LAB to proceed with the analysis of samples as received by the laboratory, recognizing that any samples not in compliance with all current DOH-ELAP-NELAP requirements for containers, preservation or holding time will be noted as such on th final report.
Disposal of hazardous waste samples is the responsibility of the Client. If the Client does not wish such samples returned, LAB may add storage and disposal fees to the final invoice. Maximum storage time for samples is 30 days after completion of analysis unless modified by applicable state or federal laws. Client will be required to give the LAB written instructions concerning disposal of these samples.
LAB reserves the absolute right, exercisable at any time, to refuse to receive delivery of, refuse to accept, or revoke acceptance of any sample, which, in the sole judgment of LAB (a) is of unsuitable volume, (b) may be or become unsuitable for or may pose a risk in handling, transport, or processing for any health, safety, environmental or other reason whether or not due to the presence in the sample of any hazardous substance, and whether or not such presence has been disclosed to LAB by Client or (c) if the condition or sample date make the sample unsuitable for analysis.

Legal Responsibility. LAB is solely responsible for performance of this contract, and no affiliated company, director, officer, employee, or agent shall have any legal responsibility hereunder, whether in contract or tort including negligence.

Assignment. LAB may assign its performance obligations under this contract to other parties, as it deems necessary. LAB shall disclose to Client any assignee (subcontractor) by ELAP ID # on the submitted final report.

Force Majeure. LAB shall have no responsibility or liability to the Client for any failure or delay in performance by LAB, which results in whole or in part from any cause or circumstance beyond the reasonable control of LAB. Such causes and circumstances shall include, but not limited to, acts of God, acts or orders of any government authority, strikes or other labor disputes, natural disasters, accidents, wars, civil disturbances, difficulties or delays in transportation, mail or delivery services, inability to obtain sufficient services or supplies from LAB's usual suppliers, or any other cause beyond LAB's reasonable control.

Law. This contract shall be continued under the laws of the State of New York without regard to its conflicts of laws provision.

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

1 of 2

CHAIN OF CUSTODY

PARADIGM

REPORT TO:		INVOICE TO:		LAB PROJECT ID
CLIENT:	Inventum Engineering	CLIENT:	Same	202897
ADDRESS:	481 Carlisle Dr.	ADDRESS:		Quotation #:
CITY:	Herndon STATE: VA ZIP 20170	CITY: STATE: ZIP:		
PHONE:	571-217-3627	PHONE:		Email: todd.waldrop@inventum-eng.com
ATTN:	Todd Waldrop	ATTN:		

PROJECT REFERENCE
Buffalo Color

Matrix Codes:
AQ - Aqueous Liquid; NQ - Non-Aqueous Liquid; WA - Water; WG - Groundwater; DW - Drinking Water; WW - Wastewater; SO - Soil; SL - Sludge; SD - Solid; PT - Paint; WP - Wipe; CK - Caulk; OL - Oil; AR - Air

DATE COLLECTED	TIME COLLECTED	COMPOSITE	GRAB	SAMPLE IDENTIFIER	MATRIX CODES	NUMBER OF CONTAINERS	REQUESTED ANALYSIS: TCL VOCs (8260)	TCL SVOCs (8270)	TAL Metals (6010)	REMARKS	PARADIGM LAB SAMPLE NUMBER
6/25/20		–	V	T Sump - Area A - 062520	AQ	3	X	X	X		01
					W per history on 6/26/2020						

Turnaround Time		Report Supplements			
Availability contingent upon lab approval; additional fees may apply.					
Standard 5 day	☑	None Required	☐	None Required	☐
10 day	☐	Batch QC	☑	Basic EDD	☐
Rush 3 day	☐	Category A	☐	NYSDEC EDD	☑
Rush 2 day	☐	Category B	☐		
Rush 1 day	☐				
Date Needed _____ please indicate date needed:		Other please indicate package needed:	☐	Other EDD please indicate EDD needed :	☐

Keith Alderley / 6/25/20
Sampled By / Date/Time

Keith Alderley / 6/25/20, 5:00pm
Relinquished By / Date/Time

Total Cost:

Brian Zach 6-25-20 3:10
Received By / Date/Time

P.I.F.

Molly Wait 6/26/2020 1057
Received @ Lab By / Date/Time

5°C iced 6/26/2020 10:27

By signing this form, client agrees to Paradigm Terms and Conditions (reverse).

See additional page for sample conditions.

PARADIGM

Chain of Custody Supplement

Client: Inventium
Lab Project ID: 202897
Completed by: Molly Vail
Date: 6/26/2020

Sample Condition Requirements

Per NELAC/ELAP 210/241/242/243/244

Condition	NELAC compliance with the sample condition requirements upon receipt: Yes	No	N/A
Container Type	X		
Comments			
Transferred to method-compliant container			X
Headspace (<1 mL)	VOA		X
Comments			
Preservation	VOA met		SVOA
Comments			
Chlorine Absent (<0.10 ppm per test strip)			
Comments			
Holding Time	X		
Comments			
Temperature	X		met
Comments	5°C; wd		
Compliant Sample Quantity/Type	X		
Comments			

179 Lake Avenue • Rochester, NY 14608 • (585) 647-2530 • Fax (585) 647-3311 • ELAP ID# 10958