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DAY ENVIRONMENTAL, INC.

ENVIRONMENTAL CONSULTANTS
AN AFFILIATE OF DAY ENGINEERING, P.C.

January 7, 2020

Ms. Tasha Mumbrue
Engineering Geologist
New York State Department of Environmental Conservation
Division of Environmental Remediation
6274 East Avon-Lima Road
Avon, New York 14414-8139

RE: Revised Interim Remedial Measure Work Plan
1560 Lake Avenue, Rochester, New York
NYSDEC Site #C828213

Dear Ms. Mumbrue:

On behalf of Bonitatem LLC, the enclosed electronic copy in Portable Document Format (PDF) of a revised Interim Remedial Measure (IRM) Work Plan, dated January 7, 2020, is being submitted for the above-referenced property which has been designated NYSDEC Site #C828213 (Site).

The revised IRM Work Plan for enhanced in-situ bioremediation using an oxygen injection system accepts each of the suggestions made in the comments received from the New York State Department of Environmental Conservation (NYSDEC) in the comment letter dated December 9, 2019.

Although Bonitatem LLC has, as suggested, deleted all references in the IRM Work Plan to the specific future development plan of the Site, the grading, utility installation, and other construction activities that are associated with the anticipated commercial use of the Site as a parking lot will be important considerations for the IRM Work Plan because they are likely to occur prior to, or concurrent with, the installation of the oxygen injection system.

Bonitatem believes that the timing of the parking lot site work as it pertains to this oxygen injection system IRM may be an important factor in the schedule and implementation of this IRM because components of the oxygen injection system IRM work and parking lot construction work will need to be coordinated with the NYSDEC and the entities associated with the parking lot. As such, Bonitatem LLC will re-evaluate the oxygen injection system configuration detailed in the attached IRM Work Plan as additional details and specifications regarding parking lot grading, utilities, etc. become available, and may, if warranted, provide the NYSDEC with a proposed modification to the attached IRM Work Plan for NYSDEC's review and approval.

In addition, it is anticipated that other components of the parking lot construction work will need to be addressed in an Interim Site Management Plan and a separate Cover System IRM Work Plan.

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If there are any questions, or you require further information, please contact this office.

Sincerely,
Day Environmental, Inc.

Jeffrey A. Danzinger
Associate Principal

JAD/s

ec: Michael J. Piehler (Bonitatem LLC)
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JD8297 / 5495S-18

INTERIM REMEDIAL MEASURE WORK PLAN

1560 LAKE AVENUE
ROCHESTER, NEW YORK

Prepared For: Bonitatem LLC
770 Panorama Trail South
Rochester, New York

Prepared By: Day Engineering, P.C.
1563 Lyell Avenue
Rochester, New York 14606

Project No.: 5495S-18

Date: January 2020

INTERIM REMEDIAL MEASURE WORK PLAN

1560 LAKE AVENUE
ROCHESTER, NEW YORK

I, Nathan Simon certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Interim Remedial Measure Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10)

Nathan E Simon, P.E.
NYS P.E. License #087172
Project Engineer
Day Engineering, P.C.
January 7, 2020

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1.0 INTRODUCTION

This Interim Remedial Action Work Plan (IRMWP) describes measures proposed to address remaining soil and groundwater impacts associated with one or more historic discharges of petroleum, including petroleum constituent volatile organic compounds (VOCs) at 1560 Lake Avenue, Rochester, New York (Site). The IRMWP's measures may also mitigate the methyl tert-butyl ether (MTBE) being detected at the Site. The Site is located on an approximate 2.144-acre parcel located in an urban area, on the east side of Lake Avenue in the City of Rochester, near the intersection of Lake Avenue and West Ridge Road (NYS Rte. 104). Refer to Figure 1 for a project locus map. The Site is vacant urban land not actively used that features an unpaved area of the former building's footprint and associated asphalt paving and limited green spaces.

This IRMWP, prepared by Day Engineering, P.C. (DAY) on behalf of Bonitatem LLC ("the Owner"), describes the methods proposed for what may prove to be the final remediation at the Site. It is anticipated that the Site will be accepted into the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) and that this IRMWP will be implemented under the BCP. Future monitoring to evaluate remedy effectiveness and/or stabilized asymptomatic groundwater conditions for the contaminants of concern will be conducted as part of an Interim Site Management Plan (ISMP) and/or a final Site Management Plan (SMP). The remedial goal for the Site is to address identified impacts to the soil and groundwater attributable to the Site to levels necessary to obtain a NYSDEC certificate of completion for a Track 4 Site. This IRMWP was developed using the results of the work that was completed to date to characterize environmental conditions at the Site. Because a Remedial Investigation/Remedial Alternatives Analysis work plan (RI/RAA Work Plan) for the Site is being developed concurrently with this IRMWP, the results of the Remedial Investigation (RI) may be used to modify this IRMWP. However, the quality (i.e., Category B deliverable) and density of the existing data appears sufficient to develop the IRMWP concepts and procedures. In the event that the RI field work identifies conditions that would warrant modifications to the remedial concepts, system installation procedures, system equipment and/or maintenance and operation procedures presented herein, the NYSDEC will be notified and, if warranted, a revised or supplemental IRMWP will be submitted for NYSDEC review and approval.

The automobile dealer and maintenance facility that formerly operated at 1560 Lake Avenue has been demolished and the Site is currently vacant. The Site is bounded: to the north by Redwood Road with a commercial parking lot, a vacant commercial lot, and some residential property beyond; to the east by Lapham Street Extension with residential property beyond; to the south by commercial property and residential property; and to the west by Lake Avenue with industrial property and commercial property beyond. The planned future use of the Site is a parking lot. The anticipated Site redevelopment is permitted under the zoning associated with the Site.

1.1 Background

The property's environmental history is documented in a Phase I Environmental Site Assessment Report dated December 7, 2017, a Phase II Environmental Site Assessment Data Package dated March 23, 2018, and in the RI/RAA work plan. In summary, the 1560 Lake Avenue parcel was an automobile sales and service facility from the late 1940s to mid-2000s. In connection with the historical uses of the 1560 Lake Avenue parcel, there were multiple reported spills and records

concerning installation, registration and removal of underground storage tanks. Petroleum impacts to soil and groundwater were documented. Petroleum impacts were noted in soil, and also groundwater within the overburden and bedrock. Impacts also included detections of MTBE primarily in the bedrock groundwater. The RI is, in part, directed in ascertaining the source of the MTBE. A review of previous environmental reports indicates nine underground storage tanks were removed from the 1560 Lake Avenue parcel from the 1960s to the 1980s, and complete closure documentation, including post-excavation soil samples, was not available. The previous environmental records show complete closure documentation, including post-excavation soil samples, for six underground storage tanks that were removed from the 1560 Lake Avenue parcel from the 1990s to the 2000s (i.e., different USTs from the nine that were removed from the Site in the 1960s to the 1980s). . In order to evaluate whether underground storage tanks were still present, a geophysical survey was conducted across the entire Site, which identified two magnetic anomalies. Test pits excavated at the two magnetic anomalies did not identify underground storage tanks. As a result, it appears that no underground storage tanks currently exist at the Site. The former automobile service area had a former grease pit where personnel could conduct service work beneath the vehicles. Prior to closure by filling in-place with flowable fill, standing water in the grease pit was non-detect for VOCs and semi-volatile organic compounds (SVOCs), but did contain lube oil. As such, the water was removed and disposed off-site prior to closure by filling in-place. SVOC and metals impacts were also detected in soil and urban fill material (e.g., historic fill material) at the Site.

1.2 Purpose

The objective of the work presented in this IRMWP is to complete in-situ bioremediation actions at the Site to address soil and groundwater impacted with petroleum VOCs from on-site discharges at concentrations greater than their respective NYSDEC Protection of Groundwater SCOs and TOGS 1.1.1 Groundwater Standards and Guidance Values to achieve a Track 4 cleanup protective of the Site's reasonably anticipated commercial use as a component to obtaining a Certificate of Completion (COC) from the NYSDEC for the Site. Specifically, this IRMWP describes the anticipated in-situ treatment area, oxygen injection system infrastructure and associated ancillary oxygen generation and storage equipment, the location of proposed injection points, procedures to be used to complete the injections, and subsequent monitoring to document the effectiveness of the implemented remedial measures.

In conjunction with this remedy designed to allow the continued commercial use of the Site, it is anticipated that institutional controls (e.g., environmental easement) and engineering controls (e.g., cover system) will be put in place prior to receipt of the COC from the NYSDEC. The institutional and engineering controls will run with the land and be implemented by the current and future owners of the Site. The anticipated environmental easement will require an ISMP to be issued and finalized as an SMP following remediation at the Site.

1.3 Health and Safety Plan

A site-specific Health and Safety Plan (HASP), which includes a Community Air Monitoring Program (CAMP), is included in Appendix A. The components of these plans (i.e., site controls, protective equipment decontamination procedures, air monitoring including CAMP air monitoring, etc.), will be implemented during completion of IRMWP activities that have the potential to encounter/release contaminants that are present at the Site, include during ground intrusive activities.

1.4 Applicable Project Standards, Criteria and Guidance

Based on the Site contaminants, the existing future development scenario for a commercial use (parking lot), the urban setting of the Site and the NYSDEC requirements, the applicable or relevant and appropriate Standards, Criteria and Guidance (SCGs) values that will be used for this project are outlined below:

- Guidelines referenced in NYSDEC document titled "DER-10 Technical Guidance for Site Investigation and Remediation", dated May 2010 (DER-10) including Errata sheets issued 9/14/2015; 11/7/2017; and 4/9/2019.

- NYSDEC Technical and Operational Series (TOGS) 1.1.1 document tilted "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations", updated 1998, 1999, 2000 and 2004.

- Protection of Groundwater Soil Cleanup Objectives (SCOs), Commercial Use SCOs, and other guidance as set forth in 6 NYCRR Part 375-4 dated December 14, 2006.

2.0 SUBSURFACE AND ENVIRONMENTAL CONDITIONS

This section presents a summary of subsurface and environmental conditions based upon the findings of the studies conducted to date at the Site. Additional information regarding the Site's subsurface and environmental conditions is provided in the RI/RAA work plan being submitted concurrently with this IRMWP.

Soil Types

The ground surface of the Site is predominately covered with asphalt pavement, concrete sidewalks and the earthen footprint of the former building. Heterogeneous fill extends from the ground surface or below asphalt pavement to depths up to 13 feet below ground surface (bgs). Little to no fill was observed in the abandoned Lapham Street right-of-way located along the southern portion of the Site. The fill generally consists of reworked urban soils (various mixtures of sand, gravel, and silt) with lesser amounts of organics, rock, brick, concrete, glass, coal, sandstone, terracotta, wood, and metal. Building debris may also be present in proximity to former buildings.

The indigenous soil beneath the fill generally consists of glacial lake deposits of firm silty clay, silty sand, and gravelly sand with trace silt that extend to depths of up to approximately fifteen feet bgs, which is underlain by glacial till consisting of compact to dense red-brown silty sand with gravel and clay. Some pockets of sand, silt and clay were documented within the dense glacial till. Beneath the indigenous soil, weathered gray green shale of the Maplewood Formation was encountered at some boring locations at depths of approximately 16 to 18 feet bgs. Light gray to white sandstone of the Thorold (aka Kodak) Formation was encountered at depths ranging between 18.5 and 33 feet bgs. Red gray siltstone with sandstone interbeds of the Grimsby Formation were encountered at depths ranging between 22 and 37 feet bgs.

Soil Quality

Samples of fill material collected at the Site contain metals and/or Polycyclic-Aromatic Hydrocarbon (PAH) SVOCs at concentrations exceeding Part 375 Unrestricted Use SCOs, Commercial Use SCOs and/or Protection of Groundwater Use SCOs. Two fill samples also contained a couple of pesticides at concentrations exceeding Part 375 Unrestricted Use SCOs and/or Protection of Groundwater SCOs.

Petroleum-type odors and staining, and petroleum-related VOCs and the SVOC naphthalene were detected in some deeper fill material and soil at concentrations exceeding Part 375 Unrestricted Use SCOs, Commercial Use SCOs and/or Protection of Groundwater Use SCOs. These petroleum-related VOCs and Naphthalene were detected in fill material or soil samples at locations generally at or near the top of the overburden groundwater table.

Groundwater Flow

The depth to top of static groundwater levels in overburden monitoring wells was measured between approximately 5 and 9 feet bgs. The depths to top of static groundwater levels measured in bedrock monitoring wells were measured between approximately 6 and 18 feet bgs. Groundwater flow in the overburden is generally towards the east, and groundwater flow in the bedrock is generally towards the south.

Groundwater Quality

Based on previous studies conducted to date, groundwater at the Site has been shown to contain petroleum-related VOCs and the SVOC Naphthalene at concentrations exceeding TOGS 1.1.1 groundwater standards or guidance values. The concentrations of gasoline-related VOCs, including Benzene, Toluene, Ethylbenzene and Xylene (BTEX) in overburden groundwater were significantly higher than that detected in bedrock groundwater. The concentrations of the gasoline additive MTBE detected in bedrock groundwater were significantly higher than that detected in overburden groundwater. In summary, a majority of the Site area is petroleum-impacted, and lower concentrations of petroleum-related VOCs have migrated off-site to the east.

Aerobic Microbe Populations in Groundwater

Groundwater samples collected in February 2018 from two on-site monitoring wells (MW-3 and MW-104) were submitted to Microbial Insights (MI) for a comprehensive evaluation of the Site's biodegradation potential of petroleum hydrocarbons. The results of this analysis showed mid-to high- aerobic microbial populations in MW-3 and mid-to low- aerobic microbial populations in MW-104. This analysis indicates that aerobic microbial populations exist on-site, however, the population growth appears to be rate limited. Typically, petroleum spill sites have a limited amount of dissolved oxygen in the groundwater resulting in dissolved oxygen being the limiting factor that prevents robust microbe populations. In general, dissolved oxygen concentrations measured at the Site using a down-hole meter before water column agitation were below 2 mg/L, which is the generally accepted minimum dissolved oxygen concentration to support aerobic respiration. As such, this Site appears to be slightly anaerobic at baseline.

3.0 REMEDIAL DESIGN

This section presents the scope of work to meet the project objectives provided in Section 1.2 of this IRMWP. This work will be completed in accordance with provisions and guidance outlined in NYSDEC DER-10 unless otherwise approved by the NYSDEC and the NYSDOH. The work will include communication with the NYSDEC and submittal of status reports in accordance with requirements of a Brownfield Cleanup Agreement. The Owner will manage the existing monitoring wells as the project progresses through its various phases. Management of the existing wells could include, but is not limited to, decommissioning, protection and/or replacement.

Remedial activities will be conducted on-site. The Site currently has partial fencing and locked gates, and access to the remediation area will be limited to DAY staff, subcontractor workers, and pertinent agencies involved with the project. The public will not be permitted to enter the work area during the implementation of remedial activities.

The remedial design presented herein assumes a single on-site area of overburden saturated soils and groundwater will require treatment to achieve a Track 4 cleanup protective of the Site's reasonably anticipated commercial use (parking lot), mitigate off-site migration of contaminants, and obtain a COC from the NYSDEC. Refer to Figure 2 for the remedial area. The remedial activities will include an enhanced aerobic bioremediation technology to accelerate the naturally occurring bioremediation of petroleum constituents by indigenous microorganism populations existing within the subsurface. This IRMWP assumes that 90-95% oxygen will be supplied to the subsurface and made available to the aerobic, hydrocarbon-degrading bacteria via injection points. The remedial approach described in this IRMWP is intended as part of the final remedy for the Site, and that no further action beyond implementation of site specific institutional controls (e.g., SMP, environmental easement) and engineering controls (e.g., cover system) will be necessary. In the event the implemented IRM does not prove to be the final remediation at the Site, contingency remedial efforts may be required. Contingency remedial efforts could include addressing grossly contaminated soils if encountered during the remedial investigation, installation of oxygen injection system components, etc. The NYSDEC will be consulted on the scope and schedule of any contingency remedial actions.

The remedial design presented herein is intended to address petroleum constituents in the overburden and shallow bedrock, but is not intended to address the deeper bedrock zone that is predominantly impacted with MTBE. MTBE has been detected in the deeper bedrock zone at concentrations above applicable SCOs. In the event that the RI data indicates the MTBE measured within the on-site bedrock groundwater is attributable to the Site, the remedial approach discussed herein may be modified to directly address the bedrock condition if required by the NYSDEC.

3.1 Site Preparation, Mobilization and Controls

Site preparation activities will be implemented as warranted and during various phases of the remedial fieldwork at the Site. These activities may include, but are not be limited to, the following:

- Prior to activities that have the potential to disturb contaminated media, provisions necessary to monitor and implement dust and vapor suppression controls as described in the HASP will be available.

- Prior to completing intrusive work, a utility stakeout will be requested from Dig Safely New York for identification and clearance of buried Site utilities.
- Site grading, utility installation, and other construction activities that are associated with the anticipated commercial use of the Site as a parking lot will likely occur prior to, or concurrent with, the installation of the oxygen injection system. The timing of the parking lot site work as it pertains to this IRM is an important factor in the schedule and implementation of this IRM. Components of the IRM work and parking lot construction work will be coordinated with the NYSDEC and the entities associated with the parking lot. As additional details and specifications regarding parking lot grading, utilities, etc. become available, the oxygen injection system configuration will be evaluated, and provided NYSDEC approves, will be modified if deemed warranted.
- If required, a USEPA Class V UIC Inventory form will be completed and provided to the USEPA and the NYSDEC. [Note: Oxygen injection as described herein is not anticipated to produce hazardous vapors requiring collection or mitigation systems and is generally exempt from injection well permitting.]

3.2 In-Situ Bioremediation

To address petroleum contaminants at the Site, aerobic bioremediation will be promoted within the delineated area of impact. The objective of this work is to reduce the petroleum constituent concentrations in overburden and shallow bedrock groundwater to acceptable levels, and prevent further off-site migration of petroleum contaminants that are attributable to sources on the Site.

3.2.1 Oxygen Injection

To remediate the overburden saturated zone and capillary fringe impacted with petroleum-related VOCs, a Matrix Environmental Technologies (Matrix) oxygen injection system initially using two 32-point trailers will be installed at the Site. A total of 64 oxygen injection points will be installed within the delineated area of impacted groundwater, refer to Figure 2. The injection points are anticipated to be installed on 30-foot centers or less. As additional information defining the nature and extent of contamination becomes available during the RI, the oxygen injection system configuration will be evaluated, and provided NYSDEC approves, will be modified if deemed warranted. Oxygen injection points will be installed within the bottom of the petroleum impacted saturated soil interval and may extend up to 2 feet into the weathered bedrock, if necessary, at anticipated depths ranging from 17 to 28 ft. bgs using rotary drilling techniques. The injection points will have a screened interval extending vertically a total of 3 ft., and, may incorporate the top 2 ft., of weathered bedrock and extend up into the bottom 1 ft. of overburden soils, if warranted by RI findings. The screened interval of each oxygen injection point will be location dependent with the goal of providing oxygen at the bottom of the impacted zone. Each injection point will be constructed of 3/4-inch diameter, schedule 40 PVC pipe with a 3 ft. section of 0.010-inch slotted screen. The injection point will also be fitted with a one foot sump installed below the bottom of the screen. A silica sand pack installed around the injection point screen will be used to deliver oxygen to the subsurface while the tremie bentonite seal and grout will isolate the injection zone and reduce short circuiting through the bore hole around the injection point exterior. At the junction of the oxygen supply tubing and injection point riser, a “T” will be installed to connect the upper and lower sections of the oxygen injection point to the oxygen supply tubing.

Subsequent to the "T" in the vertical direction a reducing coupler will be installed to increase the well diameter from ¾-inch to one-inch diameter. The one-inch diameter riser will extend to the ground surface or an elevation agreed upon by the involved parties. Refer to Figure 3 for the overburden oxygen injection point specifications. The locations of the Matrix Trailers and associated oxygen injection system infrastructure (e.g., electric feed, supply trenches, etc.) will be provided to the NYSDEC for comment and approval prior to installation.

In the event that the deeper bedrock groundwater zone impacted with MTBE requires treatment, an array of oxygen injection points will be installed and monitored in accordance with the procedures outlined herein. The specific number, depth of treatment and locations of the bedrock oxygen injection points will be determined subsequent to receipt of the RI data and provided as an addendum to this IRMWP or as a supplemental IRMWP, as deemed appropriate at the time of development and submission to the NYSDEC/NYSDOH. Figure 4 presents nested overburden/bedrock oxygen injection point specifications, should they be required.

Each oxygen injection point will be connected to the oxygen delivery system using 125 pounds per square inch (PSI), high-density polyethylene (HDPE) tubing. For runs less than 350 linear feet, 1/2-inch diameter tubing will be used. For runs greater than 350 feet, 3/4-inch diameter tubing will be used. The tubing will be installed below the ground in shallow trenches and terminated in a vault located beneath the intended location of the two Matrix trailers. The tubing will be connected to the injection points using a PVC threaded tee, hose barb and clamp. A detail of the oxygen injection point is presented as Figure 3. Access to the injection points will be provided at system startup. Top elevations of critical oxygen injection points and existing groundwater monitoring wells will be fitted with permanent flush mounted curb boxes of adequate size. The critical oxygen injection locations will be selected with NYSDEC input and approval based on the injection point locations, performance, current petroleum constituent concentrations, etc. Non-critical locations will be decommissioned in accordance with CP-43 or continue to be operational but inaccessible. Once the remedial project schedule has been finalized the NYSDEC will be updated regarding any changes to the schedule/sequencing described in this IRMWP.

3.2.2 Oxygen Injection System

Each oxygen injection system includes a 90 standard cubic feet per hour (SCFH) pressure-swing adsorption (PSA) oxygen generator, rotary screw compressor, air dryer and oxygen delivery system equipped for 32 injection points. Two separate systems are required to provide oxygen to the 64 oxygen injection points. As additional information defining the nature and extent of contamination becomes available during the RI, the oxygen injection system configuration will be evaluated, and provided NYSDEC approves, will be modified if deemed warranted. Additional valves may also be required to allow flexibility and system operation at the different areas or zones of the Site. Each 90 SCFH system operates on 100-amp, 230-volt single phase electric supply. The oxygen generator separates nitrogen using clean dry air from the compressor. The nitrogen is purged to the atmosphere and the resulting gas stream, containing 90 to 95% oxygen gas, is stored in a 120 gallon steel tank. The pressure in the tank is self-regulated by the oxygen generator, at a maximum pressure of 58 - 62 psi. The oxygen pressure leaving the tank is set to approximately 30 psi using a manual regulator valve.

Oxygen will be pulsed from each storage tank using mechanical timers and solenoid valves. Two zones (one oxygen injection bank from each Matrix trailer), with each zone/bank consisting of eight oxygen injection points, will be operated concurrently. The specific wells included in each zone/bank will be determined following collection and analysis of the RI data, however, oxygen injection points in concurrent operation will not be adjacent to one another to provide the greatest oxygen utilization rate. The oxygen flow to each injection point is metered using Dwyer variable area flowmeters. The HDPE tubing in the below grade header box is connected to the flowmeters through the floor of the trailer using rubber hose and quick connect fittings. The system is fully automated via a programmable logic controller (PLC) system and operates unattended once the flow rates are adjusted and the timers are set. The compressor includes a PLC that monitors and stores operating data, tracks maintenance intervals and alerts the user of malfunction. A Dwyer pressure switch will be installed on each air receiver tank and wired to the power supply for the PSA. The switch terminates power to the PSA when pressure is lost in the air receiver. This safety device prevents the PSA from operating when the compressor malfunctions.

Each 90 SCFH oxygen and injection system is mounted in a single axle cargo trailer and includes the following major components/features:

- MET laboratory certified system built to NEC general purpose standards.
- U.L. certified Direct Logic PLC control system in NEMA 1 panel with surge and lightning protection. User interface display screen and alarm inputs from system.
- 6’ x 10’ insulated cargo trailer with the rear locking double doors, trailer jacks, lighting and HVAC. The wheels can be removed allowing the trailer to stand on jacks.
- NEMA 3R 100-Amp fused disconnect on the exterior of the trailer and a 24 slot breaker panel on interior wall.
- Kaeser SX-6 rotary screw air compressor in a low sound enclosure. Rated for 21 SCFM @ 110 psi., 5HP motor, single phase/230 Volts. Operated by a PLC control system.
- Kaeser TA-5 air dryer, wall mounted air filters and condensate trap. Single phase/110-Volts
- AirSep Model ASD oxygen generator and oxygen purity analyzer. The generator produces 90 SCFH of oxygen at 90-95% purity. Single phase/110 Volts.
- 120-gallon oxygen receiver tank and 60-gallon air receiver tank both rated for up to 200 psi.
- Four solenoid valves with each providing oxygen flow to a bank of eight injection point flow meters.

A system schematic, process flow diagram, piping and instrumentation diagram and wiring schematic are presented as Figures 5 – 7.

3.2.3 Oxygen Injection System Operation

After oxygen injection system installation, the system will be pressure checked for leaks, and any identified leaks will be repaired prior to system startup. Startup of the oxygen injection system

will consist of testing and monitoring of the electrical and mechanical components of the oxygen injection system until operation within a defined set of operational parameters has been observed. The oxygen purity will be measured using real-time instrumentation, and operating data at startup will be recorded. Oxygen flow and pressure to the injection points will be monitored as part of the startup monitoring program. If pressure buildup occurs during start-up due to accumulation of fine grained particles (fines) in the injection points, oxygen flow will be temporarily terminated and the injection points will be flushed. The oxygen flow rate to each injection point will be set to 30 SCFH at start up. The flow rate may be modified in the future based on dissolved oxygen (DO) monitoring data. However, the system will always operate at a flow rate between 10 and 50 SCFH per injection point. Matrix recommends that the timers be set to pulse oxygen so the total oxygen output from the system does not exceed 75% of the production capacity, or 60 SCFH. This will provide adequate output pressure during a complete run cycle and prevent excessive compressor motor starts. It is anticipated that the oxygen injection system will be set at a pulsed operation to supply oxygen to different areas of the oxygen injection network at different times. The pulse frequency will be evaluated based on the number of oxygen injection points installed and petroleum contaminant concentrations in groundwater that will be monitored on a quarterly basis.

It is anticipated that one day will be required to make the system operational. Refer to Appendix B for the startup procedure. Daily checks will be completed for the first week to evaluate system operation. If the system is operating as intended, site visits will be completed weekly for three weeks. If the system continues to operate as intended for the first month of operation, the startup period will be concluded and routine maintenance and checks will be implemented. Routine maintenance and checks will include documenting operating parameters, routine maintenance, collection of monitoring data, and system checks twice per month. A copy of the oxygen injection system evaluation form to be completed is presented in Appendix C. The flow meters will be adjusted to 30 SCFH during each system check and the injection points will be flushed with water or purged with nitrogen when the pressure exceeds 10 psi. Based on the depth of oxygen diffusers below the water table and friction loss through the oxygen delivery system, the points are anticipated to operate at a normal pressure of 5 ($\pm$2) psi. Variations in pressure are normal and are dependent on the groundwater elevation, length of tubing, back pressure from the formation and accumulation of fines in the injection point. Pulsing of oxygen will develop the oxygen injection points over time by drawing fines from the formation. It is common to flush the injection points more frequently during the first several months of operation.

3.2.4 Oxygen Injection System Maintenance

Routine warranty maintenance will be performed by Matrix on the compressor and oxygen generator per manufacturer's specifications on a quarterly basis. The operation and maintenance manual included as Appendix D will also be located in the trailer and describes the maintenance required on each component based on running hours. Maintenance typically consists of changing oil in various filters, adjusting belt tension, and inspecting components for wear as summarized in the maintenance manual included as Appendix D.

4.0 EFFECTIVENESS MONITORING

Validation of performance of the remedial activities implemented is required to determine the effectiveness of the treatment in attaining remedial objectives and operation endpoints. Ongoing monitoring of key contaminant and biogeochemical characteristics of the Site is critical to evaluating the effectiveness of the remedial approach to meet remedial objectives. Prior to oxygen injection system startup, baseline monitoring from select wells and/or oxygen injection points will be collected to establish groundwater conditions prior to remediation. These baseline values will provide the basis for comparison of post remedial samples and provide a metric of system effectiveness. Typical lag times to stimulate measureable increases in the rate of degrading petroleum contaminants may be on the order of several months or more. As such, samples will be collected bi-monthly for the first three months from a representative number of monitoring wells and/or oxygen injection points for measurement of field parameters using real-time instrumentation. [Note: oxygen injection points that are sampled following oxygen injection system startup will be deactivated for a minimum of 24 hours prior to collecting field or analytical laboratory samples.] In addition, four groundwater sampling monitoring events will be implemented over the first year following oxygen injection system operation (i.e., at 3 month, 6 month, 9 month and 12 month intervals from date of start-up) using monitoring wells that are installed with well screens sealed within overburden groundwater-bearing zone that underlies the Site and/or oxygen injection points. The specific wells/oxygen injection points to be evaluated will be identified following receipt of the remedial investigation data. The parameters listed below are recommended for the following reasons:

- Field Parameters – temperature, pH, specific conductance, oxygen reduction potential (ORP) and dissolved oxygen to confirm aerobic subsurface conditions are occurring and being maintained.
- TCL and CP-51 VOCs – To monitor for a reduction in target compounds indicating favorable aerobic conditions have been achieved and maintained.
- *Microbe Testing* – This is a contingency measure that will be implemented if it is suspected that the favorable aerobic conditions have been achieved, however, the VOC concentrations are not reducing. The results of this evaluation will aid in the determination if additional bioaugmentation (or other alternative remedial measures) may be warranted.

[Note: If substantial biomass is visualized in the well/oxygen injection point samples, and/or apparent reductions in hydraulic conductivity are observed, well/oxygen injection point surging may identify if the bio-clogging is primarily localized on the well screen and/or sand pack. Based on this evaluation it will be determined if the well can be restored/replaced or if biofouling of the soils within the treatment area soils are responsible for the observations of permeability loss.]

To evaluate the on-going effectiveness of the remedial efforts conducted at the Site, the following groundwater monitoring program will be completed for the field and analytical laboratory parameters presented above. The specific monitoring wells to be sampled are identified, but may be modified with the addition or substitution of other monitoring wells and/or oxygen injection points with NYSDEC approval following receipt of the remedial investigation data.

- **Source Area**: Four monitoring wells (i.e., MW-102, MW-105, MW-107 and MW-108) installed in the overburden/bedrock interface source area or area containing the greatest residual petroleum constituent concentration in groundwater will be evaluated to assess

migration of dissolved oxygen, aerobic groundwater conditions and biodegradation of petroleum VOCs. These monitoring wells will be evaluated for field parameters and tested for petroleum VOCs, and/or microbes to track the effectiveness of enhanced aerobic bioremediation.

- **Plume Area**: Six monitoring wells (i.e., MW-3, MW-6, MW-104, MW-126, MW-208 and MW-209) installed in the plume area will be evaluated to assess migration of dissolved oxygen and biodegradation of petroleum VOCs. These monitoring wells will be evaluated for field parameters and petroleum VOCs only. If warranted, and subject to NYSDEC approval, select monitoring wells in the plume area may also be tested for microbes to evaluate site conditions and system performance.
- **Down-Gradient Monitoring Wells**: Four monitoring wells (i.e., MW-4, MW-LE-02, MW-LE-03 and MW-LE-04) installed in the down-gradient direction of the Site will be evaluated for field parameters and tested for petroleum VOCs, to track the effectiveness of bioremediation.

Monitoring well sampling activities will be recorded in a field book and on groundwater sampling logs and reported as described in Section 7.0. Other observations (e.g., well integrity, etc.) will be noted on the well sampling logs. The well sampling logs will serve as the inspection form for the groundwater monitoring well network. The aspects of the groundwater monitoring program are described below.

Static water levels will be measured to a monitoring point of known elevation using a Heron Model HO1.L oil/water interface probe or similar instrument.

The groundwater samples evaluated for field parameters and submitted for analytical laboratory testing will be collected using dedicated bailers. Groundwater samples collected for analytical laboratory testing will be submitted to a NYSDOH ELAP-certified analytical laboratory and analyzed for TCL and CP-51 VOCs using United States Environmental Protection Agency (USEPA) Method 8260. Each of the samples collected for the evaluation of field parameters will be measured for pH, specific conductivity, temperature, and ORP using a Horiba U-22 meter or equivalent. Dissolved oxygen will be measured using the down-hole YSI, Incorporated Model 550A, or similar. These multiple lines of converging contaminant, hydrogeologic, geochemical and microbial data will be used to assess the changes in contaminant concentration and mass over time, changes in groundwater geochemistry and an increase in contaminant biodegradation rates.

Site-specific QA/QC samples will not be collected or analyzed as part of the routine groundwater sampling events. Samples collected to confirm that treatment is complete (e.g., final project close out) will include the collection of QA/QC samples [i.e., a trip blank, a field blank, and a matrix spike/matrix spike duplicate (MS/MSD) sample] and the preparation of a DUSR by an independent party.

The results of the effectiveness monitoring will determine the need for additional oxygen injection wells, elimination of oxygen injection wells, or modification to the operating parameters. The NYSDEC will be consulted prior to installation of additional points or significant changes to the operating parameters.

5.0 SCHEDULE

Refer to Table 1 for a tentative installation, startup and testing project schedule for the Site. The duration of oxygen injection system operation will be based on the effectiveness of the system to remediate the contamination to the groundwater standards and guidance values set forth in TOGS 1.1.1, or asymptotic conditions at levels that are deemed acceptable to the NYSDEC and the NYSDOH.

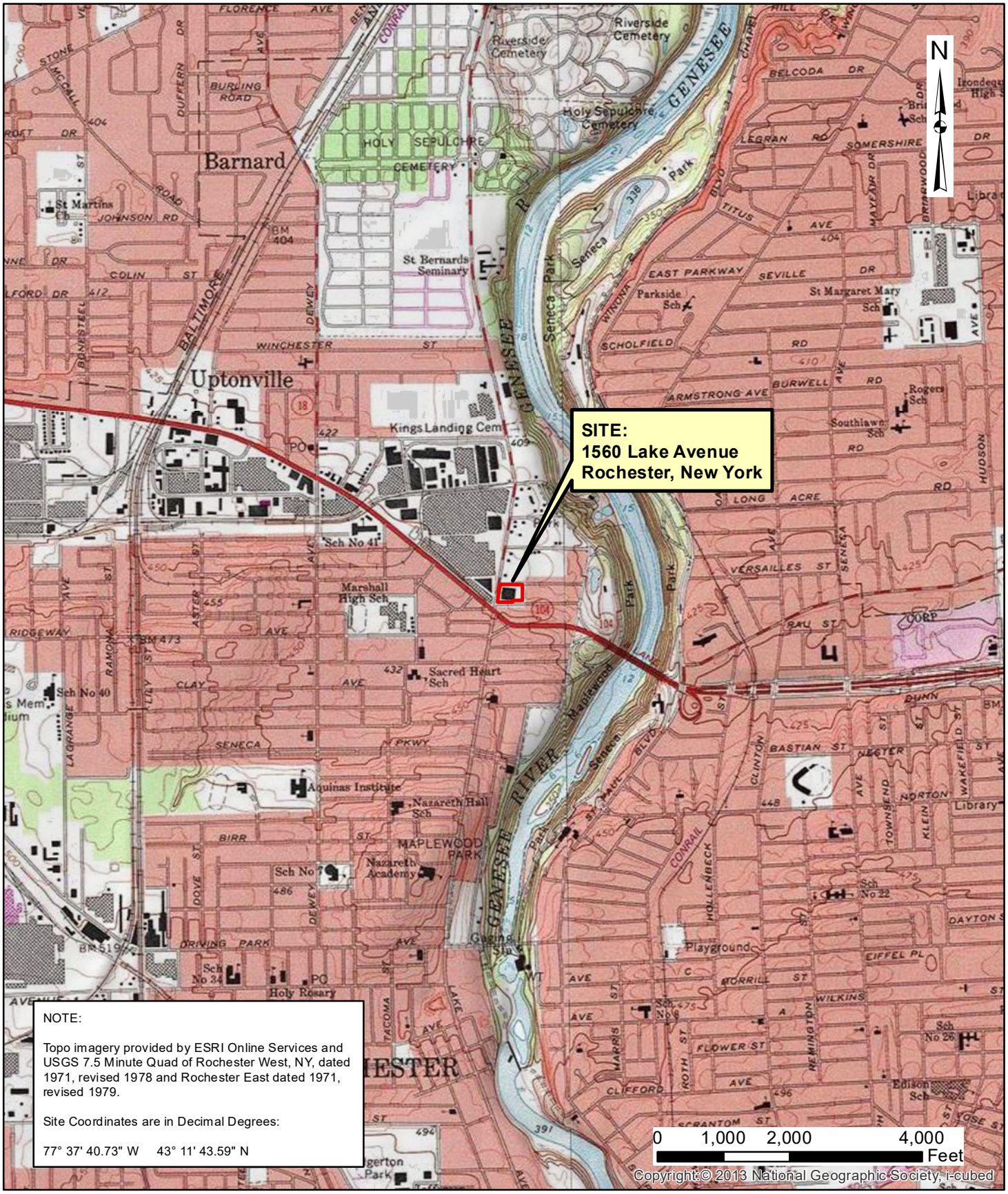
[Note: Groundwater sampling frequency will be re-evaluated in the Interim Site Management Plan and the final Site Management Plan. Once a reduction of VOC concentrations to levels acceptable to the NYSDEC and the NYSDOH and stabilized asymptotic conditions are measured for four consecutive quarterly monitoring events, sample frequency may be reduced to bi-annual sampling (two sampling events per year) with concurrence with the NYSDEC. If there is continued reduction or stabilized asymptotic conditions during the bi-annual sampling events, sample frequency may be further reduced to annual sampling with concurrence from the NYSDEC. Annual groundwater sampling will be conducted until termination of groundwater monitoring is approved by the NYSDEC. Conversely, if the NYSDEC determines that asymptotic conditions are at unacceptable levels, additional actions and/or monitoring may be required by the NYSDEC.]

6.0 DELIVERABLES

After the interim remedial measure is implemented, a construction completion report (CCR) for the oxygen injection system IRM will be prepared unless the NYSDEC agrees that this remedy will be solely documented in a Final Engineering Report (FER). This CCR or FER will include locations, depths, and injected materials used as part of the final remedy.

In addition, status reports will be submitted following the FER or CCR summarizing the data collected during subsequent monitoring events. The status reports will be submitted within six weeks of the receipt of laboratory test results.

FIGURES



NOTE:

Topo imagery provided by ESRI Online Services and USGS 7.5 Minute Quad of Rochester West, NY, dated 1971, revised 1978 and Rochester East dated 1971, revised 1979.

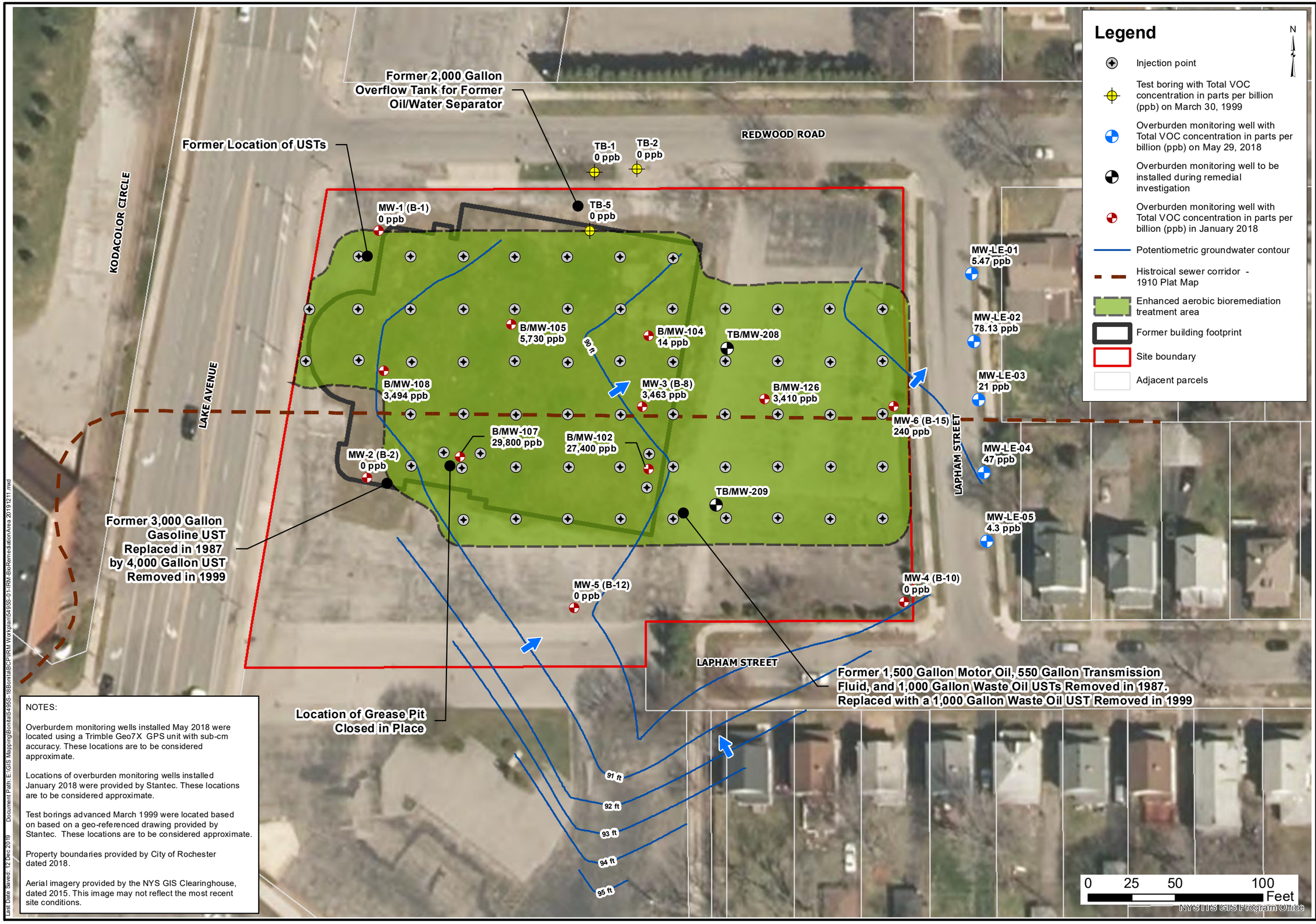
Site Coordinates are in Decimal Degrees:

77° 37' 40.73" W 43° 11' 43.59" N

Date: 04-23-2019 Drawn By: CPS Scale: AS NOTED	**DAY ENGINEERING, P.C.** Environmental Engineering Consultants Rochester, New York 14606 New York, New York 10170	Project Title: 1560 LAKE AVENUE ROCHESTER, NEW YORK BROWNFIELD CLEANUP PROGRAM Drawing Title: Project Locus Map	Project No.: 5495S-18 FIGURE 1

Document Path: \\DAYGIS\GIS_Data\GIS Mapping\Bonita\5495S-18Bonita\BCP\IRM Workplan\5495S-02-IRM-Locus.mxd

Last Date Saved: 23 Apr 2019



Legend

N

- Injection point
- Test boring with Total VOC concentration in parts per billion (ppb) on March 30, 1999
- Overburden monitoring well with Total VOC concentration in parts per billion (ppb) on May 29, 2018
- Overburden monitoring well to be installed during remedial investigation
- Overburden monitoring well with Total VOC concentration in parts per billion (ppb) in January 2018
- Potentiometric groundwater contour
- Histroical sewer corridor - 1910 Plat Map
- Enhanced aerobic bioremediation treatment area
- Former building footprint
- Site boundary
- Adjacent parcels

NOTES:

Overburdem monitoring wells installed May 2018 were located using a Trimble Geo7X GPS unit with sub-cm accuracy. These locations are to be considered approximate.

Locations of overburden monitoring wells installed January 2018 were provided by Stantec. These locations are to be considered approximate.

Test borings advanced March 1999 were located based on based on a geo-referenced drawing provided by Stantec. These locations are to be considered approximate.

Property boundaries provided by City of Rochester dated 2018.

Aerial imagery provided by the NYS GIS Clearinghouse, dated 2015. This image may not reflect the most recent site conditions.

PROJECT MANAGER	JAD
DRAWN BY	CPS
SCALE	AS NOTED
DATE	12-2019
DATE DRAWN	12-2019
DATE ISSUED	12-12-2019

DAY ENGINEERING, P.C.
Environmental Engineering Consultants
Rochester, New York 14606
New York, New York 10170

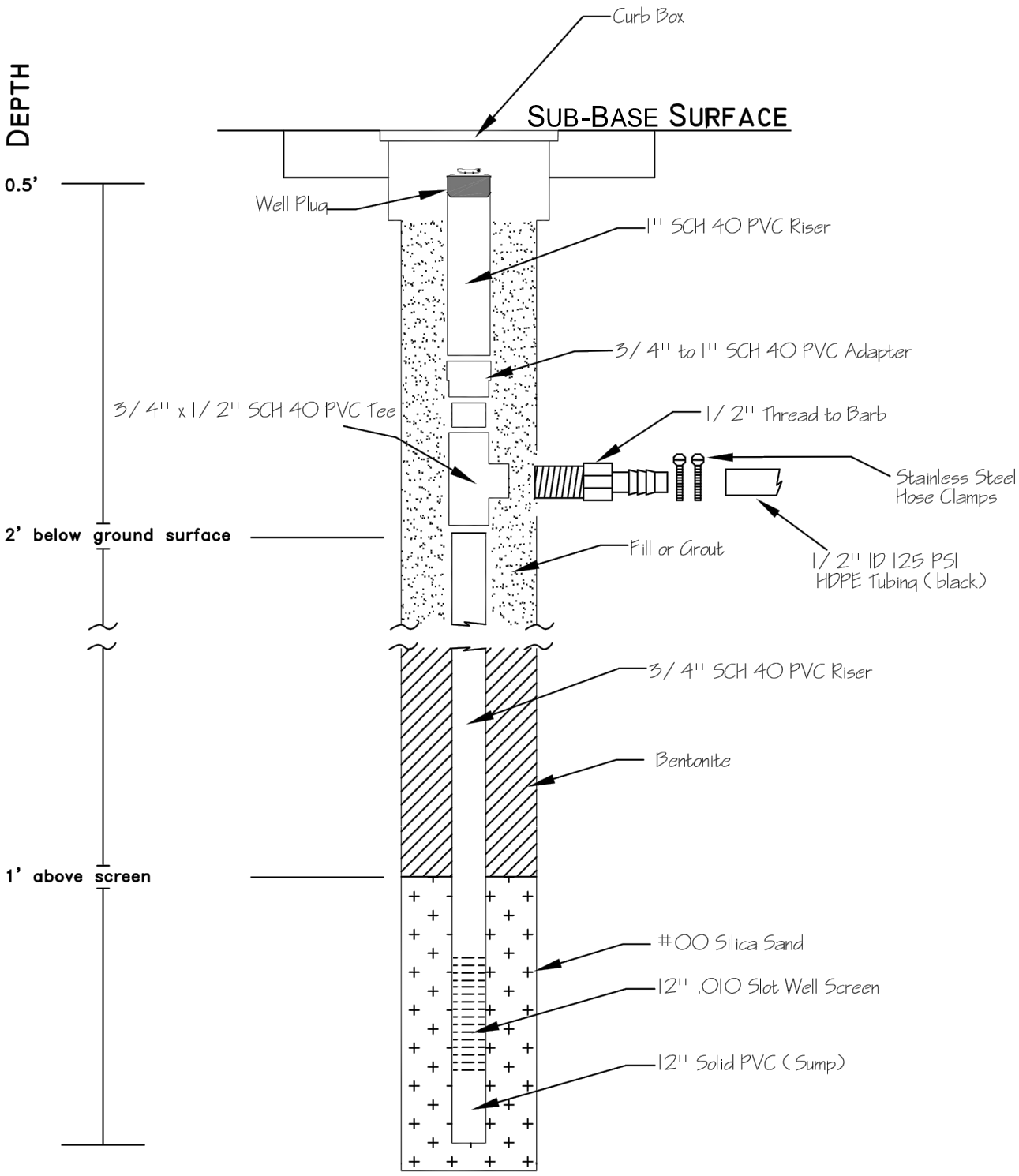
Project Title
1560 LAKE AVENUE
ROCHESTER, NEW YORK
BROWNFIELD CLEANUP PROGRAM

Drawing Title
Site Plan with Enhanced Aerobic Bioremediation Treatment Area

Project No.
5495S-18

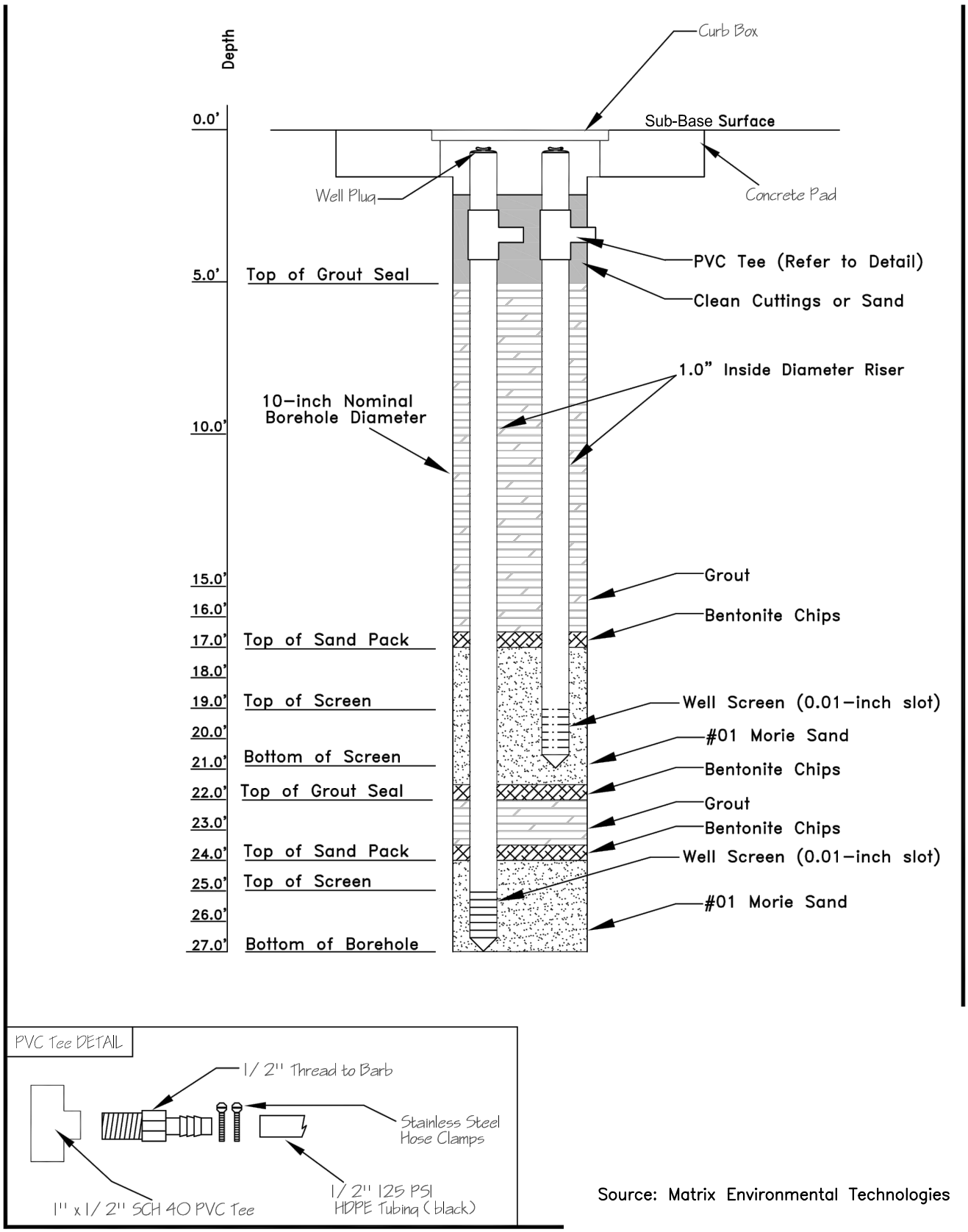
FIGURE 2

Last Date Saved: 12 Dec 2019 Document Path: E:\GIS Mapping\Bonita\5495S-18Bonita\BCP\IRM\Workplan\5495S-01-IRM-BioRemediationArea 20191211.mxd



Source: Matrix Environmental Technologies

DATE 4-15-2019 DRAWN BY RJM SCALE No Scale	day DAY ENGINEERING, P.C. ENVIRONMENTAL ENGINEERING CONSULTANTS ROCHESTER, NEW YORK 14606 NEW YORK, NEW YORK 10170	PROJECT TITLE 1560 LAKE AVENUE ROCHESTER, NEW YORK BROWNFIELD CLEANUP PROGRAM DRAWING TITLE 3/4-INCH ID OXYGEN INJECTION POINT WITH 1/2-INCH ID TUBING	PROJECT NO. 5495S-18 **FIGURE 3**



Source: Matrix Environmental Technologies

DATE 4-15-2019 DRAWN BY RJM SCALE No Scale	day DAY ENGINEERING, P.C. ENVIRONMENTAL ENGINEERING CONSULTANTS ROCHESTER, NEW YORK 14606 NEW YORK, NEW YORK 10170	PROJECT TITLE 1560 LAKE AVENUE ROCHESTER, NEW YORK BROWNFIELD CLEANUP PROGRAM DRAWING TITLE Proposed Overburden/Bedrock Nested Oxygen Injection Point Construction Detail	PROJECT NO. 5495S-18 **FIGURE 4**

Ref1: Ref2: Ref3: Layout: Figure 5 Pen Setting File: 800psFullcolor.ctb
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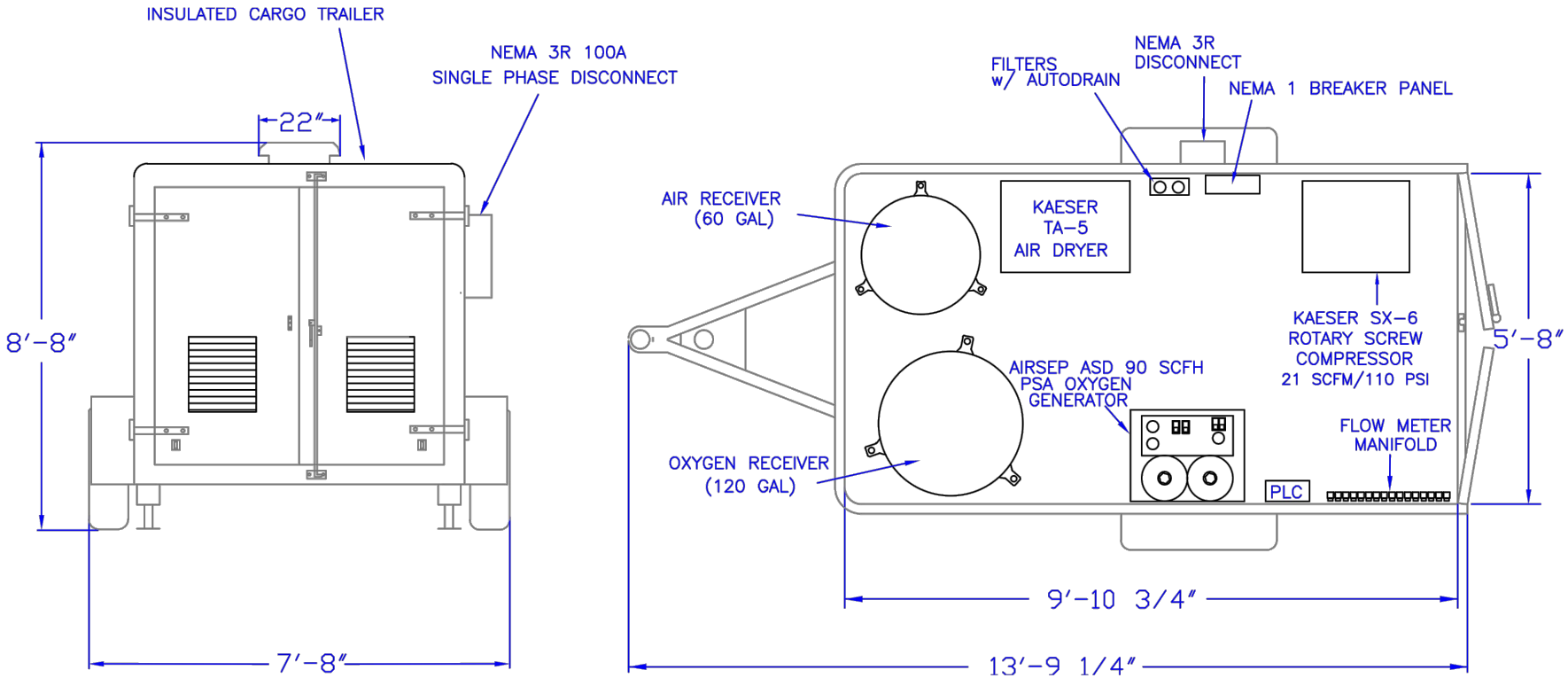
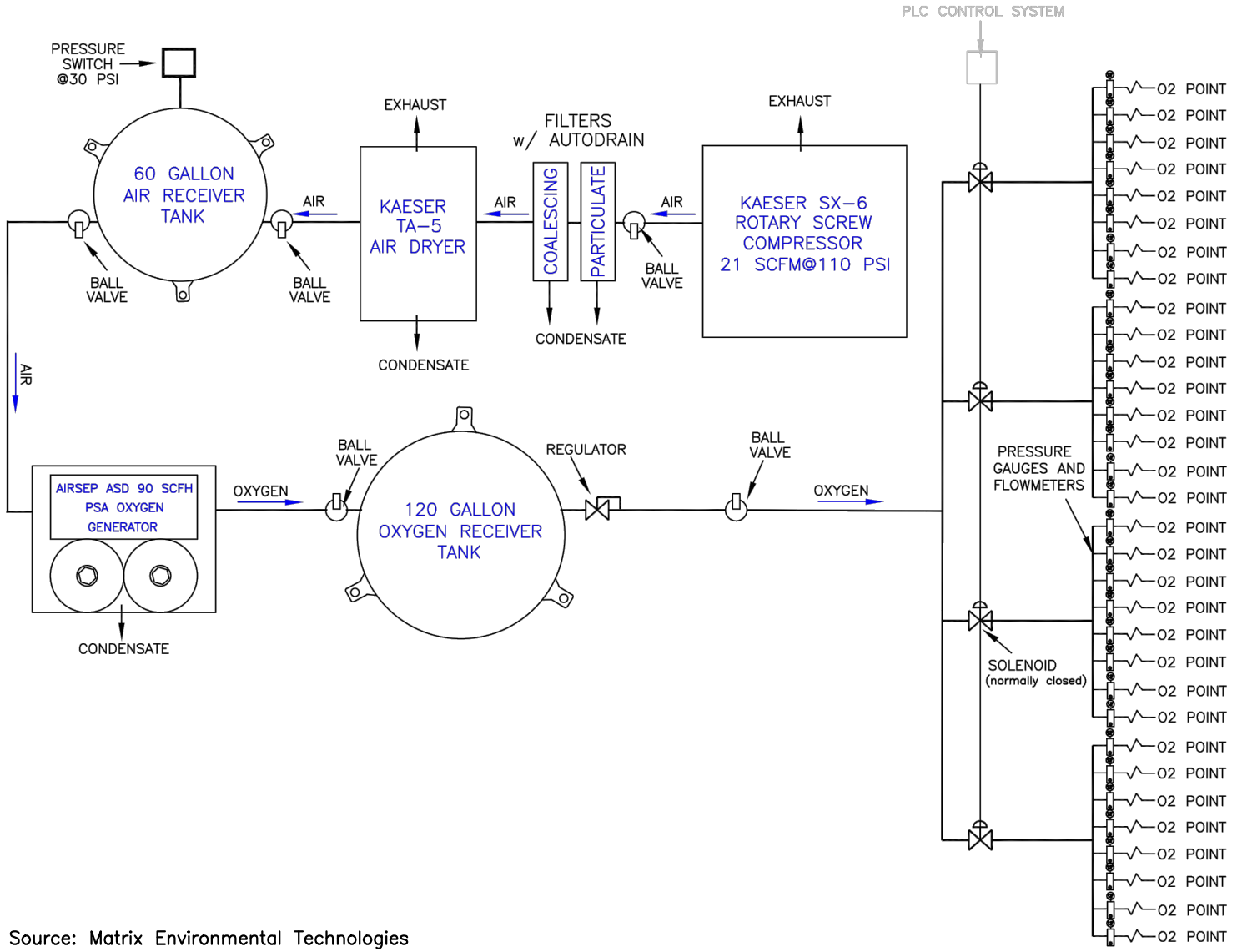


Source: Matrix Environmental Technologies

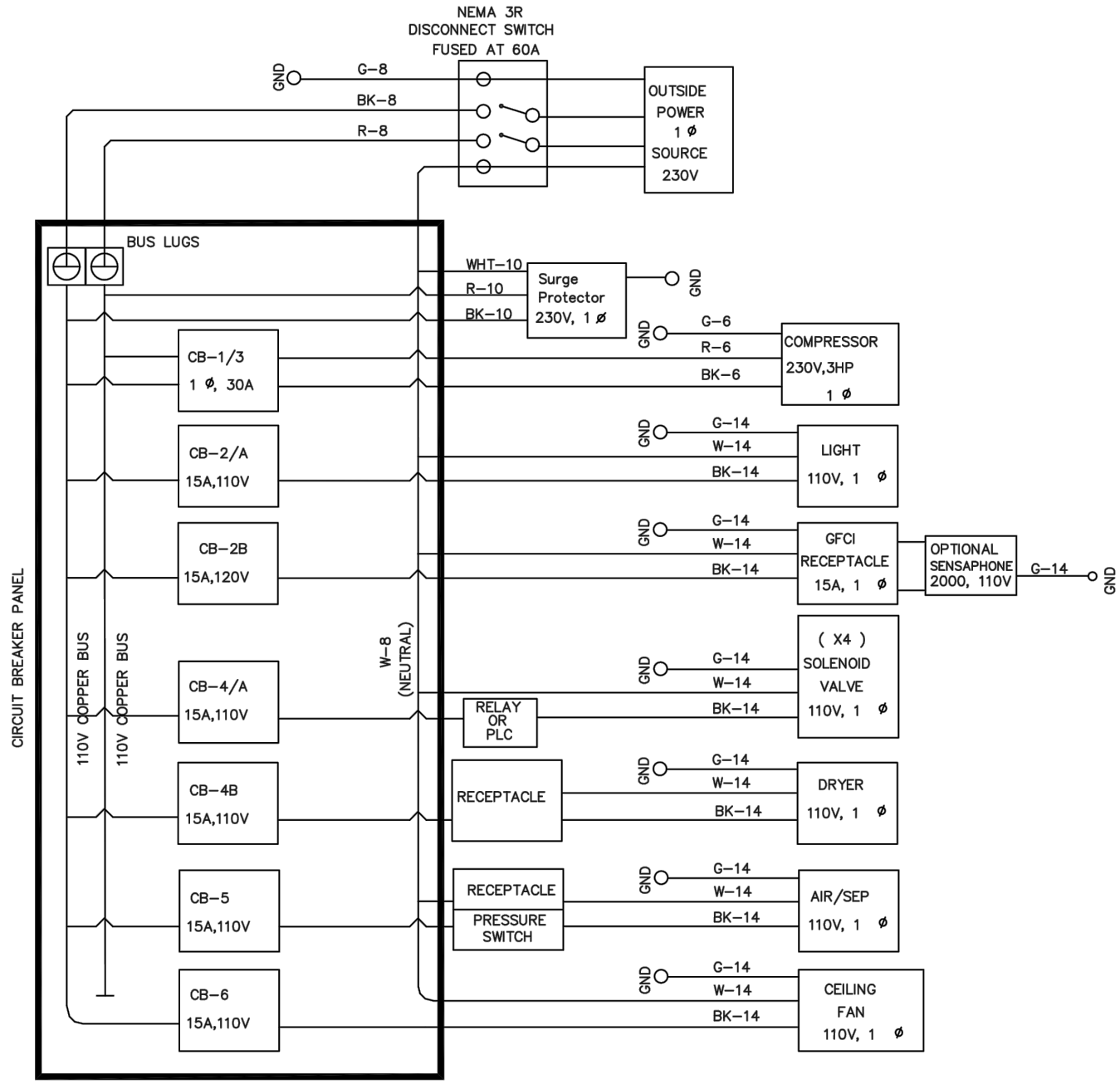
DATE 4-15-2019 DRAWN BY RJM SCALE No Scale	day DAY ENGINEERING, P.C. ENVIRONMENTAL ENGINEERING CONSULTANTS ROCHESTER, NEW YORK 14606 NEW YORK, NEW YORK 10170	PROJECT TITLE 1560 LAKE AVENUE ROCHESTER, NEW YORK PHASE II REMEDIATION DRAWING TITLE OXYGEN INJECTION SYSTEM SCHEMATIC	PROJECT NO. 5495S-18 **FIGURE 5**

Ref1: Ref2: Ref3: Layout: Figure 6 Pen Setting File: 800psFullcolor.ctb
Time Plotted: Monday, April 22, 2019 11:08:18 AM File Name: P:\Drawings\Bonita\5495S-18\5495S-18 Lake Avenue Figures.dwg



Source: Matrix Environmental Technologies

DATE 4-15-2019 DRAWN BY RJM SCALE No Scale	day DAY ENGINEERING, P.C. ENVIRONMENTAL ENGINEERING CONSULTANTS ROCHESTER, NEW YORK 14606 NEW YORK, NEW YORK 10170	PROJECT TITLE 1560 LAKE AVENUE ROCHESTER, NEW YORK PHASE II REMEDIATION DRAWING TITLE PIPING & INSTRUMENTATION DIAGRAM	PROJECT NO. 5495S-18 **FIGURE 6**



Source: Matrix Environmental Technologies

DATE 4-22-2019 DRAWN BY RJM SCALE No Scale	DAY ENGINEERING, P.C. ENVIRONMENTAL ENGINEERING CONSULTANTS ROCHESTER, NEW YORK 14606 NEW YORK, NEW YORK 10170	PROJECT TITLE 1560 LAKE AVENUE ROCHESTER, NEW YORK PHASE II REMEDIATION DRAWING TITLE OXYGEN INJECTION SYSTEM WIRING DIAGRAM	PROJECT NO. 5495S-18 **FIGURE 7**

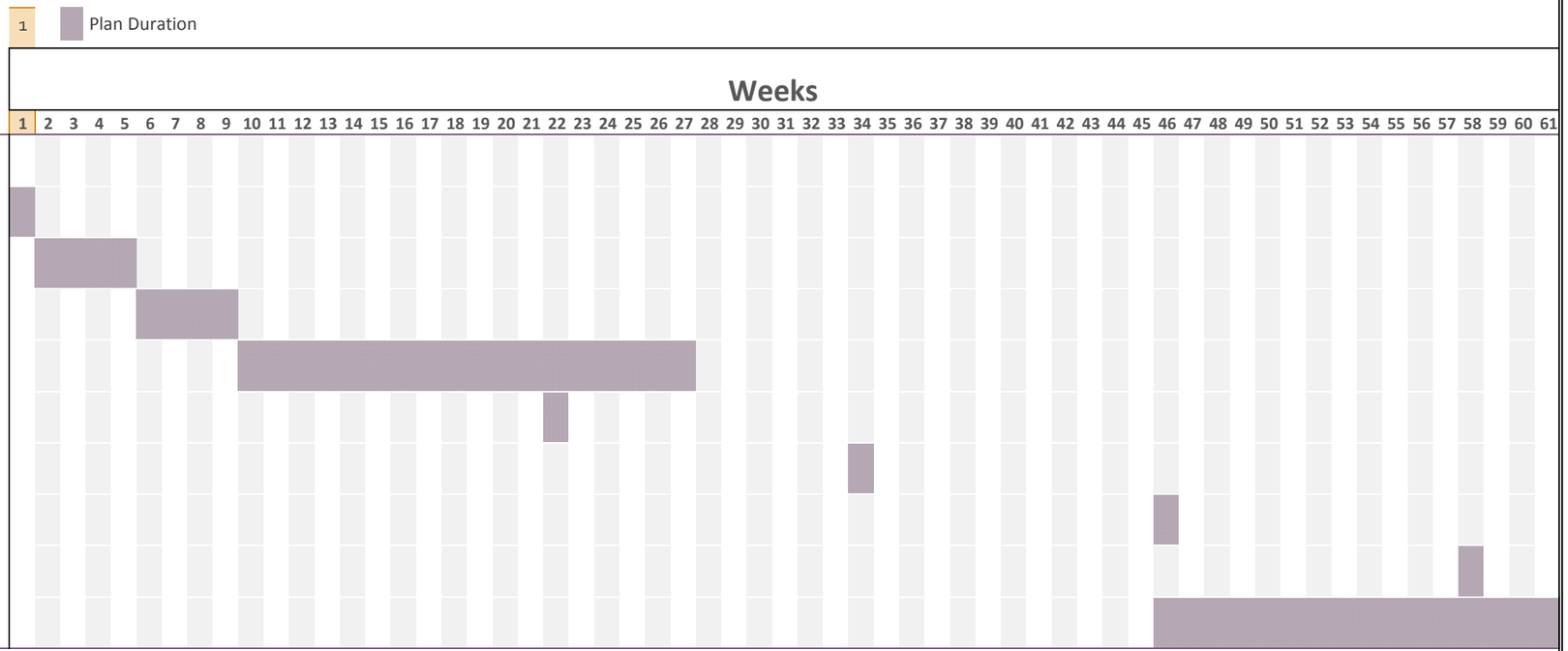
TABLES

Table 1

1560 Lake Avenue
Rochester, New York

BCP Site #TBD

Project Schedule - IRMWP



ACTIVITY	PLAN START (Weeks)	PLAN DURATION (Weeks)
Department approval of Final Oxygen Injection System Design and City's completion of parking lot sub-base [1]	0	0
Site Mobilizaton and Project Preparation	1	1
Oxygen Injection System Installation[2]	2	4
Oxygen Injection Startup Monitoring	6	4
Interim Site Mangement Plan[4]	10	18
3-Month Groundwater Monitoring Event	22	1
6-Month Groundwater Monitoring Event	34	1
9-Month Groundwater Monitoring Event	46	1
12-Month Groundwater Monitoring Event [3]	58	1
Prepare CCR/FER[4]	46	16

Notes/Assumptions

1 - Final Oxygen Injection System Design will be provided to the NYSDEC subsequent to compleitng the RI Field work.

2 - Contractor Availability is immediate

3 - Additional quarterly monitoring events may be added until effectiveness monitoring is completed.

4- Does not Include NYSDEC/NYSDOH Review Time and preparation of revised documents

APPENDIX A

Health and Safety Plan

HEALTH AND SAFETY PLAN

REMEDIAL INVESTIGATION/CORRECTIVE ACTIONS
1560 LAKE AVENUE
ROCHESTER, NEW YORK

Prepared by: Day Environmental, Inc.
1563 Lyell Avenue
Rochester, New York 14606

Project No.: 5495S-18

Date: April 30, 2019

TABLE OF CONTENTS

ATTACHMENTS

1.0 INTRODUCTION

Day Environmental, Inc. (DAY) prepared this Health and Safety Plan (HASP) to outline policies and procedures to protect workers and the public from potential environmental hazards during investigation and remediation to be conducted at, and in the vicinity of, the property addressed as 1560 Lake Avenue, City of Rochester, County of Monroe, New York (the Site). A Project Locus map presented as Figure 1 shows the general location of the Site.

Although the HASP focuses on the specific work activities planned for the Site, it must remain flexible due to the nature of this work. Conditions may change and unforeseen situations can arise that require deviations from the original HASP.

1.1 SITE LOCATION AND DESCRIPTION

The Site consists of approximately 2.144 acres of vacant land (Tax ID 090.44-1-1.2), is covered by surface comprised of soil, gravel, deteriorating pavement, and grass, and is zoned as C-3 (Regional Destination Center District). A 25-foot wide strip comprising the northern portion of the former Lapham Street right-of way, which contains a combined stormwater/sanitary sewer main, is located on the southernmost portion of the Site. The Site is bound:

- to the north by Redwood Road with a commercial parking lot, a vacant commercial lot, and some residential property beyond;
- to the east by Lapham Street Extension with residential property beyond;
- to the south by commercial property and residential property; and,
- to the west by Lake Avenue with industrial property and commercial property beyond.

1.2 SITE HISTORY/OVERVIEW

The property's environmental history is documented in a Phase I Environmental Site Assessment Report dated December 7, 2017 and a Phase II Environmental Site Assessment Data Package dated March 23, 2018, which are included as PDF enclosures with the BCP Application. In summary, the 1560 Lake Avenue parcel was an automobile sales and service facility from the late 1940s to mid-2000s. The automobile sales and service facility was built on heterogeneous fill, which extends from the ground surface to depths of up to 13 feet below the ground surface (bgs). In connection with the historical uses of the 1560 Lake Avenue parcel, there were multiple reported spills and underground storage tanks. Petroleum impacts to soil were documented. Petroleum impacts were also noted in groundwater within the overburden and bedrock. Impacts also included detections of methyl tert-butyl ether (MTBE) primarily in the bedrock groundwater with a source not identified on the parcel. Reportedly nine underground storage tanks were removed from the 1560 Lake Avenue parcel from the 1960s to the 1980s; however, complete documentation of their closure including confirmatory soil samples were not provided. A geophysical survey was conducted across the entire Site which identified two magnetic anomalies. Test pits excavated at the two magnetic anomalies did not identify

underground storage tanks. The former automobile service area had a former grease pit where personnel could conduct service work beneath the vehicles. Prior to closure by filling in-place with flowable fill, standing water in the grease pit was non-detect for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs), but did contain lube oil. As such, the water was removed and disposed off-site prior to closure by filling in-place. SVOC and metals impacts were also detected in soil and the heterogeneous fill material (e.g., historical fill material) at the Site.

1.3 PLANNED ACTIVITIES COVERED BY HASP

This HASP is intended to be used during intrusive environmental studies and remedial activities conducted at the Site that have the potential to encounter contaminated materials. Currently, identified activities to be completed at the Site that have the potential to encounter contaminated materials include:

- Site Preparation Activities
- Advancement of test borings and installation of groundwater monitoring wells, oxygen injection points, and oxygen injection system line trenches
- Soil, Groundwater and Soil Vapor sample collection
- Operation of an oxygen injection remedial system
- Installation of a cover system
- Management of Investigation Derived Waste (IDW)

This HASP can be modified to cover other site activities as deemed appropriate. Site personnel implementing the work described above must have the appropriate level of training required by OSHA including 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training and current 8-hour refresher training. The owner of the property, its contractors, and other workers at the Site will be responsible for the development and/or implementation of their own health and safety provisions associated with Site activities.

2.0 KEY PERSONNEL AND MANAGEMENT

The Project Manager (PM) and Site Safety Officer (SSO) are responsible for formulating health and safety requirements, and implementing the HASP.

2.1 PROJECT MANAGER

The PM has the overall responsibility for the project and will coordinate with the SSO to ensure that the goals of the project are attained in a manner consistent with the HASP requirements.

2.2 SITE SAFETY OFFICER

The SSO has responsibility for administering the HASP relative to site activities, and will be in the field while activities are in progress. The SSO's operational responsibilities will be monitoring, including personal and environmental monitoring, ensuring personal protective equipment (PPE) maintenance, and identification of protection levels. The air monitoring data obtained by the SSO will be available for review by regulatory agencies and other on-site personnel.

2.3 EMPLOYEE SAFETY RESPONSIBILITY

Each employee is responsible for personal safety as well as the safety of others in the area. Each employee will use the equipment provided in a safe and responsible manner as directed by the SSO.

2.4 KEY SAFETY PERSONNEL

The following individuals are anticipated to share responsibility for health and safety of DAY representatives at the Site.

DAY Project Manager	Jeffry Danzinger
DAY Site Safety Officer	Nathan Simon, Heather McLennan or Thomas Roszak

3.0 SAFETY RESPONSIBILITY

Contractors, consultants, state or local agencies, or other parties, and their employees, involved with this project will be responsible for their own safety while on-site. Their employees should be required to understand the information contained in this HASP, and ought to follow the recommendations that are made in this document. Nevertheless, contractors, consultants, state or local agencies, or other parties, and their employees, involved with this project must utilize their own health and safety plan for this project, which plan must also be found acceptable to the New York State Department of Health (NYSDOH), New York State Department of Environmental Conservation (NYSDEC) and/or the Monroe County Department of Public Health (MCDPH).

4.0 JOB HAZARD ANALYSIS

There are many hazards associated with environmental work on a site, and this HASP discusses some of the anticipated hazards for this Site. The hazards listed below deal specifically with those hazards associated with the management of potentially contaminated media (e.g., soil, fill, groundwater, etc.).

4.1 CHEMICAL HAZARDS

Chemical substances can enter the unprotected body by inhalation, skin absorption, ingestion, or injection (i.e., a puncture wound, etc.). A contaminant can cause damage to the point of contact or can act systemically, causing a toxic effect at a part of the body distant from the point of initial contact.

A list of selected constituents that have been detected at the Site at concentrations that exceed soil or groundwater standards, criteria and guidance (SCG) values established by the NYSDEC are presented below. This list also presents the available Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs), National Institute for Occupational Safety and Health (NIOSH) recommended exposure limits (RELs), and NIOSH immediately dangerous to life or health (IDLH) levels.

CONSTITUENT	OSHA PEL	NIOSH REL	IDLH
Acetone	200 ppm	150 ppm	1500 ppm
Benzene	1 ppm	0.1 ppm	500 ppm
MTBE	NA	NA	NA
Toluene	200 ppm	100 ppm	500 ppm
Ethylbenzene	100 ppm	100 ppm	800 ppm
n-propylbenzene	NA	NA	NA
n-Butylbenzene	NA	NA	NA
Isopropylbenzene	50 ppm	50 ppm	900 ppm
1,2,4-Trimethylbenzene	NA	125 mg/m^3	NA
1,3,5-Trimethylbenzene	NA	25 ppm	NA
m,p-Xylene	100 ppm	100 ppm	900 ppm
o-Xylene	100 ppm	100 ppm	900 ppm
Benz(a)anthracene	0.2 mg/m^3	0.1 mg/m^3	80 mg/m^3
Benzo(a)pyrene	0.2 mg/m^3	0.1 mg/m^3	80 mg/m^3
Benzo(b)fluoranthene	0.2 mg/m^3	0.1 mg/m^3	80 mg/m^3
Benzo(k)fluoranthene	0.2 mg/m^3	0.1 mg/m^3	80 mg/m^3

Indeno(1,2,3-cd)pyrene	NA	NA	NA
Chrysene	0.2 mg/m^3	0.1 mg/m^3	80 mg/m^3
Naphthalene	50 mg/m^3	50 mg/m^3	1250 mg/m^3
Lead	0.05 mg/m^3	0.05 mg/m^3	100 mg/m^3
Mercury	0.1 mg/m^3	0.05 mg/m^3	10 mg/m^3
Selenium	0.2 mg/m^3	0.2 mg/m^3	1 mg/m^3
Arsenic	0.01 mg/m^3	0.002 mg/m^3	5 mg/m^3
Silver	0.01 mg/m^3	0.01 mg/m^3	10 mg/m^3
Endrin	0.1 mg/m^3	0.1 mg/m^3	2 mg/m^3
Lindane	0.5 mg/m^3	0.5 mg/m^3	50 mg/m^3
DDT	1 mg/m^3	0.5 mg/m^3	500 mg/m^3
Dieldrin	0.25 mg/m^3	0.25 mg/m^3	450 mg/m^3

NA = Not Available ppm = Parts Per Million mg/m^3 = milligrams per cubic meter

The potential routes of exposure for these analytes and chemicals include inhalation, ingestion, skin absorption and/or skin/eye contact. The potential for exposure through any one of these routes will depend on the activity conducted. The most likely routes of exposure for the anticipated environmental activities at the Site include inhalation and skin/eye contact.

4.2 OXYGEN INJECTION SYSTEM HAZARDS

Relatively pure oxygen (90-95%) will be used during the remediation process. Anyone working with or maintaining equipment associated with oxygen should understand each element and section of the Safety Data Sheet (SDS) for oxygen included in Attachment 2. Also, smoking and open flames in or near the oxygen generating trailers is prohibited. Each oxygen injection trailer has signage for "no smoking" and "oxygen in use".

The attached SDS for oxygen includes specific sections for first aid measures, fire-fighting measures, accidental release measures, handling and storage measures, exposure controls and personal protection. Physical and chemical properties, stability and reactivity, toxicological information, ecological information, disposal considerations, transportation information and regulatory information are also included on the SDS.

4.3 PHYSICAL HAZARDS

There are physical hazards associated with this project, which might compound the chemical hazards. Hazard identification, training, adherence to the planned environmental measures, and careful housekeeping can prevent many problems or accidents arising from physical hazards. Potential physical hazards associated with this project and suggested preventative measures include:

- Slip/Trip/Fall Hazards – Some areas may have wet or frozen surfaces that will greatly increase the possibility of inadvertent slips. Caution must be exercised when using steps, ladders, and stairs due to slippery surfaces in conjunction with the fall hazard. Good housekeeping practices are essential to minimize the trip hazards.
- Small Quantity Flammable Liquids – Small quantities of flammable liquids will be stored in "safety" cans and labeled according to contents.
- Electrical Hazards – Electrical devices and equipment shall be de-energized prior to working near them. All extension cords will be kept out of water, protected from crushing, and observed regularly to ensure structural integrity. Temporary electrical circuits will be protected with ground fault circuit interrupters. Only qualified electricians are authorized to work on electrical circuits. Heavy equipment (e.g., excavator, backhoe, drill rig) shall not be operated within 10 feet of high voltage lines, unless proper protection form the high voltage lines is provided by the appropriate utility company.
- Noise – Work around large equipment often creates excessive noise. The effects of noise can include:

- Workers being startled, annoyed, or distracted.
- Physical damage to the ear resulting in pain, or temporary and or/permanent hearing loss.
- Communication interference that may increase potential hazards due to the inability to warn of danger and proper safety precautions to be taken.

Proper hearing protection will be worn as deemed necessary. In general, feasible administrative or engineering controls shall be utilized when on-site personnel are subjected to noise exceeding an 8-hour time weighted average (TWA) sound level of 90 decibels on the A-weighted scale (dBA). In addition, whenever employee noise exposures equal or exceed an 8-hour TWA sound level of 85 dBA, employers shall administer a continuing, effective hearing conservation program as described in the OSHA Regulation 29 Code of Federal Rules (CFR) Part 1910.95.

- Heavy Equipment – Each morning before start-up, heavy equipment will be checked to ensure safety equipment and devices are operational and ready for immediate use.
- Subsurface and Overhead Hazards – Before any excavation activity, efforts will be made to determine whether underground utilities and potential overhead hazards will be encountered. Underground utility clearance must be obtained prior to subsurface work.

4.4 ENVIRONMENTAL HAZARDS

Environmental factors such as weather, wild animals, insects, snakes and irritant plants can pose a hazard when performing outdoor tasks. The SSO shall make reasonable efforts to alleviate these hazards should they arise.

4.4.1 Heat Stress

The combination of warm ambient temperature and protective clothing increases the potential for heat stress. In particular,

- Heat rash
- Heat cramps
- Heat exhaustion
- Heat stroke

Site workers will be encouraged to increase consumption of water or electrolyte-containing beverages such as Gatorade® when the potential for heat stress exists. In addition, workers are encouraged to take rests whenever they feel any adverse effects that may be heat-related. The frequency of breaks may need to be increased upon worker recommendation to the SSO.

4.4.2 Exposure to Cold

With outdoor work in the winter months, the potential exists for hypothermia and frostbite. Protective clothing greatly reduces the possibility of hypothermia in workers. However, personnel will be instructed to wear warm clothing and to stop work to obtain more clothing if they become too cold. Employees will also be advised to change into dry clothes if their clothing becomes wet from perspiration or from exposure to precipitation.

5.0 SITE CONTROLS

To prevent migration of contaminants caused through tracking by personnel or equipment, work areas, and associated personal protective equipment staging/decontamination areas, will be specified prior to beginning operations.

5.1 SITE ZONES

In the area where contaminated materials present the potential for worker exposure (work zone), personnel entering the area must wear the mandated level of protection for the area. A "transition zone" shall be established where personnel can begin and complete personal and equipment decontamination procedures. This can reduce potential off-site migration of contaminated media. Contaminated equipment or clothing will not be allowed outside the transition zone (e.g., on clean portions of the Site) unless properly containerized for disposal. Operational support facilities will be located outside the transition zone (i.e., in a "support zone"), and normal work clothing and support equipment are appropriate in this area. If possible, the support zone should be located upwind of the work zone and transition zone.

5.2 GENERAL

The following items will be requirements to protect the health and safety of workers during implementation of activities that disturb contaminated material.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increased the probability of hand to mouth transfer and ingestion of contamination shall not occur in the work zone and/or transition zone during disturbance of contaminated material.
- Personnel admitted in the work zone shall and transition zone be properly trained in health and safety techniques and equipment usage.
- No personnel shall be admitted in the work zone without the proper safety equipment.
- Proper decontamination procedures shall be followed before leaving the transition zone.

6.0 PROTECTIVE EQUIPMENT

This section addresses the various levels of PPE, which are or may be required at this job site. Personnel entering the work zone and transition zone shall be trained in the use of the anticipated PPE to be utilized.

6.1 ANTICIPATED PROTECTION LEVELS

The following table summarizes the protection levels (refer to Section 6.2) anticipated for tasks to be implemented during this project.

TASK	PROTECTION LEVEL	COMMENTS/MODIFICATIONS
Site mobilization	D	
Site preparation	D	
Intrusive work	C/Modified D/D	Based on air monitoring, and SSO discretion.
Decontamination Area	Modified D/D	
Site breakdown and demobilization	D	

It is anticipated that work conducted as part of this project will be performed in Level D or modified Level D PPE. If conditions are encountered that require Level C PPE, the work will be temporarily suspended and the work site will be evaluated to limit exposure prior to implementing Level C PPE. If conditions are encountered that require Level A or Level B PPE, the work will immediately be stopped. The appropriate government agencies (e.g., NYSDEC, NYSDOH, MCDPH, etc.) will be notified and the proper health and safety measures will be implemented (e.g., develop and implement engineering controls, upgrade in PPE, etc.).

6.2 PROTECTION LEVEL DESCRIPTIONS

This section lists the minimum requirements for each protection level. Modifications to these requirements can be made upon approval of the SSO. If Level A, Level B, and/or Level C PPE is required, Site personnel that enter the work zone and/or transition zone must be properly trained and certified in the use of those levels of PPE.

6.2.1 Level D

Level D consists of the following:

- Safety glasses
- Hard hat when working with heavy equipment
- Steel-toed or composite-toed work boots

- Protective gloves during sampling or handling of potentially contaminated media
- Work clothing as prescribed by weather

6.2.2 Modified Level D

Modified Level D consists of the following:

- Safety glasses with side shields
- Hard hat when working with heavy equipment
- Steel-toed or composite-toed work boots
- Protective gloves during sampling or handling of potentially contaminated media
- Outer protective wear, such as Tyvek coverall [Tyveks (Sarans) and polyvinyl chloride (PVC) acid gear will be required when workers have a potential to be exposed to impacted liquids or impacted particulates]

6.2.3 Level C

Level C consists of the following:

- Air-purifying respirator with appropriate cartridges
- Outer protective wear, such as Tyvek coverall [Tyveks (Sarans) and PVC acid gear will be required when workers have a potential to be exposed to impacted liquids or particulates]
- Hard hat when working with heavy equipment
- Steel-toed or composite-toed work boots
- Nitrile, neoprene, or PVC overboots, if appropriate
- Nitrile, neoprene, or PVC gloves, if appropriate
- Face shield (when projectiles or splashes pose a hazard) and/or safety glasses with side shields.

6.2.4 Level B

Level B protection consists of the items required for Level C protection with the exception that an air-supplied respirator is used in place of the air-purifying respirator. Level B PPE is not anticipated to be required during this project. If the need for level B PPE becomes evident, activities in the affected area will be stopped until conditions are further evaluated, and any necessary modifications to the HASP have been approved by the PM and SSO. Subsequently, the appropriate safety measures (including Level B PPE) must be implemented prior to commencing site activities.

6.2.5 Level A

Level A protection consists of the items required for Level B protection with the addition of a fully encapsulating, vapor-proof suit capable of maintaining positive pressure. Level A PPE is not anticipated to be required during this project. If the need for level A PPE becomes evident, activities in the affected area will be stopped until conditions are further evaluated, and any necessary modifications to the HASP have been approved by the PM and SSO. Subsequently, the appropriate safety measures (including Level A PPE) must be implemented prior to commencing site activities.

6.3 RESPIRATORY PROTECTION

Any respirator used will meet the requirements of the OSHA 29 CFR 1910.134. Both the respirator and cartridges specified shall be fit-tested prior to use in accordance with OSHA regulations (29 CFR 1910). Air purifying respirators shall not be worn if contaminant levels exceed designated respirator cartridge use concentrations. The workers will wear respirators with approval for: organic vapors less than 1,000 parts per million (ppm); and dusts, fumes and mists with a TWA less than 0.05 milligrams per cubic meter (mg/m^3).

No personnel who have facial hair, which interferes with respirator sealing surface, will be permitted to wear a respirator and will not be permitted to work in areas requiring respirator use.

Only workers who have been certified by a physician as being physically capable of respirator usage shall be issued a respirator. Personnel unable to pass a respiratory fit test or without medical clearance for respirator use will not be permitted to enter or work in areas that require respirator protection.

7.0 DECONTAMINATION PROCEDURES

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when they leave the work site.

7.1 PERSONNEL DECONTAMINATION

Personnel involved with activities that involve disturbing contaminated media will follow the decontamination procedures described herein to ensure that material which workers may have contacted in the work zone and/or transition zone does not result in personal exposure and is not spread to clean areas of the Site. This sequence describes the general decontamination procedure. The specific stages can vary depending on the Site, the task, and the protection level, etc.

1. Leave work zone and go to transition zone
2. Remove soil/debris from boots and gloves
3. Remove boots
4. Remove gloves
5. Remove Tyvek suit and discard, if applicable
6. Remove and wash respirator, if applicable
7. Go to support zone

7.2 EQUIPMENT DECONTAMINATION

In order to reduce the potential for cross-contamination of samples collected during this project, the following procedures will be implemented to ensure that the data collected (primarily the laboratory data) is acceptable.

It is anticipated that most of the materials used to assist in obtaining samples will be disposable one-time use materials (e.g., sampling containers, bailers, rope, pump tubing, nitrile gloves, etc.). However, when equipment must be re-used (e.g., drill rigs, static water level indicator, split spoon samplers, etc.), it will be decontaminated in the transition zone by at least one of the following methods:

- Steam clean the equipment within a dedicated decontamination area; or
- Rough wash in tap water; wash in mixture of tap water and Alconox-type soap; double rinse with deionized or distilled water; and air dry and/or dry with clean paper towel.

The decontamination area will be set-up in a location to minimize disturbance to properties/areas surrounding the work area.

7.3 DISPOSAL

Disposable clothing will be disposed in accordance with applicable regulations. Liquids (e.g., decontamination water, etc.) or solids (e.g., soil) generated by project activities will be disposed in accordance with applicable regulations.

8.0 AIR MONITORING

During activities that have the potential to disturb contaminated soil, fill material, or groundwater, air monitoring will be conducted in order to determine airborne particulate and contamination levels. This ensures that respiratory protection is adequate to protect personnel against the chemicals that are encountered and that chemical contaminants are not migrating off-site. Additional air monitoring may be conducted at the discretion of the SSO. Readings will be recorded and be available for review.

The following chart describes the direct reading instrumentation that will be utilized and appropriate action levels.

Monitoring Device	Action Level	Response/Level of PPE
PID Volatile Organic Compound Meter	< 1 ppm in breathing zone, sustained 5 minutes	Level D
	1-25 ppm in breathing zone, sustained 5 minutes	Cease work, implement measures to reduce air emissions when the work is performed, etc. If levels can not be brought below 1 ppm in the breathing zone, then upgrade PPE to Level C
	26-250 ppm in breathing zone, sustained 5 minutes	Level B, Stop work, evaluate the use of engineering controls, etc.
	>250 ppm in breathing zone	Level A, Stop work, evaluate the use of engineering controls, etc.
RTAM Particulate Meter	< 100 $\mu g/m^3$ above background over an integrated period not to exceed 15 minutes.	Continue working
	> 100 $\mu g/m^3$ above background	Cease work, implement dust suppression, change in way work performed, etc. If levels can not be brought below 150 $\mu g/m^3$, then upgrade PPE to Level C

8.1 PARTICULATE MONITORING

During activities where contaminated materials (e.g., soil, fill, etc.) may be disturbed, air monitoring will include real-time monitoring for particulates using a real-time aerosol monitor (RTAM) particulate meter at the perimeter of the work zone in accordance with the Final DER-10 Technical Guidance for Site Investigation and Remediation (DER-10) dated May 2010. DER-

10 uses an action level of 100 µg/m^3 (0.10 mg/m^3) over background conditions for an integrated period not to exceed 15 minutes. If the action level is exceeded, or if visible dust is encountered, then work shall be discontinued until corrective actions are implemented. Corrective actions may include dust suppression, change in the way work is performed, and/or upgrade of personal protective equipment.

8.2 VOLATILE ORGANIC COMPOUND MONITORING

During activities where contaminated materials may be disturbed, a photoionization detector (PID) will be used to monitor total VOCs in the ambient air. The PID will prove useful as a direct reading instrument to aid in determining if current respiratory protection is adequate or needs to be upgraded. The SSO will take measurements before operations begin in an area to determine the amount of VOCs naturally occurring in the air. This is referred to as a background level. Levels of VOCs will periodically be measured in the air at active work sites, and at the transition zone when levels are detected above background in the work zone.

8.3 COMMUNITY AIR MONITORING PLAN

During activities that have the potential to disturb contaminated soil, fill material, or groundwater, this Community Air Monitoring Plan (CAMP) will be implemented. The CAMP includes real-time monitoring for VOCs and particulates (i.e., dust) at the downwind perimeter of each designated work area when activities with the potential to release VOCs or dust are in progress at the Site. This CAMP is based on the NYSDOH Generic CAMP included as Appendix 1A DER-10. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences/businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of project activities.

Continuous monitoring will be conducted during ground intrusive activities involving potentially contaminated soil, fill material or groundwater. Ground intrusive activities include, but are not limited to, test pitting or trenching, advancement/installation of test borings/monitoring wells/in-situ remediation components, etc.

Periodic monitoring for VOCs will be conducted during non-intrusive activities involving potentially contaminated soil, fill material or groundwater where deemed appropriate (e.g., during collection of soil samples or groundwater samples, etc.).

8.3.1 VOC Monitoring, Response Levels, and Actions

VOCs must be monitored at the downwind perimeter of the immediate work area (i.e., the work zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment

should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 ppm above background for the 15-minute average, work activities must be temporarily halted and monitoring must be continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source or vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less (but in no case less than 20 feet), is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

The 15-minute readings must be recorded and made available for NYSDEC and NYSDOH personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

8.3.2 Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind perimeter of the work zone at temporary particulate monitoring stations. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter ($\mu g/m^3$) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 $\mu g/m^3$ above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 $\mu g/m^3$ above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.

Readings will be recorded and made available for review.

9.0 EMERGENCY CONTINGENCY PLAN

This section presents the emergency contingency plan (ECP) describing the procedures to be performed in the event of an emergency (e.g., fire, spill, tank/drum release, etc.). To provide first-line assistance to field personnel in the case of illness or injury, the following items will be made immediately available on the Site:

- First-aid kit;
- Portable emergency eye wash; and
- Supply of clean water.

9.1 EMERGENCY TELEPHONE NUMBERS

The following telephone numbers are listed in case there is an emergency at the Site:

Fire/Police Department:	911
Poison Control Center:	(800) 222-1222
NYSDEC	
Region 8: Environmental Remediation	(585) 226-5349
Spill Hotline	(800) 457-7362
NYSDOH	
Public Health Duty Officer	(866) 881-2809
MCDPH	
Public Health Engineering	(585) 753-5476
Bonitatem LLC.	
Michael J. Piehler	(585) 310-7000
DAY ENVIRONMENTAL, INC.	
Jeffrey Danzinger	(585) 454-0210 ext. 114
NEAREST HOSPITAL:	Rochester General Hospital 1425 Portland Avenue, Rochester, NY 14621 (585) 922-4000 (Main) (585) 922-2000 (Emergency Department)
Directions to the Hospital:	Head South on Lake Avenue towards West Ridge Road. Take NY-104 E/ Keeler Street Expressway to NY-104 Service Road East. Take the exit towards Carter Street/Portland Avenue from NY-104. Continue on NY-104 Service Road to 1425 Portland Avenue, Rochester, New York (Figure 1).

9.2 EVACUATION

During activities involving potential disturbance of contaminated soil, fill material, or groundwater, a log of each individual entering and leaving the Site will be kept for emergency accounting practices. Although unlikely, it is possible that a site emergency could require evacuating personnel from the Site. If required, the SSO will give the appropriate signal for site evacuation (i.e., hand signals, alarms, etc.).

All personnel shall exit the Site and shall congregate in an area designated by the SSO. The SSO shall ensure that all personnel are accounted for. If someone is missing, the SSO will alert emergency personnel. The appropriate government agencies will be notified as soon as possible regarding the evacuation, and any necessary measures that may be required to mitigate the reason for the evacuation.

9.3 MEDICAL EMERGENCY

In the event of a medical emergency involving illness or injury to one of the on-site personnel, Emergency Medical Services (EMS) and the appropriate government agencies should be notified immediately. The area in which the injury or illness occurred shall not be entered until the cause of the illness or injury is known. The nature of injury or illness shall be assessed. If the victim appears to be critically injured, administer first aid and/or cardio-pulmonary resuscitation (CPR) as needed. If appropriate, instantaneous real-time air monitoring shall be done in accordance with air monitoring outlined in Section 8.0 of this HASP.

9.4 CONTAMINATION EMERGENCY

It is unlikely that a contamination emergency will occur; however, if such an emergency does occur, the specific work area shall be shut down and immediately secured. If an emergency rescue is needed, notify Police, Fire Department and EMS units immediately. Advise them of the situation and request an expedient response. The appropriate government agencies shall be notified immediately. The area in which the contamination occurred shall not be entered until the arrival of trained personnel who are properly equipped with the appropriate PPE and monitoring instrumentation as outlined in Section 8.0 of this HASP.

9.5 FIRE EMERGENCY

In the event of a fire on-site, all non-essential site personnel shall be evacuated to a safe, secure area. The Fire Department will be notified immediately, and advised of the situation and the identification of any hazardous materials involved. The appropriate government agencies shall be notified as soon as possible.

The four classes of fire along with their constituents are as follows:

Class A:	Wood, cloth, paper, rubber, many plastics, and ordinary combustible materials.
Class B:	Flammable liquids, gases and greases.
Class C:	Energized electrical equipment.
Class D:	Combustible metals such as magnesium, titanium, sodium, potassium.

Small fires on-site may be actively extinguished; however, extreme care shall be taken while in this operation. Approaches to the fire shall be done from the upwind side if possible. Distance from on-site personnel to the fire shall be close enough to ensure proper application of the extinguishing material but far enough away to ensure that the personnel are safe. The proper extinguisher shall be utilized for the Class(es) of fire present on the site. If possible, the fuel source shall be cut off or separated from the fire. Care must be taken when performing operations involving the shut-off of valves and manifolds, if present.

Examples of proper extinguishing agent as follows:

Class A:	Water Water with 1% Aqueous Film Forming Foams (AFFF, a.k.a. Wet Water) Water with 6% AFFF or Fluorprotein Foam ABC Dry Chemical
Class B:	ABC Dry Chemical Purple K Carbon Dioxide Water with 6% AFFF Foam
Class C:	ABC Dry Chemical Carbon Dioxide
Class D:	Metal-X Dry Powder

No attempt shall be made by site personnel against large fires. Such fires shall be handled by the Fire Department.

9.6 SPILL OR AIR RELEASE

In the event of a spill or air release of hazardous materials on-site, the specific area of the spill or release shall be shut down and immediately secured. The area in which the spill or release occurred shall not be entered until the cause can be determined and site safety can be evaluated. Non-essential site personnel shall be evacuated to a safe and secure area. The appropriate government agencies shall be notified as soon as possible. The spilled or released material shall

be immediately indentified and appropriate containment measures shall be implemented, if feasible. Real-time air monitoring shall be implemented as outlined in Section 8.0 of this HASP. If the materials are unknown, Level B protection is mandatory. If warranted, samples of the materials shall be acquired to facilitate identification.

9.7 LOCATING CONTAINERIZED WASTE AND/OR UNDERGROUND STORAGE TANKS

In the event that unanticipated containerized waster (e.g., drums) and/or underground storage tanks (USTs) are located during project activities, the work must be stopped in the specific area until site safety can be evaluated and addressed. Non-essential Site personnel shall not work in the immediate area until conditions including possible exposure hazards are addressed. The appropriate government agencies shall be notified as soon as possible. The SSO shall monitor the area as outlined in Section 8.0 of this HASP.

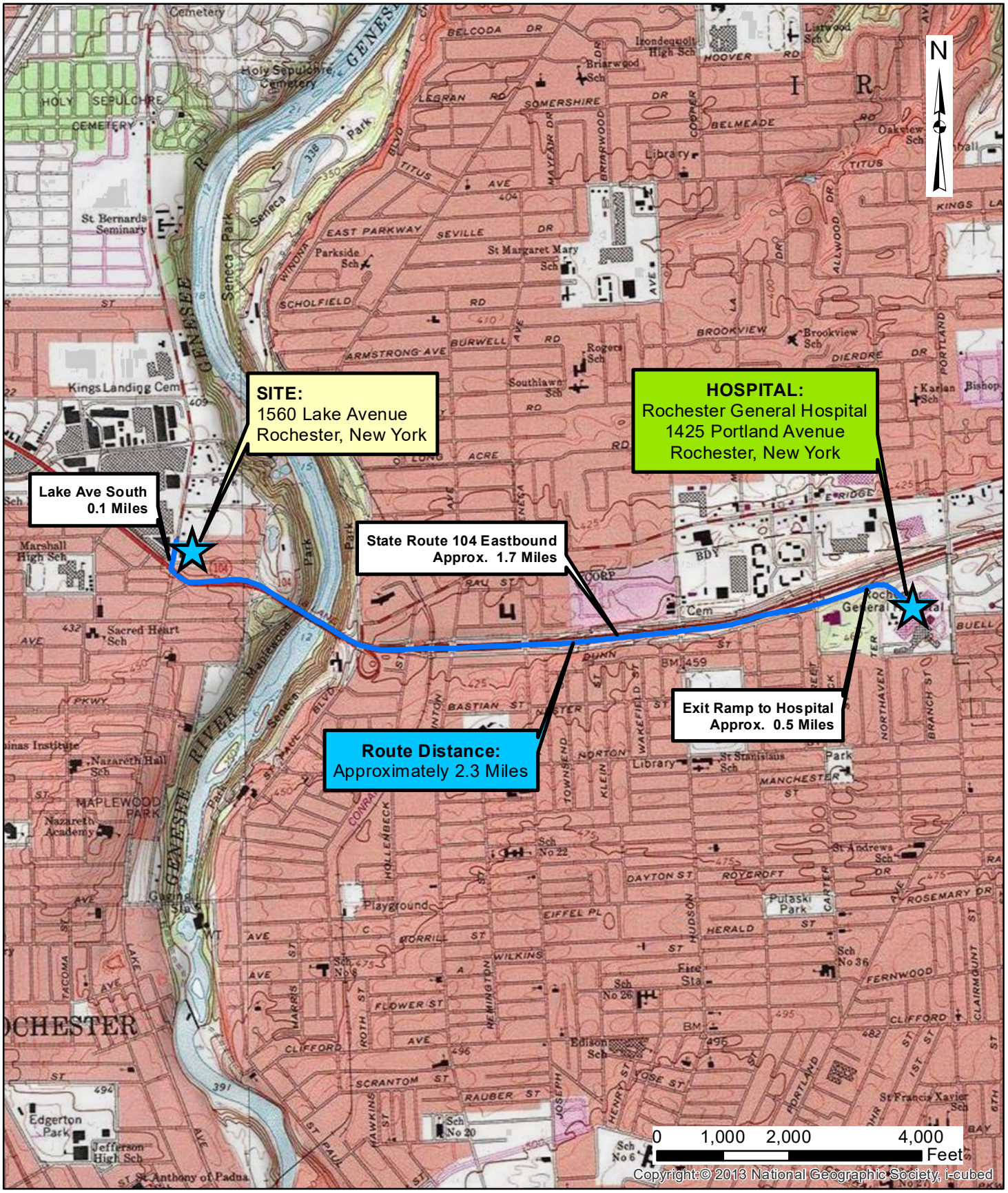
Prior to handling, unanticipated containers will be visually assessed by the SSO to gain as much information as possible about their contents. As a precautionary measure, personnel shall assume that unlabelled containers and/or tanks contain hazardous materials until their contents are characterized. To the extent possible based upon the nature of the containers encountered, actions may be taken to stabilize the area and prevent migration (e.g., placement of berms, etc.). Subsequent to initial visual assessment and any required stabilization, properly trained personnel will sample, test, remove, and dispose of any containers and/or tanks, and their contents. After visual assessment and air monitoring, if the material remains unknown, Level B protection (or higher) is mandatory.

10.0 ABBREVIATIONS

AFFF	Aqueous Film Forming Foams
BGS	Below the Ground Surface
CAMP	Community Air Monitoring Program
CFR	Code of Federal Regulations
CPR	Cardio-Pulmonary Resuscitation
DAY	Day Environmental, Inc.
dBA	Decibels on the A-Weighted Scale
ECP	Emergency Contingency Plan
EMS	Emergency Medical Service
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IDLH	Immediately Dangerous to Life or Heath
IDW	Investigative Derived Waste
MCDPH	Monroe County Department of Public Health
MTBE	Methyl Tert-Butyl Ether
mg/m^3	Milligram Per Meter Cubed
NIOSH	National Institute for Occupational Safety and Health
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PM	Project Manager
PM-10	Particulate Matter Less Than 10 Micrometers In Diameter
PPE	Personal Protection Equipment
ppm	Parts Per Million
PVC	Polyvinyl Chloride
REL	Recommended Exposure Limit
RTAM	Real-Time Aerosol Monitor
SCG	Standards, Criteria and Guidance
SSO	Site Safety Officer
SVOC	Semi-Volatile Organic Compound
TWA	Time-Weighted Average
UST	Underground Storage Tank
$\mu g/m^3$	Micrograms Per Meter Cubed
VOC	Volatile Organic Compound

ATTACHMENT 1

Figure 1 – Route for Emergency Services



Document Path: E:\GIS Mapping\Bonita5495S-18Bonita\HASP\5495S-01-HASP- Route to Hospital.mxd

Last Date Saved: 16 Apr 2019

Date: 04-15-2019 Drawn By: CPS Scale: AS NOTED	**DAY ENVIRONMENTAL, INC.** Environmental Consultants Rochester, New York 14606 New York, New York 10170	Project Title: 1560 LAKE AVENUE ROCHESTER, NEW YORK HEALTH AND SAFETY PLAN Drawing Title: Route to Emergency Services	Project No. 5495S-19 FIGURE 1

ATTACHMENT 2

Oxygen Safety Data Sheet

SAFETY DATA SHEET

Oxygen

Airgas
an Air Liquide company

Section 1. Identification

GHS product identifier : Oxygen

Chemical name : oxygen

Other means of identification : Molecular oxygen; Oxygen molecule; Pure oxygen; O2; UN 1072; Dioxygen; Oxygen USP, Aviator's Breathing Oxygen (ABO)

Product type : Gas.

Product use : Synthetic/Analytical chemistry.

Synonym : Molecular oxygen; Oxygen molecule; Pure oxygen; O2; UN 1072; Dioxygen; Oxygen USP, Aviator's Breathing Oxygen (ABO)

SDS # : 001043

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : OXIDIZING GASES - Category 1
GASES UNDER PRESSURE - Compressed gas

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : May cause or intensify fire; oxidizer.
Contains gas under pressure; may explode if heated.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Open valve slowly. Use only with equipment cleaned for Oxygen service.

Prevention : Keep away from clothing, incompatible materials and combustible materials. Keep reduction valves, valves and fittings free from oil and grease.

Response : In case of fire: Stop leak if safe to do so.

Storage : Protect from sunlight. Store in a well-ventilated place.

Disposal : Not applicable.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : oxygen

Other means of identification : Molecular oxygen; Oxygen molecule; Pure oxygen; O2; UN 1072; Dioxygen; Oxygen USP, Aviator's Breathing Oxygen (ABO)

Product code : 001043

CAS number/other identifiers

CAS number : 7782-44-7

Ingredient name	%	CAS number
oxygen	100	7782-44-7

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : No known significant effects or critical hazards.

Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Section 4. First aid measures

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Oxidizing material. This material increases the risk of fire and may aid combustion. Contact with combustible material may cause fire. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Hazardous thermal decomposition products : No specific data.

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Section 7. Handling and storage

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid breathing gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Avoid contact with eyes, skin and clothing. Empty containers retain product residue and can be hazardous. Keep away from clothing, incompatible materials and combustible materials. Keep reduction valves free from grease and oil.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F). Separate from reducing agents and combustible materials. Store away from grease and oil. Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
oxygen	None.

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Section 8. Exposure controls/personal protection

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Compressed gas.]

Color : Colorless. Blue.

Odor : Odorless.

Odor threshold : Not available.

pH : Not available.

Melting point : -218.4°C (-361.1°F)

Boiling point : -183°C (-297.4°F)

Critical temperature : -118.15°C (-180.7°F)

Flash point : [Product does not sustain combustion.]

Evaporation rate : Not available.

Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: reducing materials, combustible materials and organic materials.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : Not available.

Vapor density : 1.1 (Air = 1)

Specific Volume (ft^3/lb) : 12.0482

Gas Density (lb/ft^3) : 0.083

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : Not available.

Partition coefficient: n-octanol/water : 0.65

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Not applicable.

Flow time (ISO 2431) : Not available.

Molecular weight : 32 g/mole

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Hazardous reactions or instability may occur under certain conditions of storage or use.
Conditions may include the following:
contact with combustible materials
Reactions may include the following:
risk of causing fire

Section 10. Stability and reactivity

Conditions to avoid : No specific data.

Incompatible materials : Highly reactive or incompatible with the following materials:
combustible materials
reducing materials
grease
oil

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity
Not available.

Irritation/Corrosion
Not available.

Sensitization
Not available.

Mutagenicity
Not available.

Carcinogenicity
Not available.

Reproductive toxicity
Not available.

Teratogenicity
Not available.

Specific target organ toxicity (single exposure)
Not available.

Specific target organ toxicity (repeated exposure)
Not available.

Aspiration hazard
Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : No known significant effects or critical hazards.

Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Section 11. Toxicological information

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
oxygen	0.65	-	low

Mobility in soil

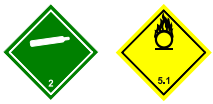
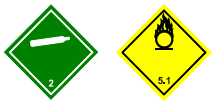
Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1072	UN1072	UN1072	UN1072	UN1072
UN proper shipping name	OXYGEN, COMPRESSED	OXYGEN, COMPRESSED	OXYGEN, COMPRESSED	OXYGEN, COMPRESSED	OXYGEN, COMPRESSED
Transport hazard class(es)	2.2 (5.1) 	2.2 	2.2 (5.1) 	2.2 (5.1) 	2.2 (5.1) 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Additional information

DOT Classification : **Limited quantity** Yes.
Quantity limitation Passenger aircraft/rail: 75 kg. Cargo aircraft: 150 kg.
Special provisions A52

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2), 2.23-2.25 (Class 5).
Explosive Limit and Limited Quantity Index 0.125
ERAP Index 3000
Passenger Carrying Ship Index 50
Passenger Carrying Road or Rail Index 75
Special provisions 42

IATA : **Quantity limitation** Passenger and Cargo Aircraft: 75 kg. Cargo Aircraft Only: 150 kg.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: This material is listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

Australia : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

Europe : This material is listed or exempted.

Japan : **Japan inventory (ENCS)**: Not determined.
Japan inventory (ISHL): Not determined.

Malaysia : Not determined.

New Zealand : This material is listed or exempted.

Philippines : This material is listed or exempted.

Republic of Korea : This material is listed or exempted.

Section 15. Regulatory information

Taiwan : This material is listed or exempted.

Thailand : Not determined.

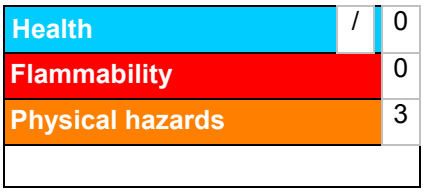
Turkey : Not determined.

United States : This material is listed or exempted.

Viet Nam : Not determined.

Section 16. Other information

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

National Fire Protection Association (U.S.A.)

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
OXIDIZING GASES - Category 1 GASES UNDER PRESSURE - Compressed gas	Expert judgment According to package

History

Date of printing : 2/3/2018

Date of issue/Date of revision : 2/3/2018

Date of previous issue : 1/27/2017

Version : 0.03

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973

Section 16. Other information

as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

APPENDIX B

Matrix Environmental Technologies Inc.
Startup Procedure for the Oxygen Injection System

Start Up Procedures for the Oxygen Injection System

The system has been fully tested prior to delivery. Therefore the initial start procedures described in the Kaeser Compressor Service Manual do not apply to on-site start up. Before initiating start up procedures, the system should be fully inspected for loose connections and damage during transport. All repairs should be made prior to start up.

Electrical Service

The system requires a 230-volt single-phase power supply with a minimum 100-amp service. Do not attempt to operate this system using a 208-volt power supply. The electrical service should include a meter and disconnect mounted on a pole or building. The electrical service should be connected to the NEMA 3R safety switch mounted on the exterior of the trailer in compliance with all applicable electrical codes. A licensed electrician may be required for this task. Following connection and activation of the electrical service, turn on the breakers located in the NEMA 1 load center on the interior of the trailer.

Connection to Oxygen Injection Points

Using the flexible tubing from the oxygen delivery manifold, connect to each underground oxygen supply line using properly sized fittings and hose clamps. Connection through the floor of the trailer is recommended.

Start Up of the Kaeser Rotary Screw Compressor Package

A brief description is provided here but the Kaeser manual should be reviewed and completely understood before operating the system. Identify the EMERGENCY STOP pushbutton on the compressor. This feature will immediately shut down the compressor in the event of an emergency. Warning, the EMERGENCY STOP pushbutton does not terminate voltage to the compressor. Caution, before servicing the compressor, the breaker for the compressor must be in the OFF position in accordance with applicable lock out/tag out procedures per OSHA CFR 29 1910.147.

The compressor should always be switched ON and OFF using keys 1 and 2 on the control panel (Sigma PLC). Do not use the breaker for turning the compressor on and off. Press the ON key and the compressor status will be displayed. The compressor can start at any moment.

Kaeser air dryer start up procedures.

Rotate the control switch to the ON position. Open the ball valve located between the compressor and wall mounted filter assembly. The compressor will load the tank to a pressure of approximately 100 PSI as displayed on the control panel.

Start Up of the AirSep PSA Oxygen Generator

The AirSep manual provides instruction for the AS-20, AS-45 and AS-80. The start up and operating procedures are the same for all three units. However, please refer to the AS-80 specifications for parts and service that apply to this system.

Turn the PSA ON/OFF switch to the ON position and the Auto/Manual switch to the AUTO position. Air will exhaust from the filter drain port. The PSA will cycle at a pressure of approximately 70 PSI as shown on the cycle pressure gauge. The PSA is self regulated and will not operate without compressed air. Oxygen production will continue until the oxygen receiver (120-gallon tank) pressure rises to approximately 58 PSI. The compressor and PSA will automatically enter a resting mode and will not restart until the pressure drops in the oxygen receiver tank.

Start Up of the Oxygen Delivery System

The regulator on the oxygen receiver tank has been factory adjusted to provide sufficient pressure to the injection points without over pressurizing the oxygen delivery manifold. Adjusting this regulator is not advised. Once the oxygen receiver is full and the system is in a resting mode, open the ball valve on the oxygen receiver tank. A mechanical timer operates each bank of injection points by opening a normally closed solenoid valve. The injection cycles have been pre-set at the factory and should only be changed after consulting with a Matrix Environmental technician. Improperly set injection cycles can result in excessive motor starts on the compressor and shorten the maintenance intervals on the equipment. The normalized oxygen output (total cubic feet per hour, not flow meter rates) should never exceed 60 SCFH. Exceeding this output rate will accelerate equipment wear and may result in low oxygen output pressure.

Allow each timer to run through a complete cycle and adjust the Dwyer flow meters to 30 SCFH or other pre-determined per point flow rate. Adjusting the flow meters at each site visit is standard. Rising pressure at the delivery manifold is an indication of silt buildup in the injection points. The points should be cleared when oxygen flow decreases to 10 SCFH or pressure exceeds 15 PSI (or sooner if desired).

The oxygen injection system is now ready for unattended operation. It is strongly suggested that several complete run cycles be supervised before leaving the site. Do not forget to set the thermostat on the heater and verify that the roof-mounted ventilator is operational. Also inspect the air inlet filters on the doors of the trailer and clean or replace when dirty.

APPENDIX C

Matrix Environmental Technologies Inc.
Oxygen Injection System Evaluation Sheet

OXYGEN INJECTION SYSTEM EVALUATION SHEET

Date Work Performed:_____

Project No._____Project Name_____Performed By_____
Bi-Weekly_____Monthly _____Quarterly_____Maintenance/Repairs _____

System Status on Arrival: ON OFF
If OFF probable cause: _____
_____

AIRSEP Unit

FEED (psi) _____
CYCLE (psi) _____
RECIEVER (psi) _____
RUN TIME (hours) _____
OXYGEN PURITY (%) _____

COMPRESSOR Unit

Air Supply (psi)_____
Run Hours _____
Load Hours _____
System Starts _____
Regular Hours _____

OIL Level: GOOD LOW
amount added: _____

COOLER FILTER MAT: GOOD or CHG.

BELTS: GOOD or ADJ.

INJECTION BANK

Point ID	IP-1	IP-2	IP-3	IP-4	IP-5	IP-6
SCFH						
PSI						
Point ID	IP-7	IP-8	IP-9			
SCFH						
PSI						

Timer/PLC injection duration _____ minutes
Points set to _____ SCFH on departure.

REGULAR MAINTENANCE TASKS:

	Service Run Hours	Parts Lifetime Hours	Service Required Yes/No
OIL		4000	
OIL FILTER		4000	
AIR FILTER		4000	
AIR/OIL SEPARATOR		4000	

MONTHLY MAINTENANCE TASKS

√ Completed	Task
	Check air filter on compressor. Change air filter element if necessary.
	Check drive belts on compressor.
	Change cooler filter mat on compressor.

YEARLY MAINTENANCE TASKS

√ Completed	Task
	Change oil filter on compressor.
	Change cooling oil on compressor.
	Check electrical connections on compressor for tightness.

TWO YEAR INSPECTION

√ Completed	Task
	Change oil separator cartridge on compressor.
	Check pressure relief valve on compressor.
	Replace drive belt on compressor.
	Replace filter on air dryer.

COMMENTS:_____
_____
_____
_____

MONITORING WELL/O2 POINT DATA SHEET

Date Work Performed:___________

Project No.______________Project Name________________________Performed By______

WELL ID	Depth to LNAPL/Depth to Water (feet)	D.O. (mg/L)	ORP	TEMP (°C)	pH

APPENDIX D

Matrix Environmental Technologies Inc.
Oxygen Injection System Operational and Maintenance Manual

Oxygen System Operation and Maintenance

Upon each inspection/site visit:

- Perform general inspection of trailer/structure for unanticipated leaks, noises, observations that may indicate concerns
- Inspect HVAC units for proper operation and settings
- Check and adjust flow meters – operate points manually to check flow and pressures, adjust as necessary
- Check pressures on oxygen generator
  - Incoming pressure – between 90 – 120 psi
  - Cycle pressure – approximately 75 psi
  - Oxygen receiver pressure – shut down target pressure – between 58 – 60 psi
- Check the cooling oil level on Kaeser Compressor
- Check the cooler filter mat on Kaeser Compressor
- Ensure automatic drain on oxygen generator functions properly (very important)
- Inspect wall filters (KRO [water separator] and KPF [particulate filter])

Monthly inspection (in addition to above actions):

- Check the air filter and change the air filter element (if necessary) on Kaeser Compressor
- Maintain the drive belts on Kaeser Compressor
- Change the cooler filter mat on Kaeser Compressor
- Monthly (at minimum) – check oxygen purity on **full** tank

Six month interval inspections:

- Inspect and clean bowls and replace particulate filter on oxygen generator

Yearly inspection (in addition to above actions):

- Change the oil filter on Kaeser Compressor
- Change the cooling oil on Kaeser Compressor (assumes a synthetic lubricant (oil) is being used in the compressor. (Change after first year of operation, then every 2 years. [Cooling oil changes will be different if non-synthetic oil is used.])
- Check that all electrical connections are tight on Kaeser Compressor
- Check performance of automatic valves and actuators on oxygen generator
- Clean and lubricate feed air regulator on oxygen generator
- Clean bowls and replace both particulate and coalescing filters on oxygen generator
- Replace wall filters (KRO and KPF filters)

Two year inspection (in addition to above actions):

- Change the oil separator cartridge on Kaeser Compressor
- Check the pressure relief valve on Kaeser Compressor
- Replace the drive belt on Kaeser Compressor
- Replace filter on Air Dryer every two years or whenever main service for compressor is performed