Remedial Action Work Plan

Former Trico Plant
BCP Site No. C915281
Buffalo, New York

July 2017

0092-016-001

Prepared For: 847 Main Street, LLC, and
791 Washington Street, LLC

Prepared By:

Benchmark Environmental Engineering & Science, PLLC

In Association With:

TurnKey Environmental Restoration, LLC

2558 Hamburg Turnpike, Suite 300, Buffalo, New York 14218 | phone: (716) 856-0635 | fax: (716) 856-0583

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FORMER TRICO PLANT

791 WASHINGTON STREET

BUFFALO, NEW YORK

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Prepared for:

847 Main Street, LLC,

and

791 Washington Street, LLC

Prepared By:

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0599

In Association With:

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0635

Certification

I, Thomas H. Forbes, certify that I am currently a NYS registered professional engineer and that this Remedial Action Work Plan (RAWP) for Site No. C915281 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).

7-24-17

Date

REMEDIAL ACTION WORK PLAN

Former Trico Plant
791 Washington Street
Buffalo, New York

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1.0 INTRODUCTION

Benchmark Environmental Engineering and Science, PLLC (Benchmark), in association with TurnKey Environmental Restoration, LLC (TurnKey), referred to herein as Benchmark-TurnKey, has prepared this Remedial Action Work Plan (RAWP) on behalf of 847 Main Street, LLC, 791 Washington Street, LLC, and their construction manager, The Krog Group, LLC, referred to herein as Krog. Krog has elected to pursue cleanup and redevelopment of the Former Trico Plant, located at 791 Washington Street, Buffalo, New York (Site; see Figures 1 and 2), under the New York State Brownfield Cleanup Program (BCP or Program) through an executed Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) dated October 24, 2013.

This document presents the scope of work and procedures for completion of planned remedial activities on the Site. The remedial activities will be completed by remedial construction contractors under contract to Krog and/or Benchmark-TurnKey. The work will be completed in general accordance with 6NYCRR Part 375 and NYSDEC DER-10 guidelines.

1.1 Site Background

The Site consists of a single parcel totaling approximately 2.11 acres, located at 791 Washington Street in the City of Buffalo, Erie County, New York. The property is currently developed with a complex of five adjoining buildings totaling 617,627 square feet. The oldest of the five buildings was constructed circa 1890 as a portion of the Christian Weyand Brewery that operated at the Site until the enactment of prohibition. The building was purchased in 1920 by the Trico Products Corporation for the manufacturing of windshield wiper blades for the automobile industry. The remaining buildings were constructed from 1920 to 1954. The Trico Products Corporation operated at the Site until approximately 1993. The building complex is currently vacant and has been idle since at least 2000. Historic operations included electroplating, smelting, die-casting, rubber extrusion, and metal fabrication. Figure 3 provides the building layout for the basement and first floor.

The investigation activities discussed in the following section (Section 1.2) and remedial actions (Section 3.0) pertain to those on the lowest levels of the building in the respective areas that are in contact with underlying subbase or soil/fill (see Figure 3).

1.2 Previous Environmental History

A summary of the findings of the previous subsurface environmental investigations completed at the Site is provided below. Figure 4 shows the historic and Remedial Investigation (RI) sample locations. Soil, groundwater, and soil vapor intrusion analytical summary tables from previous investigations and the approved Remedial Investigation/Alternatives Analysis Report are provided in Appendix A.

1.2.1 *July 2013 – Limited Subsurface Investigation*

Benchmark-TurnKey completed a Limited Subsurface Investigation at the Site in 2013. The soil/fill sample results are summarized on Table 3A included in Appendix A. Figure 4 shows the approximate locations of the 2013 investigation locations. The findings of the previous investigation are as follows:

- Oil staining was noted in numerous areas of the basement and first floor of the building.
- Open buckets/containers of oil were noted in multiple areas of the basement.
- Six in-ground lifts were noted in the western loading dock area of the building and oil-staining was noted surrounding the lifts. Apparent oil was observed within the void space exposed between two layers of the first floor concrete foundation in the soil boring identified as SB-1, proximate to the in-ground lifts. These lifts will require removal prior to site redevelopment.
- The sub-basement was filled with water at the time of the investigation; historic reports identified approximately 144,000 gallons water are present in the sub-basement of the complex.
- Elevated concentrations of polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and metals have been detected in sub-slab soil samples collected from beneath the building first floor and basement foundations.

1.2.2 *July 2016 Remedial Investigation/Alternatives Analysis Report (RI/AAR)*

Benchmark-TurnKey completed a RI to more fully characterize the Site in accordance with the BCP requirements. The RI included soil vapor intrusion sampling (indoor, outdoor and sub-slab air), interior utility observations, the completion of soil borings, and installation of monitoring wells/piezometers to assess soil and groundwater at

the Site. The analytical sample results are summarized on Tables 3B through Table 8 included in Appendix A. The findings of the RI are as follows.

Geology/Hydrogeology

- In general the geology at the Site underlying the concrete building slabs is native soil consisting of a varying thickness and alternating layers of reddish-brown sandy lean clays and sandy silts to depths of around 40 feet below investigation grade. In some locations underlying the concrete building slab, a thin veneer (2 to 3 inches) of fill material was present consisting of black fine to course sand with ash overlying the native soil.
- The depth to groundwater at the Site ranged from 1.65 feet below grade (fbg) to 11.75 fbg and indicated a southerly groundwater flow direction. Figure 5 presents the overburden groundwater isopotential map for the June 10, 2016. The hydraulic gradient was calculated to range from 0.02 to 0.03 feet/foot.

Summary of Analytical Results

- Based on the RI soil/fill data, no volatile organic compounds (VOCs) or semi-volatile organic compounds (SVOCs) were detected above the Part 375 Restricted Residential Soil Cleanup Objectives (RRSCOs). There were chlorinated VOCs (cVOCs) detections beneath the concrete slab in the former truck repair area that slightly exceeded their respective Part 375 Protection of Groundwater Soil Cleanup Objectives (PGWSCOs). Two sample locations from the Limited Subsurface Investigation (SB-10 and SB-11) had slightly elevated SVOCs above RRSCOs. No polychlorinated biphenyls (PCBs), pesticides, or herbicides were detected above MDLs during the RI; however, the Limited Subsurface Investigation sample location SB-8 had a PCB concentration slightly above its RRSCO. Arsenic was the only metal analyte detected during the RI slightly above its respective RRCO and at only one location, RISB-13. Arsenic, mercury, and barium were the only metal analytes detected slightly above their respective RRSCOs during the Limited Subsurface Investigation (SB-1, -2, -7 and -8).
- Based on the groundwater data, SVOCs, metals, PCBs, pesticides, or herbicides are not considered to be COCs in Site groundwater. Two SVOCs were detected

at one location at concentrations above their respective GWQS; however, these detection are relatively low and not considered significant. Certain metals were detected slightly above GWQS; however, the metals were primarily limited to naturally occurring minerals with the exception of iron, which is a common analyte found in groundwater in urban settings; and magnesium and sodium are common to road salt used on the streets surrounding the Site. Furthermore, municipally supplied potable water is available, and on-site groundwater is not used for potable or other purposes. cVOCs were detected at four locations in the central portion of the Site and may contribute to SVI. Concentrations of Total cVOCs in groundwater at RIMW-4, RIMW-7 and RIMW-9 do not exceed 500 ug/L at any one particular location. The Site and surrounding area are serviced by a municipal drinking water system.

- VOCs were not detected above their respective groundwater quality standards (GWQS) in the two deep off-site wells installed at NYSDEC's request. Deep and/or off-site groundwater does not appear to be a concern.
- Based on the New York State Department of Health (NYSDOH) Soil Vapor Intrusion (SVI) Guidance decision matrices the building will require mitigation due to elevated trichloroethene (TCE) concentrations in sub-slab and indoor air samples.
- The results of the basement surface water sampling indicate that low levels of metals and pesticides are present in the water. No VOCs, PCBs, or herbicides were detected above method detection limits (MDLs).
- Given the nature and extent of contamination present underneath the building, in an urban setting, with a long history of commercial/industrial use, it is not reasonably practicable to remediate the property to pre-release (Unrestricted Use) or Track 2 Restricted-Residential Use conditions.

Alternative Analysis

Based on the Alternatives Analysis completed, a Track 4 RRSCO cleanup will achieve the Sites remedial action objectives (RAOs) and is the selected remedy. Additional components of the remedial measures to achieve the selected remedy include:

- Treating on-site groundwater in-situ.
- Removing hydraulic lift infrastructure and any associated impacted soil/fill followed by collecting post-excavation confirmatory samples in accordance with DER-10.
- Managing impacted water during remedial activities and hydraulic lift removal.
- Pumping sub-basement water with on-site treatment, if required by Buffalo Sewer Authority (BSA), prior to discharging to sanitary sewer.
- Cleaning accessible utility and/or sewer services with evidence of potential impacts.
- Removing and properly disposing off-site miscellaneous abandoned regulated waste materials; and abating building components for lead, asbestos, oil staining, PCBs, etc. as required during redevelopment. Building surfaces and features planned to remain with evidence of impacts from historic operations will be addressed (e.g., encapsulated or sealed) consistent with a Restricted Residential Use scenario.
- Installing an active sub-slab depressurization (ASD) system within the existing buildings.
- Maintaining existing cover system in accordance with 6NYCRR Part 375 and NYSDEC DER-10 guidelines. The cover system includes building foundations and asphalt on former Burton Street. Building foundations removed for future development must be replaced by six inches of concrete or asphalt (including sub-base material), or a minimum of two feet of clean soil/gravel meeting the import criteria for restricted-residential use sites, in accordance with Appendix 5 of DER-10.
- Implementing the Site Management Plan (SMP), which will include:
    - Engineering Controls (ECs) consisting of the existing building foundations and asphalt on former Burton Street to eliminate potential exposure pathways to contaminants and building ASD system for SVI control.
    - Institutional Controls (IC) to restrict groundwater use on-site and limit Site uses to restricted-residential use.
    - Operation and Maintenance Plan for the ASD System.

- Excavation Work Plan to assure that future intrusive activities and soil/fill handling at the Site is completed in a safe and environmentally responsible manner.
- Site Monitoring Plan that includes provisions for a Site-wide inspection program to assure that the EC/ICs have not been altered and remain effective.
- Environmental Easement filed with Erie County.

1.2.3 *Summary of Environmental Conditions*

Based on the previous investigation and RI, the following environmental conditions exist at the Site that should be addressed to fulfill the requirements of the Restricted Residential Track 4 cleanup:

- SVOCs, metal analytes and PCBs were detected in the soil/fill in limited locations beneath the building slab at concentrations slightly above their respective RRSCOs.
- cVOCs were detected in the soil/fill beneath the concrete slab of the former truck repair area slightly above their respective PGWSCOS, but below RRSCOs..
- cVOCs were detected in the groundwater in the central portion of the Site at concentrations exceeding their respective GWQS; and may contribute to SVI. The concentrations of cVOCs in groundwater at RIMW-4, RIMW-7 and RIMW-9, although they do not exceed 500 ug/L at any one particular location, should be addressed.
- Based on the NYSDOH SVI Guidance decision matrices the building will require mitigation due to elevated trichloroethene (TCE) concentrations in sub-slab and indoor air samples.

1.3 Primary Constituents of Concern (COCs)

Based on the previous investigations and RI, and the planned redevelopment of the Site, the constituents of concern (COCs) for a restricted residential use are presented below:

Soil/Fill: cVOCs, PAHs, PCBs, metals

Groundwater: cVOCs in the central portion of the building

Sub-slab Vapor/Indoor Air: cVOCs

1.4 Remedial Action Objectives

The remedial actions for the Former Trico Plant must satisfy Remedial Action Objectives (RAOs). RAOs are site-specific statements that convey the goals for minimizing substantial risks to public health and the environment. For the Site, appropriate RAOs have been defined as:

Soil/Fill RAOs

- Remove, treat, or mitigate contaminated soil/fill to the degree possible to protect public health and the environment and prevent further degradation of on-site and off-site groundwater quality.
- Prevent ingestion/direct contact with contaminated soil/fill.
- Prevent migration of contaminants that may further result in groundwater or surface water contamination.
- Prevent inhalation of or exposure to contaminants volatilizing from contaminated soil/fill.

Groundwater RAOs

- Prevent ingestion of groundwater containing contaminant levels exceeding NYSDEC Class GA GWQS/GVs or with visual/olfactory evidence of impact.
- Prevent contact with, or inhalation of, volatiles emanating from contaminated groundwater.
- Prevent degradation of on-site and off-site water quality.

Infiltration Water RAOs

- Prevent ingestion of impacted water and contact or inhalation of contaminants from impacted water during remedial action.
- Treat and discharge infiltration water to sanitary sewer under a Buffalo Sewer Authority (BSA) discharge permit.
- Sub-basement containing infiltration water will be filled in with suitable backfill to prevent future accumulation or similar water.

Soil Vapor

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at the Site.

Remedial Action

In general, remedial activities will include:

- completion of in-Situ injections of a biological amendment to degrade cVOCs in the central portion of the Site;
- removal of the hydraulic lifts and associated impacted soil in the former loading dock along Washington Street;
- removal, treatment, if required by BSA, and discharge of water present in the sub-basement of the building to the sanitary sewer;
- cleaning accessible utility and sewer services with evidence of potential impact;
- removal and proper disposal of impacted soil/fill that may be encountered during demolition of select portion of the existing building;
- installation of an active sub-slab depressurization system within the building;
- maintain the existing cover system in accordance with 6 NYCRR Part 375 and DER-10 guidelines; and
- imposition of an environmental easement and implementation of a Site Management Plan.

Details of the planned remedial action are presented in Sections 2 and 3.

1.5 Project Organization and Responsibilities

The Applicant was accepted into the BCP as a non-responsible party (volunteer) per ECL§27-1405 and Benchmark-TurnKey will provide oversight of the remedial actions identified in this RAWP. The NYSDEC Division of Environmental Remediation (Region 9), in consultation with the NYSDOH shall monitor the remedial actions to verify that the work is performed in accordance with the Brownfield Cleanup Agreement, the approved RA Work Plan, and NYSDEC DER-10 guidance.

2.0 PRE-REMEDIATION TASKS

2.1 Public Information and Outreach

A fact sheet containing information about the planned remedial work will be prepared by NYSDEC and distributed electronically through their listserv system to those individuals that have signed up to receive the information. Furthermore, a copy of this RAWP will be made available for public review at the NYSDEC Region 9 office and the Buffalo-Erie County Public Library, the designated document repository.

2.2 Underground Utilities Location

The remediation contractor will contact underground facilities protection organization (Dig Safely New York, UFPO) to locate utility lines within the work area.

2.3 Health and Safety Plan Development

A Health and Safety Plan (HASP) will be prepared and enforced by the remediation contractor in accordance with the requirements of 29 CFR 1910.120. The HASP will cover on-site remedial activities associated with soil, groundwater, water treatment, and soil vapor intrusion. Krog will be responsible for Site control and Benchmark-TurnKey will be responsible for the health and safety of its authorized site workers. Benchmark-TurnKey's HASP is provided for informational purposes in Appendix B. The remediation contractor will be required to develop a HASP as or more stringent than Benchmark-TurnKey's HASP.

2.4 Mobilization and Site Preparation

The remediation contractor's field operations at the Site will commence with mobilizing equipment and materials to the Site and other temporary controls as described below.

A site walk will be completed in the areas planned for remedial action to inspect the work area and work surface for access, staging and health and safety. Any deficiencies in the work areas or surface that may create issues with remedial action performance will be addressed.

2.5 Temporary Facilities and Controls

Temporary facilities for use during the remedial work may include a construction field trailer and portable toilet(s). Temporary controls, as necessary, will be employed for protection against off-site migration of soil/fill and safety hazards during construction, including safety fencing, dust suppression, and erosion control as further described below.

2.5.1 *Access Controls*

Temporary safety construction fencing (e.g., 6-foot chain link) is currently in place around the perimeter of the building restricting access to the sidewalk around the building and building entrances. As the majority of the remedial action is to occur within the footprint of the building. Daily work areas will be identified with construction cones and/or snow fencing, if necessary, to identify the outer perimeter of work area(s) to distinguish the work zone and discourage access from others that may be working within the building. Work areas will be determined daily based on the planned remedial activities, and may be changed throughout the work day to ensure safe operations. Access control will consider site worker and general public safety, and tenant access requirements, if necessary.

2.5.2 *Material Storage*

Temporary on-Site storage will be needed for the remedial activities, which will include in-Situ groundwater treatment reagents, materials for ASD system installation, sub-basement water treatment, etc. The reagents and other materials required to be stored on-site will be properly stored within the existing building. The location of the temporary storage area will be determined based on the construction/demolition activities that are on-going at the time and the location of the remedial action to be completed.

2.5.3 *Dust Monitoring and Controls*

A Community Air Monitoring Plan (CAMP), as more fully described in Section 4.1, will be implemented during Site work that will disturb subsurface soil/fill materials. If community air monitoring indicates the need for dust suppression or if dust is visually observed leaving the Site, the contractor will apply a water spray across the excavation and surrounding areas, and on Site haul roads as necessary to mitigate airborne dust formation and migration. Potable water will either be obtained from a public hydrant or provided by the on-site water service, if available.

If CAMP data indicate exceedance of VOC thresholds the contractor will be required to adjust work practices to minimize the area of soil disturbance.

2.5.4 *Excavation Work Plan*

As excavation activities will occur during remedial action and building demolition/redevelopment activities may expose subsurface soil/fill, an Excavation Work Plan (EWP) has been prepared and included in Appendix C. The EWP has been prepared using the latest NYSDEC template as a guide. Soil/fill generated during remedial activities and/or building demolition will be handled in accordance with the EWP.

3.0 CLEANUP APPROACH

The approved Remedial Investigation / Alternatives Analysis Report and the NYSDEC Decision Document (DD) identified the cleanup approach for the Site. Specifically, the selected remedy is a Restricted Residential Track 4 approach (i.e., restricted use with site-specific soil cleanup objectives) incorporating the following major remedial elements:

- Removal of hydraulic lifts, associated infrastructure and associated impacted soil/fill.
- In-Situ direct injection of biological amendments to address areas of the Site impacted with chlorinated VOCs in groundwater.
- Installation of an active subslab depressurization (ASD) system within the existing building (Active Subslab Depressurization System Work Plan will be submitted under separate cover).
- Cleaning accessible utility and/or sewer services with evidence of potential impacts.
- Sub-basement water treatment and discharge.
- Removing and properly disposing off-site miscellaneous abandoned regulated waste materials; and abating building components for lead, asbestos, oil staining, and PCBs as required during redevelopment.
- Maintenance and replacement of site cover system within areas of the building footprint that will undergo demolition/redevelopment.
- Development of a Site Management Plan (SMP) for post-certificate of completion (COC) operation, maintenance and monitoring.

3.1 Removal of Hydraulic Lifts, Associated Infrastructure and Associated Impacted Soil/fill

Six hydraulic lifts are present in the northwestern portion of the building within the loading dock area off of Washington Street. The lifts and associated infrastructure are located beneath the elevated loading dock in this area.

The contents of the six lifts will be removed, containerized and properly characterized for off-site disposal and/or recycling. Once the contents have been removed the lifts along with their associated infrastructure and impacted soil/fill present, if any, will be removed with the necessary mechanical equipment. The excavation activities and

handling of the soil/fill will be completed in accordance with the EWP in Appendix C. Any impacted soil/fill will also be properly characterized prior to off-site disposal.

Post-excavation soil/fill samples will be collected in accordance with DER-10 requirements for CP-51 list VOCs via USEPA SW-846 Method 8260 and CP-51 list SVOCs via USEPA SW-846 Method 8270.

3.2 In-Situ Groundwater Treatment

3.2.1 *Technology Description*

Enhanced Bioremediation of chlorinated VOCs in groundwater will be accomplished using three (3) amendments developed by Regenesis Corporation. These amendments include:

- 3-D Microemulsion (3DME, also known as HRC Advanced®);
- Bio-Dechlor Inoculum Plus (BDI); and
- Chemical Reducing Solution (CRS®)

3DME is a slightly viscous lactic acid-based liquid that is pressure injected into saturated soils using small diameter probe rods and a high-pressure injection pump. The 3DME facilitates anaerobic bioremediation by slow hydrolysis of the lactic acid that release hydrogen when metabolized by naturally-occurring microbes. The resulting hydrogen is then used in a microbially mediated process known as reductive dechlorination. 3DME produces a sequential, staged release of its electron donor components; this staged fermentation provides an immediate, mid-range and long-term, controlled-release supply of hydrogen (electron donor) to fuel the reductive dechlorination process for up to four years.

BDI is liquid mixture enriched with natural microbial consortium containing species of *Dehalococcoides sp.* (DHC) which are capable of completely dechlorinating contaminants during in-situ anaerobic bioremediation processes. The liquid mixture will be injected into the saturated soils with the 3DME (discussed above) and CRS (discussed below). Once in place it is capable of reducing PCE or TCE through ethene to ensure the degradation process does not stop at DCE/VC and allow remain in the groundwater after the parent compounds have been reduced.

CRS® is a liquid iron-based reagent for enhanced biogeochemical in-situ chemical reduction of chlorinated contaminants. CRS is a pH neutral, iron solution that can be easily mixed with 3DME prior to injection. It is a soluble, food-grade source of ferrous iron (Fe2+) designed to precipitate reduced iron sulfides, oxides and/or hydroxides capable of destroying chlorinated solvents via chemical reduction pathways.

Information, including amendment product brochures, Safety Data Sheets (SDSs) and application instructions are included in Appendix D. The reagents will be delivered in 275-gallon totes and/or 55-gallon drums to the Site and properly stored on-Site within the building.

Prior to implementing the in-situ groundwater treatment, an underground injection permit will be obtained from the United State Environmental Protection Agency.

3.2.2 *Site Specific In-Situ Treatment Details*

The site-specific remedial program was developed using design software provided by Regenesis. This remedial program will involve directly injecting approximately 18,800 lbs. of 3DME into the upper groundwater/saturated soils within the cVOC-plume in accessible areas within the Site building (see Figure 6). The 3DME concentrate will be diluted in the field with water from the municipally-supplied potable water supplier (Erie County Water Authority) to a 10% solution prior to injection. Therefore, 196 lbs. of 3DME will be diluted with 211 gallons of water for a total volume of 235 gallon of 3DME mixture to be injected at each point. However, dilutions may be modified in the field based upon achieved application rates.

In total, 96 injection points are planned to address groundwater impacts. Direct-push delivery probes will be advanced to depths between 2 feet and 12 feet into the groundwater table. Based on the varying basement floor elevations, the delivery probes depths will range from 3.5 to 13.5 fbgs in the lowest basement area (groundwater measured at approximately 1.5 feet below the floor) and 11 to 21 fbgs in the former truck repair area of the upper basement (groundwater measured at approximately 9 feet below the floor). The 3DME® will be injected continuously at a rate of approximately 23.5 gallons per foot of 3DME mixture (i.e., 19 lbs/ft.) over the 10 foot saturated injection interval for a total of 235 gallons per injection point. Any modifications to these protocols will be documented in the Final Engineering Report.

3.2.3 *Groundwater Monitoring*

A groundwater sampling program will be implemented to evaluate the effectiveness of the in-situ groundwater treatment program. Groundwater sampling will be completed consistent with the approved RI Work Plan (dated October 2013) utilizing low-flow techniques. In addition to standard field measured parameters, including pH, specific conductance, dissolved oxygen, redox potential, temperature and turbidity, groundwater samples will be collected and analyzed as follows:

- Quarterly groundwater sampling will be completed to monitor the short-term effectiveness of the in-situ treatment prior to obtaining the certificate of completion (COC). Additional details of long-term groundwater monitoring will be provided in the Site Management Plan, which is a component of the overall Site Remedy.
- The groundwater sampling program will consist of post-treatment monitoring at 8 existing monitoring wells (on-site wells: TKMW-2, -4, -6, -7, -9, -10; and off-site wells: TKMW-11, -12; see Figure 6). Groundwater samples will be analyzed for TCL VOCs via USEPA SW-846 Method 8260 and 1,4-dioxane via SW-846 Method 8270 using isotopic dilution. Groundwater data will be provided to the NYSDEC after each monitoring event. If the off-site monitoring wells do not indicated the present of VOCs above the groundwater quality standards for two (2) consecutive monitoring events, they can be removed from the groundwater sampling program.
- Additional analytical parameters to evaluate effectiveness of the in-situ treatment include, dissolved iron, manganese, sulfate, nitrate-nitrite, and dissolved gases including methane, ethane, and ethene, will be collected.
- Monitoring wells not planned for future use, as shown on Figure 6, will be decommissioned in accordance with NYSDEC CP-43: Groundwater Monitoring Well Decommissioning Policy.

3.3 Active Sub-slab Depressurization System

Based on the SVI results from the RI, an ASD system will be required within the footprint of the building basement. Figure 7 identifies the basement portion of the building that will require depressurization via the ASD system. An ASD system creates a low-

pressure zone beneath a building slab using a powered fan connected via piping to create negative pressure beneath the building foundation. The low pressure field prevents soil gas from entering the building. In general, the essential components of an ASD will include:

- installation of suction pits and/or subsurface piping beneath the slab to adequately provide negative pressure beneath the entire basement footprint;
- installation of a vent stack from the suction pits and/or subsurface piping that will extent above the roof line for discharge;
- installation of a continuous operation fans equipped with a pressure gauge to assure the system is under negative pressure; and,
- sealing major slab and foundation penetrations, including joints, cracks and utility and pipe penetrations.

A formal ASD System Work Plan (ASDWP) will be submitted prior to the installation of the ASD system, which will occur prior to building occupancy. The ASDWP will include the results of planned pre-installation communication testing, which will be used to determine the radius of influence below the slab(s), required suction point and/or subsurface piping locations, and number and types of fans to adequately provide negative pressure under the building basement slab. The ASD will be designed in general accordance with the EPA design document entitled "Radon Prevention in the Design and Construction of Schools and Other Large Buildings" Third Printing with Addendum, June 1994 and the NYSDOH "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" dated October 2006.

3.4 Cleaning Accessible Utility and/or Sewers/Structures

During the RI, an inspection was performed to locate on-site utilities/sewer present within the building. Figure 8 shows the locations of the utilities/sewer structures identified. Figure 8 also identifies 15 locations of utility and/or sewers that should be cleaned out due to the presence of staining, sheen, oil present, and/or cVOC-impacted solid/semi-solid contents within the structure.

The structures will be cleaned using the combination of a pressure washer and drum vacuum to remove the contents and clean the structures. Inflatable pigs will be placed into the structures, as necessary, to prevent the contents/wash water from migrating away from

the structure during the cleaning process and to allow the wash water and spoils to be containerized for characterization and off-site disposal. The structures will be visually inspected to verify that staining, sheen, and/or oil present within the structure has been removed.

3.5 Building Demolition, Concrete Foundation & Slab Removal/Replacement, and Limited Excavation

The redevelopment plan for the building will involve limited demolition of a portion of the existing building, concrete slab/foundation replacement, and limited excavation. These activities will be completed to install a court yard at grade with Ellicott Street, concrete slabs/foundation to be replaced to support to court yard, and areas of concrete and soil/fill removal to facilitate the installation of parking ramps and/or other building requirements. Figure 9 identifies the areas of the building foundation and slabs which will potentially be demolished to complete this work. .

As underlying soil/fill may be exposed during the limited building demolition, slab removal/replacement or limited excavation, an EWP (as discussed in Section 2.5.4) has been prepared and included in Appendix C. The EWP procedures will be implemented when subsurface soil/fill is exposed during redevelopment activities.

In general and consistent with DER-10 requirements, if grossly impacted soil/fill are identified, they will be removed to the extent possible. Other soil/fill encountered with be handled and managed in accordance with the EWP. CAMP will be implemented during activities, as outlined in the HASP (Appendix A), that involve exposing subsurface soil/fill.

The foundation removal/replacement in the area of the lowest basement area may require dewatering to install the replacement foundations to support the at grade court yard. If dewatering is required, it will be completed in accordance with the fluids management section of the EWP. Groundwater will likely require treatment prior to discharge. Benchmark-Turnkey will contact the Buffalo Sewer Authority (BSA) to obtain a temporary discharge permit and discharge sampling requirements, if any. Groundwater will be pumped through a bag filtration system to remove any suspended sediment prior, into a granular activated carbon (GAC) treatment system, and then into a storage tank, prior to discharge into the BSA sanitary sewer system. If required, analytical samples will be collected prior to charge. Water will not be discharged in excess of the BSA permit requirements. Once the

dewatering activities are complete, the GAC will be sampled for waste characterization. Based on the results the GAC will either be properly disposed or taken to a facility to be regenerated in accordance with local, state, and federal regulations.

3.6 Sub-Basement Water Removal, Treatment and Discharge

The sub-basement of the building is filled with water. The standing water is thought to be from groundwater infiltration or storm water accumulation and has been estimated to be as much as 144,000-gallons. The water was sampled during the RI and found to contain low levels of metals and 4,4'-DDD (pesticide).

Prior to removing water from the sub-basement, Benchmark-Turnkey will contact the Buffalo Sewer Authority (BSA) to obtain a temporary discharge permit and discharge sampling requirements, if any. A pump will be used to remove water from the sub-basement. The water will be pumped through a bag filtration system to remove any suspended sediment prior, into a GAC treatment system, and then into a 21,000 gallon storage tank, prior to discharge into the BSA sanitary sewer system. If required, analytical samples will be collected prior to charge. Water will not be discharged in excess of the BSA permit requirements.

Once the sub-basement water removal, treatment, and discharge is complete, the GAC will be sampled for waste characterization. Based on the results the GAC will either be properly disposed or taken to a facility to be regenerated in accordance with local, state, and federal regulations.

Current redevelopment plans call for the sub-basement to be filled with concrete.

3.7 Cover System Replacement

During the demolition/redevelopment, portions of the basement concrete foundations/slab will be removed and replaced with concrete to facilitate the installation of the court yard and parking ramps. Appendix F contains a cross section view of a typical slab on grade concrete replacement detail.

The existing hardscape cover system north of the building along Burton Street, which includes asphalt roadway, concrete sidewalk and concrete curbing, will not be altered. Subsurface activities (e.g., subsurface borings RI-SB-15 and RI-SB-16) completed in Burton Street indicated that the asphalt and underlying concrete aggregate are at least 1 foot thick.

Any subsurface work will be noticed to NYSDEC and completed in accordance with the SMP.

CAMP monitoring will be completed when subsurface soil/fill beneath the interior and/or exterior cover systems are exposed and those soil/fill will be handled/managed in accordance with the EWP, if they require handling and/or removal.

Materials that are imported to the Site for use as backfill material on-Site must meet the following criteria:

- Off-site soil will originate from known sources having no evidence of disposal or releases of hazardous substances, hazardous, toxic or radioactive wastes, which has been tested in accordance with DER10, 5.4(e)10, or at a reduced frequency if agreeable to the Department.

- All off-site sources of soil/fill to be used as backfill must be tested in accordance with DER-10, found to contain concentrations less than criteria listed in Table 1 – Criteria for Use of Off-Site Soil, and meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

- No off-site materials meeting the definition of a solid waste as defined in 6NYCRR, Part 360-1.2(a) shall be used as backfill.

4.0 REMEDIAL ACTIVITIES SUPPORT DOCUMENTS

4.1 Health and Safety Protocols

Benchmark-TurnKey has prepared a Health and Safety Plan (HASP) for use by our employees in accordance with 40 CFR 300.150 of the NCP and 29 CFR 1910.120. The HASP, provided in Appendix B, includes the following site-specific information:

- A hazard assessment.
- Training requirements.
- Definition of exclusion, contaminant reduction, and other work zones.
- Monitoring procedures for Site operations.
- Safety procedures.
- Personal protective clothing and equipment requirements for various field operations.
- Disposal and decontamination procedures.

The HASP also includes a contingency plan that addresses potential site-specific emergencies, and a Community Air Monitoring Plan that describes required particulate monitoring to protect the neighboring community during intrusive site remediation activities.

Health and safety activities will be monitored throughout the remedial field activities. A member of the field team will be designated to serve as the Site Safety and Health Officer (SSHO) throughout the field program. This person will report directly to the Project Manager and the Corporate Health and Safety Coordinator. The HASP will be subject to revision as necessary, based on new information that is discovered during the field investigation and/or remedial activities.

4.1.1 *Community Air Monitoring*

Real-time community air monitoring will be performed during intrusive activities at the Site. A CAMP is included with Benchmark-TurnKey's HASP. Particulate and VOC monitoring will be performed along the downwind perimeter of the work area during excavation, grading and soil/fill handling activities in accordance with this plan. Upwind concentrations will be field monitored at the start and periodically throughout the work day.

Monitoring locations will be evaluated throughout the work day, as described in the CAMP. The CAMP is consistent with the requirements for community air monitoring at remediation sites as established by the New York State Department of Health (NYSDOH) and NYSDEC. Accordingly, it follows procedures and practices outlined under NYSDEC's DER-10 (May 2010) Appendix 1A (NYSDOH's Generic Community Air Monitoring Plan) and Appendix 1B (Fugitive Dust and Particulate Monitoring).

4.2 Citizen Participation Activities

NYSDEC will coordinate and lead community relations throughout the course of the project with support from Benchmark-TurnKey as requested. A Citizen Participation (CP) Plan has been prepared by Benchmark-TurnKey and approved by NYSDEC. A copy of the CP Plan has been placed in the Buffalo and Erie County Public Library, the designated project document repository. The NYSDEC, with input from Benchmark-TurnKey and Krog, will issue project fact sheets to keep the public informed of remedial activities.

5.0 REPORTING

5.1 Remedial Activities Reporting

Benchmark-TurnKey will be on-Site during the remedial actions to document remedial activities and subsurface activities which disturb the existing cover system at the Site. Monitoring and documentation of the RA activities will include: construction stake-out; record drawings; daily reports of activities; community air monitoring results; post-injection sampling and analysis; and progress photographs and sketches.

5.1.1 *Field Construction Monitoring*

Standard daily reporting procedures will include preparation of an Inspector's Daily Report and, when appropriate, problem identification and corrective measures reports. Appendix E contains sample project documentation forms. Information that may be included on the daily report form includes:

- Processes and locations of construction under way.
- Number and type of truckloads of soil/fill or other materials (e.g., concrete) removed from the site.
- Approximate sampling locations (sketches), field measurements and/or GPS (Trimble) coordinates and sample designations.
- Cover system removal areas and depths of excavations.
- Injection point locations, depth and injection interval and volume of material injected.

The completed reports will be available upon request and will be submitted to the NYSDEC as part of the Final Engineering Report. The NYSDEC will be promptly notified of problems requiring modifications to this RAWP prior to proceeding or completion of the construction item.

Photo documentation of the remedial and redevelopment activities will be prepared by a field representative throughout the duration of the project as necessary to convey typical work activities, changed conditions, and/or special circumstances as it relates to the implementation of this RAWP.

5.2 Final Engineering Report

A Final Engineering Report (FER) will be prepared at the conclusion of remedial activities. The FER will include the following information and documentation, consistent with the NYSDEC's DER-10 Technical Guidance for Site Remediation:

- Introduction and background.
- A Site or area planimetric map showing the parcel(s) remediated, including significant site features.
- A Site map showing the lateral limits of any excavations.
- Tabular summaries of unit quantities including: volume of soil excavated and disposition of excavated soil.
- Planimetric map showing location of all injection locations.
- Documentation on the disposition of impacted soil removed from the Site.
- Documentation of the in-Situ injection biological amendments. Injection locations and amount of biological amendments will be documented.
- Documentation on the installation of the ASD System.
- Documentation of the cover system, including survey elevations and licensed professional engineer stamped record drawings.
- Copies of daily inspection reports and, if applicable, problem identification and corrective measure reports.
- Photo documentation of remedial activities.
- Text describing the remedial activities performed; a description of any deviations from the Work Plan and associated corrective measures taken; and other pertinent information necessary to document that the Site activities were carried out in accordance with this Work Plan.

5.3 Site Management Plan

A Site Management Plan (SMP) will be prepared for the Site that describes site-specific Institutional Controls and/or Engineering Controls (IC/EC) is a required component of the final remedy. Therefore, as part of the final remedy, an SMP will be prepared. Consistent with NYSDEC BCP requirements, components of the SMP will include:

- **Engineering and Institutional Controls Plan**. Engineering controls include any physical barrier or method employed to actively or passively contain, stabilize, or monitor contaminants; restrict the movement of contaminants; or eliminate potential exposure pathways to contaminants. Institutional controls at the site will include groundwater use restrictions and use restrictions of the Site to restricted use (i.e., residential or commercial purposes).
- **Operation and Maintenance Plan** that describes the measures necessary to operate, monitor, and maintain the mechanical components of the Sub-Slab Depressurization System.
- **Excavation Work Plan** to assure that future intrusive activities and soil/fill handling at the Site are completed in a safe and environmentally responsible manner.
- **Site Monitoring Plan** that includes: provisions for a groundwater monitoring plan and a Site-wide inspection program to assure that the IC/ECs have not been altered and remain effective.
- **Environmental Easement** filed with Erie County.

6.0 PROJECT SCHEDULE

The anticipated project schedule for the major tasks to be performed during implementation of the RAWP are discussed below. The major tasks planned with the anticipated are as follows:

- Subslab Communication Testing – June 2017
- Issue Decision Document – July 2017
- ASDWP Preparation & Submittal – July 2017
- Building Demolition – Summer 2017
- Hydraulic Lift Removal – Summer 2017
- Sub-basement Dewatering – Summer 2017
- In-situ Groundwater Treatment Injections – September 2017
    - Groundwater monitoring to be conducted 3 and 6 months after injections
- Utility/Structure Cleaning – Fall 2017
- Concrete Foundation & Slab Removal/Replacement – Fall 2017
- ASD System Installation – Fall 2017
- Submit Draft Site Management Plan (SMP) and Final Engineering Report (FER) – Winter 2017
- Submit Final SMP and FER – Winter 2017/Early 2018
- Receive Certificate of Completion (COC) – Spring 2018

TABLE

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 1

CRITERIA FOR USE OF OFF-SITE SOIL

REMEDIAL ACTION WORK PLAN
FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

PARAMETER	ReUse SCOs [1]
Volatile Organic Compounds (VOCs) - mg/Kg	
1,1,1-Trichloroethane	**0.68**
1,1-Dichloroethane	**0.27**
1,1-Dichloroethene	**0.33**
1,2-Dichlorobenzene	**1.1**
1,2-Dichloroethane	**0.02**
cis-1,2-Dichloroethene	**0.25**
trans-1,2-Dichloroethene	**0.19**
1,3-Dichlorobenzene	**2.4**
1,4-Dichlorobenzene	**1.8**
1,4-Dioxane	**0.1**
Acetone	**0.05**
Benzene	**0.06**
Butylbenzene	**12**
Carbon tetrachloride	**0.76**
Chlorobenzene	**1.1**
Chloroform	**0.37**
Ethylbenzene	**1**
Hexachlorobenzene	**1.2**
Methyl ethyl ketone	**0.12**
Methyl tert butyl ether	**0.93**
Methylene chloride	**0.05**
n-Propylbenzene	**3.9**
sec-Butylbenzene	**11**
tert-Butylbenzene	**5.9**
Tetrachloroethene	**1.3**
Toluene	**0.7**
Trichloroethene	**0.47**
1,2,4-Trimethylbenzene	**3.6**
1,3,4-Trimethylbenzene	**8.4**
Vinyl chloride	**0.02**
Xylene	**1.6**

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 1

CRITERIA FOR USE OF OFF-SITE SOIL

REMEDIAL ACTION WORK PLAN
FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

PARAMETER	ReUse SCOs [1]
Semi-Volatile Organic Compounds (SVOCs) - mg/Kg	
Acenaphthene	**98**
Acenaphthylene	**100**
Anthracene	**100**
Benzo(a)anthracene	**1**
Benzo(a)pyrene	**1**
Benzo(b)fluoranthene	**1**
Benzo(g,h,i)perylene	**100**
Benzo(k)fluoranthene	**1.7**
Chrysene	**1**
Dibenzo(a,h)anthracene	**0.33**
Fluoranthene	**100**
Fluorene	**100**
Indeno(1,2,3-cd)pyrene	**0.5**
m-Cresol	**0.33**
Naphthalene	**12**
o-Cresol	**0.33**
p-Cresol	**0.33**
Pentachlorophenol	**0.8**
Phenanthrene	**100**
Phenol	**0.33**
Pyrene	**100**
Metals - mg/Kg	
Arsenic	**16**
Barium	**400**
Beryllium	**47**
Cadmium	**4.3**
Chromium, trivalent	**NS**
Chromium, hexavalent	**19**
Copper	**270**
Cyanide	**27**
Lead	**400**
Manganese	**2000**
Mercury	**0.73**
Nickel	**130**
Selenium	**4**
Silver	**8.3**
Zinc	**2480**

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 1

CRITERIA FOR USE OF OFF-SITE SOIL

REMEDIAL ACTION WORK PLAN
FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

PARAMETER	ReUse SCOs [1]
Pesticides/Herbicides and PCBs - mg/Kg	
Silvex (2,4,5-TP)	**3.8**
4,4'-DDE	**8.9**
4,4'-DDT	**7.9**
4,4'-DDD	**13**
Aldrin	**0.097**
alpha-BHC	**0.02**
beta-BHC	**0.09**
alpha-Chlordane	**2.9**
delta-BHC	**0.25**
Dibenzofuran	**59**
Dieldrin	**0.1**
Endosulfan I	**24**
Endosulfan II	**24**
Endosulfan sulfate	**24**
Endrin	**0.06**
Heptachlor	**0.38**
Lindane	**0.1**
Polychlorinated biphenyls (PCBs)	**1**

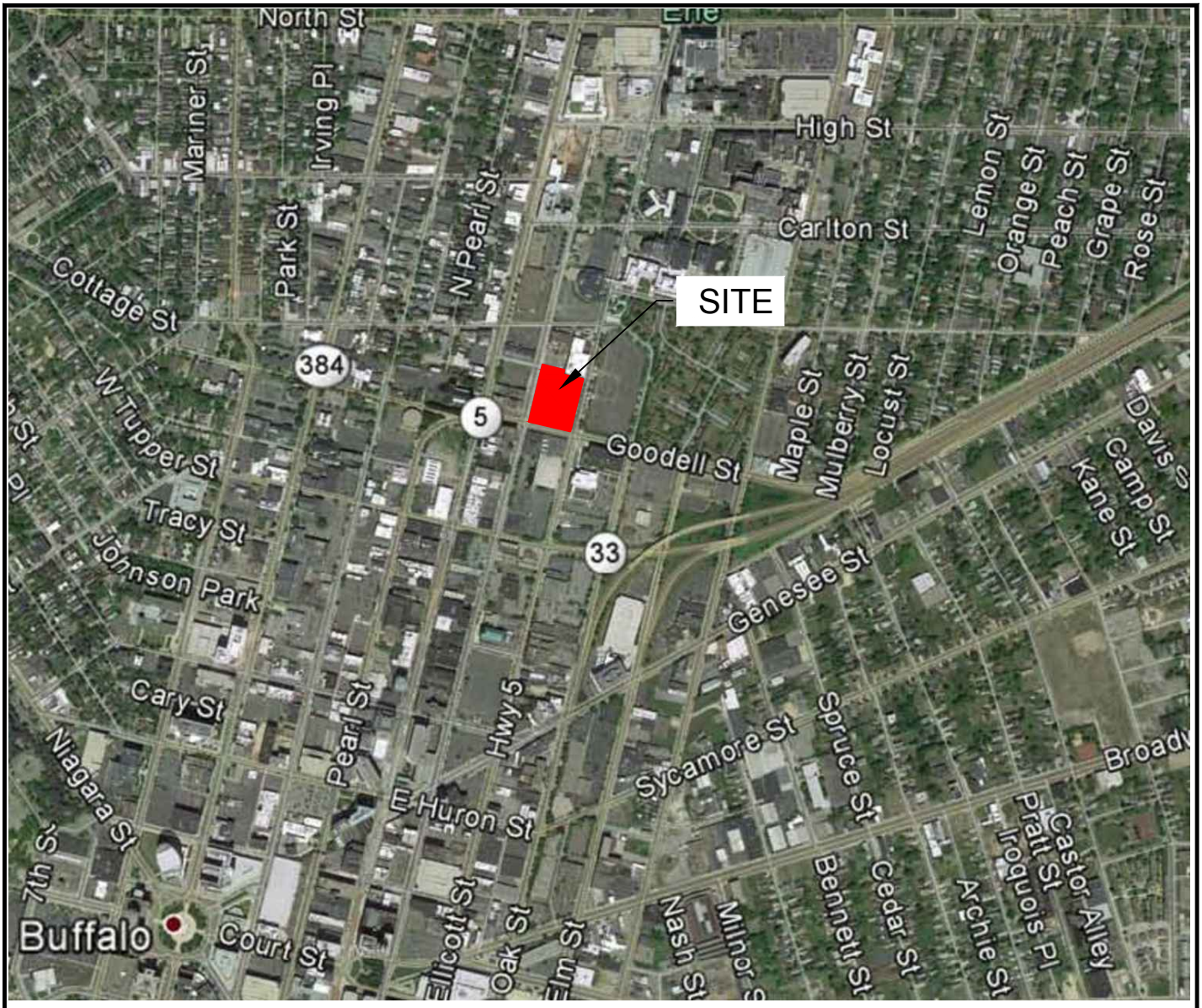
Notes:

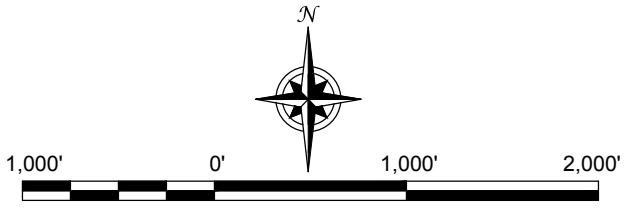
1. Values are the lower of the 6NYCRR NYSDEC Part 375 Protection of Groundwater or Restrcited Residential Soil Cleanup Objectives (SCOs).

FIGURES

F:\CAD\TurnKey\Krog\Former Trico Building BCP\RAWP\Figure 1; Site Location and Vicinity Map.dwg

FIGURE 1





SCALE: 1 INCH = 1,000 FEET
SCALE IN FEET
(approximate)

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

PROJECT NO.: 0092-016-001

DATE: OCTOBER 2016

DRAFTED BY: RFL

SITE LOCATION AND VICINITY MAP

REMEDIAL ACTION WORK PLAN

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

PREPARED FOR

THE KROG GROUP, LLC

F:\CAD\TurnKey\Krog\Former Trico Building BCP\RAWP\Figure 2; Site Plan Aerial.dwg

DATE: OCTOBER 2016
DRAFTED BY: RFL

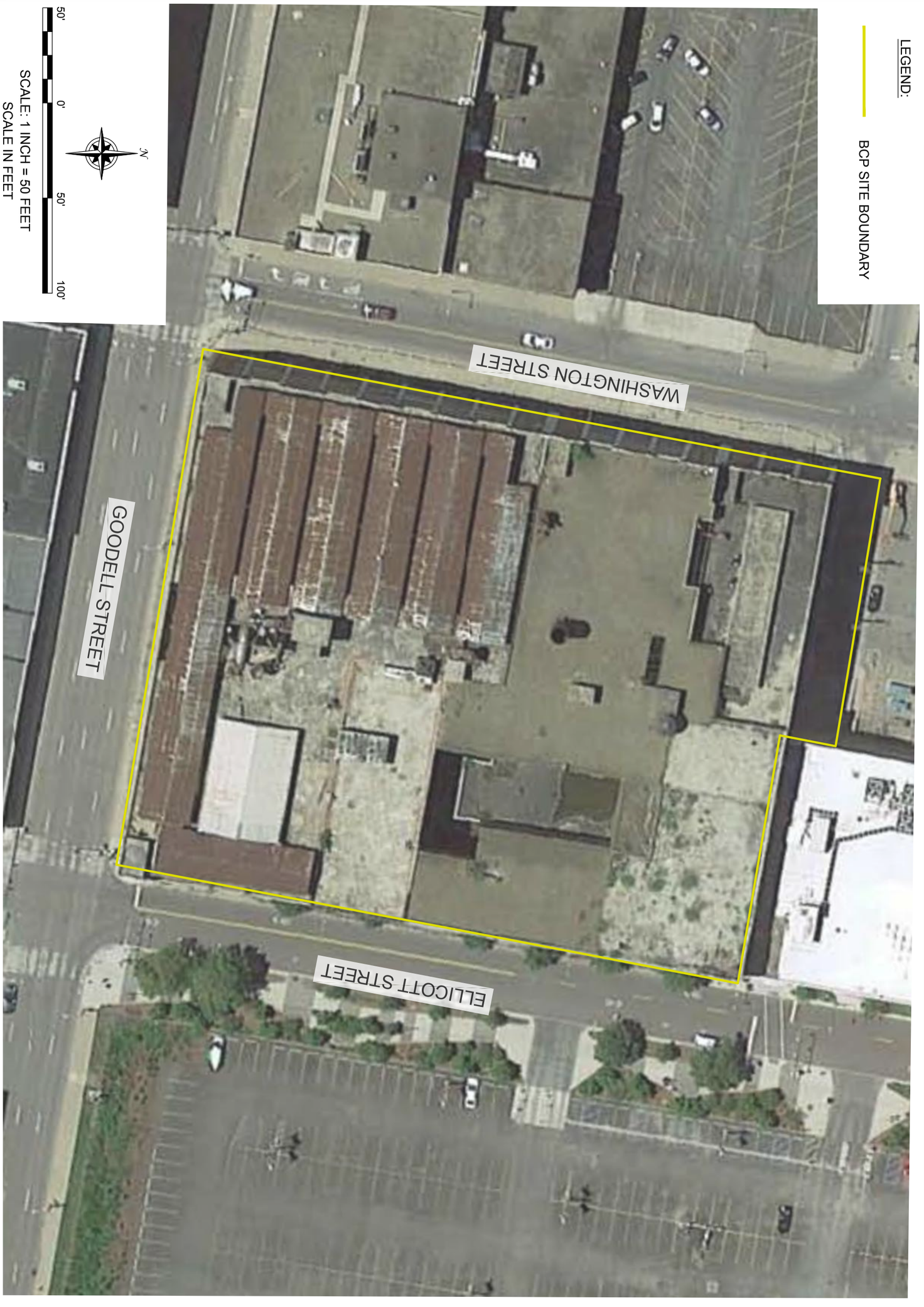


FIGURE 2

SITE PLAN (AERIAL)

REMEDIAL ACTION WORK PLAN

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

PREPARED FOR
THE KROG GROUP, LLC

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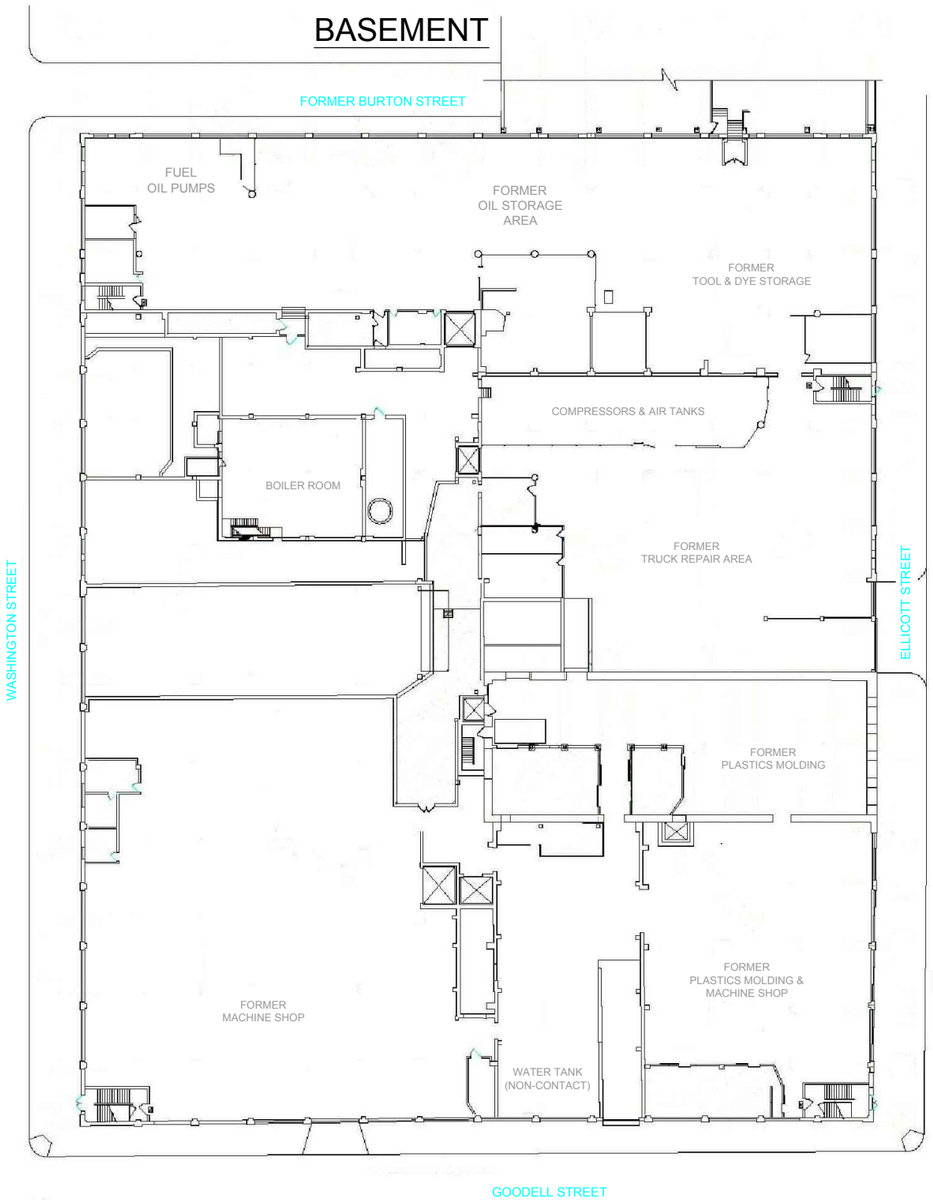
TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

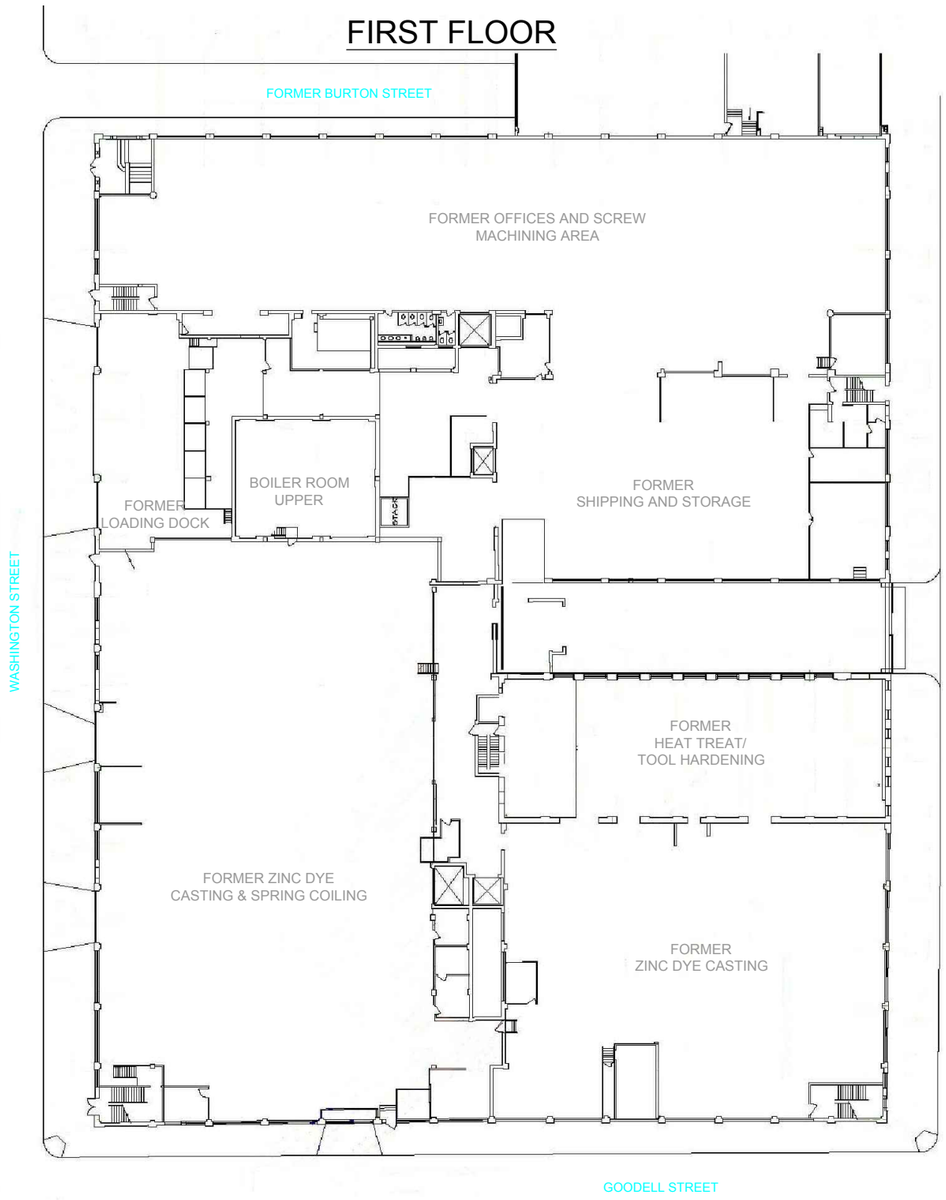
JOB NO.: 0092-016-001

F:\CAD\TurnKey\Krog\Former Trico Building BCP\RI AAR\Figure 3; Floor PlansREV.dwg

BASEMENT



FIRST FLOOR



50 0' 50 100

SCALE: 1 INCH = 50 FEET
SCALE IN FEET
(approximate)

DATE: OCTOBER 2016
DRAFTED BY: RFL

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JOB NO.: 0092-016-001

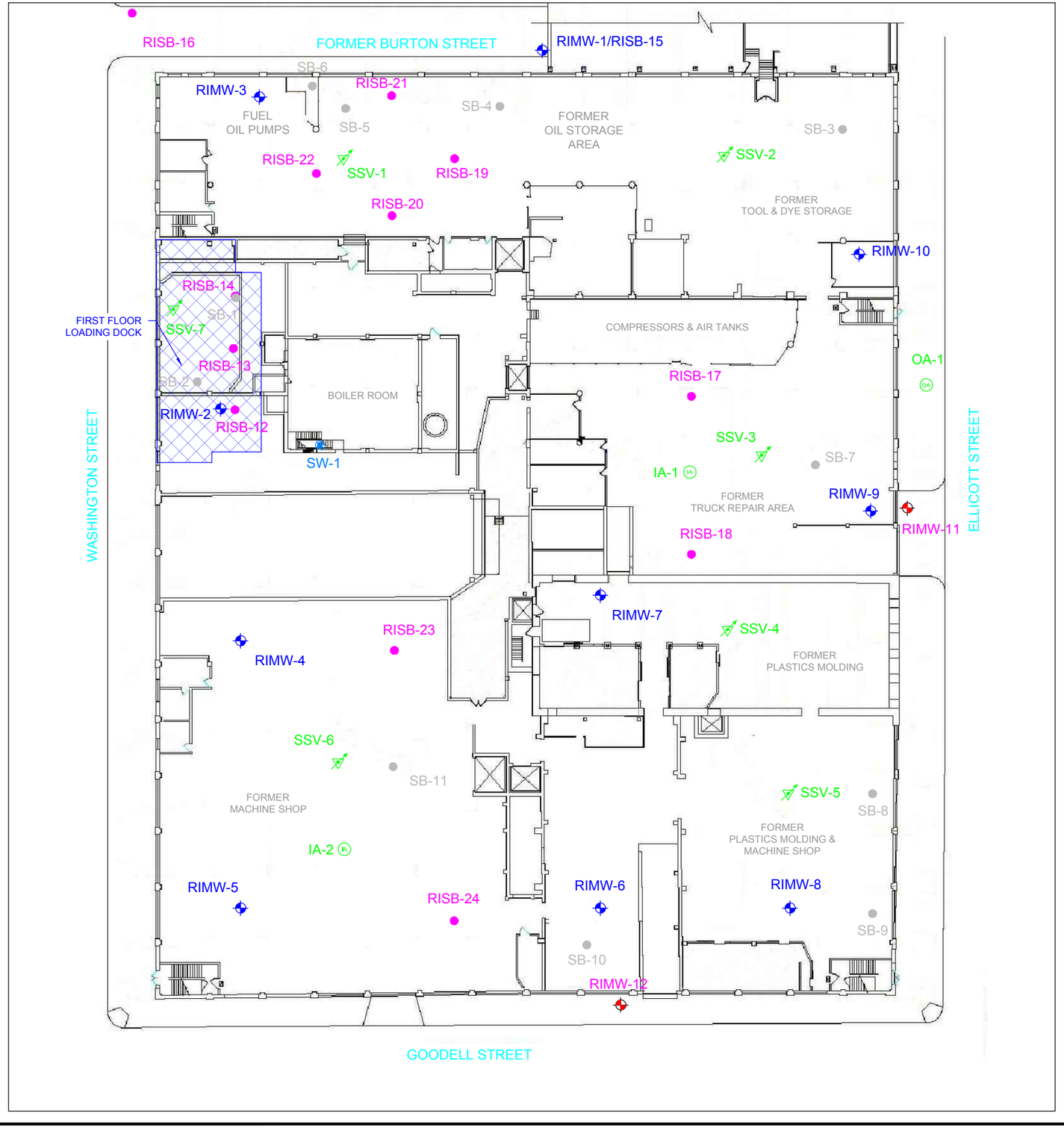
BUILDING FLOOR PLAN BASEMENT & 1ST FLOOR

REMEDIAL ACTION WORK PLAN

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

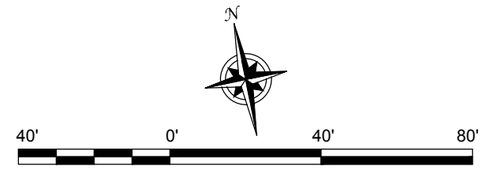
PREPARED FOR
THE KROG GROUP, LLC

FIGURE 3



LEGEND:

SB-2	2013 BORING LOCATION
RISB-3	SOIL BORING LOCATION
RIMW-2	SOIL BORING/MONITORING WELL LOCATION
SW-1	BASEMENT STANDING WATER SAMPLE LOCATION
SV-3	SUB-SLAB VAPOR SAMPLE LOCATION
IA-1	INDOOR AIR SAMPLE LOCATION
OA-1	OUTDOOR AIR SAMPLE LOCATION
RIMW-12	OFF-SITE MONITORING WELL LOCATION



SCALE: 1 INCH = 40 FEET
SCALE IN FEET
(approximate)

DATE: OCTOBER 2016
DRAFTED BY: RFL

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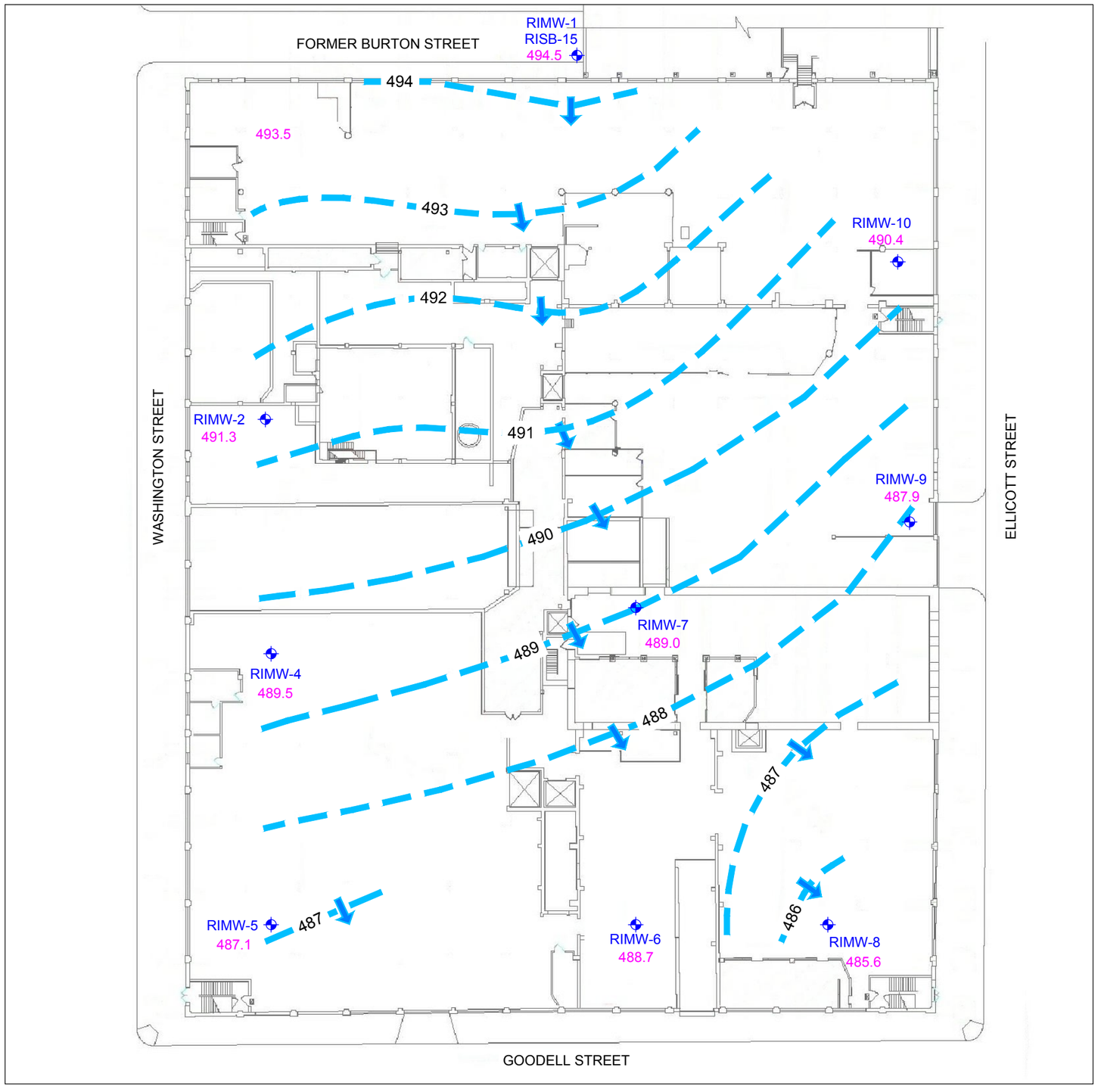
JOB NO.: 0092-016-001

REMEDIAL INVESTIGATION SAMPLE LOCATIONS

REMEDIAL ACTION WORK PLAN
FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK
PREPARED FOR
THE KROG GROUP, LLC

FIGURE 4

F:\CAD\TurnKey\Krog\Former Trico Building BCP\RAWP\Figure 5; GW ISO MAP.dwg



LEGEND:

- RIMW-3 — MONITORING WELL LOCATION
- 493.5 — GROUNDWATER ELEVATION JUNE 10, 2016
- 488 — GROUNDWATER CONTOUR
- GROUNDWATER FLOW DIRECTION

N

40' 0' 40' 80'

SCALE: 1 INCH = 40 FEET
SCALE IN FEET
(approximate)

GROUNDWATER ISOPOTENTIAL MAP
JUNE 10, 2016

REMEDIAL ACTION WORK PLAN

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

PREPARED FOR
THE KROG GROUP, LLC

FIGURE 5

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
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JOB NO.: 0092-016-001

DATE: OCTOBER 2016
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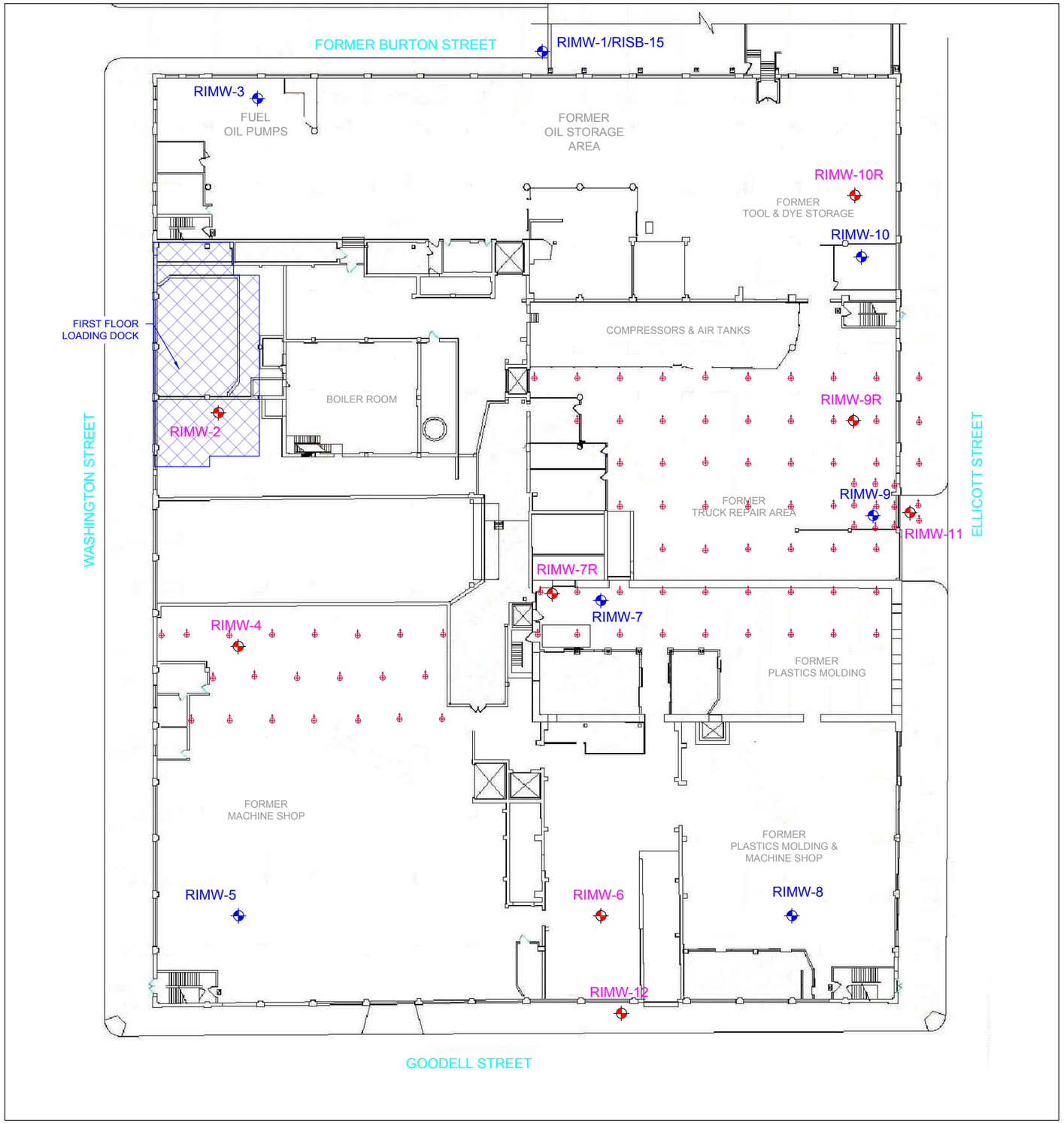
F:\CAD\TurnKey\Krog\Former Trico Building BCP\RAWP\Figure 6; Planned GW Remedial Strategy.dwg



LEGEND:

- PLANNED AMENDMENT INJECTION LOCATION
- RIMW-3 — MONITORING WELL LOCATIONS TO BE DECOMMISSIONED
- RIMW-2 — EXISTING POST-INJECTION GROUNDWATER MONITORING LOCATION
- RIMW-7R — PLANNED POST-INJECTION GROUNDWATER MONITORING LOCATION

NOTES:

1. DUE TO REDEVELOPMENT PLANS INSIDE BUILDING, THREE (3) POST-INJECTION MONITORING WELL LOCATIONS WILL NEED TO BE DECOMMISSIONED AND RELOCATED: RIMW-7, -9 AND -10. THE PROPOSED LOCATIONS FOR THE REPLACEMENT WELLS ARE SHOWN AS RIMW-7R, -9R, AND -10R.

N

40' 0' 40' 80'

SCALE: 1 INCH = 40 FEET
SCALE IN FEET
(approximate)

DATE: FEBRUARY 2017
DRAFTED BY: RFL

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TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

JOB NO.: 0092-016-001

PLANNED GROUNDWATER REMEDIAL STRATEGY AMENDMENT
INJECTION AND POST-INJECTION GROUNDWATER MONITORING LOCATIONS

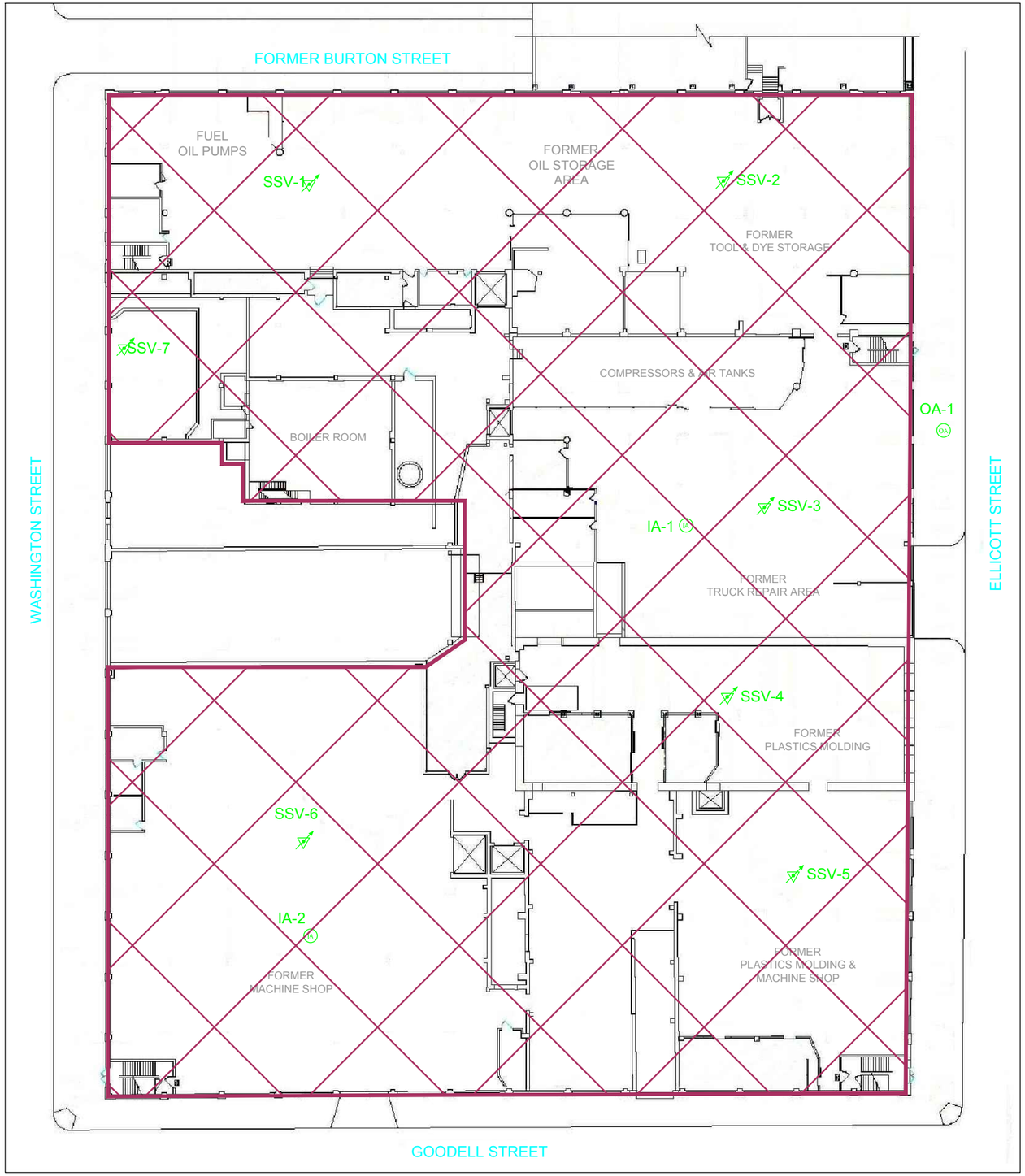
REMEDIAL ACTION WORK PLAN

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

PREPARED FOR
THE KROG GROUP, LLC

FIGURE 6

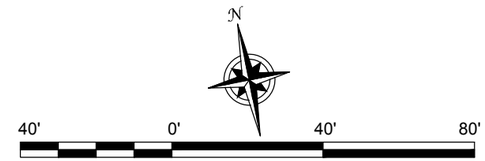
F:\CAD\TurnKey\Krog\Former Trico Building BCP\RAWP\Figure 7; SVI Mitigation.dwg



LEGEND:

SSV-3		SUB-SLAB VAPOR SAMPLE LOCATION
IA-1	IA	INDOOR AIR SAMPLE LOCATION
OA-1	OA	OUTDOOR AIR SAMPLE LOCATION
		AREA OF SVI MITIGATION

NOTES:
1. SVI = SOIL VAPOR INTRUSION



SCALE: 1 INCH = 40 FEET
SCALE IN FEET
(approximate)

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2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

JOB NO.: 0092-016-001

AREA OF BUILDING REQUIRING SVI MITIGATION

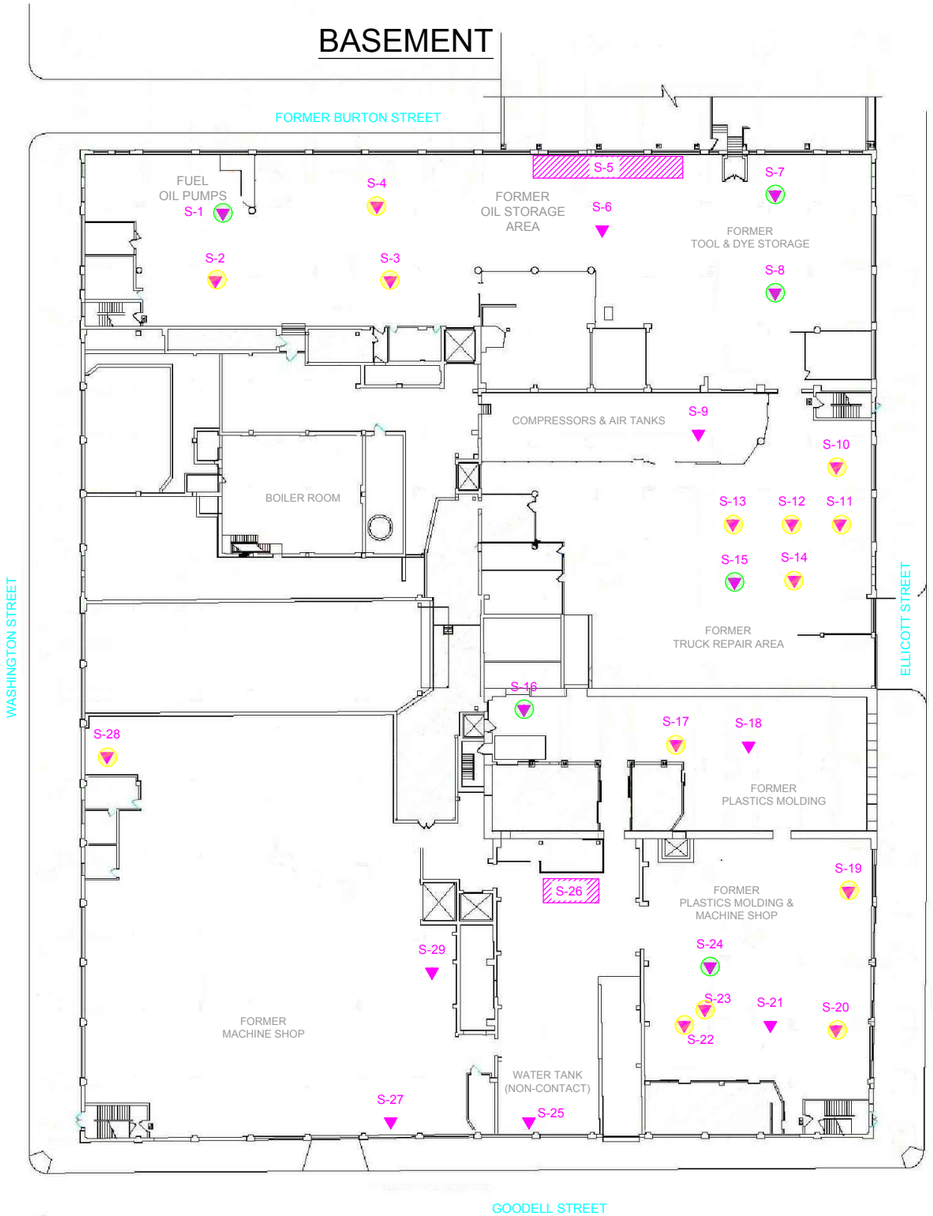
REMEDIAL ACTION WORK PLAN
FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK
PREPARED FOR
THE KROG GROUP, LLC

FIGURE 7

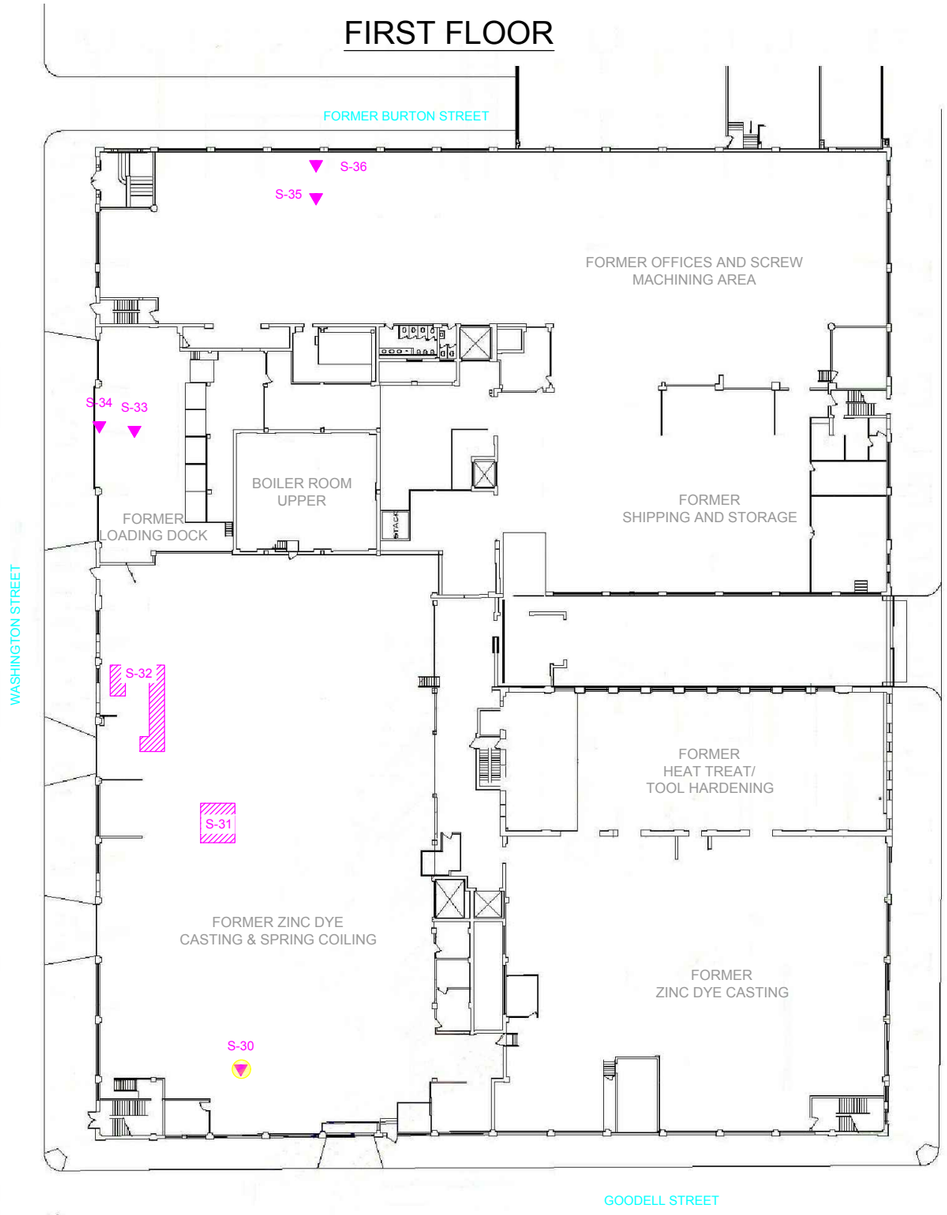
DATE: FEBRUARY 2017
DRAFTED BY: RFL

F:\CADT\TurnKey\Krog\Former Trico Building BCP\RAWP\Figure 8 - Utility and Structure Remediation.dwg

BASEMENT



FIRST FLOOR



LEGEND

S-5 ▼ UTILITY AND SEWER SERVICE SURFACE/SUBSURFACE FEATURE LOCATION (SEE APPENDIX A FOR DESCRIPTION)

S-22 ▼ STRUCTURE TO BE CLEANED DUE TO STAINING, SHEEN AND/OR OIL PRESENT

S-24 ▼ STRUCTURE TO BE CLEANED DUE TO PRESENCE OF SEDIMENT

N

50 0' 50 100

SCALE: 1 INCH = 50 FEET
SCALE IN FEET
(approximate)

DATE: OCTOBER 2016
DRAFTED BY: RFL

UTILITY AND SEWER STRUCTURE REMEDIAL APPROACH
BASEMENT & 1ST FLOOR

REMEDIAL ACTION WORK PLAN

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

PREPARED FOR
THE KROG GROUP, LLC

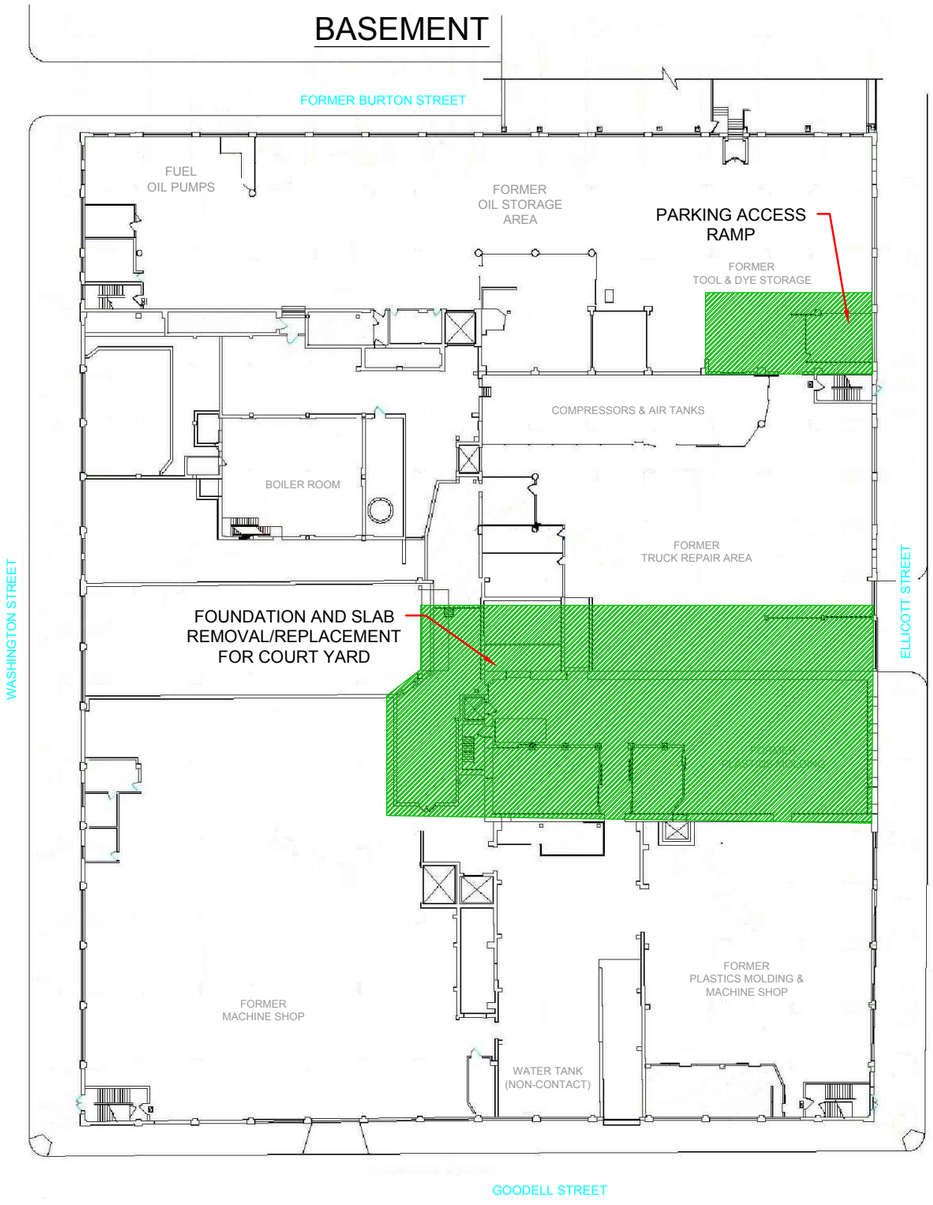
BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

JOB NO.: 0092-016-001

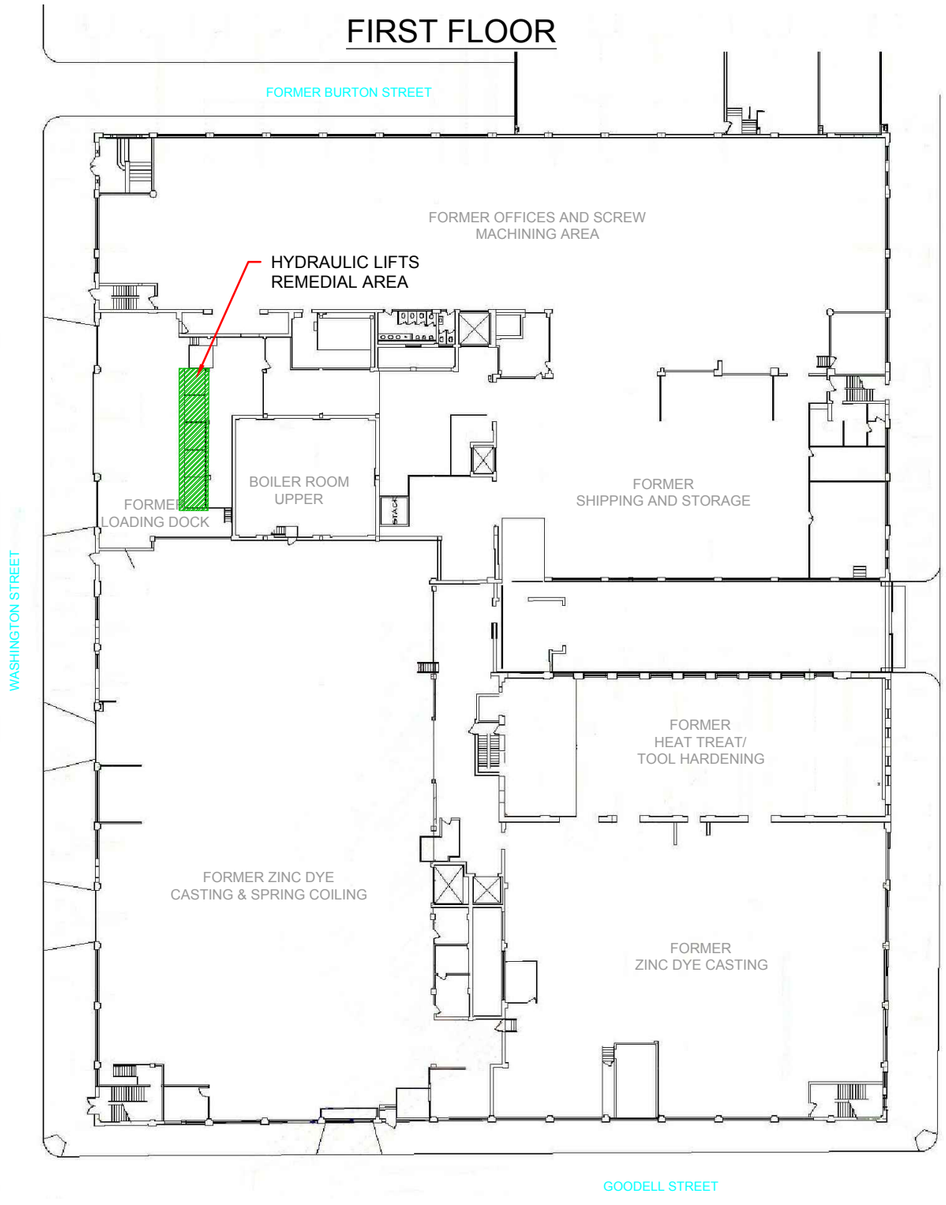
FIGURE 8

F:\CAD\TurnKey\Krog\Former Trico Building BCP\RAWP\Figure 9; Bldg Demo.dwg

BASEMENT



FIRST FLOOR



N

50 0' 50 100

SCALE: 1 INCH = 50 FEET
SCALE IN FEET
(approximate)

DATE: FEBRUARY 2017
DRAFTED BY: RFL

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218, (716) 856-0599

JOB NO.: 0092-016-001

BUILDING DEMOLITION, CONCRETE FOUNDATION AND FLOOR SLAB REMOVAL/REPLACEMENT AND LIMITED EXCAVATION AREAS

REMEDIAL ACTION WORK PLAN

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

PREPARED FOR
THE KROG GROUP, LLC

FIGURE 9

APPENDIX A

ANALYTICAL SUMMARY TABLES FROM PREVIOUS INVESTIGATION & RI

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 1A

SOIL PROBE & SAMPLE ELEVATIONS

REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

Location	Date Installed	Ground Elevation (ft) [1, 2]	Total Depth (fbgs)	Bottom Depth Elevation (ft)	Soil/Fill Sample Interval (fbgs)	Soil/Fill Sample Interval (ft) [1, 2]
RISB-12	05/23/2016	503.7	16.0	487.7	2 to 4	499.7 to 501.7
RISB-13	05/23/2016	503.7	4.0	499.7	1 to 3	500.7 to 502.7
RISB-14	05/23/2016	503.7	11.0	492.7	NS	NS
RISB-15	05/24/2016	503.1	16.0	487.1	6 to 8	495.1 to 497.1
RISB-16	05/26/2016	503.1	16.0	487.1	0 to 5	498.1 to 503.1
RISB-17	05/24/2016	497.3	16.0	481.3	4 to 6	491.3 to 493.3
RISB-18	05/24/2016	497.3	16.0	481.3	2 to 4	493.3 to 495.3
RISB-19	05/24/2016	497.3	16.0	481.3	2 to 4	493.3 to 495.3
RISB-20	05/24/2016	497.3	16.0	481.3	4 to 6	491.3 to 493.3
RISB-21	05/24/2016	497.3	16.0	481.3	6 to 8	489.3 to 491.3
RISB-22	05/24/2016	497.3	16.0	481.3	8 to 10	487.3 to 489.3
RISB-23	05/24/2016	491.5	16.0	475.5	2 to 4	487.5 to 489.5
RISB-24	05/24/2016	491.5	16.0	475.5	4 to 6	485.5 to 487.5
RISB-25	11/14/2016	491.3	12.0	479.3	NS	NS
RISB-26	11/14/2016	491.3	12.0	479.3	NS	NS
RISB-27	11/14/2016	497.3	12.0	485.3	7 to 8	489.3 to 490.3
					11 to 12	485.3 to 486.3
RISB-28	11/14/2016	497.3	12.0	485.3	4 to 6	491.3 to 493.3
RISB-29	11/14/2016	497.3	12.0	485.3	NS	NS
RISB-30	11/14/2016	497.3	12.0	485.3	NS	NS
RISB-31	11/14/2016	497.3	12.0	485.3	NS	NS
RISB-32	11/14/2016	497.3	12.0	485.3	7 to 8	489.3 to 490.3
RISB-33	11/14/2016	497.3	12.0	485.3	NS	NS
RISB-34	11/14/2016	497.3	12.0	485.3	NS	NS
RISB-35	11/14/2016	497.3	12.0	485.3	5 to 7	490.3 to 492.3
RIMW-1	05/23/2016	503.12	16.0	487.12	NS	NS
RIMW-2	05/23/2016	503.74	16.0	487.74	0 to 2	501.74 to 503.74
					8 to 10	493.74 to 495.74
RIMW-3	05/25/2016	497.26	16.0	481.26	0 to 2	495.26 to 497.26
RIMW-4	05/25/2016	491.46	16.0	475.46	0 to 2	489.46 to 491.46
RIMW-5	05/26/2016	491.54	16.0	475.54	6 to 8	483.54 to 485.54
RIMW-6	05/25/2016	491.39	16.0	475.39	4 to 7	484.39 to 487.39
RIMW-7	05/26/2016	491.30	16.0	475.30	2 to 4	487.30 to 489.30
RIMW-8	05/26/2016	491.51	16.0	475.51	0 to 2	498.51 to 491.51
RIMW-9	05/26/2016	497.26	16.0	481.26	0 to 2	495.26 to 497.26
RIMW-10	05/26/2016	497.34	16.0	481.34	2 to 4	493.34 to 495.34
RIMW-11	11/14/2016	501.3	36.0	465.30	NS	NS
RIMW-12	11/21/2016	499.4	40.0	459.40	NS	NS

Abbreviations:

NS = not sampled.
ft = feet.
fbgs = feet below ground surface
fbTOR = feet below top of riser

Notes:

1. Elevations are based on an assumed vertical elevation established using an arbitary benchmark (fire hydrant at corner of Washington St and Goodell).
2. Elevations were estimated based on survey measurements from nearby monitoring wells

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 1B

MONITORING WELL CONSTRUCTION DETAILS

REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

LOCATION		Elevations						Well Screen Data		
Number	Date Installed	TOR Elevation (ft) [1]	Top of Road Box Elevation (ft) [1, 2]	Total Depth (fbgs)	Bottom of Well Elevation (ft)	Water Level Depth 6/10/2016	Water Level Evelation 6/10/2016	Well Diameter (inches)	Length of Well Screen (feet)	Well Screen Interval Elevation (ft) [1, 2]
RIMW-1	05/23/2016	502.82	503.12	16.0	487.12	8.34	494.48	1	10	487.12 to 497.12
RIMW-2	05/23/2016	503.09	503.74	16.0	487.74	11.75	491.34	2	10	487.74 to 497.74
RIMW-3	05/25/2016	497.06	497.26	16.0	481.26	3.61	493.45	1	10	481.26 to 491.26
RIMW-4	05/25/2016	491.15	491.46	16.0	475.46	1.65	489.50	1	10	475.46 to 485.46
RIMW-5	05/26/2016	491.33	491.54	16.0	475.54	4.22	487.11	1	10	475.54 to 485.54
RIMW-6	05/25/2016	490.99	491.39	16.0	475.39	2.28	488.71	2	10	475.39 to 485.39
RIMW-7	05/26/2016	490.89	491.30	16.0	475.30	1.87	489.02	2	10	475.30 to 485.30
RIMW-8	05/26/2016	491.19	491.51	16.0	475.51	5.58	485.61	2	10	475.51 to 485.51
RIMW-9	05/26/2016	496.73	497.26	16.0	481.26	8.85	487.88	2	10	481.26 to 491.26
RIMW-10	05/26/2016	497.02	497.34	16.0	481.34	6.65	490.37	2	10	481.34 to 491.34
RIMW-11	11/14/2016	501.0 [2]	501.30	36.0	465.30	NI	NA	2	8	457.3 to 465.3
RIMW-12	11/21/2016	499.1 [2]	499.40	40.0	459.40	NI	NA	2	8	451.4 to 459.4

Abbreviations:

ft = feet.
fmsl = feet above mean sea level
fbgs = feet below ground surface
NI = not installed
NA = not applicable

Notes:

1. Elevations are based on an assumed vertical elevation established using an arbitary benchmark (fire hydrant at corner of Washington St and Goodell).
2. Elevations were estimated based on survey measurements from nearby monitoring wells and assuming relatively level floors in the area.

TABLE 2

SUMMARY OF HISTORIC AND REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PROGRAM

REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

Sample Identifier	Depth Sampled/ Screened (fbgs)	Analysis										Date Sampled
		PAHs	RCRA 8 Metals	TCL VOCs	TCL SVOCs	PCBs	Pesticides	Herbicides	TAL Metals & Cyanide	TAL Metals - Dissolved	VOCs via TO-15	
2013 LIMITED SUBSURFACE INVESTIGATION SAMPLES												
Soil/Fill Samples												
SB-1	1 - 2	X	X			X						07/01/2013
SB-2	1 - 2	X	X			X						07/01/2013
SB-3	0.5 - 1	X	X			X						07/01/2013
SB-4	0.5 - 1	X	X			X						07/01/2013
SB-5	0.5 - 1	X	X			X						07/01/2013
SB-6	0.5 - 1	X	X			X						07/01/2013
SB-7	1 - 1.5	X	X			X						07/01/2013
SB-8	1 - 1.5	X	X			X						07/01/2013
SB-9	1 - 1.5	X	X			X						07/01/2013
SB-10	1 - 2	X	X			X						07/01/2013
SB-11	1 - 2	X	X			X						07/01/2013
REMEDIAL INVESTIGATION SAMPLES												
Air & Sub-Slab Vapor												
SSV-1	0.1										X	05/14/2016
SSV-2	0.1										X	05/14/2016
SSV-3	0.1										X	05/14/2016
SSV-4	0.1										X	05/14/2016
SSV-5	0.1										X	05/14/2016
SSV-6	0.1										X	05/14/2016
SSV-7	0.1										X	05/14/2016
IA-1	NA										X	05/14/2016
IA-2	NA										X	05/14/2016
OA-1	NA										X	05/14/2016
Subsurface Soil/Fill												
RISB-12	2 - 4				X	X	X	X	X			05/23/2016
RISB-13	1 - 3				X	X			X			05/23/2016
RISB-15	6 - 8				X	X			X			05/23/2016
RISB-16	0 - 5				X	X			X			05/23/2016
RISB-17	4 - 6				X	X	X	X	X			05/24/2016
RISB-18	2 - 4			X	X	X			X			05/24/2016
RISB-19	2 - 4			X	X	X	X	X	X			05/24/2016
RISB-20	4 - 6				X	X			X			05/24/2016
RISB-21	6 - 8				X	X			X			05/24/2016
RISB-22	8 - 10				X	X			X			05/24/2016
RISB-23	2 - 4				X	X			X			05/24/2016
RISB-24	4 - 6				X	X	X	X	X			05/24/2016
RIMW-2	0 - 2			X								05/23/2016
RIMW-2	8 - 10				X	X	X	X	X			05/23/2016
RIMW-3	0 - 2				X	X			X			05/25/2016
RIMW-4	0 - 2			X	X	X			X			05/25/2016
RIMW-5	6 - 8				X	X			X			05/26/2016
RIMW-6	4 - 7				X	X			X			05/25/2016
RIMW-7	2 - 4				X	X			X			05/26/2016
RIMW-8	0 - 2				X	X			X			05/26/2016
RIMW-9	0-2				X	X			X			05/26/2016
RIMW-10	2 - 4				X	X			X			05/26/2016
RISB-27	7 - 8			X								11/15/2016
RISB-27	11 - 12			X								11/15/2016
RISB-28	4 - 6			X								11/15/2016
RISB-32	7 - 8			X								11/15/2016
RISB-35	5 - 7			X								11/15/2016
Groundwater												
RI MW-1	6 - 16			X	X	X	X	X	X			06/14/2016
RI MW-2	6 - 16			X	X	X	X	X	X	X		06/14/2016
RI MW-3	6 - 16			X	X	X	X	X	X	X		06/14/2016
RI MW-4	6 - 16			X	X	X	X	X	X	X		06/14/2016
RI MW-5	6 - 16			X	X	X	X	X	X			06/14/2016
RI MW-6	6 - 16			X	X	X	X	X	X	X		06/14/2016
RI MW-7	6 - 16			X	X	X	X	X	X	X		06/14/2016
RI MW-8	6 - 16			X	X	X	X	X	X			06/14/2016
RI MW-9	6 - 16			X	X	X	X	X	X			06/14/2016
RIMW-9	6 - 16			X								11/28/2016
RIMW-9	6 - 16			X								12/09/2016
RI MW-10	6 - 16			X	X	X	X	X	X			06/14/2016
RIMW-11	28 - 36			X								11/28/2016
RIMW-12	30 - 38			X								11/28/2016
Sub-Basement Water												
Basement Surface Water Sample	--			X	X	X	X	X	X			05/20/2016
Drainage Structure Solids												
S-12	--			X								11/15/2016
S-14	--			X								11/15/2016
S-15	--			X								11/15/2016

Notes:
1. Sub-slab samples listed as SSV-1 through SSV-7 were identifed in the laboratory report as SV-1 through SV-7.
2. For sample depths noted as 0-2 or 0-5 fbgs, soil samples were colected from beneath the concrete or asphalt.

Definitions:
fbgs = feet below ground surface
PAHs = polycyclic aromatic hydrocarbons
RCRA = Resource Conservation and Recovery Act
TCL VOCs = Target Compound List Volatile Organic Compounds
TCL SVOCs = Target Compound List Volatile Organic Compounds
PCBs = Polychlorinated biphenyls
TAL = Target Analyte List
IA = Indoor Air
OA = Outdoor Air
SSV = Sub-slab soil vapor

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 3A

SUMMARY OF 2013 LIMITED SUBSURFACE SOIL/FILL ANALYTICAL RESULTS

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

Parameter[1]	Unrestricted Use SCOs[2]	Restricted Residential Use SCOs[2]	Sample Locations										
			SB-1 (1-2')	SB-2 (1-2')	SB-3 (0.5-1')	SB-4 (0.5-1')	SB-5	SB-6 (0.5-1')	SB-7 (1-1.5')	SB-8 (1-1.5')	SB-9 (1-1.5')	SB-10 (1-2')	SB-11 (1-2')
			7/1/2013	7/1/2013	7/1/2013	7/1/2013	7/1/2013	7/1/2013	7/1/2013	7/1/2013	7/1/2013	7/1/2013	7/1/2013
Semi-Volatile Organic Compounds (SVOCs) - mg/Kg [3]													
2-Methylnaphthalene	--	--	0.0062 J	0.0084	0.029	0.0037 J	ND	0.046	0.061	0.012 J	0.0055 J	0.19	0.037
Acenaphthene	**20**	**100**	0.0049 J	0.0023 J	ND	ND	ND	0.043	0.025	0.015 J	ND	0.58	0.1
Acenaphthylene	**100**	**100**	ND	ND	0.0022 J	ND	ND	ND	0.0055 J	0.23	ND	0.074 J	0.0061 J
Anthracene	**100**	**100**	0.0091	0.0054 J	0.0051 J	ND	0.0054 J	0.084	0.048	0.24	0.004 J	1.5	0.27
Benzo(a)anthracene	**1**	**1**	0.036	0.017	0.024	ND	0.016	0.22	0.15	0.77	0.013	**2.6**	0.41
Benzo(a)pyrene	**1**	**1**	0.028	0.013	0.019	ND	0.016	0.17	0.12	0.59	0.011	**1.8**	0.29
Benzo(b)fluoranthene	**1**	**1**	0.062	0.048	0.03	ND	0.021	0.24	0.22	1	0.017	**2.6**	0.38
Benzo(g,h,i)perylene	**100**	**100**	0.013	0.0079 J	0.0078	ND	0.011	0.083	0.1	0.28	0.0051 J	0.9	0.13
Benzo(k)fluoranthene	**0.8**	**3.9**	0.02	0.013	0.011	ND	0.0078 J	0.1	0.073	0.4	0.006 J	**0.97**	0.14
Chrysene	**1**	**3.9**	0.042	0.031	0.027	ND	0.022	0.2	0.16	0.69	0.015	**2.1**	0.31
Dibenzo(a,h)anthracene	**0.33**	**0.33**	ND	ND	0.0064 J	ND	0.0059 J	ND	0.03	0.084	ND	0.28	**0.46**
Fluoranthene	**100**	**100**	0.081	0.065	0.037	ND	0.037	0.57	0.28	2.1	0.03	6	0.84
Fluorene	**30**	**100**	0.0042 J	0.0029 J	ND	ND	ND	0.053	0.027	0.057	ND	0.51	0.1
Indeno(1,2,3-cd)pyrene	**0.5**	**0.5**	0.019	0.013	0.013	ND	0.014	ND	0.1	0.37	0.0095	**1.1**	0.16
Naphthalene	**12**	**100**	0.0047 J	0.003 J	0.013	0.0026 J	ND	0.037	0.073	0.019 J	0.0036 J	0.25	0.046
Phenanthrene	**100**	**100**	0.048	0.03	0.035	ND	0.023	0.45	0.22	1	0.019	5.4	0.72
Pyrene	**100**	**100**	0.056	0.037	0.03	ND	0.032	ND	0.22	1.6	0.023	4.7	0.67
Total PCBs - mg/Kg [3]													
Aroclor 1248			0.189	0.0852	ND	ND	ND	ND	0.232	1.02	ND	0.023 J	ND
Aroclor 1254			0.15	0.0482	ND	ND	ND	ND	ND	0.762	ND	ND	ND
Aroclor 1260			0.0531	0.0198 J	ND	ND	ND	ND	ND	0.68	ND	ND	ND
Total PCBs	**0.1**	**1**	**0.3921**	**0.1532**	0	0	0	0	**0.232**	**2.462**	0	0.023 J	0
Total Metals - mg/Kg													
Arsenic	**13**	**16**	**16**	**22**	2.5	3	2.8	2.5	9.4	2	1.2	2.4	1.9
Barium	**350**	**400**	200	69	26	35	80	70	73	**530**	28	57	42
Cadmium	**2.5**	**4.3**	0.82	0.55	0.29 J	0.36 J	0.6	0.38 J	0.37 J	**2.6**	0.32 J	0.4 J	0.31 J
Chromium	**30**	**180**	24	10	5.9	8	12	13	9.5	**110**	7.8	21	8.5
Lead	**63**	**400**	16	11	17	13	25	16	27	**160**	14	16	14
Selenium	**3.9**	**180**	0.68 J	1.1	0.58 J	ND	0.27 J	ND	0.33 J	0.4 J	0.36 J	ND	0.28 J
Silver	**2**	**180**	ND	ND	ND	ND	ND	ND	ND	0.65	ND	ND	ND
Mercury	**0.18**	**0.81**	**0.34**	ND	ND	ND	ND	ND	**1.4**	ND	ND	ND	ND

Notes:

1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Values per NYSDEC Part 375 Soil Cleanup Objectives (December 2006)
3. Sample results were reported by the laboratory in ug/kg and converted to mg/kg for comparison to SCOs.

Definitions:

ND = Parameter not detected above laboratory detection limit.
"--" = Sample not analyzed for parameter or no SCO available for the parameter.
J = Estimated value; result is less than the sample quantitation limit but greater than zero.

BOLD	= Result exceeds Part 375 Unrestricted Use SCOs.
BOLD	= Result exceeds Part 375 Restricted Residential Use SCOs.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TABLE 3B
SUMMARY OF REMEDIAL INVESTIGATION SUBSURFACE SOIL-FILL ANALYTICAL RESULTS
REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NY

TURNKEY ENVIRONMENTAL RESTORATION, LLC

PARAMETER[1]	Unrestricted Use SCOs[2]	Protection of Groundwater SCOs[2]	Restricted Residential Use SCOs[2]	SAMPLE LOCATIONS																														
				RI MW-2 (0-2)	RI MW-2 (8-10)	RI MW-3 (0-2)	RI MW-4 (0-2)	RI MW-5 (6-8)	BLIND DUPLICATE 2 RI MW-5 (6-8)	RI MW-6 (4-7)	RI MW-8 (0-2)	RI MW-7 (2-4)	RI MW-9 (0-2)	RI MW-10 (2-4)	RI SB-12 (2-4)	RI SB-13 (1-3)	RI SB-15 (6-8)	RI SB-16 (0-5)	RI SB-17 (4-6)	RI SB-18 (2-4)	RI SB-19 (2-4)	BLIND DUPLICATE RI SB-19 (2-4)	RI SB-20 (4-6)	RI SB-21 (6-8)	RI SB-22 (8-10)	RI SB-23 (2-4)	RI SB-24 (4-6)	RI SB-27 (7-8)	RI SB-27 (11-12)	RI SB-28 (4-6)	RI SB-32 (7-8)	RI SB-35 (5-7)		
Volatile Organic Compounds (VOCs) - mg/Kg[3]																																		
1,1,1-Trichloroethane	0.68	0.68	100	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	ND	ND		
1,1-Dichloroethane	0.27	0.27	26	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	0.026 J	0.043 J	0.0023	0.075		
1,1-Dichloroethene	0.33	0.33	100	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	0.0016	0.01		
1,2-Dichlorobenzene	1.1	1.1	100	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	ND	ND		
1,4-Dichlorobenzene	1.8	1.8	13	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	ND	ND		
2-Butanone (MEK)	0.12	0.12	100	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	ND	ND		
4-methyl-2-pentanone (MIBK)	--	--	--	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	ND	ND		
Acetone	0.05	0.05	100	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	0.0091	0.0094 J		
Benzene	0.06	0.06	4.8	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	ND	0.00036 J		
n-Butylbenzene	12	--	--																								ND	ND	ND	ND	ND		
sec-Butylbenzene	11	11	100																								ND	ND	ND	ND	ND		
Chlorobenzene	1.1	1.1	100	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	ND	0.00079 J		
cis-1,2-Dichloroethene	0.25	0.25	100	ND	--	--	0.011 J	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	**0.34**	**0.85**	**0.58**	0.17	0.019		
Cyclohexane	--	--	--	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	ND	0.0012 J		
Ethylbenzene	1	1	41	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	ND	ND		
Isopropylbenzene (Cumene)	--	--	--	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	ND	ND		
p-Isopropyltoluene	--	--	--																								ND	ND	ND	ND	ND		
n-Propylbenzene	3.9	3.9	100																								ND	ND	ND	ND	ND		
1,3,5-Trimethylbenzene	8.4	8.4	52																								ND	ND	ND	ND	ND		
1,2,4-Trimethylbenzene	3.6	3.6	52																								ND	ND	ND	ND	ND		
Methylcyclohexane	--	--	--	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	0.018 J	0.052 J	ND	ND		
Methylene chloride	0.05	0.05	100	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	0.001 J	0.0017 J		
Tetrachloroethene	1.3	0.47	19	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	ND	ND		
Toluene	0.7	0.7	100	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	ND	ND		
trans-1,2-Dichloroethene	0.19	0.19	100	ND	--	--	0.0081 J	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	0.079 J	0.18	0.021 J	**0.59**	0.022		
Trichloroethene	0.47	0.47	21	ND	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	0.0026 J	ND	ND	--	--	--	--	--	**1.9**	**2.8**	**5.4**	0.024	0.14		
Vinyl chloride	0.02	0.02	0.9	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	ND	ND		
Total Xylenes	0.26	1.6	100	ND	--	--	ND	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	ND	ND	ND	ND		
Semi-Volatile Organic Compounds (SVOCs) - mg/Kg[3]																																		
Acenaphthene	20	98	100	--	ND	ND	--	ND	ND	0.075 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.032 J	--	--	--	--	--		
Anthracene	100	1,000	100	--	ND	ND	--	ND	ND	0.18 J, F2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.11 J	--	--	--	--	--		
Benzo(a)anthracene	1	1	1	--	ND	ND	--	ND	ND	0.37 J	ND	ND	ND	ND	0.021 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.18 J	--	--	--	--	--		
Benzo(a)pyrene	1	22	1	--	ND	ND	--	ND	ND	0.3 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.16 J	--	--	--	--	--		
Benzo(b)fluoranthene	1	1.7	1	--	ND	ND	--	ND	ND	0.38 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.18 J	--	--	--	--	--		
Benzo(ghi)perylene	100	1,000	100	--	ND	ND	--	ND	ND	0.17 J, F2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1 J	--	--	--	--	--		
Benzo(k)fluoranthene	0.8	1.7	3.9	--	ND	ND	--	ND	ND	0.17 J, F2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.087 J	--	--	--	--	--		
Bis(2-ethylhexyl) phthalate	--	--	--	--	0.085 J	ND	--	ND	ND	0.085 J	ND	ND	ND	ND	ND	0.13 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--		
Carbazole	--	--	--	--	ND	ND	--	ND	ND	0.083 J, F2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.026 J	--	--	--	--	--		
Chrysene	1	1	3.9	--	ND	ND	--	ND	ND	0.35 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.16 J	--	--	--	--	--		
Diethyl phthalate	--	--	--	--	ND	ND	--	ND	ND	0.042 J	ND	ND	ND	ND	ND	0.038 J	0.032 J	ND	ND	ND	ND	ND	ND	0.04 J	ND	ND	--	--	--	--	--		
Di-n-butyl phthalate	--	--	--	--	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.53	0.066 J	ND	ND	ND	ND	ND	--	--	--	--	--		
Dibenzofuran	--	--	--	--	ND	ND	--	ND	ND	0.051 J, F2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.032 J	--	--	--	--	--		
Fluoranthene	100	1000	100	--	ND	ND	--	ND	ND	0.92 J	ND	ND	0.035 J	ND	0.037 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.39	--	--	--	--	--		
Fluorene	30	386	100	--	ND	ND	--	ND	ND	0.067 J, F2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.046 J	--	--	--	--	--		
Indeno(1,2,3-cd)pyrene	0.5	8.2	0.5	--	ND	ND	--	ND	ND	0.15 J, F2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.089 J	--	--	--	--	--		
Phenanthrene	100	1000	100	--	ND	ND	--	ND	ND	0.84 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.33	--	--	--	--	--		
Pyrene	100	1000	100	--	ND	ND	--	ND	ND	0.77 J	ND	ND	0.03 J	ND	0.03 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.32	--	--	--	--	--		
Total Metals - mg/Kg[3]																																		
Aluminum	--	--	--	--	8,950 B	13,000	7,840	16,200	13,400	3,980 J	3,340	11,200	3,460	10,400	7,500 J	9,750 B	22,800 B	8,510	8,140 J	3,460 B	9,960 B	10,200 B	15,100 B	14,100 B	11,300 B	3,690 B	13,500 B	--	--	--	--	--		
Arsenic	13	16	16	--	ND	ND	ND	ND	ND	ND	ND	ND	2.7	3.2	2.3	**26.9**	6.1	2.4	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--		
Barium	350	820	400	--	60.2	132	55.9	102	99.3	25.7 F1	18.3	80.3	66	60.4	28.7	94.1	230	36.3	56.3 J	17.5	49.2	48.7	74.8	74	51.7	19.1	49.1	--	--	--	--	--		
Beryllium	7.2	47	72	--	0.36	0.5	0.3	0.67	0.55	ND	ND	0.45	0.23	0.42	0.3	0.88	0.93	0.37	0.33	ND	0.39	0.4	0.58	0.52	0.43	ND	0.57	--	--	--	--	--		
Cadmium	2.5	7.5	4.3	--	ND	ND	ND	ND	ND	ND	0.28	0.27	0.23	0.29	ND	ND	ND	0.24	0.37	ND	0.32	ND	ND	ND	ND	ND	ND	--	--	--	--	--		
Calcium	--	--	--	--	64,200 B	58,600	59,400	40,300	34,000	55,900	47,200	60,800	35,700	59,100	20,700 B	51,300 B	51,100 B	17,200	58,700 B	54,100 B	60,100 B	58,000 B	59,400 B	61,600 B	64,300 B	54,100 B	38,500 B	--	--	--	--	--		
Chromium	30	19	180	--	12.1	16	10.4	21.2	17.4	8.7	6	14.8	7.9	13.8	17.9	15.1	28.4	12.5	11 F2	5.7	13.7	13.5	18.2	16.9	14	6.1	18.5	--	--	--	--	--		
Cobalt	--	--	--	--	5.8	7.3	4.5	7.7	5.9	2.5	2.1	5.6	2.8	5.3	3.8	14.2	11.9	3.8	4.7	2.2	5.2	6.3	7.8	7	6	2.3	8.5	--	--	--	--	--		
Copper	50	1720	270	--	10.6	12	8.7	13.9	10.1	7.1	5.2	10	9.9	8.9	11.8	20.2	22.4	7.6	10	5.2	10.7	10.2	12.3	12.2	12.2	5.3	17.7	--	--	--	--	--		
Iron	--	--	--	--	12,500 B	14,900	10,600	16,900 ^	13,400 ^	7,180 J	5,910 ^	12,800 ^	10,500 ^	15,800 ^	12,300 B	17,100 B	26,300 B	11,500 ^	11,400 J	7,680 B	13,400 B	12,900 B	17,000 B	15,200 B	13,400 B	6,780 B	17,600 B	--	--	--	--	--		
Lead	63	450	400	--	11.7	12.8	12.7	10.2	7.6	13.1 F1	7.6	12.8	22.1	13.5	**93.9**	12.2	16.7	14.3	11.8	9.9	21.9	14.1	13.4	14.6	15.2	9.7	13.5	--	--	--	--	--		
Magnesium	--	--	--	--	29,900 B	25,600	27,500	18,400	15,700	26,700	24,800	28,800	16,600	29,200	10,500 B	8,640 B	19,400 B	6,240	26,500 B	26,200 B	26,400 B	26,400 B	24,700 B	27,000 B	28,900 B	26,700 B	18,900 B	--	--	--	--	--		
Manganese	1,600	2,000	2,000	--	378 B	373	332	344	284	281	234	392	179	354	277 B	331 B	398 B	221	330 B, F2	292 B	357 B	370 B	415 B	411 B	386 B	278 B	291 B	--	--	--	--	--		
Mercury	0.18	0.73	0.81	--	ND	ND	ND	ND	ND	ND	ND	ND	0.025	ND	0.044	ND	ND	0.037	ND	ND	0.042	ND	ND	ND	ND	ND	ND	--	--	--	--	--		
Nickel	30	130	310	--	12.3	15.9	9.4	19.8	15.1	ND	ND	13.2	6.8	13	9.6	20.4	**33.6**	9.1	10.8 F2	**116**	12.7	13.4	18.2	16.9	13.8	ND	20.8	--	--	--	--	--		
Potassium	--	--	--	--	3,010	4,650	2,830	5,580	4,850	1,310 J	1,130	4,070	949	3,630	1,900	2130	7160	1,590	2,780 J	1,030	3,400	3,500	5,430	5,050	4,120	1,310	4,360	--	--	--	--	--		
Sodium	--	--	--	--	441	463	288	517	441	231	223	275	204	225	1,910	963	2160	1,180	264	192	252	266	331	292	447	212	199	--	--	--	--	--		
Vanadium	--	--	--	--	20.2	26	18.7	30.2	25	12.4	11	22.5	13.9	21.2	18.9	24.3	42.8	21.9	18.9 F1, F2	13.2	22.4	22.9	28.9	27.5	23	12.4	28.8	--	--	--	--	--		
Zinc	109	2,480	10,000	--	51.7	51.8	60.1	55.3	64.5	58.7 F1	61.4	70.8	58.7 F1, F2	63	87	64.1	78.6	70	61.4	25.1	77.7	57.3	59.7	58.8	59.7	64.6	**132**	--	--	--	--	--		
Cyanide - Total	27	40	27	--	6.3	ND	ND	ND	ND	ND	ND	ND	ND	7.4	ND	ND	ND	ND	ND	23.7	R	R	1.8	ND	ND	ND	ND	ND	--	--	--	--	--		
Polychlorinated biphenyls (PCBs) - mg/Kg[3]																																		
Total PCBs	0.1	0.1	1	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--		
Pesticides and Herbicides - mg/Kg[3]																																		
				--	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	ND	--	--	--	--	--		

Notes:
1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Values per NYSDEC Part 375 Soil Cleanup Objectives (SCOs).
3. Sample results were reported by the laboratory in ug/kg and converted to mg/kg for comparisons to SCOs.

Definitions:
ND = Parameter not detected above laboratory detection limit.
"--" = No SCO value available for the parameter; or parameter not analysed for.
J = Estimated value; result is less than the sample quantitation limit but greater than zero.
^ = ICV, CCV, ICB, CCB, ISA, ISB, CRI, DLCK, or MRL standard: instrument related QC is outside acceptance limits.
F1 = MS and/or MSD Recovery is outside acceptance limits
F2= MS/MSD RPD exceeds control limits
B= Compound was found in the blank and sample.

Bold	= Result exceeds Part 375 Unrestricted SCOs
Bold	Result exceeds Part 375 Protection of Groundwater SCOs
Bold	= Results exceeds Part 375 Restricted Residential SCOs

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 3C

SUMMARY OF REMEDIAL INVESTIGATION DRAINAGE STRUCTURE ANALYTICAL RESULTS

REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NY

PARAMETER[1]	Restricted Residential Use SCOs [2]	DRAINAGE STRUCTURE SAMPLE LOCATIONS		
		S-12	S-14	S-15
Volatile Organic Compounds (VOCs) - mg/Kg [3]				
1,1,1-Trichloroethane	**100**	0.0052	ND	ND
1,1-Dichloroethane	**26**	ND	0.0012 J	ND
1,1-Dichloroethene	**100**	ND	0.00066 J	ND
1,2-Dichlorobenzene	**100**	ND	0.00064 J	ND
1,4-Dichlorobenzene	**13**	0.00072 J	0.00053 J	0.0005 J
2-Butanone (MEK)	**100**	ND	0.045	0.023
4-methyl-2-pentanone (MIBK)	**--**	ND	0.0029 J	0.0044 J
Acetone	**100**	ND	0.2	0.28
Benzene	**4.8**	ND	0.00072 J	0.0021
n-Butylbenzene	**--**	ND	0.001 J	ND
sec-Butylbenzene	**100**	ND	0.0012 J	ND
Chlorobenzene	**100**	ND	0.0082	ND
cis-1,2-Dichloroethene	**100**	ND	0.014	0.0012 J
Cyclohexane	**--**	ND	0.0031 J	0.0054 J
Ethylbenzene	**41**	ND	0.014	0.0011 J
Isopropylbenzene (Cumene)	**--**	ND	0.0061	0.00077 J
p-Isopropyltoluene	**--**	ND	0.0042	0.0023
n-Propylbenzene	**100**	ND	0.0024	0.001 J
1,3,5-Trimethylbenzene	**52**	ND	0.0062 J	0.0042 J
1,2,4-Trimethylbenzene	**52**	ND	0.017	0.0082 J
Methylcyclohexane	**--**	ND	0.027	0.0016 J
Methylene chloride	**100**	0.0019 J	0.0028 J	0.0035 J
Tetrachloroethene	**19**	0.0015	0.00087 J	0.0019
Toluene	**100**	ND	0.086	0.0024 J
trans-1,2-Dichloroethene	**100**	ND	0.0023 J	ND
Trichloroethene	**21**	0.00079 J	0.16	0.0078
Vinyl chloride	**0.9**	ND	0.00044 J	ND
Total Xylenes	**100**	ND	0.098	0.0053 J

Notes:

1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Sample results were reported by the laboratory in ug/kg and converted to mg/kg.

Definitions:

ND = Parameter not detected above laboratory detection limit.

J = Estimated value; result is less than the sample quantitation limit but greater than zero.

Bold = Results exceed the Restricted Residential Soil Cleanup Objectives.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 4

SUMMARY OF REMEDIAL INVESTIGATION GROUNDWATER ANALYTICAL RESULTS

REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

PARAMETER [1]	GWQS [2]	Sample Location															
		RI MW-1	RI MW-2	RI MW-3	RI MW-4	RI MW-5	RI MW-6	RI MW-7	RI MW-8	RI MW-9	RI MW-9	Blind Duplicate RI MW-9	RI MW-9	RI MW-10	Blind Duplicate RI MW-10	RI MW-11	RI MW-12
		06/14/16	06/14/16	06/14/16	06/14/16	06/14/16	06/14/16	06/14/16	06/14/16	06/14/16	11/28/16	11/28/16	12/09/16	06/14/16	06/14/16	11/28/16	
Volatile Organic Compounds (VOCs) - ug/L																	
1,1-Dichloroethene	**5**	ND	ND	ND	0.6 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone (MEK)	**50**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.4 J	ND	ND
Acetone	**50**	ND	44	3 J	3.2 J	ND	3.8 J	14	4.3 J	16 J	6.7	5.8	ND	20	19	3 J	8.5
Benzene	**1**	ND	ND	0.73 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.54	0.34 J
Carbon disulfide	**120**	ND	0.96 J	ND	ND	ND	0.38 J	0.42 J	ND	1.4 J	ND	ND	ND	1.9	1.9	ND	ND
Chlorobenzene	**5**	ND	ND	0.93 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	**5**	ND	ND	ND	**140**	ND	1.9	**36 F1**	ND	1.8 J	3.1	2.2 J	ND	ND	ND	2.8	ND
Cyclohexane	**--**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.28 J
Methylcyclohexane	**--**	0.64 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl tert butyl ether (MTBE)	**10**	ND	ND	ND	2 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	**5**	ND	ND	ND	ND	ND	ND	ND	ND	3.3	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	**5**	ND	ND	ND	ND	ND	ND	0.54 J	ND	**4,200**	**8.5**	**7.2**	4.9	ND	ND	ND	ND
trans-1,2-Dichloroethene	**5**	ND	ND	ND	**200**	ND	1.3	**100 J**	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	**5**	ND	**11**	ND	**82**	ND	ND	**89 J**	ND	**7**	1	0.74	0.45 J	2.5	2.8	ND	0.33 J
Vinyl chloride	**2**	ND	ND	ND	**2.1**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Semi-Volatile Organic Compounds (SVOCs) - ug/L																	
Acetophenone	**--**	ND	0.95 J	ND	ND	ND	ND	ND	ND	0.5 J	--	--	--	0.51 J	ND	--	--
Benzaldehyde	**--**	ND	ND	0.28 J	ND	ND	ND	ND	ND	ND	--	--	--	ND	ND	--	--
Benzo(a)pyrene	**ND**	ND	ND	ND	ND	ND	ND	ND	ND	0.48 J	--	--	--	ND	ND	--	--
Benzo(b)fluoranthene	**0.002**	ND	ND	ND	ND	ND	ND	ND	ND	**0.71 J**	--	--	--	ND	ND	--	--
Benzo(ghi)perylene	**--**	ND	ND	ND	ND	ND	ND	ND	ND	0.5 J	--	--	--	ND	ND	--	--
Butyl benzyl phthalate	**--**	ND	ND	ND	ND	ND	ND	ND	2.3 J	ND	--	--	--	ND	ND	--	--
Chrysene	**0.002**	ND	ND	ND	ND	ND	ND	ND	ND	**0.56 J**	--	--	--	ND	ND	--	--
Diethyl phthalate	**--**	ND	ND	0.7 J	ND	ND	ND	ND	ND	ND	--	--	--	ND	ND	--	--
Fluoranthene	**50**	ND	ND	ND	ND	ND	ND	ND	ND	1.1 J	--	--	--	0.68 J	0.46 J	--	--
Phenanthrene	**50**	ND	ND	ND	ND	ND	ND	0.75 J	ND	ND	--	--	--	0.74 J	0.81 J	--	--
Pyrene	**50**	ND	ND	ND	ND	ND	ND	ND	ND	0.84 J	--	--	--	0.46 J	ND	--	--
Total Metals - ug/L																	
Aluminum	**--**	24,400	3,200	69,800	122,000	15,000	3,700	1,800	1,400	430	--	--	--	1300	1,300	--	--
Arsenic	**25**	ND	ND	**26**	**48**	ND	ND	ND	ND	ND	--	--	--	ND	ND	--	--
Barium	**1,000**	340 B	55 B	**1600 B**	850 B	180 B	120 B	180 J	360 B	110 B	--	--	--	49 B	44 B	--	--
Beryllium	**3**	ND	ND	2.9	**5.1**	ND	ND	ND	ND	ND	--	--	--	ND	ND	--	--
Cadmium	**5**	2.2	ND	3.9	3.8	ND	ND	ND	ND	ND	--	--	--	ND	ND	--	--
Calcium	**--**	610,000	219,000	849,000	1,830,000	164,000	142,000	224,000	151,000	104,000	--	--	--	111,000	113,000	--	--
Chromium	**50**	40	ND	**110**	**170**	18	5.9	ND	9.9	ND	--	--	--	ND	ND	--	--
Cobalt	**5**	**20**	ND	**75**	**120**	**7.1**	ND	ND	**6.6**	ND	--	--	--	ND	ND	--	--
Copper	**200**	42	ND	130	**210**	16	ND	ND	13	ND	--	--	--	ND	ND	--	--
Cyanide, Total	**200**	ND	ND	ND	36	ND	ND	ND	ND	ND	--	--	--	ND	ND	--	--
Iron	**300**	**40,800**	**3,000**	**103,000**	**185,000**	**17,800**	**3,800**	**2,100**	**1,700**	**410**	--	--	--	**1,300**	**1,200**	--	--
Lead	**25**	**81**	ND	**220**	**390**	**32**	10	ND	19	ND	--	--	--	ND	ND	--	--
Magnesium	**35,000**	**231,000**	**122,000**	**350,000**	**692,000**	**66,600**	**71,700**	**103,000**	**61,600**	**50,300**	--	--	--	**44,600**	**45,100**	--	--
Manganese	**300**	**1,800**	200	**4,400**	**7,400**	**540**	120	140	160	120	--	--	--	140	140	--	--
Mercury	**0.7**	ND	ND	0.65	0.47	ND	ND	ND	0.24	ND	--	--	--	ND	ND	--	--
Nickel	**100**	44	18	**160**	**260**	17	ND	ND	14	ND	--	--	--	ND	ND	--	--
Potassium	**--**	28,200	67,200	30,600	44,600	8,000	9,800	8,700	37,900	4,000	--	--	--	9,900	9,500	--	--
Sodium	**20,000**	**2,260,000**	**882,000**	**563,000**	**362,000 J**	**566,000**	**300,000**	**78,600**	**248,000**	**84,500**	--	--	--	**89,100**	**89,100**	--	--
Vanadium	**14**	**56**	ND	**150**	**240**	**26**	5.5	ND	ND	ND	--	--	--	ND	ND	--	--
Zinc	**2,000**	370	41	1,100	820	90	70	100 J	190	760	--	--	--	31	25	--	--
Dissolved Metals - ug/L																	
Aluminum	**--**	--	ND	270 J	630 J	ND	--	ND	ND	--	--	--	--	--	--	--	--
Barium	**1,000**	--	17 J	60 J	27 J	32 J	--	15 J	19 J	--	--	--	--	--	--	--	--
Calcium	**--**	--	209,000 J	184,000 J	230,000 J	70,000 J	--	215,000 J	144,000 J	--	--	--	--	--	--	--	--
Cobalt	**5**	--	ND	**7.3 J**	ND	ND	--	ND	**5.5 J**	--	--	--	--	--	--	--	--
Iron	**300**	--	ND	230 J	**530 J**	ND	--	ND	ND	--	--	--	--	--	--	--	--
Magnesium	**35,000**	--	**120,000 J**	**77,600 J**	**123,000 J**	27,400 J	--	**99,900 J**	**59,700 J**	--	--	--	--	--	--	--	--
Manganese	**300**	--	160 J	240 J	110 J	27 J	--	87 J	120 J	--	--	--	--	--	--	--	--
Nickel	**100**	--	15 J	11 J	ND	ND	--	ND	ND	--	--	--	--	--	--	--	--
Potassium	**--**	--	63,000 J	12800 J	17,400 J	2600 J	--	8,300 J	32,700 J	--	--	--	--	--	--	--	--
Sodium	**20,000**	--	**884,000 J**	**607000 J**	**437,000 J**	**569,000 J**	--	**77,900 J**	**244,000 J**	--	--	--	--	--	--	--	--
Zinc	**2,000**	--	15 J	27 J	ND	ND	--	94 J	52 J	--	--	--	--	--	--	--	--
PCB (ug/L)																	
Aroclor 1248	**0.09**	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	ND	ND	--	--
Pesticides and Herbicides - ug/L																	
4,4'-DDD	**0.3**	ND	0.088 J	ND	ND	ND	ND	ND	ND	ND	--	--	--	ND	ND	--	--
delta-BHC	**0.01**	ND	ND	**0.011 J**	ND	ND	ND	ND	ND	ND	--	--	--	ND	ND	--	--
Field Measurements (Units as Indicated)																	
pH (units)	**6.5 - 8.5**	7.6	7.2	7.5	7.5	7.8	7.4	7.2	7.5	7.2	7.36	7.36	7.27	7.1	7.1	7.46	7.53
Temperature (oC)	**--**	11.3	8.9	9.5	9.5	10.2	9.4	9.5	9.8	10.5	10.1	10.1	10.8	10.4	10.4	8.4	7.6
Specific Conductance (uS)	**--**	1340	5180	4762	3870	3282	2350	1793	2184	1293	2503	2503	2407	1016	1016	2507	3502
Turbidity	**--**	>1000	131	>1000	>1000	>1000	47.9	113	172	122	10	10	25.8	41	41	21.7	14.1
DO (ppm)	**--**	2.61	5.24	4.34	2.75	3.44	4.98	5.34	3.66	8.48	1.99	1.99	3.26	7.39	7.39	2.29	4.62
ORP (mV)	**--**	-25	-248	41	-58	-34	-209	-70	-204	47	-88	-88	-12	167	167	-92	-96

Notes:

1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds or analytes were reported as non-detect.
2. Values per NYSDEC Division of Water Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations - Class GA (TOGS 1.1.1)

Definitions:

ND = Parameter not detected above laboratory detection limit.
"--" = No value available for the parameter; Parameter not analysed for.
B = Compound was found in the blank and the sample.
F1 = MS and/or MSD Recovery is outside acceptance limits.
J = Estimated value; result is less than the reporting limit but greater than zero.
BOLD = Result exceeds GWQS.

TABLE 5

SUMMARY OF REMEDIAL INVESTIGATION SUB-BASEMENT WATER ANALYTICAL RESULTS

REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

PARAMETER [1]	Basement Surface Water
	05/20/16
Volatile Organic Compounds (VOCs) - ug/L	
	ND
Semi-Volatile Organic Compounds (SVOCs) - ug/L	
	ND
Total Metals - ug/L	
Barium	0.01
Calcium	200
Iron	2.7
Magnesium	36.9
Manganese	0.42
Nickel	0.059
Potassium	80.8
Sodium	191
Zinc	0.045
PCB (ug/L)	
	ND
Pesticides and Herbicides - ug/L	
4,4'-DDD	0.08 J

Notes:

Definitions:

ND = Parameter not detected above laboratory detection limit.

"--" = No value available for the parameter; Parameter not analysed for.

B = Compound was found in the blank and the sample.

J = Estimated value; result is less than the reporting limit but greater than zero.

TABLE 6

SUMMARY OF REMEDIAL INVESTIGATION SOIL VAPOR INTRUSION AIR ANALYTICAL RESULTS

REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

PARAMETERS	Indoor Air IA-1	Indoor Air IA-2	Sub-Slab Vapor SSV-1	Sub-Slab Vapor SSV-2	Sub-Slab Vapor SSV-3	Sub-Slab Vapor SSV-4	Sub-Slab Vapor SSV-5	Sub-Slab Vapor SSV-6	Sub-Slab Vapor SSV-7	Outdoor Air OA-1
Volatile Organic Compounds (VOCs) - micrograms per cubic meter (ug/m3)										
1,1,1- TRICHLOROETHANE	0.26 J	ND	ND	ND	890	13	0.4 J	5.7	ND	ND
1,1- DICHLOROETHANE	ND	ND	ND	ND	290	0.9 J	ND	ND	ND	ND
1,2,4-TRIMETHYLBENZENE	0.25 J	0.32 J	0.3 J	0.52 J	ND	0.79 J	0.25 J	ND	0.36 J	0.31 J
1,2-DICHLOROETHENE, Total	0.22 J	6.3	ND	0.52 J	810	20	0.71 J	310	ND	ND
1,3-BUTADIENE	0.25 J	0.38 J	ND	ND	ND	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	1.3	0.45 J	ND	ND	ND	ND	ND	ND	ND	ND
1,4-DIOXANE (P-DIOXANE)	ND	110	ND	ND	ND	ND	ND	ND	49	ND
2,2,4-TRIMETHYLPENTANE	0.33 J	0.37 J	ND	ND	ND	2.1	0.7 J	1.5 J	0.88 J	0.45 J
ACETONE	2.5 J	16	6.2 J	40	ND	12 J	12	14 J	140	6 J
BENZENE	1.4	2.3	0.63	1.7	ND	3.2	1 J	2.3 J	6.8	0.69
BROMODICHLOROMETHANE	ND	ND	0.32 J	1.9 J	ND	0.66 J	ND	ND	ND	ND
CARBON DISULFIDE	ND	0.93 J	0.48 J	0.88 J	ND	1.9 J	ND	ND	2 J	0.24 J
CARBON TETRACHLORIDE	0.5 J	0.46 J	0.26 J	0.78 J	ND	ND	0.27 J	ND	0.47 J	0.41 J
CHLOROETHANE	ND	0.68 J	ND	ND	ND	ND	ND	ND	0.55 J	ND
CHLOROFORM	ND	ND	12	93	160 J	17	ND	2.4 J	ND	ND
CHLOROMETHANE	0.93 J	1.4	0.2 J	ND	ND	ND	ND	ND	ND	1.1
CIS-1,2-DICHLOROETHENE	0.22 J	5.9	ND	0.5 J	730	18	0.71 J	220	ND	ND
CYCLOHEXANE	0.17 J	ND	0.35 J	4	ND	3.4	0.75	1.7 J	95	ND
DICHLORODIFLUOROMETHANE	2.7	2.5	2.5	3 J	ND	2.7 J	0.98 J	30	1.9 J	2.4 J
ETHYLBENZENE	0.22 J	0.3 J	0.21 J	0.39 J	ND	1 J	0.3 J	ND	0.45 J	0.3 J
FREON TF	0.65 J	0.58 J	0.58 J	0.87 J	ND	ND	ND	ND	ND	ND
ISOPROPYL ALCOHOL	ND	ND	ND	ND	ND	ND	2.5 J	ND	4.1 J	3.4 J
M,P-XYLENES	0.95 J	1.2 J	0.74 J	1.4 J	ND	3.8 J	1.1 J	2.2 J	1.3 J	1.1 J
METHYL BUTYL KETONE (2-HEXANONE)	ND	ND	ND	0.53 J	ND	ND	ND	ND	ND	ND
METHYL ETHYL KETONE (2-BUTANONE)	ND	1.4 J	1.5	3.8	ND	2.6 J	3	3.8 J	11	0.6 J
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	ND	ND	ND	0.66 J	ND	ND	0.48 J	ND	2.3 J	ND
METHYLENE CHLORIDE	0.83 J	0.69 J	0.88 J	1.5 J	ND	ND	0.79 J	ND	1.3 J	0.83 J
NAPHTHALENE	ND	ND	ND	0.53 J	ND	ND	ND	ND	ND	ND
N-HEPTANE	0.19 J	ND	0.39 J	1.7	ND	4.2	1.2	2 J	42	0.25 J
N-HEXANE	0.57 J	0.85	0.84	3	ND	8	2.2	4.5	100	0.62 J
O-XYLENE (1,2-DIMETHYLBENZENE)	0.32 J	0.37 J	0.28 J	0.53 J	ND	1.2 J	0.34 J	0.77 J	0.46 J	0.4 J
STYRENE	ND	0.2 J	ND	ND	ND	ND	0.28 J	ND	ND	0.2 J
TETRACHLOROETHENE	0.16 J	0.24 J	1.5	2.4	ND	2.8	0.89 J	2.2 J	1.4 J	ND
TOLUENE	2.2	2.5	2.4	3.6	ND	8.8	4.5	4.6	9	2.1
TRANS-1,2-DICHLOROETHENE	ND	0.42 J	ND	ND	99 J	2.2	ND	90	ND	ND
TRICHLOROETHENE	1.4	35	1.5	260	19,000	390	9.4	610	5.9	0.23 J
TRICHLOROFLUOROMETHANE	1.6	1.3	1.6	2.1	ND	3	0.75 J	1.4 J	1.4 J	1.2
VINYL CHLORIDE	ND	0.089 J	ND	ND	ND	ND	ND	0.51 J	ND	ND
XYLENES, TOTAL	1.3 J	1.5 J	1 J	1.9 J	ND	5 J	1.4 J	3 J	1.8 J	1.5 J

Notes:
1. Only those parameters detected above the method detection limits, at a minimum of one location are presented in this table.
2. ND = compound concentration below reporting limit.
3. J = estimated concentrations; results is lees than reporting limit but greater than zero.
4. Sub-slab samples listed as SSV-1 through SSV-7 were identifed in the laboratory report as SV-1 through SV-7.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 7

SUMMARY OF INDOOR AIR SAMPLING RESULTS VS NYSDOH INDOOR & OUTDOOR AIR CRITERIA

REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT

FORMER TRICO PLANT
791 WASHINGTON STREET
BUFFALO, NEW YORK

PARAMETERS	NYSDOH Indoor 90th Percentile Comparison (ug/m3)	INDOOR AIR IA-1	INDOOR AIR IA-2	OUTDOOR AIR OA-1
1,1,1-TRICHLOROETHANE	**3.1**	0.26 J	ND	ND
1,1-DICHLOROETHANE	**NV**	ND	ND	ND
1,2,4-TRIMETHYLBENZENE	**9.5**	0.25 J	0.32 J	0.31 J
1,2-DICHLOROETHENE	**NV**	0.22 J	6.3	ND
1,3-BUTADIENE	**NV**	0.25 J	0.38 J	ND
1,4-DICHLOROBENZENE	**1.3**	1.3	0.45 J	ND
1,4-DIOXANE (P-DIOXANE)	**NV**	ND	110	ND
2,2,4-TRIMETHYLPENTANE	**NV**	0.33 J	0.37 J	0.45 J
ACETONE	**110**	2.5 J	16	6 J
BENZENE	**15**	1.4	2.3	0.69
BROMODICHLOROMETHANE	**NV**	ND	ND	ND
CARBON DISULFIDE	**NV**	ND	0.93 J	0.24 J
CARBON TETRACHLORIDE	**0.81**	0.5 J	0.46 J	0.41 J
CHLOROETHANE	**<0.25**	ND	**0.68 J**	ND
CHLOROFORM	**1.4**	ND	ND	ND
CHLOROMETHANE	**3.3**	0.93 J	1.4	1.1
CIS-1,2-DICHLOROETHENE	**<0.25**	0.22 J	5.9	ND
CYCLOHEXANE	**8.1**	0.17 J	ND	ND
DICHLORODIFLUOROMETHANE	**15**	2.7	2.5	2.4 J
ETHYLBENZENE	**7.4**	0.22 J	0.3 J	0.3 J
FREON TF	**NV**	0.65 J	0.58 J	ND
ISOPROPYL ALCOHOL	**NV**	ND	ND	3.4 J
M,P-XYLENES	**12**	0.95 J	1.2 J	1.1 J
METHYL BUTYL KETONE (2-HEXANONE)	**NV**	ND	ND	ND
METHYL ETHYL KETONE (2-BUTANONE)	**16**	ND	1.4 J	0.6 J
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	**2.2**	ND	ND	ND
METHYLENE CHLORIDE	**22**	0.83 J	0.69 J	0.83 J
NAPHTHALENE	**NV**	ND	ND	ND
N-HEPTANE	**19**	0.19 J	ND	0.25 J
N-HEXANE	**18**	0.57 J	0.85	0.62 J
O-XYLENE (1,2-DIMETHYLBENZENE)	**7.6**	0.32 J	0.37 J	0.4 J
STYRENE	**1.3**	ND	0.2 J	0.2
TETRACHLOROETHENE	**2.9**	0.16 J	0.24 J	ND
TOLUENE	**58**	2.2	2.5	2.1
TRANS-1,2-DICHLOROETHENE	**NV**	ND	0.42 J	ND
TRICHLOROETHENE	**0.48**	**1.4**	**35**	0.23 J
TRICHLOROFLUOROMETHANE	**17**	1.6	1.3	1.2
VINYL CHLORIDE	**<0.25**	ND	0.089 J	ND
XYLENES, TOTAL	**NV**	1.3 J	1.5 J	1.5 J

Notes:
1. Only those parameters detected above the method detection limits, at a minimum of one location are presented in this table.
2. NV = No Value
3. ND = compound concentration below reporting limit.
4. J = estimated concentration. Results is less than the reporting limit but greater than or equal to the method detection limit.

= Indoor Results Exceeds NYSDOH 90th Percentile

TABLE 8

COMPARISON OF AIR SAMPLNG RESULTS TO NYSDOH SVI GUIDANCE MATRICES

REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT

Former Trico Plant
791 Washington Street
Buffalo, New York

Sample Location	Carbon Tetrachloride		Trichloroethene (TCE)		Vinyl Chloride		Tetrachloroethene (PCE)		1,1,1 -Trichloroethane		cis-1,2-Dichloroethene		1,1-Dichloroethene	
	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix 1	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix 1	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix 1	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix 2	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix 2	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix 2	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix 2
SSV-1	0.26 J	NFA	1.5	I, R	ND	NFA	1.5	NFA	ND	NFA	ND	NFA	ND	NFA
SSV-2	0.78 J	NFA	260	Mitigate	ND	NFA	2.4	NFA	ND	NFA	0.5 J	NFA	ND	NFA
SSV-3	ND	NFA	19000	Mitigate	ND	NFA	ND	NFA	890	Monitor	730	Monitor	810	Monitor
SSV-7	0.47 J	Background	5.9	Monitor	ND	NFA	1.4 J	NFA	ND	NFA	ND	NFA	ND	NFA
IA-1	0.5 J		1.4		ND		0.16 J		0.26 J		0.22 J		ND	
OA-1	0.41 J	Background	0.23 J	Background	ND	Background	ND	Background	ND	Background	ND	Background	ND	Background
SSV-4	ND	NFA	390	Mitigate	ND	NFA	2.8	NFA	13	NFA	18	I, R	ND	NFA
SSV-5	0.27 J	NFA	9.4	Mitigate	ND	NFA	0.89 J	NFA	0.4 J	NFA	0.71 J	I, R	ND	NFA
SSV-6	ND	NFA	610	Mitigate	ND	NFA	2.2 J	NFA	5.7	NFA	220	Monitor/Mitigate	ND	NFA
IA-2	0.46 J		35		0.089 J		0.24 J		ND		5.9		ND	
OA-1	0.41 J	Background	0.23 J	Background	ND	Background	ND	Background	ND	Background	ND	Background	ND	Background

Notes:

1. Sub-slab samples listed as SSV-1 through SSV-7 were identifed in the laboratory report as SV-1 through SV-7.

Definitions:

ND = Not Detected
NFA = No further action.
I, R = Take reasonable and practical actions to identify source(s) and reduce exposures.
Monitor = Monitor soil vapor / indoor air
Mitigate = Mitigate source of identified parameter.

= NYSDOH Matrix 1 Compounds
= NYSDOH Matrix 2 Compounds

APPENDIX B

HEALTH AND SAFETY PLAN

SITE HEALTH AND SAFETY PLAN
for
BROWNFIELD CLEANUP PROGRAM
RENEDIAL ACTION ACTIVITIES

FORMER TRICO PLANT
BUFFALO, NEW YORK

February 2017 0092-016-001

Prepared for:

791 WASHINGTON STREET, LLC

and

The Krog Group LLC

Prepared By:

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0599

In Association With:

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0635

FORMER TRICO PLANT
HEALTH AND SAFETY PLAN FOR RA ACTIVITIES

ACKNOWLEDGEMENT

Plan Reviewed by (initial):

Corporate Health and Safety Director: Thomas H. Forbes, P.E.

Project Manager: Christopher Boron

Designated Site Safety and Health Officer: Bryan C. Hann

Acknowledgement:
I acknowledge that I have reviewed the information contained in this site-specific Health and Safety Plan, and understand the hazards associated with performance of the field activities described herein. I agree to comply with the requirements of this plan.

NAME (PRINT)	SIGNATURE	DATE

FORMER TRICO PLANT
HEALTH AND SAFETY PLAN FOR RA ACTIVITIES

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APPENDICES

1.0 INTRODUCTION

1.1 General

In accordance with OSHA requirements contained in 29 CFR 1910.120, this Health and Safety Plan (HASP) describes the specific health and safety practices and procedures to be employed by TurnKey Environmental Restoration, LLC and Benchmark Environmental Engineering & Science, PLLC employees (referred to jointly hereafter as "TurnKey-Benchmark") during Remedial Action (RA) activities at the Site, identified as the Former Trico Plant in the City of Buffalo, New York. This HASP presents procedures for TurnKey-Benchmark employees who will be involved with RA field activities; it does not cover the activities of other contractors, subcontractors or other individuals on the Site. These firms will be required to develop and enforce their own HASPs as discussed in Section 2.0. TurnKey-Benchmark accepts no responsibility for the health and safety of contractor, subcontractor or other personnel.

This HASP presents information on known Site health and safety hazards using available historical information, and identifies the equipment, materials and procedures that will be used to eliminate or control these hazards. Environmental monitoring will be performed during the course of field activities to provide real-time data for on-going assessment of potential hazards.

1.2 Site Background

The Site consists of a single parcel totaling approximately 2.1 acres, located at 791 Washington Street in the City of Buffalo, Erie County, New York. The property is currently developed with a complex of five buildings totaling 617,627 square feet. The oldest of the five buildings was constructed circa 1890 as a portion of the Christian Weyand Brewery which operated at the Site until the enactment of prohibition. The building was purchased in 1920 by the Trico Products Corporation for the manufacturing of windshield wiper blades for the automobile industry. The remaining buildings were constructed from 1920 to 1954. The Trico Products Corporation operated at the Site until circa 1990. Operations included electroplating, smelting, die-casting, rubber extrusion, and metal fabrication. As documented in the historical reports and Remedial Investigation (RI) summarized in Section 2.8,

industrial manufacturing at the Site has resulted in chemical and/or petroleum impacts to the building interior, underlying soil and groundwater.

1.3 Summary of Environmental Conditions

Based on the previous investigation and RI, the following environmental conditions exist at the Site that should be addressed to fulfill the requirements of the Restricted Residential Track 4 cleanup:

- SVOCs, metal analytes and PCBs were detected in the soil/fill in limited locations beneath the building slab at concentrations slightly above their respective RRSCOs.
- cVOCs were detected in the soil/fill beneath the concrete slab of the former truck repair area and may be the cause of the cVOCs detected in the groundwater.
- cVOCs were detected in the groundwater in the central portion of the Site at concentrations exceeding their respective GWQS; and are likely the cause of SVI. The concentrations of cVOCs in groundwater at RIMW-4, RIMW-7 and RIMW-9, although they do not exceed 500 ug/L at any one particular location, should be addressed.
- Based on the NYSDOH SVI Guidance decision matrices the building will require mitigation due to elevated trichloroethene (TCE) concentrations in sub-slab and indoor air samples.

1.4 Primary Constituents of Concern (COCs)

Based on the previous investigations and RI, and the planned redevelopment of the Site, the constituents of concern (COCs) for a restricted residential use are presented below:

Soil/Fill: cVOCs, PAHs, PCBs, metals

Groundwater: cVOCs in the central portion of the building

Sub-slab Vapor/Indoor Air: cVOCs

Inorganic Compounds – The inorganic COC potentially present at elevated concentrations include arsenic, barium, cadmium, chromium, lead, mercury, and asbestos.

Semi-Volatile Organic Compounds (SVOCs) – SVOCs present at elevated concentrations include the Polycyclic Aromatic Hydrocarbons (PAHs) benzo(a)anthracene,

benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene. PAHs are commonly found in urban soil environments.

Polychlorinated Biphenyls (PCBs) – PCBs present at elevated concentrations include aroclor 1248, aroclor 1254, and aroclor 1260.

Chlorinated VOCs (cVOCs) – cVOCs present at elevated concentrations include trichloroethene (TCE), tetrachloroethene (PCE), vinyl chloride (VC), and cis-1,2-Dichloroethene (cis-DCE).

1.5 Overview of RA Activities

TurnKey-Benchmark personnel will be on-site to observe, assist, and/or perform RA activities. The field activities to be completed as part of the RA are described below. Planned RA activities are more fully described in the Remedial Action Work Plan (RAWP) for the Site.

Remedial Action Activities

1. **Removal of Hydraulic Lifts, Associated Infrastructure and Associated Impacted Soil/Fill:** Six hydraulic lifts are present in the northwestern portion of the building within the loading dock area off of Washington Street. The lifts and associated infrastructure are located beneath the elevated loading dock in this area.
2. **In-Situ Groundwater Treatment:** The groundwater remedial program will involve directly injecting approximately 18,800 lbs. of 3DME into the upper groundwater/saturated soils within the cVOC-plume in accessible areas within the Site building via direct push soil probe rig and pump.
3. **Groundwater Monitoring:** The quarterly groundwater sampling program will consist of post-treatment monitoring at 6 existing monitoring wells (TKMW-2, -4, -6, -7, -9, and -10, see Figure 6). Groundwater samples will be analyzed for TCL VOCs via USEPA SW-846 Method 8260.
4. **Active Sub-Slab Depressurization System Installation:** An active sub-slab depressurization (ASD) system will be installed within the basement area of the building. Tasks will include communication testings, concrete cores, installation of appropriate suction piping and mechanical fans.
5. **Cleaning Accessible Utility and/or Sewers/Structures:** During the RI, locations of utility and/or structures were identified that should be cleaned out due to the

presence of staining, sheen, oil present, and/or cVOC-impacted solid contents within the structure. The structures will be cleaned using the combination of a pressure washer and drum vacuum to remove the contents and clean the structures.

6. **Building Demolition, Concrete Foundation & Slab Removal/Replacement, and Limited Excavation:** The redevelopment plan for the building will involve limited demolition of a portion of the existing building, concrete slab/foundation replacement, and limited excavation. Underlying soil/fill and/or groundwater which may contain contaminants may be exposed during the limited building demolition, slab removal/replacement or limited excavation.
7. **Sub-Basement Water Removal, Treatment and Discharge:** The sub-basement of the building is filled with water thought to be from groundwater infiltration or storm water accumulation and has been estimated at 144,000-gallons. The water will be pumped through a bag filtration system, granular activated carbon (GAC) treatment system, into a storage tank, prior to discharge into the BSA sanitary sewer under permit. If required, analytical samples will be collected prior to charge. Water will not be discharge in excess of the BSA permit requirements.
8. **Cover System Replacement:** During the demolition/redevelopment, portions of the basement concrete foundations/slab will be removed and replaced with concrete to facilitate the installation of the court yard and parking ramps.

2.0 ORGANIZATIONAL STRUCTURE

This chapter of the HASP describes the lines of authority, responsibility and communication as they pertain to health and safety functions at the Site. The purpose of this chapter is to identify the personnel who impact the development and implementation of the HASP and to describe their roles and responsibilities. This chapter also identifies other contractors and subcontractors involved in work operations; and establishes the lines of communications among them for health and safety matters. The organizational structure described in this chapter is consistent with the requirements of 29 CFR 1910.120(b)(2). This section will be reviewed by the Project Manager and updated as necessary to reflect the current organizational structure at this Site.

2.1 Roles and Responsibilities

All Turnkey-Benchmark personnel on the Site must comply with the minimum requirements of this HASP. The specific responsibilities and authority of management, safety and health, and other personnel on this Site are detailed in the following paragraphs.

2.1.1 Corporate Health and Safety Director

The TurnKey-Benchmark Corporate Health and Safety Director is ***Mr. Thomas H. Forbes, P.E.***. The Corporate Health and Safety Director responsible for developing and implementing the Health and Safety program and policies for Benchmark Environmental Engineering & Science, PLLC and TurnKey Environmental Restoration, LLC, and consulting with corporate management to ensure adequate resources are available to properly implement these programs and policies. The Corporate Health and Safety Director coordinates TurnKey-Benchmark's Health and Safety training and medical monitoring programs and assists project management and field staff in developing site-specific health and safety plans.

2.1.2 Project Manager

The Project Manager for this Site is ***Mr. Christopher Boron.*** The Project Manager has the responsibility and authority to direct all TurnKey-Benchmark work operations at the Site. The Project Manager coordinates safety and health functions with the Site Safety and

Health Officer, and bears ultimate responsibility for proper implementation of this HASP. He may delegate authority to expedite and facilitate any application of the program, including modifications to the overall project approach as necessary to circumvent unsafe work conditions. Specific duties of the Project Manager include:

- Preparing and coordinating the Site work plan.
- Providing TurnKey-Benchmark workers with work assignments and overseeing their performance.
- Coordinating health and safety efforts with the Site Safety and Health Officer (SSHO).
- Reviewing the emergency response coordination plan to assure its effectiveness.
- Serving as the primary liaison with Site contractors and the property owner.

2.1.3 Site Safety and Health Officer

The Site Safety and Health Officer (SSHO) for this Site is ***Mr. Bryan C. Hann***. The qualified alternate SSHO is ***Mr. Richard L. Dubisz.*** The SSHO reports to the Project Manager. The SSHO is on-site or readily accessible to the Site during all work operations and has the authority to halt Site work if unsafe conditions are detected. The specific responsibilities of the SSHO are:

- Managing the safety and health functions for TurnKey-Benchmark personnel on the Site.
- Serving as the point of contact for safety and health matters.
- Ensuring that TurnKey-Benchmark field personnel working on the Site have received proper training (per 29 CFR Part 1910.120(e)), that they have obtained medical clearance to wear respiratory protection (per 29 CFR Part 1910.134), and that they are properly trained in the selection, use and maintenance of personal protective equipment, including qualitative respirator fit testing.
- Performing or overseeing Site monitoring as required by the HASP.
- Assisting in the preparation and review of the HASP.
- Maintaining site-specific safety and health records as described in this HASP.
- Coordinating with the Project Manager, Site Workers, and Contractor's SSHO as necessary for safety and health efforts.

2.1.4 Site Workers

Site workers are responsible for: complying with this HASP or a more stringent HASP, if appropriate (i.e., Contractor and Subcontractor's HASP); using proper PPE; reporting unsafe acts and conditions to the SSHO; and following the safety and health instructions of the Project Manager and SSHO.

2.1.5 Other Site Personnel

Other Site personnel who will have health and safety responsibilities will include, but not limited to the Drilling Contractor, Excavation Contractor, ASD System Installation Contractor, who will be responsible for developing, implementing and enforcing a Health and Safety Plan equally stringent or more stringent than TurnKey-Benchmark's HASP. TurnKey-Benchmark assumes no responsibility for the health and safety of anyone outside its direct employ. Each Contractor's HASP shall cover all non-TurnKey/Benchmark Site personnel. Each Contractor shall assign a SSHO who will coordinate with TurnKey-Benchmark's SSHO as necessary to ensure effective lines of communication and consistency between contingency plans.

In addition to TurnKey-Benchmark and Contractor personnel, other individuals who may have responsibilities in the work zone include subcontractors and governmental agencies performing Site inspection work (i.e., the New York State Department of Environmental Conservation). The Contractor shall be responsible for ensuring that these individuals have received OSHA-required training (29 CFR 1910.120(e)), including initial, refresher and site-specific training, and shall be responsible for the safety and health of these individuals while they are on-site.

3.0 HAZARD EVALUATION

Due to the presence of certain contaminants at the Site, the possibility exists that workers will be exposed to hazardous substances during field activities. The principal points of exposure would be through direct contact with and incidental ingestion of soil, and through the inhalation of contaminated particles or vapors. Other points of exposure may include direct contact with groundwater. In addition, the use of drilling and/or medium to large-sized construction equipment (e.g., excavator) will also present conditions for potential physical injury to workers. Further, since work will be performed outdoors, the potential exists for heat/cold stress to impact workers, especially those wearing protective equipment and clothing. Adherence to the medical evaluations, worker training relative to chemical hazards, safe work practices, proper personal protection, environmental monitoring, establishment work zones and Site control, appropriate decontamination procedures and contingency planning outlined herein will reduce the potential for chemical exposures and physical injuries.

3.1 Chemical Hazards

As discussed in Section 1.3, historic activities have potentially resulted in impacts to Site soils and groundwater. Soil and groundwater may be impacted by SVOCs (PAHs) and/or inorganic compounds due to historic use of the Site. Table 1 lists exposure limits for airborne concentrations of the COCs identified in Section 1.4 of this HASP. Brief descriptions of the toxicology of the prevalent COCs and related health and safety guidance and criteria are provided below.

1. **Arsenic (CAS #7440-38-2)** is a naturally occurring element and is usually found combined with one or more elements, such as oxygen or sulfur. Inhalation is a more important exposure route than ingestion. First phase exposure symptoms include nausea, vomiting, diarrhea and pain in the stomach. Prolonged contact is corrosive to the skin and mucus membranes. Arsenic is considered a Group A human carcinogen by the USEPA. Exposure via inhalation is associated with an increased risk of lung cancer. Exposure via the oral route is associated with an increased risk of skin cancer.
2. **Barium (CAS #7440-39-3)** is found in waste streams from a large number of industrial uses. Acute exposures to barium may cause gastrointestinal disturbances and muscular weakness. Long term exposures may cause hypertension.

3. **Cadmium (CAS #7440-43-9)** is a natural element and is usually combined with one or more elements, such as oxygen, chloride or sulfur. Breathing high levels of cadmium severely damages the lungs and can cause death. Ingestion of high levels of cadmium severely irritates the stomach, leading to vomiting and diarrhea. Long term exposure to lower levels of cadmium leads to a buildup of this substance in the kidneys and possible kidney disease. Other potential long term effects are lung damage and fragile bones. Cadmium is suspected to be a human carcinogen.
4. **Chromium (CAS #7440-47-3)** trivalent chromium occurs in trace amounts in foods and waters, and appears to be benign. In contrast, hexavalent chromium is very toxic and mutagenic when inhaled. In the body, chromium (VI) is reduced by several mechanisms to chromium (III) and excreted from the body; whereas the chromate ion is transferred into the cell. The acute toxicity of chromium (VI) is due to its strong oxidation properties. In the blood stream, it damages the kidneys, the liver and blood cells through oxidation reactions. Hemolysis, renal and liver failure are the results of these damages.
5. **Lead (CAS #7439-92-1)** can affect almost every organ and system in our bodies. The most sensitive is the central nervous system, particularly in children. Lead also damages kidneys and the immune system. The effects are the same whether it is breathed or swallowed. Lead may decrease reaction time, cause weakness in fingers, wrists or ankles and possibly affect memory. Lead may cause anemia.
6. **Mercury (CAS #7439-97-6)** is used in industrial applications for the production of caustic and chlorine, and in electrical control equipment and apparatus. Over-exposure to mercury may cause coughing, chest pains, bronchitis, pneumonia, indecision, headaches, fatigue and salivation. Mercury is a skin and eye irritant.
7. **Polycyclic Aromatic Hydrocarbons (PAHs)** are formed as a result of the pyrolysis and incomplete combustion of organic matter such as fossil fuel. PAH aerosols formed during the combustion process disperse throughout the atmosphere, resulting in the deposition of PAH condensate in soil, water and on vegetation. In addition, several products formed from petroleum processing operations (e.g., roofing materials and asphalt) also contain elevated levels of PAHs. Hence, these compounds are widely dispersed in the environment. PAHs are characterized by a molecular structure containing three or more fused, unsaturated carbon rings. Seven of the PAHs are classified by USEPA as probable human carcinogens (USEPA Class B2). These are: benzo(a)pyrene; benzo(a)anthracene; benzo(b)fluoranthene; benzo(k)fluoranthene; chrysene; dibenzo(a,h)anthracene; and indeno(1,2,3-cd)pyrene. The primary route of exposure to PAHs is through incidental ingestion and inhalation of contaminated particulates. PAHs are characterized by an organic odor, and exist as oily liquids in pure form. Acute exposure symptoms may include acne-type blemishes in

areas of the skin exposed to sunlight.

8. Polychlorinated Biphenyls (PCBs) are a series of compounds that were commonly used in transformer oil and are suspected carcinogens. PCBs may vary in form from oily liquids to white solids. Exposure may cause nausea, vomiting, weight loss, jaundice, edema and abdominal pain.

9. Chlorinated Volatile Organic Compounds

- **Tetrachloroethene (PCE)** was formally widely used in dry cleaning operations as a solvent. It is harmful by ingestion inhalation and skin absorption. Exposure can cause dermatitis, dizziness, nausea, liver and kidney damage. This compound is a suspected carcinogen.
- **Trichloroethene (TCE)** was formally widely used in dry cleaning operations and metal degreasing. In pure form it is a clear, colorless liquid with a distinct odor and boiling point of 186 degrees Fahrenheit. TCE is more dense than water, causing it to sink rapidly through soil and fractured bedrock. It is toxic by inhalation and skin absorption. It is an irritant to the skin, eyes and mucous membranes. Symptoms of exposure may include headache, dizziness and nausea. Exposure may cause liver and kidney damage. TCE is a suspected human carcinogen.
- **Cis 1,2-Dichloroethene (cis 1,2-DCE)** is used as an intermediate in the production of other chlorinated solvents and compounds, as well as low temperature extraction solvents for dyes, perfumes, and lacquers; commercial use of these compounds is not extensive. They are highly volatile by reaction with alkalis, potassium hydroxide, sodium, and sodium hydroxide. Direct exposure is mostly by inhalation resulting in heart and liver damage.
- **Vinyl chloride (CAS#75-01-4)** is a breakdown product of TCE and is classified by EPA as a human carcinogen. Acute (short-term) exposure to high levels of vinyl chloride in air has resulted in CNS effects, such as dizziness, drowsiness, and headaches in humans. Chronic (long-term) exposure to vinyl chloride through inhalation and oral exposure in humans has resulted in liver damage.

With respect to the anticipated RA activities discussed in Section 1.5, possible routes of exposure to the above-mentioned contaminants are presented in Table 2. The use of proper respiratory equipment, as outlined in Section 7.0 of this HASP, will minimize the potential for exposure to airborne contamination. Exposure to contaminants through dermal and other routes will also be minimized through the use of protective clothing

(Section 7.0), safe work practices (Section 6.0), and proper decontamination procedures (Section 12.0).

3.2 Physical Hazards

RA field activities at the Site may present the following physical hazards:

- The potential for physical injury during heavy construction equipment use, such as backhoes, excavators and drilling equipment.
- The potential for heat/cold stress to employees during the summer/winter months (see Section 10.0).
- The potential for slip and fall injuries due to rough, uneven terrain and/or open excavations.

These hazards represent only some of the possible means of injury that may be present during RA operations and sampling activities at the Site. Since it is impossible to list all potential sources of injury, it shall be the responsibility of each individual to exercise proper care and caution during all phases of the work.

4.0 TRAINING

4.1 Site Workers

All personnel performing RA activities at the Site (such as, but not limited to, equipment operators, general laborers, and drillers) and who may be exposed to hazardous substances, health hazards, or safety hazards and their supervisors/managers responsible for the Site shall receive training in accordance with 29 CFR 1910.120(e) before they are permitted to engage in operations in the exclusion zone or contaminant reduction zone. This training includes an initial 40-hour Hazardous Waste Site Worker Protection Course, an 8-hour Annual Refresher Course subsequent to the initial 40-hour training, and 3 days of actual field experience under the direct supervision of a trained, experienced supervisor. Additional site-specific training shall also be provided by the SSHO prior to the start of field activities. A description of topics to be covered by this training is provided below.

4.1.1 Initial and Refresher Training

Initial and refresher training is conducted by a qualified instructor as specified under OSHA 29 CFR 1910.120(e)(5), and is specifically designed to meet the requirements of OSHA 29 CFR 1910.120(e)(3) and 1910.120(e)(8). The training covers, as a minimum, the following topics:

- OSHA HAZWOPER regulations.
- Site safety and hazard recognition, including chemical and physical hazards.
- Medical monitoring requirements.
- Air monitoring, permissible exposure limits, and respiratory protection level classifications.
- Appropriate use of personal protective equipment (PPE), including chemical compatibility and respiratory equipment selection and use.
- Work practices to minimize risk.
- Work zones and Site control.
- Safe use of engineering controls and equipment.
- Decontamination procedures.

- Emergency response and escape.
- Confined space entry procedures.
- Heat and cold stress monitoring.
- Elements of a Health and Safety Plan.
- Spill containment.

Initial training also incorporates workshops for PPE and respiratory equipment use (Levels A, B and C), and respirator fit testing. Records and certification received from the course instructor documenting each employee's successful completion of the training identified above are maintained on file at TurnKey-Benchmark's Buffalo, NY office. Contractors and Subcontractors are required to provide similar documentation of training for all their personnel who will be involved in on-site work activities.

Any employee who has not been certified as having received health and safety training in conformance with 29 CFR 1910.120(e) is prohibited from working in the exclusion and contamination reduction zones, or to engage in any on-site work activities that may involve exposure to hazardous substances or wastes.

4.1.2 Site Training

Site workers are given a copy of the HASP and provided a site-specific briefing prior to the commencement of work to ensure that employees are familiar with the HASP and the information and requirements it contains. The Site briefing shall be provided by the SSHO prior to initiating field activities and shall include:

- Names of personnel and alternates responsible for Site safety and health.
- Safety, health and other hazards present on the Site.
- The site lay-out including work zones and places of refuge.
- The emergency communications system and emergency evacuation procedures.
- Use of PPE.
- Work practices by which the employee can minimize risks from hazards.
- Safe use of engineering controls and equipment on the site.

- Medical surveillance, including recognition of symptoms and signs of over-exposure as described in Chapter 5 of this HASP.
- Decontamination procedures as detailed in Chapter 12 of this HASP.
- The emergency response plan as detailed in Chapter 15 of this HASP.
- Confined space entry procedures, if required, as detailed in Chapter 13 of this HASP.
- The spill containment program as detailed in Chapter 9 of this HASP.
- Site control as detailed in Chapter 11 of this HASP.

Supplemental health and safety briefings will also be conducted by the SSHO on an as-needed basis during the course of the work. Supplemental briefings are provided as necessary to notify employees of any changes to this HASP as a result of information gathered during ongoing Site characterization and analysis. Conditions for which the SSHO may schedule additional briefings include, but are not limited to: a change in Site conditions (e.g., based on monitoring results); changes in the work schedule/plan; newly discovered hazards; and safety incidents occurring during Site work.

4.2 Supervisor Training

On-site safety and health personnel who are directly responsible for or who supervise the safety and health of workers engaged in hazardous waste operations (i.e., SSHO) shall receive, in addition to the appropriate level of worker training described in Section 4.1, above, 8 additional hours of specialized supervisory training, in compliance with 29 CFR 1910.120(e)(4).

4.3 Emergency Response Training

Emergency response training is addressed in Appendix A of this HASP, Emergency Response Plan.

4.4 Site Visitors

Each Contractor's SSHO will provide a site-specific briefing to all Site visitors and other non-TurnKey/Benchmark personnel who enter the Site beyond the Site entry point.

The site-specific briefing will provide information about Site hazards, the Site layout including work zones and places of refuge, the emergency communications system and emergency evacuation procedures, and other pertinent safety and health requirements as appropriate.

Site visitors will not be permitted to enter the exclusion zone or contaminant reduction zones unless they have received the level of training required for Site workers as described in Section 4.1.

5.0 MEDICAL MONITORING

Medical monitoring examinations are provided to TurnKey-Benchmark employees as stipulated under 29 CFR Part 1910.120(f). These exams include initial employment, annual and employment termination physicals for all TurnKey-Benchmark employees involved in hazardous waste site field operations. Post-exposure examinations are also provided for employees who may have been injured, received a health impairment, or developed signs or symptoms of over-exposure to hazardous substances, or were accidentally exposed to substances at concentrations above the permissible exposure limits without necessary personal protective equipment. Such exams are performed as soon as possible following development of symptoms or the known exposure event.

Medical evaluations are performed by Health Works WNY, an occupational health care provider under contract with TurnKey-Benchmark. Health Works WNY's local facility is located at 1900 Ridge Road, West Seneca, New York 14224. The facility can be reached at (716) 823-5050 to schedule routine appointments or post-exposure examinations.

Medical evaluations are conducted according to the TurnKey-Benchmark Medical Monitoring Program and include an evaluation of the workers' ability to use respiratory protective equipment. The examinations include:

- Occupational/medical history review.
- Physical exam, including vital sign measurement.
- Spirometry testing.
- Eyesight testing.
- Audio testing (minimum baseline and exit, annual for employees routinely exposed to greater than 85db).
- EKG (for employees >40 yrs age or as medical conditions dictate).
- Chest X-ray (baseline and exit, and every 5 years).
- Blood biochemistry (including blood count, white cell differential count, serum multiplastic screening).
- Medical certification of physical requirements (i.e., sight, musculoskeletal, cardiovascular) for safe job performance and to wear respiratory protection equipment.

The purpose of the medical evaluation is to determine an employee's fitness for duty on hazardous waste sites; and to establish baseline medical data.

In conformance with OSHA regulations, TurnKey-Benchmark will maintain and preserve medical records for a period of 30 years following termination of employment. Employees are provided a copy of the physician's post-exam report, and have access to their medical records and analyses.

6.0 SAFE WORK PRACTICES

All TurnKey-Benchmark employees shall conform to the following safe work practices during all on-site work activities conducted within the exclusion and contamination reduction zones:

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth contact is strictly prohibited.
- The hands and face must be thoroughly washed upon leaving the work area and prior to engaging in any activity indicated above.
- Respiratory protective equipment and clothing must be worn by all personnel entering the Site as required by the HASP or as modified by the Site safety officer. Excessive facial hair (i.e., beards, long mustaches or sideburns) that interferes with the satisfactory respirator-to-face seal is prohibited.
- Contact with surfaces/materials either suspected or known to be contaminated will be avoided to minimize the potential for transfer to personnel, cross contamination and need for decontamination.
- Medicine and alcohol can synergize the effects of exposure to toxic chemicals. Due to possible contraindications, use of prescribed drugs should be reviewed with the TurnKey-Benchmark occupational physician. Alcoholic beverage and illegal drug intake are strictly forbidden during the workday.
- All personnel shall be familiar with standard operating safety procedures and additional instructions contained in this Health and Safety Plan.
- On-site personnel shall use the "buddy" system. No one may work alone (i.e., out of earshot or visual contact with other workers) in the exclusion zone.
- Personnel and equipment in the contaminated area shall be minimized, consistent with effective Site operations.
- All employees have the obligation to immediately report and if possible, correct unsafe work conditions.
- Use of contact lenses on-site will not be permitted. Spectacle kits for insertion into full-face respirators will be provided for TurnKey-Benchmark employees, as requested and required.

The recommended specific safety practices for working around the contractor's equipment (e.g., backhoes, bulldozers, excavators, drill rigs etc.) are as follows:

- Although the Contractor and subcontractors are responsible for their equipment and safe operation of the Site, TurnKey-Benchmark personnel are also responsible for their own safety.
- Subsurface work will not be initiated without first clearing underground utility services.
- Heavy equipment should not be operated within 20 feet of overhead wires. This distance may be increased if windy conditions are anticipated or if lines carry high voltage. The Site should also be sufficiently clear to ensure the project staff can move around the heavy machinery safely.
- Care should be taken to avoid overhead wires when moving heavy-equipment from location to location.
- Hard hats, safety boots and safety glasses should be worn at all times in the vicinity of heavy equipment. Hearing protection is also recommended.
- The work Site should be kept neat. This will prevent personnel from tripping and will allow for fast emergency exit from the Site.
- Proper lighting must be provided when working at night.
- Construction activities should be discontinued during an electrical storm or severe weather conditions.
- The presence of combustible gases should be checked before igniting any open flame.
- Personnel shall stand upwind of any construction operation when not immediately involved in sampling/logging/observing activities.
- Personnel will not approach the edge of an unsecured trench/excavation closer than 2 feet.

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 Equipment Selection

Personal protective equipment (PPE) will be donned when work activities may result in exposure to physical or chemical hazards beyond acceptable limits, and when such exposure can be mitigated through appropriate PPE. The selection of PPE will be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the Site, the task-specific conditions and duration, and the hazards and potential hazards identified at the Site.

Equipment designed to protect the body against contact with known or suspect chemical hazards are grouped into four categories according to the degree of protection afforded. These categories designated A through D, consistent with United States Environmental Protection Agency (USEPA) Level of Protection designation, are:

- **Level A:** Should be selected when the highest level of respiratory, skin and eye protection is needed.
- **Level B:** Should be selected when the highest level of respiratory protection is needed, but a lesser level of skin protection is required. Level B protection is the minimum level recommended on initial Site entries until the hazards have been further defined by on-site studies. Level B (or Level A) is also necessary for oxygen-deficient atmospheres.
- **Level C:** Should be selected when the types of airborne substances are known, the concentrations have been measured and the criteria for using air-purifying respirators are met. In atmospheres where no airborne contaminants are present, Level C provides dermal protection only.
- **Level D:** Should not be worn on any Site with elevated respiratory or skin hazards. This is generally a work uniform providing minimal protection.

OSHA requires the use of certain PPE under conditions where an immediate danger to life and health (IDLH) may be present. Specifically, OSHA 29 CFR 1910.120(g)(3)(iii) requires use of a positive pressure self-contained breathing apparatus, or positive pressure air-line respirator equipped with an escape air supply when chemical exposure levels present a substantial possibility of immediate serious injury, illness or death, or impair the ability to escape. Similarly, OSHA 29 CFR 1910.120(g)(3)(iv) requires donning totally-encapsulating

chemical protective suits (with a protection level equivalent to Level A protection) in conditions where skin absorption of a hazardous substance may result in a substantial possibility of immediate serious illness, injury or death, or impair the ability to escape.

In situations where the types of chemicals, concentrations, and possibilities of contact are unknown, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be further characterized. The individual components of clothing and equipment must be assembled into a full protective ensemble to protect the worker from site-specific hazards, while at the same time minimizing hazards and drawbacks of the personal protective gear itself. Ensemble components are detailed below for levels A/B, C, and D protection.

7.2 Protection Ensembles

7.2.1 Level A/B Protection Ensemble

Level A/B ensembles include similar respiratory protection, however Level A provides a higher degree of dermal protection than Level B. Use of Level A over Level B is determined by: comparing the concentrations of identified substances in the air with skin toxicity data, and assessing the effect of the substance (by its measured air concentrations or splash potential) on the small area of the head and neck unprotected by Level B clothing.

The recommended PPE for level A/B is:

- Pressure-demand, full-face piece self-contained breathing apparatus (MSHA/-NIOSH approved) or pressure-demand supplied-air respirator with escape self-contained breathing apparatus (SCBA).
- Chemical-resistant clothing. For Level A, clothing consists of totally-encapsulating chemical resistant suit. Level B incorporates hooded one-or two-piece chemical splash suit.
- Inner and outer chemical resistant gloves.
- Chemical-resistant safety boots/shoes.
- Hardhat.

7.2.2 Level C Protection Ensemble

Level C protection is distinguished from Level B by the equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main selection criterion for Level C is that conditions permit wearing an air-purifying device. The device (when required) must be an air-purifying respirator (MSHA/NIOSH approved) equipped with filter cartridges. Cartridges must be able to remove the substances encountered. Respiratory protection will be used only with proper fitting, training and the approval of a qualified individual. In addition, an air-purifying respirator can be used only if: oxygen content of the atmosphere is at least 19.5% in volume; substances are identified and concentrations measured; substances have adequate warning properties; the individual passes a qualitative fit-test for the mask; and an appropriate cartridge/canister is used, and its service limit concentration is not exceeded.

Recommended PPE for Level C conditions includes:

- Full-face piece, air-purifying respirator equipped with MSHA and NIOSH approved organic vapor/acid gas/dust/mist combination cartridges or as designated by the SSHO.
- Chemical-resistant clothing (hooded, one or two-piece chemical splash suit or disposable chemical-resistant one-piece suit).
- Inner and outer chemical-resistant gloves.
- Chemical-resistant safety boots/shoes.
- Hardhat.

An air-monitoring program is part of all response operations when atmospheric contamination is known or suspected. It is particularly important that the air be monitored thoroughly when personnel are wearing air-purifying respirators. Continual surveillance using direct-reading instruments is needed to detect any changes in air quality necessitating a higher level of respiratory protection.

7.2.3 Level D Protection Ensemble

As indicated above, Level D protection is primarily a work uniform. It can be worn in areas where only boots can be contaminated, where there are no inhalable toxic substances and where the atmospheric contains at least 19.5% oxygen.

Recommended PPE for Level D includes:

- Coveralls.
- Safety boots/shoes.
- Safety glasses or chemical splash goggles.
- Hardhat.
- Optional gloves; escape mask; face shield.

7.2.4 Recommended Level of Protection for Site Tasks

Based upon current information regarding both the contaminants suspected to be present at the Site and the various tasks that are included in the remedial activities, the minimum required levels of protection for these tasks shall be as identified in Table 3.

8.0 EXPOSURE MONITORING

8.1 General

Based on the results of historic sample analysis, the RI, and the nature of the proposed work activities at the Site, the possibility exists for organic vapors and/or particulates may be released to the air during intrusive construction activities. Ambient breathing zone concentrations may at times, exceed the permissible exposure limits (PELs) established by OSHA for the individual compounds (see Table 1), in which case respiratory protection will be required. Respiratory and dermal protection may be modified (upgraded or downgraded) by the SSHO based upon real-time field monitoring data.

8.1.1 On-Site Work Zone Monitoring

TurnKey-Benchmark personnel will conduct routine, real-time air monitoring during all intrusive construction phases such as excavation, backfilling, drilling, etc. The work area will be monitored at regular intervals using a photo-ionization detector (PID), combustible gas meter and a particulate meter. Observed values will be recorded and maintained as part of the permanent field record.

Additional air monitoring measurements may be made by TurnKey-Benchmark personnel to verify field conditions during subcontractor oversight activities. Monitoring instruments will be protected from surface contamination during use. Additional monitoring instruments may be added if the situations or conditions change. Monitoring instruments will be calibrated in accordance with manufacturer's instructions before use.

8.1.2 Off-Site Community Air Monitoring

In addition to on-site monitoring within the work zone(s), monitoring at the down-wind portion of the Site perimeter will be conducted. This will provide a real-time method for determination of vapor and/or particulate releases to the surrounding community as a result of ground intrusive investigation work.

Ground intrusive activities are defined by NYSDOH Appendix 1A Generic Community Air Monitoring Plan. Ground intrusive activities include soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring

wells. Non-intrusive activities include the collection of soil and sediment samples or the collection of groundwater samples from existing wells. Continuous monitoring is required for ground intrusive activities and periodic monitoring is required for non-intrusive activities. Periodic monitoring consists of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring while bailing a well, and taking a reading prior to leaving a sampling location. This may be upgraded to continuous if the sampling location is in close proximity to individuals not involved in the Site activity (i.e., on a curb of a busy street). The action levels below will be used during periodic monitoring.

8.2 Monitoring Action Levels

8.2.1 On-Site Work Zone Action Levels

The PID, or other appropriate instrument(s), will be used by TurnKey-Benchmark personnel to monitor organic vapor concentrations as specified in this HASP. Combustible gas will be monitored with the "combustible gas" option on the combustible gas meter or other appropriate instrument(s). In addition, fugitive dust/particulate concentrations will be monitored during major soil intrusion (viz., well/boring installation) using a real-time particulate monitor as specified in this plan. In the absence of such monitoring, appropriate respiratory protection for particulates shall be donned. Sustained readings obtained in the breathing zone may be interpreted (with regard to other Site conditions) as follows for TurnKey-Benchmark personnel:

- Total atmospheric concentrations of unidentified vapors or gases ranging from 0 to 1 ppm above background on the PID) - Continue operations under Level D (see Appendix A).
- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings from >1 ppm to 5 ppm above background on the PID (vapors not suspected of containing high levels of chemicals toxic to the skin) - Continue operations under Level C (see Appendix A).
- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings of >5 ppm to 50 ppm above background on the PID - Continue operations under Level B (see Attachment 1), re-evaluate and alter (if possible) construction methods to achieve lower vapor concentrations.

- Total atmospheric concentrations of unidentified vapors or gases above 50 ppm on the PID - Discontinue operations and exit the work zone immediately.

If deemed necessary, the explosimeter will be used to monitor levels of both combustible gases and oxygen during RA activities. Action levels based on the instrument readings shall be as follows:

- Less than 10% LEL - Continue engineering operations with caution.
- 10-25% LEL - Continuous monitoring with extreme caution, determine source/cause of elevated reading.
- Greater than 25% LEL - Explosion hazard, evaluate source and leave the Work Zone.
- 19.5% - 21% oxygen - proceed with extreme caution; attempt to determine potential source of oxygen displacement.
- Less than 19.5% oxygen - leave work zone immediately.
- 21-25% oxygen - Continue engineering operations with caution.
- Greater than 25% oxygen - Fire hazard potential, leave Work Zone immediately.

The particulate monitor will be used to monitor respirable dust concentrations during all intrusive activities and during handling of Site soil/fill. Action levels based on the instrument readings shall be as follows:

- Less than 50 mg/m^3 - Continue field operations.
- 50-150 mg/m^3 - Don dust/particulate mask or equivalent
- Greater than 150 mg/m^3 - Don dust/particulate mask or equivalent. Initiate engineering controls to reduce respirable dust concentration (viz., wetting of excavated soils or tools at discretion of Site Health and Safety Officer).

Readings with the organic vapor analyzer, combustible gas meter, and particulate monitor will be recorded and documented on the appropriate Project Field Forms. All

instruments will be calibrated before use on a daily basis and the procedure will be documented on the appropriate Project Field Forms.

8.2.2 Community Air Monitoring Action Levels

In addition to the action levels prescribed in Section 8.2.1 for TurnKey-Benchmark personnel on-site, the following criteria shall also be adhered to for the protection of downwind receptors consistent with NYSDOH requirements (Appendix C):

- **ORGANIC VAPOR PERIMETER MONITORING:**
  - If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring 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 of 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.
  - All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

- **Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures**
  - When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and

particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure (s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.
- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m3 or less at the monitoring point.
- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored Response levels and actions should be pre-determined, as necessary, for each site.

Additionally, if following the cessation of work and efforts to abate the emission source are unsuccessful, and if sustained organic vapor levels exceed 25 ppm above background within the 20-foot zone for more than 30 minutes, then the **Major Vapor Emission Response Plan** (see below) will automatically be placed into effect.

o **MAJOR VAPOR EMISSION RESPONSE PLAN:**

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts as listed in this Health and Safety Plan and the Emergency Response Plan (Appendix A) will be advised.
2. The local police authorities will immediately be contacted by the Site Health and Safety Officer and advised of the situation.
3. The Site Safety and Health Officer will determine if site workers can safely undertake source abatement measures. Abatement measures may include covering the source area with clean fill or plastic sheeting,

or consolidating contaminated materials to minimize surface area. The Site Safety and Health Officer will adjust worker personal protective equipment as necessary to protect workers from over-exposure to organic vapors.

The following personnel are to be notified in the listed sequence in the event that a Major Vapor Emission Plan is activated:

Responsible Person	Contact	Phone Number
SSHO	Police	911
SSHO	State Emergency Response Hotline	(800) 457-7362

Additional emergency numbers are listed in the Emergency Response Plan included as Appendix A.

- **EXPLOSIVE VAPORS:**
  - Sustained atmospheric concentrations of greater than 10% LEL in the work area - Initiate combustible gas monitoring at the downwind portion of the Site perimeter.
  - Sustained atmospheric concentrations of greater than 10% LEL at the downwind Site perimeter – Halt work and contact local Fire Department.

- **AIRBORNE PARTICULATE COMMUNITY AIR MONITORING**
  - Respirable (PM-10) particulate monitoring will be performed on a continuous basis at the upwind and downwind perimeter of the exclusion zone. The monitoring will be performed using real-time monitoring equipment capable of measuring less than PM-10 and integrating over a period of 15-minutes for comparison to the airborne particulate action levels. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities. All readings will be recorded and will be available for NYSDEC and NYSDOH review. Readings will be interpreted as follows:

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (ug/m^3) greater than the background (upwind perimeter) reading 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 provided that the downwind PM-10 particulate levels do not exceed 150 ug/m^3 above the upwind level and that visible dust is not migrating from the work area.
- If, after implementation of dust suppression techniques downwind PM-10 levels are greater than 150 ug/m^3 above the upwind level, work activities must be stopped and dust suppression controls re-evaluated. Work can resume provided that supplemental dust suppression measures and/or other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 ug/m^3 of the upwind level and in preventing visible dust migration.

Pertinent emergency response information including the telephone number of the Fire Department is included in the Emergency Response Plan (Appendix A).

9.0 SPILL RELEASE/RESPONSE

This chapter of the HASP describes the potential for and procedures related to spills or releases of known or suspected petroleum and/or hazardous substances on the Site. The purpose of this Section of the HASP is to plan appropriate response, control, counter-measures and reporting, consistent with OSHA requirements in 29 CFR 1910.120(b)(4)(ii)(J) and (j)(1)(viii). The spill containment program addresses the following elements:

- Potential hazardous material spills and available controls.
- Initial notification and evaluation.
- Spill response.
- Post-spill evaluation.

9.1 Potential Spills and Available Controls

An evaluation was conducted to determine the potential for hazardous material and oil/petroleum spills at this Site. For the purpose of this evaluation, hazardous materials posing a significant spill potential are considered to be:

- CERCLA Hazardous Substances as identified in 40 CFR Part 302, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).
- Extremely Hazardous Substances as identified in 40 CFR Part 355, Appendix A, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).
- Hazardous Chemicals as defined under Section 311(e) of the Emergency Planning and Community Right-To-Know Act of 1986, where such chemicals are present or will be stored in excess of 10,000 lbs.
- Toxic Chemicals as defined in 40 CFR Part 372, where such chemicals are present or will be stored in excess of 10,000 lbs.
- Chemicals regulated under 6NYCRR Part 597, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).

Oil/petroleum products are considered to pose a significant spill potential whenever

the following situations occur:

- The potential for a "harmful quantity" of oil (including petroleum and non-petroleum-based fuels and lubricants) to reach navigable waters of the U.S. exists (40 CFR Part 112.4). Harmful quantities are considered by USEPA to be volumes that could form a visible sheen on the water or violate applicable water quality standards.
- The potential for any amount of petroleum to reach any waters of NY State, including groundwater, exists. Petroleum, as defined by NY State in 6NYCRR Part 612, is a petroleum-based heat source, energy source, or engine lubricant/maintenance fluid.
- The potential for any release, to soil or water, of petroleum from a bulk storage facility regulated under 6NYCRR Part 612. A regulated petroleum storage facility is defined by NY State as a site having stationary tank(s) and intra-facility piping, fixtures and related equipment with an aggregate storage volume of 1,100 gallons or greater.

The evaluation indicates that, based on Site history and decommissioning records, a hazardous material spill is not likely to occur during RA efforts. Case will be taken during the removal of the hydraulic lifts to prevent a petroleum product spill.

9.2 Initial Spill Notification and Evaluation

Any worker who discovers a hazardous substance or oil/petroleum spill will immediately notify the Project Manager and SSHO. The worker will, to the best of his/her ability, report the material involved, the location of the spill, the estimated quantity of material spilled, the direction/flow of the spill material, related fire/explosion incidents, if any, and any associated injuries. The Emergency Response Plan presented in Appendix A of this HASP will immediately be implemented if an emergency release has occurred.

Following initial report of a spill, the Project Manager will make an evaluation as to whether the release exceeds RQ levels. If an RQ level is exceeded, the Project Manager will notify the Site owner and NYSDEC at 1-800-457-7362 within 2 hours of spill discovery. The Project Manager will also determine what additional agencies (e.g., USEPA) are to be contacted regarding the release, and will follow-up with written reports as required by the applicable regulations.

9.3 Spill Response

For all spill situations, the following general response guidelines will apply:

- Only those personnel involved in overseeing or performing containment operations will be allowed within the spill area. If necessary, the area will be roped, ribboned, or otherwise blocked off to prevent unauthorized access.
- Appropriate PPE, as specified by the SSHO, will be donned before entering the spill area.
- Ignition points will be extinguished/removed if fire or explosion hazards exist.
- Surrounding reactive materials will be removed.
- Drains or drainage in the spill area will be blocked to prevent inflow of spilled materials or applied materials.

For minor spills, the Contractor will maintain a Spill Control and Containment Kit in the Field Office or other readily accessible storage location. The kit will consist of, at a minimum, a 50 lb. bag of "speedy dry" granular absorbent material, absorbent pads, shovels, empty 5-gallon pails and an empty open-top 55-gallon drum. Spilled materials will be absorbed, and shoveled into a 55-gallon drum for proper disposal (NYSDEC approval will be secured for on-site treatment of the impacted soils/absorbent materials, if applicable). Impacted soils will be hand-excavated to the point that no visible signs of contamination remains, and will be drummed with the absorbent.

In the event of a major release or a release that threatens surface water, a spill response contractor will be called to the Site. The response contractor may use heavy equipment (e.g., excavator, backhoe, etc.) to berm the soils surrounding the spill Site or create diversion trenching to mitigate overland migration or release to navigable waters. Where feasible, pumps will be used to transfer free liquid to storage containers. Spill control/cleanup contractors in the Western New York area that may be contacted for assistance include:

- The Environmental Service Group of NY, Inc.: (716) 695-6720
- Environmental Products and Services, Inc.: (716) 447-4700
- Op-Tech: (716) 873-7680

9.4 Post-Spill Evaluation

If a reportable quantity of hazardous material or oil/petroleum is spilled as determined by the Project Manager, a written report will be prepared as indicated in Section 9.2. The report will identify the root cause of the spill, type and amount of material released, date/time of release, response actions, agencies notified and/or involved in cleanup, and procedures to be implemented to avoid repeat incidents. In addition, all re-useable spill cleanup and containment materials will be decontaminated, and spill kit supplies/disposable items will be replenished.

10.0 HEAT/COLD STRESS MONITORING

Since some of the work activities at the Site will be scheduled for both the summer and winter months, measures will be taken to minimize heat/cold stress to TurnKey-Benchmark employees. The Site Safety and Health Officer and/or his or her designee will be responsible for monitoring TurnKey-Benchmark field personnel for symptoms of heat/cold stress.

10.1 Heat Stress Monitoring

Personal protective equipment may place an employee at risk of developing heat stress, a common and potentially serious illnesses often encountered at construction, landfill, waste disposal, industrial or other unsheltered sites. The potential for heat stress is dependent on a number of factors, including environmental conditions, clothing, workload, physical conditioning and age. Personal protective equipment may severely reduce the body's normal ability to maintain temperature equilibrium (via evaporation and convection), and require increased energy expenditure due to its bulk and weight.

Proper training and preventive measures will mitigate the potential for serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress, the following steps should be taken:

- Adjust work schedules.
- Modify work/rest schedules according to monitoring requirements.
- Mandate work slowdowns as needed.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat (i.e., eight fluid ounces must be ingested for approximately every 1 lb of weight lost). The normal thirst mechanism is not sensitive enough to ensure that enough water will be consumed to replace lost perspiration. When heavy sweating occurs, workers should be

encouraged to drink more.

- Train workers to recognize the symptoms of heat related illness.

Heat-Related Illness - Symptoms:

- Heat rash may result from continuous exposure to heat or humid air.
- Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include: muscle spasms; pain in the hands, feet and abdomen.
- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include: pale, cool, moist skin; heavy sweating; dizziness; nausea; fainting.
- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are: red, hot, usually dry skin; lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

The monitoring of personnel wearing protective clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism.

- Heart rate may be measured by the radial pulse for 30 seconds as early as possible in the resting period. The rate at the beginning of the rest period should not exceed 100 beats per minute. If the rate is higher, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest periods stay the same, If the pulse rate is 100 beats per minute at the beginning of the nest rest period, the following work cycle should be further shortened by 33%.
- Body temperature may be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature at the beginning of the rest period should not exceed 99.6 degrees Fahrenheit. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period remains the same. However, if the oral temperature exceeds 99.6 degrees Fahrenheit at the beginning of the next period, the work cycle may be further

shortened by 33%. Oral temperature should be measured at the end of the rest period to make sure that it has dropped below 99.6 degrees Fahrenheit. No TurnKey-Benchmark employee will be permitted to continue wearing semi-permeable or impermeable garments when his/her oral temperature exceeds 100.6 degrees Fahrenheit.

10.2 Cold Stress Monitoring

Exposure to cold conditions may result in frostbite or hypothermia, each of which progresses in stages as shown below.

- **Frostbite** occurs when body tissue (usually on the extremities) begins to freeze. The three states of frostbite are:
  1) **Frost nip** - This is the first stage of the freezing process. It is characterized by a whitened area of skin, along with a slight burning or painful sensation. Treatment consists of removing the victim from the cold conditions, removal of boots and gloves, soaking the injured part in warm water (102 to 108 degrees Fahrenheit) and drinking a warm beverage. Do not rub skin to generate friction/ heat.
  2) **Superficial Frostbite** - This is the second stage of the freezing process. It is characterized by a whitish gray area of tissue, which will be firm to the touch but will yield little pain. The treatment is identical for Frost nip.
  3) **Deep Frostbite** - In this final stage of the freezing process the affected tissue will be cold, numb and hard and will yield little to no pain. Treatment is identical to that for Frost nip.

- **Hypothermia** is a serious cold stress condition occurring when the body loses heat at a rate faster than it is produced. If untreated, hypothermia may be fatal. The stages of hypothermia may not be clearly defined or visible at first, but generally include:
  1) Shivering
  2) Apathy (i.e., a change to an indifferent or uncaring mood)
  3) Unconsciousness
  4) Bodily freezing

Employees exhibiting signs of hypothermia should be treated by medical professionals. Steps that can be taken while awaiting help include:

1) Remove the victim from the cold environment and remove wet or frozen clothing. (Do this carefully as frostbite may have started.)
2) Perform active re-warming with hot liquids for drinking (Note: do not give the victim any liquid containing alcohol or caffeine) and a warm water bath (102 to 108 degrees Fahrenheit).
3) Perform passive re-warming with a blanket or jacket wrapped around the victim.

In any potential cold stress situation, it is the responsibility of the Site Health and Safety Officer to encourage the following:

- Education of workers to recognize the symptoms of frostbite and hypothermia.
- Workers should dress warmly, with more layers of thin clothing as opposed to one thick layer.
- Personnel should remain active and keep moving.
- Personnel should be allowed to take shelter in heated areas, as necessary.
- Personnel should drink warm liquids (no caffeine or alcohol if hypothermia has set in).
- For monitoring the body's recuperation from excess cold, oral temperature recordings should occur:
  - At the Site Safety Technicians discretion when suspicion is based on changes in a worker's performance or mental status.
  - At a workers request.
  - As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind chill less than 20 degrees Fahrenheit or wind chill less than 30 degrees Fahrenheit with precipitation).
  - As a screening measure, whenever anyone worker on-site develops hypothermia.

Any person developing moderate hypothermia (a core body temperature of 92 degrees Fahrenheit) will not be allowed to return to work for 48 hours without the recommendation of a qualified medical doctor.

11.0 WORK ZONES AND SITE CONTROL

Work zones around the areas designated for construction activities will be established on a daily basis and communicated to all employees and other Site users by the SSHO. It shall be each Contractor's Site Safety and Health Officer's responsibility to ensure that all Site workers are aware of the work zone boundaries and to enforce proper procedures in each area. The zones will include:

- Exclusion Zone ("Hot Zone") - The area where contaminated materials may be exposed, excavated or handled and all areas where contaminated equipment or personnel may travel. The zone will be delineated by flagging tape. All personnel entering the Exclusion Zone must wear the prescribed level of personal protective equipment identified in Section 7.
- Contamination Reduction Zone - The zone where decontamination of personnel and equipment takes place. Any potentially contaminated clothing, equipment and samples must remain in the Contamination Reduction Zone until decontaminated.
- Support Zone - The part of the site that is considered non-contaminated or "clean." Support equipment will be located in this zone, and personnel may wear normal work clothes within this zone.

In the absence of other task-specific work zone boundaries established by the SSHO, the following boundaries will apply to all investigation and construction activities involving disruption or handling of Site soils or groundwater:

- Exclusion Zone: 50 foot radius from the outer limit of the sampling/construction activity.
- Contaminant Reduction Zone: 100 foot radius from the outer limit of the sampling/construction activity.
- Support Zone: Areas outside the Contaminant Reduction Zone.

Access of non-essential personnel to the Exclusion and Contamination Reduction Zones will be strictly controlled by the SSHO. Only personnel who are essential to the completion of the task will be allowed access to these areas and only if they are wearing the prescribed level of protection. Entrance of all personnel must be approved by the SSHO.

The SSHO will maintain a Health and Safety Logbook containing the names of TurnKey-Benchmark workers and their level of protection. The zone boundaries may be changed by the SSHO as environmental conditions warrant, and to respond to the necessary changes in work locations on-site.

12.0 DECONTAMINATION

12.1 Decontamination for TurnKey-Benchmark Employees

The degree of decontamination required is a function of a particular task and the environment within which it occurs. The following decontamination procedure will remain flexible, thereby allowing the decontamination crew to respond appropriately to the changing environmental conditions that may arise at the Site. All TurnKey-Benchmark personnel on-site shall follow the procedure below, or the Contractor's procedure (if applicable), whichever is more stringent.

Station 1 - Equipment Drop: Deposit visibly contaminated (if any) re-useable equipment used in the contamination reduction and exclusion zones (tools, containers, monitoring instruments, radios, clipboards, etc.) on plastic sheeting.

Station 2 - Boots and Gloves Wash and Rinse: Scrub outer boots and outer gloves. Deposit tape and gloves in waste disposal container.

Station 3 - Tape, Outer Boot and Glove Removal: Remove tape, outer boots and gloves. Deposit tape and gloves in waste disposal container.

Station 4 - Canister or Mask Change: If worker leaves exclusive zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot cover donned, and worker returns to duty.

Station 5 - Outer Garment/Face Piece Removal: Protective suit removed and deposited in separate container provided by Contractor. Face piece or goggles are removed if used. Avoid touching face with fingers. Face piece and/or goggles deposited on plastic sheet. Hard hat removed and placed on plastic sheet.

Station 6 - Inner Glove Removal: Inner gloves are the last personal protective equipment to be removed. Avoid touching the outside of the gloves with bare fingers. Dispose of these gloves in waste disposal container.

Following PPE removal, personnel shall wash hands, face and forearms with absorbent wipes. If field activities proceed for a duration of 6 consecutive months or longer, shower facilities will be provided for worker use in accordance with OSHA 29 CFR 1910.120(n).

12.2 Decontamination for Medical Emergencies

In the event of a minor, non-life threatening injury, personnel should follow the decontamination procedures as defined, and then administer first-aid.

In the event of a major injury or other serious medical concern (e.g., heat stroke), immediate first-aid is to be administered and the victim transported to the hospital in lieu of further decontamination efforts unless exposure to a Site contaminant would be considered "Immediately Dangerous to Life or Health."

12.3 Decontamination of Field Equipment

Decontamination of heavy equipment will be conducted by the Contractor in accordance with his approved Health and Safety Plan in the Contamination Reduction Zone. As a minimum, this will include manually removing heavy soil contamination, followed by steam cleaning on an impermeable pad.

Decontamination of all tools used for sample collection purposes will be conducted by TurnKey-Benchmark personnel. It is expected that all tools will be constructed of nonporous, nonabsorbent materials (i.e., metal), which will aid in the decontamination effort. Any tool or part of a tool made of porous, absorbent material (i.e., wood) will be placed into suitable containers and prepared for disposal.

Decontamination of bailers, split-spoons, spatula knives, and other tools used for environmental sampling and examination shall be as follows:

- Disassemble the equipment
- Water wash to remove all visible foreign matter.
- Wash with detergent.
- Rinse all parts with distilled-deionized water.
- Allow to air dry.
- Wrap all parts in aluminum foil or polyethylene.

13.0 CONFINED SPACE ENTRY

OSHA 29 CFR 1910.146 identifies a confined space as a space that is large enough and so configured that an employee can physically enter and do assigned work, has limited or restricted means for entry and exit, and is not intended for continuous employee occupancy. Confined spaces include, but are not limited to, trenches, storage tanks, process vessels, pits, sewers, tunnels, underground utility vaults, pipelines, sumps, wells, and excavations.

Confined space entry by TurnKey-Benchmark employees is not anticipated to be necessary to complete the RA activities identified in Section 2.0. In the event that the scope of work changes or confined space entry appears necessary, the Project Manager will be consulted to determine if feasible engineering alternatives to confined space entry can be implemented. If confined space entry by TurnKey-Benchmark employees cannot be avoided through reasonable engineering measures, task-specific confined space entry procedures will be developed and a confined-space entry permit will be issued through TurnKey-Benchmark's corporate Health and Safety Director. TurnKey-Benchmark employees shall not enter a confined space without these procedures and permits in place.

14.0 FIRE PREVENTION AND PROTECTION

14.1 General Approach

Recommended practices and standards of the National Fire Protection Association (NFPA) and other applicable regulations will be followed in the development and application of Project Fire Protection Programs. When required by regulatory authorities, the project management will prepare and submit a Fire Protection Plan for the approval of the contracting officers, authorized representative or other designated official. Essential considerations for the Fire Protection Plan will include:

- Proper Site preparation and safe storage of combustible and flammable materials.
- Availability of coordination with private and public fire authorities.
- Adequate job-site fire protection and inspections for fire prevention.
- Adequate indoctrination and training of employees.

14.2 Equipment and Requirements

Fire extinguishers will be provided by each Contractor and are required on all heavy equipment and in each field trailer. Fire extinguishers will be inspected, serviced, and maintained in accordance with the manufacturer's instructions. As a minimum, all extinguishers shall be checked monthly and weighed semi-annually, and recharged if necessary. Recharge or replacement shall be mandatory immediately after each use.

14.3 Flammable and Combustible Substances

All storage, handling or use of flammable and combustible substances will be under the supervision of qualified persons. All tanks, containers and pumping equipment, whether portable or stationary, used for the storage and handling of flammable and combustible liquids, will meet the recommendations of the National Fire Protection Association.

14.4 Hot Work

If the scope of work necessitates welding or blowtorch operation, the hot work permit presented in Appendix B will be completed by the SSHO and reviewed/issued by the Project Manager.

15.0 EMERGENCY INFORMATION

In accordance with OSHA 29 CFR Part 1910, an Emergency Response Plan is attached to this HASP as Appendix A. The hospital route map is presented within Appendix A as Figure 1A.

TABLES

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 1

TOXICITY DATA FOR CONSTITUENTS OF POTENTIAL CONCERN

FORMER TRICO PLANT

BUFFALO, NEW YORK

Parameter	CAS No.	Code	Concentration Limits		
			PEL	REL	IDLH
Volatile Organic Compounds: mg/m^3					
Trichloroethene	79-01-6	Ca	100	25	1000
Tetrachloroethene	127-18-4	Ca	100	*	150
cis-1,2-dichloroethene	156-59-2	*none*	200	200	1000
vinyl chloride	75-01-4	Ca	1	*	ND
Inorganic Compounds: mg/m^3					
Arsenic	7440-38-2	Ca	0.010	0.002 [STEL]	5
Barium	7440-39-3	*none*	0.5	0.5	250
Cadmium	7440-43-9	Ca	0.005	*	9
Chromium	7440-47-3	*none*	0.5	0.5	250
Lead	7439-92-1	*none*	0.050	0.050	100
Mercury	7439-97-6	*none*	0.1	0.05 C-0.1	10
Asbestos	1332-21-4	Ca	0.1	0.1	ND
Polychlorinated Compounds: mg/m^3					
Aroclor 1254	11097-69-1	Ca	0.5	0.5	5
Aroclor 1260	11096-82-5	*none*	--	--	--
Semi-volatile Organic Compounds (SVOCs): mg/m^3					
Benzo(a)anthracene	56-55-3	*none*	--	--	--
Benzo(a)pyrene	50-32-8	*none*	--	--	--
Benzo(b)fluoranthene	205-99-2	*none*	--	--	--
Chrysene	218-01-9	*none*	--	--	--
Dibenzo(a,h)anthracene	53-70-3	*none*	--	--	--
Indeno(1,2,3-cd)pyrene	193-39-5	*none*	--	--	--

Data source: National Institute for Occupational Safety and Health (NIOSH) Pocket Guide to Chemical Hazards
'accessed electronically (www.cdc.gov/niosh/npg).

Ca = NIOSH considers constituent to be a potential occupational carcinogen.

PEL = Permissible Exposure Limit, established by OSHA, equals the maximium exposure conconcentration allowable
'for 8 hours per day @ 40 hours per week (TWA)

REL = Recommended Exposure Limit, established by NIOSH, equals the maximum exposure concentration
'recommended for 8 hours per day @ 40 hours per week (TWA)

IDLH = Immediately Dangerous to Life or Health, established by NIOSH.

ND indicates that an IDLH has not as yet been determined.

STEL = Short Term Exposure Limit for a 15 minute period.

* Lowest feasible concentration recommended.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 2

POTENTIAL ROUTES OF EXPOSURE TO COC

FORMER TRICO PLANT

BUFFALO, NEW YORK

Activity [1]	Direct Contact with Soil/Fill	Inhalation of Vapors or Dust	Direct Contact with Groundwater
Remedial Action Tasks			
Removal of Hydraulic Lifts, Associated Infrastructure and Associated	x	x	
In-Situ Groundwater Treatment		x	x
Groundwater Monitoring		x	x
Active Sub-Slab Depressurization System Installation	x	x	x
Cleaning Accessible Utility and/or Sewers/Structures	x	x	
Building Demolition, Concrete Foundation & Slab Removal/Replacement,and Limited Excavation	x	x	x
Sub-Basement Water Removal, Treatment and Discharge		x	x
Cover System Replacement	x	x	x

Notes:

1. Activity as described in Section 1.5 of the Health and Safety Plan.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 3

REQUIRED LEVELS OF PROTECTION FOR RI ACTIVITIES

FORMER TRICO PLANT

BUFFALO, NEW YORK

Activity	Respiratory Protection [1]	Clothing	Gloves [2]	Boots [2, 3]	Other Required PPE/Modifications [2, 4]
Remedial Investigation Tasks					
Removal of Hydraulic Lifts, Associated Infrastructure and Associated	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS
In-Situ Groundwater Treatment	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS
Groundwater Monitoring	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	SGSS
Active Sub-Slab Depressurization System Installation	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	SGSS
Cleaning Accessible Utility and/or Sewers/Structures	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS
Building Demolition, Concrete Foundation & Slab Removal/Replacement,and Limited Excavation	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS
Sub-Basement Water Removal, Treatment and Discharge	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS
Cover System Replacement	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS

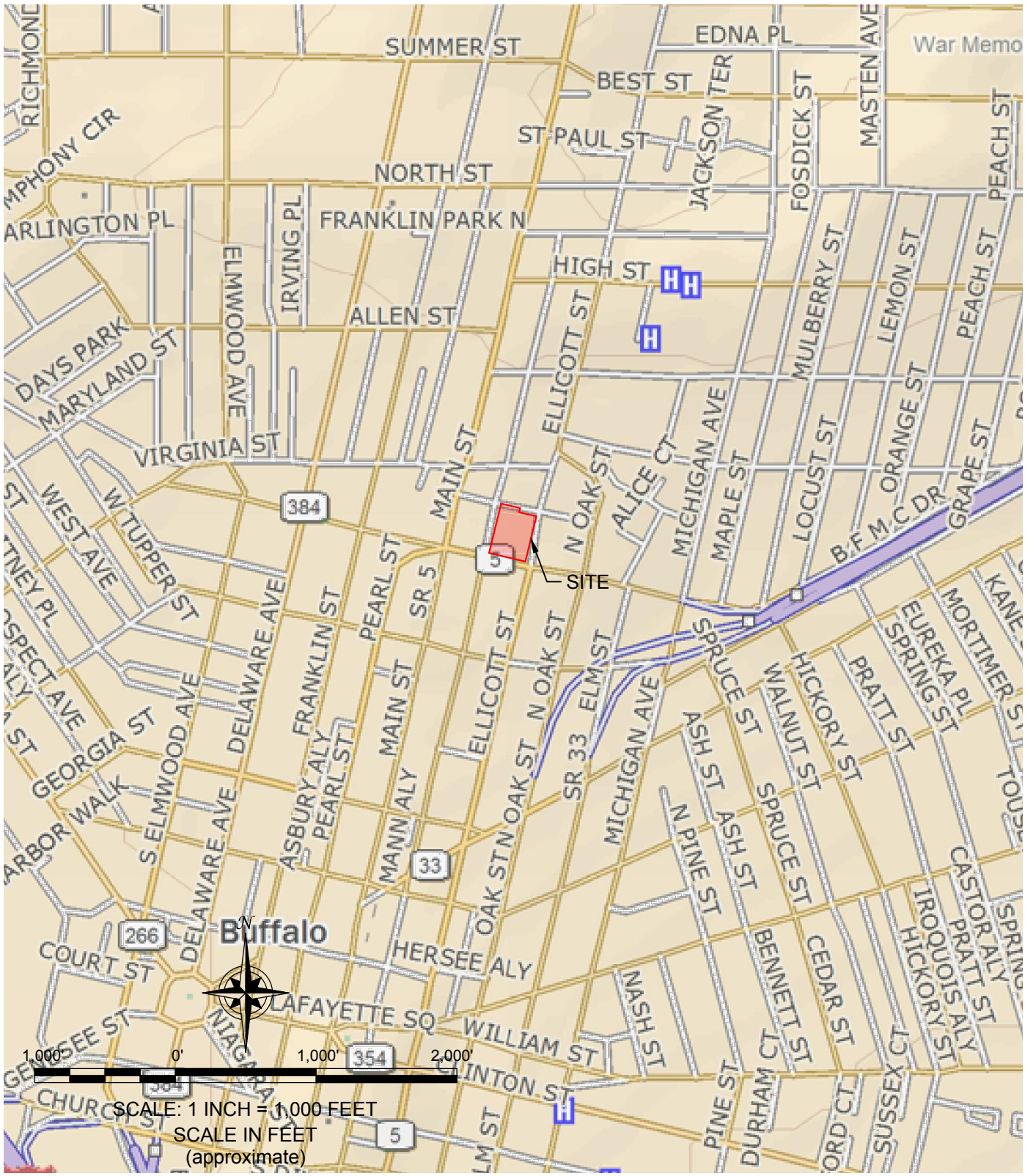
Notes:

1. Respiratory equipment shall conform to guidelines presented in Section 7.0 of this HASP. The Level C requirement is an air-purifying respirator equiped with organic compound/acid gas/dust cartridge.
2. HH = hardhat; L= Latex; L/N = latex inner glove, nitrile outer glove; N = Nitrile; SGSS = safety glasses with sideshields; STSS = steel toe safety shoes.
3. Latex outer boot (or approved overboot) required whenever contact with contaminated materials may occur. SSHO may downgrade to STSS (steel-toed safety shoes) if contact will be limited to cover/replacement soils.
4. Dust masks shall be donned as directed by the SSHO (site safety and health officer) or site safety technician whenever potentially contaminated airborne particulates (i.e., dust) are present in significant amounts in the breathing zone. Goggles may be substituted with safety glasses w/side-shields whenever contact with contaminated liquids is not anticipated.

FIGURES

F:\CAD\TurnKey\Krog\Former Trico Building BCP\RI\Figure 1; Site Location and Vicinity Map.dwg

FIGURE 1



TurnKey Environmental Restoration, LLC

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

PROJECT NO.: 0092-01□-500

DATE: JULY 201□

DRAFTED BY: JGT

SITE LOCATION AND VICINITY MAP

HEALTH AND SAFETY PLAN

FORMER TRICO PLANT

BUFFALO, NEW YORK

PREPARED FOR

□□7 MAIN STREET, LLC

F:\CAD\TurnKey\Krog\Former Trico Building BCP\RI\RI Site Plan Base Map.dwg

DATE: JULY201□
DRAFTED BY: JGT

FIGURE 2

SITE PLAN (AERIAL)

HEALTH AND SAFETY PLAN

FORMER TRICO PLANT

BUFFALO, NEW YORK

PREPARED FOR

□□7 MAIN STREET, LLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

JOB NO.: 0092-01□-500

APPENDIX A

EMERGENCY RESPONSE PLAN

EMERGENCY RESPONSE PLAN
for
BROWNFIELD CLEANUP PROGRAM
RA ACTIVITIES

FORMER TRICO PLANT
BUFFALO, NEW YORK

February 2017 0092-016-001

Prepared for:

791 WASHINGTON STREET, LLC

and

The Krog Group LLC

Prepared By:

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0599

In Association With:

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0635

FORMER TRICO PLANT
HEALTH AND SAFETY PLAN FOR RI ACTIVITIES
APPENDIX A: EMERGENCY RESPONSE PLAN

TABLE OF CONTENTS

LIST OF FIGURES

1.0 GENERAL

This report presents the site-specific Emergency Response Plan (ERP) referenced in the Site Health and Safety Plan (HASP) prepared for Remedial Activities (RA) activities at the Site identified the former Trico plant addressed at 791 Washington Street in Buffalo, New York. This appendix of the HASP describes potential emergencies that may occur at the Site; procedures for responding to those emergencies; roles and responsibilities during emergency response; and training all workers must receive in order to follow emergency procedures. This ERP also describes the provisions this Site has made to coordinate its emergency response planning with other contractors on-site and with off-site emergency response organizations.

This ERP is consistent with the requirements of 29 CFR 1910.120(l) and provides the following site-specific information:

- Pre-emergency planning.
- Personnel roles, lines of authority, and communication.
- Emergency recognition and prevention.
- Safe distances and places of refuge.
- Evacuation routes and procedures.
- Decontamination procedures.
- Emergency medical treatment and first aid.
- Emergency alerting and response procedures.
- Critique of response and follow-up.
- Emergency personal protective equipment (PPE) and equipment.

2.0 PRE-EMERGENCY PLANNING

This Site has been evaluated for potential emergency occurrences, based on site hazards, the required work tasks, the site topography, and prevailing weather conditions. The results of that evaluation indicate the potential for the following site emergencies to occur at the locations indicated.

Type of Emergency:

1. Medical, due to physical injury

Source of Emergency:

1. Slip/trip/fall

Location of Source:

1. Non-specific

3.0 ON-SITE EMERGENCY RESPONSE EQUIPMENT

Emergency procedures may require specialized equipment to facilitate worker rescue, contamination control and reduction, or post-emergency clean up. Emergency response equipment available on the Site is listed below. The equipment inventory and storage locations are based on the potential emergencies described above. This equipment inventory is designed to meet on-site emergency response needs and any specialized equipment needs that off-site responders might require because of the hazards at this Site but not ordinarily stocked.

Any additional personal protective equipment (PPE) required and stocked for emergency response is also listed below. During an emergency, the Emergency Response Coordinator (ERC) is responsible for specifying the level of PPE required for emergency response. At a minimum, PPE used by emergency responders will comply with Section 7.0, Personal Protective Equipment, of this HASP. Emergency response equipment is inspected at regular intervals and maintained in good working order. The equipment inventory is replenished as necessary to maintain response capabilities.

Emergency Equipment	Quantity	Location
First Aid Kit	1	Site Vehicle
Chemical Fire Extinguisher	2 (minimum)	All heavy equipment and Site Vehicle

Emergency PPE	Quantity	Location
Full-face respirator	1 for each worker	Site Vehicle
Chemical-resistant suits	4 (minimum)	Site Vehicle

4.0 EMERGENCY PLANNING MAPS

An area-specific map of the Site will be developed on a daily basis during performance of field activities. The map will be marked to identify critical on-site emergency planning information, including: emergency evacuation routes, a place of refuge, an assembly point, and the locations of key site emergency equipment. Site zone boundaries will be shown to alert responders to known areas of contamination. There are no major topographical features, however the direction of prevailing winds/weather conditions that could affect emergency response planning are also marked on the map. The map will be posted at site-designated place of refuge and inside the TurnKey personnel field vehicle.

5.0 EMERGENCY CONTACTS

The following identifies the emergency contacts for this ERP.

Emergency Telephone Numbers:

Project Manager: ***Christopher Boron***
Work: (716) 856-0599
Mobile: (716) 864-2726

Corporate Health and Safety Director: ***Thomas H. Forbes, P.E.***
Work: (716) 856-0599
Mobile: (716) 864-1730

Site Safety and Health Officer (SSHO): ***Bryan C. Hann***
Work: (716) 856-0635
Mobile: (716) 870-1165

Alternate SSHO: ***Richard L. Dubisz***
Work: (716) 856-0635
Mobile: (716) 998-4334

BUFFALO GENERAL HOSPITAL (ER):	(716) 859-5600
FIRE:	911
AMBULANCE:	911
BUFFALO POLICE:	911
STATE EMERGENCY RESPONSE HOTLINE:	(800) 457-7362
NATIONAL RESPONSE HOTLINE:	(800) 424-8802
NYSDOH:	(518) 402-7860
NYSDEC:	(716) 851-7220
NYSDEC 24-HOUR SPILL HOTLINE:	(800) 457-7252

The Site location is:
791 Washington Street
Buffalo, New York 14203
Site Phone Number: (Insert Cell Phone or Field Trailer): _____

6.0 EMERGENCY ALERTING & EVACUATION

Internal emergency communication systems are used to alert workers to danger, convey safety information, and maintain site control. Any effective system can be employed. Two-way radio headsets or field telephones are often used when work teams are far from the command post. Hand signals and air-horn blasts are also commonly used. Every system must have a backup. It shall be the responsibility of each contractor's Site Health and Safety Officer to ensure an adequate method of internal communication is understood by all personnel entering the site. Unless all personnel are otherwise informed, the following signals shall be used.

1) Emergency signals by portable air horn, siren, or whistle: two short blasts, personal injury; continuous blast, emergency requiring site excavation.

2) Visual signals: hand gripping throat, out of air/cannot breathe; hands on top of head, need assistance; thumbs up, affirmative/ everything is OK; thumbs down, no/negative; grip partner's wrist or waist, leave area immediately.

If evacuation notice is given, site workers leave the worksite with their respective buddies, if possible, by way of the nearest exit. Emergency decontamination procedures detailed in Section 12.0 of the HASP are followed to the extent practical without compromising the safety and health of site personnel. The evacuation routes and assembly area will be determined by conditions at the time of the evacuation based on wind direction, the location of the hazard source, and other factors as determined by rehearsals and inputs from emergency response organizations. Wind direction indicators are located so that workers can determine a safe up wind or cross wind evacuation route and assembly area if not informed by the emergency response coordinator at the time the evacuation alarm sounds. Since work conditions and work zones within the site may be changing on daily basis, it shall be the responsibility of the construction Site Health and Safety Officer to review evacuation routes and procedures as necessary and to inform all TurnKey-Benchmark workers of any changes.

Personnel exiting the site will gather at a designated assembly point. To determine that everyone has successfully exited the site, personnel will be accounted for at the assembly

site. If any worker cannot be accounted for, notification is given to the SSHO (***Bryan Hann*** or ***Richard Dubisz***) so that appropriate action can be initiated. Contractors and subcontractors on this site have coordinated their emergency response plans to ensure that these plans are compatible and that source(s) of potential emergencies are recognized, alarm systems are clearly understood, and evacuation routes are accessible to all personnel relying upon them.

7.0 EXTREME WEATHER CONDITIONS

the Site Safety and Health Officer in conjunction with the Contractor's SSHO will determine if engineering operations can continue without sacrificing the health and safety of site personnel. Items to be considered prior to determining if work should continue include but are not limited to:

- Potential for heat/cold stress.
- Weather-related construction hazards (e.g., flooding or wet conditions producing undermining of structures or sheeting, high wind threats, etc).
- Limited visibility.
- Potential for electrical storms.
- Limited site access/egress (e.g., due to heavy snow)

8.0 EMERGENCY MEDICAL TREATMENT & FIRST AID

Personnel Exposure:

The following general guidelines will be employed in instances where health impacts threaten to occur or acute exposure is realized:

- Skin Contact: Use copious amounts of soap and water. Wash/rinse affected area for at least 15 minutes. Decontaminate and provide medical attention. Eyewash stations will be provided on site. If necessary, transport to Buffalo General Hospital.

- Inhalation: Move to fresh air and, if necessary, transport to Buffalo General Hospital.

- Ingestion: Decontaminate and transport to Buffalo General Hospital.

Personal Injury:

Minor first-aid will be applied on-site as deemed necessary. In the event of a life threatening injury, the individual should be transported to Buffalo General Hospital via ambulance. The Site Health and Safety Officer will supply available chemical specific information to appropriate medical personnel as requested.

First aid kits will conform to Red Cross and other applicable good health standards, and shall consist of a weatherproof container with individually sealed packages for each type of item. First aid kits will be fully equipped before being sent out on each job and will be checked weekly by the SSHO to ensure that the expended items are replaced.

Directions to Buffalo General Hospital (see Figure 1A):

The following directions describe the best route from the Site to Buffalo General Hospital:

- Travel northeast on Washington Street
- Turn right onto High Street. Follow signs to ER at 100 High Street on the left.

9.0 EMERGENCY RESPONSE CRITIQUE & RECORD KEEPING

Following an emergency, the SSHO and Project Manager shall review the effectiveness of this Emergency Response Plan (ERP) in addressing notification, control and evacuation requirements. Updates and modifications to this ERP shall be made accordingly. It shall be the responsibility of each contractor to establish and assure adequate records of the following:

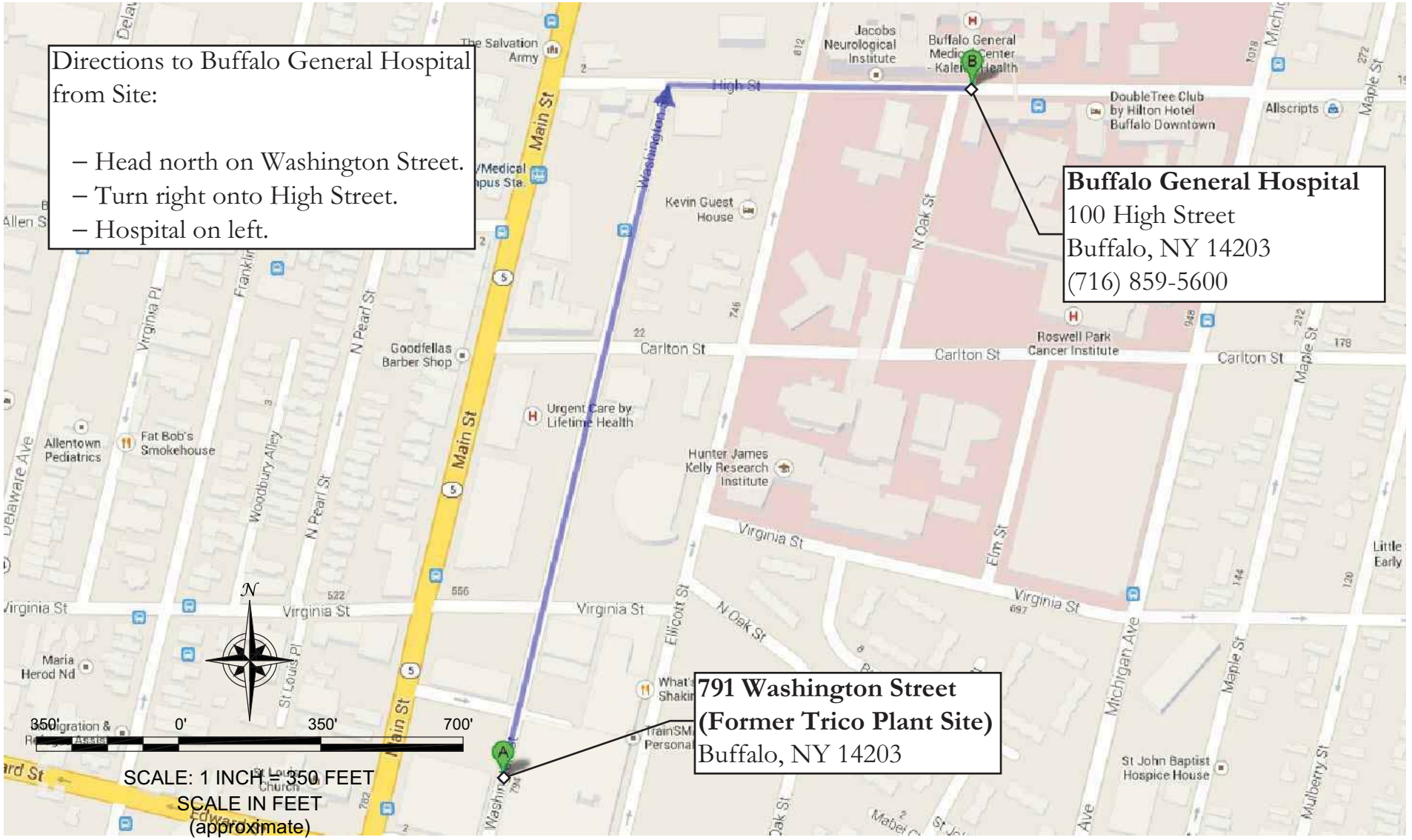
- Occupational injuries and illnesses.
- Accident investigations.
- Reports to insurance carrier or State compensation agencies.
- Reports required by the client.
- Records and reports required by local, state, federal and/or international agencies.
- Property or equipment damage.
- Third party injury or damage claims.
- Environmental testing logs.
- Explosive and hazardous substances inventories and records.
- Records of inspections and citations.
- Safety training.

10.0 EMERGENCY RESPONSE TRAINING

All persons who enter the worksite, including visitors, shall receive a site-specific briefing about anticipated emergency situations and the emergency procedures by the SSHO. Where this site relies on off-site organizations for emergency response, the training of personnel in those off-site organizations has been evaluated and is deemed adequate for response to this site.

FIGURES

F:\CAD\TurnKey\Krog\Former Trico Building BCP\RI\ERP\Figure 1A; Hospital Route Map.dwg



TURNKEY ENVIRONMENTAL RESTORATION, LLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0635

PROJECT NO.: 0092-013-500

DATE: JULY 2013

DRAFTED BY: JGT

HOSPITAL ROUTE MAP

EMERGENCY RESPONCE PLAN

FORMER TRICO PLANT

BUFFALO, NEW YORK

PREPARED FOR

847 MAIN STREET, LLC

FIGURE 1A

APPENDIX B

HOT WORK PERMIT FORM

HOT WORK PERMIT

PART 1 - INFORMATION

Issue Date:	
Date Work to be Performed: Start:	Finish (permit terminated):
Performed By:	
Work Area:	
Object to be Worked On:	

PART 2 - APPROVAL

(for 1, 2 or 3: mark Yes, No or NA)*

Will working be on or in:	Finish (permit terminated):	
1. Metal partition, wall, ceiling covered by combustible material?	yes	no
2. Pipes, in contact with combustible material?	yes	no
3. Explosive area?	yes	no

* = If any of these conditions exist (marked "yes"), a permit will not be issued without being reviewed and approved by Thomas H. Forbes (Corporate Health and Safety Director). Required Signature below.

PART 3 - REQUIRED CONDITIONS**

(Check all conditions that must be met)

	PROTECTIVE ACTION		PROTECTIVE EQUIPMENT
	Specific Risk Assessment Required		Goggles/visor/welding screen
	Fire or spark barrier		Apron/fireproof clothing
	Cover hot surfaces		Welding gloves/gauntlets/other:
	Move movable fire hazards, specifically		Wellintons/Knee pads
	Erect screen on barrier		Ear protection: Ear muffs/Ear plugs
	Restrict Access		B.A.: SCBA/Long Breather
	Wet the ground		Respirator: Type:
	Ensure adequate ventilation		Cartridge:
	Provide adequate supports		Local Exhaust Ventilation
	Cover exposed drain/floor or wall cracks		Extinguisher/Fire blanket
	Fire watch (must remain on duty during duration of permit)		Personal flammable gas monitor
	Issue additional permit(s):		

Other precautions:

** Permit will not be issued until these conditions are met.

SIGNATURES

Orginating Employee:	Date:
Project Manager:	Date:
Part 2 Approval:	Date:

APPENDIX C

NYSDOH GENERIC COMMUNITY AIR MONITORING PLAN

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. 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 and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion 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, particularly if wind direction changes. 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.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. 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 of 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.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. 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 all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/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 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/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 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

APPENDIX C

EXCAVATION WORK PLAN

APPENDIX C – EXCAVATION WORK PLAN

C-1 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed by a qualified environmental professional during all excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Section C-4 of this Appendix.

C-2 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a silt sock (within the building) and a berm, silt sock and/or silt fence (outside the building). Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC.

C-3 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated impacted material.

The owner of the property and/or its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

Loaded vehicles leaving the site will be appropriately lined (if necessary), tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The owner or its contractor will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials, as necessary.

C-4 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Truck transport routes shall be selected to involve the shortest commute through residential neighborhoods, if necessary, and shortest commute to an expressway or thruway pending the final destination of the vehicle.

All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

C-5 MATERIALS DISPOSAL OFF-SITE

Material excavated and removed from the Site will be treated as regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part

360) and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Final Engineering Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

C-6 MATERIALS REUSE ON-SITE

The qualified environmental professional will ensure that procedures defined for materials reuse in this EWP are followed and that unacceptable material does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

C-7 FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge, and development fluids will not be recharged back to the land surface or subsurface of the site, and will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream, or river) will be performed under a SPDES permit.

C-8 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be replaced in a manner that complies with the RAWP. The cover system will be comprised of a minimum of 2 feet of clean soil or a hardscape cover system including asphalt pavement, concrete covered sidewalks, and concrete building. A demarcation layer, consisting of orange mesh material or equivalent material will be placed to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this EWP.

C-9 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional and will be in compliance with provisions in this EWP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at **http://www.dec.ny.gov/regulations/67386.html**, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site, unless granted written permission from NYSDEC.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

The specific criteria under which off-site material may be used as cover or backfill are presented below.

- **Off-Site Soil:** Off-Site soil may be used as backfill provided that it originates from: 1) an NYSDEC-approved borrow site; or 2) a known source having no evidence of disposal or releases of hazardous substances, hazardous, toxic, radioactive wastes, or petroleum. In both instances the imported soil must be tested as discussed herein and demonstrated to meet restricted-residential SCOs

or lesser as published in 6NYCRR Part 375-6.8(b). In addition, no off-site materials meeting the definition of a solid waste as defined in 6NYCRR, Part 360-1.2 (a) shall be used as backfill.

- **Other Off-Site Material:** No other fill material will be brought on-site without a specific approval from the NYSDEC Project Manager.

C-9.1 Quality Assurance Requirements

The contractor will be required to collect the specified number of samples and submit the samples to an independent, NYSDOH ELAP-certified laboratory for analysis. The NYSDEC will be notified of the sampling and provided an opportunity to observe the sample collection work.

All analyses will be in accordance with USEPA SW-846 methodology. The laboratory data package will be a Category A deliverable; however, the NYSDEC may request, at any time, to upgrade the deliverable to Category B. Each import soil source shall be analyzed for the following parameters as more specifically listed in 6NYCRR Part 375-6:

- VOCs – Method 8260
- SVOCs – Method 8270
- Organochlorine Pesticides and PCBs – Method 8081/8082
- Metals, excluding mercury – Method 6010
- Mercury – Method 7471
- Cyanide – Method 9013

Each import soil source shall be subject to testing in accordance with the following schedule per NYSDEC DER-10 Table 5.4(e)10:

Contaminant:	**VOCs**	**SVOCs, Inorganics & PCBs/Pesticides**	
Soil Quantity (cubic yards)	**Discrete Samples**	**Composite**	**Discrete Samples/Composite**
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1,000	7	2	
1,000 or greater	Add an additional 2 VOC and 1 composite for each additional 1,000 cubic yards or consult with DER		

Grab samples will be required for VOC analysis. For all other required analyses, a minimum of four grab samples will be collected to form a single composite sample. Approximately equal aliquots of the grab samples will be composited in the field using a stainless steel trowel and bowl. The trowel and bowl shall be decontaminated with a non-phosphate detergent (e.g., Alconox®) and potable water wash solution followed by a distilled water rinse between sampling locations).

Import criteria are the lesser of the values from the restricted-residential or protection of groundwater SCOs as published in 6NYCRR Part 375-6.8(b).

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

C-10 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Final Engineering Report.

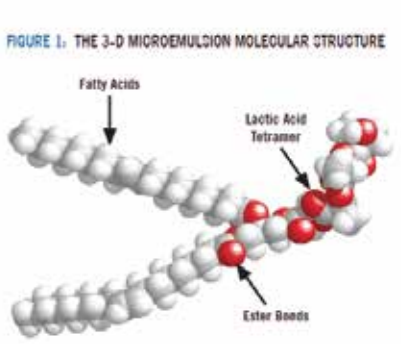
APPENDIX D

REGENESIS AMENDMENT PRODUCT INFORMATION

3-D Microemulsion® Factory Emulsified Technical Description

3-D Microemulsion (3DME®) is comprised of a patented molecular structure containing oleic acids (i.e., oil component) and lactates/polylactates, which are molecularly bound to one another (figure 1). The 3DME molecule contains both a soluble (hydrophilic) and in-soluble (lipophilic) region. These two regions of the molecule are designed to be balanced in size and relative strength. The balanced hydrophilic/lipophilic regions of 3DME result in an electron donor with physical properties allowing it to initially adsorb to the aquifer material in the area of application, then slowly redistribute via very small 3DME "bundles" called micelles. These 3DME micelles spontaneously form within sections of the aquifer where concentrations of 3DME reach several hundred parts per million. The micelles' small size and mobility allow it to move with groundwater flow through the aquifer matrix, passing easily through the pore throats in between soil grains resulting in the further redistribution of 3DME within the aquifer. This allows for advective distribution of the oleic acids which are otherwise insoluble and unable to distribute in this manner, allowing for increased persistence of the lactate/polylactates component due to their initial attachment to the oleic acids.

Example of 3-D Microemulsion



Due to its patented molecular structure, 3DME offers far greater transport when compared to blended emulsified vegetable oil (EVO) products, which fail to distribute beyond the limits of pumping. 3DME also provides greater persistence when compared to soluble substrates such as lactates or simple sugars. The 3DME molecular structures capitalize on the best features of the two electron-donor types while at the same time, minimize their limitations. 3DME is delivered to the site as a ready-to-apply emulsion that is simply diluted with water to generate a large volume of a 3DME colloidal suspension.

Suspension of 3DME generated by this mixing range from micelles on the order of .02 microns to .05 microns in diameter, to "swollen" micelles, (termed "microemulsions") which are on the order of .05 to 5 microns in diameter. Once injected into the subsurface in high volumes, the colloidal suspension mixes and dilutes in existing pore waters. The micelles/microemulsions on the injection front will then begin to sorb onto the surfaces of soils as a result of zeta potential attraction and organic matter within the soils themselves. As the sorption continues, the 3DME will "coat" pore surfaces developing a layer of molecules and in some cases a bilayer. This sorption process continues as the micelles/microemulsion moves outward and disassociates into their hydrophilic/hydrophobic components. The specialized chemistry of 3DME results in a staged release of electron donors: free lactate (immediate); polylactate esters (mid-range) and free fatty acids & fatty acid esters (long-term). Material longevity of three years or greater has been seen at most sites as determined from biogeochemical analyses.

For a list of treatable contaminants with the use of 3DME, view the Range of Treatable Contaminants Guide

Chemical Composition

- Hydrogen Release Compound Partitioning Electron Donor – CAS #823190-10-9
- Sodium Lactate – CAS# 72-17-3
- Water – CAS# – 7732-18-5

3-D Microemulsion® Factory Emulsified Technical Description

Properties

- Density – Approximately 1.0 grams per cubic centimeter (relative to water)
- pH – Neutral (approximately 6.5 to 7.5 standard units)
- Solubility – Soluble in Water
- Appearance – White emulsion
- Odor – Not detectable
- Vapor Pressure – None
- Non-hazardous

Storage and Handling Guidelines

Storage
Store in original tightly closed container
Store in a cool, dry, well-ventilated place
Store away from incompatible materials
Recommended storage containers: plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass

Handling
Avoid contact with eyes, skin, and clothing
Provide adequate ventilation
Wear appropriate personal protective equipment
Observe good industrial hygiene practices

Applications

- 3DME is diluted with water prior to application. Resulting emulsion has viscosity similar to water.
- Easily injects into formation through direct push injection points, injection wells or other injection delivery systems.

Application instructions for this product are contained here 3DME FE Application Instructions.

Health and Safety

Material is food grade and relatively safe to handle. We recommend avoiding contact with eyes and prolonged contact with skin. OSHA Level D personal protection equipment including vinyl or rubber gloves, and eye protection are recommended when handling this product. Please review the Material Safety Data Sheet for additional storage, usage, and handling requirements here: SDS-3DME FE.

REGENESIS

www.regenesis.com
1011 Calle Sombra, San Clemente CA 92673
949.366.8000

3-D Microemulsion® Installation Instructions

Introduction

3-D Microemulsion® (3DME), a form of HRC Advanced®, should ONLY be applied as a high- volume, microemulsion. In this form it offers greater physical distribution of the 3DME material across a larger potential radius from a single injection point. The production of a 3DME emulsion involves the on-site, volumetric mixing of 10 parts water with 1 part delivered 3DME concentrate to form the injection-ready 3DME. This microemulsion suspension can then be injected directly or further diluted to a predetermined ratio of 3DME to water. The following instructions provide details in the production and installation of 3DME.

Material Overview Handling and Safety

3DME concentrate is shipped and delivered in 4.25-gallon buckets. Each bucket has a gross weight of approximately 32 pounds. Each bucket contains 30 pounds of 3DME concentrate (net weight) and a nominal volume of 3.7 gallons. At room temperature, 3DME concentrate is a liquid material with a viscosity of approximately 500 centipoise, roughly the equivalent of pancake syrup. The viscosity of 3DME is not temperature sensitive above 50 °F (10 °C). However, below 50 °F the viscosity may increase significantly. If the user plans to apply the product in cold weather, consideration should be given to heating the material to above 60 °F so that it can be easily handled. 3DME concentrate should be stored in a warm, dry place that is protected from direct sunlight. It is common for stored 3DME concentrate to settle somewhat in the bucket, a quick pre-mix stir by a hand held drill with a paint or "jiffy mixer" attachment will rapidly re-homogenize the material. 3DME concentrate is non-toxic, however field personnel should take precautions while handling and applying the material. Field personnel should use appropriate personal protection equipment (PPE) including eye protection. Gloves should be used as appropriate based on the exposure duration and field conditions. A Material Safety Data Sheet is provided with each shipment. Personnel who operate field equipment during the installation process should have appropriate training, supervision, and experience and should review the MSDS prior to site operations.

Micro-Emulsion Production 3DME to Water Ratio

3DME concentrate should be mixed with water on a volume to volume (v/v) basis to produce a micro-emulsion starting at 10 parts water: 1 part 3DME. Although microemulsions can be easily produced using greater water volumes than 10 parts, e.g. 20 to 50 parts water to 1 part 3DME, the initial microemulsion should never be produced below a ratio of less than 10 parts water: 1 part 3DME v/v.

WARNING: Do not attempt to produce a microemulsion at less than 10 parts water to 1 part 3DME ratio v/v. This will produce an undesirable and unstable solution. The field production of 3DME is a very simple procedure; however, it is critical that the user follow the mixing directions outlined below. Never attempt to add water to the 3DME as this will produce an undesirable and unstable large emulsion. Always add the 3DME to a large volume of water.

As indicated previously the 10:1 ratio of water to 3DME v/v is the minimum water ratio that can be used, a greater ratio (more dilute solution) can easily be achieved and is governed by: A) the volume of

3DME required to treat the estimated contaminant mass, B) the pore volume in which the material is applied, C) the time available for installation (gallons/pump rate), and C) the estimated volume of 3DME that the target zone will accept over the time period allocated for installation.

Conceptually, although a higher volume of water to volume of 3DME will produce a larger volume of the suspension, it will lower the concentration of 3DME per gallon of solution. Thus, the benefit of using a high water/3DME v/v ratio in order to affect a greater pore volume of the subsurface aquifer is offset by the dilution of the 3DME per unit volume of suspension as well as by the limitations of the subsurface hydraulic conductivity and effective porosity (capacity of the aquifer to accept the volume of 3DME microemulsion).

It is important that the user plan in advance the v/v 3DME/water ratio to be employed at a project site. The resulting volume of solution will dictate the site water requirements and the time required for injection, etc. If upon injection of greater than 10:1 3DME microemulsion, the subsurface does not readily accept the volume of solution as designed, the user can adjust downward the v/v water to 3DME ratio until a more concentrated suspension is produced (this solution should never drop below the required 10 parts water: 1 part 3DME v/v production ratio).

For more information on designing a 3DME/water ratios to meet specific site conditions, please contact REGENESIS Technical Services.

Direct Push Application Requirements

One of the best methods to deliver the 3DME microemulsion into the subsurface is to pressure inject the solution through direct-push rods using hydraulic equipment, or to pressure inject/gravity feed the microemulsion into the dedicated injection wells. The use of low cost push points or temporary injection points allows the applier to more cost effectively distribute the 3DME material across shallow sites by employing multiple points per site. In the case of treating deep aquifer sites, the use of the microemulsion applied via dedicated injection wells is likely to be the most cost effective remediation approach. Please note that this set of instructions is specific to direct-push equipment. Please contact REGENESIS Technical Services to assist you with dedicated injection well applications.

In general, REGENESIS strongly recommends application of the 3DME microemulsion using an injection pump with a minimum delivery rate of three gallons per minute (gpm) and a pressure rating of between 150 to 200 pounds per square inch (psi).

Note: The injection pump requirements are different than the requirements of the mixing pump (see Mixing to Generate 3DME Microemulsion). High pressure, positive displacement pumps and progressive cavity pumps are appropriate for injecting 3DME. For low permeability lithologies (clay, silt) higher pressure pumps (800-1600 psi) may be necessary, while for more permeable lithologies (gravel, sand) a lower pressure pump may be adequate.

Examples of appropriate pumps are: Rupe Models 6-2200, 9-1500 and 9-1600 (positive displacement), Geoprobe® GS- 2000 (positive displacement) and DP-800 (progressive cavity), Yamada (air diaphragm), Moyno (progressive cavity), and Wilden (air diaphragm). Delivery rate is a critical factor in managing installation time and costs. Generally, higher delivery rates (>6 gpm) are more cost effective for these types of applications but pump selection should be on a site specific basis and account for the volume of 3DME solution and specific aquifer conditions present at the site.

The installation of the 3DME microemulsion should span the entire vertical contaminated saturated thickness. If the vertical extent of the application is confined to a limited interval, then the microemulsion should be placed across a vertical zone extending a minimum of one-foot above and one-foot below the screened interval of monitoring wells that are being used to evaluate the performance of the project.

Producing the 3DME Microemulsion

The application of 3DME requires the creation of a microemulsion. Technically the optimal suspension is an 3DME-in-water suspension containing microemulsions. Before beginning the mixing procedure the user should have in mind the desired water to 3DME ratio v/v desired.

It is critical that the microemulsion be produced using a high-shear apparatus such as a high speed centrifugal pump. The shearing provided by the vanes in these types of pumps is sufficient to form and maintain a homogeneous milky emulsion. This pump will be a different pump than that used to inject the 3DME microemulsion into the subsurface. If the user is uncertain as to requirements for the pump or the applicability of a certain pump, please contact REGENESIS Technical Services. REGENESIS typically suggests using a water trailer/pump apparatus commonly found at equipment rental facilities. REGENESIS recommends using a Magnum Products LLC model MWT500 or equivalent water trailer (fitted with centrifugal recirculation pump). This “trash pump” or transfer pump is an ideal high shear pump and the water tank (400 gallons) serves as an excellent mixing tank.

To ensure that proper microemulsion suspension is generated REGENESIS suggests a two-step process that simply requires mixing at least 10 parts water to 1 part 3DME concentrate using water at a temperature ≥ 60 °F.

Step 1. REGENESIS recommends that the 3DME concentrate in each bucket be re- homogenized using a drill equipped with a paint or “jiffy” mixer attachment as minor settling may have occurred during shipment.

Step 2. To calculate the volume of water necessary to produce a 10:1 v/v microemulsion, each bucket of 3DME concentrate containing 3.7 gallons of material should be mixed with 37 gallons of water.

Example: 6 buckets x 3.7 gallons 3DME concentrate/bucket yields a total of 22.2 gallons of 3DME concentrate. Thus, a 10:1 v/v solution will require 222 gallons of water (22.2 gallons 3DME concentrate x 10 gallons water yields 222 gallons of water). A nominal total volume microemulsion would result from the summation of the 3DME concentrate volume (22.2 gallons) and the water volume (222 gallons). This yields a total fluids delivery volume of approximately 244 gallons.

The previously calculated water volume (222 gallons) should be transferred into an appropriately sized mixing tank. The water should be circulated by the high shear centrifugal pump and each of the six 3DME buckets slowly poured into the tank. Each bucket of 3DME concentrate should be poured at a slow rate (approx. 1 minute per bucket) and the contents of the tank continually recirculated using the high hear centrifugal pump. A period of 1-2 minutes should be allowed between addition of each subsequent bucket of 3DME concentrate to allow the centrifugal pump to continue to shear and mix the water/3DME concentrate. Upon addition of the entire volume of 3DME concentrate the pump

should remain on to allow the solution mixture to recirulate. The recirculation of the 3DME microemulsion should continue until the material is injected to maintain microemulsion consistency.

Application of microemulsion Using Direct-Push Methods

1. Prior to the installation of the microemulsion, any surface or overhead impediments should be identified as well as the location of all underground structures. Underground structures include but are not limited to: utility lines, tanks, distribution piping, sewers, drains, and landscape irrigation systems.
2. Planned installation locations should be adjusted to account for all impediments and obstacles.
3. Pre-mark the installation locations, noting any points that may have different vertical application requirements or total depth.
4. Set up the direct-push unit over each specific point and follow the manufacturer's standard operating procedures (SOP). Care should be taken to assure that probe holes remain vertical.
5. For most applications, REGENESIS suggests using drive rods with an O.D. of at least 1.25-inches and an I.D. of at least 0.625-inches I.D (Geoprobe or equivalent). However, the lithologic conditions at some sites may warrant the use of larger 2.125-inch O.D./1.5-inch I.D. drive rods.
6. The most typical type of sub-assembly currently being used is designed for 1.25-inch direct-push rods and is manufactured by Geoprobe. Other brands of drive rods can also be used but require the fabrication of a sub-assembly that allows for a connection between the pump and drive rod.
7. For mixing large volumes of the microemulsion, REGENESIS recommends using a Magnum Products LLC model MWT500 water trailer (fitted with centrifugal recirculation pump) or equivalent unit. However, single large volume poly tanks are adequate. We suggest filling the tank with an appropriate quantity (e.g. from the example above 222 gallons) of water before start of mixing operations. The tank should be configured so that both a hose and a fire hydrant or larger water tank can be connected to it simultaneously and filled with water quickly and easily. This will dramatically reduce the time needed to fill the tank with mixing water.
8. REGENESIS highly recommends preparing the microemulsion before pushing any drive rods into the subsurface. NOTE: best if the microemulsion is produced a single day application volumes.
9. After the microemulsion mixing/shearing step has been completed as described above, the microemulsion is ready to be applied. Check to see if a hose has already been attached to the inlet side of the centrifugal pump. If this has not been done, do so now.
10. If a non-water trailer tank is being used for mixing the microemulsion a stand alone centrifugal pump and hose system should be used for the shearing and mixing operations.
11. Advance drive rods through the ground surface, as necessary, following SOP.
12. Push the drive rod assembly with an expendable tip to the desired maximum depth. REGENESIS suggests pre-counting the number of drive rods needed to reach depth prior to starting injection activities to avoid any miscalculations.
13. After the drive rods have been pushed to the desired depth, the rod assembly should be withdrawn three to six inches. The expendable tip can be dropped from the drive rods, following SOP.
14. If an injection tool is used instead of a direct-push rod with an expendable tip, the application of material can take place without any preliminary withdrawal of the rods.
15. In some cases, introduction of a large column of air may be problematic. This is particularly the case in deep injections (>50 ft) with large diameter rods (>1.5-inch O.D.). To prevent the injection of air into the aquifer during the application, fill the drive rods with 3DME emulsion after they have been pushed to the desired depth and before the disposable tip has been dropped or before the injection tip is operational.

16. Transfer the appropriate quantity of the microemulsion from the water trailer to the working/ application pump hopper or associated holding tank.
17. A volume check should be performed prior to the injection of the microemulsion. Determining the volume discharged per unit time/stroke using a graduated bucket and stopwatch or stroke counter.
18. Start the pump and use the graduated bucket to determine how many gallons of micro- emulsion are delivered each minute or stroke per unit volume.
19. Connect the 1.25-inch O.D., 1-inch I.D. delivery hose to the pump outlet and the appropriate sub-assembly. Circulate the microemulsion through the hose and the sub-assembly to displace any air present in the system.
20. Connect the sub-assembly to drive rod. After confirming that all of the connections are secure, pump the microemulsion through the delivery system to displace water or other fluids in the rods.
21. The pump engine RPM and hydraulic settings should remain constant throughout the day to maintain a constant discharge rate.
22. The material is now ready to be installed in the subsurface. Use the pumps discharge rate as calculated in step 18 to determine the withdrawal rate of the drive rods needed for the application.
23. Slowly withdraw the drive rods using Geoprobe Rod Grip or Pull Plate Assembly (Part AT1222-For 1.25-inch drive rods). While slowly withdrawing single lengths of drive rod (3 or 4 feet), pump the pre-determined volume of microemulsion into the aquifer across the desired treatment interval.
24. Remove one or two sections of the drive rod at a time. The drive rod may contain some residual material, REGENESIS suggests placing it in a clean, empty bucket and allowing the material to drain. Eventually, the material recovered in the bucket should be returned to pump hopper for reuse.
25. Observe any indications of aquifer refusal such as “surfacing” around the injection rods or previously installed injection points. If aquifer acceptance appears to be low, allow enough time for the aquifer to equilibrate prior to removing the drive rod.
26. Repeat steps 19-25 until treatment of the entire contaminated vertical zone has been achieved.
27. Install an appropriate seal, such as bentonite, above the microemulsion injection zone. The seal should span across the entire vadose zone. Depending on soil conditions and local regulations, a bentonite seal using chips or pellets can be used. If the injection hole remains open more than three or four feet below the ground surface sand can be used to fill the hole and provide a base for the bentonite seal. The installation of an appropriate seal assures that the microemulsion remains properly placed and prevents contaminant migration from the surface. If the microemulsion continues to “surface” up the direct-push borehole, an oversized disposable drive tip or wood plug/stake can be used to temporarily plug the hole until the aquifer equilibrates and the material stops surfacing.
28. Remove and clean the drive rods as necessary.
29. Finish the borehole at the surface as appropriate (concrete or asphalt cap, if necessary).
30. Periodically compare the pre- and post-injection discharge rates of the microemulsion in the pump hopper or holding tank using any pre-marked volume levels. If volume level indicators are not on the pumps hopper or holding tank use a pre-marked dipstick or alternatively temporary mark the hopper or holding tank with known quantities/volumes of water using a carpenter’s grease pencil (Kiel crayon).
31. Move to the next probe point, repeating steps 11-29.

Helpful Hints

1. Application in Cold Weather Settings

As discussed in the Material Overview, Handling, and Safety section, cold weather tends to increase the viscosity of 3DME as well as decrease the ease of microemulsion formation.

To optimize an application in cold weather settings REGENESIS recommends maintaining the 3DME concentrate and the associated water at a temperature ≥60oF (16oC). The following procedures can be used to facilitate the production and installation of a 10:1 v/v 3DME microemulsion.

- Raise and maintain the temperature of the HRC-A to at least 60 °F (16 °C) prior to mixing with water. A hot water bath can be used to heat up the 3DME concentrate buckets. A Rubbermaid fiberglass Farm Trough Stock Tank (Model 4242-00-GRAY) has been used for this process. This trough can hold up to 16 buckets of 3DME concentrate.
- Hot water (approximately 130-170 °F or 54-77 °C) should be added to the tank after the buckets of 3DME have been placed inside. The hot water should be delivered from a heated pressure washer (Hotsy® Model No. 444 or equivalent) or steam cleaner unit.
- It is equally critical that a moderate water temperature (>60 °F or 16°C) be used in the production of the microemulsion. If on-site water supply is below 60 °F use a hot water or steam cleaner to generate a small volume (e.g. 5-10% of total water volume) of hot water (130–170 °F/54-77 °C). This small volume of hot water should be added to remaining cold water volume to raise the total volume temperature to >60 °F. When the 3DME concentrate and water each reach a minimum temperature of 60 °F or 16 °C the two materials are ready for mixing.
- Upon achieving a minimum temperature of 60 °F or 16 °C (approximately 10-20 minutes). When the 3DME and the associated water volumes have reached a minimum temperature of 60 °F or 16 °C (approximately 10-20 minutes) they are ready for mixing.
- In exceptionally harsh winter temperature settings use of a separate insulated pump containment structure and insulated delivery hoses may be necessary.
- Use a pump with a heater unit.
- Periodically check the temperature of the material in the hopper.
- Re-circulate the 3DME microemulsion through the pump and hose to maintain temperature adequate temperatures.
- Care should be taken to avoid the re-circulation of material volumes that exceed the volume of the pump hopper or holding tank.

Table 1: Equipment Volume and 3DME microemulsion Weight per Unit Length of Hose (Feet)

Equipment	Volume	Product Weight
1-inch OD; 0.625-inch ID hose (10 feet)	0.2 gallon	1.6 lbs.
1.25-inch OD; 0.625-inch ID drive rod (3 feet):	0.05 gallon	0.4 lbs.
1.25-inch OD; 0.625-inch ID drive rod (4 feet):	0.06 gallon	0.5 lbs.

2. Pump Cleaning

For best results, use a heated pressure washer to clean equipment and rods periodically throughout the day. Internal pump mechanisms and hoses can be easily cleaned by re-circulating a solution of hot water and a biodegradable cleaner such as Simple Green through the pump and delivery hose. Further cleaning and decontamination (if necessary due to subsurface conditions) should be performed according to the equipment supplier's standard procedures and local regulatory requirements.

Note: Before using the Rupe Pump, check the following:

- Fuel level prior to engaging in pumping activities (it would be best to start with a full tank)
- Remote control/pump stroke counter LCD display [if no display is present, the electronic counter will need to be replaced (Grainger Stock No. 2A540)]
- Monitor pump strokes by observing the proximity switches (these are located on the top of the piston).

3. Bedrock Applications

When contaminants are present in competent bedrock aquifers, the use of direct-push technology as a delivery method is not possible. REGENESIS is in the process of developing methods for applying 3DME via boreholes drilled using conventional rotary techniques. To develop the best installation strategy for a particular bedrock site, it is critical that our customers call the Technical Services department at REGENESIS early in the design process.

The microemulsion can be applied into a bedrock aquifer in cased and uncased boreholes. The microemulsion can be delivered by simply filling the borehole without pressure or by using a single or straddle packer system to inject the material under pressure. Selection of the appropriate delivery method is predicated on site-specific conditions. The following issues should be considered in developing a delivery strategy:

- Is the aquifer's hydraulic conductivity controlled by fractures?
- Backfilling may be the better delivery method in massive, unfractured bedrock. This is particularly true in an aquifer setting with high permeability and little fracturing (such as that found in massive sandstone).
- Down-hole packer systems may be more advantageous in fractured bedrock aquifers.
- In this case the fracture type, trends, and interconnections should be evaluated and identified.
- Are the injection wells and monitoring wells connected by the same fractures?
- Determine if it is likely that the injection zone is connected to the proposed monitoring points.
- If pressure injection via straddle packers is desired, consideration should be given to the well construction. Specific issues to be considered are:
- Diameter of the uncased borehole (will casing diameter allow a packer system to be used under high pressures?).
- Diameter of the casing (same as above).
- Strength of the casing (can it withstand the delivery pressures?).
- Length of screened interval (screened intervals greater than 10 feet will require a straddle packer system).

For further assistance or questions please contact REGENESIS Technical Services at 949.366.8000

BDI PLUS® Technical Description

Bio-Dechlor INOCULUM Plus (BDI PLUS®) is an enriched natural consortium containing species of Dehalococcoides sp. (DHC). BDI PLUS has been shown to simulate the rapid and complete dechlorination of chlorinated solvents such as tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE) and vinyl chloride (VC) to non-toxic end products, ethene, carbon dioxide and water.

The culture also contains microbes capable of dehalogenating halomethanes (e.g., carbon tetrachloride and chloroform) and haloethanes (e.g., 1,1,1-TCA and 1,1-DCA) as well as mixtures of these contaminants.

Species of Dehalococcoides sp. (DHC)

For a list of treatable contaminants with the use of BDI PLUS, view the Range of Treatable Contaminants Guide

Chemical Composition

- Non-hazardous, naturally-occurring, non-altered anaerobic microbes and enzymes in a water-based medium.

Properties

- Appearance – Murky, yellow to grey water
- Odor – Musty
- pH 6.0 to 8.0
- Density – Approximately 1.0 grams per cubic centimeter (0.9 to 1.1 g/cc)
- Solubility – Soluble in Water
- Vapor Pressure – None
- Non-hazardous

Storage and Handling Guidelines

Storage
Store in original tightly closed container
Store away from incompatible materials
Recommended storage containers: plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass
Store in a cool, dry area at 4-5°C (39 - 41°F)
Material may be stored for up to 3 weeks at 2-4°C without aeration

Handling
Avoid prolonged exposure
Observe good industrial hygiene practices
Wear appropriate personal protective equipment

BDI PLUS® Technical Description

Applications

- BDI PLUS is delivered to the site in liquid form and is designed to be injected directly into the saturated zone requiring treatment.
- Most often diluted with de-oxygenated water prior to injection into either hydraulic push injection points or properly constructed injection wells.
- The typical dilution rate of the injected culture is 10 gallons of deoxygenated water to 1 liter of standard BDI PLUS culture.

Application instructions for this product are contained here BDI PLUS Application Instructions.

Health and Safety

Material is non-hazardous and relatively safe to handle; however avoid contact with eyes and prolonged contact with skin. OSHA Level D personal protection equipment including: vinyl or rubber gloves and safety goggles or a splash shield are recommended when handling this product. An eyewash station is recommended. Please review the Material Safety Data Sheet for additional storage, usage, and handling requirements here: BDI PLUS SDS.

REGENESIS

www.regenesis.com
1011 Calle Sombra, San Clemente CA 92673
949.366.8000

BIO-DECHLOR INOCULUM

Bio-Dechlor INOCULUM PLUS (BDI PLUS®) Installation Instructions:

General Guidelines

Bio-Dechlor INOCULUM PLUS (BDI PLUS®) is an enriched natural microbial consortium containing species of Dehalococcoides. This microbial consortium has since been enriched to increase its ability to rapidly dechlorinate contaminants during *in situ* bioremediation processes. BDI PLUS has been shown to stimulate the rapid and complete dechlorination of compounds such as tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE), and vinyl chloride (VC). BDI PLUS also contains microorganisms capable of degrading chloromethanes (carbon tetrachloride and chloroform) as well as chloroethanes like trichloroethane (TCA).

Recent trends in engineered bioremediation indicate that the treatment of chlorinated solvent contamination sometimes results in slow or incomplete degradation of the intermediate compounds. When faced with this circumstance, bioaugmentation with a microbial consortium such as BDI PLUS offers a solution to accelerate or simply make possible the complete dechlorination of these otherwise recalcitrant compounds.

REGENESIS® believes that the best approach to install BDI PLUS into the subsurface is by direct-push methods. This allows for the BDI PLUS solution to be applied directly into the aquifer material and provides greater coverage/treatment over the life of the project. As a minimum, the following equipment will be needed to perform this type of installation:

- Direct-push drilling unit
- Grout pump (e.g. Geoprobe GS 2000)
- Appropriate hose assembly including a fitting that links a hose from the grout pump to the direct-push rods (provided by REGENESIS with shipment)
- One or more 55+ gallon water drums, fitted with an appropriate lid that has at least one bung hole (number of drums depends on size of application)
- Rotary transfer pump (or equivalent) with appropriate amount of hose to connect from 55-gal drum to hopper of grout pump (similar to Grainger No. 1P893, Fill-Rite model #FR112GR)
- Compressed Nitrogen gas tank with appropriate regulator (0 to 15 pounds per square inch (psi). A 300-ft^3 tank should be sufficient for discharge of concentrated or non-concentrated kegs and for nitrogen sparging to deoxygenate batch water.
- Pressure washer (or equivalent) for cleaning

Material Packaging and Safety

BDI PLUS is a mixture of living bacteria including members of the Dehalococcoides genus that are capable of anaerobically degrading chlorinated contaminants. The culture has been tested to ensure that it is free of the most common pathogenic bacteria, but like all living cultures it should be handled with due care to prevent contamination of work surfaces or field personnel.

During installation activities, REGENESIS recommends that field personnel use at least level “D” personal protection equipment (PPE). A Materials Safety Data Sheet (MSDS) is sent with each shipment and should be reviewed before proceeding with installation activities.

BIO-DECHLOR INOCULUM

Warning

- The BDI PLUS container is pressurized to 10 to 15 psi with nitrogen before shipping
- Wear suitable eye protection, gloves, respirator and protective clothing
- Gas cylinders used to dispense culture MUST be equipped with a proper pressure regulator
- During operation DO NOT exceed the containers maximum working pressure of 15 psi

Unpacking

1. Carefully remove the container from shipping cooler and stand upright. DO NOT use the plastic sight tube as a handle.
2. Carefully check the container, connectors, valves and tubing for any damage or defects. If defects or damage is observed, do not use. Report any damage to REGENESIS at 949.366.8000. A back up set of quick connects is provided in the packaging material.
3. Check and ensure that all valves are in the CLOSED position.

Storage

If the schedule of bacteria application requires adding the bacteria over a period of more than one day, the keg(s) should be stored at a temperature 2-4 °C, but freezing must be avoided. This can normally be achieved by storing the kegs under ice in the provided coolers. Keg should be pressurized with Nitrogen to pressure 10- 15 psi. before storing to ensure a tight seal on the keg cap.

Culture Keg in Cooler

Shipping

After completion of operation, please, ship cooler with keg and all attachments back to the following address:

Shaw Environmental, Inc.
17 Princess Road, Lawrenceville, NJ 08648

Specific Installation Procedures

1. The BDI PLUS must be added to the previously prepared “oxygen-free” water before it is installed in the subsurface. The desired amount of BDI PLUS should be carefully discharged into the 55-gal drum containing the appropriate amount of “oxygen free” water. The tables provided below indicates the amount of water that a given amount of BDI PLUS should be mixed with.
   The BDI PLUS must be added to “oxygen-free” water before it is installed in the subsurface. To ensure that the water has reached the desired anoxic state prior to mixing with BDI PLUS an appropriate amount of nitrogen sparging into the 55-gal drum containing a given amount of water at least one hour prior to adding the BDI PLUS. To ensure that a sufficient quantity of “oxygen free” water is available throughout the day, a large trough of “nitrogen sparged” water can be prepared and additional 55-gal drums can be filled from this trough. The water in the trough can be transferred to the 55-gal drums where the BDI is mixed with the water using a primed transfer pump.

Nitrogen sparging is accomplished by a gas sparging device equivalent to a fish tank aerator. Adjust the 300ft^3 nitrogen tank pressure regulator to 3-5 psi and immerse the gas sparger to the bottom of the drum or trough. By internal convection and oxygen stripping processes, the oxygen levels should diminish within an hour. Be careful to not consume too much gas and not have nitrogen to empty the kegs. Keeping an eye on tank pressure loss and dissolved oxygen level will indicate when one can trim down on the sparge pressure and conserve the nitrogen.

BDI PLUS Dilution Chart

Volume of BDI PLUS	Volume of Water
5 liters	50 gal
1 liter	10 gal

Volume of BDI PLUS Concentrate	Volume of Water
0.5 liters	50 gal
0.1 liter	10 gal

2. The drive rod assembly should be fitted with a disposable tip on the first drive rod and pushed down to the desired depth. This process should be done in accordance with the manufacturer's standard operating procedure (SOP).
3. A sub-assembly connecting the delivery hose to the drive rods and pump should be used. The sub-assembly should be constructed in a manner that allows for the drive rods to be withdrawn while the material is being pumped.
4. Prior to connecting the hose to the sub-assembly a volume check should be completed to determine the volume and weight of product displaced with each pump stroke.
5. After the drive rods have been pushed to the desired depth, the rod assembly should be with drawn three to six inches so that the disposable tip has room to be dropped.
   a. If an injection tool is used instead of an expendable tip, the application of material can take place without any preliminary withdrawal of the rods.
6. Fill the annular space of the drive rods with water. This will minimize the amount of air introduced to the system.
7. Insert the telescoping suction pipe on the rotary transfer pump into a bung hole on the lid of the 55-gal drum and make sure that the pipe reaches the bottom of the drum. If possible, attach the suction pipe to the bung hole with the 2" bung adapter to ensure that the pump remains securely in place while pumping the Bio-Dechlor INOCULUM mixture from the drum to the pump hopper.
8. Attach the hose to the outlet of the rotary transfer pump making sure that the opposite end of the hose reaches the pump hopper. Open the opposite bung hole on the drum lid to prevent a vacuum then pump the desired amount of BDI PLUS solution into the hopper of the pump.
9. Connect the hose from the grout pump to the drive rod assembly.
10. Start pumping the BDI PLUS product solution.
11. The initial volume of BDI PLUS solution pumped should only be enough to displace the water within the drive rods. Once this is done the actual injection can start.
12. Begin withdrawing the drive rods, in accordance with the manufacturer's SOP, and start pumping the BDI PLUS solution simultaneously. The dosage should be 0.1 liter per vertical foot or 1 gallon per vertical foot if prepared using the BDI dilution chart. The withdrawal rate should be such that it allows theappropriate quantity of material to be injected into each vertical foot of aquifer being

treated. The withdrawal rate should be slow to avoid creating a vacuum. This vacuum can potentially pull a small volume of material to the surface if the drive rods are withdrawn too quickly.

13. In less permeable soils such as clays and silts, there may be difficulty accepting the volume of estimated material. In this case REGENESIS recommends using a "step-wise" application approach. For this approach we suggest withdrawing the drive rods in one-foot increments and then injecting the quantity of material required per vertical foot.
14. Look for any indications of aquifer refusal such as:
    - Excessive pump noise or application pressure spikes (e.g. squealing)
    - Surfacing of material through the injection point ("blow-by") If acceptance appears to be an issue it is critical that the aquifer is given enough time to equilibrate before breaking down the drive rods and/or removing the hose. The failure to do this can lead to excessive back flow of the BDI PLUS material on personnel, equipment, and the ground surface.
15. If BDI PLUS solution continues to "surface" after the drive rods have been completely removed from the borehole a plug may be necessary. Large diameter disposable tips or wood stakes have been used successfully for this purpose.
16. Drive rods should be disconnected after one rod (typically 4 feet in length) has been withdrawn. The drive rods should be placed in a bucket (or equivalent) after they have been disconnected.
17. Complete the installation of the BDI PLUS solution at the designated application rate across the entire targeted vertical interval.
18. After the injection is completed, an appropriate seal should be installed above the vertical interval where the BDI PLUS solution has been placed to prevent contaminant migration. Typically, bentonite powder or chips are used to create this seal. However, consultants should review local regulations before beginning field installation activities to confirm that this approach can be used.
19. Complete the borehole at the surface as appropriate using concrete or asphalt.
20. Repeat steps 7 through 19 until the entire application has been completed. If additional drums of de-oxygenated water are required, prepare as suggested in Step 1.
21. Prior to the installation of BDI PLUS, all surface and overhead impediments should be identified as well as the location(s) of any underground structure(s). Underground structures include but are not limited to: utility lines (gas, electrical, sewer, etc), drain piping, and landscape irrigation systems.
22. The planned injection locations should be adjusted in the field to account for impediments and obstacles.
23. The actual injection locations should be marked prior to the start of installation activities to facilitate the application process.
24. Using an appropriate pump to install the BDI PLUS product is very critical to the success of the application as well as the overall success of the project. Based on our experience in the field, REGENESIS strongly recommends using a pump that has a pressure rating of at least 1,000 psi and a delivery rate of at least 3 gallons per minute. If the application involves both HRC and BDI PLUS, two separate pumps may be required to facilitate the process. The pump used to deliver HRC to the subsurface should be in accordance with the specifications outlined in the General Guidelines section of the HRC Installation Instructions.

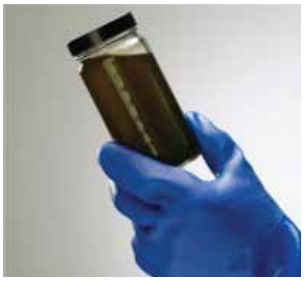
Additional Information

The internal workings of the grout pump can be cleaned easily by recirculating a solution of hot water and a biodegradable cleaner (e.g. Simple Green) through the pump and delivery hose(s). If additional cleaning and decontamination is required it should be conducted in accordance with the manufacturer's SOP and local regulatory requirements.

Note: REGENESIS assumes that all of the material (microorganisms) sent to a site for installation purposes will be used for that particular project and that no material (microorganisms) will be left over at the conclusion of the installation activities.

CRS® Technical Description

CRS® (Chemical Reducing Solution) is an iron-based reagent that facilitates biogeochemical *in situ* chemical reduction (ISCR) of halogenated contaminants such as chlorinated ethenes and ethanes. CRS is a pH neutral, liquid iron solution that is easily mixed with 3-D Microemulsion® Factory Emulsified before injection into a contaminated aquifer. CRS provides a soluble, food-grade source of ferrous iron (Fe^{2+}), designed to precipitate as reduced iron sulfides, oxides, and/or hydroxides. These Fe^{2+} minerals are capable of destroying chlorinated solvents via chemical reduction pathways, thus improving the efficiency of the overall reductive dechlorination process by providing multiple pathways for contaminant degradation in groundwater.



Example of CRS

For a list of treatable contaminants with the use of CRS, view the Range of Treatable Contaminants Guide.

Chemical Composition

• Water	7732-18-5
• Ferrous Gluconate	299-29-6

Properties

- Appearance – Dark green to black
- Odor – Odorless
- pH 6.0 to 8.0
- Density – Approximately 1.0 grams per cubic centimeter (0.9 to 1.1 g/cc)
- Solubility – Miscible
- Vapor Pressure – None
- Non-hazardous

Storage and Handling Guidelines

Storage
Store in original tightly closed container
Store away from incompatible materials
Recommended storage containers: plastic-lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass
Store in a cool, dry, well-ventilated place
Keep away from extreme heat and strong oxidizing agents

Handling
Avoid prolonged exposure
Observe good industrial hygiene practices
Wear appropriate personal protective equipment
Avoid contact with eyes, skin, and clothing
Avoid breathing spray mist
Use with adequate ventilation

CRS® Technical Description

Applications

- Permanent injection wells
- Direct-push injection points

Application instructions for this product are contained in the CRS Application Instructions.

Health and Safety

The manufacturer lists no ingredients as hazardous according to OSHA 29 CFR 1910.1200. Observe good industrial hygiene practices. Wash hands after handling. Store away from incompatible materials. Dispose of waste and residues in accordance with local authority requirements. Please review the CRS PLUS Material Safety Data Sheet for additional storage, usage, and handling requirements.

www.regenesis.com
1011 Calle Sombra, San Clemente CA 92673
949.366.8000

Chemical Reducing Solution (CRS®) Installation Instructions:

General Guidelines

CRS® is a liquid amendment to 3D Microemulsion® that provides ferrous iron (Fe^{2+}) to the reductive dechlorination process, thus enabling *In situ* Chemical Reduction (ISCR) pathways for contaminant destruction. The material is added in a prescribed ratio to the 3D Microemulsion mixture before injection. Exact ratios and mixing quantities should be obtained from your REGENESIS® representative.

Material Handling and Safety

CRS is a neutral-pH material made from very low toxicity ingredients. However, as with all chemicals, CRS should be handled, used, and disposed of safely in accordance with its Material Safety Data Sheet (MSDS) and in compliance with local and federal regulations.

Product Mixing and Application

CRS contains reduced ferrous iron (Fe^{2+}) and will oxidize slowly to ferric iron (Fe^{3+}) in air. To maximize the reducing capacity of the solution, exposure to air should be minimized prior to injection of the material. Therefore, it is important that the drums CRS is delivered in stay closed and air-tight until CRS is ready to be added to 3D Microemulsion.

Two methods are recommended for mixing and application of CRS with 3D Microemulsion:
1) Direct batch mixing
2) Controlled metering with a Dosatron™ chemical dispenser

These two options are outlined below.

I. Method 1 - Direct batch mixing of CRS

1. Obtain recipe for emulsion preparation and CRS addition from REGENESIS
2. Dilute 3D Microemulsion with the prescribed quantity of water
3. Stir drum of CRS for 30 seconds with a vortex mixer at a mild turbulence setting to ensure solution homogeneity without air entrainment
4. Transfer the prescribed quantity of CRS into the 3D Microemulsion batch
5. Mix the emulsion and CRS batch using a vortex mixer – note: care should be taken to:
    i. Minimize direct exposure and entrainment of air
    ii. Mix periodically to maintain homogeneity of batch
6. Inject the final mixture directly into the treatment zone

CHEMICAL REDUCING SOLUTION

II. Method 2- Controlled Metering using a Dosatron™ chemical dispenser

1. Obtain recipe for emulsion preparation and CRS addition from REGENESIS
2. Dilute 3D Microemulsion with the prescribed quantity of water
3. Stir drum of CRS for 30 seconds with a vortex mixer at a mild turbulence setting to ensure solution homogeneity without air entrainment
4. Assemble injection setup to incorporate the Dosatron chemical metering system
5. Inject the diluted batch of 3D Microemulsion using the Dosatron unit to meter the CRS solution into the 3D Microemulsion at the prescribed ratios

For direct assistance or answers to any questions you may have regarding these instructions, contact REGENESIS Technical Services at 949.366.8000.

APPENDIX E

PROJECT DOCUMENTATION FORMS

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

INSPECTOR'S DAILY REPORT

Page _____ of _____

CONTRACTOR:	JOB NO.:
CLIENT:	DATE:

LOCATION:		DAY: Su M Tu W Th F Sa	
WEATHER:	TEMP: °F	START:	END:

WORK PERFORMED:

TEST PERFORMED:	QA PERSONNEL:
	SIGNATURE:

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

INSPECTOR'S DAILY REPORT

(CONTINUED) Page ____ of ____

CONTRACTOR:	JOB NO.:
CLIENT:	DATE:

MEETINGS HELD & RESULTS:

CONTRACTOR'S WORK FORCE AND EQUIPMENT

DESCRIPTION	H	#	DESCRIPTION	H	#	DESCRIPTION	H	#
Field Engineer						Front Loader Ton		
Superintendent						Bulldozer		
Laborer-Foreman						DJ Dump Truck		
Laborer						Water Truck		
Operating Engineer			Equipment			Backhoe		
Carpenter			Generators			Excavator		
Ironworker			Welding Equipment			Pad foot roller		
Concrete Finisher			Roller					
			Paving Equipment					
			Air Compressor					

REMARKS:

REFERENCES TO OTHER FORMS:

SAMPLES COLLECTED:

Sample Number:
Approx. Location of Stockpile:
No. of Stockpile
Date of Collection:
Weather:
Field Observations:

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

DAILY LOG	DATE			
	REPORT NO.			
	PAGE		OF	

PROBLEM IDENTIFICATION REPORT

Date:

Project:

Job No:

Location:

CQA Monitor(s):

Client:

Contractor:

Contractor's Supervisor:

WEATHER CONDITIONS:

Ambient Air Temp. - A.M.:

Ambient Air Temp. - P.M.:

Wind Direction:

Wind Speed:

Precipitation:

Problem Description:

Problem Location (reference test location, sketch on back of form as appropriate):

Problem Causes:

Suggested Corrective Measures or Variances:

Linked to Corrective Measures Report No. *or Variance Log No.*

Approvals (initial):

CQA Engineer:

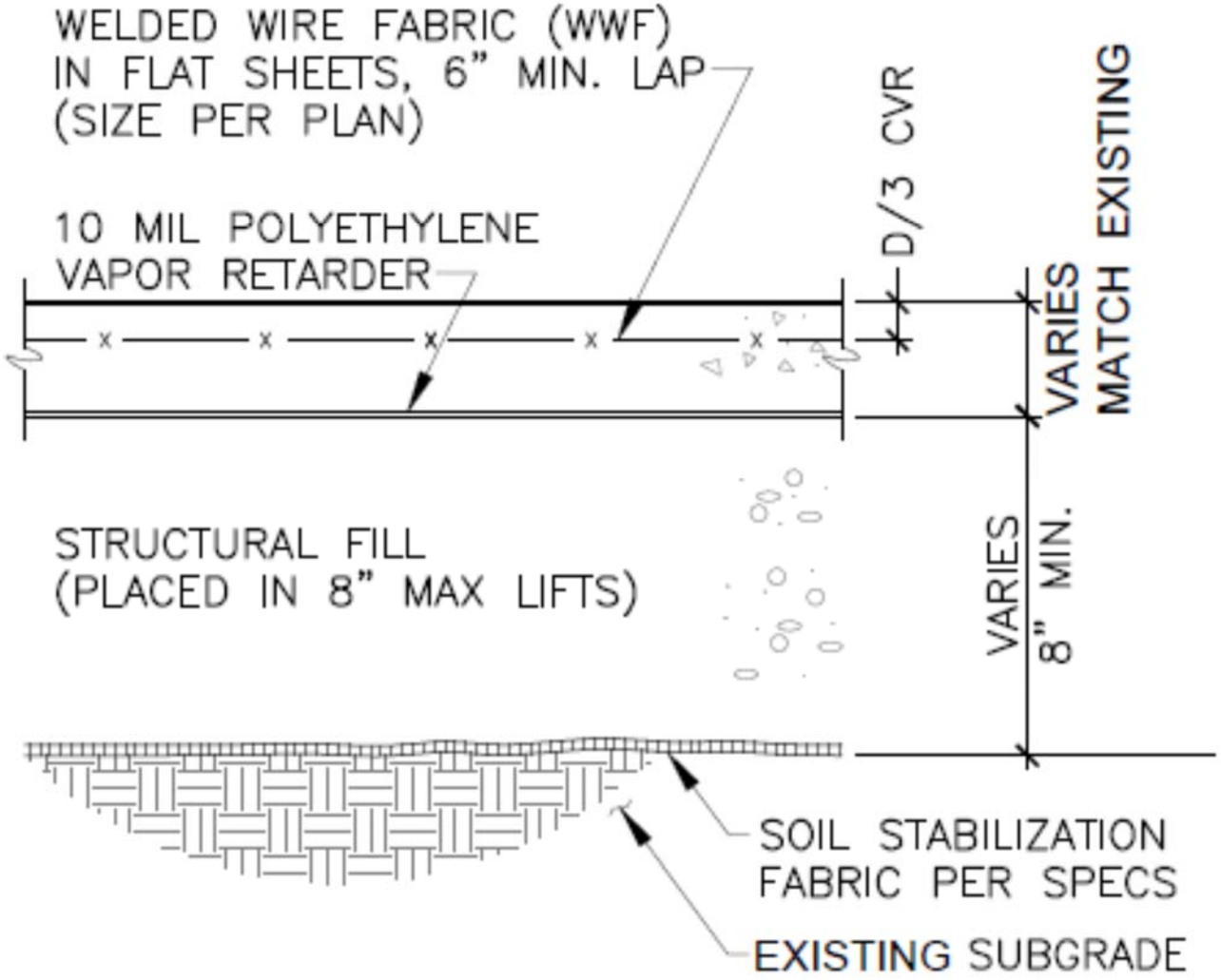
Project Manager:

Signed:

CQA Representative

APPENDIX F

TYPICAL SLAB ON GRADE CONCRETE REPLACEMENT DETAIL



7 TYPICAL SLAB ON GRADE DETAIL