Remedial Action Work Plan (RAWP)

Betlem Site (C915348)
Hamburg, New York

March 2023 0480-019-001

Prepared For:

Betlem Associates LLC

Prepared By:

BENCHMARK

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BCP SITE NUMBER: C915348
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Certification

I, Thomas H. Forbes, certify that I am currently a NYS registered professional engineer and that this March 2023 Remedial Action Work Plan (RAWP) for the Betlem Site (C915348) 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).

SEAL 

3-17-23

Date

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1.0 INTRODUCTION

Benchmark Civil/Environmental Engineering & Geology, (Benchmark) has prepared this Remedial Action Work Plan (RAWP) on behalf of Betlem Associates LLC to present the proposed scope of work and implementation procedures for completion of remedial activities at the Betlem Site (Site), Brownfield Cleanup Program (BCP) Site C915348, located at 0 Lake Avenue (AKA 250 Lake Avenue) in the Town of Hamburg (Village of Blasdell), Erie County, New York (Site, see Figures 1 and 2).

The remedial activities will be completed by Betlem Associates LLC, and their designated remedial contractors and subcontractors, with oversight provided by Benchmark. The work will be completed in accordance with 6NYCRR Part 375 and New York State Department of Environmental Conservation (NYSDEC) DER-10 guidelines.

1.1 Background and History

The ±3.54-acre Site consists of one tax parcel (Tax ID No. 150.16-1-2.12) and is improved with one industrial building, measuring approximately 86,000 square feet, which is currently used for steel warehousing. The remainder of the Site includes gravel areas, and to a lesser extent, green space on the western and southern portions of the Site.

The Volunteer plans to use the Site and existing building as an industrial metal fabrication and distribution facility. The existing building will be renovated to meet the needs of the operation with installation of crane systems and metal fabrication/manufacturing equipment.

Based on historic records and previous studies, the Site was historically used for steel manufacturing/fabrication with storage of bar steel and bar mill, a wire shop, railroad tracks, machine/construction equipment warehousing and general warehousing from at least 1909 until approximately 1986. Historic owners/operators included Bethlehem Steel (from at least 1944 through at least 1950) and Kalman Steel (in at least 1928). Subsequent operations included storage and distribution beginning in approximately 1986.

Benchmark completed and submitted to NYSDEC a Remedial Investigation/Alternatives Analysis Report (RI/AA), dated July 2020 and revised March 2021, on behalf of Betlem Associates LLC. The RI/AA report was approved by the Department in a letter dated October 13, 2022. The RI was completed in accordance with the approved RI Work Plan, dated May 2019 and revised January 2020.

The purpose of the RI was to define the nature and extent of contamination on the BCP Site and to collect data of sufficient quantity and quality to perform the remedial alternatives evaluation. The RI was completed across the BCP Site in interior and exterior areas to supplement previous environmental data and to delineate or identify areas requiring remediation.

On-site field activities included soil boring advancement; test pit excavations; surface soil sampling; radiological screening; overburden monitoring well installation; groundwater quality sample collection; transformer oil sampling; and an interior soil vapor investigation within the existing building.

Comprehensive details of the RI sampling activities and analytical results are included in the RI/AA report that was submitted to the Department. For the purpose of this RAWP, we have incorporated a summary of the RI/AA findings below in Section 1.2.

1.2 Summary of Environmental Conditions

Previous investigations including, but not limited to, Phase I and Phase II assessments were completed at the Site by Benchmark and others and are fully summarized in the RI/AA. Based on the data and analyses obtained during the RI and historic investigations, the following environmental conditions exist at the Site:

1.2.1 Soil/Fill

As summarized in the RI/AA report, fill materials including sand, silt and/or gravel with intermingled slag, were noted across the Site. Fill at certain investigation locations was intermingled with fragments of ash, brick and wood. Fill depths generally ranged between 2 and 8 feet below ground surface (fbgs). Blue stained slag was observed at SB-6, SB-8, SB-15, MW-4, TP-5, and TP-6 between 0 and 4 fbgs.

Non-descript odors and elevated photoionization detector (PID) readings above background (0.0 ppm) were detected in 27 of 42 investigation locations. The highest PID readings were detected at SB-28 (6' – 375.6 parts per million, ppm; 11' – 760 ppm) and SB-29 (6' – 81 ppm; 8' – 77.6 ppm) during the RI and at SB-12 (4' – 84.7 ppm), SB-15 (4' – 937 ppm; 9' – 237 ppm), SB-16 (6' – 386 ppm), SB-19 (4' – 1,805 ppm; 10' – 1,156 ppm), SB-21/21W (4' – 77.4 ppm; 10' – 155 ppm), and SB-23/23W (5' – 270 ppm) during the Phase II investigations.

Black liquid with a non-descript odor was identified at SB-15 during the 2018 Phase II activities and black liquid was observed within the sample sleeve at SB-29 during RI

activities. Sheen was observed on saturated soil/fill material at TP-2 and TP-5 from 2 to 4 fbgs and TP-6 at 6 fbgs.

No volatile organic compounds (VOCs) were detected at concentrations exceeding 6 NYCRR Part 375 commercial soil cleanup objectives (CSCOs) in subsurface soil samples from the RI and 2018 Phase II. Total VOC tentatively identified compounds (TICs) from RI samples were either non-detect or detected at concentrations ranging from 0.04 mg/kg (SB-24) to 521 mg/kg (SB-27W).

Soil/fill is impacted by semi-volatile organic compounds (SVOCs) with concentrations exceeding CSCOs and industrial SCOs (ISCOs) at all six surface soil sample locations and 14 of the 31 subsurface soil sample locations. The highest total polycyclic aromatic hydrocarbon (PAH) concentrations were identified at SS-2 (1,455 milligrams per kilogram, mg/kg), collected in the green space along the western side of the existing building, and TP-2, 2 to 4 fbgs (1,212 mg/kg), collected proximate to the former railroad tracks east of the existing building . No other total PAH concentrations exceed 500 mg/kg in surface or subsurface soil. All 19 RI subsurface soil samples analyzed for SVOCs were also analyzed for TICs. Total SVOC TICs were either non-detect or detected at concentrations ranging from 2.8 mg/kg to 533 mg/kg.

Metals were detected in surface and subsurface soil samples at concentrations above CSCOs and/or ISCOs. Of note, arsenic exceeded its ISCO of 16 mg/kg at two surface soil samples, SS-5 (18.2 mg/kg) and SS-6 (17.3 mg/kg), and 16 of the 31 subsurface soil samples with concentrations ranging from 16.3 mg/kg at MW-4 to 188 mg/kg at TP-3. In addition, lead exceeded its CSCO at SB-27W (2,870 mg/kg) and its ISCO at TP-3 (6,440 mg/kg), manganese exceeding its ISCO at SS-1, TP-3 and TP-5, mercury exceeded its ISCO at SB-2 and TP-3, barium exceeded its CSCO at TP-1 and TP-3, and cadmium exceeding its CSCO at TP-3.

No RI subsurface soil samples contained polychlorinated biphenyls (PCBs) at concentrations above CSCOs with exception to total PCBs exceeding its CSCO of 1 mg/kg at SB-25 (2 to 5 fbgs – 2.7 mg/kg). No pesticides or herbicides were detected above CSCOs. Per- and polyfluoroalkyl substances (PFASs) were reported as either non-detect or at very low concentrations in surface and subsurface soil samples with individual concentrations significantly below 1 nanograms per gram (ng/g).

A summary of the Phase II and RI sampling locations and exceedances is shown on Figure 3. Phase II and RI soil/fill analytical results are summarized in Tables 1A through 3B.

1.2.2 Radiological Screening Results

Gamma concentrations of slag material identified at interior and exterior locations ranged between 7,240 counts per minute (cpm) to 8,721 cpm (see Table 4). Radiological screening completed by Benchmark at off-site nearby properties generally ranged between 7,000 cpm and 9,000 cpm. While there is no current published radiological guidance, based on Benchmark's experience at similar properties in Western New York, NYSDEC typically compares Site concentrations to 1.5x background, which in this case, using off-site nearby properties, would range between 10,500 cpm and 13,500 cpm. Therefore, gamma concentrations identified at the Site are within range and below 1.5x background.

1.2.3 Transformer Oil Sampling

A transformer room containing three inactive pad-mounted transformers was identified in the southern portion of the building (see Figure 3). Three transformer oil samples, identified as T-1 through T-3, were collected directly from each of the transformers. Analytical results of the oil samples were all non-detect for PCBs and below the United States Environmental Protection Agency (USEPA) PCB Contaminated Threshold of 50 mg/kg (see Table 5). Therefore, the transformers located are non-PCB containing transformers (per USEPA 40 CFR 761).

1.2.4 Groundwater

Groundwater levels measured in monitoring wells prior to groundwater sampling ranged between 2.14 fbgs (SB-21W) and 6.23 fbgs (SB-20W). Groundwater at the Site generally flows in a north/northwesterly direction. Elevated groundwater was identified at SB-21W and is likely representative of an artesian effect and mounding beneath the building slab which provides a water level that is not representative of overburden groundwater levels. Deep groundwater was identified at SB-22W (6.03 fbgs) and is likely not representative of actual groundwater levels at this location as SB-22W was screened in the clay unit only, with minimal groundwater present in the well.

No visual or olfactory concerns were identified in groundwater samples collected from the Site.

Primarily petroleum-related VOCs were detected at concentrations above TOGS 1.1.1 Groundwater Quality Standards/Guidance Values (GWQS/GV) at SB-21W and chlorinated VOCs were detected above GWQS at SB-22W. Groundwater VOC concentrations at SB-21W and SB-22W from the historic Phase II (February 2019) and RI

activities (March 2020) are generally on the same order of magnitude at SB-21W and such have decreased during the most recent sampling at SB-22W. Isopropylbenzene (cumene) slightly exceeds its GWQS at SB-23W. VOC TICs generally non-detect or ranging at estimated concentrations between 13 micrograms per liter (ug/L) and 209 ug/L.

Certain SVOCs, primarily PAHs, were detected at estimated concentrations slightly above GWQS at SB-21W and SB-22W. SVOC TICs generally ranged at estimated concentrations between 2.4 ug/L and 383 ug/L.

Total metals detected above their respective GWQS included arsenic, barium, beryllium, cadmium, chromium, copper, lead, mercury, and nickel. Additional metals above GWQS, most of which are naturally occurring minerals, included iron, magnesium, manganese, sodium, and zinc.

PCBs were not detected at concentrations above laboratory detection limits.

Certain herbicides and pesticides were at concentrations slightly exceeding GWQS at SB-21W and MW-2.

1,4-Dioxane was detected at concentrations slightly exceeding its NYSDEC Emerging Contaminant Action Level (0.35 ug/L) in 4 of the 5 groundwater monitoring wells sampled during the RI.

PFAS were detected at low level (e.g., totals between 2.53 ng/L and 26.01 ng/L) concentrations significantly below NYSDEC Action Levels at SB-21W, SB-22W, MW-1, MW-2, and MW-3.

Monitoring well locations are shown on Figures 3 and 4. Phase II and RI groundwater analytical results are summarized in Tables 6A through 6C.

1.2.5 Soil Vapor Intrusion (SVI) Results

Seven air samples were collected and analyzed for VOCs via Method TO-15 during the RI. Sub-slab vapor and indoor air analytical results in comparison to the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York Decision Matrices indicate "No Further Action (NFA)" with the exception of 1,1,1-trichloroethane (1,1,1-TCA) at SSV-2. Specifically, 1,1,1-TCA was identified in sub-slab air in the southern portion of the building at SSV-2 at a concentration of 1,000 micrograms per cubic meter (ug/m3), which is on the NYSDOH mitigation threshold (1,000 ug/m3 and above).

There does not appear to be an indoor air concern and results of the sub-slab soil vapor sampling indicate a marginal sub-slab vapor concern, which will be further evaluated

and may be directly attributable to VOC groundwater impacts at SB-22W (1,1,1-trichloroethane was identified in groundwater at this location). As further discussed below, an injection is planned to degrade the VOCs in groundwater at SB-22W. As such, we expect that subsurface conditions will improve over time thereby decreasing the concentration of 1,1,1-trichloroethane in sub-slab vapor to NFA at a concentration below the 1,000 ug/m3 threshold. Our approach is to resample sub-slab vapor in the area of SSV-2 as part of the remedial action activities; additional details are provided below in Section 3.8.

Sub-slab vapor, indoor air, and outdoor air locations are shown on Figure 3. Analytical results are summarized in Table 7A and compared to NYSDOH decision matrices in Table 7B.

1.3 Primary Constituents of Concern (COCs)

Based on the historic use of the Site as well as results of the historic and RI activities discussed above, the primary Constituents of Concern (COCs) are presented below:

- ***Soil/Fill:*** PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, pyrene) and metals (arsenic, mercury, and/or lead).
- ***Groundwater:*** Petroleum VOCs at SB-22W (1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, isopropylbenzene, naphthalene, n-propylbenzene, toluene, and total xylenes) and chlorinated VOCs (CVOCs) at SB-21W (1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethane, chloroethane, methylene chloride, and vinyl chloride).
- ***Sub*-Slab Vapor:** CVOC (1,1,1-trichloroethane at SSV-2)

1.4 Site Specific Action Levels (SSALs)

The current redevelopment plan calls for redevelopment of the Site in an industrial capacity as a metal fabrication and distribution facility. Based on this planned future use of the Site, the objective is to obtain a Track 4 Commercial Use cleanup to allow permitted commercial uses in the future.

Per 6NYCRR Part 375-3.8(e)(4), Track 4 soil cleanups may use site-specific information to identify site-specific SCOs (or site-specific action levels; SSALs) that are protective of public health and the environment under a restricted use scenario. For Track 4

remedies, restrictions can be placed on the use of the property in the form of institutional and engineering controls if they can be realistically implemented and maintained in a reliable and enforceable manner. Areas that exceed the applicable SCOs must be covered by material meeting the requirements of the generic soil cleanup table contained in Part 375-6.7(d) for the applicable future site uses (i.e., commercial).

The following SSALS have been established for the Betlem Site which have been used to develop remedial soil/fill excavation areas.

- Total PAHs > 500 mg/kg; this alternative Soil Cleanup Level was employed in lieu of individual commercial SCOs, per NYSDEC Commissioner Policy on Soil Cleanup Guidance (CP-51).
- Total Arsenic > 60 mg/kg; this arsenic SSAL is recommended, in consultation with the Department, based upon the range and frequency of the arsenic concentrations across the Site, and the planned end use of the Site in a commercial/manufacturing capacity.
- Total Lead > 3,900 mg/kg. This SSAL is recommended as such is consistent with the total lead ISCO.
- Total Mercury > 5.7 mg/kg. This SSAL is recommended as such is consistent with the total mercury ISCO.

1.5 Remedial Action Objectives

The remedial actions for the Betlem Site 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 Betlem Site, appropriate RAOs have been defined as:

Soil RAOs

- Remove soil/fill from areas of concern (i.e., soil/fill deemed unacceptable to remain on-Site, even under a Track 4 approach) as necessary to protect public health and the environment.
- Prevent ingestion/direct contact with contaminated soil/fill.
- Implement and maintain engineering and institutional controls to assure that the Site is not used in a manner inconsistent with the reasonably anticipated future use scenario.

Groundwater RAOs

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent ingestion of and/or direct contact with groundwater containing contaminant levels exceeding Standards, Criteria, and Guidance (SCGs).

Soil Vapor RAOs

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

1.6 Summary of Remedial Areas

The following remedial areas (aka "Area of Concern" - AOC) have been identified to address the COCs and RAOs detailed above. Anticipated excavation limits are included for soil remedial areas.

- AOC TP-1 – located at the northern end of the Site, arsenic exceeding the SSAL (60 mg/kg) was identified at TP-1 (145 mg/kg) to a depth of 4 fbgs.
- AOC TP-4 – located in the eastern portion of the Site, arsenic exceeding the SSAL (60 mg/kg) was identified at TP-4 (60.8 mg/kg) to a depth of 4 fbgs.
- AOC TP-5 – located in the central portion of the Site, arsenic exceeding the SSAL (60 mg/kg) was identified at TP-5 (70.4 mg/kg) to a depth of 4 fbgs.
- AOC SB-5 – located in the eastern portion of the Site, arsenic exceeding the SSAL (60 mg/kg) was identified at SB-5 (60.9 mg/kg) to a depth of 4 fbgs.
- AOC SB-2 – located in the eastern portion of the Site, metals including arsenic and mercury were identified at concentrations above their SSAL/ISCO (60 mg/kg and 5.7 mg/kg, respectively), at TP-3 (139 mg/kg and 23.6 mg/kg for arsenic and mercury, respectively) to a depth of 5 fbgs.
- AOC TP-3 – located in the eastern portion of the Site, metals including arsenic, lead, mercury, and manganese were identified at concentrations above their SSAL/ISCOs (60 mg/kg, 3,900 mg/kg, 5.7 mg/kg, and 10,000 mg/kg respectively), at TP-3 (188 mg/kg, 6,440 mg/kg, 52.3, and 19,800 mg/kg for arsenic, lead, mercury, and manganese, respectively) to a depth of 5 fbgs.
- AOC TP-2 – located in the northern portion of the Site, total PAHs exceeding the SSAL (500 mg/kg) was identified at TP-2 (1,212 mg/kg) to a depth of 5 fbgs.
- AOC SS-2 – located in the western portion of the Site, total PAHs exceeding the SSAL (500 mg/kg) was identified at TP-2 (1,455 mg/kg) to a depth of 2 inches below

ground surface; we have assumed an impacted depth of up to approximately 5 fbgs based on nearby investigation locations.

- SB-21W – located in the northwestern portion of the Site, primarily petroleum VOCs including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, isopropylbenzene, naphthalene, n-propylbenzene, toluene, and total xylenes and one CVOC (chloroethene) exceeding GWQS/GV were identified in groundwater.
- SB-22W – located in the southern portion of the Site, CVOCs including 1,1,1-trichloroethane (1,1,1-TCA), 1,1,2-trichloroethane (1,1,2-TCA), 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethane (1,2-DCA), chloroethane, methylene chloride, and vinyl chloride (VC) exceeding GWQS/GV were identified in groundwater.

1.7 Project Organization and Responsibilities

Remedial actions will be completed by remedial contractors under contract to Betlem Associates LLC and/or Benchmark. The work will be performed in accordance with the Brownfield Cleanup Agreement (BCA), the approved RAWP, 6NYCRR Part 375, and NYSDEC DER-10 guidance.

2.0 PREPARATION TASKS

The following tasks were or will be completed in preparation of remedial action activities:

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 and the Citizen Participation (CP) Plan have been made available for public review at the NYSDEC Region 9 office and the Lackawanna Public Library, the designated document repository. Project related documents can also be found on the Department's DECinfo Locator website using the following hyperlink:
https://www.dec.ny.gov/data/DecDocs/C915348/

2.2 Waste Characterization

The soil/fill disposal facility has yet to be chosen; however, waste characterization samples will be collected in accordance with the selected landfill analytical disposal requirements. Pre-characterization of the soil/fill will allow for direct loading and off-site transportation at the time of the impacted soil/fill excavation. Based on the results of the waste characterization sampling, impacted soil will be managed according to all federal, state, and local waste disposal regulations.

Waste characterization samples will be collected at the time of soil/fill Area of Concern (AOC) delineation activities, which are further detailed below.

2.3 Delineation of Soil/Fill AOCs

Delineation of exterior soil/fill AOCs will be completed as an initial step in the remedial process to identify horizontal and vertical excavation limits; delineation samples will serve as end-point post-excavation samples. Approximate unconfirmed excavation boundaries for each soil/fill AOC are depicted on Figure 5. Additional information relative to the confirmatory soil/fill sample frequency and laboratory analytical scheme is provided below in Section 3.2.

Sidewall and bottom delineation soil/fill samples will be collected using an excavator from the approximate soil/fill AOC boundaries shown on Figure 5; confirmatory samples

will be biased to visually impacted portions of the delineation excavation limits. The anticipated horizontal and vertical limits of each excavation are included in Section 3.1. Delineation samples will be collected from these proposed limits (generally a 20-foot or 30-foot diameter centered on the Phase II/RI location and a 4 to 5 ft depth). Additional step-out sidewall delineation samples, from an additional 10 feet (generally a 30-foot or 40-foot diameter), will be collected and placed on hold pending laboratory analytical results of the initial soil/fill samples. Similarly, a bottom (vertical) delineation sample will be collected approximately 1 ft below the original sample location and placed on hold pending laboratory analytical results of the initial soil/fill samples. If favorable results are obtained for the initial soil/fill samples, then the step-out horizontal and vertical delineation samples won't be analyzed by the laboratory. The soil/fill delineation samples will be analyzed by the laboratory in the event that exceedances are identified in the initial samples.

If both the initial delineation soil/fill sample and the step-out soil/fill sample exceeds its SSAL, additional soil/fill samples may be collected by Benchmark for delineation purposes, in consultation with the Department.

The soil/fill sidewall and bottom samples collected during the delineation work will be considered remedial endpoint/post-excavation samples where concentrations do not exceed the remedial goals (CSCOs or SSALs) established for the Site or otherwise in consultation with the Department.

2.4 Mobilization and Site Preparation

Prior to mobilization and site preparation, a Site-Specific Health and Safety Plan (HASP) will be prepared by the remedial contractor selected for the project.

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.

2.6 Access Controls

Temporary safety construction fencing (e.g., 6-foot chain link) will be placed around the perimeter of the Site, where needed, during remedial activities, restricting access from public access area around the Site. 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 workday to ensure safe operations. Access control will consider site worker and general public safety. And tenant access requirements, if necessary.

2.7 Erosion and Sediment Control

Provisions will be made for erosion and sedimentation control (silt fencing/silt sock) at the downgradient Site perimeter during remediation and redevelopment activities. The storm water controls will be in place prior to disturbance of soil/fill materials and be maintained throughout excavation activities. Provisions will be made to keep surrounding sidewalks and roadways free of soil from construction and trucking activities.

2.8 Utility Clearance

Prior to intrusive activities, Dig Safely New York (Call 811) will be contacted by the site contractor at a minimum of three (3) business days in advance of the work and informed of the intent to perform excavation work at the Site.

2.9 Health and Safety Plan Development

A HASP will be prepared and enforced by the remediation contractor(s) in accordance with the requirements of 29 CFR 1910.120. The HASP will cover all on-site remedial activities. Benchmark will be responsible for the health and safety of its authorized site workers. Benchmark HASP is provided in Appendix A. The remediation contractor will be required to develop a HASP as or more stringent than Benchmark HASP.

2.9.1 Dust Monitoring and Controls

A Community Air Monitoring Plan (CAMP), included herein as Appendix B, will be implemented in accordance with DER-10, Appendices 1A and 1B (Generic Community Air Monitoring Plan and Fugitive Dust and Particulate Monitoring, respectively, during intrusive activities during exterior and interior remediation work. If community air monitoring indicates the need for dust suppression, 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, provided by an off-site water service, or provided via a water truck with water from an off-site source. Other dust suppression techniques that may be used to supplement the water spray include:

- Hauling materials in properly tarped containers or vehicles.
- Restricting vehicle speeds on-Site.
- Hydro-seeding of final grades.

3.0 REMEDIAL ACTION ACTIVITIES

The NYSDEC will be notified at least 5 business days in advance of any planned remedial activities. Waste characterization sampling, excavation, soil/fill delineation/post-excavation confirmatory sampling, backfilling/site grading/cover placement, transformer removal, and groundwater injection activities will be performed in accordance with this work plan.

3.1 Remedial Excavation Activities

Remedial work will be documented by an experienced Benchmark professional and will involve excavation until the applicable Part 375 Soil Cleanup Objectives (SCOs) and/or SSALs are met on the excavation floor/walls, the BCP Site boundaries are reached, the feasible horizontal and/or vertical limits of excavation have been reached, or NYSDEC agrees no further excavation activities are required.

The impacted soil/fill to be excavated and transported off-site for disposal are further described below. AOC remedial excavation locations are shown on Figure 4.

Arsenic-Impacted Areas: Arsenic was identified as the contaminant of concern at four locations at concentrations above the SSAL of 60 mg/kg.

AOC TP-1: An approximate 30-ft by 30-ft area (900 square feet) will be excavated to an approximate depth of 4 fbgs. It has been estimated that approximately 200 tons of soil/fill will be removed and disposed of off-site at a permitted commercial solid waste landfill.

AOC TP-4: An approximate 20-ft by 20-ft area (400 square feet) will be excavated to an approximate depth of 4 fbgs. It has been estimated that approximately 90 tons of soil/fill will be removed and disposed of off-site at a permitted commercial solid waste landfill.

AOC TP-5: An approximate 20-ft by 20-ft area (400 square feet) will be excavated to an approximate depth of 4 fbgs. It has been estimated that approximately 90 tons of soil/fill will be removed and disposed of off-site at a permitted commercial solid waste landfill.

AOC SB-5: An approximate 20-ft by 20-ft area (400 square feet) will be excavated to an approximate depth of 4 fbgs. It has been estimated that approximately 90 tons of

soil/fill will be removed and disposed of off-site at a permitted commercial solid waste landfill.

Metal-Impacted Areas: Arsenic, lead, and/or mercury were identified at concentrations above their SSAL/ISCOs (60 mg/kg, 3,900 mg/kg, 5.7 mg/kg, and 10,000 mg/kg respectively) at two locations.

AOC SB-2: An approximate 30-ft by 30-ft area (900 square feet) will be excavated to an approximate depth of 5 fbgs. It has been estimated that approximately 250 tons of soil/fill will be removed and disposed of off-site at a permitted commercial solid waste landfill.

AOC TP-3: An approximate 30-ft by 30-ft area (900 square feet) will be excavated to an approximate depth of 5 fbgs. It has been estimated that approximately 250 tons of soil/fill will be removed and disposed of off-site at a permitted commercial solid waste landfill.

PAH-Impacted Areas: PAH-impacted soil/fill was identified at two locations at concentrations above the SSAL of 500 mg/kg for total PAHs.

AOC TP-2: An approximate 30-ft by 30-ft area (900 square feet) will be excavated to an approximate depth of 5 fbgs. It has been estimated that approximately 250 tons of soil/fill will be removed and disposed of off-site at a permitted commercial solid waste landfill.

AOC SS-2: An approximate 15-ft by 30-ft area (450 square feet) will be excavated to an approximate depth of 5 fbgs. It has been estimated that approximately 125 tons of soil/fill will be removed and disposed of off-site at a permitted commercial solid waste landfill.

As previously discussed, delineation soil/fill samples, to serve as end-point post-excavation samples, will be collected prior to excavation activities to determine the actual horizontal and vertical extents of each AOC excavation. Delineation/post-excavation samples will be collected as discussed below in Section 3.2 to confirm the impacted soil/fill has been removed. Actual site conditions (e.g., visual and/or confirmatory sample analytical results) will dictate final excavation limits. Additional soil/fill removal will be completed, if necessary, based on the delineation/confirmatory results and discussion with NYSDEC.

Once waste characterization and delineation sampling are completed, the contractor will excavate and direct load soil/fill from the excavation areas into trucks for off-site disposal. If soil/fill is to be excavated and stockpiled, it will be covered with poly-sheeting and secured at the end of each workday.

Final excavation limits will be surveyed with a handheld Trimble GeoXH GPS unit (or equivalent) and average excavation depths will be manually measured in the field. Horizontal limits and locations of final remedial excavations will be presented on the Site Map in the Final Engineering Report (FER).

Care will be taken to minimize dust formation during excavation and loading and to prevent any dust or mud from being tracked off-Site. The excavation equipment will have sufficient boom length to allow for placement of soil/fill directly into the truck bed if ground surface conditions are conducive to truck traffic (e.g., dry and firm).

As referenced in the HASP (Appendix A, Section 12.3) The Contractor, in accordance with their approved Health and Safety Plan will conduct decontamination of heavy equipment. As a minimum, this will include manually removing visual soil contamination prior to demobilization.

3.2 Confirmation Sampling

Delineation/post excavation confirmatory soil/fill samples will be collected from the remedial excavation areas. Specifically, a minimum of one (1) sample per 30 linear feet of sidewall and one (1) sample for each 900 square feet of excavation bottom will be used to confirm the excavation limits meet SSALs and/or applicable SCOs (Commercial SCOs).

Confirmatory soil/fill samples will be analyzed for the following parameters:

Arsenic-Impacted Areas (TP-1, TP-4, TP-5, SB-5): Total arsenic via EPA Method 6010.

Metal-Impacted Areas (SB-2, TP-3): Total arsenic via EPA Method 6010 and total mercury via EPA Method 7471 at SB-2; Total arsenic and lead via EPA Method 6010, and total mercury via EPA Method 7471 at TP-3.

PAH-Impacted Areas (TP-2, SS-2): Total PAHs via EPA Method 8270.

An equivalent Category B deliverables package will be furnished with the data to allow data evaluation and preparation of a Data Usability Summary Report (DUSR) by an independent, third-party data validation expert. Expedited turnaround times may be requested for the analytical results to minimize the time that the excavation(s) remains open. Quality Assurance (QA) samples will be collected to support the verification sample data

evaluation. The QA samples will include a minimum of one matrix spike, one matrix spike duplicate, and one blind duplicate per 20 verification samples. Dedicated equipment will be used to avoid the need for equipment blanks.

3.3 Excavation Backfill and Demarcation Layer

Following NYSDEC concurrence that the remedial excavation is complete the excavation will be backfilled with approved backfill material in accordance with DER-10.

Backfill material may consist of the following materials:

- Gravel, rock, or stone, consisting of virgin material, from a permitted mine or quarry may be imported, without chemical testing, if it meets the requirements of DER-10, or as otherwise approved by NYSDEC.
- Recycled concrete or brick from a NYSDEC-registered construction and demolition debris processing facility may be imported, without chemical testing, if it meets the requirements of DER-10, or as otherwise approved by NYSDEC.
- Imported soil/fill originating from known off-site sources having no evidence of disposal or releases of hazardous substances, hazardous, toxic or radioactive wastes, or petroleum, and which meets the chemical criteria for Commercial Use Sites in DER-10, Appendix 5. 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.
- Reuse of on-site soil/fill, including excavated overburden soil/fill removed to access impacted soil or to meet final site grades; these materials will only be utilized below the soil cover system. The soil/fill will be PID screened prior to being used as backfill.

Following NYSDEC concurrence that the remedial excavation is complete, a demarcation layer consisting of orange mesh or equivalent material will be laid down prior to placement of backfill. The demarcation layer will provide a visual reference to the top of the remaining contamination and require adherence to special conditions for disturbance of remaining contaminated soils in the Site Management Plan (SMP). The demarcation layer is further referenced in Section 3.5.

Imported soil/fill material will be subject to characterization requirements in accordance with DER-10 Table 5.4(e)10, or as otherwise approved by NYSDEC prior to import to the Site. Characterization testing will be performed by an independent, NYSDOH Environmental Laboratory Accreditation Program (ELAP)-approved laboratory. An equivalent Category B deliverables package will be furnished with the data to allow data

evaluation and preparation of a Data Usability Summary Report by an independent, third-party data validation expert. QA samples will be collected to support the data evaluation. The QA samples will include a minimum of one matrix spike, one matrix spike duplicate, and one blind duplicate per 20 verification samples.

3.4 Groundwater Management

If deemed necessary, water removed from excavations and surface water run-in to excavations during the impacted soil removal will be handled on-site prior to discharge to the municipal sewer. In general, water removed from excavations will be stored/settled in a portable storage (frac) tank, and subsequently pumped through a bag or cartridge filter prior to treatment using granular activated carbon (GAC). Treated groundwater will be discharged into the municipal sanitary sewer in accordance with a temporary discharge permit; Benchmark, the Site owner, or their designated representative will coordinate with the municipal sanitary sewer (Erie County Sewer District #3) to obtain any necessary temporary sewer discharge permits.

Following completion of excavation work, the frac tank will be decontaminated via pressure washing. Settled solids remaining in the frac tank and spent filter bags will be disposed of off-site. In addition, the spent GAC will be characterized and regenerated off-site, or disposed at a permitted disposal facility in accordance with applicable federal and state regulations.

3.5 Cover System

A cover system will be installed across the Site to prevent direct contact with underlying soil. The planned cover system includes two different hardscape cover types (building footprint and recycled concrete). The existing railroad tracks will remain as a part of the cover system, as they serve as a functional part of future Site use. A planned cover system layout is provided on Figure 6.

As previously discussed, in areas with recycled concrete cover, 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 and require adherence to special conditions for disturbance of remaining contaminated soils in the SMP. Where recycled concrete cover system transitions to hardscape, and/or at the limits of the BCP property, the cover will be keyed-in as necessary to achieve the minimum 12-inches of approved backfill material needed, without tapering. We note that recycled concrete, which was sourced from

DOT-approved ready mix from the Skyway bridge deck renovation/removal project and crushed to 2" minus, is planned for import as hardscape cover material and excavation backfill. A minimum of 1 ft of recycled concrete will be compacted and placed atop subgrade/subbase; this thickness is consistent with a Track 4 Commercial Cleanup.

3.6 Transformer Disposal

A transformer room containing three inactive pad-mounted transformers exists in the southern portion of the building. Analytical results of oil samples collected from the three transformers indicated that all three transformers are non-PCB containing transformers. The transformers and oil will be properly disposed as non-hazardous waste.

3.7 In-Situ Groundwater Treatment

Based on the data collected during the RI, localized groundwater VOC impacts were identified within the building footprint at SB-22W (upgradient well in the southwestern portion of the building) and SB-21W (downgradient well in the northwestern portion of the building). Groundwater has a north/northwesterly flow direction.

Specifically, VOCs exceeding GWQS include 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, isopropylbenzene, naphthalene, n-propylbenzene, toluene, and total xylenes at SB-21W and 1,1,1-TCA, 1,1,2-TCA, 1,1-DCA, 1,1-DCE, 1,2-DCE, chloroethane, methylene chloride, and VC at SB-22W. Impacted groundwater in the area of SB-21W and SB-22W will be addressed via the application of In-Situ Enhanced Biodegradation Reagents, as discussed in the following Sections.

3.7.1 Technology Description

Biodegradation agents to be injected at SB-21W and SB-22W were selected based on the primary COCs at each location; petroleum VOCs at SB-21W and CVOCs at SB-22W. Approximate injection locations are depicted on Figure 7. The amendments were developed by Regenesis Corporation and include:

- SB-21W: PetroFix™ Remediation Fluid
- SB-22W: 3-D Microemulsion® and S-MicroZVI®

PetroFix™ is a black, viscous, highly saturated liquid consisting of 1 to 2 micrometer activated carbon particles and electron acceptors suspended in water. The activated carbon

readily absorbs hydrocarbons in the groundwater. Once adsorbed to the carbon particles, biodegradation is stimulated by adding a mixture of ammonium sulfate and sodium nitrate, which act as electron acceptors. The electron acceptors stimulate biodegradation in an anaerobic environment by providing the conditions necessary for the existing microbes to break down contamination through a series of redox reactions. Although the addition of electron acceptors stimulates biodegradation, these processes will continue after they have been exhausted, allowing for long-term biodegradation and remediation.

3-D Microemulsion® (3DME) is a slightly viscous lactic acid-based liquid that is mixed with water and 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 dichlorination. 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 dichlorination process for up to four years.

S-MicroZVI® is an in-situ chemical reduction reagent composed of colloidal, sulfidated zero-valent iron particles suspended in glycerol using proprietary environmentally acceptable dispersants. S-MicroZVI® can destroy chlorinated contaminants through direct chemical reaction and will also stimulate anaerobic biological degradation by rapidly creating a reducing environment that is favorable for reductive dichlorination.

Information regarding the amendments, Safety Data Sheets (SDSs) and application instructions are included in Appendix C. The reagents will be delivered 55-gallon drums to the Site and properly stored on Site within the building until the injections occur.

Prior to implementing the in-situ groundwater treatment, an underground injection permit will be obtained from the USEPA.

3.7.2 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 amendments in two areas of the Site, in the area of SB-21W and SB-22W (see Figure 7).

The treatment area for SB-21W is approximately 400 square feet, and the treatment interval will target a depth of 9 to 14 feet. The depth to groundwater in the vicinity of SB-21W is approximately 2.14 fbgs. Approximately 1,228 gallons of a mixture consisting of

approximately 41 gallons of product (400 lbs of activated carbon and 20 lbs of electron acceptor mixture) and 1,187 gallons of water will be injected into this area in a grid-like pattern via direct-push delivery probes. The mixture will be prepared on-site in a mixing tank prior to injection. Approximately 9.2 gallons of activated carbon and 4.5 lbs of the electron acceptor mixture will be mixed with 265.8 gallons of water (dilutions may be modified in the field based upon achieved application rates). Approximately 136 gallons of the mixture will be injected at each of the nine injection points within the 400 square-foot area (see Figure 7). Dilutions may be modified in the field based upon achieved application rates; any modifications to these protocols will be documented in the FER.

The treatment area for SB-22W is approximately 400 square feet, and the treatment interval will target a depth of 9 to 14 feet. The depth to groundwater in the vicinity of SB-22W is approximately 6.03 fbgs. Approximately 881 gallons of a mixture consisting of approximately 48 gallons of 3DME (400 lbs), 10 gallons of S-MicroZVI® (150 lbs), and 824 gallons of water will be injected into this area in a grid-like fashion via direct-push delivery probes. The mixture will be prepared on-site in a mixing tank prior to injection. Approximately 8 gallons of 3DME and 2 gallons of S-MicroZVI® will be mixed with 137 gallons of water and injected into each of the six injection points within the 400 square-foot area (see Figure 7). Dilutions may be modified in the field based upon achieved application rates; any modifications to these protocols will be documented in the FER.

3.7.3 Groundwater Monitoring

A groundwater sampling program will be implemented to evaluate the effectiveness of the in-situ groundwater treatment program. Quarterly groundwater sampling will be completed for TCL plus CP-51 VOC via EPA Method 8260 at SB-21W and SB-22W to monitor the short-term effectiveness of the in-situ treatment prior to obtaining the Certificate of Completion (COC). Groundwater monitoring will continue until NYSDEC concurrence is obtained that remedial objectives have been achieved. Additional details of long-term groundwater monitoring will be provided in the SMP, which is a component of the overall Site Remedy.

Groundwater sampling will be completed consistent with the approved RI Work Plan utilizing low-flow techniques. In addition to VOC analysis, standard field measured parameters (pH, specific conductance, dissolved oxygen, redox potential, temperature, and turbidity) will be monitored.

Groundwater data will be provided to the NYSDEC after each monitoring event. Additional analytical parameters to evaluate effectiveness of the in-situ treatment may include, total dissolved iron, sulfate, and nitrate, if deemed necessary.

Monitoring wells not planned for future use will be decommissioned with NYSDEC approval in accordance with NYSDEC CP-43: Groundwater Monitoring Well Decommissioning Policy.

3.8 SVI Investigation/Active Sub-slab Depressurization (ASD) System

1,1,1-TCA was identified in sub-slab air in the southern portion of the building at SSV-2 at a concentration of 1,000 ug/m3, which is at the NYSDOH mitigation threshold (1,000 ug/m3 and above). There does not appear to be an indoor air concern and results of the sub-slab soil vapor sampling indicate a marginal sub-slab vapor concern, which will be further evaluated and may be directly attributable to VOC groundwater impacts at SB-22W (1,1,1-TCA was identified in groundwater at this location). As an injection is planned to degrade the VOCs in groundwater at SB-22W, we expect that subsurface conditions will improve over time thereby decreasing the concentration of 1,1,1-TCA in sub-slab vapor to a concentration below the 1,000 ug/m3 threshold. The planned use of the Site for commercial/industrial purposes further reduces this concern

Therefore, six weeks after completion of groundwater injection activities or the start of heating season, whichever is greater, one additional sub-slab sample (SSV-2R1) and one concurrent indoor air sample (IA-2R1) will be collected from the area of SSV-2/IA-2 for VOC analysis by TO-15. If chlorinated VOC exceedances above the NYSDOH decision matrices are identified, a formal ASD System Work Plan (ASDWP) will be submitted for NYSDEC/NYSDOH review and approval prior to the installation of an ASD system. If required, the ASD system will be designed in general accordance with the NYSDOH "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" dated October 2006.

If the IA/SSV VOC analytical results indicate no further action in comparison to the decision matrices, we understand that the Department is requiring indoor air sampling in the SSV-2/IA-2 area as a post-COC monitoring requirement under the SMP.

4.0 REMEDIAL ACTIVITIES SUPPORT DOCUMENTS

4.1 Health and Safety Protocols

Benchmark has prepared a 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 A, 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 CAMP as described above.

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). The SSHO 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 remedial activities at the Site. A Community Air Monitoring Plan is included as Appendix B. Particulate and VOC monitoring will be performed in the upwind and downwind directions of the work areas during subgrade excavation, grading, and soil/fill handling activities in accordance with this plan. The CAMP is consistent with the requirements for community air monitoring at remediation sites as established by the NYSDOH and NYSDEC. Accordingly, it follows procedures and practices outlined under DER-10 Appendix 1A (NYSDOH's Generic

Community Air Monitoring Plan) and Appendix 1B (Fugitive Dust and Particulate Monitoring).

4.2 Citizen Participation Activities and Fact Sheets

NYSDEC will coordinate and lead community relations throughout the course of the project with support from Benchmark as requested. A CP Plan has previously been prepared as a separate document and submitted to the NYSDEC. A copy of the approved CP Plan was placed at the designated document repository.

The NYSDEC, with input from Benchmark and Betlem Associates LLC, will issue project-related fact sheets to keep the public informed of BCP activities.

5.0 REPORTING AND SCHEDULE

Benchmark environmental professionals will be on-site full-time during all major remedial activities to monitor and document: construction stake-out; record drawings; daily reports of remediation activities; community air monitoring results; post-excavation sampling and analysis; and progress photographs and sketches. Full details of the remedial activities will be included in the FER.

Remedial work is expected to commence in the near future following NYSDEC approval of the RAWP and completion of soil/fill AOC work.

6.0 REMEDIAL ACTIVITIES REPORTING

6.1 Construction Monitoring

A Benchmark Scientist or Engineer will be on-site on a full-time basis to document remedial activities. Such documentation will include, at minimum, daily reports of Remedial Action activities, community air monitoring results, photographs, and sketches. Appendix D contains sample project documentation forms. The CAMP data will be provided to the NYSDEC and NYSDOH Project Managers via email on a weekly basis.

The completed reports will be available on-site and submitted to the NYSDEC as part of the FER. The NYSDEC will be promptly notified of problems requiring modifications to this Work Plan prior to proceeding or completion of the construction item.

Photo documentation of the remedial 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. If determined to be necessary, periodic on-site construction progress meetings will be held to which NYSDEC will receive an invitation.

6.2 Final Engineering Report

A 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.
- Planimetric map showing the areas remediated, including significant site features.
- Map(s) showing the lateral limits and depths of any excavation and/or treatment areas including a NYS-licensed professional engineer certification.
- Map showing the engineering controls established for the Site including a NYS-licensed professional engineer certification.
- Tabular summaries of unit quantities including: volume of soil excavated and/or treated and disposition of excavated/treated soil; and, origin and volume of imported soil.
- Planimetric map showing location of all verification and other sampling locations with sample identification labels/codes.

- Tabular comparison of verification and other sample analytical results to SCOs and SSALs. An explanation shall be provided for any results exceeding acceptance criteria.
- Documentation on the disposition of impacted soil removed.
- Documentation of the cover system, including survey elevations.
- 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.

In addition, Betlem Associates LLC will subcontract for third-party data review of post-excavation verification data by a qualified, independent data validation expert. Specifically, a DUSR will be prepared, with appropriate data qualifiers added to the results. The DUSR format will follow the NYSDEC's September 1997 DUSR guidelines and draft DER-10 guidance. The DUSR and any necessary qualifications to the data will be appended to the FER.

6.3 Site Management Plan

For any BCP site not cleaned up to NYSDEC Part 375 Unrestricted SCOs (USCOs), preparation of a SMP 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, a SMP will be prepared. Consistent with NYSDEC BCP requirements, the SMP will include the following components:

- **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 commercial or industrial purposes.
- **Operation and Maintenance Plan** that describes the measures necessary to operate, monitor, and maintain the soil cover system and ASD system (if needed).

- **Excavation Work Plan** to assure that post-remediation intrusive activities and soil/fill handling at the Site related to redevelopment, operation, and maintenance 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 remain effective.
- **Environmental Easement** filed with Erie County.

7.0 REFERENCES

1. New York State Department of Environmental Conservation. *6 NYCRR Part 375 Environmental Remediation Programs Subparts 375-1 to 375-4 and 375-6*. Effective December 14, 2006.
2. New York State Department of Environmental Conservation. *DER-10 Technical Guidance for Site Investigation and Remediation.* May 2010.
3. Benchmark Environmental Engineering & Science, PLLC. *Remedial Investigation/Alternatives Analysis Report, Betlem Site, BCP Site Number: C915348, Hamburg (Village of Blasdell), New York*. July 2020, Revised March 2021.
4. Benchmark Environmental Engineering & Science, PLLC, *Work Plan for Remedial Investigation*. Betlem Site (C915348). May 2019, Revised January 2020.
5. New York State Department of Environmental Conservation. *Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards And Guidance Values And Groundwater Effluent Limitations*. June 1998.
6. New York State Department of Health. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. October 2006.
7. New York State Department of Environmental Conservation. *CP-51 Soil Cleanup Guidance*. October 2010.

TABLES

BENCHMARK

TABLE 1A

SUMMARY OF RI SURFACE SOIL/FILL ANALTICAL RESULTS
REMEDIAL ACTION WORK PLAN

BETLEM SITE
BCP SITE NO. C915348
HAMBURG, NEW YORK

PARAMETER [1]	Unrestricted Use SCOs [2]	Commercial Use SCOs [2]	Industrial Use SCOs [2]	Remedial Investigation Sample Location (Depth- inches)					
				SS-1 (0-2")	SS-2 (0-2")	SS-3 (0-2")	SS-4 (0-2")	SS-5 (0-2")	SS-6 (0-2")
				03/18/2020					
TCL Volatile Organic Compounds (VOCs) - mg/Kg [3]									
Acetone	**0.05**	**500**	**1000**	ND	ND	NT	ND	NT	0.016 J
Naphthalene	**12**	**500**	**1000**	0.002 J	0.0026 J	NT	ND	NT	0.0011 J
Total VOC TICs	--	--	--	ND	0.0099 TJN	NT	ND	NT	0.056 TJN
TCL Semi-Volatile Organic Compounds (SVOCs) - mg/Kg [3]									
Acenaphthene	**20**	**500**	**1000**	1.8 J	18 J	ND	ND	1.4 J	2.8 J
Anthracene	**100**	**500**	**1000**	4.4	29	ND	ND	ND	4.2 J
2-Methylnaphthalene	--	--	--	ND	4.6 J	ND	ND	ND	ND
Benzo (a) anthracene	**1**	**5.6**	**11**	**10**	**120**	ND	**3.6 J**	**7.6 J**	**10**
Benzo(a)pyrene	**1**	**1**	**1.1**	**8.6**	**120**	ND	**3.6 J**	**7.1 J**	**9.6 J**
Benzo (b) fluoranthene	**1**	**5.6**	**11**	**11**	**160**	**15 J**	**4.7 J**	**8.5 J**	**12**
Benzo (g,h,i) perylene	**100**	**500**	**1000**	5.4	87	ND	3.1 J	4.9 J	7.8 J
Benzo (k) fluoranthene	**0.8**	**56**	**110**	**5.2**	**67**	ND	**1.7 J**	**4.7 J**	**6.4 J**
Chrysene	**1**	**56**	**110**	**9.6**	**130**	ND	**3.6 J**	**7.7 J**	**11**
Carbazole	--	--	--	2.5 J	22	ND	ND	1.7 J	2.8 J
Dibenzo(a,h)anthracene	**0.33**	**0.56**	**1.1**	**1.7 J**	**27**	ND	ND	ND	**2.4 J**
Dibenzofuran	**7**	**350**	**1000**	1.3 J	**9.8 J**	ND	ND	ND	1.6 J
Fluoranthene	**100**	**500**	**1000**	20	**250**	26 J	7.4 J	15	24
Fluorene	**30**	**500**	**1000**	2 J	15 J	ND	ND	ND	2.3 J
Indeno (1,2,3-cd) pyrene	**0.5**	**5.6**	**11**	**5.3**	**79**	ND	**2.7 J**	**5.1 J**	**6.9 J**
Naphthalene	**12**	**500**	**1000**	1.2 J	**13 J**	ND	ND	ND	ND
Phenanthrene	**100**	**500**	**1000**	18	**150**	17 J	5.4 J	12	19
Pyrene	**100**	**500**	**1000**	16	**190**	20 J	5.6 J	14	18
Total SVOC TICs	--	--	--	17 TJN	534 TJN	ND	ND	ND	ND
			Total PAHS	120.2 J	**1455 J**	78 J	41.4 J	88 J	136.4 J
			Total SVOCs	124 J	1491.4 J	78 J	41.4 J	89.7 J	140.8 J
TAL Metals - mg/Kg									
Aluminum	--	--	--	5620	20200	7460	13700	15900	22800
Arsenic	**13**	**16**	**16**	7.6	2.2 J	2.2	6.8 F2	**18.2**	**17.3**
Barium	**350**	**400**	**10000**	50.2 J	130	49.4	180 F1	104	335
Beryllium	**7.2**	**590**	**2700**	0.51	4.9	1.1	1.5	1.3	3.5
Cadmium	**2.5**	**9.3**	**60**	0.94	1.5	0.2 J	0.56	0.58	0.49
Calcium	--	--	--	124000 J-	81900 B	186000 B	92100 B	34300 B	141000 B
Chromium	**30**	**1500**	**6800**	**796 J**	29.7	**35.8**	**50.2 F2 F1**	23.7	**32.3**
Cobalt	--	--	--	2.6	2.3	1.8	4.4	8	3.2
Copper	**50**	**270**	**10000**	31.5	**71.7**	18.5	23.2	30	41.5
Iron	--	--	--	116000 J-	7060	7480	13800	24500	17300
Lead	**63**	**1000**	**3900**	46.3 J	**68.8**	19.3	**92.5 F1**	32.6	**74.7**
Magnesium	--	--	--	26700	19900	12100	12400 F2	4600	12600
Manganese	**1600**	**10000**	**10000**	**20100 J**	**2010 B**	940 B	1250 F2 B	718 B	**3750 B**
Mercury	**0.18**	**2.8**	**5.7**	0.038	0.051	0.0099 J	0.072	**0.36**	**0.25**
Nickel	**30**	**310**	**10000**	15.1	7.2	10	19.8 F2 F1	20.3	14.6
Potassium	--	--	--	823	1050	781	1720	1630	1950
Selenium	**3.9**	**1500**	**6800**	ND	0.99 J	ND	ND	1.1 J	1.3 J^
Silver	**2**	**1500**	**6800**	ND	0.31 J	ND	ND	ND	ND
Sodium	--	--	--	158 J	609	243	693	152 J	563
Vanadium	--	--	--	426	10.2	12.8	26.2	22.3	14.2
Zinc	**109**	**10000**	**10000**	**145 J**	**1940**	45.3	**207 F2**	**198**	**113**
Cyanide, Total	**27**	**27**	**10000**	ND	ND	ND	ND	0.63 J	0.81 J
Polychlorinated Biphenyls (PCBs) - mg/Kg									
Aroclor 1254	--	--	--	ND	NT	NT	0.25 J	NT	NT
Total PCBs	**0.1**	**1**	**25**	ND	NT	NT	**0.25**	NT	NT
Pesticides 8081/Herbicides 8082 - mg/Kg [3]									
4,4'-DDT	**0.0033**	**47**	**94**	**0.051 J**	NT	NT	**0.043 J**	NT	NT
4,4'-DDD	**0.0033**	**92**	**180**	ND	NT	NT	**0.027 J F1**	NT	NT
gamma-BHC (Lindane)	**0.1**	**9.2**	**23**	0.022 J	NT	NT	ND	NT	NT
Methoxychlor	--	--	--	ND	NT	NT	ND	NT	NT
Pentachlorophenol	**0.8**	**6.7**	**55**	0.018 J	NT	NT	ND	NT	NT
Perfluorinated Alkyl Acids - ng/g									
Perfluorobutanoic Acid (PFBA)	--	--	--	ND	NT	NT	ND	NT	NT
Perfluoroheptanoic Acid (PFHpA)	--	--	--	0.043 J	NT	NT	0.055 JI	NT	NT
Perfluorooctanoic Acid (PFOA)	**0.66**	**500**	**600**	0.11 J	NT	NT	0.14 J	NT	NT
Perfluorononanoic Acid (PFNA)	--	--	--	0.047 J	NT	NT	0.05 J	NT	NT
Perfluorooctanesulfonic Acid (PFOS)	**0.88**	**440**	**440**	ND	NT	NT	ND	NT	NT
Perfluorodecanoic Acid (PFDA)	--	--	--	0.084 J	NT	NT	0.1 JI	NT	NT
Perfluoroundecanoic Acid (PFUnA)	--	--	--	0.12 J	NT	NT	ND	NT	NT
Perfluorodecanesulfonic Acid (PFDS)	--	--	--	ND	NT	NT	0.059 J	NT	NT
Perfluorododecanoic Acid (PFDoA)	--	--	--	0.09 J	NT	NT	ND	NT	NT
PFOA + PFOS	--	--	--	0.11	NT	NT	0.14	NT	NT

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) and Sampling, Analysis, and Assessment of PFAS Guidance October 2020.
3. Sample results were reported by the laboratory in ug/kg and converted to mg/kg for comparisons to SCOs.

Definitions:

B = Compound was found in the blank and the sample.
F1 = MS and/or MSD recovery exceeds control limits.
F2 = MS/MSD RPD exceeds control limits.
I = Value is EMPC (estimated maximum possible concentration).
J = Estimated value; result is less than the sample quantitation limit but greater than zero.
J- = The analyte was positively identified; the associated numerical value is an estimated quantity that may be biased low.
N = Presumptive evidence of material
ND = Parameter not detected above laboratory detection limit.
NT = Not Tested.
T = Result is a TIC and an estimated value.
TICs = Tentatively Identified Compounds.
^ = ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.
"--" = No SCO for parameter.

Bold	= Result exceeds Unrestricted Use SCOs.
Bold	= Result exceeds Commercial Use SCOs.
Bold	= Result exceeds Industrial Use SCOs.

BENCHMARK

TABLE 1B

SUMMARY OF RI SURFACE SOIL/FILL TIC ANALTICAL RESULTS

REMEDIAL ACTION WORK PLAN

BETLEM SITE

BCP SITE NO. C915348

HAMBURG, NEW YORK

PARAMETER [1]	Remedial Investigation Sample Location (Depth- inches)					
	SS-1 (0-2")	SS-2 (0-2")	SS-3 (0-2")	SS-4 (0-2")	SS-5 (0-2")	SS-6 (0-2")
	03/18/2020					
VOC Tentatively Identified Compounds (TICs) - mg/Kg [2]						
Caryophyllene	ND	ND	NT	ND	NT	0.027 T J N
Nonane	ND	0.0099 T J N	NT	ND	NT	ND
Unknown (sum)	ND	ND	NT	ND	NT	0.029 T J
Total VOC TICs	ND	0.0099 TJN	NT	ND	NT	0.056 TJN
SVOC Tentatively Identified Compounds (TICs) - mg/Kg [2]						
1,2:3,4-Dibenzopyrene	ND	48 T J N	ND	ND	ND	ND
1,2:4,5-Dibenzopyrene	ND	17 T J N	ND	ND	ND	ND
1H-Cyclopropa[l]phenanthrene,1a,9b-dihydro-	ND	17 T J N	ND	ND	ND	ND
11H-Benzo[b]fluorene	ND	16 T J N	ND	ND	ND	ND
3,4:8,9-Dibenzopyrene	ND	36 T J N	ND	ND	ND	ND
5,12-Naphthacenedione	ND	21 T J N	ND	ND	ND	ND
9,10-Anthracenedione	ND	37 T J N	ND	ND	ND	ND
Benzo[b]triphenylene	ND	25 T J N	ND	ND	ND	ND
Benzo[e]pyrene	ND	30 T J N	ND	ND	ND	ND
Dibenzo[def,mno]chrysene	ND	33 T J N	ND	ND	ND	ND
Perylene	6.2 T J N	84 T J N	ND	ND	ND	ND
Phenanthrene, 1-methyl-	ND	24 T J N	ND	ND	ND	ND
Unknown (sum)	10.8 T J	146 T J	ND	ND	ND	ND
Total SVOC TICs	17 TJN	534 TJN	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. Sample results were reported by the laboratory in ug/kg and converted to mg/kg for comparisons to SCOs.

Definitions:

J = Estimated value; result is less than the sample quantitation limit but greater than zero.
N = Presumptive evidence of material
ND = Parameter not detected above laboratory detection limit.
NT = Not Tested
T = Result is a TIC and an estimated value.
TICs = Tentatively Identified Compounds.

BENCHMARK

TABLE 2

SUMMARY OF PHASE II SUBSURFACE SOIL/FILL ANALTICAL RESULTS

REMEDIAL ACTION WORK PLAN

BETLEM SITE

BCP SITE NO. C915348

HAMBURG, NEW YORK

PARAMETER[1]	Unrestricted Use SCOs [2]	Commercial Use SCOs [2]	Industrial Use SCOs [2]	Sample Location (Depth - ft)															
				SB-1 (3-4)	SB-2 (3-5)	SB-5 (1-3)	SB-6 (0-3)	SB-8 (2-4)	SB-9 (2-4)	SB-11 (2.5-3.5)	SB-13 (2-4)	SB-14 (2-4)	SB-15 (3-4)	SB-15 (4-6)	SB-15 (9-12)	SB-17 (2-4)	SB-17 (4-6)	SB-19 (3-4)	SB-19 (4-6)	SB-19 (10-11)
				12/5/2018							12/6/2018									
Volatile Organic Compounds (VOCs) - mg/Kg [3]																				
1,2,4-Trimethylbenzene	**3.6**	**190**	**380**	--	--	--	--	--	--	0.0066 vs*	ND	--	0.83 J	**7.5**	0.12 vs	--	0.011 J vs	--	0.66 J	ND
1,3,5-Trimethylbenzene	**8.4**	**190**	**380**	--	--	--	--	--	--	0.029 vs*	ND	--	ND	3.3	0.066 vs	--	0.0046 J vs	--	ND	ND
Acetone	**0.05**	**500**	**1000**	--	--	--	--	--	--	0.011 J vs	ND	--	ND	ND	0.049 J vs	--	0.022 J vs	--	ND	ND
Benzene	**0.06**	**44**	**89**	--	--	--	--	--	--	0.0013 J vs	ND	--	ND	ND	ND	--	ND	--	ND	ND
Cyclohexane	**--**	**--**	**--**	--	--	--	--	--	--	ND	ND	--	1.5 J	8.5	0.21 vs	--	0.0054 J vs	--	5.3	ND
Ethylbenzene	**1**	**390**	**780**	--	--	--	--	--	--	0.0048 J vs	ND	--	ND	**3.8**	0.0089 J vs	--	0.0095 J vs	--	ND	ND
Isopropylbenzene (Cumene)	**--**	**--**	**--**	--	--	--	--	--	--	0.046 vs*	ND	--	ND	2.4	0.072 vs	--	ND	--	0.97 J	0.19 J
Methyl acetate	**--**	**--**	**--**	--	--	--	--	--	--	ND	ND	--	ND	1.9 J	ND	--	ND	--	ND	ND
Methylcyclohexane	**--**	**--**	**--**	--	--	--	--	--	--	ND	ND	--	ND	53	1.1 vs	--	0.026 vs	--	36	15
n-Butylbenzene	**12**	**500**	**1000**	--	--	--	--	--	--	0.0061 J vs*	ND	--	ND	0.41 J	ND	--	ND	--	ND	ND
n-Propylbenzene	**3.9**	**500**	**1000**	--	--	--	--	--	--	0.024 vs*	ND	--	ND	2.9	0.094 vs	--	0.0029 J vs	--	0.93 J	ND
p-Cymene (p-isopropyltoluene)	**--**	**--**	**--**	--	--	--	--	--	--	0.013 vs*	ND	--	ND	ND	0.015 J vs	--	0.0035 J vs	--	ND	ND
sec-Butylbenzene	**11**	**500**	**1000**	--	--	--	--	--	--	0.015 vs*	ND	--	ND	ND	0.022 J vs	--	ND	--	ND	ND
Toluene	**0.7**	**500**	**1000**	--	--	--	--	--	--	0.0031 J vs	ND	--	ND	ND	ND	--	ND	--	ND	ND
m&p-Xylene	**0.26**	**500**	**1000**	--	--	--	--	--	--	0.0037 J vs	ND	--	**2.6 J**	**28**	0.085 J vs	--	0.039 J vs	--	ND	ND
o-Xylenes	**0.26**	**500**	**1000**	--	--	--	--	--	--	0.0014 J vs	ND	--	ND	ND	0.085 J vs	--	0.017 J vs	--	ND	ND
Total Xylenes	**0.26**	**500**	**1000**	--	--	--	--	--	--	0.0051 J vs	ND	--	**2.6 J**	**28**	ND	--	0.056 vs	--	ND	ND
Polycyclic Aromatic Hydrocarbons (PAHs) - mg/Kg [3]																				
Acenaphthene	**20**	**500**	**1000**	0.14 J	ND	ND	1.2	ND	ND	ND	ND	ND	ND	--	--	ND	--	ND	--	--
Acenaphthylene	**100**	**500**	**1000**	ND	ND	0.98 J	0.55 J	0.061 J	ND	ND	ND	ND	ND	--	--	ND	--	ND	--	--
Anthracene	**100**	**500**	**1000**	0.4 J	ND	0.76 J	2.8	0.096 J	ND	ND	1.5 J	ND	ND	--	--	ND	--	ND	--	--
Benzo(a)anthracene	**1**	**5.6**	**11**	0.7 J	**2.7 J**	**4.9**	**7.7**	0.26	0.094 J	**1.4 J**	**2.8 J**	**4.4 J**	0.19 J	--	--	ND	--	ND	--	--
Benzo(a)pyrene	**1**	**1**	**1.1**	0.62 J	**1.4 J**	**5.6**	**7.3**	0.24 J	0.069 J	**1.4 J**	**2.3 J**	ND	ND	--	--	ND	--	ND	--	--
Benzo(b)fluoranthene	**1**	**5.6**	**11**	1 K	**1.9 J**	**6.6**	**8.9**	0.29	0.11 J	**1.9 J**	**2.5 J**	ND	ND	--	--	ND	--	ND	--	--
Benzo(ghi)perylene	**100**	**500**	**1000**	0.32 J	0.94 J	3.9	5.4	0.16 J	0.082 J	ND	1.6 J	ND	ND	--	--	ND	--	ND	--	--
Benzo(k)fluoranthene	**0.8**	**56**	**110**	ND	0.58 J	**3.9**	**4.6**	0.15 J	0.038 J	**0.86 J**	**1.9 J**	ND	ND	--	--	ND	--	ND	--	--
Chrysene	**1**	**56**	**110**	0.91	ND	**4.9**	**7.3**	0.3	0.21 J	**2.7 J**	**2.4 J**	ND	ND	--	--	ND	--	ND	--	--
Fluoranthene	**100**	**500**	**1000**	1.6	3 J	9.2	17	0.41	ND	2.8 J	5.5	8 J	0.34 J	--	--	0.32 J	--	2.4 J	--	--
Fluorene	**30**	**500**	**1000**	0.28 J	ND	0.19 J	1.2	0.055 J	ND	ND	0.83 J	ND	ND	--	--	ND	--	ND	--	--
Indeno(1,2,3-cd)pyrene	**0.5**	**5.6**	**11**	0.32 J	**0.85 J**	**3.5**	**4.6**	0.15 J	0.057 J	ND	**1.3 J**	ND	ND	--	--	ND	--	ND	--	--
Naphthalene	**12**	**500**	**1000**	ND	ND	ND	0.7 J	ND	0.15 J	ND	ND	ND	ND	--	--	ND	--	ND	--	--
Phenanthrene	**100**	**500**	**1000**	1.6	2.3 J	2.1	12	0.31	0.19 J	2.1 J	5.1	6.6 J	0.23 J	--	--	1.8 J	--	ND	--	--
Pyrene	**100**	**500**	**1000**	1.2	2.9 J	8.7	14	0.33	0.23 J	2.7 J	4.6 J	6.3 J	0.29 J	--	--	2.7	--	ND	--	--
			Total PAHs	9.09 J K	16.57 J	55.23 J	95.25 J	2.812 J	1.23 J	15.86 J	32.33 J	25.3 J	1.05 J	--	--	4.82 J	--	2.4 J	--	--
Metals - mg/Kg																				
Arsenic	**13**	**16**	**16**	10.2	**139**	**60.9**	**53.2**	**40.9**	7.8	**52.5**	12.1	11.2	**39**	--	--	5.4	--	12.2	--	--
Barium	**350**	**400**	**10000**	106 B	**950 B**	292 B	196 B	227 B	161 B	146 B	126 B	195 B	158 B	--	--	**353 B**	--	80 B	--	--
Cadmium	**2.5**	**9.3**	**60**	0.31	**7.9**	**5.7**	0.68	0.13 J	0.56	1.6	0.65	0.63 J	0.93 J	--	--	0.71	--	0.3	--	--
Chromium	**30**	**1500**	**6800**	8.8	**263**	29.6	26.1	5.8	7.4	**37.4**	20.9	**32.8**	**31.7**	--	--	14.8	--	**37.1**	--	--
Lead	**63**	**1000**	**3900**	**1180 B**	**1340 B**	**227 B**	**65.6 B**	5.1 B	30.9 B	**158 B**	**64.7 B**	**270 B**	63 B	--	--	49.9 B	--	**73.4 B**	--	--
Mercury	**0.18**	**2.8**	**5.7**	0.12	**23.6**	**0.19**	0.062	ND	0.025 J	**1.7**	0.038	0.12	0.11	--	--	0.017 J	--	0.036	--	--
Selenium	**3.9**	**1500**	**6800**	1 J	3.2 J	3 J	2 J	3.8 J	3.1 J	3.2 J	1.6 J	ND	2 J	--	--	1.8 J	--	1.3 J	--	--
Silver	**2**	**1500**	**6800**	ND	**2.1 J**	ND	ND	ND	ND	ND	ND	ND	ND	--	--	ND	--	ND	--	--
Cyanide - Total	**27**	**27**	**10000**	--	--	--	--	26.4	--	--	--	--	--	--	--	--	--	--	--	--
Polychlorinated biphenyls (PCBs) - mg/Kg [3]																				
Total PCBs	0.1	**1**	**25**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	ND	--	ND	--	--

Notes:

1. Only those parameters detected at a minimum of one sample location are presented in this table; 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 value available for the parameter; Parameter not analyzed for.
J = Estimated value; result is less than the sample quantitation limit but greater than zero.
K = Benzo (b&k) fluoranthene are unresolved due to matrix, result is reported as benzo(b)fluoranthene.
B = Compound was found in the blank and sample.
vs = Reported analyte concentrations are below 200 ug/kg and may be biased low due to the sample not being collected according to 5035A-L.
* = ISTD response or retention time outside acceptable limits..

Bold	= Result exceeds Unrestricted Use SCOs.
Bold	= Result exceeds Commercial Use SCOs.
Bold	= Result exceeds Industrial use SCO's.

BENCHMARK

TABLE 3A

SUMMARY OF RI SUBSURFACE SOIL/FILL ANALYTICAL RESULTS

REMEDIAL ACTION WORK PLAN

BETLEM SITE

BCP SITE NO. C915348

HAMBURG, NEW YORK

PARAMETER [1]	Unrestricted Use SCOs [2]	Commercial Use SCOs [2]	Industrial Use SCOs [2]	Remedial Investigation Sample Location (Depth- feet)																		
				MW-1 (10-12)	MW-2 (0-3)	MW-3 (0-3)	MW-4 (0-3)	SB-24 (0-3)	SB-25 (2-5)	SB-26 (0-2)	SB-27 (1-4)	SB-28 (9-12)	SB-29 (6-8.5)	SB-30 (12-13)	SB-31 (1-3)	TP-1 (0-3)	TP-2 (2-4)	TP-3 (2-4)	TP-4 (2-4)	TP-5 (2-4)	TP-6 (5-6)	TP-7 (3-4)
				03/23/2020	03/23/2020	03/24/2020	03/23/2020	03/25/2020	03/26/2020							03/31/2020						
TCL Volatile Organic Compounds (VOCs) - mg/Kg [3]																						
1,1,1-Trichloroethane	**0.68**	**500**	**1000**	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND	NT	NT	0.2 J	ND	NT
1,2,4-Trimethylbenzene	**3.6**	**190**	**380**	ND	ND	NT	NT	ND	0.16 J	ND	1.2 J	0.48	ND	ND	NT	ND	ND	NT	NT	0.094 J	ND	NT
1,3,5-Trimethylbenzene	**8.4**	**190**	**380**	ND	ND	NT	NT	ND	ND	ND	ND	0.077 J	ND	ND	NT	ND	ND	NT	NT	ND J	ND	NT
2-Hexanone	--	--	--	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	0.035 J	NT	ND	ND	NT	NT	ND J	ND	NT
Acetone	**0.05**	**500**	**1000**	0.014 J	0.0072 J	NT	NT	0.012 J	ND	0.03 J	ND	ND	ND	0.047 J	NT	ND	**0.052**	NT	NT	ND J	ND	NT
Cyclohexane	--	--	--	ND	ND	NT	NT	ND	ND	ND	ND	0.97	ND	ND	NT	ND	ND	NT	NT	0.063 J	ND	NT
Ethylbenzene	**1**	**390**	**780**	ND	ND	NT	NT	ND	**3.6**	0.0011 J	ND	ND	ND	ND	NT	ND	ND	NT	NT	0.14 J	ND	NT
Isopropylbenzene (Cumene)	--	--	--	ND	ND	NT	NT	ND	0.086 J	ND	ND	**0.2**	**0.14 J**	ND	NT	ND	ND	NT	NT	ND J	ND	NT
Methyl acetate	--	--	--	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND	NT	NT	ND J	**0.56 J F2**	NT
Methylcyclohexane	--	--	--	ND	ND	NT	NT	ND	ND	ND	1.5 J	4.3	0.87	ND	NT	ND	ND	NT	NT	0.32 J	ND	NT
Methylene chloride	**0.05**	**500**	**1000**	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND	NT	NT	ND J	ND	NT
Methyl ethyl ketone (2-Butanone)	**0.12**	**500**	**1000**	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	0.007 J	NT	ND	0.011 J	NT	NT	ND J	ND	NT
Naphthalene	**12**	**500**	**1000**	ND	0.018	NT	NT	ND	0.25 J	ND	1.1 J	ND	ND	ND	NT	ND	0.0073	NT	NT	0.34 J	ND	NT
n-Butylbenzene	**12**	**500**	**1000**	ND	ND	NT	NT	ND	ND	ND	ND	ND	**0.4 J**	ND	NT	ND	ND	NT	NT	ND J	ND	NT
n-Propylbenzene	**3.9**	**500**	**1000**	ND	ND	NT	NT	ND	ND	ND	ND	0.2	0.2 J	ND	NT	ND	ND	NT	NT	ND J	ND	NT
sec-Butylbenzene	**11**	**500**	**1000**	ND	ND	NT	NT	ND	ND	ND	ND	0.047 J	0.18 J	ND	NT	ND	ND	NT	NT	ND J	ND	NT
tert-Butylbenzene	**5.9**	**500**	**1000**	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	0.0027 J	NT	ND	0.00081 J	NT	NT	ND J	ND	NT
Tetrachloroethene	**1.3**	**150**	**300**	ND	ND	NT	NT	ND	0.17 J	ND	ND	ND	ND	ND	NT	ND	ND	NT	NT	ND J	ND	NT
Toluene	**0.7**	**500**	**1000**	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND	NT	NT	0.069 J	ND	NT
Total Xylenes	**0.26**	**500**	**1000**	ND	ND	NT	NT	ND	**18 F1**	0.0027 J	**10**	0.18 J	ND	ND	NT	ND	ND	NT	**1.17 J**	ND	ND	NT
Total VOC TICs	--	--	--	ND	ND	NT	NT	0.0429 TJN	5.79 TJN	ND	521 TJN	27.3 TJN	118.2 TJN	1.23 TJN	NT	ND	0.449 TJN	NT	NT	ND	70.3 TJN	NT
TCL Semi-Volatile Organic Compounds (SVOCs) - mg/Kg [3]																						
Acenaphthene	**20**	**500**	**1000**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.074 J	ND	ND	13 J	2 J	ND	ND J	ND	0.36 J
Acenaphthylene	**100**	**500**	**1000**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	13 J	0.63 J	ND	ND J	ND	ND
Anthracene	**100**	**500**	**1000**	ND	7.2 J	ND	ND	ND	ND	ND	ND	ND	ND	0.069 J	ND	ND	54	6.7	ND	ND J	ND	0.8 J
2-Methylnaphthalene	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.1	0.18 J	ND	ND	ND	1.4 J	ND	ND J	ND	ND
Benzo (a) anthracene	**1**	**5.6**	**11**	ND	**17 J**	**7.5 J**	0.8 J	ND	**14 J**	0.42 J	ND	ND	ND	0.062 J	**5.1 J**	0.64 J	**110**	**11**	0.32 J	**1.4 J**	ND	**1.4 J**
Benzo(a)pyrene	**1**	**1**	**1.1**	ND	**17 J**	**7.2 J**	0.91 J	ND	**10 J**	0.46 J	ND	ND	ND	0.047 J	**7.9 J**	0.73 J	**90**	**8.1**	0.36 J	**1.5 J**	**3.2 J**	**1.4 J**
Benzo (b) fluoranthene	**1**	**5.6**	**11**	ND	**21**	**7.4 J**	**1.3 J**	ND	**14 J F2**	0.71 J	ND	ND	ND	0.058 J	**9.2 J**	0.82 J	**110**	**8.9**	0.4 J	**1.9 J**	ND	**1.7 J**
Benzo (g,h,i) perylene	**100**	**500**	**1000**	ND	11 J	4.2 J	0.91 J	ND	5 J F1 F2	0.42 J	ND	ND	ND	ND	4.6 J	0.56 J	43	4.2	0.32 J	1.3 J	0.039 J	0.89 J
Benzo (k) fluoranthene	**0.8**	**56**	**110**	ND	**8 J**	**3.3 J**	0.42 J	ND	**5.5 J F1**	0.23 J	ND	ND	ND	ND	**4.1 J**	0.5 J	**45**	**4.2**	ND	0.55 J	ND	0.61 J
Biphenyl	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.41 J	ND J	ND	ND	ND
Chrysene	**1**	**56**	**110**	ND	**17 J**	ND	0.78 J	0.56 J	**13 J**	0.41 J	ND	ND	ND	0.053 J	**6.4 J**	0.64 J	**110**	**9**	0.36 J	**1.3 J**	ND	**1.5 J**
Carbazole	--	--	--	ND	3.7 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12 J	2.5	ND	ND J	ND	0.4 J
Di-n-butyl phthalate	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND J	ND	ND
Dibenzo(a,h)anthracene	**0.33**	**0.56**	**1.1**	ND	**3.9 J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.24 J	**16 J**	**1.7 J**	ND	**0.47 J**	ND	**0.41 J**
Dibenzofuran	**7**	**350**	**1000**	ND	3.6 J	ND	ND	ND	ND	ND	ND	ND	0.31	0.082 J	ND	ND	**16 J**	2.6	ND	ND J	ND	0.32 J
Diethyl phthalate	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.052 J F2	ND
Fluoranthene	**100**	**500**	**1000**	ND	38	11 J	1.3 J	ND	**27 J**	0.73 J	3.2 J	ND	ND	0.1 J	9.1 J	1.1	**210**	19	0.77 J	2.8 J	0.056 J	3.4
Fluorene	**30**	**500**	**1000**	ND	4.7 J	ND	ND	ND	ND	ND	ND	ND	0.35	0.18 J	ND	ND	**37**	**4**	ND	ND J	ND	0.42 J
Indeno (1,2,3-cd) pyrene	**0.5**	**5.6**	**11**	ND	**11 J**	**4 J**	**0.78 J**	ND	**4.9 J**	0.33 J	ND	ND	ND	ND	**4.9 J**	0.5 J	**41**	**4.2**	0.32 J	**1.2 J**	0.043 J	**0.9 J**
Naphthalene	**12**	**500**	**1000**	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.089 J	ND	ND	ND	ND	**2.2**	ND	ND J	ND	ND
N-Nitrosodiphenylamine	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.26**	ND	ND	ND	ND	ND	ND J	ND	ND
Phenanthrene	**100**	**500**	**1000**	ND	32	11 J	0.56 J	0.28 J	17 J	0.48 J	ND	ND	ND	0.19 J	7.6 J	0.44 J	**150**	17	0.57 J	1.7 J	ND	3.4
Pyrene	**100**	**500**	**1000**	ND	31	11 J	1.2 J	ND	27 J	0.67 J	3.6 J	ND	ND	0.1 J	14 J	0.44 J	**170**	15	0.63 J	2.3 J	0.08 J	2.5
Total SVOC TICs	--	--	--	ND	ND	ND	ND	19.2 TJN	ND	7.49 TJN	223 TJN	6.91 TJN	69.9 TJN	16.82 TJN	347 TJN	ND	533 TJN	53.6 TJN	2.8 TJN	ND	76.8 TJN	ND
				Total PAH	218.8 J	66.6 J	8.96 J	0.84 J	137.4 J F1 F2	4.86 J	6.8 J	ND	0.979 J	0.933 J	72.9 J	6.61 J	**1212 J**	117.83 J	4.05 J	16.42 J	3.418 J B F1 F2	19.69 J
				Total SVOCs	226.1 J	66.6 J	8.96 J	0.84 J	137.4 J F1 F2	4.86 J	6.8 J	ND	4.389 J	1.555 J	72.9 J	6.61 J	1240 J	124.74 J	4.05 J	16.42 J	3.47 J B F1 F2	20.41 J
TAL Metals - mg/Kg																						
Aluminum	--	--	--	22300	22900 B	24000	34600	13900	6950 J	8660	7110	21400	19800	14900	4200	38600	13200	3250	18400	14900	23300	8460
Antimony	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	67.3 J	ND	ND	ND J	ND
Arsenic	**13**	**16**	**16**	7.2	**25**	**53.8**	**16.3**	**13.7**	5.3	8.1	9.3	2.3	4.5	5.2	12.6	**145**	**48.3**	**188**	**60.8**	**70.4 J**	**23.6 F2**	**29**
Barium	**350**	**400**	**10000**	98.4 J	**359 B**	200	298	83.5	102 J	107	75	109	95.7	81.7	53.8	**595**	170	**2400**	202	307	136 J	82.3
Beryllium	**7.2**	**590**	**2700**	1.2	3.9	2.9	4.1	0.87	1.1 B	0.68 B	0.65 B	0.92 B	0.98 B	0.81 B	0.53 B	5.8	2.5	0.34	2.6	2.6	1.3	1.1
Cadmium	**2.5**	**9.3**	**60**	0.13 J	0.63	0.25 J	0.1 J	**4.1**	0.42	0.29	0.44	0.8	0.3	0.3	1.4	0.61	0.7 J	**28.6**	1.1 J	1.7	0.63	0.62 J
Calcium	--	--	--	2940	84800 B	151000 B	186000	72800 B	38200	93700	46500	2220	2190	2340	7840	162000	72600	17500	66300	98700	9650	15900
Chromium	**30**	**1500**	**6800**	**35**	27.1	**83.8**	12.9	23.7	**70.6 J**	**32.3**	**260**	28.4	24.1	21.8	**48.9**	**30.9**	**162**	**814**	**53.7**	**333 J**	**33.9**	**62**
Cobalt	--	--	--	17.3	4.7	4.5	2.6	6.8	5.3	5.9	8.1	10.9	14.8	12	8.1	4.3	23.1	37.5	12	9.6	15.8	12.6
Copper	**50**	**270**	**10000**	24.8	33.2	43.3	8.1	24.1	16 J-	22.1 ^ B	37.4 ^ B	27.7 ^ B	26.4 ^ B	21.5 ^ B	**103 ^ B**	25.3 B	**93 B**	**1070 B**	**106 B**	**78.8 J**	26.5 J-	**70.2 B**
Iron	--	--	--	24100	75400 B	70400	25300	99700	40200	20100	40600	20300	24200	27300	122000	68900	354000	319000	161000	134000	39900	151000
Lead	**63**	**1000**	**3900**	16.7	**385 B**	62.7	18	48.4	**939**	19.2	**2870**	12.7	16.9	16.5	**146 J**	**72.5**	**116**	**6440**	**497**	**812 J**	18.4	**103**
Magnesium	--	--	--	5440 J	8860 B	17900	28200	21800	6620 J	3480	4040	5380	3710	4020	908	10300	10500	1590	11200	13900	5140 F1	1730
Manganese	**1600**	**10000**	**10000**	295	**2740 B**	**2970**	**4250 ^**	802	1540 J	455	756	212	214	315	1030	**2690**	**3930**	**19800**	**2550**	**39400 J**	373	1330
Mercury	**0.18**	**2.8**	**5.7**	0.014 J	0.036	0.032	0.013 J	0.017 J	0.048	0.09	0.063	0.033	0.032	0.034	0.075	0.085	**0.38**	**52.3**	0.049	0.15	0.054	0.14
Nickel	**30**	**310**	**10000**	**44.7**	14.3	18.3	11.7	15.8	**32.4 F1**	21.7	18	**38.8**	**34.8**	**32.2**	**35.2**	11.9 J	**59**	**270**	**35.6 J**	29.4 J	**37.3**	**30.2 J**
Potassium	--	--	--	5960	1320	2040	1170	1080	588 F1	1400	877	3440	2220	2170	542	3040	1030	490	1740	1700	3530 J	918
Selenium	**3.9**	**1500**	**6800**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5 J	ND	ND	ND	ND	ND	0.74 J F1	ND
Silver	**2**	**1500**	**6800**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**2.3 J**	ND	ND	ND	ND
Sodium	--	--	--	234	586	817	706	142 J	496	1190	193	156 J	99.1 J	106 J	124 J	881	403	365	699	705	304	133 J
Thallium	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	27.5 J	ND	ND
Vanadium	--	--	--	48.8	22	21.8	8.5	12.9	7.7	21.1	20	38.6	40.3	31	21.4	31.2	43.5	93.5	35	700 J	44 F1	47.7
Zinc	**109**	**10000**	**10000**	84.3 B	**311 B**	90	20.5 B	**2150**	**223 J**	69.8	**618**	**110**	95.1	78.9	**504**	**311**	**149**	**8300**	**507**	**740 J**	**121 J**	**459**
Cyanide, Total	**27**	**27**	**10000**	ND	1.4	3.4	1.3	2.6	ND J	ND	ND	ND	ND	ND	ND	4.8	ND	ND	ND	ND	ND	ND
Polychlorinated Biphenyls (PCBs) - mg/Kg																						
Aroclor 1242	--	--	--	ND	NT	NT	NT	ND	1.4	ND	NT	ND	ND	NT	NT	NT	ND J	ND	NT	ND	ND	NT
Aroclor 1254	--	--	--	ND	NT	NT	NT	ND	1.3	ND	NT	ND	ND	NT	NT	NT	ND J	ND	NT	ND	ND	NT
Total PCBs	**0.1**	**1**	**25**	ND	NT	NT	NT	ND	**2.7**	ND	NT	ND	ND	NT	NT	NT	ND J	ND	NT	ND	ND	NT
Pesticides 8081/Herbicides 8082 - mg/Kg [3]																						
4,4'-DDE	**0.0033**	**62**	**120**	ND	ND	NT	NT	NT	**0.061 J**	ND	NT	ND	0.00052 J	NT	NT	NT	ND	ND	NT	ND	ND	NT
4,4'-DDT	**0.0033**	**47**	**94**	ND	ND	NT	NT	NT	**0.17**	**0.015 J**	NT	0.00079 J	ND	NT	NT	NT	**0.018 J**	ND	NT	ND	ND	NT
alpha-BHC	**0.02**	**3.4**	**6.8**	ND	ND	NT	NT	NT	**0.025 J**	ND	NT	ND	0.00079 J	NT	NT	NT	0.0096 J	ND	NT	ND	ND	NT
beta-BHC	**0.036**	**3**	**14**	ND	ND	NT	NT	NT	ND	ND	NT	ND	ND	NT	NT	NT	ND	ND	NT	ND	ND	NT
delta-BHC	**0.04**	**500**	**1000**	ND	ND	NT	NT	NT	ND	ND	NT	ND	ND	NT	NT	NT	ND	ND	NT	ND	ND	NT
Endrin	**0.014**	**89**	**410**	ND	ND	NT	NT	NT	**0.022 J**	ND	NT	ND	ND	NT	NT	NT	ND	ND	NT	ND	ND	NT
Endrin Aldehyde	--	--	--	ND	ND	NT	NT	NT	ND	ND	NT	0.0008 J	0.0011 J	NT	NT	NT	ND	ND	NT	ND	ND	NT
gamma-BHC (Lindane)	**0.1**	**9.2**	**23**	ND	ND	NT	NT	NT	0.02 J	ND	NT	0.00055 J	ND	NT	NT	NT	ND	0.0088 NJ	NT	ND	ND J	NT
Methoxychlor	--	--	--	0.0014 J	ND	NT	NT	NT	0.07 J	ND	NT	ND	ND	NT	NT	NT	ND	ND	NT	ND	ND	NT
Perfluorinated Alkyl Acids - ng/g																						
Perfluorobutanoic Acid (PFBA)	--	--	--	ND	ND	NT	NT	ND	ND	ND	NT	ND	ND	NT	NT	NT	ND	0.33 B	NT	ND	ND	NT
Perfluorobutanesulfonic Acid (PFBS)	--	--	--	ND	ND	NT	NT	ND	ND	0.034 J	NT	ND	ND	NT	NT	NT	ND	ND	NT	ND	ND	NT
Perfluorooctanesulfonic Acid (PFOS)	**0.88**	**440**	**440**	ND	ND	NT	NT	ND	ND	ND	NT	ND	ND	NT	NT	NT	ND	0.33 J	NT	0.35 J	ND	NT
Perfluorodecanoic Acid (PFDA)	--	--	--	ND	ND	NT	NT	ND	ND	ND	NT	ND	ND	NT	NT	NT	ND	ND	NT	0.041 J	ND	NT
PFOA + PFOS	--	--	--	ND	ND	NT	NT	ND	ND	ND	NT	ND	ND	NT	NT	NT	ND	0.33	NT	0.35	ND	NT

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) and Sampling, Analysis, and Assessment of PFAS Guidance October 2020..
3. Sample results were reported by the laboratory in ug/kg and converted to mg/kg for comparisons to SCOs.

Definitions:

B = Compound was found in the blank and the sample.
F1 = MS and/or MSD recovery exceeds control limits
F2 = MS/MSD RPD exceeds control limits
J = Estimated value; result is less than the sample quantitation limit but greater than zero.
N = Presumptive evidence of material
NJ = The detection is tentative in identification and estimated in value. Although there is presumptive evidence of the analyte, the result should be used with caution as a potential false positive and/or elevated quantitative value.
ND = Parameter not detected above laboratory detection limit.
NT = Not Tested
T = Result is a TIC and an estimated value.
TICs = Tentatively Identified Compounds.
^ = ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.
"-" = No SCO for parameter.

J-

Bold	= Result exceeds Unrestricted Use SCOs.
Bold	= Result exceeds Commercial Use SCOs.
Bold	= Result exceeds Industrial Use SCOs.

BENCHMARK

TABLE 3B

SUMMARY OF RI SUBSURFACE SOIL/FILL TIC ANALYTICAL RESULTS

REMEDIAL ACTION WORK PLAN

BETLEM SITE

BCP SITE NO. C915348

HAMBURG, NEW YORK

PARAMETER [1]	Remedial Investigation Sample Location (Depth- feet)																			
	MW-1 (10-12)	MW-2 (0-3)	MW-3 (0-3)	MW-4 (0-3)	SB-24 (0-3)	SB-25 (2-5)	SB-26 (0-2)	SB-27 (1-4)	SB-28 (9-12)	SB-29 (6-8.5)	SB-30 (12-13)	SB-31 (1-3)	TP-1 (0-3)	TP-2 (2-4)	TP-3 (2-4)	TP-4 (2-4)	TP-5 (2-4)	BD-2 (TP-5)	TP-6 (5-6)	TP-7 (3-4)
	03/23/2020	03/23/2020	03/24/2020	03/23/2020	03/25/2020	03/26/2020							03/31/2020							
VOC Tentatively Identified Compounds (TICs) - mg/Kg [2]																				
1H-Indene, 2,3-dihydro-1,1-dimethyl-	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	0.1 T J N	NT	ND	ND	NT	NT	ND	ND	ND	NT
1H-Indene,2,3-dihydro-1,1,3-trimethyl-	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	0.13 T J N	NT	ND	ND	NT	NT	ND	ND	ND	NT
1H-Indene, 2,3-dihydro-4,7-dimethyl-	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	0.13 T J N	NT	ND	ND	NT	NT	ND	ND	ND	NT
1-Methyldecahydronaphthalene	ND	ND	NT	NT	ND	ND	ND	35 T J N	ND	ND	ND	NT	ND	0.049 T J N	NT	NT	ND	ND	ND	NT
Benzene, 1-(1-methylethenyl)-2-(1-methylethyl)-	ND	ND	NT	NT	ND	ND	ND	49 T J N	ND	ND	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Cyclohexane, 1,2-dimethyl-, trans-	ND	ND	NT	NT	ND	ND	ND	ND	2.1 T J N	ND	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Cyclopentane, 1,2,3-trimethyl-,(1.alpha.,2.alpha.,3.beta.)-	ND	ND	NT	NT	ND	ND	ND	ND	2.1 T J N	ND	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Cyclopentane, 1,2,4-trimethyl-	ND	ND	NT	NT	ND	ND	ND	ND	2.4 T J N	ND	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Cyclohexane, 1,2,4-trimethyl-,(1.alpha.,2.beta.,4 beta.)-	ND	ND	NT	NT	ND	ND	ND	ND	3.2 T J N	ND	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Cyclohexane, 1,3-dimethyl-, cis-	ND	ND	NT	NT	ND	ND	ND	ND	6.2 T J N	ND	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Cyclohexane, 1,3-dimethyl-, trans-	ND	ND	NT	NT	ND	ND	ND	ND	1.3 T J N	ND	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Cyclohexane, 2-butyl-1,1,3-trimethyl-	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	ND	NT	ND	0.043 T J N	NT	NT	ND	ND	ND	NT
Cyclohexane, ethyl-	ND	ND	NT	NT	ND	ND	ND	ND	5 T J N	ND	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Decahydro-4,4,8,9,10-pentamethylnaphthalene	ND	ND	NT	NT	0.012 T J N	ND	ND	ND	ND	ND	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Heptylcyclohexane	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND	NT	NT	ND	ND	7.8 T J N	NT
Naphthalene, 1-methyl-	ND	ND	NT	NT	ND	ND	ND	ND	ND	7.8 T J N	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Naphthalene, 1,6-dimethyl-	ND	ND	NT	NT	ND	ND	ND	ND	ND	13 T J N	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Naphthalene, 1,7-dimethyl-	ND	ND	NT	NT	ND	1.8 T J N	ND	83 T J N	ND	ND	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Naphthalene, 2,3-dimethyl-	ND	ND	NT	NT	ND	ND	ND	ND	ND	10 T J N	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Naphthalene, 2,6-dimethyl-	ND	ND	NT	NT	ND	ND	ND	36 T J N	ND	ND	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Naphthalene, 2,7-dimethyl-	ND	ND	NT	NT	ND	ND	ND	91 T J N	ND	ND	ND	NT	ND	ND	NT	NT	ND	ND	ND	NT
Nonane, 2,6-dimethyl-	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	ND	NT	ND	0.038 T J N	NT	NT	ND	ND	ND	NT
Tridecane, 7-methyl-	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	0.15 T J N	NT	ND	ND	NT	NT	ND	ND	ND	NT
Undecane, 2,6-dimethyl-	ND	ND	NT	NT	ND	ND	ND	ND	ND	ND	0.17 T J N	NT	ND	0.038 T J N	NT	NT	ND	ND	6.9 T J N	NT
Unknown (sum)	ND	ND	NT	NT	0.0309 T J	3.99 T J	ND	227 T J	5 T J	87.4 T J	0.552 T J	NT	ND	0.281 T J	NT	NT	ND	ND	55.6 T J	NT
Total VOC TICs	ND	ND	NT	NT	0.0429 TJN	5.79 TJN	ND	521 TJN	27.3 TJN	118.2 TJN	1.232 TJN	NT	ND	0.449 TJN	NT	NT	ND	ND	70.3 TJN	NT
SVOC Tentatively Identified Compounds (TICs) - mg/Kg [2]																				
1-Docosene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.61 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND
1H-Cyclopropa[l]phenanthrene,1a,9b-dihydro-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	36 T J N	4.5 T J N	ND	ND	ND	ND	ND
1H-Indene,2,3-dihydro-1,1,3-trimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.55 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND
11H-Benzo[a]fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	41 T J N	ND	ND	ND	ND	ND	ND
11H-Benzo[b]fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	26 T J N	3.2 T J N	ND	ND	ND	ND	ND
13H-Dibenzo[a,h]fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
28-Nor-17.beta.(H)-hopane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3-(2-Methyl-propenyl)-1H-indene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.98 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND
3-Methyl-4-(methoxycarbonyl)hexa-2,4-dienoic acid)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.3 T J N	ND
4H-Cyclopenta[def]phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.6 T J N	ND	ND	2.9 T J N	ND	ND
8H-Indeno[2,1-b]phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	33 T J N	ND	ND	ND	ND	ND	ND
9,10-Anthracenedione	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2 T J N	ND	ND
Anthracene, 1-methyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	47 T J N	2.9 T J N	ND	ND	2.2 T J N	ND	ND
Anthracene, 2-methyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene, 9-methyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Azulene, 7-ethyl-1,4-dimethyl-	ND	ND	ND	ND	1.6 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benz[a]anthracene-5,6-diol,5,6-dihydro-7-methyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2 T J N	ND	ND	ND	ND	ND
Benzene, 1,2-dimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.9 T J N	ND	ND
Benzene, 1,2,3-trimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	0.41 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene, 1,2,4,5-tetramethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.1 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene, 1,3-dimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.8 T J N	ND	ND
Benzene, (3-methyl-2-butenyl)-	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.6 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo[e]pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	52 T J N	ND	ND	ND	5.5 T J N	ND	ND
Benzo[j]fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butylated Hydroxytoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	52 T J N	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene, 2-methyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyclic octaatomic sulfur	ND	ND	ND	ND	ND	ND	1.4 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane, 1-ethyl-2-methyl-,trans-	ND	ND	ND	ND	ND	ND	ND	ND	0.52 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane, 1-ethyl-4-methyl-, cis-	ND	ND	ND	ND	ND	ND	ND	ND	0.45 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane, 1-ethyl-4-methyl-,trans-	ND	ND	ND	ND	ND	ND	ND	ND	0.43 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane, octyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.6 T J N	ND	ND	ND	ND	ND	ND	ND	ND	3.1 T J N	ND
Cyclopentane, 1-methyl-2-propyl-	ND	ND	ND	ND	ND	ND	ND	ND	0.45 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Decahydro-4,4,8,9,10-pentamethylnaphthalene	ND	ND	ND	ND	2.8 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo[def,mno]chrysene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20 T J N	ND	ND	ND	2.2 T J N	ND	ND
Docosane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.2 T J N	ND	ND	ND	ND	ND
Eicosane	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.2 T J N	ND	ND	ND	ND	3.5 T J N	ND	ND	ND	ND	ND
Eicosane, 10-methyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.7 T J N	ND
Ethane, 1,1,2,2-tetrachloro-	ND	ND	ND	ND	ND	ND	ND	ND	0.38 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptane, 3-ethyl-2-methyl-	ND	ND	ND	ND	ND	ND	ND	ND	0.66 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptylcyclohexane	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.4 T J N	ND	ND	ND	ND	ND	ND	ND	ND	3.7 T J N	ND
Indeno[1,2,3-fg]naphthacene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.4 T J N	ND	ND
n-Octadecane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.3 F1	ND
Naphthalene, 1-methyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.2 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene, (1-methylethyl)-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.99 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene, 1,3-dimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.1 T J N	1.2 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene, 1,4,5-trimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.2 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene, 1,4,6-trimethyl-	ND	ND	ND	ND	ND	ND	ND	22 T J N	ND	3 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene, 1,5-dimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.8 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene, 1,6-dimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.6 T J N	0.91 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene, 2,3-dimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.75 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene, 2,3,6-trimethyl-	ND	ND	ND	ND	ND	ND	ND	18 T J N	ND	3.4 T J N	0.74 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nonadecane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3 T J N	ND	ND	ND	ND	ND
Pentadecane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.3 T J N	ND
Pentadecane, 2,6,10-trimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	6 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pentadecane, 2,6,10,14-tetramethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.5 T J N	1.4 T J N	ND	ND	ND	ND	ND	ND	ND	9.4 T J N	ND
Pentadecane, 7-methyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.5 T J N	ND
Pentaphene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.8 T J N	ND	ND	ND	ND	ND
Phenanthrene, 1-methyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	19 T J N	3.2 T J N	ND	ND	ND	ND	ND
Phenanthrene, 2-methyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.3 T J N	ND	ND	ND	ND	ND
Phenanthrene, 2,3-dimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	30 T J N	ND	ND	ND	ND	ND	ND
Pregnan-20-one, (5.alpha.)-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	24 T J N	ND	ND	ND	ND	ND	ND
Pyrene, 1-methyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.7 T J N	ND	ND	ND	ND	ND
Pyrene, 2-methyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.2 T J N	ND	ND
Naphthalene, 2,7-dimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.68 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tricosane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.6 T J N	ND	ND	ND	ND	ND
Tridecane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tridecane, 4,8-dimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.6 T J N	ND
Trifluoroacetic acid, n-octadecylester	ND	ND	ND	ND	ND	ND	ND	ND	0.35 T J N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Triphenylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.9 T J N	ND	ND	ND	ND	ND
Undecane, 2,6-dimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.9 T J N	ND	ND	ND	ND	ND	ND	ND	4.2 T J N	ND	ND
Unknown (sum)	ND	ND	ND	ND	14.8 T J	ND	6.09 T J	183 T J	3.26 T J	9.5 T J	6.81 T J	295 T J	ND	205 T J	9.2 T J	2.8 T J	ND	2.8 T J	25.7 T J	ND
Total SVOC TICs	ND	ND	ND	ND	19.2 TJN	ND	7.49 TJN	223 TJN	6.91 TJN	69.9 TJN	16.82 TJN	347 TJN	ND	533 TJN	53.6 TJN	2.8 TJ	ND	26.9 T J N	76.8 TJN	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. Sample results were reported by the laboratory in ug/kg and converted to mg/kg for comparisons to SCOs.

Definitions:

DL = Dilution
J = Estimated value; result is less than the sample quantitation limit but greater than zero.
N = Presumptive evidence of material
ND = Parameter not detected above laboratory detection limit.
NT = Not Tested
T = Result is a tentatively identified compound (TIC) and an estimated value.
TICs = Tentatively Identified Compounds.

BENCHMARK

TABLE 4

SUMMARY OF RADIOLOGICAL SCREENING RESULTS
REMEDIAL ACTION WORK PLAN
BETLEM SITE
BCP SITE NO. C915348
HAMBURG, NEW YORK

Parameter	Sample Location & Sample Date							
	SB-24	SB-27	SB-29	TP-4	TP-5	TP-6	MW-1	MW-3
	4/8/2020							
Radiation Levels - Counts per Minute (CPM)								
Radiation	7240	7833	7629	7599	7723	8721	7778	8074

Notes:

1. Average radiation level detected was 8200 cpm during the Phase II Environmental Investigation Radiation Walkover performed by Benchmark on February 26, 2019.

BENCHMARK

TABLE 5

SUMMARY OF TRANSFORMER OIL ANALYTICAL RESULTS

REMEDIAL ACTION WORK PLAN

BETLEM SITE

BCP SITE NO. C915348

HAMBURG, NEW YORK

PARAMETER [1]	USEPA PCB CONTAMINATED THRESHOLD [3]	Transformer ID [2]		
		T-1	T-2	T-3
		03/18/2020		
Polychlorinated Biphenyls (PCBs) - mg/Kg				
Total PCBs	**50-500 mg/kg**	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. Oil sample collected from inactive pad-mounted transformers located in the transformer room.
3. As all total PCB concentrations are non-detect, per the USEPA, the oil/transformers are considered non-PCB transformers (as per USEPA PCB Inspection Manual - August 2004).

Definitions:

ND = Parameter not detected above laboratory detection limit.

Bold = Result exceeds USEPA PCB Contaminated Threshold

BENCHMARK

TABLE 6A

SUMMARY OF PHASE II AND RI GROUNDWATER ANALYTICAL RESULTS
REMEDIAL ACTION WORK PLAN
BETLEM SITE
BCP SITE NO. C915348
HAMBURG, NEW YORK

Parameters [1]	Class GA GWQS[2]	GROUNDWATER MONITORING WELL LOCATION											
		MW-1	MW-2	MW-3	MW-4	SB-20W		SB-21W		SB-22W		SB-23W[4]	SB-27W
		3/30/2020	4/2/2020	4/2/2020	3/30/2020	2/27/2019	3/31/2020	2/26/19	3/31/2020 - 4/2/2020	2/26/19	3/30/2020	2/27/2019	3/31/2020
Volatile Organic Compounds (VOCs) - ug/L													
1,1,1-Trichloroethane	**5**	ND	ND	ND	ND	ND	ND	ND	ND	**810**	**390**	ND	ND
1,1,2-Trichloroethane	**1**	ND	ND	ND	ND	ND	ND	ND	ND	**5.8 J**	**4 J**	ND	ND
1,1-Dichloroethane	**5**	ND	ND	0.45 J F1	ND	1.2 J	ND	ND	ND	**300**	**180**	ND	ND
1,1-Dichloroethene	**5**	ND	ND	ND	ND	0.53	ND	ND	ND	**480**	**220**	ND	ND
1,2,4-Trimethylbenzene	**5**	ND	ND	ND	ND	ND	ND	**140**	**140**	ND	ND	ND	ND
1,2-Dichloroethane (EDC)	**0.6**	ND	ND	ND	ND	ND	ND	ND	ND	**6.5**	**4.7 J**	ND	ND
1,3,5-Trimethylbenzene	**5**	ND	ND	ND	ND	ND	ND	**39**	**39**	ND	ND	ND	ND
2-Butanone (MEK)	**50**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	27	ND
4-Isopropyltoluene	**5**	ND	ND	ND	ND	ND	2.9 J	ND	4.9 J	ND	ND	ND	ND
Acetone	**50**	21	ND	ND	7.6 J	11	ND	23	ND	ND	ND	5.3	37 J
Benzene	**1**	ND	ND	ND	ND	ND	ND	**2.7**	**2.6 J**	ND	ND	ND	ND
Carbon disulfide	**60**	ND	ND	ND	ND	ND	ND	3.9 J	ND	ND	ND	ND	ND
Chloroethane	**5**	ND	ND	ND	ND	ND	ND	**12**	ND	**60**	**42**	ND	ND
Cyclohexane	**--**	ND	ND	ND	ND	ND	ND	15	17	ND	ND	24	ND
Ethylbenzene	**5**	ND	ND	ND	ND	ND	ND	**9.2**	**14**	ND	ND	ND	ND
Isopropylbenzene (Cumene)	**5**	ND	ND	ND	ND	ND	ND	**8.3**	**11**	ND	ND	**6.9**	ND
Methyl tert butyl ether (MTBE)	**10**	ND	0.36 J	ND	0.19 J	ND	ND	ND	ND	ND	ND	ND	ND
Methylcyclohexane	**--**	ND	ND	ND	ND	ND	ND	17	13	ND	ND	110	1.1 J
Methylene chloride	**5**	ND	ND	ND	ND	ND	ND	ND	ND	ND	**5.4 J**	ND	ND
Naphthalene	**10**	ND	ND	ND	ND	ND	2.9 J	ND	**40**	ND	ND	ND	ND
n-Butylbenzene	**5**	ND	ND	ND	ND	ND	ND	3.1	ND	ND	ND	ND	ND
n-Propylbenzene	**5**	ND	ND	ND	ND	ND	ND	**9.2**	**10**	ND	ND	3.4	ND
p-Isopropyltoluene	**--**	ND	ND	ND	ND	ND	ND	6.9	ND	ND	ND	ND	ND
sec-Butylbenzene	**5**	ND	ND	ND	ND	ND	ND	4.3	ND	ND	ND	0.82 J	ND
Toluene	**5**	ND	ND	ND	ND	ND	ND	**8.7**	**10**	ND	ND	ND	ND
Vinyl chloride	**2**	ND	ND	ND	ND	ND	ND	ND	ND	**21**	**8.9**	ND	ND
Total Xylenes	**5**	ND	ND	ND	ND	ND	ND	**85**	**130**	ND	ND	3.9 J	ND
Total VOC TICs	**--**	ND	ND	ND	ND	NT	ND	NT	209 TJN	NT	ND	NT	13 TJN
Semi-Volatile Organic Compounds (SVOCs) - ug/L													
2,4,5-Trichlorophenol	**--**	ND	ND	ND	NT	NT	NT	NT	5.1 J	NT	ND	NT	ND
2-Methylnaphthalene	**--**	ND	ND	ND	NT	NT	NT	NT	21 J	NT	ND	NT	ND
Benzo(a)anthracene	**0.002**	ND	ND	ND	NT	NT	NT	NT	ND	NT	**0.55 J**	NT	ND
Benzo(b)fluoranthene	**0.002**	ND	ND	ND	NT	NT	NT	NT	ND	NT	**0.7 J**	NT	ND
Chrysene	**0.002**	ND	ND	ND	NT	NT	NT	NT	ND	NT	**0.56 J**	NT	ND
Fluoranthene	**50**	ND	ND	ND	NT	NT	NT	NT	ND	NT	1.2 J	NT	ND
Naphthalene	**10**	ND	ND	ND	NT	NT	NT	NT	**21 J**	NT	ND	NT	ND
Pentachlorophenol	**1**	ND	ND	ND	NT	NT	NT	NT	**11 J**	NT	ND	NT	ND
Phenanthrene	**50**	ND	ND	ND	NT	NT	NT	NT	ND	NT	1 J	NT	ND
Phenol	**1**	ND	ND	ND	NT	NT	NT	NT	**6.4 J**	NT	ND	NT	ND
Pyrene	**50**	ND	ND	ND	NT	NT	NT	NT	ND	NT	0.92 J	NT	ND
Total SVOC TICs	**--**	ND	4.8 TJ	3.2 TJ	NT	NT	NT	NT	383 TJN	NT	2.4 TJN	NT	42 TJN
Total PAHs		ND	ND	ND	NT	NT	NT	NT	21 J	NT	4.93 J	NT	ND
Total SVOCs		ND	ND	ND	NT	NT	NT	NT	64.5 J	NT	4.93 J	NT	ND
Total Metals - ug/L [3]													
Aluminum	**--**	3700	1000	2800	NT	NT	NT	NT	48100	NT	153000	NT	586000
Arsenic	**25**	ND	ND	ND	NT	NT	NT	NT	**41**	NT	**71**	NT	**300**
Barium	**1000**	86	100	170	NT	NT	NT	NT	590	NT	880	NT	**2900**
Beryllium	**3**	ND	ND	ND	NT	NT	NT	NT	2.8	NT	**7**	NT	**26**
Cadmium	**5**	ND	ND	ND	NT	NT	NT	NT	4	NT	**7.5**	NT	**13**
Calcium	**--**	231000	168000	143000	NT	NT	NT	NT	319000	NT	128000	NT	1050000
Chromium	**50**	5.1	1.7 J	14	NT	NT	NT	NT	**170**	NT	**270**	NT	**1100**
Cobalt	**--**	1.4 J	0.75 J	3.4 J	NT	NT	NT	NT	30	NT	110	NT	390
Copper	**200**	4.6 J	ND	12	NT	NT	NT	NT	92	NT	**310**	NT	**1100**
Iron	**300**	**8400**	**1000**	**4500**	NT	NT	NT	NT	**165000**	NT	**233000**	NT	**927000**
Lead	**25**	4.1 J	ND	ND	NT	NT	NT	NT	**220**	NT	**290**	NT	**3500**
Magnesium	**35000**	**52900**	**54000**	**46200**	NT	NT	NT	NT	**58900**	NT	**68300**	NT	**321000**
Manganese	**300**	**1400**	220 B	**2300 B**	NT	NT	NT	NT	**2400**	NT	**3600**	NT	**14600**
Mercury	**0.7**	ND	ND	ND	NT	NT	NT	NT	0.23	NT	0.43	NT	**1**
Nickel	**100**	5.7 J	2.8 J	13	NT	NT	NT	NT	74	NT	**290**	NT	**1200**
Potassium	**--**	2700	1600	1900	NT	NT	NT	NT	83900	NT	25000	NT	103000
Silver	**50**	ND	ND	ND	NT	NT	NT	NT	ND	NT	1.8 J	NT	4.9 J
Sodium	**20000**	**58900**	**49400**	**120000**	NT	NT	NT	NT	**71300**	NT	**23700**	NT	**39700**
Vanadium	**--**	7.6	1.9 J	4.4 J	NT	NT	NT	NT	96	NT	300	NT	1200
Zinc	**2000**	12	3.2 J	20	NT	NT	NT	NT	1400	NT	1100	NT	**3000**
Polychlorinated biphenyls- ug/L													
Total PCBs	**0.09**	ND	ND	ND	NT	NT	NT	NT	ND	NT	ND	NT	ND
Pesticides and Herbicides - ug/L													
4,4'-DDD	**0.3**	ND	ND	0.011 J	NT	NT	NT	NT	ND	NT	ND	NT	NT
4,4'-DDT	**0.2**	ND	ND	ND	NT	NT	NT	NT	ND	NT	ND	NT	NT
Aldrin	**--**	ND	ND	ND	NT	NT	NT	NT	0.013 J	NT	ND	NT	NT
alpha-BHC	**0.01**	ND	ND	ND	NT	NT	NT	NT	ND	NT	ND	NT	NT
delta-BHC	**0.04**	ND	ND	ND	NT	NT	NT	NT	0.014 J	NT	ND	NT	NT
Dieldrin	**0.004**	ND	**0.01 J**	ND	NT	NT	NT	NT	**0.013 J**	NT	ND	NT	NT
Endosulfan I	**--**	ND	ND	ND	NT	NT	NT	NT	ND	NT	ND	NT	NT
Endosulfan sulfate	**--**	ND	ND	ND	NT	NT	NT	NT	0.034 J	NT	ND	NT	NT
Pentachlorophenol	**1**	ND	ND	ND R	NT	NT	NT	NT	**2.5 J+**	NT	ND	NT	NT
trans-Chlordane	**0.05**	ND	ND	ND	NT	NT	NT	NT	ND	NT	ND	NT	NT

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 TOGS 1.1.1 Class GA Groundwater Quality Standards (GWQS).
3. Sample results were reported by the laboratory in mg/L and converted to ug/L for comparisons to GWQS.
4. SB-23W unintentionally destroyed during winter (2019-2020) activities.

Definitions:
TICs = tentatively identified compounds
B = Compound was found in the blank and sample.
F1 = MS and/or MSD Recovery is outside acceptance limits.
J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
J+ = The analyte was positively identified; the associated numerical value is an estimated quantity that may be biased high.
ND = Parameter not detected above laboratory detection limit.
NT = Not tested.
N = Presumptive evidence of material.
R = The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control limits. The analyte may or may not be present.
T = Result is a tentatively identified compound (TIC) and an estimated value.
"--" = No SCO for parameter.

Bold = Result exceeds GWQS.

BENCHMARK

TABLE 6B

SUMMARY OF RI GROUNDWATER TIC SAMPLE RESULTS

REMEDIAL ACTION WORK PLAN

BETLEM SITE

BCP SITE NO. C915348

HAMBURG, NEW YORK

Parameters [1]	SAMPLE LOCATION								
	MW-1	MW-2	BD-1	MW-3	MW-4	SB-20W	SB-21W	SB-22W	SB-27W
	3/30/20	4/2/20		4/2/20	3/30/20	3/31/20	3/31/2020 - 4/2/20	3/30/20	3/31/20
VOC Tentatively Identified Compounds (TICs) - ug/L									
Benzene, 1-ethyl-2-methyl-	ND	ND	ND	ND	ND	ND	25 T J N	ND	ND
Benzene, 1,2,3,4-tetramethyl-	ND	ND	ND	ND	ND	ND	51 T J N	ND	ND
Benzene, 1,2,4,5-tetramethyl-	ND	ND	ND	ND	ND	ND	27 T J N	ND	ND
Benzene, 4-ethyl-1,2-dimethyl-	ND	ND	ND	ND	ND	ND	30 T J N	ND	ND
Cyclopentane, methyl-	ND	ND	ND	ND	ND	ND	13 T J N	ND	ND
Naphthalene, 1,5-dimethyl-	ND	ND	ND	ND	ND	ND	ND	ND	13 T J N
Naphthalene, 1,2,3,4-tetrahydro-	ND	ND	ND	ND	ND	ND	21 T J N	ND	ND
Naphthalene, 2-methyl-	ND	ND	ND	ND	ND	ND	22 T J N	ND	ND
Unknown (sum)	ND	ND	ND	ND	ND	ND	20 T J	ND	ND
Total VOC TICs	ND	ND	ND	ND	ND	ND	209 TJN	ND	13 TJN
SVOC Tentatively Identified Compounds (TICs) - ug/L									
1,3,5-Triazine-2,4(1H,3H)-dione,3-cyclohexyl-6-(dimethylami)	ND	4.8 T J N	ND	ND	NT	NT	ND	ND	ND
1,4-Dioxane	ND	ND	1.6 T J N	ND	NT	NT	ND	ND	ND
1,4-Methanonaphthalene,1,4-dihydro-	ND	ND	ND	ND	NT	NT	ND	ND	12 T J N
2-Naphthalenecarboxylic acid	ND	ND	ND	ND	NT	NT	18 T J N	ND	ND
Benzene, 1-ethyl-2-methyl-	ND	ND	ND	ND	NT	NT	16 T J N	ND	ND
Benzene, 1-ethyl-3-methyl-	ND	ND	ND	ND	NT	NT	18 T J N	ND	ND
Benzene, 1,2,3-trimethyl-	ND	ND	ND	ND	NT	NT	72 T J N	ND	ND
Benzene, 1,2,3,4-tetramethyl-	ND	ND	ND	ND	NT	NT	34 T J N	ND	ND
Benzene, 1,3-dimethyl-	ND	ND	ND	ND	NT	NT	25 T J N	ND	ND
Benzene, 4-ethyl-1,2-dimethyl-	ND	ND	ND	ND	NT	NT	11 T J N	ND	ND
Column Bleed	ND	ND	ND	ND	NT	NT	ND	ND	19 T J
Cyclohexane	ND	ND	ND	3.2 T J	NT	NT	ND	ND	ND
Dodecane	ND	ND	ND	ND	NT	NT	15 T J N	ND	ND
n-Hexadecanoic acid	ND	ND	ND	ND	NT	NT	11 T J N	ND	ND
Naphthalene, 1-methyl-	ND	ND	ND	ND	NT	NT	29 T J N	ND	ND
Naphthalene, 1,2,3,4-tetrahydro-	ND	ND	ND	ND	NT	NT	12 T J N	ND	ND
Naphthalene, 1,5-dimethyl-	ND	ND	ND	ND	NT	NT	ND	ND	ND
Naphthalene, 1,7-dimethyl-	ND	ND	ND	ND	NT	NT	11 T J N	ND	ND
Naphthalene, 1,8-dimethyl-	ND	ND	ND	ND	NT	NT	ND	ND	11 T J N
Naphthalene, 2,7-dimethyl-	ND	ND	ND	ND	NT	NT	18 T J N	ND	ND
p-Xylene	ND	ND	1.7 T J	ND	NT	NT	28 T J N	ND	ND
Phenol, 4-(2-propenyl)-	ND	ND	ND	ND	NT	NT	11 T J N	ND	ND
Unknown (sum)	ND	ND	ND	ND	NT	NT	54 T J	2.4 T J	ND
Total SVOC TICs	ND	4.8 TJ	3.3	3.2 TJ	NT	NT	383 TJN	2.4 TJN	42 TJN

Notes:

1. Only those parameters detected at a min. of one sample location are presented; all other compounds were reported as non-detect.

Definitions:

TICs = tentatively identified compounds
J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
ND = Parameter not detected above laboratory detection limit.
NT = Not tested.
N = Presumptive evidence of material.
T = Result is a TIC and an estimated value.

BENCHMARK

TABLE 6C

SUMMARY OF RI GROUNDWATER EMERGING CONTAMINANT SAMPLE RESULTS
REMEDIAL ACTION WORK PLAN
BETLEM SITE
BCP SITE NO. C915348
HAMBURG, NEW YORK

Parameters [1]	NYSDEC Action Level [2]	SAMPLE LOCATION				
		MW-1	MW-2	MW-3	SB-21W	SB-22W
		3/30/20			3/31/2020 - 4/2/20	3/30/20
Semi-Volatile Organic Compounds (SVOCs) Method 8270D SIM ID - ug/L						
1,4-Dioxane	**0.35**	**2.2 E**	**11 E**	0.25	**14 E**	**73**
Fluorinated Alkyl Substances (Method 537) - ng/L						
Perfluorobutanoic acid (PFBA)	**100**	ND	1.1 J B	8.7 B	ND R	ND
Perfluoropentanoic acid (PFPeA)	**100**	ND	ND	7.1	ND	ND
Perfluorobutanesulfonic acid (PFBS)	**100**	ND	ND	0.51 J	ND	ND
Perfluorohexanoic acid (PFHxA)	**100**	ND	ND	4.6	ND	ND
Perfluoroheptanoic acid (PFHpA)	**100**	ND	ND	1.9	2.6	ND
Perfluorohexanesulfonic acid (PFHxS)	**100**	ND	ND	ND	ND	ND
Perfluorooctanoic acid (PFOA)	**10**	ND	ND	3.2	6.4	ND
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2FTS)	**100**	ND	ND	2.7 J+	ND	ND
Perfluoroheptanesulfonic acid (PFHpS)	**100**	ND	ND	ND	ND	ND
Perfluorononanoic acid (PFNA)	**100**	ND	ND	ND	ND	ND
Perfluorooctanesulfonic acid (PFOS)	**10**	ND	ND	ND	ND	ND
Perfluorodecanoic acid (PFDA)	**100**	ND	ND	ND	ND	ND
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2FTS)	**100**	ND	ND	ND	ND	ND
N-Methyl Perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	**100**	ND	ND	ND	ND	ND
Perfluoroundecanoic Acid (PFUnA)	**100**	ND	ND	ND	ND	ND
Perfluorodecanesulfonic acid (PFDS)	**100**	ND	ND	ND	ND	ND
Perfluorooctanesulfonamide (FOSA)	**100**	ND	0.37 J B	ND	ND	ND
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	**100**	ND	ND	ND	ND	ND
Perfluorododecanoic Acid (PFDoA)	**100**	ND	0.48 J	ND	ND	ND
Perfluorotridecanoic Acid (PFTrDA)	**100**	ND	ND	ND	ND	ND
Perfluorotetradecanoic acid (PFTeA)	**100**	ND	0.58 J	ND	ND	ND
PFOA + PFOS	**70**	ND	ND	3.2	6.4	ND
Total Fluorinated Alkyl Substances	**500**	0	2.53	28.71	9	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. Emerging Contaminant Action Levels per the NYSDEC.

Definitions:

B = Compound was found in the blank and sample.
E = Result exceeds calibration range.
J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
J+ = The analyte was positively identified; the associated numerical value is an estimated quantity that may be biased high.
ND = Parameter not detected above laboratory detection limit.
NT = Not tested.
R = The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control limits. The analyte may or may not be present.
"--" = No Action Level for parameter.

Bold = Result exceeds NYSDEC Action Level.

BENCHMARK

TABLE 7A

SUMMARY OF SUBSLAB VAPOR, INDOOR AIR, AND OUTDOOR AIR ANALTICAL RESULTS

REMEDIAL ACTION WORK PLAN

BETLEM SITE

BCP SITE NO. C915348

HAMBURG, NEW YORK

Parameter	Sample Location & Sample Date						
	SSV-1	IA-1	SSV-2	IA-2	SSV-3	IA-3	OA-1
	3/21/2020 - 3/22/2020						
Volatile Organic Compou0s (VOCs, ug/m3)							
1,1,1-Trichloroethane (Matrix B)	ND< 0.82 J	ND< 0.82	1000	ND< 0.82	26 J	ND< 0.82	ND< 0.82
1,1-Dichloroethane	ND< 0.61 J	ND< 0.61	180	ND< 0.61	ND< 0.61 J	ND< 0.61	ND< 0.61
1,1-Dichloroethene (Matrix A)	ND< 0.59 J	ND< 0.59	4.7	ND< 0.59	ND< 0.59 J	ND< 0.59	ND< 0.59
2,2,4-trimethylpentane	ND< 0.7 J	ND< 0.7	1.6	ND< 0.7	ND< 0.7 J	ND< 0.7	ND< 0.7
Acetone	4.5 J	23	38	7.6	18 J	6.4 J	5.2
Benzene	0.61 J	ND< 0.48	6.4	0.67	1.8 J	0.61	0.61
Bromodichloromethane	ND< 1 J	1.1	ND< 1	ND< 1	ND< 1 J	ND< 1	ND< 1
Carbon Disulfide	ND< 0.47 J	30	71	ND< 0.47	25 J	ND< 0.47	ND< 0.47
Carbon Tetrachloride (Matrix A)	ND< 0.94 J	ND< 0.94	ND< 0.94	0.57	ND< 0.94 J	0.63	0.63
Chloroethane	ND< 0.4 J	ND< 0.4	0.4	ND< 0.4	ND< 0.4 J	ND< 0.4	ND< 0.4
Chloroform	ND< 0.73 J	2.5	0.83	ND< 0.73	ND< 0.73 J	ND< 0.73	ND< 0.73
Chloromethane	0.87 J	ND< 0.31	ND< 0.31	0.87	ND< 0.31 J	0.83	0.85
cis-1,2-Dichlorethene (Matrix A)	ND< 0.59 J	ND< 0.59	ND< 0.59	ND< 0.59	ND< 0.59 J	ND< 0.59	ND< 0.59
Cyclohexane	ND< 0.52 J	ND< 0.52	62	ND< 0.52	6.2 J	ND< 0.52	ND< 0.52
Freon 11	1.3 J	ND< 0.84	ND< 0.84	1.3	1 J	1.3	1.3
Freon 12	2.5 J	1.5	2	2.4	2.5 J	2.5	2.5
Heptane	ND< 0.61 J	67	18	ND< 0.61	6.6 J	ND< 0.61	ND< 0.61
Hexane	ND< 0.53 J	380	56	0.56	7 J	ND< 0.53	ND< 0.53
Isopropyl alcohol	ND< 0.37 J	ND< 0.37	2.2	ND< 0.37	ND< 0.37 J	ND< 0.37	0.86
m&p-Xylene	0.43 J	0.48 J	ND< 1.3	ND< 1.3	ND< 1.3 J	ND< 1.3	ND< 1.3
Methyl Butyl Ketone	ND< 1.2 J	ND< 1.2	ND< 1.2	0.53 J	ND< 1.2 J	ND< 1.2	ND< 1.2
Methyl Ethyl Ketone	0.47 J	3.5	4	ND< 1.2	3.6 J	0.47 J	ND< 1.2
Methylene chloride (Matrix B)	0.52 J	2.6	2	0.66	0.76 J	0.9	0.56
Tetrachloroethene (Matrix B)	ND< 1 J	ND< 1.0	ND< 1.0	ND< 1.0	ND< 1 J	ND< 1.0	ND< 1.0
Toluene	0.94 J	0.57 J	3.1 J	0.87 J	1.9 J	0.83 J	0.68 J
Total Xylenes	0.43 J	0.48 J	ND< 1.3	ND< 1.3	ND< 1.3 J	ND< 1.3	ND< 1.3
Trichloroethene (Matrix A)	ND< 0.81 J	ND< 0.81	ND< 0.81	ND< 0.81	ND< 0.81 J	ND< 0.81	ND< 0.81
Vinyl acetate	ND< 0.53 J	ND< 0.53	12	ND< 0.53	ND< 0.53 J	ND< 0.53	ND< 0.53
Vinyl chloride (Matrix C)	ND< 0.1 J	ND< 0.10	ND< 0.10	ND< 0.10	ND< 0.1 J	ND< 0.10	ND< 0.10

Notes:

1. Only those parameters detected above the method detection limit, at a minimum of one location, are presented in this table.
2. Constituent monitored under NYSDOH Vapor/ Indoor Air Quality Standards - (Matricies A,B,C- Updated May 2017)

Definitions:

ND = Parameter not detected above laboratory detection limit.
"--" = No value available for the parameter. Or parameter not analysed for.
J = The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.
blue = one of eight compounds regulated by the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (May 2017)

BENCHMARK

TABLE 7B

COMPARISON OF SUBSLAB VAPOR, INDOOR AIR, & OUTDOOR AIR ANALYTICAL DATA TO NYSDOH DECISION MATRICES
REMEDIAL ACTION WORK PLAN

BETLEM SITE
BCP SITE NO. C915348
HAMBURG, NEW YORK

Sample Location	Carbon Tetrachloride		Trichloroethene (TCE)		cis-1,2-Dichloroethene		1,1-Dichloroethene		Tetrachloroethene (PCE)		1,1,1 -Trichloroethane		Methylene Chloride		Vinyl Chloride	
	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix A	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix A	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix A	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix A	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix B	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix B	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix B	Lab Reported Concentration (ug/m^3)	Soil Vapor / Indoor Air Matrix C
Round 1 (March 2020)																
SUB-SLAB-1	ND< 0.94	NFA	ND< 0.81	NFA	ND< 0.59	NFA	ND< 0.59	NFA	ND< 1.0	NFA	ND< 0.82	NFA	0.52	NFA	ND< 0.10	NFA
INDOOR AIR-1	ND< 0.94		ND< 0.81		ND< 0.59		ND< 0.59		ND< 1.0		ND< 0.82		2.6		ND< 0.10	
SUB-SLAB-2	ND< 0.94		ND< 0.81		ND< 0.59		4.7		ND< 1.0		1000	MITIGATE	2		ND< 0.10	
INDOOR AIR-2	0.57		ND< 0.81		ND< 0.59		ND< 0.59		ND< 1.0		ND< 0.82		0.66		ND< 0.10	
SUB-SLAB-3	ND< 0.94		ND< 0.81		ND< 0.59		ND< 0.59		ND< 1.0		26	NFA	0.76		ND< 0.10	
INDOOR AIR-3	0.63		ND< 0.81		ND< 0.59		ND< 0.59		ND< 1.0		ND< 0.82		0.9		ND< 0.10	
OUTDOOR AIR-1	0.63		ND< 0.81		ND< 0.59		ND< 0.59		ND< 1.0		ND< 0.82		0.56		ND< 0.10	

Notes:

1. Concentration in micrograms per cubic meter (ug/m^3)

Definitions:

ND = Not Detected
J = Results areestimated; results are below the reporting limit, but greater than or equal to the method detection limit.
NFA = No further action.
I, R = Take reasonable and practical actions to identify source(s) and reduce exposures and resample or mitigate.
Monitor = Monitor soil vapor / indoor air
Mitigate = Mitigate source of identified parameter.

Analytes Assigned:
Trichloroethene (TCE), *cis*-1,2-Dichloroethene (c12-DCE), 1,1-Dichloroethene (11-DCE), Carbon Tetrachloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)		
	< 0.2	0.2 to < 1	1 and above
< 6	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	4. No further action	5. MONITOR	6. MITIGATE
60 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

Analytes Assigned:
Tetrachloroethene (PCE), 1,1,1-Trichloroethane (111-TCA), Methylene Chloride

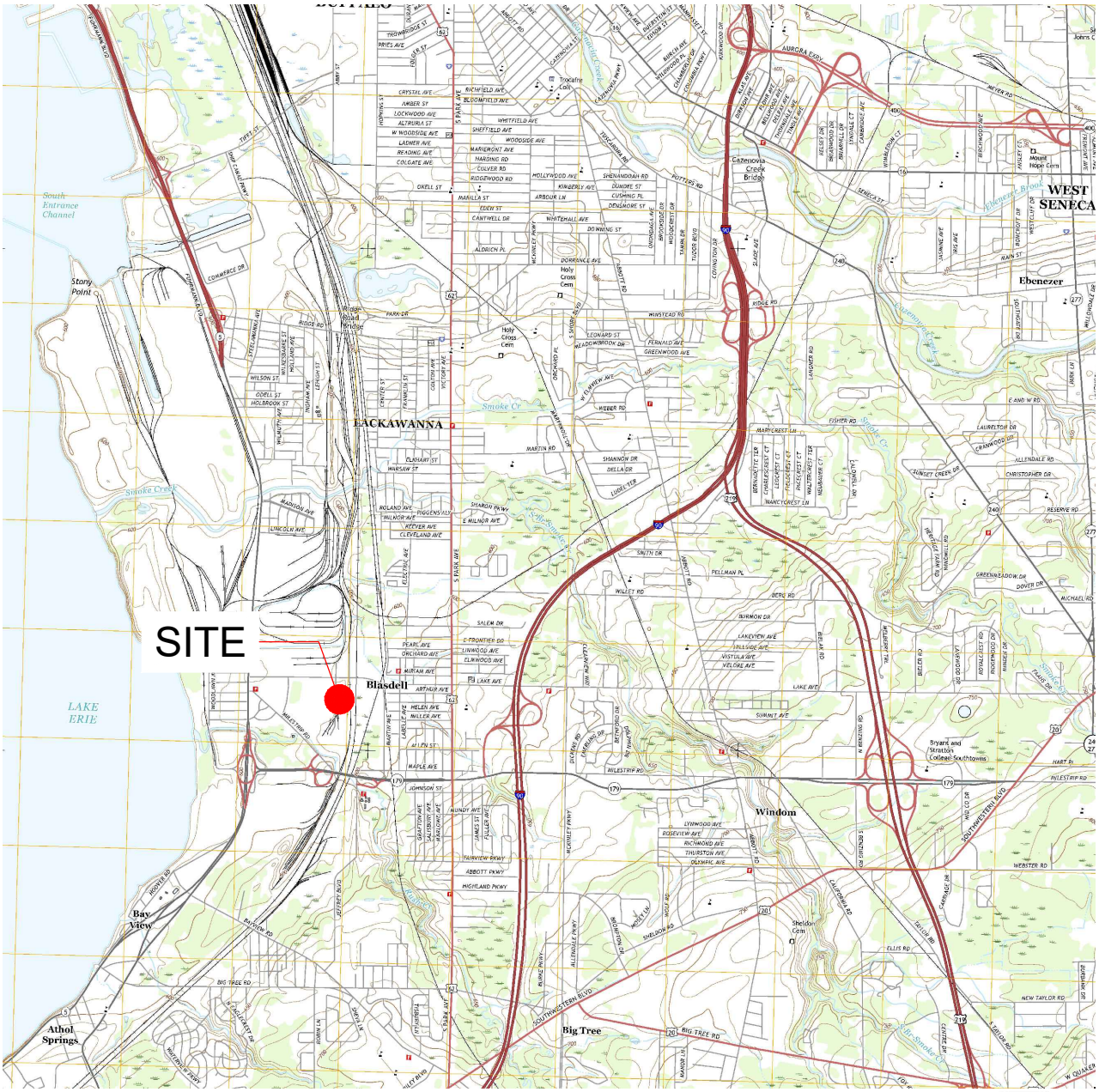
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)		
	< 3	3 to < 10	10 and above
< 100	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
100 to < 1,000	4. No further action	5. MONITOR	6. MITIGATE
1,000 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

Analytes Assigned:
Vinyl Chloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)	
	< 0.2	0.2 and above
< 6	1. No further action	2. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	3. MONITOR	4. MITIGATE
60 and above	5. MITIGATE	6. MITIGATE

FIGURES

FIGURE 1



SCALE: 1 INCH = 5,000 FEET
SCALE IN FEET
(approximate)

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

PROJECT NO.: B0480-019-001

DATE: AUGUST 2022

DRAFTED BY: CCB

SITE LOCATION & VICINITY MAP

REMEDIAL ACTION WORK PLAN

BETLEM SITE
BCP SITE NO. C915348
HAMBURG, NEW YORK

PREPARED FOR

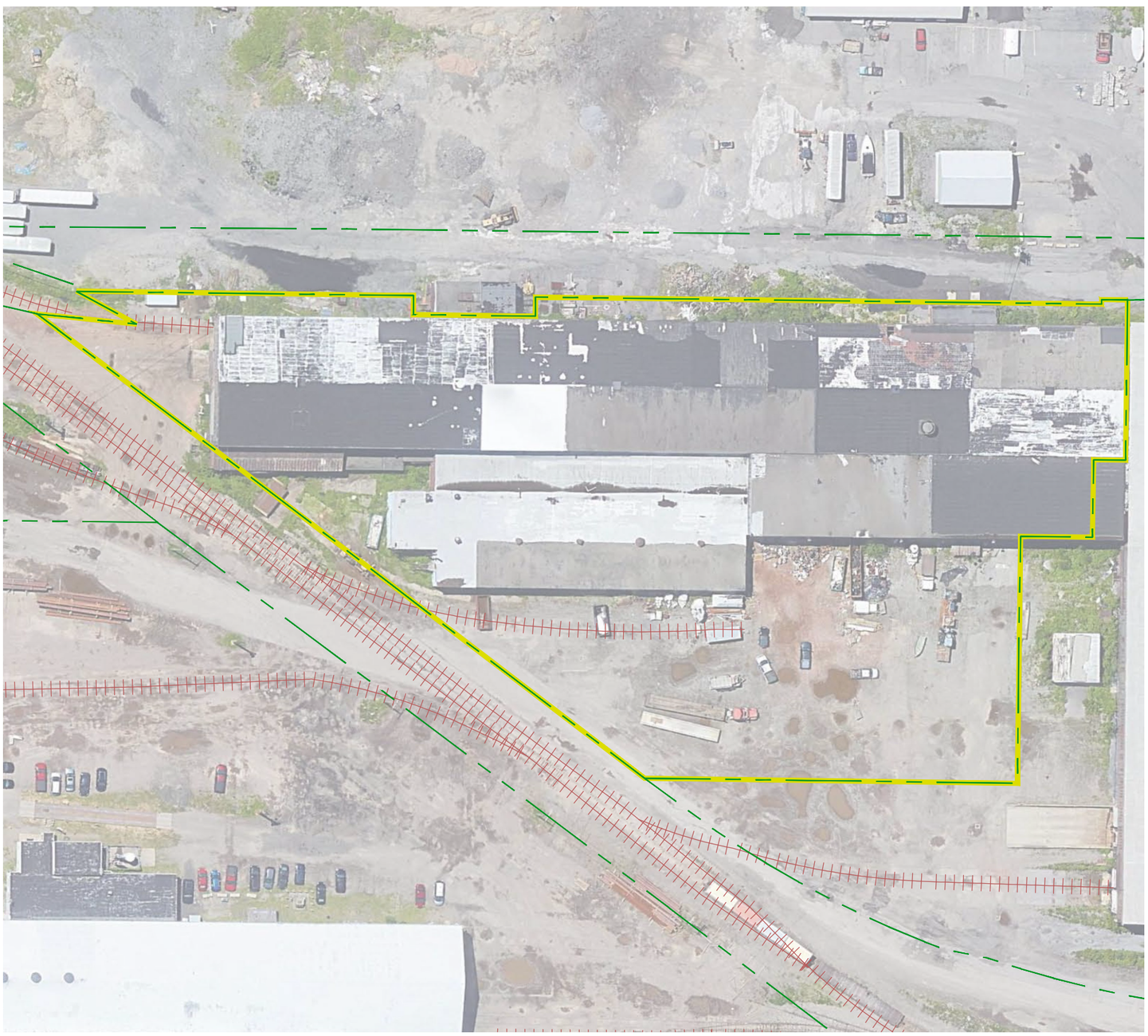
BETLEM ASSOCIATES LLC

DATE: AUGUST 2022
DRAFTED BY: CCB

LEGEND:
PROPERTY BOUNDARY
PARCEL
RAILROAD

N

SCALE: 1 INCH = 80 FEET
SCALE IN FEET
(approximate)
80' 0' 80' 160'



SITE PLAN (AERIAL)

FIGURE 2

REMEDIAL ACTION WORK PLAN

BETLEM SITE
BCP SITE NO. C915348
HAMBURG, NEW YORK
PREPARED FOR
BETLEM ASSOCIATES LLC

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

JOB NO.: B0480-019-001

F:\CAD\Benchmark\250 Lake Avenue Associates\RAWP\Figure 3: Historic & Remedial Investigation Locations.dwg

LEGEND:

- PROPERTY BOUNDARY
- PARCEL
- BUILDING
- RAILROAD TRACKS
- HISTORIC CONCRETE TRENCH
- SS-1 — RI SURFACE SOIL
- TP-1 — RI TEST PIT
- SB-24 — RI SOIL BORING
- MW-1 — RI SOIL BORING / MONITORING WELL
- SV-1 — RI SUBSLAB SOIL VAPOR / INDOOR AIR
- SB-1 — HISTORIC SOIL BORING (2018 PHASE II)
- SB-20W — HISTORIC MONITORING WELL (2019 SUPPLEMENTAL PHASE II)

NOTES:

- REMEDIAL INVESTIGATION COMPLETED BY BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC (BENCHMARK) MARCH - APRIL 2020.
- VALUES PER 6NYCRR PART 375 SOIL CLEANUP OBJECTIVES (SCOs).

DEFINITIONS:

- J = ESTIMATED VALUE, RESULT IS LESS THAN THE SAMPLE QUANTITATION LIMIT BUT GREATER THAN ZERO.
- B = COMPOUND WAS FOUND IN THE BLANK AND THE SAMPLE
- F1 = MS AND/OR MSD RECOVERY EXCEEDS CONTROL LIMITS
- F2 = MS/MSD RPD EXCEEDS CONTROL LIMITS
- PPM = PARTS PER MILLION
- FBGS = FEET BELOW GROUND SURFACE

= EXCEEDS PART 375 CSCOSs

= EXCEEDS PART 375 ISCOSs

N

80' 0' 80' 160'

SCALE: 1 INCH = 80 FEET
SCALE IN FEET
(approximate)

DATE: AUGUST 2022
DRAFTED BY: CCB

SB-23 HIGHEST PID READING = 270 PPM @ 5 FBGS
HIGHEST PID READING = 5.8 PPM @ 2 FBGS

TP-7 (3-4')	MG/KG
BENZO(A)PYRENE	1.4 J
ARSENIC	29

SS-1 (0-2")	MG/KG
BENZO(A)ANTHRACENE	10
BENZO(A)PYRENE	8.6
BENZO(B)FLUORANTHENE	11
DIBENZO(A,H)ANTHRACENE	1.7 J
MANGANESE	20100 B

SB-14 HIGHEST PID READING = 0.7 PPM @ 2.5 FBGS
SB-20 HIGHEST PID READING = 41.8 PPM @ 6 FBGS
SB-28 HIGHEST PID READING = 375 PPM @ 6 FBGS
= 760 PPM @11 FBGS
SB-19 HIGHEST PID READING = 1805 PPM @ 4 FBGS
= 1156 PPM @10 FBGS
SB-12 HIGHEST PID READING = 84.7 PPM @ 4 FBGS
SB-21 HIGHEST PID READING = 155 PPM @ 10 FBGS
HIGHEST PID READING = 937 PPM @ 4 FBGS

SB-15 (3-4')	MG/KG
ARSENIC	39

SB-16 HIGHEST PID READING = 386 PPM @ 6 FBGS
HIGHEST PID READING = 30 PPM @ 3 FBGS

SB-13 (2-4')	MG/KG
BENZO(A)PYRENE	2.3 J

SS-2 (0-2")	MG/KG
BENZO(A)ANTHRACENE	120
BENZO(A)PYRENE	120
BENZO(B)FLUORANTHENE	160
BENZO(K)FLUORANTHENE	67
CHRYSENE	130
DIBENZO(A,H)ANTHRACENE	27
INDENO(1,2,3-CD)PYRENE	79

HIGHEST PID READING = 39.2 PPM @ 5 FBGS

SB-27/27W (1-4')	MG/KG
LEAD	2870

HIGHEST PID READING = 0.6 PPM @ 2 FBGS

SB-31 (1-3')	MG/KG
BENZO(A)PYRENE	7.9 J
BENZO(B)FLUORANTHENE	9.2 J

SB-30 HIGHEST PID READING = 14 PPM @ 14 FBGS
SB-29 HIGHEST PID READING = 81 PPM @ 6 FBGS
SB-10 HIGHEST PID READING = 30 PPM @ 8 FBGS
HIGHEST PID READING = 9 PPM @ 5 FBGS

SB-25 (2-5')	MG/KG
BENZO(A)ANTHRACENE	14 J
BENZO(A)PYRENE	10 J
BENZO(B)FLUORANTHENE	14 J F2
TOTAL PCBs	2.7

SB-17 HIGHEST PID READING = 1.6 PPM @ 3 FBGS
SB-9 HIGHEST PID READING = 36.1 PPM @ 3 FBGS
SB-22 HIGHEST PID READING = 8.4 PPM @ 3 FBGS

SS-3 (0-2")	MG/KG
BENZO(B)FLUORANTHENE	15 J

SS-4 (0-2")	MG/KG
BENZO(A)PYRENE	3.6 J

SB-8 (2-4')	MG/KG
ARSENIC	40.9

HIGHEST PID READING = 6.2 PPM @ 6 FBGS

TP-6 (5-6')	MG/KG
BENZO(A)PYRENE	3.2 F1 F2
ARSENIC	23.6 F2

MW-3 (0-3')	MG/KG
BENZO(A)ANTHRACENE	7.5 J
BENZO(A)PYRENE	7.2 J
BENZO(B)FLUORANTHENE	7.4 J
ARSENIC	53.8

TP-1 (0-3')	MG/KG
ARSENIC	145
BARIUM	595

HIGHEST PID READING = 13.2 PPM @ 3 FBGS

SB-11 (2.5-3.5')	MG/KG
BENZO(A)PYRENE	1.4 J
ARSENIC	52.5

HIGHEST PID READING = 4.3 PPM @ 4 FBGS

TP-2 (2-4')	MG/KG
BENZO(A)ANTHRACENE	110
BENZO(A)PYRENE	90
BENZO(B)FLUORANTHENE	110
CHRYSENE	110
DIBENZO(A,H)ANTHRACENE	16 J
INDENO(1,2,3-CD)PYRENE	41
ARSENIC	48.3

SB-1 (3-4')	MG/KG
LEAD	1180 B

HIGHEST PID READING = 0.1 PPM @ 3.5 FBGS

SB-2 (3-5')	MG/KG
BENZO(A)PYRENE	1.4 J
ARSENIC	139
BARIUM	950 B
LEAD	1340 B
MERCURY	23.6

HIGHEST PID READING = 0.9 PPM @ 4 FBGS

TP-3 (2-4')	MG/KG
BENZO(A)ANTHRACENE	11
BENZO(A)PYRENE	8.1
BENZO(B)FLUORANTHENE	8.9
DIBENZO(A,H)ANTHRACENE	1.7 J
ARSENIC	188
BARIUM	2400
CADMIUM	28.6
COPPER	1070 B
LEAD	6440
MANGANESE	19800
MERCURY	52.3

MW-4 (0-3')	MG/KG
ARSENIC	16.3

TP-4 (2-4')	MG/KG
ARSENIC	60.8

SB-26 HIGHEST PID READING = 0.6 PPM @ 1 FBGS

TP-5 (2-4')	MG/KG
BENZO(A)PYRENE	1.5 J
ARSENIC	70.4
MANGANESE	39400

SB-5 (1-3')	MG/KG
BENZO(A)PYRENE	5.6
BENZO(B)FLUORANTHENE	6.6
ARSENIC	60.9

MW-2 (0-3')	MG/KG
BENZO(A)ANTHRACENE	17 J
BENZO(A)PYRENE	17 J
BENZO(B)FLUORANTHENE	21
DIBENZO(A,H)ANTHRACENE	3.9 J
INDENO(1,2,3-CD)PYRENE	11 J
ARSENIC	25

SB-6 (0-3')	MG/KG
BENZO(A)ANTHRACENE	7.7
BENZO(A)PYRENE	7.3
BENZO(B)FLUORANTHENE	8.9
ARSENIC	53.2

SS-6 (0-2")	MG/KG
BENZO(A)ANTHRACENE	10
BENZO(A)PYRENE	9.6 J
BENZO(B)FLUORANTHENE	12
DIBENZO(A,H)ANTHRACENE	2.4 J
INDENO(1,2,3-CD)PYRENE	6.9 J
ARSENIC	17.3

SB-24 HIGHEST PID READING = 1.9 PPM @ 1.5 FBGS

SS-5 (0-2")	MG/KG
BENZO(A)ANTHRACENE	7.6 J
BENZO(A)PYRENE	7.1 J
BENZO(B)FLUORANTHENE	8.5 J
ARSENIC	18.2

SS-1 SB-14 SB-20W SB-28 SB-19 SB-23W (DESTROYED) TP-7 TP-1 OA-1 MW-1 SB-1 SV-1 IA-1 SB-12 SB-15 SB-21W SB-21W (500.23) SB-16 SB-11 TP-2 SB-3 SB-2 SB-13 TP-3 SB-4 MW-4 SS-2 SB-31 SB-27/27W SB-26 TP-4 SV-3 IA-3 TP-5 SB-30 SB-25 SB-17 SB-5 SB-29 SB-10 MW-2 TRANSFORMER ROOM SB-24 SB-6 SB-9 SS-6 SV-2 IA-2 SS-5 SB-7 SB-22W (490.47) SB-22W SB-18 SS-3 SS-4 SB-8 TP-6 MW-3

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HISTORIC & REMEDIAL INVESTIGATION LOCATIONS

REMEDIAL ACTION WORK PLAN
BETLEM SITE
BCP SITE NO. C915348
HAMBURG, NEW YORK
PREPARED FOR
BETLEM ASSOCIATES LLC

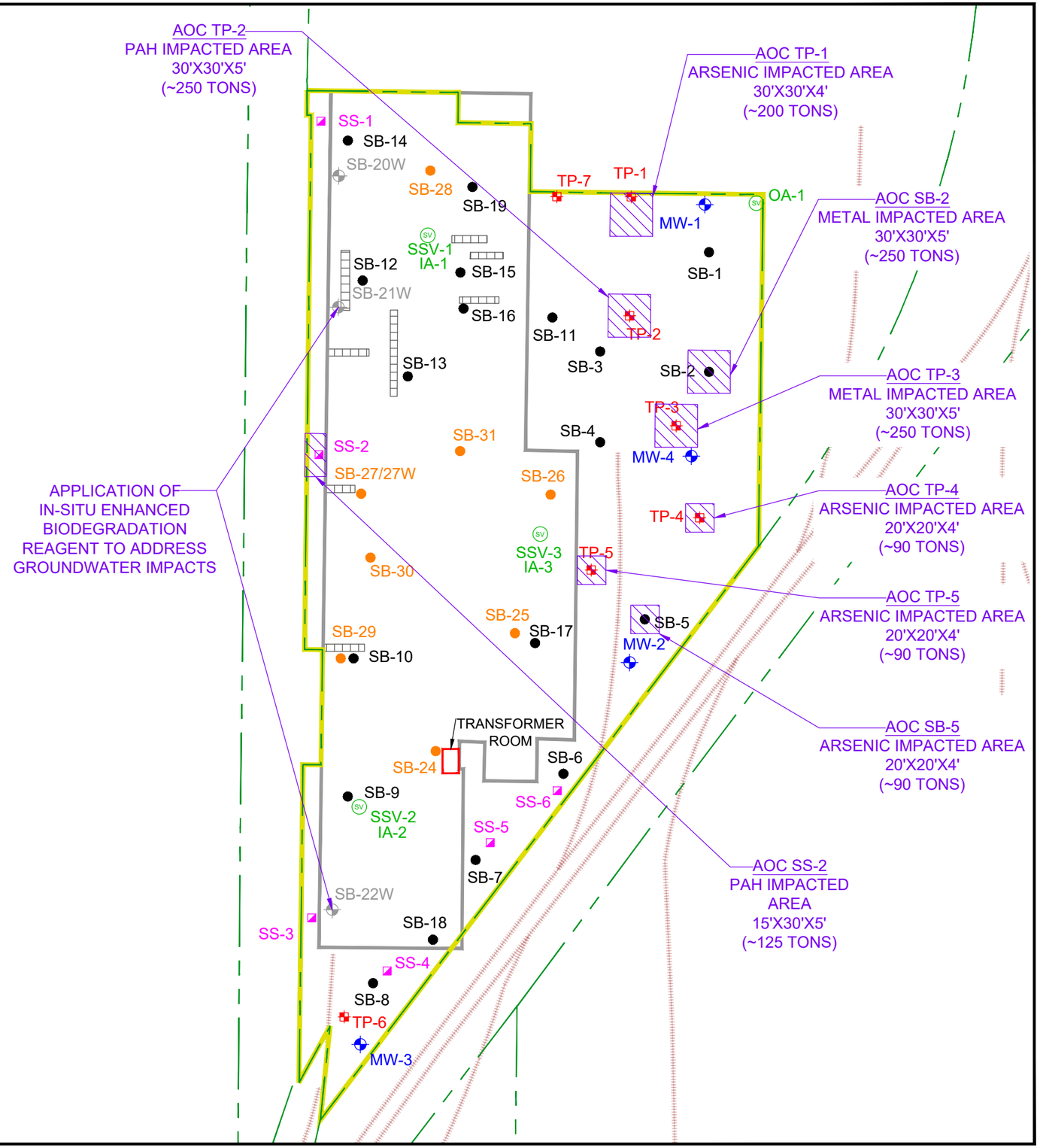
FIGURE 3

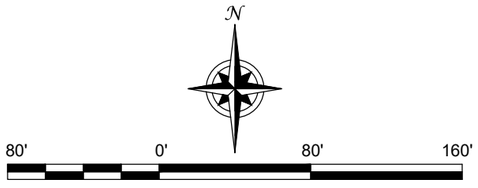
LEGEND:

- PROPERTY BOUNDARY
- PARCEL
- BUILDING
- RAILROAD TRACKS
- HISTORIC CONCRETE TRENCH
- SS-1 — RI SURFACE SOIL
- TP-1 — RI TEST PIT
- SB-24 — RI SOIL BORING
- MW-1 — RI SOIL BORING / MONITORING WELL
- SV-1 — RI SUBSLAB SOIL VAPOR / INDOOR AIR
- SB-1 — HISTORIC SOIL BORING (2018 PHASE II)
- SB-20W — HISTORIC MONITORING WELL (2019 SUPPLEMENTAL PHASE II)
- APPROXIMATE TRACK 4 AREA OF CONCERN (AOC) LOCATIONS

NOTE:

ESTIMATED TOTAL OF 1,345 TONS OF SOIL/FILL REMOVED DURING AOC REMOVAL





SCALE: 1 INCH = 80 FEET
SCALE IN FEET
(approximate)

DATE: AUGUST 2022
DRAFTED BY: CCB

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JOB NO.: B0480-019-001

REMEDIAL AREA OF CONCERN (AOC) LOCATIONS

REMEDIAL ACTION WORK PLAN

BETLEM SITE
BCP SITE NO. C915348
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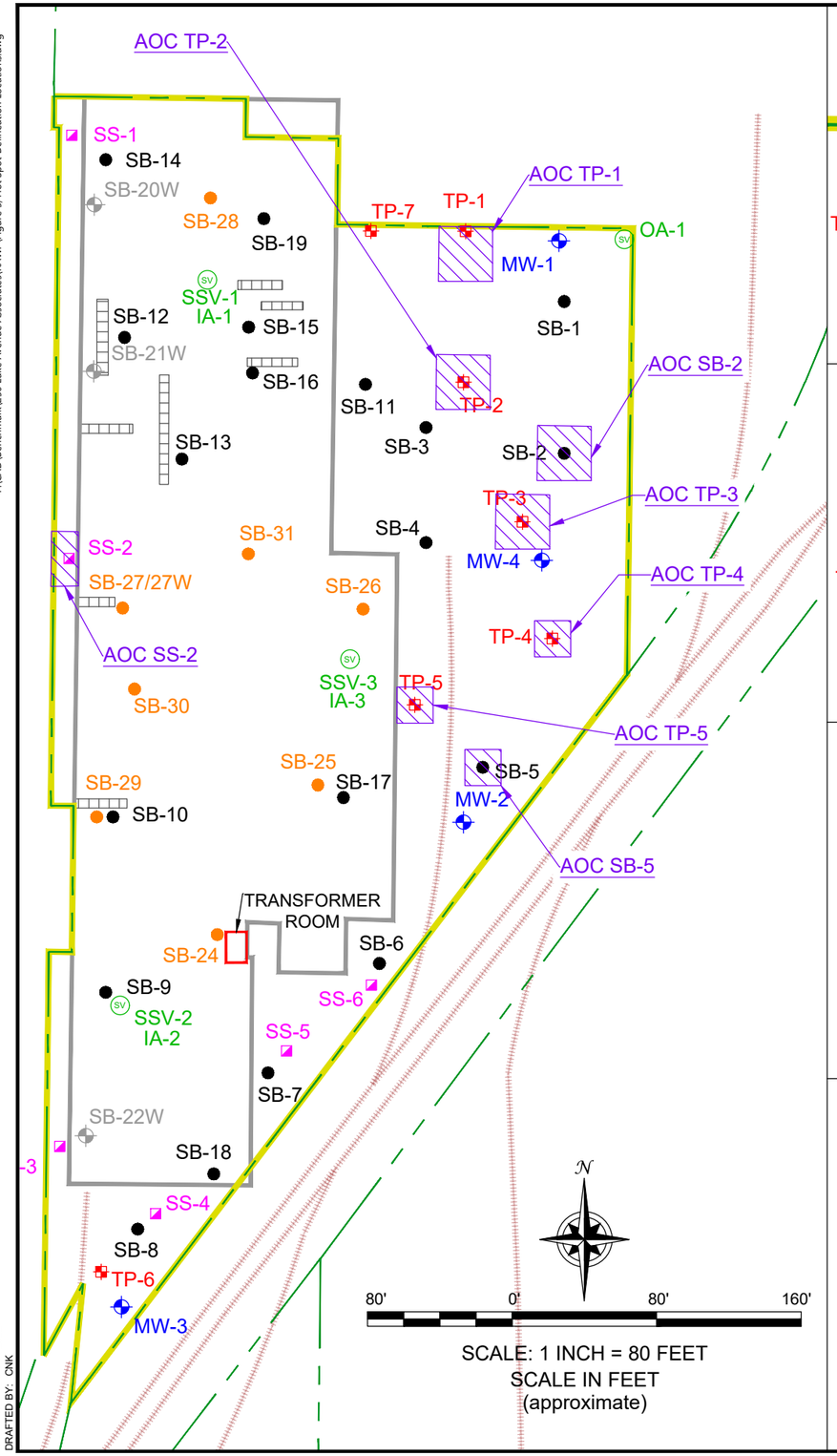
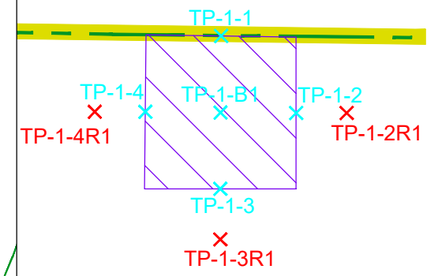
FIGURE 4

F:\CAD\Benchmark\250 Lake Avenue Associates\RAWP\Figure 5; Hot Spot Delineation Locations.dwg

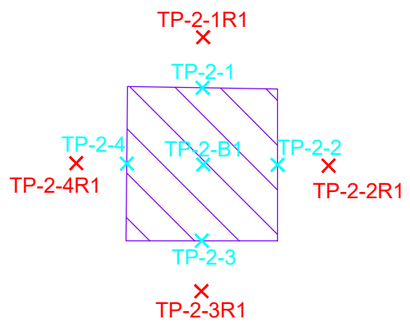


DATE: SEPTEMBER 2022
DRAFTED BY: CNK

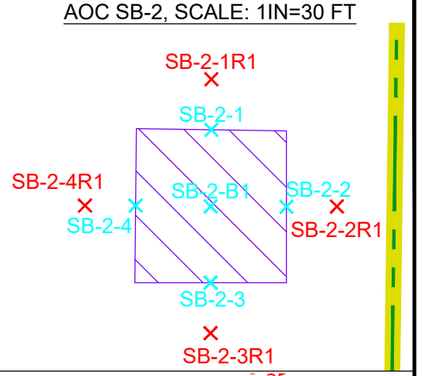
AOC TP-1, SCALE: 1IN=30 FT



AOC TP-2, SCALE: 1IN=30 FT



AOC SB-2, SCALE: 1IN=30 FT



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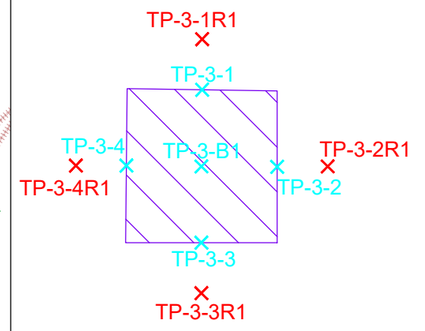

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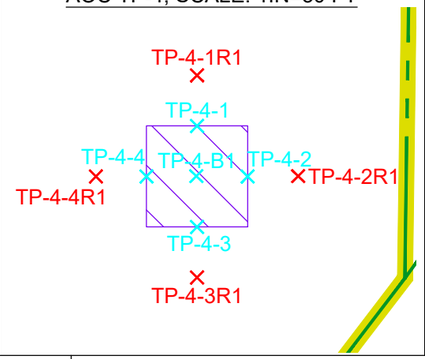
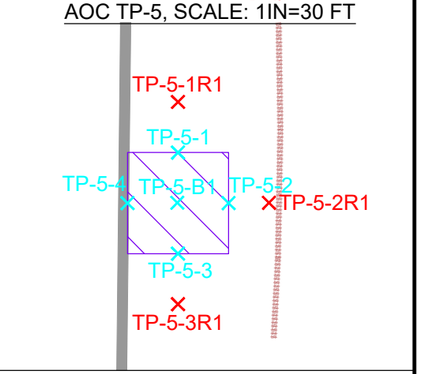
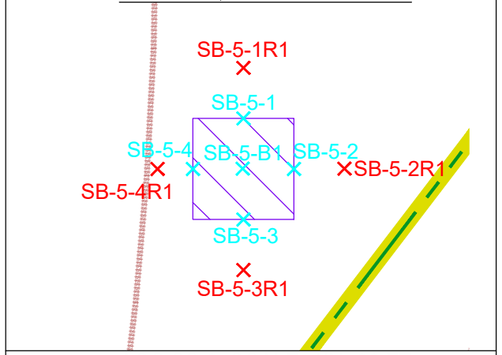


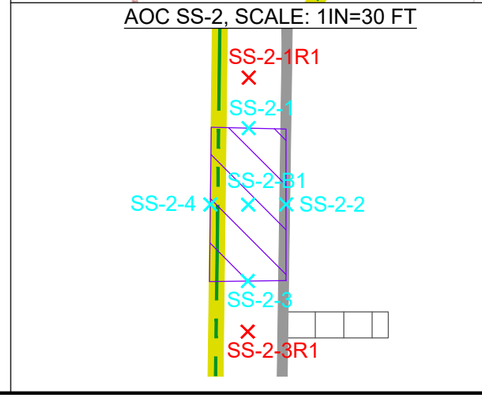
AOC TP-5, SCALE: 1IN=30 FT



AOC SB-5, SCALE: 1IN=30 FT



AOC SS-2, SCALE: 1IN=30 FT



LEGEND:

- PROPERTY BOUNDARY
- PARCEL
- BUILDING
- RAILROAD TRACKS
- HISTORIC CONCRETE TRENCH
- SS-1 — RI SURFACE SOIL
- TP-1 — RI TEST PIT
- SB-24 — RI SOIL BORING
- MW-1 — RI SOIL BORING / MONITORING WELL
- SV-1 — RI SUBSLAB SOIL VAPOR / INDOOR AIR
- SB-1 — HISTORIC SOIL BORING (2018 PHASE II)
- SB-20W — HISTORIC MONITORING WELL (2019 SUPPLEMENTAL PHASE II)
- APPROXIMATE TRACK 4 AOC LOCATIONS
- TP-1-2 — AOC DELINEATION SAMPLE LOCATIONS
- TP-1-2R1 — DELINEATION STEP-OUT LOCATIONS

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AREA OF CONCERN (AOC) DELINEATION LOCATIONS

REMEDIAL ACTION WORK PLAN

BETLEM SITE
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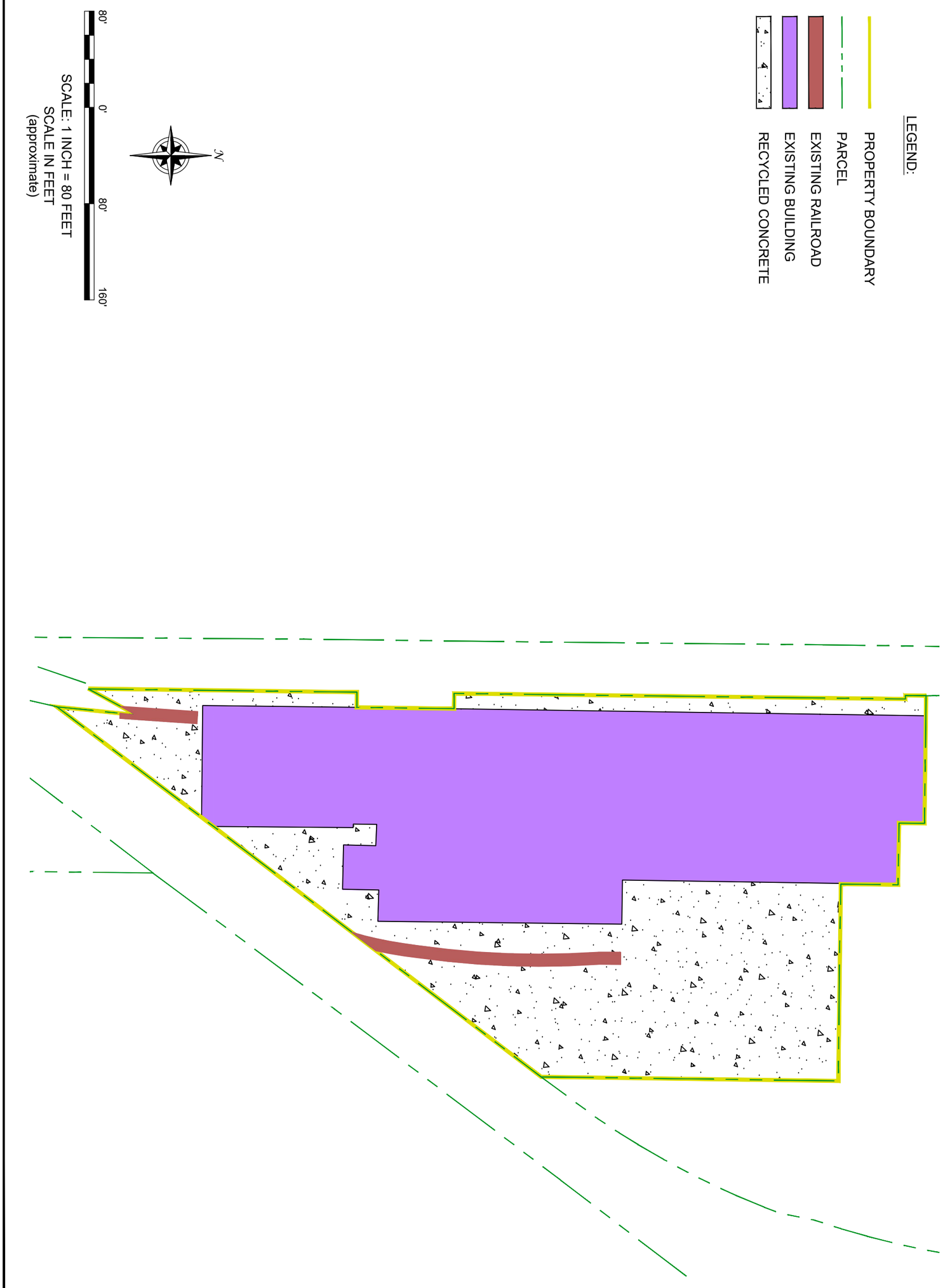
FIGURE 5

DATE: SEPTEMBER 2022
DRAFTED BY: CNK



COVER SYSTEM

REMEDIAL ACTION WORK PLAN

BETLEM SITE
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PREPARED FOR

BETLEM ASSOCIATES LLC

FIGURE 6

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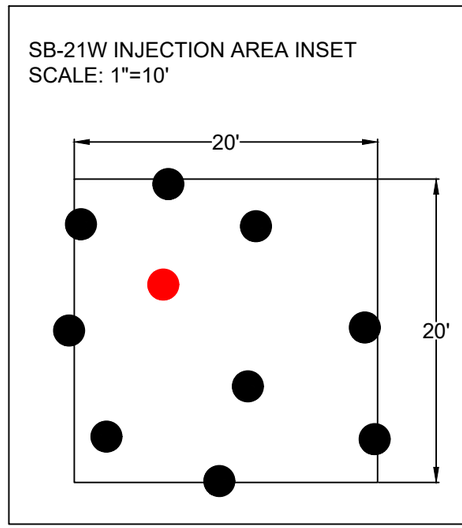
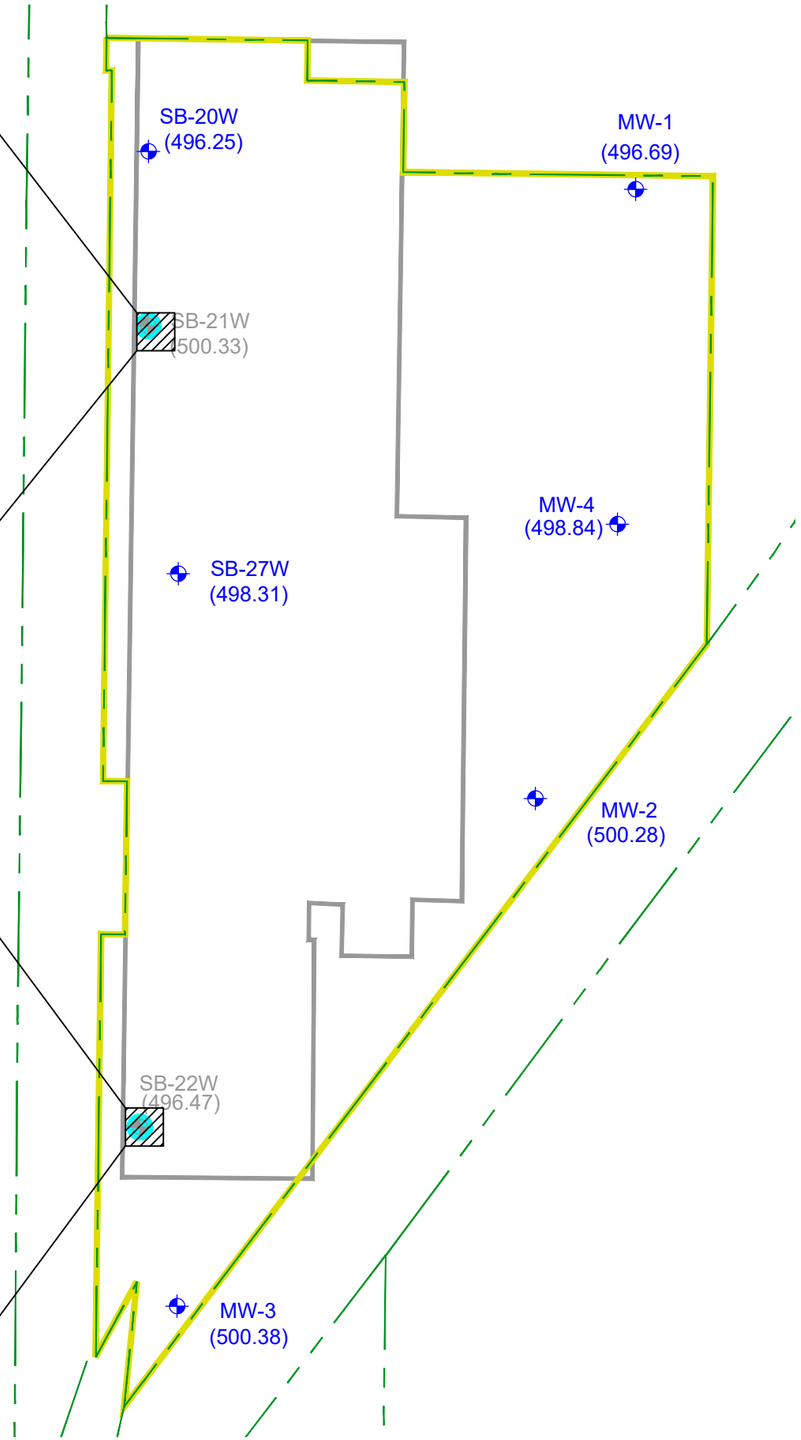
LEGEND:

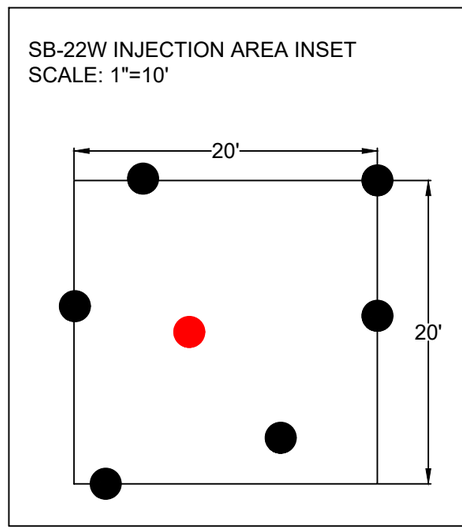
- PROPERTY BOUNDARY
- PARCEL
- BUILDING
- MW-1 — MONITORING WELL
- SB-21W — HISTORIC MONITORING WELL (2019 SUPPLEMENTAL PHASE II)
- VOCs EXCEED GWQS/GV
- GROUNDWATER INJECTION AREA
- MONITORING WELL (INSET)
- INJECTION WELL (INSET)

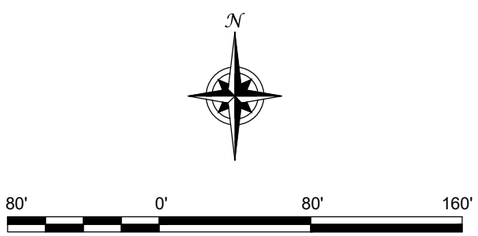
NOTES:

1. PETROFIX™ REMEDIATION FLUID WILL BE INJECTED AT SB-21W TO ADDRESS GROUNDWATER IMPACTED BY PETORLUEM VOCs.
2. 3-D MICROEMULSION® AND S-MICRO ZVI® WILL BE INJECTED AT SB-22W TO ADDRESS GROUNDWATER IMPACTED BY CVOCs.
3. POST-INJECTION GROUNDWATER MONITORING WILL BE COMPLETED AT SB-21W AND SB-22W.









SCALE: 1 INCH = 80 FEET
SCALE IN FEET
(approximate)

DATE: JANUARY 2023
DRAFTED BY: CCB/CNK

BENCHMARK

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JOB NO.: B0480-019-001

GROUNDWATER INJECTION AREAS

REMEDIAL ACTION WORK PLAN
BETLEM SITE
BCP SITE NO. C915348
HAMBURG, NEW YORK
PREPARED FOR
BETLEM ASSOCIATES LLC

FIGURE 7

APPENDIX A

HEALTH AND SAFETY PLAN

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

BETLEM SITE

HAMBURG, NEW YORK

November 2022 0480-019-001

Prepared for:

BETLEM ASSOCIATES LLC

BETLEM SITE
HEALTH AND SAFETY PLAN FOR RA ACTIVITIES

ACKNOWLEDGEMENT

Plan Reviewed by (initial):

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

Project Manager: Bryan Mayback

Designated Site Safety and Health Officer: Bryan Mayback

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

BETLEM SITE
HEALTH AND SAFETY PLAN FOR RA ACTIVITIES

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BETLEM SITE
HEALTH AND SAFETY PLAN FOR RA ACTIVITIES

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BETLEM SITE
HEALTH AND SAFETY PLAN FOR RA ACTIVITIES

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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 and Benchmark Civil/Environmental Engineering & Geology, PLLC employees (referred to hereafter as "Benchmark") during Remedial Action (RA) activities at the Betlem Site (Site) located in the Town of Hamburg, Erie County, New York. This HASP presents procedures for 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. 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 Background

The Site consisting of one tax parcel (Tax ID No. 150.16-1-2.12) totals ±3.54 acres and is improved with one large industrial building currently used for steel warehousing. The remainder of the Site includes gravel areas, and to a lesser extent, green space on the western and southern portions of the Site.

Based on historic records and previous studies, the Site was historically used for steel manufacturing/fabrication with storage of bar steel and bar mill, a wire shop, railroad tracks, machine/construction equipment warehousing and general warehousing from at least 1909 until approximately 1986. Historic owners/operators included Bethlehem Steel (from at least 1944 through at least 1950) and Kalman Steel (in at least 1928). The Site has been used as a storage and distribution facility since approximately 1986.

1.3 Known and Suspected Environmental Conditions

Previous investigations have confirmed that historic industrial operations have impacted the Site, which will require remediation prior to redevelopment. Previous investigation findings include:

Soil

The 3.54-acre Site is a historic industrial property with impacted fill materials from unknown sources. Soil impacts with nuisance conditions, apparently from historic operations, are also present on-Site, mostly in interior areas. Semi-volatile organic compounds (SVOCs) and metals were identified in soil/fill at concentrations exceeding 6 NCYRR Part 375 commercial soil cleanup objectives (CSCOs). Polychlorinated Biphenyls (PCBs) were non-detect or at concentrations below CSCOs except for one sample from beneath the building slab at SB-25 (2-5 fbgs), which had a total PCB concentration slightly above its CSCO. Volatile organic compounds (VOCs), pesticides, and herbicides did not exceed CSCOs.

Groundwater

Based on the groundwater data, the vast majority of analytes were detected below TOGS 1.1.1 Groundwater Quality Standards/Guidance Values (GWQS). Localized groundwater VOC impacts were identified within the building footprint at SB-21W and SB-22W. Specifically, VOCs exceeding GWQS include 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, isopropylbenzene, naphthalene, n-propylbenzene, toluene, and total xylenes at SB-22W and 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethane, chloroethane, methylene chloride, and vinyl chloride at SB-21W. PCBs were non-detect in the groundwater samples collected from the Site. Analytes associated with additional analyses performed (i.e., SVOCs, metals, pesticides, herbicides, and emerging contaminants) are generally non-detect or at low level concentrations consistent with an industrial area.

Soil Vapor

1,1,1-trichloroethane was identified in sub-slab air in the southern portion of the building at SSV-2 at a concentration of 1,000 ug/m3, which slightly exceeds the NYSDOH mitigation threshold (1,000 ug/m3 and above). As previously indicated, there does not appear to be an indoor air concern and results of the sub-slab soil vapor sampling indicate a marginal sub-slab vapor concern, which will be further evaluated and may be directly attributable to VOC groundwater impacts at SB-22W (1,1,1-trichloroethane was identified in groundwater at this location). As an injection is planned to degrade the VOCs in groundwater at SB-22W, we expect that subsurface conditions will improve over time thereby decreasing the concentration of 1,1,1-trichloroethane in sub-slab vapor to no further action (NFA) at a concentration

below the 1,000 ug/m3 threshold. The planned use of the Site for commercial/industrial purposes further reduces this concern. Our approach is to resample sub-slab vapor in the area of SSV-2 as part of the remedial action activities; the need for vapor mitigation will be further assessed during the remedial design phase to determine whether an active sub-slab depressurization (ASD) system is required within the building.

1.4 Parameters of Interest

Based on the previous investigations, constituents of potential concern (COPCs) in soil and, potentially groundwater, at the Site include:

- **Inorganic Compounds –** The inorganic COPCs potentially present at elevated concentrations are arsenic, barium, cadmium, copper, lead, manganese, and mercury.

- **Semi-Volatile Organic Compounds (SVOCs) –** SVOCs present at elevated concentrations may include polycyclic aromatic hydrocarbons (PAHs), which are byproducts of incomplete combustion and impurities in petroleum products.

- **Volatile Organic Compounds (VOCs) –** VOCs present at elevated concentrations may include petroleum VOCs and chlorinated VOCs (CVOCs).

1.5 Overview of Remedial Activities

Benchmark-TurnKey personnel will be on-site to observe and perform remedial activities. The field activities to be completed as part of the remedial are described below.

1. Excavation of metals and PAH-impacted soil/fill at Areas of Concern (AOCs) followed by off-site disposal at a commercial sanitary landfill.
2. Waste characterization sampling.
3. Post-excavation sampling.
4. Backfilling.
5. Groundwater Management.
6. Soil cover placement.
7. Removal of the three inactive privately-owned transformers from the southern portion of the building.

8. Application of In-Situ Enhanced Biodegradation Reagent to address groundwater VOC impacts in the areas of SB-21W and SB-22W.
9. Soil Vapor Intrusion assessment and ASD system installation (as needed).

2.0 ORGANIZATIONAL STRUCTURE

This section 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 establish 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 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 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 consulting with corporate management to ensure adequate resources are available to properly implement these programs and policies. The Corporate Health and Safety Director coordinates 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. Thomas H. Forbes.*** The Project Manager has the responsibility and authority to direct all 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 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 SSHO for this Site is ***Mr. Bryan Mayback***. The qualified alternate SSHO is ***Mr. Christopher Boron.*** 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 Benchmark personnel on the Site.
- Serving as the point of contact for safety and health matters.
- Ensuring that 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 the Drilling Contractor, who will be responsible for developing, implementing and enforcing a Health and Safety Plan equally stringent or more stringent than Benchmark's HASP. Benchmark assumes no responsibility for the health and safety of anyone outside its direct employ. Each Contractor's HASP shall cover all non- Benchmark Site personnel. Each Contractor shall assign a SSHO who will coordinate with Benchmark's SSHO as necessary to ensure effective lines of communication and consistency between contingency plans.

In addition to 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, inorganic and SVOC impacts have been identified in the fill material and VOC impacts have been identified in the groundwater present at the Site. Table 1 lists exposure limits for airborne concentrations of the COPCs identified in Section 1.4 of this HASP. Brief descriptions of the toxicology of the prevalent COPCs and related health and safety guidance and criteria are provided below.

- **1,1,1-Trichloroethane (CAS #71-55-6)** is a colorless, sweet-smelling liquid that was once produced industrially in large quantities for use as a solvent. Also known as 1,1,1-TCA, symptoms of acute inhalation exposure include dizziness, nausea, vomiting, diarrhea, loss of consciousness, and decreased blood pressure.
- **1,1,2-Trichloroethane/1,2,2-Triflouroethane (CAS #79-00-5)** is commonly used as a solvent. Routes of exposure include inhalation, ingestion, or through the skin. Effects include stinging/burning of the skin and possible nervous system effects.
- **1,1-Dichloroethane (CAS #75-34-3)** is a colorless oily liquid with a chloroform-like odor. Commonly used in limited amounts as a solvent for cleaning and degreasing, and in the manufacture of adhesives and synthetic fibers. Exposure routes include inhalation or drinking contaminated water if you are near industrial facilities or hazardous waste sites. May cause skin irritation, central nervous

system depression, along with liver, kidney, and lung damage.

- **1,1-Dichloroethene (CAS #75-35-4)** has a sweet chloroform-like odor. Also known as 1,1-DCE, it is a breakdown product of the anaerobic reduction of TCE, which effects the central nervous system.
- **1,2-Dichloroethane (CAS #107-06-2)** is a colorless, highly flammable liquid with a pleasant smell that does not naturally exist in the environment. Also known as 1,2-DCA, it is commonly used in the production of vinyl chloride and as a solvent. Inhalation may cause respiratory distress, nausea, and vomiting. Contact may cause irritation to the skin and eyes. Exposure affects the central nervous system, liver, and kidneys and may cause cancer.
- **1,2,4-Trimethylbenzene (CAS #95-63-6)** is a common gasoline additive. Acute exposure predominantly results in skin irritation and inhalation causes chemical pneumonitis. Symptoms include headache, dizziness, fatigue, muscular weakness, drowsiness.
- **1,3,5-Trimethylbenzene (CAS #108-67-8)** is a colorless, odorless flammable liquid. The substance is irritating to the eyes, the skin and the respiratory tract. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system.
- **Benzene (CAS #71-43-2)** poisoning occurs most commonly through inhalation of the vapor, however, benzene can also penetrate the skin and poison in that way. Locally, benzene has a comparatively strong irritating effect, producing erythema and burning and, in more severe cases, edema and blistering. Exposure to high concentrations of the vapor (i.e., 3,000 ppm or higher) may result in acute poisoning characterized by the narcotic action of benzene on the central nervous system. In acute poisoning, symptoms include confusion, dizziness, tightening of the leg muscles, and pressure over the forehead. Chronic exposure to benzene (i.e., long-term exposure to concentrations of 100 ppm or less) may lead to damage of the blood-forming system. Benzene is very flammable when exposed to heat or flame and can react vigorously with oxidizing materials.
- **Chloroethane (CAS # 75-00-3)** is a colorless, flammable gas with a sharp smell formerly used in leaded gasoline. It is used to numb the skin prior to medical procedures. Acute exposure may lead to loss of muscle coordination and unconsciousness.
- **Ethylbenzene (CAS #100-41-4)** is a component of automobile gasoline. Over-exposure may cause kidney, skin liver and/or respiratory disease. Signs of exposure may include dermatitis, irritation of the eyes and mucus membranes, headache. Narcosis and coma may result in more severe cases.
- **Isopropylbenzene (CAS #98-82-8)** is a component of multiple petroleum products. Acute exposure results in central nervous system depression. Symptoms

include headache, dizziness, fatigue, muscular weakness, drowsiness, and coordination loss.

- **Methylene Chloride (CAS #75-09-2)** is a clear, colorless, nonflammable, volatile liquid with a sweet, pleasant smell and emits highly toxic fumes when heated to decomposition. It is used as a solvent in paint removers, degreasing agent, and electronics manufacturing. Inhalation exposure irritates the nose and throat, affects the central nervous system, and is anticipated to be a human carcinogen.
- **n-Propylbenzene (CAS # 103-65-1)** is a colorless, flammable liquid used to make other chemicals. Contact to the skin and eyes may cause burns and irritation. The substance may also be toxic and/or cause irritation when inhaled or ingested. Effects of exposure may also include nausea, headaches, dizziness, central nervous system depression, and unconsciousness.
- **Naphthalene (CAS #91-20-3)** is a component in fuel, coal, and tar. Main routes of exposure include inhalation, through the skin, and by ingestion. The contaminant may cause lesions of blood cells. This substance is possibly carcinogenic to humans.
- **Toluene (CAS #108-88-3)** is a common component of paint thinners and automobile fuel. Acute exposure predominantly results in central nervous system depression. Symptoms include headache, dizziness, fatigue, muscular weakness, drowsiness, and coordination loss. Repeated exposures may cause removal of lipids from the skin, resulting in dry, fissured dermatitis.
- **Vinyl Chloride (CAS #75-01-4)** is a synthetic chlorinated organic chemical used in the manufacture of polyvinyl chloride (PVC). Its presence in site-specific circumstances may be attributable to breakdown of the halogenated aliphatic hydrocarbons TCE and 1,2-trans-dichloroethene to vinyl chloride. In high concentrations, vinyl chloride may cause reversible narcosis similar to alcohol intoxication. Skin contact with undiluted vinyl chloride results in frostbite by rapid evaporation and subsequent freezing. It is unlikely that these acute effects would be observed at the concentrations and site-specific exposure scenarios expected. Chronic exposure to vinyl chloride through inhalation has been associated with liver toxicity, fatty deposition in particular. Vinyl chloride is a suspect carcinogen.
- **Xylene (o, m, and p) (CAS #95-47-6, 108-38-3, and 106-42-3)** are colorless, flammable liquids present in paint thinners and fuels. Acute exposure may cause central nervous system depression, resulting in headache, dizziness, fatigue, muscular weakness, drowsiness, and coordination loss. Repeated exposures may also cause removal of lipids from the skin, producing dry, fissured dermatitis. Exposure of high concentrations of vapor may cause eye irritation and damage, as well as irritation of the mucus membranes.

- **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.
- **Polychlorinated Biphenyls (PCBs)** are associated with former substations, rail yards, and hydraulic pump houses on the Site. PCBs can be absorbed into the body by inhalation of its aerosol, through the skin, and by ingestion. Repeated or prolonged contact with skin may cause dermatitis. PCBs may have effects on the liver. Animal tests show that PCBs possibly cause toxic effects in human reproduction. In the food chain, bioaccumulation takes place, specifically in aquatic organisms. A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.
- **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.
- **Barium (CAS # 7440-39-3)** is a silver white metal, produced by the reduction of barium oxide. Local effects and symptoms of exposure to barium compounds, such as the hydroxide or carbonate, may include irritation of the eyes, throat, nose and skin. Systemic effects from ingestion include increased muscle contractility, reduction of heart rate/potential arrest, intestinal peristalsis, vascular constriction, and bladder contraction.
- **Cadmium (CAS #7440-43-9)** is a naturally occurring element that is generally

found combined with elements such as oxygen, chloride, or sulfur. Cadmium is used in products such as batteries, pigments, metal coatings and plastics. Cadmium can cause vomiting and diarrhea when ingested, and cause lung damage when inhaled. Long term effects of cadmium include kidney damage, increased bone fragility, cancer, and death.

- **Copper (CAS #7440-50-8)** is a naturally occurring metal in the environment in rocks, soil, water and air. The most common use of copper is to make wire, pipes, and sheet metal. High levels of copper exposure may cause irritation of the nose, mouth, and eyes, vomiting, diarrhea, stomach cramps, and death.
- **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.
- **Manganese (CAS #7439-96-5)** is a naturally occurring element that is commonly used in the production of steel, stainless steel, and cast iron. Exposure may cause insomnia, mental confusion, cough, difficulty breathing, vomiting, weakness, and damage to kidneys and the central nervous system.
- **Mercury (CAS #7439-97-6)** is used in industrial applications for the production of caustic and chlorine, and in electrical control equipment and apparatus. Overexposure to mercury may cause coughing, chest pains, bronchitis, pneumonia, indecision, headaches, fatigue, and salivation. Mercury is a skin and eye irritant.

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, if deemed necessary. 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 Betlem 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 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- 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 Benchmark employees as stipulated under 29 CFR Part 1910.120(f). These exams include initial employment, annual and employment termination physicals for all 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, an occupational health care provider under contract with Benchmark. Health Works is located in Seneca Square Plaza, 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 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, 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 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 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 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, 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

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 and the nature of the proposed work activities at the Site, the possibility exist that 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

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 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 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 in the Generic Community Air Monitoring Plan and attached as Appendix C. 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 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 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.

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 from the field equipment 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 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 sustained ambient air concentration of organic vapors at the downwind perimeter of the exclusion zone exceeds 5 ppm above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the sustained organic vapor decreases below 5 ppm over background, work activities can resume with continued monitoring.
  - If the sustained ambient air concentration of organic vapors at the downwind perimeter of the exclusion zone are greater than 5 ppm over background but less than 25 ppm for the 15-minute average, activities can resume provided that: the organic vapor level 200 feet downwind of the working site or half the distance to the nearest off-site residential or commercial structure, whichever is less, but in no case less than 20 feet, is below 5 ppm over background; and

more frequent intervals of monitoring, as directed by the Site Health and Safety Officer, are conducted.

- If the sustained organic vapor level is above 25 ppm at the perimeter of the exclusion zone for the 15-minute average, the Site Health and Safety Officer must be notified and work activities shut down. The Site Health and Safety Officer will determine when re-entry of the exclusion zone is possible and will implement downwind air monitoring to ensure vapor emissions do not impact the nearest off-site residential or commercial structure at levels exceeding those specified in the ***Organic Vapor Contingency Monitoring Plan*** below. All readings will be recorded and will be available for New York State Department of Environmental Conservation (DEC) and Department of Health (DOH) personnel to review.

o **ORGANIC VAPOR CONTINGENCY MONITORING PLAN:**

- If the sustained organic vapor level is greater than 5 ppm over background 200 feet downwind from the work area or half the distance to the nearest off-site residential or commercial property, whichever is less, all work activities must be halted.

- If, following the cessation of the work activities or as the result of an emergency, sustained organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest off-site residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest off-site residential or commercial structure (20-foot zone).

- If efforts to abate the emission source are unsuccessful and if sustained organic vapor levels approach or exceed 5 ppm above background within the 20-foot zone for more than 30 minutes, or are sustained at levels greater than 10 ppm above background for longer than one minute, 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. Frequent air monitoring will be conducted at 30-minute intervals within the 20-foot zone. If two sustained successive readings below action levels are measured, air monitoring may be halted or modified by the Site Health and Safety Officer.

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 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 and/or a petroleum product spill is not likely to occur during RI efforts.

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 Attachment H2 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 Benchmark employees. The Site Safety and Health Officer and/or his or her designee will be responsible for monitoring 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 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 a heated area, 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. Flagging tape will delineate the zone. 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 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 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 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 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

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

Benchmark personnel will conduct decontamination of all tools used for sample collection purposes. 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 Benchmark employees is not anticipated to be necessary to complete the RI 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 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 Benchmark's corporate Health and Safety Director. 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 1.

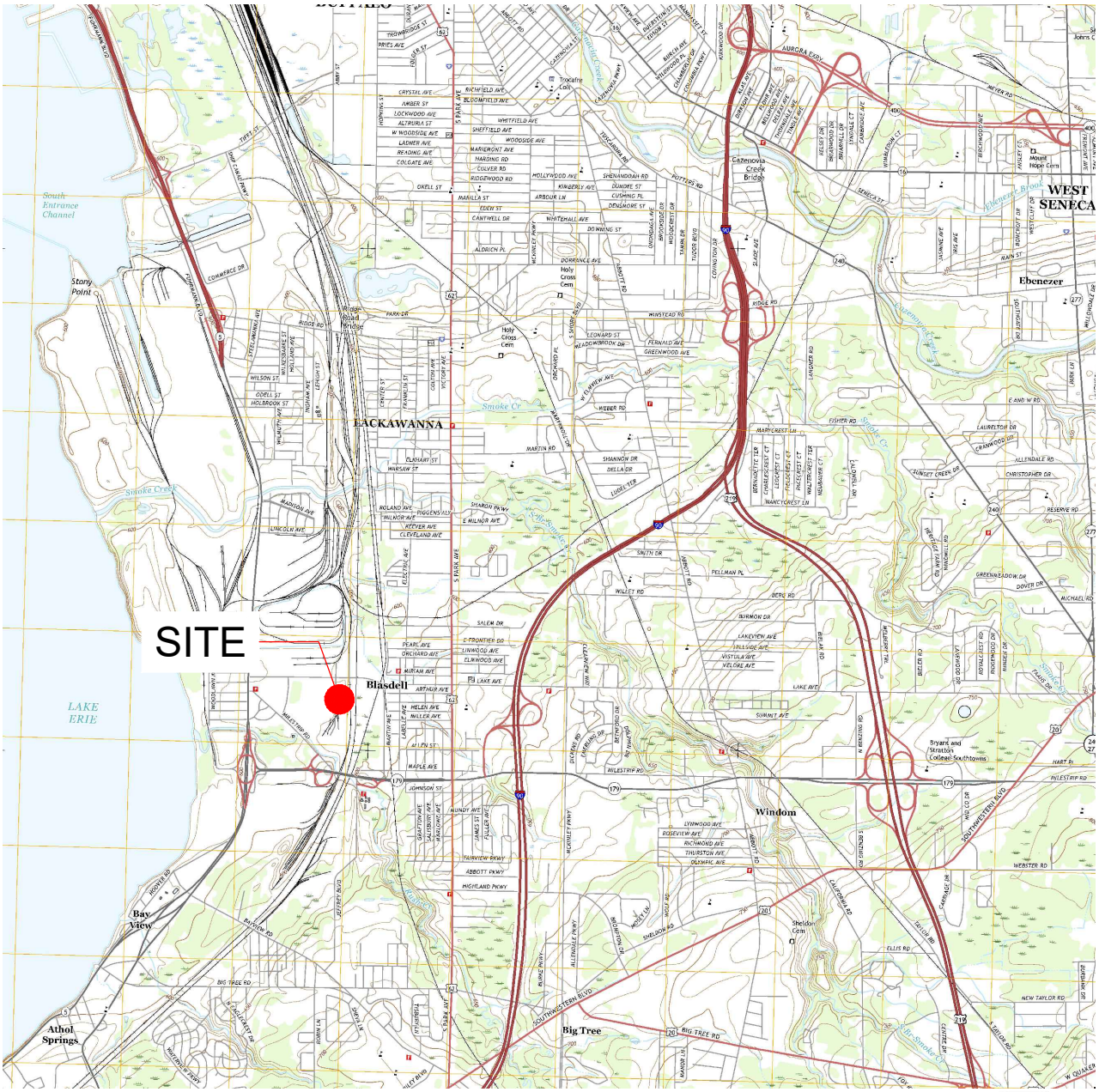
16.0 REFERENCES

1. New York State Department of Environmental Conservation. *DER-10; Technical Guidance for Site Investigation and Remediation.* May 2010.

TABLES

FIGURES

FIGURE 1



SCALE: 1 INCH = 5,000 FEET
SCALE IN FEET
(approximate)

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

PROJECT NO.: B0480-019-001

DATE: AUGUST 2022

DRAFTED BY: CCB

SITE LOCATION & VICINITY MAP

HEALTH AND SAFETY PLAN

BETLEM SITE
BCP SITE NO. C915348
HAMBURG, NEW YORK

PREPARED FOR

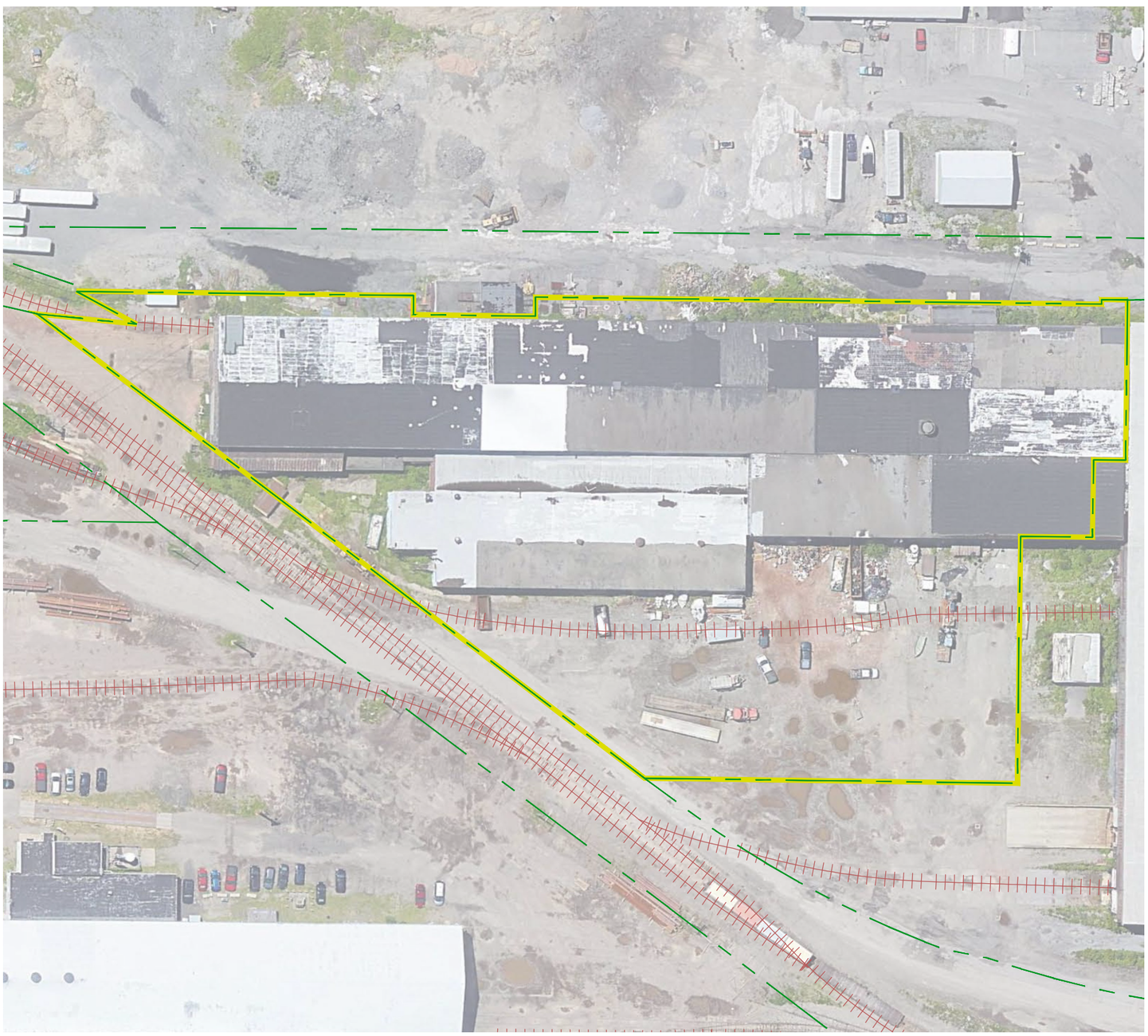
BETLEM ASSOCIATES LLC

DATE: AUGUST 2022
DRAFTED BY: CCB

LEGEND:
PROPERTY BOUNDARY
PARCEL
RAILROAD

N

SCALE: 1 INCH = 80 FEET
SCALE IN FEET
(approximate)
80' 0' 80' 160'



SITE PLAN (AERIAL)

FIGURE 2

HEALTH AND SAFETY PLAN

BETLEM SITE
BCP SITE NO. C915348
HAMBURG, NEW YORK
PREPARED FOR
BETLEM ASSOCIATES LLC

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

JOB NO.: B0480-019-001

ATTACHMENT A

EMERGENCY RESPONSE PLAN

BENCHMARK

EMERGENCY RESPONSE PLAN
for
BROWNFIELD CLEANUP PROGRAM
REMEDIAL ACTION ACTIVITIES

BETLEM SITE

HAMBURG, NEW YORK

August 2022 0480-019-001

Prepared for:

BETLEM ASSOCIATES LLC

BETLEM SITE
HEALTH AND SAFETY PLAN FOR RA ACTIVITIES
APPENDIX A: EMERGENCY RESPONSE PLAN

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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 Action (RA) activities at the Betlem Site in Hamburg, 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 in 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 Benchmark personnel field vehicle.

5.0 EMERGENCY CONTACTS

The following identifies the emergency contacts for this ERP.

Emergency Telephone Numbers:

Project Manager: *Bryan Mayback*
Work: (716) 856-0599
Mobile: (716) 844-1699

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

Site Safety and Health Officer (SSHO): *Bryan Mayback*
Work: (716) 856-0599
Mobile: (716) 844-1699

Alternate SSHO: *Christopher Boron*
Work: (716) 856-0635
Mobile: (716) 864-2726

BUFFALO MERCY HOSPITAL (ER):	(716) 826-7000
FIRE:	911
AMBULANCE:	911
BUFFALO POLICE:	911
STATE EMERGENCY RESPONSE HOTLINE:	(800) 457-7362
NATIONAL RESPONSE HOTLINE:	(800) 424-8802
NYSDOH:	(716) 847-4385
NYSDEC:	(716) 851-7220
NYSDEC 24-HOUR SPILL HOTLINE:	(800) 457-7252

The Site location is:

0 Lake Avenue (AKA 250 Lake Avenue)
Hamburg, New York 14219
Site Phone Number: Benchmark Staff Cell Phones to be used.

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 all personnel entering the site understand an adequate method of internal communication. 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 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 Mayback*** or ***Christopher Boron***) 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

In the event of adverse 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 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 Hospital.

- Ingestion: Decontaminate and transport to 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 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 Mercy Hospital (see Figure 1):

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

- Proceed north toward Lake Avenue
- Turn left onto Lake Avenue toward Seneca Drive
- Turn right onto NY-5 E
- Take the Tifft Street Exit toward Fuhrmann Boulevard
- At the traffic circle, take the 1st exit onto Tifft Street
- Turn right onto McKinley Pkwy
- Turn left onto Lorraine Avenue
- Hospital on the right (565 Abbott Road)
  (5.9 miles)

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.

FIGURE

FIGURE 1

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

PROJECT NO.: B0480-019-001

DATE: AUGUST 2022

DRAFTED BY: CCB

HOSPITAL ROUTE MAP

EMERGENCY RESPONSE PLAN

BETLEM SITE
BCP SITE NO. C915348
HAMBURG, NEW YORK

PREPARED FOR

BETLEM ASSOCIATES LLC

ATTACHMENT B

HOT WORK PERMIT FORM

BENCHMARK

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

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:

ATTACHMENT C

NYSDOH GENERIC COMMUNITY AIR MONITORING PLAN

BENCHMARK

Appendix C1
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 C2
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 B

COMMUNITY AIR MONITORING PLAN

Appendix C1
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

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APPENDIX C

REGENESIS SAFETY DATA SHEETS (INJECTION MATERIALS)

SAFETY DATA SHEET

1. Identification

Product identifier **PetroFix**

Other means of identification None.

Recommended use Remediation of contaminants in soil and groundwater.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company Name REGENESIS

Address 1011 Calle Sombra
San Clemente, CA 92673 USA

General information 949-366-8000

E-mail CustomerService@regenesis.com

Emergency phone number For Hazardous Materials Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC 24/7 at:

USA, Canada 1-800-424-9300

International 1-703-527-3887

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards Not classified.

OSHA defined hazards Not classified.

Label elements

Hazard symbol None.

Signal word None.

Hazard statement The mixture does not meet the criteria for classification.

Precautionary statement

Prevention Observe good industrial hygiene practices.

Response Wash hands after handling.

Storage Store away from incompatible materials.

Disposal Dispose of waste and residues in accordance with local authority requirements.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information None.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Activated carbon <10 µm	7440-44-0	>25
Calcium sulfate dihydrate	10101-41-4	<10
Additive	-	<2

Composition comments All concentrations are in percent by weight unless otherwise indicated.
Components not listed are either non-hazardous or are below reportable limits.
Chemical ingredient identity and/or concentration information withheld for some or all components present is confidential business information (trade secret), and is being withheld as permitted by 29 CFR 1910.1200(i).

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact	Wash off with soap and water. Get medical attention if irritation develops and persists.
Eye contact	Rinse with water. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. Get medical attention if symptoms occur.
Most important symptoms/effects, acute and delayed	Direct contact with eyes may cause temporary irritation.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	None known.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed. Combustion products may include: carbon oxides, nitrogen oxides, sulfur oxides, calcium oxide.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	This material will not burn until the water has evaporated. Residue can burn. When dry may form combustible dust concentrations in air.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store in tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-3 (29 CFR 1910.1000)

Components	Type	Value	Form
Activated carbon <10 µm (CAS 7440-44-0)	TWA	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Activated carbon <10 µm (CAS 7440-44-0)	TWA	2 mg/m3	Respirable fraction.
Calcium sulfate dihydrate (CAS 10101-41-4)	TWA	10 mg/m3	Inhalable fraction.

Biological limit values No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls	Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

Eye/face protection	Wear safety glasses with side shields (or goggles).
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.
Skin protection	
Other	Wear suitable protective clothing.
Respiratory protection	In case of insufficient ventilation, wear suitable respiratory equipment.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	
Physical state	Liquid.
Form	Aqueous suspension.
Color	Black.
Odor	Odorless.
Odor threshold	Not available.
pH	8 - 10
Melting point/freezing point	32 °F (0 °C).
Initial boiling point and boiling range	212 °F (100 °C)
Flash point	Not applicable.
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Vapor pressure	Property has not been measured.
Vapor density	Property has not been measured.
Relative density	Property has not been measured.
Solubility(ies)	
Solubility (water)	Not determined.
Partition coefficient (n-octanol/water)	Not applicable, product is a mixture. Not applicable, product is a mixture.
Auto-ignition temperature	Property has not been measured.
Decomposition temperature	Property has not been measured.
Viscosity	Not available.
Other information	
Density	Property has not been measured.
Explosive properties	Not explosive.
Flammability	This material will not burn until the water has evaporated.
Kinematic viscosity	Property has not been measured.
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.

Conditions to avoid	May generate combustible dust if material dries. Contact with incompatible materials. Avoid drying out product.
Incompatible materials	Acids. Strong oxidizing agents.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Spray mist may irritate the respiratory system. For dry material: Dust may irritate respiratory system.
Skin contact	Prolonged or repeated exposure may cause minor irritation.
Eye contact	Direct contact with eyes may cause temporary irritation.
Ingestion	May cause discomfort if swallowed.
Symptoms related to the physical, chemical and toxicological characteristics	Direct contact with eyes may cause temporary irritation.

Information on toxicological effects

Acute toxicity Not expected to be acutely toxic.

Components	Species	Test Results
Activated carbon <10 µm (CAS 7440-44-0)		
Acute		
Oral		
LD50	Rat	> 10000 mg/kg

Skin corrosion/irritation	Prolonged skin contact may cause temporary irritation. Based on available data, the classification criteria are not met.
Serious eye damage/eye irritation	Direct contact with eyes may cause temporary irritation. Based on available data, the classification criteria are not met.

Respiratory or skin sensitization

Respiratory sensitization	Not a respiratory sensitizer. Based on available data, the classification criteria are not met.
Skin sensitization	This product is not expected to cause skin sensitization. Based on available data, the classification criteria are not met.

Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic. Based on available data, the classification criteria are not met.
Carcinogenicity	Not classifiable as to carcinogenicity to humans. Based on available data, the classification criteria are not met.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects. Based on available data, the classification criteria are not met.
Specific target organ toxicity - single exposure	Not classified. Based on available data, the classification criteria are not met.
Specific target organ toxicity - repeated exposure	Not classified. Based on available data, the classification criteria are not met.
Aspiration hazard	Not an aspiration hazard. Based on available data, the classification criteria are not met.
Chronic effects	Prolonged inhalation may be harmful.
Further information	No other specific acute or chronic health impact noted.

12. Ecological information

Ecotoxicity	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	No data is available on the degradability of this product.

Bioaccumulative potential	No data available.
Mobility in soil	No data available.
Other adverse effects	None known.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not established.

15. Regulatory information

US federal regulations This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Toxic Substances Control Act (TSCA)	All components of the mixture on the TSCA 8(b) inventory are designated “active”.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical	No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA)	Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Calcium sulfate dihydrate (CAS 10101-41-4)

US. New Jersey Worker and Community Right-to-Know Act

Not listed.

US. Pennsylvania Worker and Community Right-to-Know Law

Not listed.

US. Rhode Island RTK

Activated carbon <10 µm (CAS 7440-44-0)
Calcium sulfate dihydrate (CAS 10101-41-4)

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 15-February-2018

Revision date 02-December-2021

Version # 02

HMIS® ratings

Health: 1
Flammability: 1
Physical hazard: 0
Personal protection: B

NFPA ratings

Disclaimer

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

SAFETY DATA SHEET

1. Identification

Product identifier **PetroFix Electron Acceptor Blend**

Other means of identification None.

Recommended use Remediation of soils and groundwater.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company Name REGENESIS

Address 1011 Calle Sombra
San Clemente, CA 92673 USA

General information 949-366-8000

E-mail CustomerService@regenesis.com

Emergency phone number For Dangerous Goods Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC 24/7 at:

USA, Canada 1-800-424-9300

International +1 703-741-5970

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards Serious eye damage/eye irritation Category 2B

OSHA defined hazards Not classified.

Label elements

Hazard symbol None.

Signal word Warning

Hazard statement Causes eye irritation.

Precautionary statement

Prevention Wash thoroughly after handling.

Response If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

Storage Store away from incompatible materials.

Disposal Dispose of waste and residues in accordance with local authority requirements.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information None.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Ammonium sulfate	7783-20-2	30 - 60
Sodium nitrate	7631-99-4	30 - 60

Composition comments All concentrations are in percent by weight unless otherwise indicated.

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact Wash off with soap and water. Get medical attention if irritation develops and persists.

Eye contact Do not rub eyes. Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.

Ingestion	Rinse mouth. Get medical attention if symptoms occur.
Most important symptoms/effects, acute and delayed	Direct contact with eyes may cause temporary irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Suitable extinguishing media	Use fire-extinguishing media appropriate for surrounding materials.
Unsuitable extinguishing media	None known.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed. Combustion products may include: nitrogen oxides, sulfur oxides, ammonia.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk. Use water spray to cool unopened containers.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	Material will not burn.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Avoid the generation of dusts during clean-up. Collect dust using a vacuum cleaner equipped with HEPA filter. Stop the flow of material, if this is without risk. Large Spills: Wet down with water and dike for later disposal. Absorb in vermiculite, dry sand or earth and place into containers. Shovel the material into waste container. Following product recovery, flush area with water. Small Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal. Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Minimize dust generation and accumulation. Provide appropriate exhaust ventilation at places where dust is formed. Avoid contact with eyes. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store in tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Provide eyewash station.

Individual protection measures, such as personal protective equipment

Eye/face protection	Wear approved safety goggles. Use tight fitting goggles if dust is generated.
Skin protection	
Hand protection	Wear protective gloves. Suitable gloves can be recommended by the glove supplier.

Skin protection	
Other	Wear suitable protective clothing.
Respiratory protection	If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Recommended use: Wear respirator with dust filter. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	
Physical state	Solid.
Form	Powder.
Color	White.
Odor	Property has not been measured.
Odor threshold	Property has not been measured.
pH	Property has not been measured.
Melting point/freezing point	Property has not been measured.
Initial boiling point and boiling range	Property has not been measured.
Flash point	Not applicable, material is a solid.
Evaporation rate	Property has not been measured.
Flammability (solid, gas)	This material will not burn.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	Not applicable, material is a solid.
Explosive limit - upper (%)	Not applicable, material is a solid.
Vapor pressure	Property has not been measured.
Vapor density	Property has not been measured.
Relative density	Property has not been measured.
Solubility(ies)	
Solubility (water)	Property has not been measured.
Partition coefficient (n-octanol/water)	Not applicable.
Auto-ignition temperature	Not applicable, material is a solid.
Decomposition temperature	Property has not been measured.
Viscosity	Not applicable.
Other information	
Density	Property has not been measured.
Explosive properties	Not explosive.
Kinematic viscosity	Not applicable, material is a solid.
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Contact with incompatible materials. Heat.
Incompatible materials	Strong reducing agents. Strong acids.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Dust may irritate respiratory system.
Skin contact	Dust or powder may irritate the skin.
Eye contact	Causes serious eye irritation.
Ingestion	May cause discomfort if swallowed.
Symptoms related to the physical, chemical and toxicological characteristics	Direct contact with eyes may cause temporary irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision.

Information on toxicological effects

Acute toxicity

Components	Species	Test Results
Ammonium sulfate (CAS 7783-20-2)		
Acute		
Dermal		
LD50	Rat	> 2000 mg/kg
Inhalation		
Dust		
LC50	Rat	> 1000 mg/m³, 8 Hours
Oral		
LD50	Rat	2000 - 4250 mg/kg

Skin corrosion/irritation	Not classified.
Serious eye damage/eye irritation	Causes serious eye irritation.
Respiratory or skin sensitization	
Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic. Based on available data, the classification criteria are not met.
Carcinogenicity	Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Sodium nitrate (CAS 7631-99-4) 2A Probably carcinogenic to humans.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not an aspiration hazard.
Chronic effects	Prolonged exposure may cause chronic effects.

12. Ecological information

Ecotoxicity	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Components		Species	Test Results
Ammonium sulfate (CAS 7783-20-2)			
Aquatic			
Acute			
Crustacea	EC50	Daphnia magna	> 100 mg/l, 96 Hours
Fish	LC50	Pimephales promelas	> 100 mg/l, 96 Hours
Chronic			
Fish	NOEC	Pimephales promelas	300 mg/l, 10 days

Persistence and degradability The product solely consists of inorganic compounds which are not biodegradable.

Bioaccumulative potential No data available.

Mobility in soil No data available.

Other adverse effects None known.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Ammonium sulfate (CAS 7783-20-2) 1.0 % One-Time Export Notification only.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Toxic Substances Control Act (TSCA) All components of the mixture on the TSCA 8(b) inventory are designated “active”.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

Classified hazard categories Serious eye damage or eye irritation

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Ammonium sulfate	7783-20-2	30 - 60
Sodium nitrate	7631-99-4	30 - 60

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Contains component(s) regulated under the Safe Drinking Water Act.

US state regulations

US. Massachusetts RTK - Substance List

Ammonium sulfate (CAS 7783-20-2)
Sodium nitrate (CAS 7631-99-4)

US. New Jersey Worker and Community Right-to-Know Act

Sodium nitrate (CAS 7631-99-4)

US. Pennsylvania Worker and Community Right-to-Know Law

Ammonium sulfate (CAS 7783-20-2)
Sodium nitrate (CAS 7631-99-4)

US. Rhode Island RTK

Ammonium sulfate (CAS 7783-20-2)
Sodium nitrate (CAS 7631-99-4)

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 15-August-2018

Revision date 20-May-2022

Version # 02

HMIS® ratings Health: 1
Flammability: 0
Physical hazard: 0
Personal protection: B

NFPA ratings

Disclaimer

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

SAFETY DATA SHEET

1. Identification

Product identifier **3-D Microemulsion® Factory Emulsified**

Other means of identification 3DME

Recommended use Remediation of soils and groundwater.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company Name REGENESIS

Address 1011 Calle Sombra
San Clemente, CA 92673 USA

General information 949-366-8000

E-mail CustomerService@regenesis.com

Emergency phone number For Dangerous Goods Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC 24/7 at:

USA, Canada 1-800-424-9300

International +1 703-741-5970

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards Not classified.

OSHA defined hazards Not classified.

Label elements

Hazard symbol None.

Signal word None.

Hazard statement The mixture does not meet the criteria for classification.

Precautionary statement

Prevention Observe good industrial hygiene practices.

Response Wash hands after handling.

Storage Store away from incompatible materials.

Disposal Dispose of waste and residues in accordance with local authority requirements.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information None.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Fatty acid esters	-	40 - 60
Water	7732-18-5	35 - 45
Lactate oligomers	-	2 - 10
Sodium lactate	867-56-1	2 - 10
Surfactant	-	< 1

Composition comments All concentrations are in percent by weight unless otherwise indicated.
Contains no hazardous ingredients according to OSHA 29 CFR 1910.1200.

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact	Wash off with soap and water. Get medical attention if irritation develops and persists.
Eye contact	Rinse with water. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. Get medical attention if symptoms occur.
Most important symptoms/effects, acute and delayed	Direct contact with eyes may cause temporary irritation. Prolonged skin contact may cause temporary irritation.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed. Combustion products may include: carbon oxides, phosphorus oxides, metal oxides.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk. Water spray should be used to cool containers.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	The product is an aqueous solution. After the water component evaporates, the remaining material will burn.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	This product is miscible in water. Spilled product may create a slipping hazard. Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store in tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Recommended storage containers: plastic lined steel, plastic, glass, aluminum, stainless steel, reinforced fiberglass.

8. Exposure controls/personal protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

Eye/face protection	Wear safety glasses with side shields (or goggles).
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.

Skin protection	
Other	Wear suitable protective clothing.
Respiratory protection	In case of insufficient ventilation, wear suitable respiratory equipment.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	
Physical state	Liquid.
Form	Liquid.
Color	White.
Odor	Odorless.
Odor threshold	Not available.
pH	6 - 8
Melting point/freezing point	Property has not been measured.
Initial boiling point and boiling range	212 °F (100 °C)
Flash point	> 199.94 °F (> 93.3 °C) Closed Cup
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	Property has not been measured.
Explosive limit - upper (%)	Property has not been measured.
Vapor pressure	Property has not been measured.
Vapor density	Property has not been measured.
Relative density	1 - 1.2
Solubility(ies)	
Solubility (water)	Miscible.
Partition coefficient (n-octanol/water)	Property has not been measured. Property has not been measured.
Auto-ignition temperature	Property has not been measured.
Decomposition temperature	Not applicable as the product is not unstable.
Viscosity	Not available.
Other information	
Density	Property has not been measured.
Explosive properties	Not explosive.
Kinematic viscosity	Property has not been measured.
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Undergoes hydrolysis in water to form lactic acid and soybean oil.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents. Bases. Acids.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation Spray mists may cause respiratory tract irritation.

Skin contact May cause mild or temporary skin irritation upon prolonged and excessive contact.

Eye contact Direct contact with eyes may cause temporary irritation.

Ingestion May cause discomfort if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics Direct contact with eyes may cause temporary irritation. Prolonged skin contact may cause temporary irritation.

Information on toxicological effects

Acute toxicity Not expected to be acutely toxic.

Skin corrosion/irritation Prolonged skin contact may cause temporary irritation.

Serious eye damage/eye irritation Direct contact with eyes may cause temporary irritation.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not an aspiration hazard.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Components		Species	Test Results
Fatty acid esters (CAS -)			
Aquatic			
Acute			
Algae	EL50	Selenastrum capricornutum	> 854.9 mg/l, 72 hours
Fish	LL50	Pimephales promelas	> 1000 mg/l, 96 hours
Other	EL50	Daphnia sp.	> 1000 mg/l, 48 hours

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available.

Mobility in soil The product is completely soluble in water. Expected to be mobile in soil.

Other adverse effects None known.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not established.

15. Regulatory information

US federal regulations This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Toxic Substances Control Act (TSCA)	All components of the mixture on the TSCA 8(b) inventory are designated “active”.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical	No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA)	Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Not listed.

US. Pennsylvania Worker and Community Right-to-Know Law

Not listed.

US. Rhode Island RTK

Not regulated.

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	Yes
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 09-April-2015

Revision date 06-May-2022

Version # 04

HMIS® ratings

Health: 1
Flammability: 1
Physical hazard: 0
Personal protection: B

NFPA ratings

Disclaimer

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

SAFETY DATA SHEET

1. Identification

Product identifier **S-MicroZVI or S-MZVI**

Other means of identification None.

Recommended use Remediation of contaminants in soil and groundwater.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company Name REGENESIS

Address 1011 Calle Sombra
San Clemente, CA 92673 USA

General information 949-366-8000

E-mail CustomerService@regenesis.com

Emergency phone number For Dangerous Goods Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC 24/7 at:

USA, Canada 1-800-424-9300

International +1 703-741-5970

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards Not classified.

OSHA defined hazards Not classified.

Label elements

Hazard symbol None.

Signal word None.

Hazard statement The mixture does not meet the criteria for classification.

Precautionary statement

Prevention Observe good industrial hygiene practices.

Response Wash hands after handling.

Storage Store away from incompatible materials.

Disposal Dispose of waste and residues in accordance with local authority requirements.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information Contact with acids liberates very toxic gas.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Glycerol	56-81-5	40 - 50
Zero valent iron	7439-89-6	30 - 50
Iron(II) sulfide	1317-37-9	1 - 4

Composition comments All concentrations are in percent by weight unless otherwise indicated.
Components not listed are either non-hazardous or are below reportable limits.

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact Wash off with soap and water. Get medical attention if irritation develops and persists.

Eye contact Rinse with water. Get medical attention if irritation develops and persists.

Ingestion	Rinse mouth. Get medical attention if symptoms occur.
Most important symptoms/effects, acute and delayed	Direct contact with eyes may cause temporary irritation.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Suitable extinguishing media	Use fire-extinguishing media appropriate for surrounding materials.
Unsuitable extinguishing media	None known.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed. Combustion products may include: carbon oxides, iron oxides.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	This material will not burn until the water has evaporated. Residue can burn.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Avoid prolonged exposure. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
Glycerol (CAS 56-81-5)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.

US. OSHA Table Z-3 (29 CFR 1910.1000)

Components	Type	Value	Form
Glycerol (CAS 56-81-5)	TWA	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
		50 mppcf	Total dust.
		15 mppcf	Respirable fraction.

Biological limit values No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls	Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

Eye/face protection	Wear safety glasses with side shields (or goggles).
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.
Skin protection	
Other	Wear suitable protective clothing.
Respiratory protection	In case of insufficient ventilation, wear suitable respiratory equipment.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	
Physical state	Liquid.
Form	Viscous metallic suspension.
Color	Dark gray
Odor	Slight.
Odor threshold	Property has not been measured.
pH	10 (As shipped) 7 - 8 (When mixed with water)
Melting point/freezing point	Property has not been measured.
Initial boiling point and boiling range	Property has not been measured.
Flash point	Property has not been measured.
Evaporation rate	Property has not been measured.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	Property has not been measured.
Explosive limit - upper (%)	Property has not been measured.
Vapor pressure	Property has not been measured.
Vapor density	Property has not been measured.
Relative density	Property has not been measured.
Solubility(ies)	
Solubility (water)	Property has not been measured.
Partition coefficient (n-octanol/water)	Property has not been measured.
Auto-ignition temperature	Property has not been measured.
Decomposition temperature	Property has not been measured.
Viscosity	3000 cP (77 °F (25 °C))
Other information	
Density	Property has not been measured.
Explosive properties	Not explosive.
Kinematic viscosity	Property has not been measured.
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.

Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Contact with acids will release highly flammable and highly toxic hydrogen sulfide gas. Can react with some acids with the evolution of hydrogen.
Conditions to avoid	Contact with incompatible materials. Avoid drying out product.
Incompatible materials	Strong oxidizing agents. Acids.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Spray mist may irritate the respiratory system. For dry material: Dust may irritate respiratory system.
Skin contact	Prolonged or repeated exposure may cause minor irritation.
Eye contact	Direct contact with eyes may cause temporary irritation.
Ingestion	May cause discomfort if swallowed.
Symptoms related to the physical, chemical and toxicological characteristics	Direct contact with eyes may cause temporary irritation.

Information on toxicological effects

Acute toxicity Not expected to be acutely toxic.

Components	Species	Test Results
Glycerol (CAS 56-81-5)		
Acute		
Dermal		
LD50	Rabbit	> 18700 mg/kg
Oral		
LD50	Rat	27200 mg/kg

Skin corrosion/irritation	Prolonged skin contact may cause temporary irritation.
Serious eye damage/eye irritation	Direct contact with eyes may cause temporary irritation.

Respiratory or skin sensitization

Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not an aspiration hazard.
Further information	Contains an ingredient known to produce adverse effects in a small percentage of hypersensitive individuals exhibited as respiratory distress and allergic skin reactions.

12. Ecological information

Ecotoxicity	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Components	Species	Test Results
Glycerol (CAS 56-81-5)		
Aquatic		
Acute		
Crustacea EC50	Daphnia magna	> 10000 mg/l, 24 Hours

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available.

Partition coefficient n-octanol / water (log Kow)

Glycerol (CAS 56-81-5)	-1.76

Mobility in soil No data available.

Other adverse effects None known.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not established.

15. Regulatory information

US federal regulations This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Toxic Substances Control Act (TSCA) All components of the mixture on the TSCA 8(b) inventory are designated “active”.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

FEMA Priority Substances Respiratory Health and Safety in the Flavor Manufacturing Workplace

Glycerol (CAS 56-81-5) Other Flavoring Substances with OSHA PEL's

US state regulations

US. Massachusetts RTK - Substance List

Glycerol (CAS 56-81-5)

US. New Jersey Worker and Community Right-to-Know Act

Glycerol (CAS 56-81-5)

US. Pennsylvania Worker and Community Right-to-Know Law

Glycerol (CAS 56-81-5)

US. Rhode Island RTK

Glycerol (CAS 56-81-5)

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

Zero valent iron (CAS 7439-89-6)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 27-December-2018

Revision date 25-May-2022

Version # 02

HMIS® ratings Health: 1
Flammability: 1
Physical hazard: 0
Personal protection: B

NFPA ratings

Disclaimer

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

APPENDIX D

PROJECT DOCUMENTATION FORMS

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

DAILY LOG				
	DATE			
	NO.			
	SHEET		OF	

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
PROJECT LOCATION:	CLIENT:
FIELD ACTIVITY:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

TIME	DESCRIPTION

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS:

WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
A.M.:	
P.M.:	

PERSONNEL ON SITE:

SIGNATURE DATE:

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

DAILY LOG	DATE			
	NO.			
	SHEET		OF	

FIELD ACTIVITY DAILY LOG
(CONTINUED)

PROJECT NAME:	PROJECT NO.

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

TIME	DESCRIPTION

SIGNATURE DATE:

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

DAILY LOG	DATE			
	NO.			
	SHEET		OF	

FIELD ACTIVITY DAILY LOG
(CONTINUED)

PROJECT NAME:	PROJECT NO.

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

TIME	DESCRIPTION

REFERENCED PROJECT FIELD FORMS:

☐ Aquifer Test Data Sheet	☐ Impacted Soil Excavation Log	☐ Soil Gas Survey Log
☐ Chain-of-Custody Form	☐ Impacted Soil Transportation Log	☐ Step-Drawdown Test Data Sheet
☐ Construction Sample Summary Log	☐ Monitoring Well Inspection Form	☐ Survey Elevation Log
☐ Corrective Measures Report	☐ Nuclear Densitometer Field Log	☐ Tailgate Safety Meeting Form
☐ Daily Drilling Report	☐ Photographic Log	☐ Test Pit Excavation Log
☐ Drilling Safety Checklist	☐ Pipe Leakage Testing Log	☐ Underground/Overhead Utility Checklist
☐ Equipment Calibration Log	☐ Post-Closure Field Inspection Report	☐ Variance Log
☐ Field Borehole Log	☐ Pressure Packer Testing Log	☐ Water Level Monitoring Record
☐ Field Borehole/Monitoring Well Installation Log	☐ Problem Identification Report	☐ Water Quality Field Collection Log
☐ Field Investigation Report	☐ Real-Time Air Monitoring Log	☐ Water Sample Collection Log
☐ Field Slug Test Log	☐ Record of Telecom Meeting	☐ Well Abandonment/Decomm. Log
☐ Groundwater Elevation Log	☐ Sample Summary Collection Log	☐ Well Completion Detail
☐ GW Well Development and Purge Log	☐ Sediment Sample Collection Log	☐
☐ Hot Work Permit	☐ Seep Sample Collection Log	☐
☐ IDW Container Log	☐ Seepage Meter Sample Collection Log	☐

SIGNATURE DATE:

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

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

DAILY LOG	DATE			
	REPORT NO.			
	PAGE		OF	

CORRECTIVE MEASURES 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:

Corrective Measures Undertaken (reference Problem Identification Report No.)

Retesing Location:

Suggested Method of Minimizing Re-Occurrence:

Approvals (initial):

CQA Engineer:

Project Manager:

Signed:

CQA Representative

APPENDIX E

ELECTRONIC COPY