JAY'S LUCKY CLEANERS
3220-3224 LONG BEACH ROAD
OCEANSIDE, NEW YORK
NYSDEC BCP ID: C130219

REMEDIAL ACTION WORK PLAN

SUBMITTED TO:

New York State Department of Environmental Conservation
Division of Environmental Remediation
50 Circle Road
Stony Brook, New York 11790

ON BEHALF OF:

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PWGC Project Number: UPC1905

JULY 2020

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FIGURES

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CERTIFICATION

I PAUL K. BOYCE certify that I am currently a NYS registered professional engineer and that this Interim Remedial Measure Work Plan was prepared in accordance with applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

PAUL K. BOYCE, P.E.
Name

074604
NYS PE License Number

Paul Boyce
Signature

07.16.2020
Date

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1.0 INTRODUCTION

P.W. Grosser Consulting Engineer & Hydrogeologist, PC (PWGC) has prepared the following Remedial Action Work Plan (RAWP) for the Jay's Lucky Cleaners site located at 3220 to 3224 Long Beach Road, Oceanside, New York (the "Property" or "Site"). Based on the historical use of the Property as a drycleaner and the confirmed presence of chlorinated solvents in groundwater beneath the Site, the property owner, United Properties Corp., was accepted into the New York State Brownfields Cleanup Program (BCP) as a volunteer as set forth in a Brownfield Cleanup Agreement (BCA), dated December 10, 2015 (Site No. C130219).

1.1 Purpose and Organization

The objective of the RAWP is to detail a remedial design for the approved remedial alternative as detailed in the Alternative Analysis (AA) Report dated October 2019 prepared by PWGC. The findings of the AA Report are summarized in this RAWP and the AA Report is included as **Appendix A**.

This report contains the following seven sections,

- Section 1.0, Introduction, provides purpose and organization of the RAWP, references the site background information, and summarizes previous investigations, including the site Remedial Investigation (RI).
- Section 2.0 Details the scope and results of the Interim Remedial Measure (IRM) and post IRM verification and characterization sampling, monitoring and testing conducted at the site. This section also discusses the conceptual model for the site, which outlines the fate and transport of on-site contamination.
- Section 3.0 Details the Remedial Action Objectives (RAOs), identifies the Standards, Criteria, and Guidelines (SCGs) that are applicable to the site and presents the remedial action plan.
- Section 4.0 Details the remedial action and provides specific design elements, engineering and institutional controls to be implemented and details the reporting requirements going forward.
- Section 5.0 Provides Health and Safety requirements to implement the RAWP.
- Section 6.0 Provides a remedial schedule for construction and implementation of the RAWP.
- Section 7.0 Provides a list of documents referenced in preparation of this RAWP.

1.2 Project Background

A Phase I Environmental Site Assessment (ESA) and a Focused Subsurface Site Investigation (FSSI) were conducted at the Site in 2014. The Phase I ESA identified prior and current use of one of the retail units located

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at 3220 Long Beach Road as a drycleaner, and the presence of an above ground storage tank (AST) used to store fuel oil. Elevated concentrations of volatile organic compounds (VOCs) indicative of impact from dry cleaning operations were reported in groundwater at the southwestern portion of the Site. No evidence of impacts to soil and groundwater were reported in relation to fuel oil.

Additional investigation and groundwater sampling was conducted in September 2014. This effort was limited to the southern/southwestern portion of the Site, in the estimated down-gradient groundwater flow direction. Elevated concentrations of VOCs (acetone, tetrachloroethene [PCE], trichloroethene [TCE], and cis-1,2-dichloroethene [cis-1,2-DCE]) were reported in groundwater above New York State Department of Environmental Conservation (NYSDEC) standards.

1.3 Site Description

The subject site is located at 3220 to 3224 Long Beach Road, Oceanside, New York. The property is identified as Nassau County Section 43, Block 336, Lot 42. The site is bordered on the north by a commercial property, on the east by Long Beach Road, on the west by residential and commercial properties, and on the south by Montgomery Avenue.

The current property consists of one single-story retail strip building with three units and front and side parking lots that cover the remainder of the property. The entire property is approximately 0.23 acres in area. The building was originally constructed in 1959. There is currently no planned change to the usage of the Site.

A Vicinity Map is included as **Figure 1**. A Site Plan is included as **Figure 2**.

1.4 Site History

The building was constructed in 1959. Prior to construction of these buildings, the lot was vacant.

A review of available New York Telephone Address Directories, Certificates of Occupancy, and available Sanborn Fire Insurance Maps indicated the subject site was utilized in the past by a, convenience store, surf shop, massage parlor, and drycleaner. A drycleaner has occupied a unit within 3220 Long Beach Road unit since at least 1959.

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1.5 Previous Environmental Investigations

The Remedial Investigation described in Section 2.3.5 was performed by PWGC and is summarized below. Additional investigations and investigative reports have been prepared by others. PWGC has also reviewed and summarized these reports below.

1.5.1 Phase I ESA Report (11/18/1998)

Prepared by: Middleton, Kontokosta Associates, LTD (MKA)

A Phase I ESA was conducted by MKA in November 1998. The Phase I ESA identified the presence of the drycleaner at the 3220 Long Beach Road unit and the above ground storage tank located in the western alley behind the 3220 Long Beach Road unit. MKA did not report any recognized environmental conditions. MKA stated that no further testing (subsurface or otherwise) was required on the subject site.

1.5.2 Phase I ESA Report (11/3/2004)

Prepared by: Middleton Environmental, Inc. (MEI)

A Phase I ESA was conducted by MEI in November 2004. The Phase I ESA identified the presence of the drycleaner at the 3220 Long Beach Road unit and the above ground storage tank located in the western alley behind the 3220 Long Beach Road unit. MEI did not report recognized environmental conditions.

1.5.3 Phase I ESA Report & Focused Subsurface Site Investigation (3/31/2014)

Prepared by: Merritt Environmental Consulting Corp. (MECC)

A Phase I ESA and FSSI was completed by MECC in March 2014. The purpose of the FSSI was to address the recognized environmental conditions specified in the Phase I ESA Report. The Phase I ESA identified prior and current use of one of the retail units located at 3220 Long Beach Road as a drycleaner. Elevated concentrations of volatile organic compounds (VOCs) indicative of impact from dry cleaning operations were reported in groundwater at the southwestern portion of the site. PCE was reported in two groundwater samples (B1GW and B2GW) at 450 micrograms per liter (ug/L) and 11 ug/L respectively, above the NYSDEC TOGS 1.1.1 Ambient Groundwater Quality Standards (GWQS) and Guidance Values of 5 ug/L.

1.5.4 Groundwater Sampling and Laboratory Analysis (9/16/2014)

Prepared by: MECC

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MECC completed a Groundwater Sampling and Laboratory Analysis summary in September 2014. The scope of work included the installation of three groundwater monitoring wells, groundwater sampling, and an elevation survey to determine site-specific groundwater flow direction.

Groundwater analytical results reported concentrations of VOCs (acetone, cis-1,2-DCE, TCE, and PCE) above GWQS. Groundwater flow direction was determined to flow west.

1.5.5 Remedial Investigation: Work Plan, Investigation Activities, and Report

Prepared by: PWGC

Remedial Investigation Workplan and Remedial Investigation Activities

PWGC prepared a Remedial Investigation Work Plan (RIWP) which was submitted to and approved by NYSDEC in September 2016. The Remedial Investigation commenced shortly thereafter and was completed in November of 2016. The purpose of the RI was to delineate soil, groundwater, and soil vapor impact within the Site boundary and to determine if on site impacts have the potential to migrate off-site.

The scope of work included the installation and sampling 12 soil borings, installation of three new groundwater monitoring wells, installation of nine temporary groundwater sampling points, collection of a combined 16 air samples (soil vapor, ambient air, and indoor air), groundwater sampling of a combined 15 sample points, and performance of both a geophysical and elevation survey to determine site-specific groundwater flow direction.

The proposed activities were based upon the findings and data presented within the historical reports and data collected by previous consultants and detailed above. The activities were also performed to supplement the data and conclusions provided by MECC within the Phase I ESA Report/Focused Subsurface Site Investigation and subsequent groundwater sampling and laboratory analysis performed in 2014.

Remedial Investigation Report

In June 2018, PWGC prepared a Remedial Investigation Report (RIR) for submittal to the NYSDEC. The RIR summarized the findings of the RI activities performed in November 2016 and February 2018. The report identified specific contamination concentrations throughout each media (soil, groundwater, and indoor air/soil vapor), delineated the extent of contamination in soil and groundwater, evaluated potential exposure pathways, and provided conclusions and recommendations. The RIR was approved by NYSDEC via a letter dated May 29, 2019.

Soil sample results identified isolated instances of VOCs, pesticides, and metals exceeding Unrestricted Use SCOs. With exception of arsenic and lead in the 0 to 2-foot interval at boring location SB004, concentrations of VOCs, pesticides, and metals were observed to be below Commercial Use SCOs at the Site. PCE impacted soils appear to be limited to the northern portion of the Site in the immediate vicinity of the dry-cleaning machine.

Several SVOCs, pesticides, and metals were detected in groundwater at concentrations exceeding their respective AWQS. Apart from one detection of cis-1,2-DCE, PCE was the sole VOC detected exceeding AWQSs at the Site. PCE exceedances were observed at multiple groundwater sample locations along the western portion of the Site. Locations where PCE concentrations were highest in groundwater (monitoring wells MW001, MW002) appear to be located directly downgradient of the dry-cleaning machine, based upon the site-specific groundwater flow direction as determined during the RI.

Groundwater vertical profiles were installed up and down gradient of the dry-cleaning machine, with samples collected at 10-foot intervals from the water table (six feet below grade) to the apparent top of the Gardiners 20-foot Clay, which appears to be present approximately 38 feet below grade. PCE impact above its AWQS was limited to the water table interval in onsite samples. One offsite vertical profile was installed; PCE was detected above its AWQS in the 34 to 38-foot sample interval at this location.

PCE was detected in soil vapor with the highest concentrations observed beneath the building slab, and along the western Property boundary. PCE was also detected in indoor air samples collected from within the building at concentrations below the NYSDOH guideline value of 30 $\mu g/m^3$. However, based on evaluation of PCE concentrations in indoor air and sub-slab soil vapor using NYSDOH decision matrices, soil vapor intrusion appears to be occurring and requires mitigation measures.

The above soil, groundwater, and soil vapor data, site hydrology, geology, and potential pathways relative to the locations of adjacent properties was then considered to prepare a fate and transport evaluation for the contaminants of concern. The evaluation and the RIR concluded that impacted groundwater and soil vapor may be migrating off-site.

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Based on the findings of the RI, NYSDOH issued a determination dated February 25, 2019 that the Site represents a significant threat to public health due to the potential for offsite receptors to be impacted by site related VOCs.

1.5.6 Interim Remedial Measure

Prepared By: PWGC

PWGC submitted an Interim Remedial Measure (IRM) Work Plan to NYSDEC in June 2017. The IRM included the installation of a sub-slab depressurization system (SSDS) to be installed in the existing building to mitigate vapor intrusion identified during the RI.

The SSDS consists of a vacuum blower located behind the building in an acoustical attenuating enclosure, to produce a negative pressure under the building slab. Four vapor extraction pits are utilized to create a vacuum beneath the building's slab. Recovered vapor is treated utilizing granulated activated carbon (GAC) and vented above the roofline of the building. The SSDS was constructed without significant deviations from the design submitted with the IRM Work Plan. Construction was completed in September 2018. Indoor air sampling performed following installation of the SSDS appeared to demonstrate the SSDS was operating effectively. PWGC prepared a Construction Completion Report (CCR) documenting the IRM for submittal to NYSDEC in June 2019.

Ongoing IRM activities, performed in accordance with the Operation, Maintenance & Monitoring (OM&M) Plan included with the CCR consist of continued operation of the SSDS, periodic vacuum monitoring, and system O&M inspections. Based on air sampling performed in March 2019, the SSDS is operating as intended.

1.5.7 Emerging Contaminants Sampling

In March 2018 NYSDEC issued a letter requiring that groundwater sampling for emerging contaminants be performed at the above referenced site. Emerging contaminants refers to 1,4-dioxane and perfluoroakyl and polyfluoroakyl substances (PFAS). PWGC submitted an Emerging Contaminants Sampling Plan in May 2018 (approved by NYSDEC via email), performed the sampling in August 2018, and submitted an Emerging Contaminants Sampling Report in October 2018.

Emerging contaminant sampling consisted of collection of groundwater samples from three onsite wells (MW001, MW003 and MW005); samples were collected and analyzed in accordance with NYSDEC guidance documents for emerging contaminant sampling.

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NYSDEC has not established water quality standards or guidance values for PFAS or 1,4-dioxane. NYSDEC has proposed a maximum contaminant level of 10 parts per trillion (ppt) for PFAS compounds perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) which is scheduled to be adopted in Summer 2020. USEPA has specified a Health Advisory Level (HAL) of 70 ppt for PFOA PFOS. The 70 ppt HAL applies to each compound individually, as well as the total of PFOA and PFOS.

PFOA and/or PFOS were detected above the USEPA HAL of 70 ppt in samples collected from monitoring wells MW001 and MW005 with maximum concentrations of 726 ppt for PFOS (MW001) and 111 ppt for PFOA (MW005). PFOA (7.05 ppt) and PFOS (5.86 ppt) were detected below the USEPA HAL in monitoring well MW003. Monitoring well MW003 is located upgradient of the site with respect to groundwater flow. 1,4-Dioxane was not detected in groundwater samples collected from the site.

1.6 Regional Geology/Hydrogeology

The geologic setting of Long Island is well documented and consists of crystalline bedrock composed of schist and gneiss overlain by layers of unconsolidated deposits. Immediately overlying the bedrock is the Raritan Formation, consisting of the Lloyd sand confined by the Raritan Clay Member. The Lloyd sand is an aquifer and consists of discontinuous layers of gravel, sand, sandy and silty clay, and solid clay. The Raritan Clay is a solid and silty clay with few lenses of sand and gravel; abundant lignite and pyrite; and gray, red or white in color.

Above the Raritan Clay lies the Magothy Formation. The Magothy Aquifer consists of layers of fine to coarse sand of moderate to high permeability, with inter-bedded lenses of silt and clay of low permeability resulting in areas of preferential horizontal flow. Therefore, this aquifer generally becomes more confined with depth. The Magothy Aquifer is overlain by the Jameco and Upper Glacial Aquifer systems. The Upper Glacial Aquifer is the water table aquifer at this location and is comprised of medium to coarse sand and gravel with occasional thin lenses of fine sand and brown clay. This aquifer extends from the land surface to the top of the Magothy and, therefore, is hydraulically connected to the Magothy Aquifer.

1.7 Site Geology/Hydrogeology

Regional groundwater flow direction is south. Site-specific groundwater flow was observed to be southwest. The nearest surface water bodies are Bedell Creek, located approximately 0.4 miles east of the site and an unnamed canal located approximately 0.6 miles southwest of the site. Municipal water supply is provided by New York American Water.

Based on review of United States Geological Survey (USGS) Water Supply Paper 1613-A, Geology and Ground-Water Conditions in Southern Nassau and Southeastern Queens Counties Long Island, NY (Perlmutter & Geraghty, 1963), it appears that the Gardiners 20-foot clay may be present beneath the Site. This paper indicates the top of the clay layer is estimated at approximately 25 feet below mean sea level; based on the site elevation, the clay layer would be expected to be approximately 35 feet below existing grade at the Site. Based on a soil boring performed as part of the RI, it appears that the Gardiners 20-foot clay is present at approximately 38 feet below grade at the subject property. This clay layer will likely act as an aquitard inhibiting migration of PCE impacted groundwater beneath the clay layer.

1.8 Site Features

The project site elevation is approximately seven feet above mean sea level and is generally level. The site is developed with one single-story retail strip building with a front and side parking lots and is approximately 0.23 acres in area. There are no exposed areas of vegetation.

1.9 Current and Future Site Use

The site is currently utilized as a strip mall with several tenants and parking areas. Significant changes in use of the site are not planned for the near future. The goal of the cleanup at the site is to achieve Track 1 status; however, it is understood that the project may achieve Track 2 or Track 4.

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2.0 REMEDIAL ACTION OBJECTIVES (RAOS)

The final remedial measure for the Site must satisfy the RAOs. Remedial Action Objectives are site specific statements that convey the goals for minimizing or eliminating risks to public health and the environment.

The following subsections summarize the contaminants of concern, general locations of contaminants, and the RAOs for each of the identified media. These RAOs are based on the findings of the RI and the anticipated future use of the project site, which is to remain undeveloped.

2.1.1 Soil

The primary contaminant of concern detected in soils at the Site is PCE. The RAOs for public health protection and environmental protection for this medium are:

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure to contaminants volatilizing from soil.
- Prevent migration of contaminants that would result in groundwater or surface water contamination.

2.1.2 Groundwater

The primary contaminant of concern detected in groundwater at the Site is PCE. The RAOs for public health protection and environmental protection for this medium are:

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.
- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

2.1.3 Soil Vapor

The primary contaminant of concern detected in soil vapor at the Site is PCE. The RAOs for public health protection and environmental protection for this medium are:

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

2.2 Emerging Contaminants

In addition to PCE, sampling performed at the site for emerging contaminants identified PFAS in groundwater at the site (see Section 1.5.7). As of the date of this report, NYSDEC has not established soil or groundwater quality

standards or guidance values for PFAS. USEPA has specified a HAL of 70 parts per trillion (ppt) for PFAS compounds PFOA and PFOS in drinking water. The 70 ppt HAL applies to each compound individually, as well as the total of PFOA and PFOS. NYSDEC has proposed a groundwater standard of 10 ppt for PFOA and PFOS; however, that standard has not yet been formally adopted.

PFAS sampling at the site was limited to groundwater sampling of three monitoring wells, and no soil sampling, which is insufficient to evaluate whether PFAS detected in groundwater at the site is related to an on or offsite source. PFAS was detected in an upgradient monitoring well, albeit at concentrations below the USEPA HAL of 70 ppt. Additionally, in the absence of formally established NYSDEC soil or groundwater quality standards for PFAS, there are no remedial goals for potential PFAS remediation to achieve at this time. However, NYSDEC expects that soil and/or groundwater standards for PFAS will be established in Summer 2020. As such, soil sampling for PFAS will be included as part of the remedial program in accordance with NYSDEC's Guidelines for Sampling and Analysis of PFAS (January 2020). Based on the nature of PFAS compounds, impact (if present) would be managed by:

- Soil - excavation and offsite disposal and/or capped and managed under a Site Management Plan.
- Groundwater – ex situ treatment (pump and treat), in situ treatment (colloidal carbon injections/sequestration), and/or managed under a Site Management Plan.

2.3 Remedial Action Plan

Remedial alternatives are evaluated as part of a detailed Alternative Analysis Report developed for the site by PWGC in May 2020. A copy of the Alternative Analysis is included as **Appendix A**.

2.3.1 Selection of the Preferred Remedy

The Applicant's preferred remedy for the site, as detailed in the Alternative Analysis is Alternative 2 – In Situ Bioremediation. Alternative 2 would include in-situ bioremediation of onsite groundwater, continued operation of the SSDS, and implementation of a SMP with ECs/ICs and long-term monitoring of onsite groundwater impact. The details of this alternative include:

- Installation of four additional groundwater monitoring wells.
- Installation of four additional vapor monitoring points at the property boundary to monitor potential off-gassing of VOC impact related to the remedy.
- Pre-remediation collection of groundwater and soil vapor samples from the onsite monitoring well and soil vapor point networks.

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- Pre-remediation collection of soil samples for PFAS from three locations along the western and southern property boundaries. Sample locations will be provided to NYSDEC for review prior to mobilization.
- Implementation of an in-situ bioremediation injection program consisting of injection of a bioremediation solution (combination of Regenesis 3-D Microemulsion, S-MicroZVI and BDI Plus, or similar) throughout the affected area. Bioremediation injections will be performed through temporary injection points installed throughout the treatment area using a direct-push drill rig (Geoprobe®, or similar). The specific locations and depth intervals for temporary injection points will be determined following the installation of monitoring wells and groundwater sampling described above; data generated during this sampling will be used in conjunction with RI data to determine specific injection point locations and depths.
- Post-remediation collection of groundwater and soil vapor samples from the full onsite monitoring well and soil vapor point networks.
- Preparation and implementation of a SMP which will include ICs/ECs consisting of an environmental easement limiting the site usage to commercial or lower and a composite cover system to limit exposure to residual subsurface impact (soils exceeding Unrestricted Use SCOs), and long-term monitoring of onsite groundwater.
- Continued O&M of the existing SSDS until otherwise directed by NYSDEC and/or NYSDOH. For cost estimating purposes, PWGC assumes that the SSDS will operate for approximately 10 years.
- Groundwater monitoring of the full onsite monitoring well network on a quarterly basis to confirm the effectiveness of the remedy for a minimum of two years. The frequency of sampling and number of wells to be sampled may be modified with the approval of NYSDEC.
- Annual inspections and certifications of the engineering controls for approximately 20 years.
- In the event that NYSDEC does establish soil and/or groundwater quality standards, additional soil and/or groundwater sampling/remedial plans for PFAS may be included in a remedial design document and/or the SMP.

This remedy is anticipated to yield a Track 2 cleanup contingent upon soils meeting Restricted SCOs and groundwater meeting AWQSs. In the event that groundwater does not meet AWQSs and long-term treatment is required, the remedy will meet Track 4 requirements

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Overall Protectiveness of Public Health and the Environment

Alternative 2 would achieve the RAOs for soil, groundwater, and soil vapor.

Compliance with Remedial Goals, SCGs, and RAOs

Alternative 2 could meet compliance with remedial goals, SCGs and RAOs for the site by meeting Commercial Use SCOs for PCE in soil (PCE concentrations detected in soils at the site during the RI are below Commercial Use SCOs), and Class GA AWQSs for groundwater.

Short-Term Impacts and Effectiveness

The short-term adverse impacts and exposure to the public and the environment during the implementation of Alternative 2 is minimal. Short-term exposure to on-site workers during remedial work will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during intrusive activities.

Long-Term Effectiveness and Permanence

Alternative 2 achieves long term effectiveness and permanence by covering residual impacted soils with impervious surfaces, reducing groundwater impact below Class GA AWQS, and mitigating vapor intrusion within the building through continued operation of the existing SSDS.

Reduction of Toxicity, Mobility or Volume through Treatment

Alternative 2 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by meeting a site-specific SCO for PCE and requiring that residually impacted soils be permanently covered. Treatment of groundwater will reduce the toxicity, mobility, and volume of contaminants in on-site groundwater. With the implementation of the ICs/ECs at the site, potential exposure to PCE in soil vapor is limited by the existing SSDS.

Implementability

Alternative 2 can be implemented using readily available and proven technologies. Both the technical and non-technical aspects of implementing this alternative are feasible. Access to the interior of the dry-cleaning shop

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for the purposes of bioremediation injections would be limited by the small size of the space and presence of dry-cleaning equipment (dry-cleaning machine, pressing machine, clothing racks).

Cost-Effectiveness

Estimated costs associated with implementation of Alternative 2 are as follows:

Capital Costs	$265,728
PRSC Costs	$394,752
Total Estimated Costs	$660,480

Estimated capital costs for Alternative 2 include direct capital costs for installation and sampling of additional monitoring wells and vapor monitoring points, implementation of a bioremediation injection program, and post injection sampling; indirect capital costs would include the preparation of a Final Engineering Report (FER) and SMP for the site, and preparation and filing of an environmental easement for the site (including an updated property survey). Estimated PRSC costs for Alternative 2 include long term groundwater monitoring for two years, SSDS O&M and air sampling for 10 years, and annual SMP certifications for 20 years.

Compatibility with Land Use

The proposed future land use is to remain commercial. Alternative 2 would restrict the use of the property to commercial. The alternative is consistent with the NYSDEC BCP goal for cleanup of contaminated land and brings the property into productive use. The alternative is protective of natural resources and cultural resources.

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3.0 REMEDIAL ACTION ACTIVITIES

The remedial action for the site consists of bioremediation of onsite groundwater and implementation of institutional and engineering controls.

3.1 Governing Documents

3.1.1 Site Specific Health and Safety Plan

The Health and Safety Plan (HASP) takes into account the specific hazards inherent to the site and presents the minimum requirements which are to be met by the remediation contractor and its subcontractors, P.W. Grosser Consulting Inc. (PWGC) and its subcontractors, and other on-site personnel in order to avoid and, if necessary, protect against health and/or safety hazards. The site-specific HASP is included as **Appendix B**.

Contractors and subcontractors will have the option of adopting this HASP or developing their own site-specific document. If a contractor or subcontractor chooses to prepare their own HASP, it must meet the minimum requirements as detailed in the site HASP prepared by PWGC and must be made available to PWGC and the NYSDEC.

Activities performed under the HASP will comply with applicable parts of OSHA Regulations, primarily 29 CFR Parts 1910 and 1926, and the PWGC Corporate Environmental Health and Safety policy. Modifications to the HASP may be made with the approval of the PWGC Health and Safety Manager (HSM) and/or Project Manager (PM).

3.1.2 Quality Assurance Project Plan

The quality assurance project plan (QAPP), included as **Appendix C**, presents the objectives, functional activities, methods, and quality assurance / quality control (QA/QC) requirements associated with sample collection and laboratory analysis for remedial activities. The QAPP follows requirements detailed in DER-10, Section 2.

The components of the QAPP include:

- Project Organization,
- Sampling requirements, including methodology, identification, quantity, volumes, locations, frequency, chain of custody procedures, and sample packaging,
- Field/Laboratory data control requirements,
- Equipment decontamination, and
- Field documentation.

3.1.3 Community Air Monitoring Plan

A site-specific Community Air Monitoring Plan (CAMP) has been prepared and included as **Appendix D** to provide measures for protection for the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminants as a direct result of the remedial activities. The primary concerns for this Site are VOCs and dust particulates.

The CAMP will be implemented and executed in accordance with 29 CFR 1910.120(h), the NYSDOH Generic CAMP with special requirements for activities within 20 feet of potential receptors, and NYSDEC TAGM #4031.

3.1.4 Community Participation Plan

Prior to NYSDEC approval of this RAWP, there will be a 45-day public comment period. Notification of the start of the 45-day public comment period will be performed in accordance with the Community Participation Plan (CPP) prepared for the site.

A certification of mailing will be sent by the Participant to the NYSDEC project manager following the distribution of all Fact Sheets and notices that includes: (1) certification that the Fact Sheets were mailed, (2) the date they were mailed; (3) a copy of the Fact Sheet, (4) a list of recipients (contact list); and (5) a statement that the repository was inspected on (specific date) and that it contained all of applicable project documents.

No changes will be made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing.

A copy of the CPP for this project is included as **Appendix E**.

Document repositories have been established at the following locations and contain all applicable project documents:

Oceanside Public Library
30 Davison Avenue
Oceanside, New York 11572
516-776-2360
Hours: Monday through Friday: 9:30AM to 9:00PM
Saturday: 9:30AM to 5:00PM, Sunday: 12:00PM to 4:00PM

NYSDEC Region One

50 Circle Road

Stony Brook, NY 11790-2356

Attn: William Fonda

631-444-0350

Hours: Monday through Friday: 9:00AM to 5:00PM (by appointment)

3.2 Pre-Remedial Program Activities

3.2.1 Monitoring Well Installation and Sampling

To further characterize groundwater quality beneath the site four additional groundwater monitoring wells will be installed to supplement the six existing wells at the site. Proposed monitoring well locations are illustrated in **Figure 2**. Monitoring wells will be installed in accordance with the Division of Environmental Remediation (DER) Draft DER-10 Technical Guidance for Site Investigation and Remediation, May 2012. Specific details of the proposed remedial action will be set forth in a Remedial Design Workplan which will be submitted to NYSDEC for review and approval prior to the start of field work to implement the remedial action.

A rotary drill rig and/or Geoprobe® (or equivalent) direct push drill rig outfitted for rotary drilling will be used to install the wells with hollow-stem augers using standard drilling methods. The wells will be constructed of two-inch diameter, schedule 40 PVC casing and screen with 0.010 inch slot. The wells will be constructed with a 10 foot screen section and riser to grade unless precluded by hydrogeologic conditions. The well annulus will be filled with #2 morie sand, or equivalent, to two feet above the well screen. The screen will be set with seven (7) feet into and three (3) feet above the water table at the time of installation. A two-foot fine sand layer will be installed above the screen followed by a two-foot bentonite seal. Above the bentonite layer, the annulus around the well will be filled with a cement/bentonite grout. A concrete surface pad (2 feet by 2 feet by 6-inch) will be installed. The wells will be finished with flush mount curb boxes. Monitoring well construction diagrams will be developed for each of the monitoring wells.

Approximately 48-hours after installation, the newly installed monitoring wells will be developed by over-pumping to restore the hydraulic properties of the aquifer. Well development will continue until the turbidity of the groundwater is less than or equal to 50 Nephelometric Turbidity Units (NTUs), or when pH, temperature, and conductivity measurements stabilize. Stabilization is considered achieved when three consecutive readings

of these field parameters are within five percent of each other over a period of 15 minutes. Monitoring well development water will be containerized for off-site disposal. New monitoring wells along with existing wells will be surveyed relative to an arbitrary on-site datum.

Following installation of new wells, groundwater samples will be collected from the full monitoring well network at the site. Samples will be collected in compliance with the United States Environmental Protection Agency (USEPA) Low-flow Groundwater Purging and Sampling Procedure (USEPA, 2017). Groundwater samples will be analyzed for VOCs by USEPA Method 8260.

3.2.2 Soil Vapor Point Installation and Sampling

To further characterize soil vapor quality beneath the site four additional soil vapor monitoring points will be installed to supplement the nine existing points at the site. Soil vapor samples will be collected at a depth of approximately one foot above the groundwater table at the site. Proposed soil vapor monitoring points will be biased toward the property boundary and are illustrated in **Figure 2**. Monitoring points will be installed in accordance with NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (2006) with updates.

Soil vapor points will be installed with direct-push technology and will include a six-inch stainless-steel screen at the base of the sampling point and polyethylene tubing to grade. A coarse sand will be placed surrounding the screen and six inches above. The remainder of the soil vapor point annulus will be backfilled with bentonite to the surface. A protective casing and flush mount manway will be placed at the surface of the permanent soil vapor point.

Soil vapor samples should be collected 24 hours after installation. A tracer gas will be utilized to test if a competent seal exists around the soil vapor point. Once the integrity of the seal is confirmed at each location, three volumes of air will be extracted from each point prior to sample collection with a flow rate of less than 0.2 liters/minute.

Soil vapor and ambient air samples will be collected using 6-liter SUMMA vacuum canisters fitted with eight-hour flow controllers with a flow rate of less than 0.2 liters/minute. Canisters shall be batched certified clean by the laboratory. Samples will be analyzed for VOCs by USEPA Method TO-15.

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3.2.3 Emerging Contaminant Sampling

To evaluate soils at the site for the presence of PFAS, a total of three soil samples will be collected for laboratory analysis from three locations along the western property boundary. Sample locations will be provided to NYSDEC for review prior to mobilization.

Soil borings will be installed utilizing a Geoprobe® direct-push drill rig outfitted with a macro-core sampler and dedicated acetate liners, or equivalent approved methods. Soils will be collected continuously from ground surface to ten feet below ground surface (bgs), or the top of the water table, whichever is shallower. Soils will be field screened for the presence of VOCs using a photoionization detector (PID). Soil samples will be classified using the Unified Soil Classification System. Boring logs will be prepared for each boring location.

At each boring location, one soil sample will be submitted for laboratory analysis from the two-foot interval exhibiting the most evidence of impact (PID response, staining, odor, etc.) above the water table. Soil samples will not be collected from below the water table.

In accordance with NYSDEC's Guidelines for Sampling and Analysis of PFAS (January 2020), samples will be analyzed using the Synthetic Precipitation Leaching Procedure (SPLP) with the leachate analyzed for PFAS. Specific analytical methods will consist of SPLP by USEPA Method 1312 (using western US pH requirements) and PFAS by USEPA Method 537.1.

3.3 Bioremediation Program

To address VOC impacted groundwater at the site, an in-situ enhanced bioremediation program will be implemented. The program will consist of the injection of multiple bioremediation products throughout the subject site to allow for the treatment of onsite groundwater impact. Bioremediation injections will be performed through temporary injection points installed throughout the treatment area using a direct-push drill rig (Geoprobe®, or similar). The specific locations and depth intervals for temporary injection points will be determined following the installation of monitoring wells and groundwater sampling described in Section 3.2; data generated during this sampling will be used in conjunction with RI data to determine specific injection point locations. Proposed bioremediation products will include:

- Regenesis 3-D Microemulsion – 3DMe provides a long-term source of stage-release of hydrogen to optimize bioremediation of CVOCs. The stages allow for the release of lactic, organic, and fatty acids for

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the steady production of hydrogen for optimized bioremediation. 3DMe is designed to biodegrade CVOC compounds through an enhanced reductive de-chlorination process in which PCE and associated breakdown products are biologically transformed into less harmful end products, such as ethene.

- Regenesis S-Micro ZVI – S-MZVI is a suspension of sulfidated, colloidal zero-valent iron (ZVI) that promotes the destruction of many organic pollutants including CVOCs. It is engineered to promote multiple pathways for contaminant degradation which leads to faster cleanup while minimizing daughter product formation. In addition, S-MZVI is easy to handle and simple to inject leading to significantly better reagent distribution. In many cases this improved formulation of ZVI can also destroy contaminants through a direct chemical reaction.
- Regenesis Bio Dechlor Inoculum Plus – BDI Plus is an enriched, microbial consortium containing species of *Dehalococcoides* for bioremediation applications. BDI Plus enhances the bioremediation process by providing a food source to 3DMe to accelerate the complete de-chlorination of CVOC breakdown products such as DCE and vinyl chloride. BDI Plus will be injected into the contaminated subsurface following application of combined emulsified 3DMe and S-Micro ZVI.

Product specification sheets for the proposed bioremediation program products are included in **Appendix F**.

The locations and depth intervals of injection points, volumes of bioremediation products, and injection methodology will be finalized based on the results of groundwater sampling to be performed as described in Section 3.4.1. The final proposed injection program information and/or changes to the proposed bioremediation products will be provided to NYSDEC for approval prior to implementation.

The approximate proposed remediation area is illustrated in **Figure 5**.

3.4 Post Bioremediation Sampling

3.4.1 Groundwater Sampling

Approximately 30 days after completion of the bioremediation injection program, a post-remedial round of groundwater sampling will be performed. Groundwater samples will be collected from the full monitoring well network at the site. Samples will be collected in compliance with the United States Environmental Protection Agency (USEPA) Low-flow Groundwater Purging and Sampling Procedure (USEPA, 2017). Groundwater samples will be analyzed for VOCs by USEPA Method 8260.

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3.4.2 Soil Vapor Point Installation and Sampling

Approximately 30 days after completion of the bioremediation injection program, a post-remedial round of soil vapor sampling will be performed. Soil vapor samples will be collected in accordance with NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (2006). A tracer gas will be utilized to test if a competent seal exists around the soil vapor point. Once the integrity of the seal is confirmed at each location, three volumes of air will be extracted from each point prior to sample collection with a flow rate of less than 0.2 liters/minute.

Soil vapor and ambient air samples will be collected using 6-liter SUMMA vacuum canisters fitted with eight-hour flow controllers with a flow rate of less than 0.2 liters/minute. Canisters shall be batched certified clean by the laboratory. Samples will be analyzed for VOCs by USEPA Method TO-15.

3.5 Remedial Monitoring

This monitoring plan was developed to evaluate the performance and effectiveness of the remedial alternative achieving RAOs.

3.5.1 Construction Phase Monitoring

Monitoring during intrusive activities (e.g., drilling, excavation) will be performed to protect the health of site workers and the surrounding community. A Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) have been developed for this project. These plans specify the monitoring procedures, action levels, and contingency measures that are required to protect public health and site workers. Generally, air monitoring would include real-time measurement of volatile emissions and dust levels.

The project HASP is included as **Appendix B**; the CAMP is included as **Appendix D**.

3.5.2 Post-Excavation Monitoring and Verification

In the event that excavation and removal of impacted soils from the site is necessary, confirmatory endpoint soil samples will be collected from the excavation area(s) to confirm the effectiveness of remedial activities. Endpoint soil samples will be collected at the frequencies specified in NYSDEC DER-10. Results will be compared to Unrestricted Use and/or Commercial SCOs.

As specified in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, verification sampling will consist of collecting endpoint soil samples from within each excavation area. DER-10 specifies a sampling frequency of one bottom sample from the excavation for every 900 square feet of bottom, and one sidewall

sample for every 30 linear feet of sidewall. Within excavation areas of one foot or less depth, sidewall samples will not be collected and additional bottom samples will be collected.

Soil sampling and equipment decontamination will be performed in accordance with the project QAPP included as **Appendix C**.

3.5.3 Waste Characterization

If necessary, waste characterization will be performed by collecting composite soil samples from excavated soil stockpiles during remedial activities. Sample analysis will be as specified by the requirements of the disposal facility's (to be determined) waste acceptance criteria. After the results of the analysis are complete, the remediation contractor will prepare the necessary forms for submittal to the waste disposal/treatment facility. Forms will then be submitted to the waste disposal facility for evaluation and final approval. Analysis for waste characterization will be provided in a results-only format.

Soil sampling and equipment decontamination will be performed in accordance with the project QAPP included as **Appendix C**.

3.5.4 Laboratory Analysis

Collected soil and groundwater samples will be placed in pre-cleaned laboratory supplied glassware and placed in a cooler packed with ice for transport to the laboratory. Soil vapor and air samples will be collected in batch certified clean SUMMA vacuum canisters. Sample analysis will be provided by a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified environmental laboratory (specific laboratory to be determined).

Analytical results will be reported in accordance with Analytical Services Protocol (ASP) Category B Deliverables, which will allow for data validation. The QA/QC program will include the preparation and analysis of field and laboratory QA/QC samples such as, trip blanks and matrix spike duplicates in accordance with the QAPP included as **Appendix C**.

Samples will be submitted to the laboratory for a standard turnaround time, which is typically one to two weeks.

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3.6 Engineering Controls

In addition to the implementation of the NYSDEC approved remedial alternative, Engineering Controls (ECs) will be put in place to prevent exposure to potential residual impact at the site. Engineering controls for the site will include the following:

- The currently existing concrete building slab and asphalt paved parking lot to cover residual impacted soils.
- The existing SSDS will continue to operate in accordance with the OM&M Plan included with the IRM CCR until NYSDEC determines it can be shut down. Upon decommissioning, the SSDS may be converted to a passive system if necessary.

3.7 Institutional Controls

In addition to the implementation of the NYSDEC approved remedial alternative, the use of Institutional Controls (ICs) will be put in place for the site to provide notice the residual impact is present and restrict/limit exposures to potential exposure pathways. For this site, ICs would include a Site Management Plan (SMP) and an Environmental Easement (EE), which would detail the requirements for:

- Restrictions on the use of groundwater from the site.
- Restrictions on excavations without notification to NYSDEC.
- Future modifications to the EE in the event of changes to site usage/development.
- EE compliance by the Grantor and the Grantor's successors.

Following approval of the RAWP, an Environmental Easement (EE) will be prepared and recorded with the Nassau County Clerk's Office. The EE will incorporate:

- The approved SMP for the site.
- A description of site restrictions, including but not limited to:
    - The use of the property for commercial or lower use only.
    - Restricting use of the groundwater underlying the site.
    - Future soil disturbance activities, including construction and repair activities, will be subject to soil management protocols.
- An agreement by the property owner to establish and maintain the institutional controls.

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3.8 Reporting

Following submission of the RAWP, the following reports will be submitted to NYSDEC:

- Monthly Status Letter Reports.
- Site Management Plan.
- Final Engineering Report.
- Periodic Review Reports and Certifications.

Details of the components of the individual reports and submission frequencies are contained in the following sections.

3.8.1 Monthly Status Letter Reports

During remedial activities, a progress letter report will be submitted on a monthly basis, by the fifteenth day of each month. These progress reports will summarize remedial actions taken during the previous month, and describe work scheduled for the next month, and summarize any issues that may affect the implementation of the RAWP. Monthly status reports will be submitted via email to the NYSDEC project manager.

3.8.2 Site Management Plan

Upon completion of remedial activities, a SMP will be submitted to the NYSDEC to specify future operation and maintenance requirements, certification and reporting requirements and site restrictions. The SMP will include;

- An EC/IC Plan.
- A Health and Safety Plan.
- An Operation and Maintenance Plan.
- A Site Inspection Plan.
- A Contingency Plan.

3.8.3 Final Engineering Report

A FER will be prepared and submitted to the NYSDEC following completion of remedial activities. The FER will detail:

- Site description, redevelopment plans, and description of surrounding properties.
- Summary of previous investigations and findings.
- Summary of IRM and findings.
- RAOs for the site.

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- Description of Approved Remedy.
- Description of Remedial Action Performed.
- SMP

3.8.4 Periodic Inspections and Certification

Following NYSDEC approval of the FER and SMP, inspection reports and certifications will be submitted to the NYSDEC, initially on an annual basis. The periodic inspection certification, to be signed by a professional engineer or other qualified environmental professional, will certify that the ECs and ICs have not been modified or altered, and no violations of the SMP have been observed. When modifications to the site, ECs or ICs have been observed, the certification will provide a description of the modifications observed and a proposed corrective action measure to address the deficiency.

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4.0 ENGINEERING SPECIFICATIONS AND CONTROLS

4.1 Engineering Specifications

4.1.1 Mobilization, Site Security

Mobilization will include the delivery of construction equipment and materials to the site. Site workers will receive site orientation and training in accordance with the site-specific HASP, CAMP and established policies and procedures to be followed during the implementation of remedial activities. The remediation contractor and all associated subcontractors will each receive a copy of the RAWP, HASP and CAMP and will be briefed on their contents.

Site preparation will include the set-up of site support facilities (as necessary), and construction of personnel and equipment decontamination stations.

Site security will be maintained by utilizing construction and/or safety fencing as needed.

4.1.2 Soil Stockpile Area Construction and Maintenance

In the event that soil excavation is necessary, stockpiles will be confined to a designated area (to be determined). The preferred method for storing soils on site will be in roll-off containers, covered with polyethylene sheeting. Should it be necessary to stockpile soils on the ground, the stockpile area will be lined with 20-mil polyethylene sheeting and surrounded by a silt fence. Stockpiled material will be covered with 20-mil polyethylene sheeting and secured until it is removed from the site.

4.1.3 Soil Disposal

In the event that off-site disposal of soils is necessary, excavated soils will be sampled in accordance with the procedures described under Section 4.3.2 of this document to meet the waste acceptance criteria of the disposal facility. Impacted soil to be removed from the site will be loaded into roll-off containers and/or dump trucks provided by a licensed waste transport company. Loading will be performed with a back-hoe, excavator, or equivalent. Loaded containers will be covered with a tarp.

4.1.4 Backfill and Site Restoration

If necessary, excavated areas will be backfilled with clean fill. Clean fill, as defined by 6NYCRR Part 360, may be brought in from off-site to backfill the excavations and will be in compliance with section 5.4(e) of the Division of Environmental Remediation's *DER-10 – Technical Guidance for Site Investigation and Remediation* (December 2002). The NYSDEC will be consulted, and must approve in advance, the return of excavated soil and the use of

off-site fill.

4.1.5 Demobilization

Following the completion of remedial activities at the site, equipment and remedial structures will be dismantled and removed from the site. Solid wastes generated during remedial activities (i.e., polyethylene sheeting) will be properly disposed of.

4.2 Engineering Controls

4.2.1 Dust Suppression

Dust generation from excavation activities and stockpiled soils will be monitored in accordance with the project CAMP. If dust generation approaches action levels, suppression will be accomplished by:

- Covering/capping exposed soil area with mulch, rubber mats, etc.
- Wetting equipment and excavation faces.
- Water spray dust suppression.
- Hauling materials in properly covered containers.
- Restricting vehicle speeds to 10 mph.

4.2.2 Odor Control

Odors will be monitored in accordance with the project CAMP. In the event that odor suppression becomes necessary, techniques to be implemented for control of odors from stockpiled soil or from the open excavation will include one or more of the following:

- Cover with plastic.
- Cover with “clean soil”.
- Application of hydro-mulch material*.
- Limit working hours to favorable wind and temperature conditions.

*This material is a seedless version of the hydro-seed product commonly used by commercial landscaping contractors to provide stabilization and rapid grow-in of grasses or wild flowers along highways, embankments and other large areas. Hydro-mulch can be sprayed over open excavation areas, temporary stockpile areas and loaded trucks, as necessary. This is a highly effective method for controlling odors, because the release of odors is sealed immediately at the source.

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4.2.3 Sediment and Erosion Control

Erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff will be placed to protect the excavation work and adjacent areas during excavation activities. Storm water control measures, such as straw hay bales or silt fence, will be utilized during excavation activities (if necessary) to prevent storm water runoff from impacting excavation areas and soil stockpiles.

Straw bales and/or silt fence may be placed at locations up gradient of excavation areas to minimize water flow and soil from entering excavations, and down gradient of excavation areas, where possible, to prevent soil from the excavations from migrating to other areas of the site.

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5.0 HEALTH AND SAFETY

The Health and Safety Plan (HASP) takes into account the specific hazards inherent to the site and presents the minimum requirements which are to be met by the remediation contractor and its subcontractors, P.W. Grosser Consulting Inc. (PWGC) and its subcontractors, and other on-site personnel in order to avoid and, if necessary, protect against health and/or safety hazards. The site-specific HASP is included as **Appendix B**.

Contractors and subcontractors will have the option of adopting this HASP or developing their own site-specific document. If a contractor or subcontractor chooses to prepare their own HASP, it must meet the minimum requirements as detailed in the site HASP prepared by PWGC and must be made available to PWGC and the NYSDEC.

Activities performed under the HASP will comply with applicable parts of OSHA Regulations, primarily 29 CFR Parts 1910 and 1926, and the PWGC Corporate Environmental Health and Safety policy. Modifications to the HASP may be made with the approval of the PWGC Health and Safety Manager (HSM) and/or Project Manager (PM).

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6.0 SCHEDULE

The estimated duration to complete the remedial program described above is soil excavation, soil transport and disposal, and site restoration is approximately 48 weeks. Following completion of remedial activities, the FER and SMP will be developed and submitted to NYSDEC, and the Environmental Easement will be prepared.

A timeline has been prepared to illustrate the proposed schedule and is included in **Appendix G.**

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PWGC, Jay's Lucky Cleaners (C130219) Remedial Investigation Report, June 2018

PWGC, Jay's Lucky Cleaners (C130219) Construction Completion Report, June 2019

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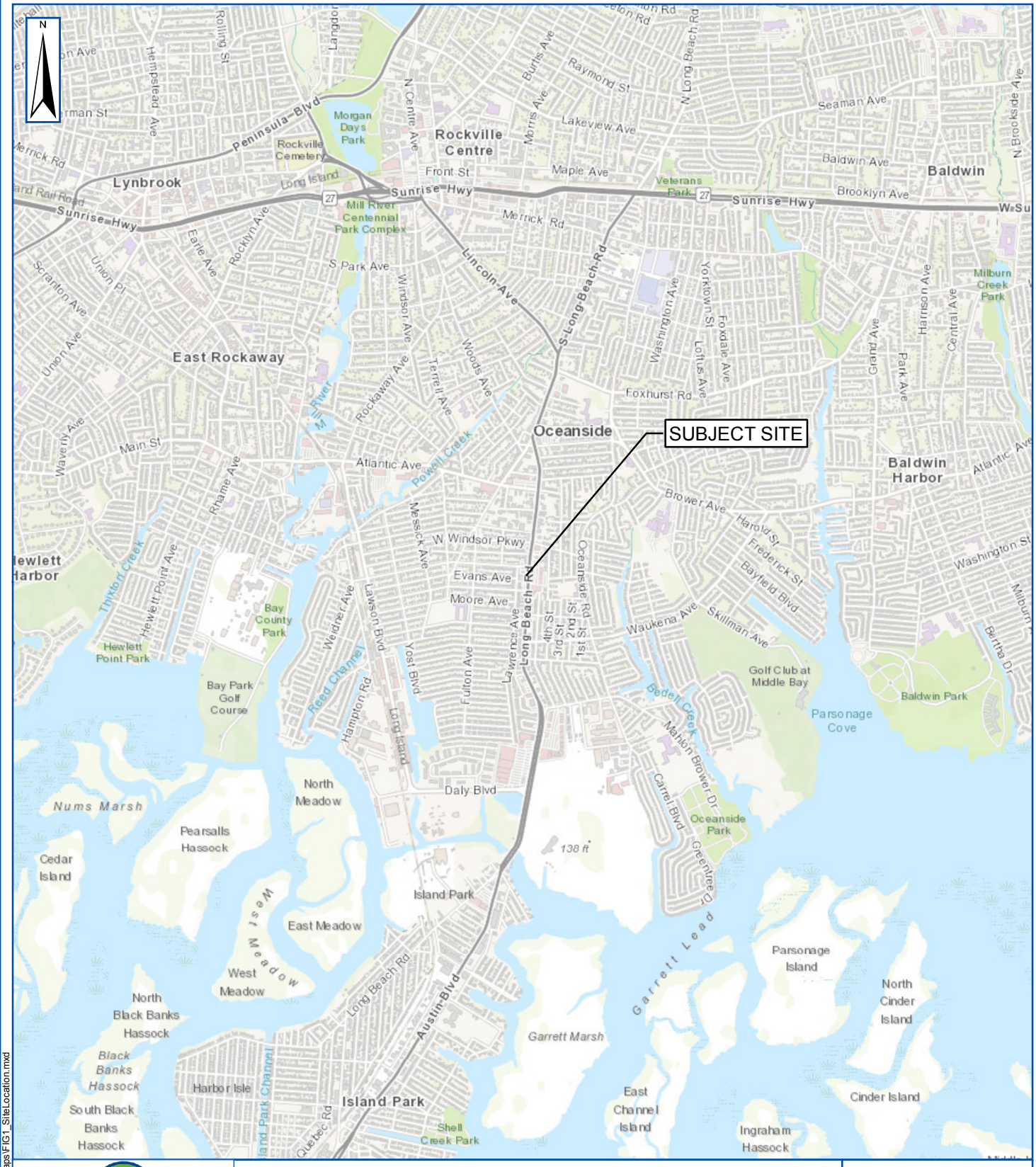
FIGURES



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SUBJECT SITE VICINITY

3220-3224 LONG BEACH ROAD
OCEANSIDE, NY

Miles
0 ½ 1 1½ 2

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Figure No:	1

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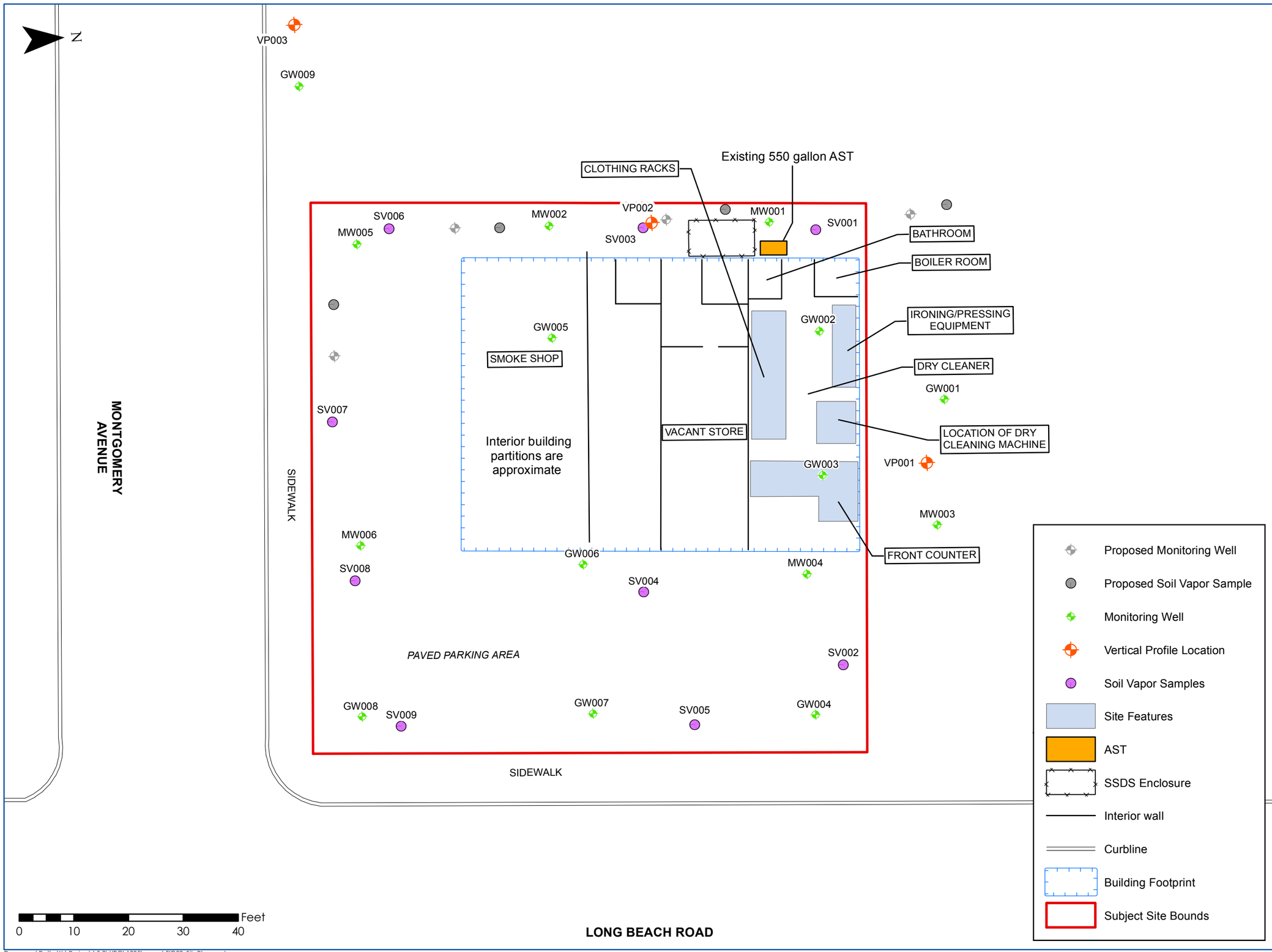

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SITE PLAN

3220-3224 LONG BEACH ROAD
OCEANSIDE, NY

FIGURE NO:

2

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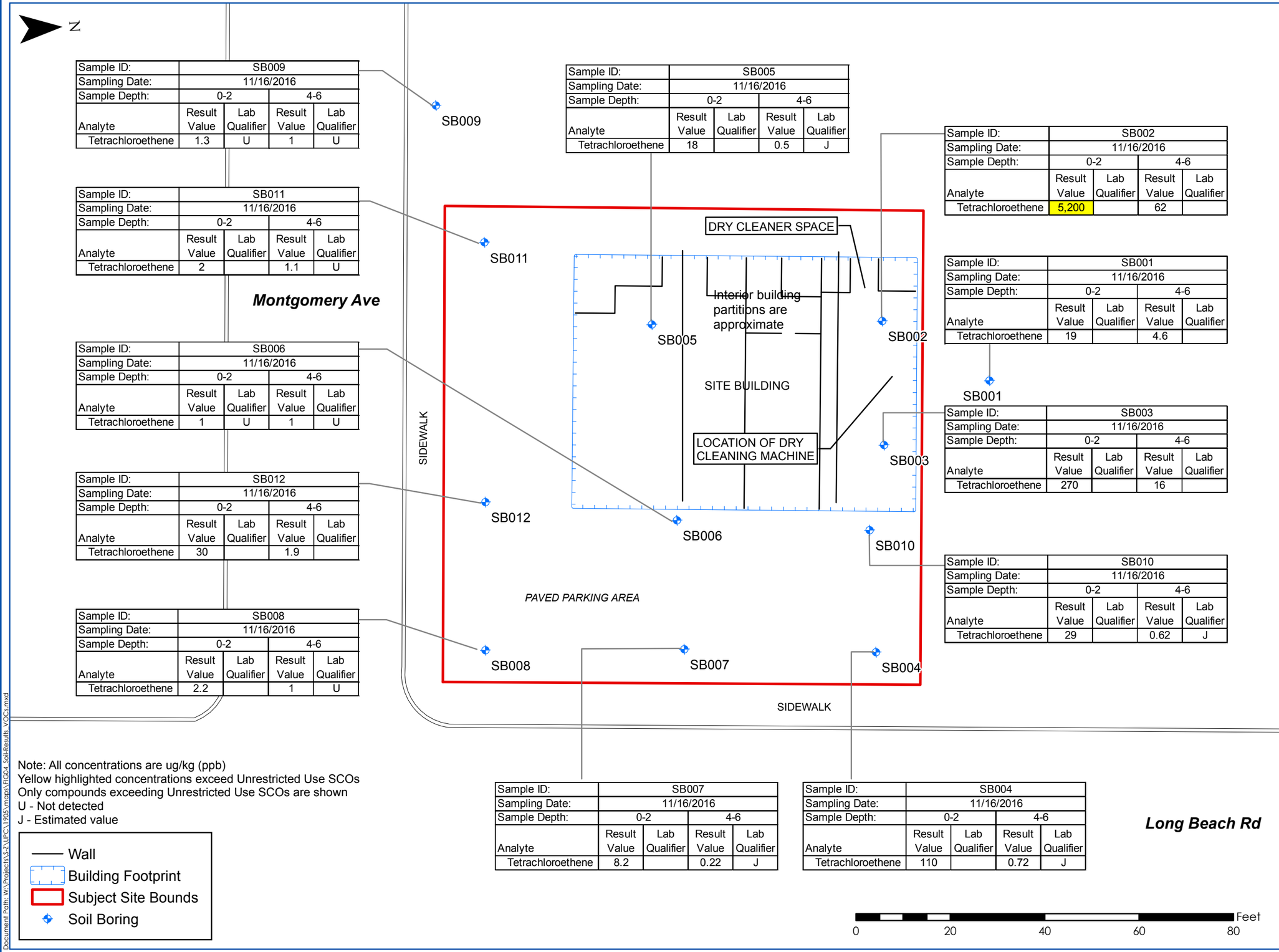

Sample ID:	SB009			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	1.3	U	1	U

Sample ID:	SB011			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	2		1.1	U

Sample ID:	SB006			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	1	U	1	U

Sample ID:	SB012			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	30		1.9	

Sample ID:	SB008			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	2.2		1	U

Sample ID:	SB005			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	18		0.5	J

Sample ID:	SB002			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	5,200		62	

Sample ID:	SB001			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	19		4.6	

Sample ID:	SB003			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	270		16	

Sample ID:	SB010			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	29		0.62	J

Sample ID:	SB007			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	8.2		0.22	J

Sample ID:	SB004			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	110		0.72	J

Note: All concentrations are ug/kg (ppb)
Yellow highlighted concentrations exceed Unrestricted Use SCOs
Only compounds exceeding Unrestricted Use SCOs are shown
U - Not detected
J - Estimated value

Wall
Building Footprint
Subject Site Bounds
Soil Boring

0 20 40 60 80 Feet

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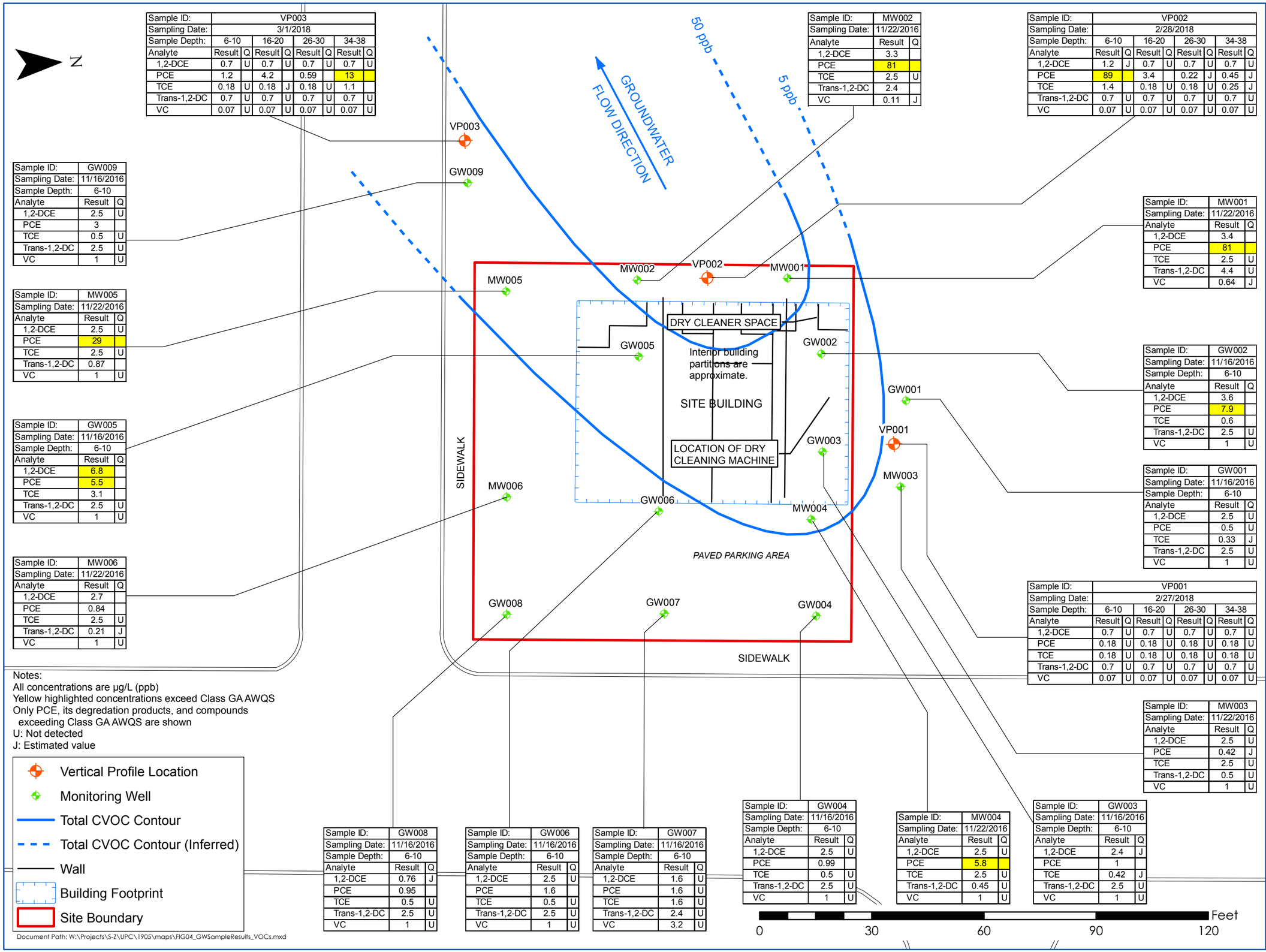
VOC CONCENTRATIONS IN SOIL

3220-3224 LONG BEACH ROAD
OCEANSIDE, NY

FIGURE NO:

3



Sample ID:	VP003							
Sampling Date:	3/1/2018							
Sample Depth:	6-10		16-20		26-30		34-38	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q
1,2-DCE	0.7	U	0.7	U	0.7	U	0.7	U
PCE	1.2		4.2		0.59		13	
TCE	0.18	U	0.18	J	0.18	U	1.1	
Trans-1,2-DC	0.7	U	0.7	U	0.7	U	0.7	U
VC	0.07	U	0.07	U	0.07	U	0.07	U

Sample ID:	MW002	
Sampling Date:	11/22/2016	
Analyte	Result	Q
1,2-DCE	3.3	
PCE	81	
TCE	2.5	U
Trans-1,2-DC	2.4	
VC	0.11	J

Sample ID:	VP002							
Sampling Date:	2/28/2018							
Sample Depth:	6-10		16-20		26-30		34-38	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q
1,2-DCE	1.2	J	0.7	U	0.7	U	0.7	U
PCE	89		3.4		0.22	J	0.45	J
TCE	1.4		0.18	U	0.18	U	0.25	J
Trans-1,2-DC	0.7	U	0.7	U	0.7	U	0.7	U
VC	0.07	U	0.07	U	0.07	U	0.07	U

Sample ID:	GW009	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	2.5	U
PCE	3	
TCE	0.5	U
Trans-1,2-DC	2.5	U
VC	1	U

Sample ID:	MW001	
Sampling Date:	11/22/2016	
Analyte	Result	Q
1,2-DCE	3.4	
PCE	81	
TCE	2.5	U
Trans-1,2-DC	4.4	U
VC	0.64	J

Sample ID:	MW005	
Sampling Date:	11/22/2016	
Analyte	Result	Q
1,2-DCE	2.5	U
PCE	29	
TCE	2.5	U
Trans-1,2-DC	0.87	
VC	1	U

Sample ID:	GW002	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	3.6	
PCE	7.9	
TCE	0.6	
Trans-1,2-DC	2.5	U
VC	1	U

Sample ID:	GW005	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	6.8	
PCE	5.5	
TCE	3.1	
Trans-1,2-DC	2.5	U
VC	1	U

Sample ID:	GW001	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	2.5	U
PCE	0.5	U
TCE	0.33	J
Trans-1,2-DC	2.5	U
VC	1	U

Sample ID:	MW006	
Sampling Date:	11/22/2016	
Analyte	Result	Q
1,2-DCE	2.7	
PCE	0.84	
TCE	2.5	U
Trans-1,2-DC	0.21	J
VC	1	U

Sample ID:	VP001							
Sampling Date:	2/27/2018							
Sample Depth:	6-10		16-20		26-30		34-38	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q
1,2-DCE	0.7	U	0.7	U	0.7	U	0.7	U
PCE	0.18	U	0.18	U	0.18	U	0.18	U
TCE	0.18	U	0.18	U	0.18	U	0.18	U
Trans-1,2-DC	0.7	U	0.7	U	0.7	U	0.7	U
VC	0.07	U	0.07	U	0.07	U	0.07	U

Sample ID:	MW003	
Sampling Date:	11/22/2016	
Analyte	Result	Q
1,2-DCE	2.5	U
PCE	0.42	J
TCE	2.5	U
Trans-1,2-DC	0.5	U
VC	1	U

Notes:
All concentrations are µg/L (ppb)
Yellow highlighted concentrations exceed Class GA AWQS
Only PCE, its degredation products, and compounds exceeding Class GA AWQS are shown
U: Not detected
J: Estimated value

Sample ID:	GW008	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	0.76	J
PCE	0.95	
TCE	0.5	U
Trans-1,2-DC	2.5	U
VC	1	U

Sample ID:	GW006	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	2.5	U
PCE	1.6	
TCE	0.5	U
Trans-1,2-DC	2.5	U
VC	1	U

Sample ID:	GW007	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	1.6	U
PCE	1.6	U
TCE	1.6	U
Trans-1,2-DC	2.4	U
VC	3.2	U

Sample ID:	GW004	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	2.5	U
PCE	0.99	
TCE	0.5	U
Trans-1,2-DC	2.5	U
VC	1	U

Sample ID:	MW004	
Sampling Date:	11/22/2016	
Analyte	Result	Q
1,2-DCE	2.5	U
PCE	5.8	
TCE	2.5	U
Trans-1,2-DC	0.45	U
VC	1	U

Sample ID:	GW003	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	2.4	J
PCE	1	
TCE	0.42	J
Trans-1,2-DC	2.5	U
VC	1	U

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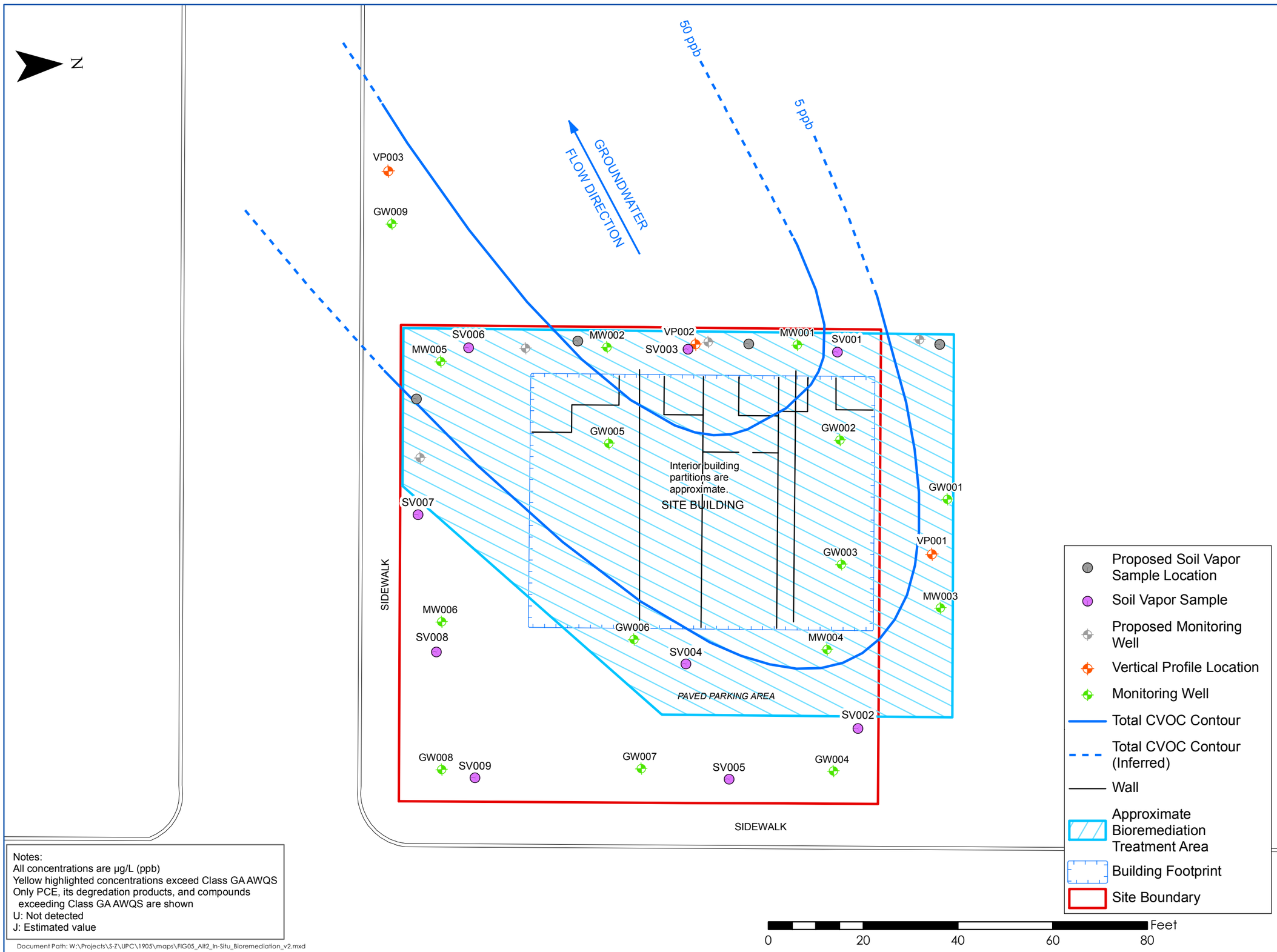
Groundwater Sample Results Volatile Organic Compounds

3220-3224 LONG BEACH ROAD
OCEANSIDE, NY

FIGURE NO:

4



Notes:
All concentrations are µg/L (ppb)
Yellow highlighted concentrations exceed Class GA AWQS
Only PCE, its degredation products, and compounds exceeding Class GA AWQS are shown
U: Not detected
J: Estimated value

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Proposed Remedial Plan Alternative 2 In-Situ Bioremediation

3206-3224 LONG BEACH ROAD
OCEANSIDE, NY

FIGURE NO:

5

APPENDIX A

ALTERNATIVES ANALYSIS

JAY'S LUCKY CLEANERS
3220-3224 LONG BEACH ROAD
OCEANSIDE, NEW YORK
NYSDEC BCP ID: C130219

ALTERNATIVES ANALYSIS

SUBMITTED TO:

New York State Department of Environmental Conservation
Division of Environmental Remediation
50 Circle Road
Stony Brook, New York 11790

ON BEHALF OF:

United Properties Corp.
1975 Hempstead Turnpike, Suite 309
East Meadow, New York 11554

PREPARED BY:

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PWGC Project Number: UPC1905

JULY 2020

ALTERNATIVES ANALYSIS
JAY'S LUCKY CLEANERS
NYSDEC BCP ID: C130219

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1.0 INTRODUCTION

P.W. Grosser Consulting Engineer & Hydrogeologist, PC (PWGC) has prepared the following Alternatives Analysis for the Jay's Lucky Cleaners site located at 3220 to 3224 Long Beach Road, Oceanside, New York (the "Property" or "Site"). Based on the historical use of the Property as a drycleaner and the confirmed presence of chlorinated solvents in groundwater beneath the Site, the property owner, United Properties Corp., was accepted into the New York State Brownfields Cleanup Program (BCP) as a volunteer as set forth in a Brownfield Cleanup Agreement (BCA), dated December 10, 2015 (Site No. C130219).

1.1 Purpose and Organization

This Alternatives Analysis Report documents the basis and the procedures used in identifying, developing, screening, and evaluating remedial alternatives that could potentially address impact identified at the site during the Remedial Investigation (RI). This Alternatives Analysis, in conjunction with the RI Report (June 2018) and Interim Remedial Measure (IRM) Construction Completion Report (June 2019), provides the NYSDEC with sufficient data to approve a feasible and cost-effective remedial alternative that will protect human health and the environment. The overall goal of the Alternatives Analysis is to develop and evaluate options for implementing a remedial action in accordance with the requirements NYSDEC 6 NYCRR Part 375 (Part 375) subpart 4 and selecting a remedy for NYSDEC approval.

This report contains the following four sections,

- Section 1.0, Introduction, provides site purpose and organization of the alternative analysis, references the site background information, and summarizes previous investigations. This section also discusses the conceptual model for the site which describes transport of contamination through the past.
- Section 2.0, Details the Remedial Action Objectives, General Response Actions, and Development of Alternatives.
- Section 3.0, Detailed Analysis of the Alternative, specifically evaluates each Alternative against eight remedial objective criteria and compares each Alternative to one another against the criteria.
- Section 4.0, States the applicant's preferred Alternative with supporting rational.

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1.2 Project Background

A Phase I Environmental Site Assessment (ESA) and a Focused Subsurface Site Investigation (FSSI) were conducted at the Site in 2014. The Phase I ESA identified prior and current use of one of the retail units located at 3220 Long Beach Road as a drycleaner, and the presence of an above ground storage tank (AST) used to store fuel oil. Elevated concentrations of volatile organic compounds (VOCs) indicative of impact from dry cleaning operations were reported in groundwater at the southwestern portion of the Site. No evidence of impacts to soil and groundwater were reported in relation to fuel oil.

Additional investigation and groundwater sampling was conducted in September 2014. This effort was limited to the southern/southwestern portion of the Site, in the estimated down-gradient groundwater flow direction. Elevated concentrations of VOCs (acetone, tetrachloroethene [PCE], trichloroethene [TCE], and cis-1,2-dichloroethene [cis-1,2-DCE]) were reported in groundwater above New York State Department of Environmental Conservation (NYSDEC) standards.

1.3 Site Description

The subject site is located at 3220 to 3224 Long Beach Road, Oceanside, New York. The property is identified as Nassau County Section 43, Block 336, Lot 42. The site is bordered on the north by a commercial property, on the east by Long Beach Road, on the west by residential and commercial properties, and on the south by Montgomery Avenue.

The current property consists of one single-story retail strip building with three units and front and side parking lots that cover the remainder of the property. The entire property is approximately 0.23 acres in area. The building was originally constructed in 1959. There is currently no planned change to the usage of the Site.

A Vicinity Map is included as **Figure 1**. A Site Plan is included as **Figure 2**.

1.4 Site History

The building was constructed in 1959. Prior to construction of these buildings, the lot was vacant.

A review of available New York Telephone Address Directories, Certificates of Occupancy, and available Sanborn Fire Insurance Maps indicated the subject site was utilized in the past by a, convenience store, surf shop,

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massage parlor, and drycleaner. A drycleaner has occupied a unit within 3220 Long Beach Road unit since at least 1959.

1.5 Previous Environmental Investigations

The Remedial Investigation described in Section 2.3.5 was performed by PWGC and is summarized below. Additional investigations and investigative reports have been prepared by others. PWGC has also reviewed and summarized these reports below.

1.5.1 Phase I ESA Report (11/18/1998)

Prepared by: Middleton, Kontokosta Associates, LTD (MKA)

A Phase I ESA was conducted by MKA in November 1998. The Phase I ESA identified the presence of the drycleaner at the 3220 Long Beach Road unit and the above ground storage tank located in the western alley behind the 3220 Long Beach Road unit. MKA did not report any recognized environmental conditions. MKA stated that no further testing (subsurface or otherwise) was required on the subject site.

1.5.2 Phase I ESA Report (11/3/2004)

Prepared by: Middleton Environmental, Inc. (MEI)

A Phase I ESA was conducted by MEI in November 2004. The Phase I ESA identified the presence of the drycleaner at the 3220 Long Beach Road unit and the above ground storage tank located in the western alley behind the 3220 Long Beach Road unit. MEI did not report recognized environmental conditions.

1.5.3 Phase I ESA Report & Focused Subsurface Site Investigation (3/31/2014)

Prepared by: Merritt Environmental Consulting Corp. (MECC)

A Phase I ESA and FSSI was completed by MECC in March 2014. The purpose of the FSSI was to address the recognized environmental conditions specified in the Phase I ESA Report. The Phase I ESA identified prior and current use of one of the retail units located at 3220 Long Beach Road as a drycleaner. Elevated concentrations of volatile organic compounds (VOCs) indicative of impact from dry cleaning operations were reported in groundwater at the southwestern portion of the site. PCE was reported in two groundwater samples (B1GW and B2GW) at 450 micrograms per liter (ug/L) and 11 ug/L respectively, above the NYSDEC TOGS 1.1.1 Ambient Groundwater Quality Standards (GWQS) and Guidance Values of 5 ug/L.

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1.5.4 Groundwater Sampling and Laboratory Analysis (9/16/2014)

Prepared by: MECC

MECC completed a Groundwater Sampling and Laboratory Analysis summary in September 2014. The scope of work included the installation of three groundwater monitoring wells, groundwater sampling, and an elevation survey to determine site-specific groundwater flow direction.

Groundwater analytical results reported concentrations of VOCs (acetone, cis-1,2-DCE, TCE, and PCE) above GWQS. Groundwater flow direction was determined to flow west.

1.5.5 Remedial Investigation: Work Plan, Investigation Activities, and Report

Prepared by: PWGC

Remedial Investigation Workplan and Remedial Investigation Activities

PWGC prepared a Remedial Investigation Work Plan (RIWP) which was submitted to and approved by NYSDEC in September 2016. The Remedial Investigation commenced shortly thereafter and was completed in November of 2016. The purpose of the RI was to delineate soil, groundwater, and soil vapor impact within the Site boundary and to determine if on site impacts have the potential to migrate off-site.

The scope of work included the installation and sampling 12 soil borings, installation of three new groundwater monitoring wells, installation of nine temporary groundwater sampling points, collection of a combined 16 air samples (soil vapor, ambient air, and indoor air), groundwater sampling of a combined 15 sample points, and performance of both a geophysical and elevation survey to determine site-specific groundwater flow direction.

The proposed activities were based upon the findings and data presented within the historical reports and data collected by previous consultants and detailed above. The activities were also performed to supplement the data and conclusions provided by MECC within the Phase I ESA Report/Focused Subsurface Site Investigation and subsequent groundwater sampling and laboratory analysis performed in 2014.

Remedial Investigation Report

In June 2018, PWGC prepared a Remedial Investigation Report (RIR) for submittal to the NYSDEC. The RIR summarized the findings of the RI activities performed in November 2016 and February 2018. The report identified specific contamination concentrations throughout each media (soil, groundwater, and indoor air/soil vapor), delineated the extent of contamination in soil and groundwater, evaluated potential exposure pathways,

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and provided conclusions and recommendations. The RIR was approved by NYSDEC via a letter dated May 29, 2019.

Soil sample results identified isolated instances of VOCs, pesticides, and metals exceeding Unrestricted Use SCOs. With exception of arsenic and lead in the 0 to 2-foot interval at boring location SB004, concentrations of VOCs, pesticides, and metals were observed to be below Commercial Use SCOs at the Site. PCE impacted soils appear to be limited to the northern portion of the Site in the immediate vicinity of the dry-cleaning machine.

Several SVOCs, pesticides, and metals were detected in groundwater at concentrations exceeding their respective AWQS. Apart from one detection of cis-1,2-DCE, PCE was the sole VOC detected exceeding AWQSs at the Site. PCE exceedances were observed at multiple groundwater sample locations along the western portion of the Site. Locations where PCE concentrations were highest in groundwater (monitoring wells MW001, MW002) appear to be located directly downgradient of the dry-cleaning machine, based upon the site-specific groundwater flow direction as determined during the RI.

Groundwater vertical profiles were installed up and down gradient of the dry-cleaning machine, with samples collected at 10-foot intervals from the water table (six feet below grade) to the apparent top of the Gardiners 20-foot Clay, which appears to be present approximately 38 feet below grade. PCE impact above its AWQS was limited to the water table interval in onsite samples. One offsite vertical profile was installed; PCE was detected above its AWQS in the 34 to 38-foot sample interval at this location.

PCE was detected in soil vapor with the highest concentrations observed beneath the building slab, and along the western Property boundary. PCE was also detected in indoor air samples collected from within the building at concentrations below the NYSDOH guideline value of 30 µg/m^3. However, based on evaluation of PCE concentrations in indoor air and sub-slab soil vapor using NYSDOH decision matrices, soil vapor intrusion appears to be occurring and requires mitigation measures.

The above soil, groundwater, and soil vapor data, site hydrology, geology, and potential pathways relative to the locations of adjacent properties was then considered to prepare a fate and transport evaluation for the contaminants of concern. The evaluation and the RIR concluded that impacted groundwater and soil vapor may be migrating off-site.

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Based on the findings of the RI, NYSDOH issued a determination dated February 25, 2019 that the Site represents a significant threat to public health due to the potential for off site receptors to be impacted by site related VOCs.

1.5.6 Interim Remedial Measure

Prepared By: PWGC

PWGC submitted an Interim Remedial Measure (IRM) Work Plan to NYSDEC in June 2017. The IRM included the installation of a sub-slab depressurization system (SSDS) to be installed in the exiting building to mitigate vapor intrusion identified during the RI.

The SSDS consists of a vacuum blower located behind the building in an acoustical attenuating enclosure, to produce a negative pressure under the building slab. Four vapor extraction pits are utilized create a vacuum beneath the building's slab. Recovered vapor is treated utilizing granulated activated carbon (GAC) and vented above the roofline of the building. The SSDS was constructed without significant deviations from the design submitted with the IRM Work Plan. Construction was completed in September 2018. Indoor air sampling performed following installation of the SSDS appeared to demonstrate the SSDS was operating effectively. PWGC prepared a Construction Completion Report (CCR) documenting the IRM for submittal to NYSDEC in June 2019.

Ongoing IRM activities, performed in accordance with the Operation, Maintenance & Monitoring (OM&M) Plan included with the CCR consist of continued operation of the SSDS, periodic vacuum monitoring, and system O&M inspections. Based on air sampling performed in March 2019, the SSDS is operating as intended.

1.5.7 Emerging Contaminants Sampling

In March 2018 NYSDEC issued a letter requiring that groundwater sampling for emerging contaminants be performed at the above referenced site. Emerging contaminants refers to 1,4-dioxane and perfluoroakyl and polyfluoroakyl substances (PFAS). PWGC submitted an Emerging Contaminants Sampling Plan in May 2018 (approved by NYSDEC via email), performed the sampling in August 2018, and submitted an Emerging Contaminants Sampling Report in October 2018.

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Emerging contaminant sampling consisted of collection of groundwater samples from three onsite wells (MW001, MW003 and MW005); samples were collected and analyzed in accordance with NYSDEC guidance documents for emerging contaminant sampling.

NYSDEC has not established water quality standards or guidance values for PFAS or 1,4-dioxane. NYSDEC has proposed a maximum contaminant level of 10 parts per trillion (ppt) for PFAS compounds perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) which is scheduled to be adopted in Summer 2020. USEPA has specified a Health Advisory Level (HAL) of 70 ppt for PFOA PFOS. The 70 ppt HAL applies to each compound individually, as well as the total of PFOA and PFOS.

PFOA and/or PFOS were detected above the USEPA HAL of 70 ppt in samples collected from monitoring wells MW001 and MW005 with maximum concentrations of 726 ppt for PFOS (MW001) and 111 ppt for PFOA (MW005). PFOA (7.05 ppt) and PFOS (5.86 ppt) were detected below the USEPA HAL in monitoring well MW003. Monitoring well MW003 is located upgradient of the site with respect to groundwater flow. 1,4-Dioxane was not detected in groundwater samples collected from the site.

1.6 Regional Geology/Hydrogeology

The geologic setting of Long Island is well documented and consists of crystalline bedrock composed of schist and gneiss overlain by layers of unconsolidated deposits. Immediately overlying the bedrock is the Raritan Formation, consisting of the Lloyd sand confined by the Raritan Clay Member. The Lloyd sand is an aquifer and consists of discontinuous layers of gravel, sand, sandy and silty clay, and solid clay. The Raritan Clay is a solid and silty clay with few lenses of sand and gravel; abundant lignite and pyrite; and gray, red or white in color.

Above the Raritan Clay lies the Magothy Formation. The Magothy Aquifer consists of layers of fine to coarse sand of moderate to high permeability, with inter-bedded lenses of silt and clay of low permeability resulting in areas of preferential horizontal flow. Therefore, this aquifer generally becomes more confined with depth. The Magothy Aquifer is overlain by the Jameco and Upper Glacial Aquifer systems. The Upper Glacial Aquifer is the water table aquifer at this location and is comprised of medium to coarse sand and gravel with occasional thin lenses of fine sand and brown clay. This aquifer extends from the land surface to the top of the Magothy and, therefore, is hydraulically connected to the Magothy Aquifer.

1.7 Site Geology/Hydrogeology

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Regional groundwater flow direction is south. Site-specific groundwater flow was observed to be southwest. The nearest surface water bodies are Bedell Creek, located approximately 0.4 miles east of the site and an unnamed canal located approximately 0.6 miles southwest of the site. Municipal water supply is provided by New York American Water.

Based on review of United States Geological Survey (USGS) Water Supply Paper 1613-A, Geology and Ground-Water Conditions in Southern Nassau and Southeastern Queens Counties Long Island, NY (Perlmutter & Geraghty, 1963), it appears that the Gardiners 20-foot clay may be present beneath the Site. This paper indicates the top of the clay layer is estimated at approximately 25 feet below mean sea level; based on the site elevation, the clay layer would be expected to be approximately 35 feet below existing grade at the Site. Based on a soil boring performed as part of the RI, it appears that the Gardiners 20-foot clay is present at approximately 38 feet below grade at the subject property. This clay layer will likely act as an aquitard inhibiting migration of PCE impacted groundwater beneath the clay layer.

1.8 Site Features

The project site elevation is approximately seven feet above mean sea level and is generally level. The site is developed with one single-story retail strip building with a front and side parking lots and is approximately 0.23 acres in area. There are no exposed areas of vegetation.

1.9 Current and Future Site Use

The site is currently utilized as a strip mall with three tenant spaces and associated parking areas. Tenants include a smoke shop/vape shop occupying both the southern and central units, and an active drycleaner occupying the northern unit. Significant changes in use of the site are not planned for the near future. The goal of the cleanup at the site is to achieve Track 1 status; however, it is understood that the project may achieve Track 2 or Track 4.

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2.0 IDENTIFICATION AND DEVELOPMENT OF ALTERNATIVES

2.1 Introduction

This section discusses developing objectives for the remediation of PCE contamination and identifies potential alternatives to be considered for the final remediation.

The remedial action objectives (RAOs) are developed for the protection of human health and the environment, based on contaminant characterization, contaminant transport, a qualitative human exposure assessment, and compliance with applicable Standards, Criteria, and Guidance Values (SCGs). Then potential remedial alternatives are identified and evaluated to determine if they can meet the RAOs and SCGs for the site.

Alternatives that are listed in the initial identification are further evaluated as alternatives for site remediation in the following sections.

2.1.1 Cleanup Tracks

The BCP allows for a multi-track approach to remediation of soil impact. Potential cleanup tracks for the site may include:

Track 1 - Unrestricted Use: Generic Soil Cleanup Table

- Cleanup meets Part 375 Unrestricted Use SCOs
- No restrictions on site usage
- Land/groundwater use restrictions or institutional/engineering controls cannot be employed to meet the RAOs for the site.

Track 2 - Restricted Use: Generic Soil Cleanup Tables

- Cleanup meets the appropriate Part 375 Restricted Use SCOs
- Land use and groundwater use restrictions are allowed
- Cannot rely upon institutional/engineering controls to prevent exposures to soil contamination at levels exceeding those specified in the corresponding soil cleanup table
- Uses generic soil cleanup table for the applicable land use scenario
- Allows for the development of site-specific SCOs for subsurface soils

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Track 3 - Restricted Use: Modified Soil Cleanup Objectives

- Cleanup meets the appropriate Part 375 Restricted Use SCOs; however, NYSDEC may approve the modification of one or more contaminant specific SCOs
- Land use and groundwater use restrictions are allowed
- Cannot rely upon institutional/engineering controls to prevent exposures to soil contamination at levels exceeding those specified in the corresponding soil cleanup table
- Uses site-specific data to generate soil cleanup objectives

Track 4 - Restricted Use: Site-Specific Objectives

- Land use and groundwater use restrictions are allowed
- Can rely upon IC/ECs to prevent exposures to soil contamination
- If soil contamination presents exposure risks above specified levels, the NYSDEC and NYSDOH must find that the cleanup would be protective of human health and the environment
- Contaminated soil must be covered by material that meets the requirements of the generic soil cleanup table for the applicable site use

2.1.2 Future Land Use

The site is currently utilized as a strip mall with several tenants and parking areas. Significant changes in use of the site are not planned for the near future.

Several alternatives to clean up the site to less restrictive standards have been identified and evaluated. In accordance with NYSDEC regulations alternatives which meet the Part 375 Unrestricted Use Soil Cleanup Objectives and no further action are also included in the evaluation.

2.2 Remedial Action Objectives (RAOs)

The final remedial measure for the Site must satisfy the RAOs. Remedial Action Objectives are site specific statements that convey the goals for minimizing or eliminating risks to public health and the environment.

The following subsections summarize the contaminants of concern, general locations of contaminants, and the RAOs for each of the identified media. These RAOs are based on the findings of the RI and the anticipated future use of the project site, which is to remain undeveloped.

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2.2.1 Soil

The primary contaminant of concern detected in soils at the Site is PCE. The RAOs for public health protection and environmental protection for this medium are:

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure to contaminants volatilizing from soil.
- Prevent migration of contaminants that would result in groundwater or surface water contamination.

2.2.2 Groundwater

The primary contaminant of concern detected in groundwater at the Site is PCE. The RAOs for public health protection and environmental protection for this medium are:

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.
- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

2.2.3 Soil Vapor

The primary contaminant of concern detected in soil vapor at the Site is PCE. The RAOs for public health protection and environmental protection for this medium are:

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

2.3 General Response Actions

General response actions for each of the affected media at the project site have been identified and are described in the following sections. Although these general response actions include no action as a remedial option, the "No Action" response action does not address the RAOs identified in the preceding section and is included for comparison purposes only.

2.3.1 Soil

General response actions available to satisfy the RAOs identified for soils include:

- No Action
- Institutional Controls
- Excavation and off-site disposal

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2.3.2 Groundwater

General response actions available to satisfy the RAOs identified for groundwater include:

- No Action
- Institutional Controls
- Monitored Natural Attenuation
- Treatment (in situ or ex situ)

2.3.3 Soil Vapor

General response actions available to satisfy the RAOs identified for soil vapor include:

- No Action
- Institutional Controls
- Engineering Controls

2.4 Emerging Contaminants

In addition to PCE, sampling performed at the site for emerging contaminants identified PFAS in groundwater at the site (see Section 1.5.7). As of the date of this report, NYSDEC has not established soil or groundwater quality standards or guidance values for PFAS. USEPA has specified a HAL of 70 parts per trillion (ppt) for PFAS compounds PFOA and PFOS in drinking water. The 70 ppt HAL applies to each compound individually, as well as the total of PFOA and PFOS. NYSDEC has proposed a groundwater standard of 10 ppt for PFOA and PFOS; however, that standard has not yet been formally adopted.

PFAS sampling at the site was limited to groundwater sampling of three monitoring wells, and no soil sampling, which is insufficient to evaluate whether PFAS detected in groundwater at the site is related to an on or offsite source. PFAS was detected in an upgradient monitoring well, albeit at concentrations below the USEPA HAL of 70 ppt. Additionally, in the absence of formally established NYSDEC soil or groundwater quality standards for PFAS, there are no remedial goals for potential PFAS remediation to achieve at this time. However, NYSDEC expects that soil and/or groundwater standards for PFAS will be established in Summer 2020. As such, soil sampling for PFAS will be included as part of the remedial program in accordance with NYSDEC's Guidelines for Sampling and Analysis of PFAS (January 2020). Based on the nature of PFAS compounds, impact (if present) would be managed by:

- Soil - excavation and offsite disposal and/or capped and managed under a Site Management Plan.
- Groundwater – ex situ treatment (pump and treat), in situ treatment (colloidal carbon

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injections/sequestration), and/or managed under a Site Management Plan.

2.5 Development of Alternatives

The general response actions identified in Section 2.3 have been assembled into a series of site-wide remedial action alternatives. The alternatives range from least comprehensive to most comprehensive as outlined in the following subsections.

2.5.1 Alternative 1 – No Further Action

Under this alternative, the project site would remain in its current state with no additional remedial activities occurring. This alternative would include:

- Continued operation of the SSDS.
- Preparation and implementation of a Site Management Plan (SMP) which will include institutional Controls and Engineering Controls (ICs/ECs) consisting of an environmental easement limiting the site usage to commercial or lower and a composite cover system to limit exposure to residual subsurface impact (soils exceeding Unrestricted Use SCOs), and long-term monitoring of onsite groundwater for natural attenuation.
- Continued operation & maintenance (O&M) of the existing SSDS for approximately 10 years.
- Groundwater monitoring to confirm the effectiveness of the remedy for approximately five years.
- Annual inspections and certifications of the engineering controls for approximately 20 years.

This alternative does not satisfy the human health or environmental RAOs for the current scenario, nor is it supportive of the current/future use of the Site for commercial purposes. This alternative has been included to provide a point of comparison for the other alternatives.

2.5.2 Alternative 2 – In-Situ Bioremediation (Track 2, With Contingent Track 4)

This alternative would include in-situ bioremediation of onsite groundwater, continued operation of the SSDS, and implementation of a SMP with ECs/ICs and long term monitored natural attenuation of onsite groundwater impact. The details of this alternative include:

- Installation of four additional groundwater monitoring wells.
- Installation of four additional vapor monitoring points at the property boundary to monitor potential off-gassing of VOC impact related to the remedy.
- Pre-remediation collection of groundwater and soil vapor samples from the full onsite monitoring well and soil vapor point networks.

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- Pre-remediation collection of soil samples for PFAS from three locations along the western and southern property boundaries. Sample locations will be provided to NYSDEC for review prior to mobilization.
- Implementation of an in-situ bioremediation injection program consisting of injection of a bioremediation solution (combination of Regenesis 3-D Microemulsion, S-MicroZVI and BDI Plus, or similar) throughout the affected area (see **Figure 5**). Bioremediation injections will be performed through temporary injection points installed throughout the treatment area using a direct-push drill rig (Geoprobe®, or similar). The specific locations and depth intervals for temporary injection points will be determined following the installation of monitoring wells and groundwater sampling described above; data generated during this sampling will be used in conjunction with RI data to determine specific injection point locations.
- Post-remediation collection of groundwater and soil vapor samples from the full onsite monitoring well and soil vapor point networks.
- Preparation and implementation of a SMP which will include ICs/ECs consisting of an environmental easement limiting the site usage to commercial or lower and a composite cover system to limit exposure to residual subsurface impact (soils exceeding Unrestricted Use SCOs), and long-term monitoring of onsite groundwater for natural attenuation.
- Continued O&M of the existing SSDS until otherwise directed by NYSDEC and/or NYSDOH. For cost estimating purposes, PWGC assumes that the SSDS will operate for approximately 10 years.
- Groundwater monitoring of the full onsite monitoring well network on a quarterly basis to confirm the effectiveness of the remedy for a minimum of two years. The frequency of sampling and number of wells to be sampled may be modified with the approval of NYSDEC.
- Annual inspections and certifications of the engineering controls for approximately 20 years.

This remedy is anticipated to yield a Track 2 cleanup contingent upon soils meeting Restricted SCOs and groundwater meeting AWQSs. In the event that groundwater does not meet AWQSs and long-term treatment is required, the remedy will meet Track 4 requirements

2.5.3 Alternative 3 – In-Situ Chemical Oxidation (Track 2, With Contingent Track 4)

This alternative would include in-situ chemical oxidation (ISCO) of onsite groundwater, continued operation of the SSDS, and implementation of a SMP with ECs/ICs and long term monitored natural attenuation of onsite groundwater impact. The details of this alternative include:

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- Installation of four additional groundwater monitoring wells.
- Installation of four additional vapor monitoring points at the property boundary to monitor potential off-gassing of VOC impact related to the remedy.
- Pre-remediation collection of groundwater and soil vapor samples from the full onsite monitoring well and soil vapor point networks.
- Pre-remediation collection of soil samples for PFAS from three locations along the western and southern property boundaries. Sample locations will be provided to NYSDEC for review prior to mobilization.
- Implementation of an in-situ chemical oxidation injection program consisting of injection of a chemical oxidant solution (Regensis Persulf-Ox, or similar) throughout the affected area (see **Figure 6**). ISCO injections will be performed through temporary injection points installed throughout the treatment area using a direct-push drill rig (Geoprobe®, or similar). The specific locations and depth intervals for temporary injection points will be determined following the installation of monitoring wells and groundwater sampling described above; data generated during this sampling will be used in conjunction with RI data to determine specific injection point locations.
- Post-remediation collection of groundwater and soil vapor samples from the full onsite monitoring well and soil vapor point networks.
- Preparation and implementation of a SMP which will include ICs/ECs consisting of an environmental easement limiting the site usage to commercial or lower and a composite cover system to limit exposure to residual subsurface impact (soils exceeding Unrestricted Use SCOs), and long-term monitoring of onsite groundwater for natural attenuation.
- Continued O&M of the existing SSDS until otherwise directed by NYSDEC and/or NYSDOH. For cost estimating purposes, PWGC assumes that the SSDS will operate for approximately 10 years.
- Groundwater monitoring of the full onsite monitoring well network on a quarterly basis to confirm the effectiveness of the remedy for a minimum of two years. The frequency of sampling and number of wells to be sampled may be modified with the approval of NYSDEC.
- Annual inspections and certifications of the engineering controls for approximately 20 years.
- In the event that NYSDEC does establish soil and/or groundwater quality standards, additional soil and/or groundwater sampling/remedial plans for PFAS may be included in a remedial design document and/or the SMP.

This remedy is anticipated to yield a Track 2 cleanup contingent upon soils meeting Restricted SCOs and

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groundwater meeting AWQSs. In the event that groundwater does not meet AWQSs and long-term treatment is required, the remedy will meet Track 4 requirements

2.5.4 Alternative 4 – Soil Excavation in Source Area (Track 1, With Contingent Track 2 or 4)

This alternative would include removal and offsite disposal of impacted soils from the suspected source area, ISCO of onsite groundwater, continued operation of the SSDS, and implementation of a SMP with ECs/ICs and long term monitored natural attenuation of groundwater impact. The details of this alternative include:

- Installation of four additional groundwater monitoring wells.
- Installation of four additional vapor monitoring points at the property boundary to monitor potential off-gassing of VOC impact related to the remedy.
- Pre-remediation collection of soil samples for PFAS from three locations along the western and southern property boundaries. Sample locations will be provided to NYSDEC for review prior to mobilization.
- Removal of the existing dry-cleaning equipment within the dry-cleaning shop to allow access to the suspected source area.
- Removal of the floor slab within the dry-cleaning shop.
- Installation of shoring (or similar excavation support) within the suspected source area (if necessary).
- Removal and offsite disposal of soils impacted with PCE above Unrestricted Use SCOs from within the suspected source area (see **Figure 7**).
- Collection of confirmatory endpoint samples from the source area excavation. The number and location of samples will be determined based on the final size of the excavation and the frequencies specified in NYSDEC DER-10 5.4 (b) 5.
- Site restoration (backfill, compaction, repair floor slab, re-install dry-cleaning equipment).
- Pre-remediation collection of groundwater and soil vapor samples from the full onsite monitoring well and soil vapor point networks.
- Implementation of an in-situ chemical oxidation injection program consisting of injection of a chemical oxidant solution (Regensis Persulf-Ox, or similar) throughout the affected area (see **Figure 7**). ISCO injections will be performed through temporary injection points installed throughout the treatment area using a direct-push drill rig (Geoprobe®, or similar). The specific locations and depth intervals for temporary injection points will be determined following the installation of monitoring wells and groundwater sampling described above; data generated during this sampling will be used in conjunction with RI data to determine specific injection point locations.

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- Post-remediation collection of groundwater and soil vapor samples from the full onsite monitoring well and soil vapor point networks.
- Preparation and implementation of a SMP which will include ICs/ECs and long-term monitoring of onsite groundwater for natural attenuation.
- Continued O&M of the existing SSDS until otherwise directed by NYSDEC and/or NYSDOH. For cost estimating purposes, PWGC assumes that the SSDS will operate for approximately 10 years.
- Groundwater monitoring of the full onsite monitoring well network on a quarterly basis to confirm the effectiveness of the remedy for a minimum of two years. The frequency of sampling and number of wells to be sampled may be modified with the approval of NYSDEC.
- Annual inspections and certifications of the engineering controls for approximately 20 years.
- In the event that NYSDEC does establish soil and/or groundwater quality standards, additional soil and/or groundwater sampling/remedial plans for PFAS may be included in a remedial design document and/or the SMP.

This remedy is anticipated to yield a Track 1 cleanup contingent upon soils meeting Unrestricted Use SCOs and groundwater meeting AWQSs. In the event that soil meets Restricted SCOs and groundwater meets AWQSs, the remedy will meet Track 2 requirements. In the event that groundwater does not meet AWQSs and long-term treatment is required, the remedy will meet Track 4 requirements

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3.0 DETAILED ANALYSIS OF ALTERNATIVES

This section details the Alternatives proposed in Section 2 and provides for remedy evaluation in accordance with DER-10 *Technical Guidance for Site Investigation and Remediation* which requires evaluation of each alternative with respect to the following nine criteria:

1. Overall Protection of Public Health and the Environment
2. Compliance with Standards, Criteria and Guidance
3. Short-Term Impacts and Effectiveness
4. Long-Term Effectiveness and Permanence
5. Reduction of Toxicity, Mobility, and Volume
6. Technical Feasibility and Reliability (Implementability)
7. Cost Effectiveness
8. Compatibility with Land Use

A brief description of each criterion is presented at the beginning of each subsection below. A ninth criterion, community acceptance, will be evaluated by the NYSDEC at the conclusion of the public comment period.

3.1 Overall Protectiveness of Public Health and the Environment

Overall protectiveness of public health and the environment assesses how well each alternative protects public health and the environment from exposure by reducing, controlling or eliminating risks. This would include protection for site employees or residents, the surrounding community, general construction and utility workers, and remedial workers during implementation of the alternative.

3.2 Compliance with Remedial Goals

Compliance with Remedial Goals, SCGs, and RAOs assess how effective each alternative is in achieving Remedial Goals, SCGs, and RAOs for the site.

3.3 Short Term Impacts or Effectiveness

Short-term impacts and effectiveness is an evaluation of the potential short-term adverse impacts and exposures to the public health and the environment during the construction and implementation phase of a remedy, with respect to the following factors: protection of the community and site workers, controlling adverse impacts to the public, and the time needed to achieve the remedial action objectives.

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3.4 Long Term Effectiveness and Permanence

Long-term effectiveness and permanence assesses the extent and effectiveness of the remedy and the controls that may be required to manage the risk posed by residual contamination at the site. This includes an evaluation of the magnitude of risk which will remain at the conclusion of remedial activities and the adequacy and reliability of post remedial site controls, if required, to ensure continuing effectiveness.

3.5 Reduction of Toxicity, Mobility, or Volume

Reduction of toxicity, mobility, or volume through treatment evaluates the ability of the treatment technology to reduce the principal threats posed by the release.

3.6 Implementability

Implementability addresses the technical and non-technical feasibility of implementing an alternative, including the availability of necessary personnel and materials required and potential difficulties in obtaining specific operating approvals, access for construction, etc.

3.7 Cost-effectiveness

This criterion is an evaluation of whether the estimated costs for a remedy are proportional to the remedy's overall effectiveness, e.g., short- and long-term effectiveness, permanence, and ability to reduce the toxicity, mobility or volume of site-related contamination. Capital costs are considered the initial costs associated with the design and construction of the system. Direct capital costs include construction, equipment and materials, land acquisition, buildings and services, transport and disposal and analytical services. Indirect capital costs include engineering and design expenses, legal and administrative costs associated with placing institutional controls (ICs) on a property, and start-up and shake-down costs. Post-remedial site control (PRSC) costs are associated with the implementation of the remedy and include site management, operation and maintenance (O&M), monitoring, auxiliary materials and energy usage, and disposal of generated wastes. Total cost is the sum of both the capital and PRSC costs. The net present worth of all remedial action costs over time is provided by discounting all future costs to the current calendar year.

3.8 Compatibility with Land Use

This criterion is an evaluation of the current, intended and reasonably anticipated future use of the site and its surroundings, as it relates to an alternative or remedy, when unrestricted levels would not be achieved.

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3.9 Individual Analysis of Alternatives

The evaluations of the criteria discussed above for each of the remedial alternatives are presented in the following sections and summarized in **Table 1**.

3.9.1 Alternative 1 – No Action

Overall Protectiveness of Public Health and the Environment

Alternative 1 does not satisfy the RAOs or provide protection of public health and the environment because it does not eliminate the potential for exposure of the public, future construction workers and site residents to on-site contaminants.

Compliance with Remedial Goals, SCGs, and RAOs

Alternative 1 does not comply with remedial goals, SCGs and RAOs for the site.

Short-Term Impacts and Effectiveness

The short-term adverse impacts and exposure to the public and the environment during the implementation of Alternative 1 would be minimal. The only plausible exposure pathways are by ingestion or dermal exposure by a worker or visitor at the site.

Long-Term Effectiveness and Permanence

Alternative 1 would not achieve long term effectiveness and permanence. Soil and groundwater with concentrations exceeding SCGs would remain at the site.

Reduction of Toxicity, Mobility or Volume through Treatment

Alternative 1 does not actively reduce toxicity, mobility or volume.

Implementability

Alternative 1 does not present significant technical difficulties.

Cost-Effectiveness

Estimated costs associated with implementation of Alternative 1 are as follows:

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Capital Costs	$36,000
PRSC Costs	$482,400
Total Estimated Costs	$518,400

Estimated capital costs for Alternative 1 include indirect capital costs for the preparation of a SMP for the site, and preparation and filing of an environmental easement for the site (including an updated property survey). Estimated PRSC costs for Alternative 1 include long term groundwater monitoring for five years, SSDS O&M and air sampling for 10 years, and annual SMP certifications for 20 years.

Compatibility with Land Use

The proposed future land use is to remain commercial. Alternative 1 would restrict the use of the property to commercial. The alternative does not comply with the NYSDEC BCP goal for cleanup of contaminated land.

3.9.2 Alternative 2 – In-Situ Bioremediation (Track 2, With Contingent Track 4)

Overall Protectiveness of Public Health and the Environment

Alternative 2 would achieve the RAOs for soil, groundwater, and soil vapor.

Compliance with Remedial Goals, SCGs, and RAOs

Alternative 2 could meet compliance with remedial goals, SCGs and RAOs for the site by meeting Commercial Use SCOs for PCE in soil (PCE concentrations detected in soils at the site during the RI are below Commercial Use SCOs), and Class GA AWQSs for groundwater.

Short-Term Impacts and Effectiveness

The short-term adverse impacts and exposure to the public and the environment during the implementation of Alternative 2 is minimal. Short-term exposure to on-site workers during remedial work will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during intrusive activities.

Long-Term Effectiveness and Permanence

Alternative 2 achieves long term effectiveness and permanence by covering residual impacted soils with

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impervious surfaces, reducing groundwater impact below Class GA AWQS, and mitigating vapor intrusion within the building through continued operation of the existing SSDS.

Reduction of Toxicity, Mobility or Volume through Treatment

Alternative 2 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by meeting a Commercial Use SCOs for PCE and requiring that residually impacted soils be permanently covered. Treatment of groundwater will reduce the toxicity, mobility, and volume of contaminants in on-site groundwater. With the implementation of the ICs/ECs at the site, potential exposure to PCE in soil vapor is limited by the existing SSDS.

Implementability

Alternative 2 can be implemented using readily available and proven technologies. Both the technical and non-technical aspects of implementing this alternative are feasible. Access to the interior of the dry-cleaning shop for the purposes of bioremediation injections would be limited by the small size of the space and presence of dry-cleaning equipment (dry-cleaning machine, pressing machine, clothing racks).

Cost-Effectiveness

Estimated costs associated with implementation of Alternative 2 are as follows:

Capital Costs	$265,728
PRSC Costs	$394,752
Total Estimated Costs	$660,480

Estimated capital costs for Alternative 2 include direct capital costs for installation and sampling of additional monitoring wells and vapor monitoring points, implementation of a bioremediation injection program, and post injection sampling; indirect capital costs would include the preparation of a Final Engineering Report (FER) and SMP for the site, and preparation and filing of an environmental easement for the site (including an updated property survey). Estimated PRSC costs for Alternative 2 include long term groundwater monitoring for two years, SSDS O&M and air sampling for 10 years, and annual SMP certifications for 20 years.

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Compatibility with Land Use

The proposed future land use is to remain commercial. Alternative 2 would restrict the use of the property to commercial. The alternative is consistent with the NYSDEC BCP goal for cleanup of contaminated land and brings the property into productive use. The alternative is protective of natural resources and cultural resources.

3.9.3 Alternative 3 – In-Situ Chemical Oxidation (Track 2, With Contingent Track 4)

Overall Protectiveness of Public Health and the Environment

Alternative 3 would achieve the RAOs for soil, groundwater, and soil vapor.

Compliance with Remedial Goals, SCGs, and RAOs

Alternative 2 could meet compliance with remedial goals, SCGs and RAOs for the site by meeting a Commercial Use SCOs for PCE in soil (PCE concentrations detected in soils at the site during the RI are below Commercial Use SCOs), and Class GA AWQSs for groundwater.

Short-Term Impacts and Effectiveness

The short-term adverse impacts and exposure to the public and the environment during the implementation of Alternative 3 is minimal. Short-term exposure to on-site workers during remedial work will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during intrusive activities.

Long-Term Effectiveness and Permanence

Alternative 3 achieves long term effectiveness and permanence by covering residual impacted soils with impervious surfaces, reducing groundwater impact below Class GA AWQS, and mitigating vapor intrusion within the building through continued operation of the existing SSDS.

Reduction of Toxicity, Mobility or Volume through Treatment

Alternative 3 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by meeting Commercial Use SCOs for PCE and requiring that residually impacted soils be permanently covered. Treatment of groundwater will reduce the toxicity, mobility, and volume of contaminants in on-site

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groundwater. With the implementation of the ICs/ECs at the site, potential exposure to PCE in soil vapor is limited by the existing SSDS.

Implementability

Alternative 3 can be implemented using readily available and proven technologies. Both the technical and non-technical aspects of implementing this alternative are feasible. Access to the interior of the dry-cleaning shop for the purposes of bioremediation injections would be limited by the small size of the space and presence of dry-cleaning equipment (dry-cleaning machine, pressing machine, clothing racks).

Cost-Effectiveness

Estimated costs associated with implementation of Alternative 3 are as follows:

Capital Costs	$268,128
PRSC Costs	$394,752
Total Estimated Costs	$662,880

Estimated capital costs for Alternative 3 include direct capital costs for installation and sampling of additional monitoring wells and vapor monitoring points, implementation of a chemical oxidant injection program, and post injection sampling; indirect capital costs would include the preparation of a FER and SMP for the site, and preparation and filing of an environmental easement for the site (including an updated property survey). Estimated PRSC costs for Alternative 2 include long term groundwater monitoring for two years, SSDS O&M and air sampling for 10 years, and annual SMP certifications for 20 years.

Compatibility with Land Use

The proposed future land use is to remain commercial. Alternative 3 would restrict the use of the property to commercial. The alternative is consistent with the NYSDEC BCP goal for cleanup of contaminated land and brings the property into productive use. The alternative is protective of natural resources and cultural resources.

3.9.4 Alternative 4 – Soil Excavation in Source Area (Track 1, With Contingent Track 2 or 4)

Overall Protectiveness of Public Health and the Environment

Alternative 4 would achieve the RAOs for soil, groundwater, and soil vapor.

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Compliance with Remedial Goals, SCGs, and RAOs

Alternative 4 could meet compliance with remedial goals, SCGs and RAOs for the site by meeting Unrestricted Use SCOs for PCE in soil, and Class GA AWQSs for groundwater.

Short-Term Impacts and Effectiveness

The short-term adverse impacts and exposure to the public and the environment during the implementation of Alternative 4 is minimal. Short-term exposure to on-site workers during remedial work will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during intrusive activities.

Long-Term Effectiveness and Permanence

Alternative 4 achieves long term effectiveness and permanence by remediating PCE impacted soils to Unrestricted Use SCOs, reducing groundwater impact below Class GA AWQS, and mitigating vapor intrusion within the building through continued operation of the existing SSDS (if necessary).

Reduction of Toxicity, Mobility or Volume through Treatment

Alternative 4 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by meeting Commercial Use SCOs for PCE and requiring that residually impacted soils be permanently capped. Treatment of groundwater will reduce the toxicity, mobility, and volume of contaminants in on-site groundwater. With the implementation of the ICs/ECs at the site, potential exposure to PCE in soil vapor is limited by the existing SSDS.

Implementability

Alternative 4 can be implemented using readily available and proven technologies. Both the technical and non-technical aspects of implementing this alternative are feasible. Access to the interior of the dry-cleaning shop for the purposes of excavation and ISCO injections would be limited by the small size of the space and presence of dry-cleaning equipment (dry-cleaning machine, pressing machine, clothing racks), and lack of a doorway large enough to allow heavy equipment inside the building (i.e., all demo and excavation work would have to be done with hand tools). Due to the proximity of the suspected source area to at least one load bearing wall (exterior

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building wall), shoring or other excavation support would be required, and the lateral extent of the excavation would be limited by interior walls and dry-cleaning equipment. Additionally, as the tenant space is currently occupied by an active dry-cleaner, the dry-cleaning machine and ancillary equipment would likely have to be removed and stored offsite to avoid damage during excavation activities and the dry-cleaning business would have to be shut down for a significant period of time during excavation and site restoration work within the building.

Cost-Effectiveness

Estimated costs associated with implementation of Alternative 4 are as follows:

Capital Costs	$415,950
PRSC Costs	$394,752
Total Estimated Costs	$858,702

Estimated capital costs for Alternative 4 include direct capital costs for installation and sampling of additional monitoring wells and vapor monitoring points, removal and storage of dry-cleaning equipment and ancillary costs, support of excavation, excavation and disposal of impacted soils, confirmatory endpoint soil sampling, site restoration, implementation of a chemical oxidant injection program, and post injection sampling; indirect capital costs would include the preparation of a FER and SMP for the site, and preparation and filing of an environmental easement for the site (including an updated property survey). Estimated PRSC costs for Alternative 4 include long term groundwater monitoring for two years, SSDS O&M and air sampling for 10 years, and annual SMP certifications for 20 years.

Compatibility with Land Use

The proposed future land use is to remain commercial. Alternative 4 would restrict the use of the property to commercial. The alternative is consistent with the NYSDEC BCP goal for cleanup of contaminated land and brings the property into productive use. The alternative is protective of natural resources and cultural resources.

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4.0 COMPARATIVE ANALYSIS

In this section, the alternatives undergo a comparative analysis to identify the advantages and disadvantages of each alternative in relation to one another and the evaluation criteria. Alternatives which do not achieve protectiveness of public health and the environment, and compliance with remedial goals, SCGs and RAOs are not considered. As such, Alternative 1 is not included in the comparative analysis.

4.1 Overall Protectiveness of Public Health and the Environment

Each alternative would achieve RAOs for soil and groundwater at the site. Each alternative will require ICs/ECs to be implemented to provide overall Protectiveness of Public Health and the Environment during remedial implementation. Remedial contractors and the surrounding neighborhood could be exposed to impacted soil, dust, and groundwater during the implementation of each alternative, but the potential risks can be minimized by following a site-specific HASP and CAMP. Potential post remediation exposures to on-site occupants from soil vapor will be controlled by the existing SSDS. Groundwater use will be restricted until groundwater quality achieves RAOs

4.2 Compliance with Remedial Goals, SCGs, and RAOs

Each alternative could meet compliance with remedial goals, SCGs, and RAOs.

4.3 Short-Term Impacts and Effectiveness

Short-term adverse impacts and exposure to the public and the environment during the implementation of each alternative are minimal and can be addressed with the site-specific HASP and CAMP. Alternative 4 would be the most disruptive and would likely require the most time to implement and require the most ECs during remediation but would achieve more stringent cleanup standards in the identified source area.

4.4 Long-Term Effectiveness and Permanence

Each alternative would achieve long-term effectiveness and permanence by permanently removing or covering soils and implementing in situ treatment of impacted groundwater to meet RAOs. However, subsurface soils exceeding Unrestricted Use SCOs would remain under Alternatives 2 and 3.

4.5 Reduction of Toxicity, Mobility or Volume through Treatment

Alternative 4 will reduce the mobility and volume of contaminants in the soils at the site. Alternatives 2 and 3 will reduce the mobility of contaminants in the soils at the site by including an impervious site cover as a permanent EC.

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4.6 Implementability

Each alternative can be implemented with readily available equipment and technologies. Alternatives 2 and 3 would be easiest logistically to implement. Due to access issues and excavation limitations, Alternative 4, while theoretically plausible, would be difficult to implement and would take significantly longer to complete.

4.7 Cost-Effectiveness

Based upon a comparison of the estimated total costs for the three alternatives, (Alternative 2 @ $660,480, Alternative 3 @ $662,880 and Alternative 4 @ $858,702), Alternative 2 is the most cost-effective alternative. Alternative 3 is the second most cost-effective alternative. However, subsurface soil impact above Unrestricted Use SCOs will remain and ICs and an Environmental Easement will be required for Alternatives 2 and 3. Alternative 4 is the costliest alternative and may also require ICs and/or an Environmental Easement.

4.8 Compatibility with Land Use

The proposed future land use is to remain commercial. Each alternative is compatible with the proposed land use.

4.9 Alternative Ratings

Table 1 summarizes the comparative evaluation of the remedial alternatives, which includes ratings for each of the criteria mandated by 6 NYCRR Part 375. The comparison of the alternatives is based upon a qualitative system that utilizes relative ratings of high, medium, and low to define each alternative's performance with respect to 6 NYCRR Part 375 criteria and the proposed future land use. These ratings are equated to a numerical scale to produce a numerical score.

RATING	DESCRIPTION	NUMERICAL RATING
HIGH	SATISFIES CRITERIA TO A HIGH DEGREE	3
MEDIUM	SATISFIES CRITERIA TO A MODERATE DEGREE	2
LOW	MINIMALLY SATISFIES CRITERIA	1

As reflected by **Table 1**, Alternative 4 is somewhat more effective than Alternatives 2 and 3, however each of the three alternatives are rated moderately effective. Alternative 4 is the costliest of the evaluated alternatives. Alternatives 2 and 3 are both more cost effective than Alternative 4. Each of these alternatives would result in a site that is suitable for the proposed future use.

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5.0 APPLICANT PREFERRED ALTERNATIVE

Based upon the findings of the RI, the location and depth of the contaminants, and the future use of the site, the applicant prefers Alternative 2 as the proposed remedy.

Alternative 2 is protective of the public health and environment, compliant with Remedial Goals, SCGs and RAOs for the site to site specific standards, has proven technology to ensure long-term effectiveness and permanence, reduces the toxicity, mobility and volume of the contamination, has minimal short-term impacts, is readily implementable, and is cost effective compared to the other alternatives. Based upon the strengths of the alternative, the protection of public health based upon the proposed future use and environment aspects, and the minimal visual impact created by the alternative, community acceptance of this alternative should be strong. As detailed in the sections above, this alternative would achieve RAOs by implementing the following tasks:

- Installation of four additional groundwater monitoring wells.
- Installation of four additional vapor monitoring points at the property boundary to monitor potential off-gassing of VOC impact related to the remedy.
- Pre-remediation collection of groundwater and soil vapor samples from the onsite monitoring well and soil vapor point networks.
- Pre-remediation collection of soil samples for PFAS from three locations along the western and southern property boundaries. Sample locations will be provided to NYSDEC for review prior to mobilization.
- Implementation of an in-situ bioremediation injection program consisting of injection of a bio remediation solution (combination of Regenesis 3-D Microemulsion, S-MicroZVI and BDI Plus, or similar) throughout the affected area.
- Post-remediation collection of groundwater and soil vapor samples from the full onsite monitoring well and soil vapor point networks.
- Preparation and implementation of a SMP which will include ICs/ECs consisting of an environmental easement limiting the site usage to commercial or lower and a composite cover system to limit exposure to residual subsurface impact (soils exceeding Unrestricted Use SCOs), and long-term monitoring of onsite groundwater for natural attenuation.
- Continued O&M of the existing SSDS for approximately 10 years.
- Groundwater monitoring to confirm the effectiveness of the remedy for approximately two years.
- Annual inspections and certifications of the engineering controls for approximately 20 years.

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The specific design and specifications of the remedial alternative will be more fully detailed in the Remedial Action Work Plan for the site.

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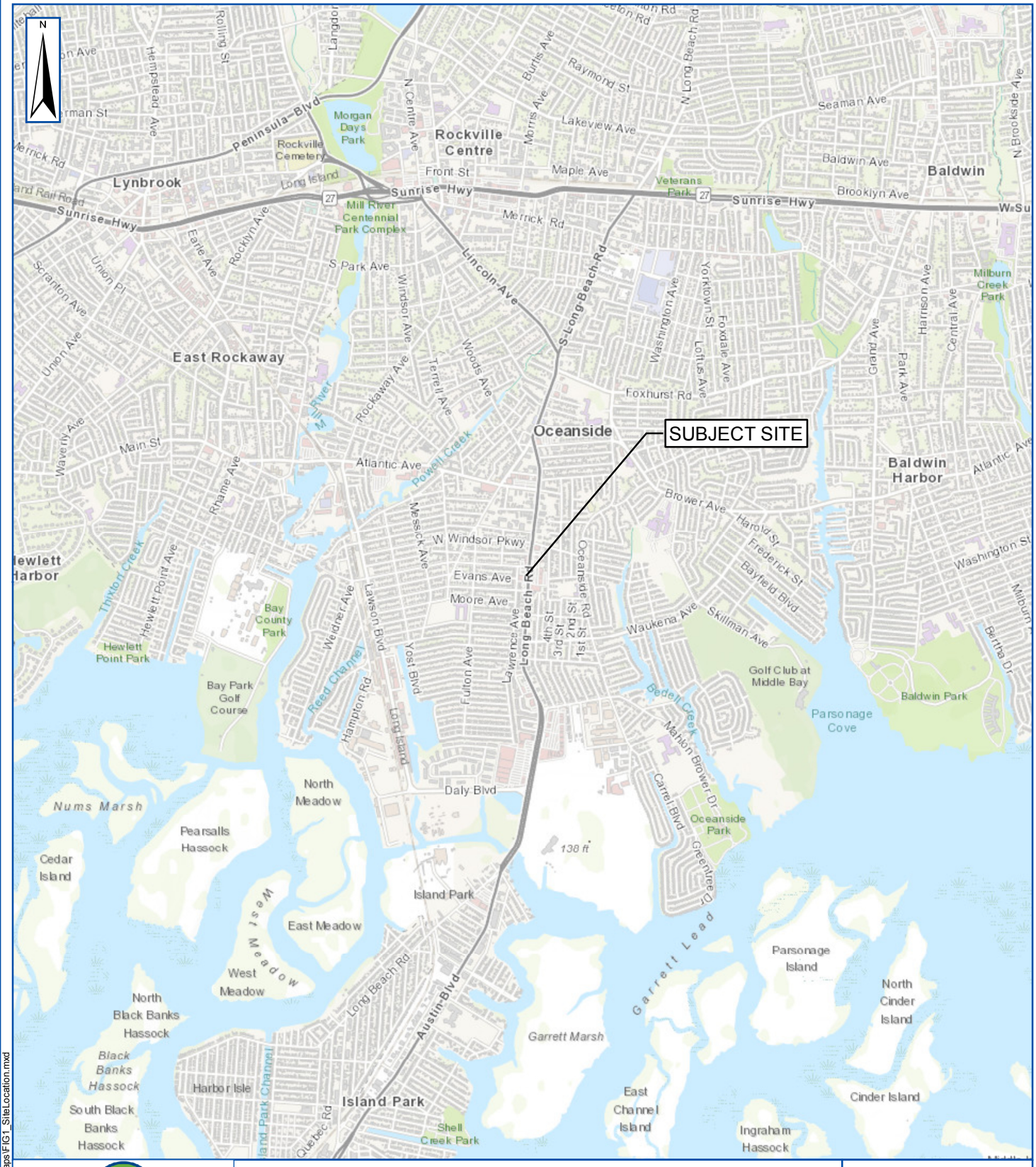
FIGURES



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Miles
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Project:	UPC1905
Date:	8/27/2019
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Drawn by:	PH
Approved by:	TM
Figure No:	1

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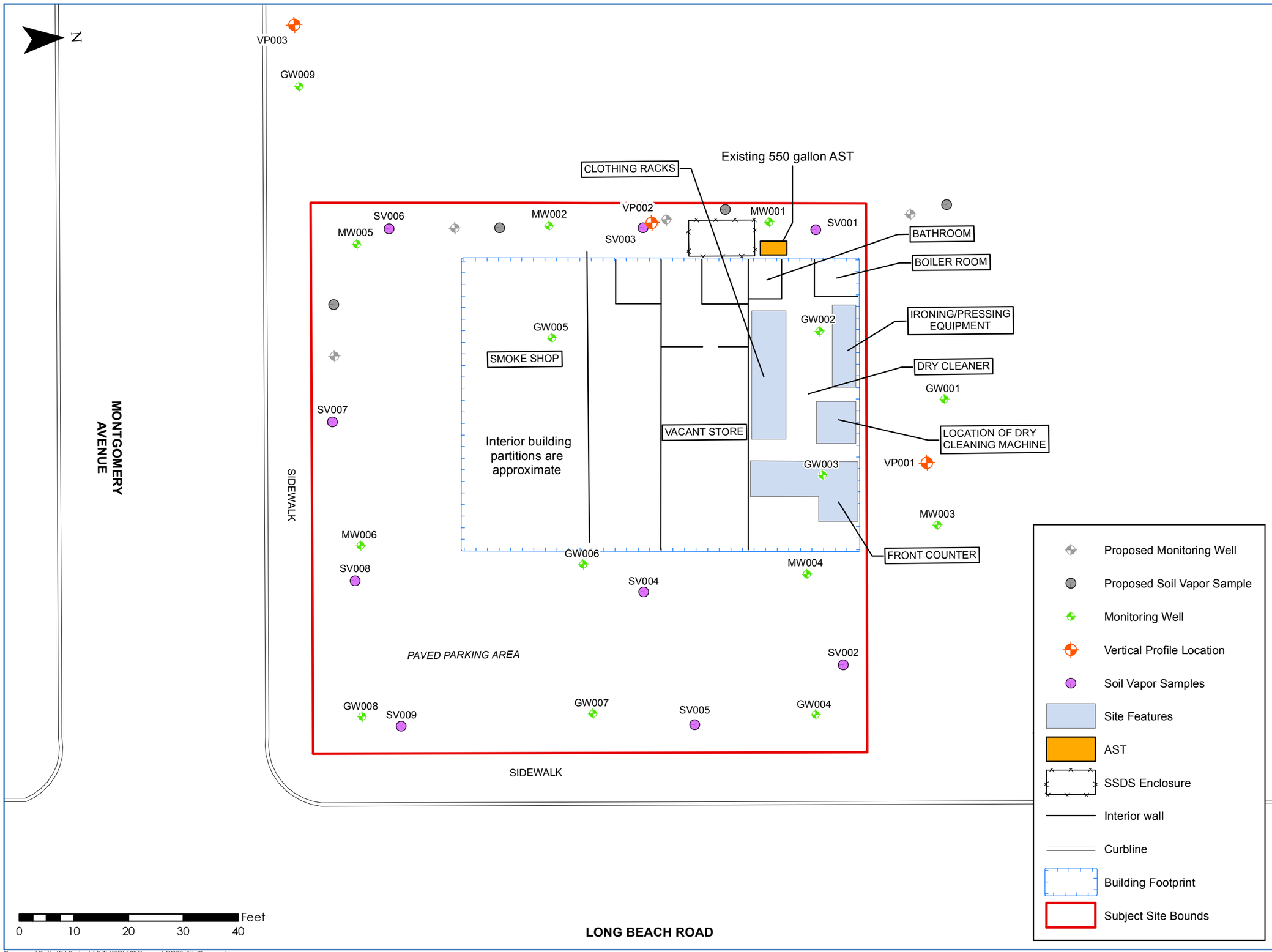

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SITE PLAN

3220-3224 LONG BEACH ROAD
OCEANSIDE, NY

FIGURE NO:

2

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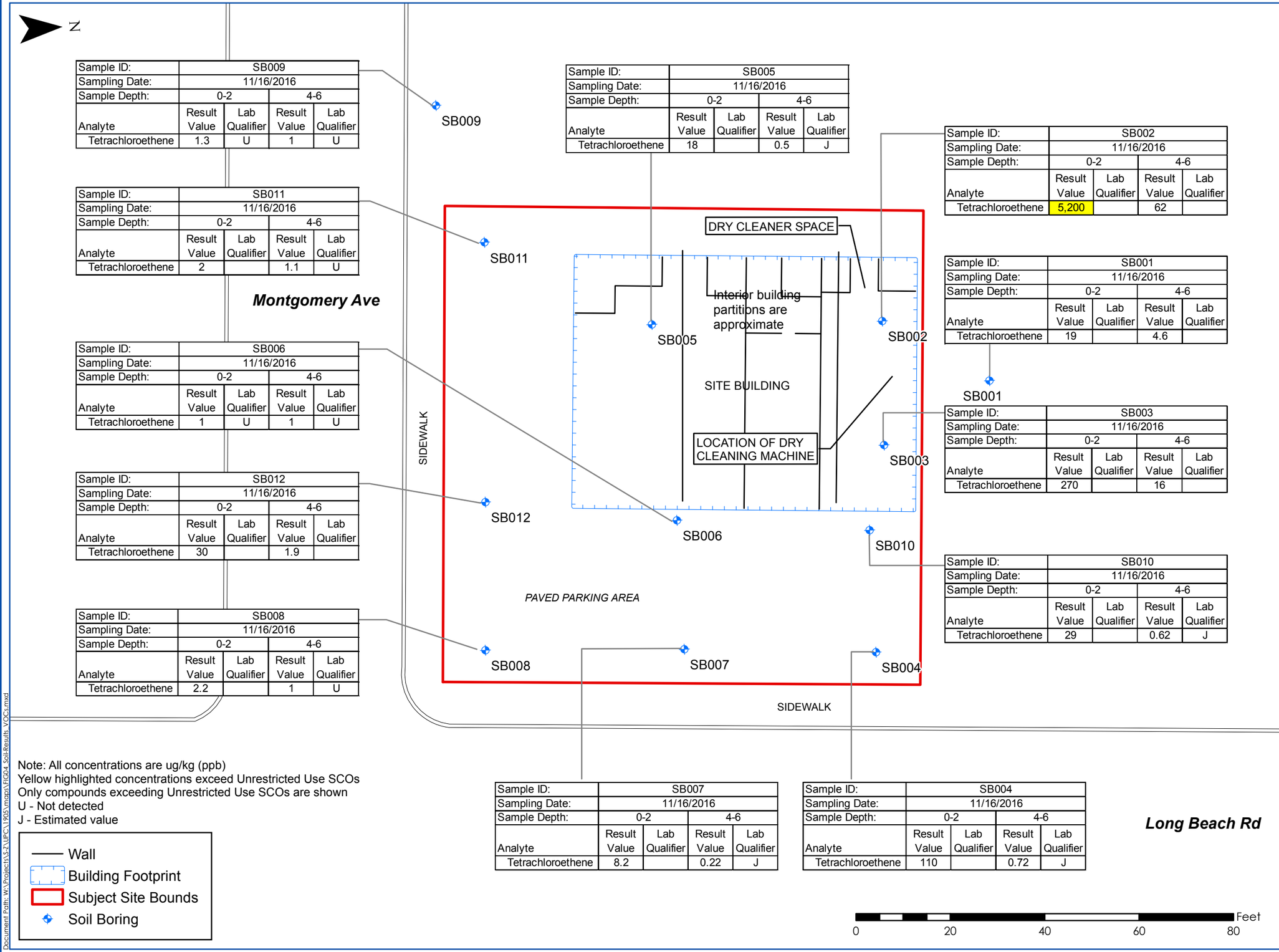

Sample ID:	SB009			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	1.3	U	1	U

Sample ID:	SB011			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	2		1.1	U

Sample ID:	SB006			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	1	U	1	U

Sample ID:	SB012			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	30		1.9	

Sample ID:	SB008			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	2.2		1	U

Sample ID:	SB005			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	18		0.5	J

Sample ID:	SB002			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	5,200		62	

Sample ID:	SB001			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	19		4.6	

Sample ID:	SB003			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	270		16	

Sample ID:	SB010			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	29		0.62	J

Sample ID:	SB007			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	8.2		0.22	J

Sample ID:	SB004			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	110		0.72	J

Note: All concentrations are ug/kg (ppb)
Yellow highlighted concentrations exceed Unrestricted Use SCOs
Only compounds exceeding Unrestricted Use SCOs are shown
U - Not detected
J - Estimated value

Wall
Building Footprint
Subject Site Bounds
Soil Boring

0 20 40 60 80 Feet

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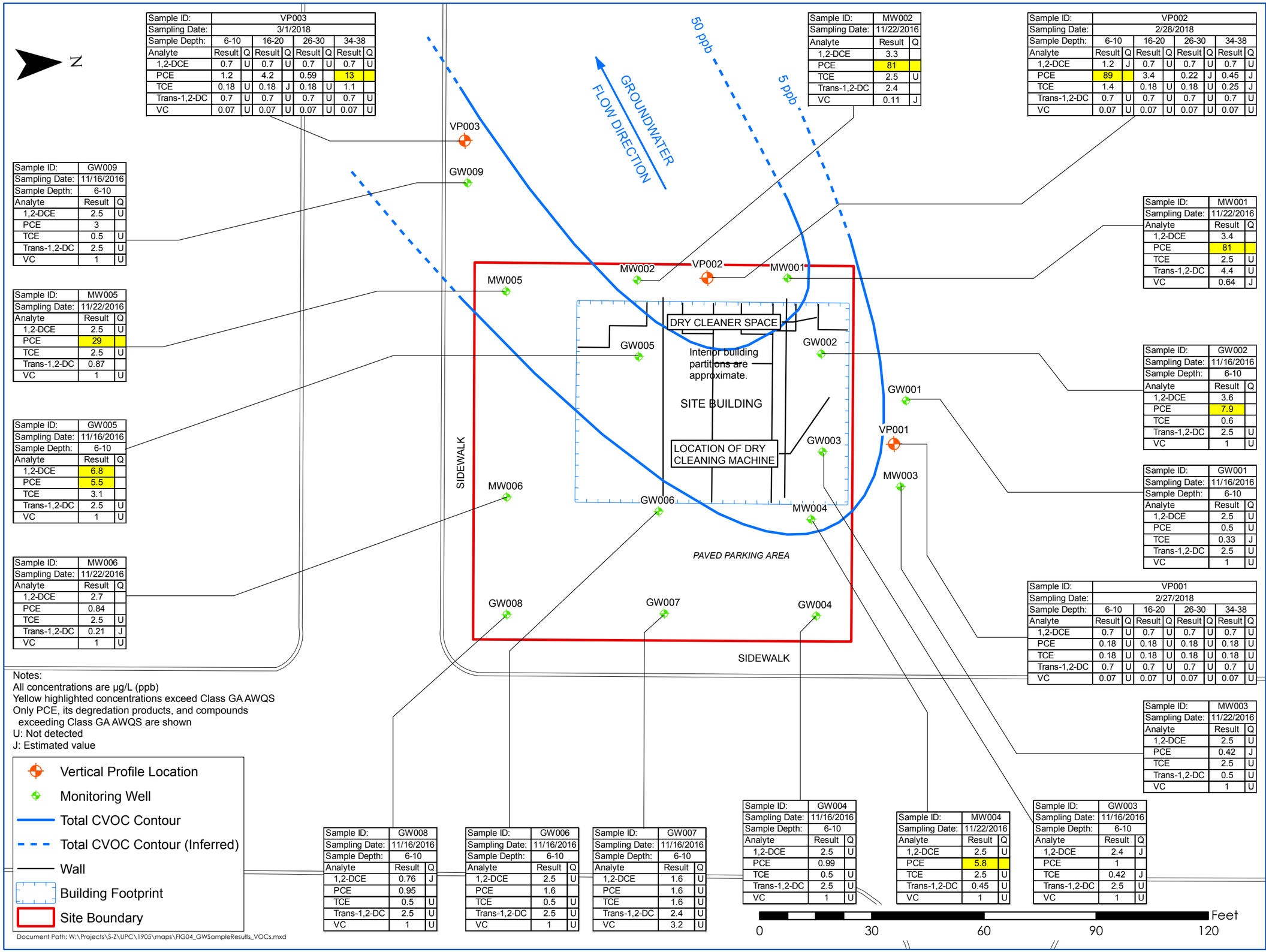
VOC CONCENTRATIONS IN SOIL

3220-3224 LONG BEACH ROAD
OCEANSIDE, NY

FIGURE NO:

3



Sample ID:	VP003							
Sampling Date:	3/1/2018							
Sample Depth:	6-10		16-20		26-30		34-38	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q
1,2-DCE	0.7	U	0.7	U	0.7	U	0.7	U
PCE	1.2		4.2		0.59		13	
TCE	0.18	U	0.18	J	0.18	U	1.1	
Trans-1,2-DC	0.7	U	0.7	U	0.7	U	0.7	U
VC	0.07	U	0.07	U	0.07	U	0.07	U

Sample ID:	MW002	
Sampling Date:	11/22/2016	
Analyte	Result	Q
1,2-DCE	3.3	
PCE	81	
TCE	2.5	U
Trans-1,2-DC	2.4	
VC	0.11	J

Sample ID:	VP002							
Sampling Date:	2/28/2018							
Sample Depth:	6-10		16-20		26-30		34-38	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q
1,2-DCE	1.2	J	0.7	U	0.7	U	0.7	U
PCE	89		3.4		0.22	J	0.45	J
TCE	1.4		0.18	U	0.18	U	0.25	J
Trans-1,2-DC	0.7	U	0.7	U	0.7	U	0.7	U
VC	0.07	U	0.07	U	0.07	U	0.07	U

Sample ID:	GW009	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	2.5	U
PCE	3	
TCE	0.5	U
Trans-1,2-DC	2.5	U
VC	1	U

Sample ID:	MW001	
Sampling Date:	11/22/2016	
Analyte	Result	Q
1,2-DCE	3.4	
PCE	81	
TCE	2.5	U
Trans-1,2-DC	4.4	U
VC	0.64	J

Sample ID:	MW005	
Sampling Date:	11/22/2016	
Analyte	Result	Q
1,2-DCE	2.5	U
PCE	29	
TCE	2.5	U
Trans-1,2-DC	0.87	
VC	1	U

Sample ID:	GW002	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	3.6	
PCE	7.9	
TCE	0.6	
Trans-1,2-DC	2.5	U
VC	1	U

Sample ID:	GW005	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	6.8	
PCE	5.5	
TCE	3.1	
Trans-1,2-DC	2.5	U
VC	1	U

Sample ID:	GW001	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	2.5	U
PCE	0.5	U
TCE	0.33	J
Trans-1,2-DC	2.5	U
VC	1	U

Sample ID:	MW006	
Sampling Date:	11/22/2016	
Analyte	Result	Q
1,2-DCE	2.7	
PCE	0.84	
TCE	2.5	U
Trans-1,2-DC	0.21	J
VC	1	U

Sample ID:	VP001							
Sampling Date:	2/27/2018							
Sample Depth:	6-10		16-20		26-30		34-38	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q
1,2-DCE	0.7	U	0.7	U	0.7	U	0.7	U
PCE	0.18	U	0.18	U	0.18	U	0.18	U
TCE	0.18	U	0.18	U	0.18	U	0.18	U
Trans-1,2-DC	0.7	U	0.7	U	0.7	U	0.7	U
VC	0.07	U	0.07	U	0.07	U	0.07	U

Sample ID:	MW003	
Sampling Date:	11/22/2016	
Analyte	Result	Q
1,2-DCE	2.5	U
PCE	0.42	J
TCE	2.5	U
Trans-1,2-DC	0.5	U
VC	1	U

Notes:
All concentrations are µg/L (ppb)
Yellow highlighted concentrations exceed Class GA AWQS
Only PCE, its degredation products, and compounds exceeding Class GA AWQS are shown
U: Not detected
J: Estimated value

Sample ID:	GW008	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	0.76	J
PCE	0.95	
TCE	0.5	U
Trans-1,2-DC	2.5	U
VC	1	U

Sample ID:	GW006	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	2.5	U
PCE	1.6	
TCE	0.5	U
Trans-1,2-DC	2.5	U
VC	1	U

Sample ID:	GW007	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	1.6	U
PCE	1.6	U
TCE	1.6	U
Trans-1,2-DC	2.4	U
VC	3.2	U

Sample ID:	GW004	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	2.5	U
PCE	0.99	
TCE	0.5	U
Trans-1,2-DC	2.5	U
VC	1	U

Sample ID:	MW004	
Sampling Date:	11/22/2016	
Analyte	Result	Q
1,2-DCE	2.5	U
PCE	5.8	
TCE	2.5	U
Trans-1,2-DC	0.45	U
VC	1	U

Sample ID:	GW003	
Sampling Date:	11/16/2016	
Sample Depth:	6-10	
Analyte	Result	Q
1,2-DCE	2.4	J
PCE	1	
TCE	0.42	J
Trans-1,2-DC	2.5	U
VC	1	U

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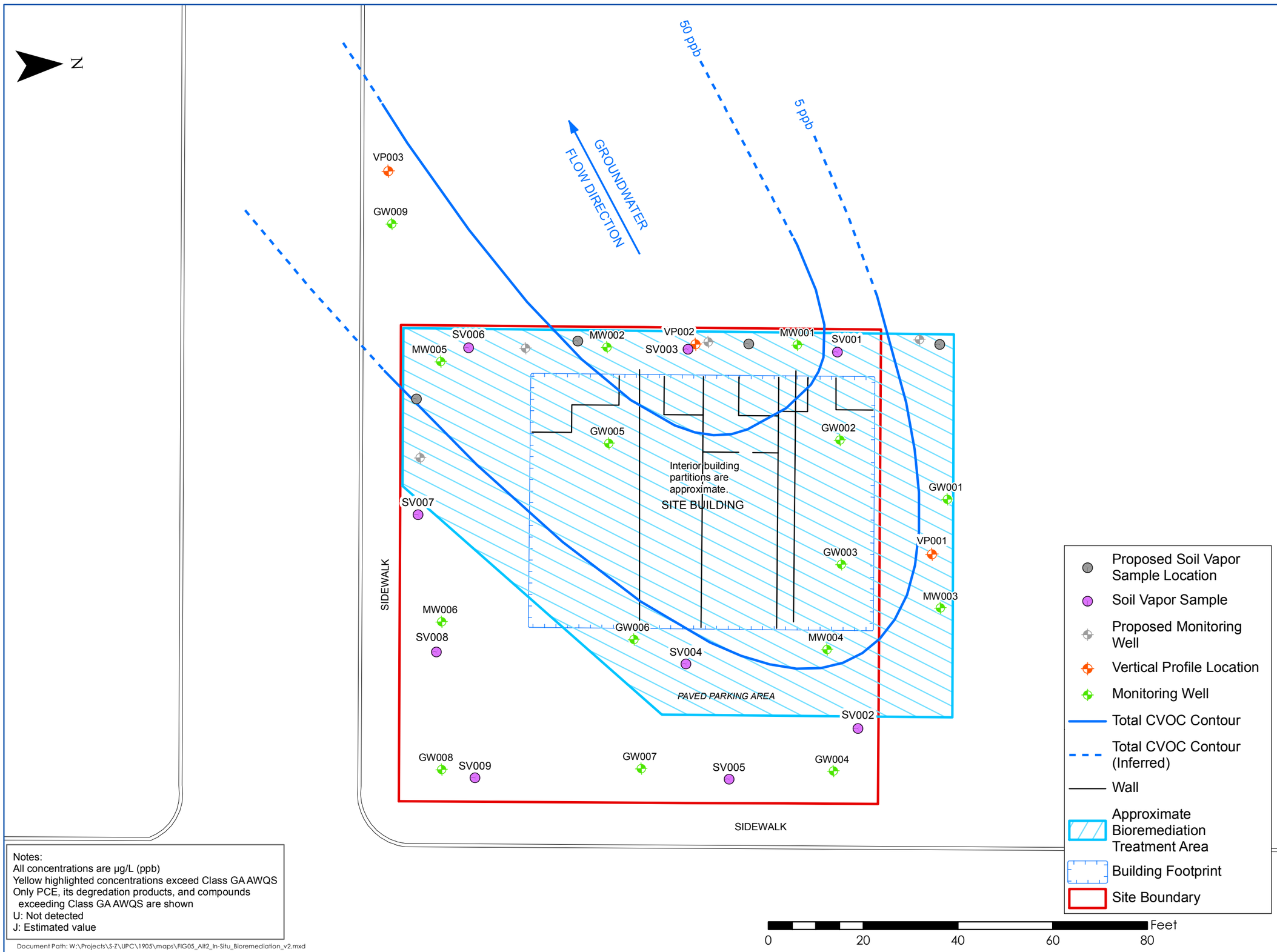
Scale:	AS SHOWN	Approved by:	TM

Groundwater Sample Results Volatile Organic Compounds

3220-3224 LONG BEACH ROAD
OCEANSIDE, NY

FIGURE NO:

4



Notes:
All concentrations are µg/L (ppb)
Yellow highlighted concentrations exceed Class GA AWQS
Only PCE, its degredation products, and compounds exceeding Class GA AWQS are shown
U: Not detected
J: Estimated value

Document Path: W:\Projects\S-Z\UPC\1905\maps\FIG05_Alt2_In-Situ_Bioremediation_v2.mxd

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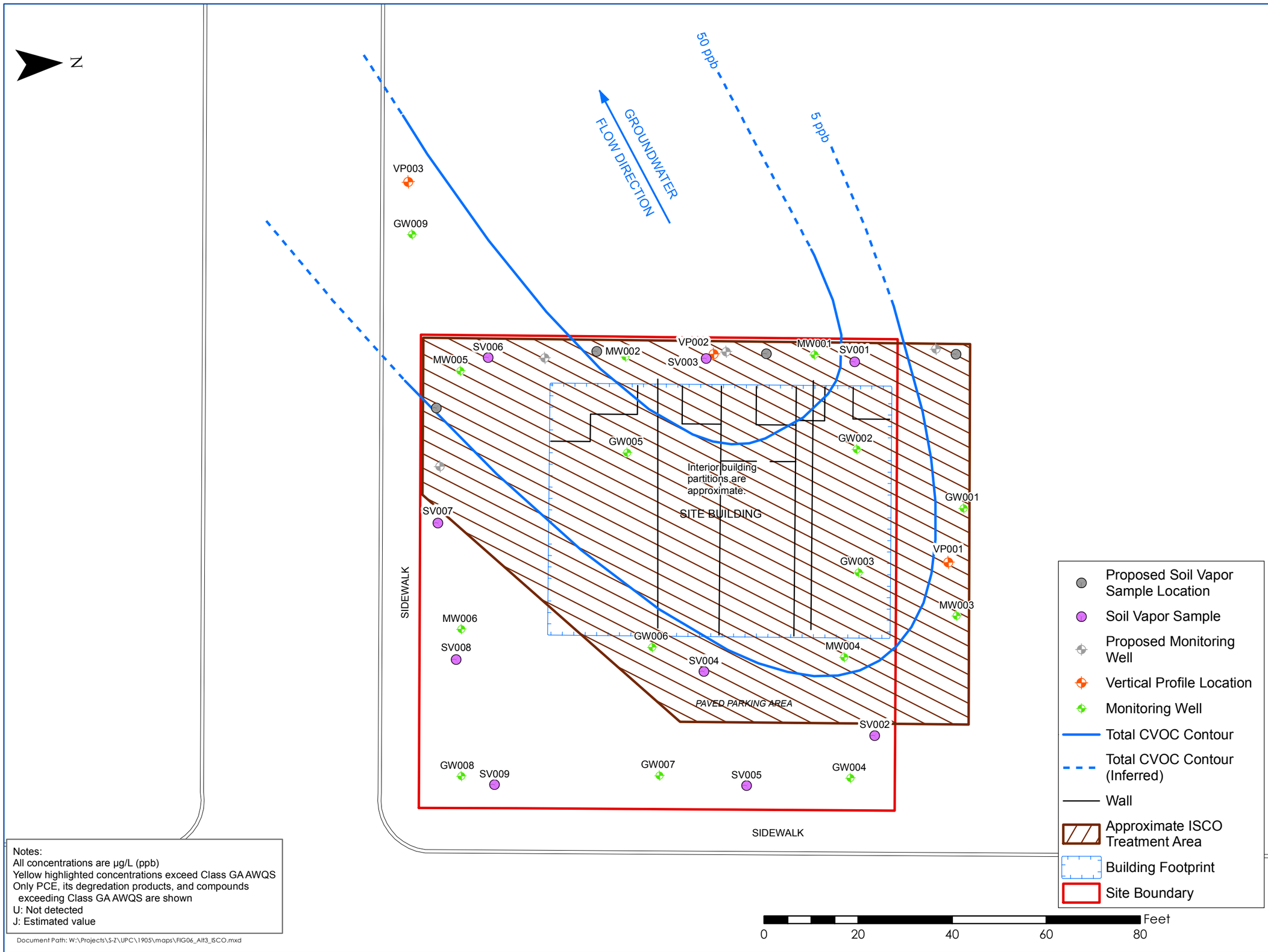
Date:	5/13/2020	Drawn by:	PH
Scale:	AS SHOWN	Approved by:	TM

Proposed Remedial Plan Alternative 2 In-Situ Bioremediation

3206-3224 LONG BEACH ROAD
OCEANSIDE, NY

FIGURE NO:

5



Notes:
All concentrations are µg/L (ppb)
Yellow highlighted concentrations exceed Class GA AWQS
Only PCE, its degredation products, and compounds exceeding Class GA AWQS are shown
U: Not detected
J: Estimated value

Document Path: W:\Projects\S-Z\UPC\1905\maps\FIG06_Alt3_ISCO.mxd

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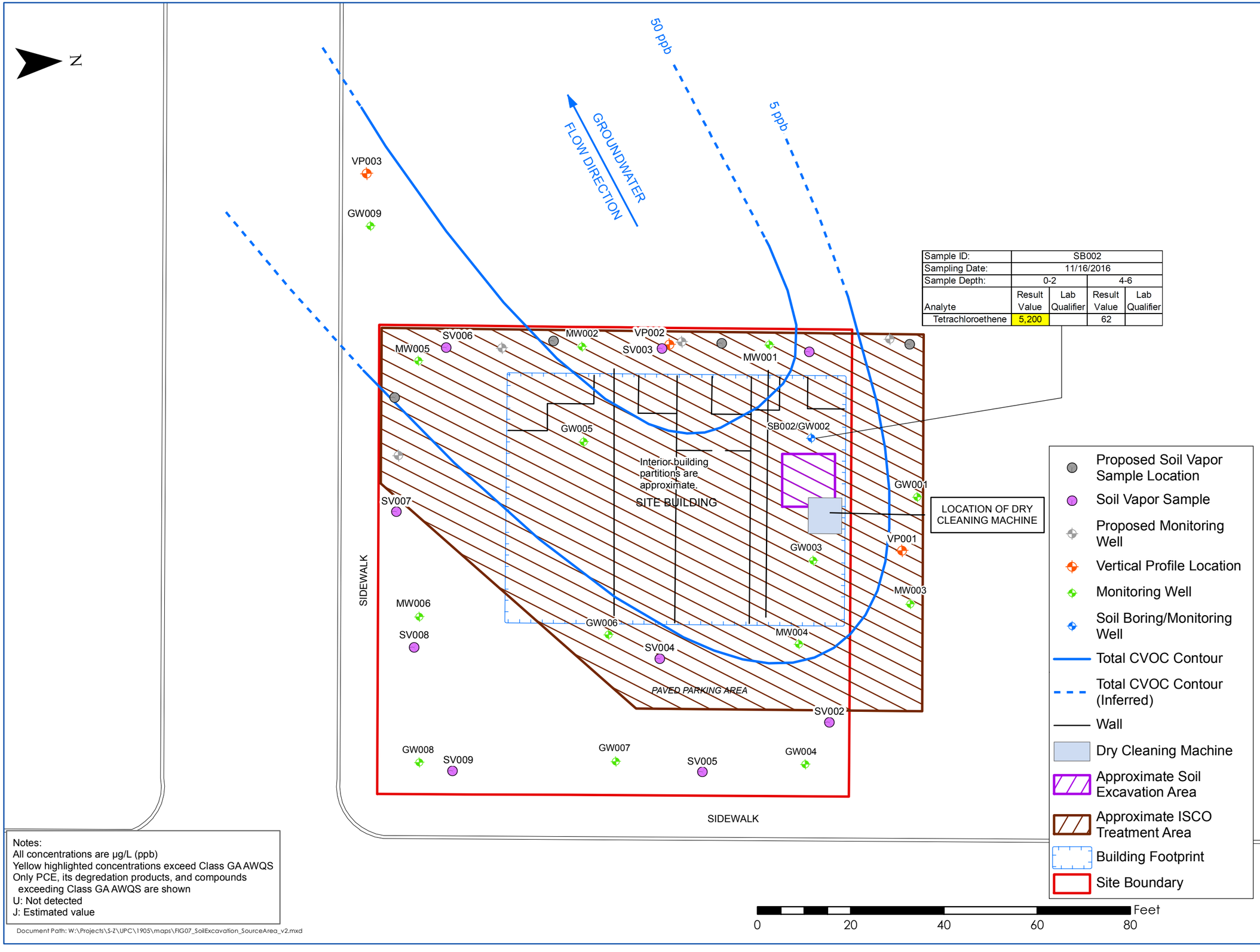
Date:	5/13/2020	Drawn by:	PH
Scale:	AS SHOWN	Approved by:	TM

Proposed Remedial Plan Alternative 3 In-Situ Chemical Oxidation

3206-3224 LONG BEACH ROAD
OCEANSIDE, NY

FIGURE NO:

6



Sample ID:	SB002			
Sampling Date:	11/16/2016			
Sample Depth:	0-2		4-6	
Analyte	Result Value	Lab Qualifier	Result Value	Lab Qualifier
Tetrachloroethene	5,200		62	

Notes:
All concentrations are µg/L (ppb)
Yellow highlighted concentrations exceed Class GA AWQS
Only PCE, its degredation products, and compounds exceeding Class GA AWQS are shown
U: Not detected
J: Estimated value

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Scale:	AS SHOWN	Approved by:	TM

Proposed Remedial Plan Alternative 4 Soil Excavation in Source Area

3206-3224 LONG BEACH ROAD
OCEANSIDE, NY

FIGURE NO:

7

TABLES

Table 1

Alternative Analysis Table
Jay's Lucky Cleaners, Oceanside, New York
NYSDEC BCP ID C130219

	EFFECTIVENESS					RELIABILITY/IMPLEMENTABILITY	Land Use	Rating	COST
ALTERNATIVE	**Overall Protection of Public Health and the Environment**	**Compliance with Standards, Criteria & Guidance (SCG)**	**Long Term Effectiveness and Permanence**	**Reduction of Toxicity, Mobility, or Volume Through Treatment**	**Short Term Effectiveness**	**Technical Feasibility and Reliability**	**Compatibility with Land Use**	**Average**	**Present Worth**
Rating Alternative 1: No Further Action	1 Does not provide protection	1 Does not comply	1 Not effective	1 Does not actively reduce toxicity, mobility or volume.	1 Minimal human exposure risk identified	1 Will require Environmental Easement, SMP, and long term groundwater monitoring and SSDS O&M	1 Restricts the use of land.	**1.0**	$ 518,400
Rating Alternative 2: In-Situ Bioremediation (Track 4)	2 Provides protection	2 Complies with Commercial SCOs and Class GA AWQS	2 Effective due to removal of contaminants and capping of residual impact	2 Will reduce toxicity, mobility and volume of soil and groundwater impact.	2 Reduces human exposure risk	2 Will require Environmental Easement, SMP, and long term groundwater monitoring and SSDS O&M	2 Compatible with proposed land use. However, a ICs and an ECs will be required.	**2.0**	$ 660,480
Rating Alternative 3: In-Situ Chemical Oxidation (Track 4)	2 Provides protection	2 Complies with Commercial SCOs and Class GA AWQS	2 Effective due to removal of contaminants and capping of residual impact	2 Will reduce toxicity, mobility and volume of soil and groundwater impact.	2 Reduces human exposure risk	2 Will require Environmental Easement, SMP, and long term groundwater monitoring and SSDS O&M	2 Compatible with proposed land use. However, a ICs and an ECs will be required.	**2.0**	$ 662,880
Rating Alternative 4: Soil Excavation in Source Area (Track 2)	2 Provides protection	3 Complies with Unrestricted Use SCOs and Class GA AWQS	3 Effective due to removal of contaminants.	3 Will reduce toxicity, mobility and volume of soil and groundwater impact.	2 Reduces human exposure risk	2 Will require Environmental Easement, SMP, and long term groundwater monitoring and SSDS O&M	2 Compatible with proposed land use. However, a ICs and an ECs will be required.	**2.4**	$ 858,702

Note:

Rating	Description	Numerical Rating
High	Satisfies Criteria to a high degree	3
Medium	Satisfies Criteria to a moderate degree	2
Low	Minimally satisfies criteria	1

APPENDIX B

HEALTH AND SAFETY PLAN

JAY'S LUCKY CLEANERS
3220-3224 LONG BEACH ROAD
OCEANSIDE, NEW YORK

HEALTH AND SAFETY PLAN

SUBMITTED TO:

New York State Department of Environmental Conservation
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PREPARED FOR:

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PWGC Project Number: UPC1502

MARCH 2016

P.W. GROSSER CONSULTING, INC.
PROJECT No. UPC1502

HEALTH AND SAFETY PLAN

Jay's Lucky Cleaners
3220-3224 Long Beach Road
Oceanside, New York

SUBMITTED:

March 2016

PREPARED FOR:

New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233

ON BEHALF OF:

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PREPARED BY:

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630 Johnson Avenue, Suite 7
Bohemia, New York 11716

HEALTH AND SAFETY PLAN
JAY'S LUCKY CLEANERS
3220-3224 LONG BEACH ROAD
OCEANSIDE, NEW YORK

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1.0 STATEMENT OF COMMITMENT

This Health and Safety Plan (HASP) has been prepared to ensure that workers are not exposed to chemical, biological and physical hazards during the planned Remedial Investigation (RI) to be performed the site known as Jay's Lucky Cleaners located at 3220-3224 Long Beach Road, Oceanside, New York. P.W. Grosser Consulting Inc.'s (PWGC's) policy is to minimize the possibility of work-related exposure through awareness and qualified supervision, health and safety training, medical monitoring, use of appropriate personal protective equipment, and the following activity specific safety protocols contained in this HASP. PWGC has established a guidance program to implement this policy in a manner that protects personnel to the maximum reasonable extent.

This HASP, which applies to persons present at the site actually or potentially exposed to safety or health hazards, describes emergency response procedures for actual and potential physical, biological and chemical hazards. This HASP is also intended to inform and guide personnel entering the work area or exclusion zone. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy.

2.0 INTRODUCTION

2.1 Purpose

This HASP addresses the regulatory requirements of health and safety practices that will be employed by site workers participating in RI activities at the project site known as Jay's Lucky Cleaners located at 3220-3224 long Beach Road, Oceanside, New York.

The HASP takes into account the specific hazards inherent to the site and presents the minimum requirements which are to be met by P.W. Grosser Consulting, Inc. (PWGC), its' subcontractors, and other on-site personnel in order to avoid and, if necessary, protect against health and/or safety hazards. PWGC sub-contractors will have the option of adopting this HASP or developing their own site-specific document. If a subcontractor chooses to prepare their own HASP, it must meet the minimum requirements as detailed in this HASP and must be made available to PWGC.

Activities performed under this HASP will comply with applicable parts of Occupational Safety and Health Administration (OSHA) Regulations, primarily 29 CFR Parts 1910 and 1926 and all other applicable federal, state, and local regulations. Modifications to the HASP may be made with the approval of the PWGC Health and Safety Manager (HSM) and/or Project Manager (PM). A copy of this HASP will be maintained on-site during all work activities.

Refusal to comply with the HASP or violation of any safety procedures by field personnel may result in their immediate removal from the site following consultation with the HSM and the Field Team Leader (FTL).

2.2 Scope

This HASP addresses the potential hazards related to the RI activities. The primary RI activities include the following:

- Site Mobilization/Demobilization;
- Soil Sampling, and
- Monitoring Well Installation

The potential hazards associated with this scope are listed below and are discussed in more detail in this HASP after the project organization and responsibilities section.

- Chemical Hazards
- Biological Hazards
- Physical Hazards

2.3 Application

The HASP applies to all personnel involved in the above tasks who wish to gain access to active work areas, including but not limited to:

- PWGC employees and subcontractors;
- Client representatives; and
- Federal, state or local representatives.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This section specifies the project organization and responsibilities.

3.1 Project Manager

- Participates in major incident investigations;
- Ensures that the HASP has all of the required approvals before site work is conducted; and
- Has the overall project responsibility for project health and safety.

3.2 Field Team Leader (FTL)/ Site Health and Safety Officer (SHSO)

- Ensures that the HASP is implemented in conjunction with the Health and Safety Manager (HSM);
- Ensures that field work is scheduled with adequate equipment to complete the job safely;
- Enforces site health and safety rules;
- Ensures that proper personal protective equipment is utilized;
- Ensures that the HSM is informed of project changes that require modifications to the HASP;
- Ensures that the procedure modifications are implemented;
- Investigates incidents;
- Conducts the site safety briefing;
- Reports to HSM to provide summaries of field operations and progress; and
- Acts as Emergency Coordinator (EC).

3.3 Health and Safety Manager

- Provides for the development of the HASP;
- Serves as the primary contact to review health and safety matters that may arise;
- Approves individuals who are assigned SHSO responsibilities;
- Coordinates revisions of this HASP with field personnel; and
- Assists in the investigation of major accidents.

3.4 Site Personnel

- Report any unsafe or potentially hazardous conditions to the FTL/SHSO;
- Maintain knowledge of the information, instructions and emergency response actions contained in this HASP; and
- Comply with rules, regulations and procedures as set forth in this HASP and any revisions.

4.0 SITE HISTORY AND PROJECT DESCRIPTION

4.1 Project Background

This Health and Safety Plan (HASP) has been prepared by PWGC, on behalf of United Properties Corp. Volatile Organic Compounds (VOCs) have been identified above guidance levels and/or standards in groundwater at the site.

4.2 Site Location and Description

The site is located at 3220-3224 Long Beach Road, Oceanside, New York. The site consists of one (1) 1-story retail strip building with three retail units and front and side parking lots. The site is approximately 0.23 acres in area. The building was constructed in 1959.

The site is identified as Nassau County Section 43, Block 336, Lot 42. The site is bordered on the north by a commercial property, on the east by Long Beach Road, on the west by residential and commercial properties, and on the south by Montgomery Avenue.

5.0 POTENTIAL HAZARDS OF THE SITE

This section presents an assessment of the chemical, biological, and physical hazards that may be encountered during the tasks specified under Section 1.0. Additional information can be found in **Appendix A** - Safety Data Sheets or in **Appendix B** - Activity Hazard Analyses.

5.1 Chemical Hazards

Review of historical information from the site indicates that the groundwater at the site is contaminated with VOCs which are present at elevated levels in groundwater. These compounds may present an occupational exposure hazard during site operations.

The chemicals identified above may have an effect on the central nervous system, respiratory system and may cause chronic liver and kidney damage. Acute exposure symptoms may include headache, dizziness, nausea, diarrhea and skin and eye irritation. Specific information on the chemicals identified at the Site can be found in Table 5-1 as well as on the Safety Data Sheets found in Appendix A.

Table 5-1

Chemical Hazards

COMPOUND	CAS#	OSHA PEL	ROUTES OF EXPOSURE	SYMPTOMS OF EXPOSURE	TARGET ORGANS	PHYSICAL DATA
Acetone	64-64-1	TWA 1,000 mg/m^3	Inhalation Ingestion Skin/Eye	Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a fragrant, mint-like odor.
Tetracholorethene (PCE)	127-48-4	TWA 100 mg/m^3	Inhalation Ingestion Skin/Eye	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system	Colorless liquid with a mild, chloroform-like odor.
Trichloroethylene (TCE)	79-01-6	TWA 100 mg/m^3	Inhalation Ingestion Skin/Eye	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system	Colorless liquid (unless dyed blue) with a chloroform-like odor.
Cis-1,2-Dichloroethene	156-59-2	TWA 200 mg/m^3	Inhalation Ingestion Skin/Eye	Irritation eyes, respiratory system; central nervous system depression	Eyes, respiratory system, central nervous system	Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor.

Abbreviations

C = Ceiling limit, not to be exceeded
CNS = Central Nervous System
OSHA = Occupational Safety and Health Administration
ppm = parts per million
PEL=Permissible Exposure Limit
TWA = Time-weighted average (8 hours)

5.2 Biological Hazards

Work will be performed in a developed area of Oceanside, New York. During the course of the project, there is potential for workers to come into contact with biological hazards such as animals, insects and plants. The Activity Hazard Analyses found in **Appendix B** includes specific hazards and control measures for each task, if applicable.

5.2.1 *Animals*

The Site is located in a predominantly developed area. It is possible that dogs, cats, rats and mice may be present. Workers shall use discretion and avoid all contact with animals.

5.2.2 *Insects*

Insects, such as mosquitoes, ticks, bees and wasps may be present during certain times of the year. Workers will be encouraged to wear repellents and PPE, if deemed necessary, when working in areas where insects are expected to be present.

During the months of April through October, particular caution must be exercised to minimize exposure to deer ticks and the potential for contracting Lyme disease. Specific precautionary work practices that are recommended include the following:

- Cover your body as much as possible. Wear long pants and long sleeved shirts. Light color clothing makes spotting of ticks easier.
- Try to eliminate possible paths by which the Deer Tick may reach unprotected skin. For example, tuck bottoms of pants into socks or boots and sleeves into gloves. (Duct tape may be utilized to help seal cuffs and ankles). If heavy concentrations of ticks or insects are anticipated or encountered, Tyvek coveralls may be utilized for added protection when the potential for heat stress is not a concern.
- Conduct periodic and frequent, (e.g., hourly), surveys of your clothing for the presence of ticks. Remove any tick, save it and report to the clinic with the tick.
- Use insect /tick repellents that contain the chemical DEET (n,n-Diethyltoluamide). Apply repellents in accordance with manufacturers' recommendations. These repellents are readily available and include such brands as Deep Woods OFF and Maximum Strength OFF.

5.2.3 *Plants*

Poison ivy, sumac and oak may be present on site. The FTL/SHSO should identify the susceptible individuals. Worker shall avoid all contact with these plants.

5.3 Physical Hazards

Most safety hazards are discussed in the Activity Hazard Analyses (AHA) in **Appendix B** for the different phases of the project. In addition to the AHAs, general work rules and other safety procedures are described in Section 10 of this HASP.

5.3.1 *Temperature Extremes*

Heat Stress

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE in hot environments. The potential hazards of working in hot environments include dehydration, cramps, heat rash, heat exhaustion, and heat stroke.

Cold Stress

At certain times of the year, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia as well as slippery surfaces, brittle equipment, and poor judgment.

PWGC's Heat/Cold Stress Protocols are specified in **Appendix C**.

5.3.2 *Steam, Heat and Splashing*

Exposure to steam/heat/splashing hazards can occur during steam cleaning activities. Splashing can also occur during well development and sampling activities. Exposure to steam/heat/splashing can result in scalding/burns, eye injury, and puncture wounds.

5.3.3 *Noise*

Noise is a potential hazard associated with the operation of heavy equipment, drill rigs, pumps and engines. Workers will wear hearing protection while in the work zone when these types of machinery are operating.

5.3.4 *Fire and Explosion*

When conducting excavation or drilling activities, the opportunity of encountering fire and explosion hazards may exist from encountering underground utilities, from the use of diesel engine equipment, and other potential ignition sources. During dry periods there is an increased chance of forest and brush fires starting at the job site. If these conditions occur no smoking will be permitted at the site and all operations involving potential ignition sources will be monitored continuously (fire watch).

5.3.5 *Manual Lifting/Material Handling*

Manual lifting of heavy objects may be required. Failure to follow proper lifting technique can result in back injuries and strains. Back injuries are a serious concern as they are the most common work place injury, often resulting in lost or restricted work time, and long treatment and recovery periods.

5.3.6 *Slips, Trips and Falls*

Working in and around the site will pose slip, trip and fall hazards due to slippery surfaces that may be oil covered, or from rough terrain, surfaces that are steep inclines, surfaced debris, or surfaces which are wet from rain or ice. Falls may result in twisted ankles, broken bones, head trauma or back injuries.

5.3.7 *Heavy Equipment Operation*

An excavator/backhoe will be used to excavate where required. Working with or near heavy equipment poses many potential hazards, including electrocution, fire/explosion, being struck by or against, or pinched/caught/crushed by, and can result in serious physical harm.

5.3.8 *Electrocution*

Encountering underground utilities may pose electrical hazards to workers. Additionally, overhead electrical lines can be a concern during drilling operations. Potential adverse effects of electrical hazards include burns and electrocution, which could result in death.

6.0 ACTIVITY HAZARD ANALYSES

The Activity Hazard Analysis (AHA) is a systematic way of identifying the potential health and safety hazards associated with major phases of work on the project and the methods to avoid, control and mitigate those hazards. The AHAs will be used to train work crews in proper safety procedures during phase preparatory meetings.

AHAs have been developed by PWGC for the following phases of work:

1. Site Mobilization/Demobilization;
2. Soil and groundwater sampling; and
3. Monitoring well/vapor point installation

Copies of these AHAs are included in **Appendix B** of this HASP.

7.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment (PPE) specified in **Table 7-1** represents the hazard analysis and PPE selection required by 29 CFR 1910.132. Specific information on known potential hazards can be found under Section 4.0 and **Appendix B** - Activity Hazard Analyses. For the purposes of PPE selection, the HSM and FTL/SHSO are considered competent persons. The signatures on the approval page of the HASP constitute certification of the hazard assessment. For activities not covered by **Table 7-1**, the FTL/SHSO will conduct the hazard assessment, select the PPE, and document changes in the appropriate field logs. PPE selection will be made in consultation with the HSM.

Modifications for initial PPE selection may also be made by the FTL/SHSO in consultation with the HSM and changes documented accordingly. If major modifications occur, the HSM will notify the PM.

7.1 PPE Abbreviations

HEAD PROTECTION
HH = Hard Hat

HEARING PROTECTION
EP = ear plugs
EM = ear muffs

HAND PROTECTION
Cot = cotton
But = Butyl
LWG = Leather Work Gloves
Neo = Neoprene
Nit = Nitrile
Sur = Surgical

EYE/FACE PROTECTION
APR = Full Face Air Purifying Respirator
MFS = Mesh Face shield
PFS =Plastic Face shield
SG = ANSI approved safety glasses with side shields

BODY PROTECTION
WC = work clothes
Cot Cov = Cotton Coveralls
Poly = Polyethylene coated Tyvek® coveralls
Saran = Saranex coated coveralls
Tyvek® = Uncoated Tyvek® coveralls

FOOT PROTECTION
Neo = Neoprene
OB = Overboot
Poly = polyethylene coated boot
Rub = rubber slush boots
STB = Leather work boots with steel toe

RESPIRATORY PROTECTION
APR = Full-face air purifying respirator with organic vapor cartridges
ASR = Full face air supplied respirator with escape bottle
SCBA = Self-contained breathing apparatus

7.2 Hazard Assessment for Selection of Personal Protective Equipment

The initial selection of personal protective equipment for each task was done by performing a hazard assessment taking into consideration the following:

- Potential chemical and physical present;
- Work operations to be performed;
- Potential routes of exposure;
- Concentrations of contaminants present; and
- Characteristics, capabilities and limitations of PPE and any hazard that the PPE presents or magnifies.

A review of the analytical data from previous sampling events indicates that VOCs identified in **Table 5-1** are the primary contaminants of concern.

The exposure routes for these chemicals are inhalation, skin absorption, skin/eye contact and ingestion. Chemical protective gloves will be required for all activities that involve sample handling and the likelihood for skin contact. The proper use of PPE and strict adherence to decontamination and personal hygiene procedures will effectively minimize skin contact and ingestion as potential routes of exposure.

Table 7-1

Personal Protective Equipment Selection

TASK	HEAD	EYE/FACE	FEET	HANDS	BODY	HEARING	RESPIRATOR
Mobilization/ Demobilization	HH	SG	STB	WG	WC	None	None
Monitoring Well / Vapor Point Installation	HH	SG	STB	WG, Nit & Sur as needed	WC, Tyvek® as needed	None	None initially APR if action levels exceeded
Soil and groundwater sampling	HH	SG	STB	WG, Nit & Sur as needed	WC, Tyvek® as needed	None	None initially APR if action levels exceeded
Decontamination	HH	SG	STB	Nit + Sur	WC, Tyvek® as needed	None	None initially APR if action levels exceeded

7.3 Respirator Cartridge Change-Out Schedule

A respirator cartridge change-out schedule has been developed in order to comply with 29 CFR 1910.134. If the use of respirators is necessary, the respirator cartridge change-out schedule for this project will be as follows:

1. Cartridges shall be removed and disposed of at the end of each shift, when cartridges become wet or wearer experiences breakthrough, whichever occurs first; and
2. If the humidity exceeds 85%, then cartridges shall be removed and disposed of after 4 hours of use.

Respirators shall not be stored at the end of the shift with contaminated cartridges left on. Cartridges shall not be worn on the second day, no matter how short of time period they were used the day before.

The schedule was developed based on the following scientific information and assumptions:

- Analytical data that is available regarding site contaminants;
- Using the Rule of Thumb provided by the AIHA;
- All of the chemicals have boiling points greater than 70 degrees C;
- Total airborne concentration of contaminants is anticipated to be less than 200 ppm;
- The humidity is expected to be less than 85%; and
- Desorption of the contaminants (including those with poor warning properties) after partial use of the chemical cartridge can occur after a short period (hours) without use (eg, overnight) and result in a non-use exposure.

The following is a partial list of factors that may affect the usable cartridge service life and/or the degree of respiratory protection attainable under actual workplace conditions. These factors have been considered when developing the cartridge change-out schedule.

Type of contaminant(s);

- Contaminant concentration;
- Relative humidity;
- Breathing rate; Temperature; Changes in contaminant concentration, humidity, breathing rate and temperature;
- Mixtures of contaminants;
- Accuracy in the determination of the conditions;
- The contaminant concentration in the workplace can vary greatly. Consideration must be given to the quality of the estimate of the workplace concentration;
- Storage conditions between multiple uses of the same respirator cartridges. It is recommended that the chemical cartridges be replaced after each work shift. Contaminants adsorbed on a cartridge can migrate through the carbon bed without airflow;

- Age of the cartridge;
- Condition of the cartridge and respirator;
- Respirator and cartridge selection respirator fit;
- Respirator assembly, operation, and maintenance;
- User training, experience and medical fitness;
- Warning properties of the contaminant; and
- The quality of the warning properties should be considered when establishing the chemical cartridge change schedule. Good warning properties may provide a secondary or back-up indication for cartridge change-out.

8.0 AIR MONITORING

Air monitoring will be performed for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities at the site. Air monitoring will be used to help to confirm that the remedial work will not spread contamination off-site through the air. The primary concerns for this site are dust particulates and VOCs. Site monitoring with a photo-ionization detector (PID) will be performed during any invasive activities.

Real-time monitoring for dust and VOCs will be conducted both within the work area, and along the site perimeter, during intrusive activities such as excavation and drilling activities.

Detailed information on the types, frequency and location of real-time monitoring and community air monitoring requirements are provided in the Community Air Monitoring Plan prepared for this project.

9.0 ZONES, PROTECTION AND COMMUNICATION

9.1 Site Control

Site zones are intended to control the potential spread of contamination throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas. A three-zone approach will be utilized. It shall include an Exclusion Zone (EZ), Contamination Reduction Zone (CRZ) and a Support Zone (SZ). Specific zones shall be established on the work site when operations begin.

This project is a hazardous waste remediation project, and any person working in an area where the potential for exposure to site contaminants exists, will only be allowed access after providing the FTL/SHSO with proper training and medical documentation.

The zones are based upon current knowledge of proposed site activities. It is possible that the zone configurations may be altered due to work plan revisions. Should this occur, the work zone will be adjusted accordingly, and documented through use of a field-change request form.

The following shall be used for guidance in revising these preliminary zone designations, if necessary.

Support Zone - The SZ is an uncontaminated area that will be the field support area for most operations. The SZ provides for field team communications and staging for emergency response. Appropriate safety equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples.

Contamination Reduction Zone - The CRZ is established between the EZ and the SZ. The CRZ contains the contamination reduction corridor and provides for an area for decontamination of personnel and portable hand-held equipment, tools and heavy equipment. A personnel decontamination area will be prepared at each exclusion zone. The CRZ will be used for EZ entry and egress in addition to access for heavy equipment and emergency support services.

Exclusion Zone - All activities, which may involve exposure to site contaminants, hazardous materials and/or conditions, should be considered an EZ. The FTL/SHSO may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ shall be determined by the site HSO allowing adequate space for the activity to be completed, field members and emergency equipment.

9.2 Contamination Control

Decontamination areas will be established for drilling/sampling activities.

9.2.1 *Personnel Decontamination Station*

All personnel and portable equipment used in the EZ shall be subject to a thorough decontamination process, as deemed necessary by the FTL/SHSO. Sampling equipment shall be decontaminated. As necessary, all boots and gloves will be decontaminated using soap and water solution and scrub brushes or simple removal and disposal.

All used respiratory protective equipment will be decontaminated daily and sanitized with appropriate sanitizer solution.

All drums generated as a result of sampling and decontamination activities will be marked and stored at a designated area at the site until the materials can be property disposed of off-site.

All non-expendable sampling equipment will be decontaminated. This usually entails the use of Alconox, solvent and distilled/deionized water rinses to eliminate contaminants.

9.3 Communication

- Each team member will have a cell phone/radio for communication with the PM, HSO and other team members during field activities.
- Hand Signals - Hand signals shall be used by field teams, along with the buddy system. The entire field team shall know them before operations commence and their use covered during site-specific training. Typical hand signals are the following:

SIGNAL	MEANING
Hand gripping throat	Out of air, can't breathe
Grip on a partner's wrist or placement of both hands around a partner's waist.	Leave the area immediately, no debate.
Hands on top of head	Need assistance
Thumbs up	Okay, I'm all right, I understand.
Thumbs down	No, negative.

10.0 MEDICAL SURVEILLANCE PROCEDURES

All contractor and subcontractor personnel performing field work where potential exposure to contaminants exists at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120(f).

10.1 Medical Surveillance Requirements

A physician's medical release for work will be confirmed by the HSM before an employee can work in the exclusion zone. The examination will be taken annually at a minimum and upon termination of hazardous waste site work if the last examination was not taken within the previous six months. Additional medical testing may be required by the HSM in consultation with the Corporate Medical Consultant and the FTL/SHSO if an over-exposure or accident occurs, if an employee exhibits symptoms of exposure, or if other site conditions warrant further medical surveillance.

10.2 Medical Data Sheet

A medical data sheet is provided in **Appendix D**. This medical data sheet is voluntary and should be completed by all on-site personnel and will be maintained at the site. Where possible, this medical data sheet will accompany the personnel needing medical assistance. The medical data sheet will be maintained in a secure location, treated as confidential, and used only on a need-to-know basis.

11.0 SAFETY CONSIDERATIONS

11.1 General Health and Safety Work Practices

A list of general health and safety work practices is included as an included in **Appendix E**. The work rules will be posted in a conspicuous location at the site.

11.2 The Buddy System

At a minimum, employees shall work in groups of two in such a manner that they can observe each other and maintain line-of-sight for each employee within the work group. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency.

11.3 Sample Handling

Personnel responsible for the handling of samples should wear the prescribed level of protection. Samples should be identified as to their hazard and packaged as to prevent spillage or breakage. Sample containers shall be decontaminated in the CRZ or EZ before entering a clean Support Zone area. Any unusual sample conditions, odors, or real-time readings should be noted. Laboratory personnel should be advised of sample hazard level and the potential contaminants present. This can be accomplished by a phone call to the lab coordinator and/or including a written statement with the samples reviewing lab safety procedures in handling, in order to assure that the practices are appropriate for the suspected contaminants in the sample.

11.4 Excavation

Excavations will be conducted in accordance with the requirements contained in 29 CFR 1926, Subpart P-Excavations. It provides for the designation of a "Competent Person" and general requirements for safe excavating practices. The program also incorporates company standards for the monitoring of potentially hazardous atmospheres; protection from water hazards; analyzing and maintaining the stability of adjacent structures; daily competent person inspections; soil classification; sloping and benching; protective systems, including fall protection; and training.

The Competent Person will be the FTL or other designee with appropriate training and experience. The Competent Person will be assisted in his/her duties by other technical personnel such as the HSM, geologists, structural engineers and soils engineers.

No entry into excavations will be allowed for this phase of the project.

12.0 DISPOSAL PROCEDURES

All discarded materials, waste materials or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard or causing litter to be left on site.

All potentially contaminated materials, e.g., clothing, gloves, etc., will be bagged or drummed as necessary, labeled and segregated for disposal. All non-contaminated materials will be collected and bagged for appropriate disposal as non-hazardous solid waste. Additional waste disposal procedures may be developed as applicable.

13.0 EMERGENCY RESPONSE PLAN

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff is essential. Specific elements of emergency support procedures which are addressed in the following subsections include communications, local emergency support units, preparation for medical emergencies, first aid for injuries incurred on site, record keeping, and emergency site evacuation procedures.

13.1 Responsibilities

13.1.1 *Health and Safety Manager (HSM)*

The HSM oversees and approves the Emergency Response/Contingency Plan and performs audits to determine that the plan is in effect and that all pre-emergency requirements are met. The HSM acts as a liaison to applicable regulatory agencies and notifies OSHA of reportable accidents.

13.1.2 *Field Team Leader/Site Health and Safety Officer (FOL/HSO)*

The FTL/SHSO is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The FTL/SHSO is required to immediately notify the HSM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the HSM can ensure that OSHA is notified within the required time frame. The HSM will be notified of all OSHA recordable injuries, fires, spills, releases or equipment damage in excess of $500 within 24 hours.

13.1.3 *Emergency Coordinator (EC)*

The Emergency Coordinator (EC) for the project is the FTL/SHSO.

The EC shall make contact with Local Emergency Response personnel prior to beginning work on site. In these contacts the EC will inform interested parties about the nature and duration of work expected on the site and the type of contaminants and possible health or safety effects of emergencies involving these contaminants. The EC will locate emergency phone numbers and identify hospital routes prior to beginning work on site. The EC shall make necessary arrangements to be prepared for any emergencies that could occur.

The EC will implement the Emergency Response/Contingency Plan whenever conditions at the site warrant such action.

13.1.4 *Site Personnel*

Site personnel are responsible for knowing the Emergency Response/Contingency Plan and the procedures contained herein. Personnel are expected to notify the EC of situations that could constitute a site emergency.

13.2 Communication

A variety of communication systems may be utilized during emergency situations. These are discussed in the following sections.

13.2.1 *Hand Signals*

Downrange field teams will employ hand signals where necessary for communication during emergency situations. Hand signals are found in Section 8.3.

13.2.2 *Field Radios and Cell Phones*

PWGC field personnel are provided cellular phones for site communication and emergency use.

13.3 Local Emergency Support Units

A route map from the site to the nearest hospital can be found in **Appendix F**. This map will be placed with the above emergency telephone numbers in all on-site vehicles.

13.4 Pre-Emergency Planning

PWGC will communicate directly with administrative personnel from the emergency room at the hospital to determine whether the hospital has the facilities and personnel needed to treat cases of trauma resulting from exposure to any of the contaminants expected to be found on the site. Instructions for finding the hospital will be posted conspicuously in the site office and in each site vehicle.

Before the field activities begin, the local emergency response personnel will be notified of the schedule for field activities and about the materials that are thought to exist on the site so that they will be able to respond quickly and effectively in the event of a fire, explosion, or other emergency. Before fieldwork on the site commences, each person who will be working there or observing the operations will complete a medical data sheet (**Appendix D**). These data sheets will be filled out during site-specific training and will be kept on the site.

In the event of an incident where a team member becomes exposed or suffers from an acute symptom of exposure to site materials and has to be taken to a hospital, a copy of his/her medical data sheet will be presented to the attending physician.

Table 13-1

Emergency Telephone Numbers

Contact	Firm or Agency	Telephone Number
Police		911
Fire		911
Hospital	South Nassau Community Hospital	(877) 768-8462 or (516) 763-3052
Ambulance		911
Project Manager/Health and Safety Manager	Kris Almskog PWGC	(631) 589-6353
Health & Safety Officer	Jessica Ferngren PWGC	(631) 589-6353
NYSDEC Site Contact	Jahan Reza, Project Manager	(631) 444-0242
Poison Control Center		(800) 962-1253
Chemtrec		(800) 424-9300

13.5 Emergency Medical Treatment

The procedures and rules in this HASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the FTL/SHSO immediately. First aid equipment will be available on site at the following locations:

- First Aid Kit: Support Zone (or designated by FTL/SHSO upon arrival)
- Emergency Eye Wash: Support Zone (or designated by FTL/SHSO upon arrival)

During site-specific training, project personnel will be informed of the location of the first aid station(s) that has been set up. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any

first aid instructions that can be obtained from doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, will be followed closely.

There will be at least two people with current First Aid and CPR certification on each active work shift. When personnel are transported to the hospital, the FTL/SHSO will provide a copy of the Medical Data Sheet to the paramedics and treating physician.

Only in non-emergency situations will an injured person be transported to the hospital by means other than an ambulance. **A map and directions to the hospital can be found in Appendix F.**

13.6 Emergency Site Evacuation Routes and Procedures

In order to mobilize the manpower resources and equipment necessary to cope with a fire or other emergency, a clear chain of authority will be established. The EC will take charge of all emergency response activities and dictate the procedures that will be followed for the duration of the emergency. The EC will report immediately to the scene of the emergency, assess the seriousness of the situation, and direct whatever efforts are necessary until the emergency response units arrive. At his/her discretion, the EC also may order the closure of the site for an indefinite period.

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs, including but not limited to fire, explosion or significant release of toxic gas into the atmosphere, an air horn will be sounded on the site. The horn will sound continuously for one blast, signaling that immediate evacuation of all personnel is necessary due to an immediate or impending danger. All heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at the evacuation meeting point, which will be determined upon arrival at the site by the FTL/SHSO, prior to work beginning. This will then be conveyed to all crew members during the site-specific briefing.

The EC will give directions for implementing whatever actions are necessary. Any project team member may be assigned to be in charge of emergency communications during an emergency. He/she will attend the site telephone specified by the EC from the time the alarm sounds until the emergency has ended.

After sounding the alarm and initiating emergency response procedures, the EC will check and verify that access roads are not obstructed. If traffic control is necessary, as in the event of a fire or explosion, a project team member, who has been trained in these procedures and designated at the site safety meeting, will take over these duties until local police and fire fighters arrive.

The EC will remain at the site to provide any assistance requested by emergency-response squads as they arrive to deal with the situation. A map showing evacuation routes, meeting places and the location of emergency equipment will be posted in all trailers and used during site-specific training.

13.7 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the site (air horn will sound for a single continuous blast), and notification of local fire and police departments. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

13.7.1 *Fire Prevention*

Adhering to the following precautions will prevent fires:

- Good housekeeping and storage of materials;
- Storage of flammable liquids and gases away from oxidizers;
- No smoking in the exclusion zone or any work area;
- No hot work without a properly executed hot work permit;
- Shutting off engines to refuel;
- Grounding and bonding metal containers during transfer of flammable liquids;
- Use of UL approved flammable storage cans;
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities; and
- Monthly inspections of all fire extinguishers.

13.8 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Safety Data Sheet or recommended by the Corporate Medical Consultant will be followed, when necessary.

SKIN AND EYE CONTACT: Use copious amounts of soap and water. Wash/rinse affected areas thoroughly, and then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination. Skin should also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs.

INHALATION: Move to fresh air. Decontaminate and transport to hospital or local medical provider.

INGESTION: Decontaminate and transport to emergency medical facility.

PUNCTURE WOUND OR LACERATION: Decontaminate and transport to emergency medical facility.

13.9 Decontamination during Medical Emergencies

If emergency life-saving first aid and/or medical treatment is required, normal decontamination procedures may need to be abbreviated or postponed. The FTL/SHSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination, when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed on-site, a plastic barrier placed between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then

be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

13.10 Accident/Incident Reporting

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone:

- Health and Safety Manager;
- Project Manager; and
- The employer of any injured worker who is not a PWGC employee.

Written confirmation of verbal reports are to be completed by the FTL/SHSO using the Incident Report Form and submitted within 24 hours. The incident report and investigation form is found in **Appendix G**. If the employee involved is not a PWGC employee, his employer will receive a copy of the report.

13.11 Adverse Weather Conditions

In the event of adverse weather conditions, the FTL/SHSO will determine if work can continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries;
- Potential for cold stress and cold-related injuries;
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds);
- Limited visibility (fog);
- Potential for electrical storms;
- Earthquakes; and
- Other major incidents.

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The FTL/SHSO will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

13.12 Spill Control and Response

All small hazardous spills/environmental releases shall be contained as close to the source as possible. Whenever possible, the MSDS will be consulted to assist in determining the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. Drains or

drainage areas should be blocked. All spill containment materials will be properly disposed. An exclusion zone around the spill area should be established depending on the size of the spill in accordance with the latest USDOT Emergency Response Guide Book. The following seven steps should be taken by the EC:

- Determine the nature, identity and amounts of major spill components;
- Make sure all unnecessary persons are removed from the spill area;
- Notify appropriate response teams and authorities;
- Use proper PPE in consultation with the FTL/SHSO;
- If a flammable liquid, gas or vapor is involved, remove all ignition sources and use non-sparking and/or explosive proof equipment to contain or clean up the spill (diesel only vehicles, air operated pumps, etc.);
- If possible, try to stop the leak with appropriate material; and,
- Remove all surrounding materials that can react or compound with the spill.

13.13 Emergency Equipment and Kits

The following minimum emergency equipment and kits shall be kept and maintained on-site:

- Industrial first aid kit;
- Burn kit and portable eye washes (one per field team);
- Fire extinguishers (one per work area); and
- Absorbent material /spill kit.

14.0 TRAINING

14.1 General Health and Safety Training

In accordance with PWGC corporate policy, and pursuant to 29 CFR 1910.120, hazardous waste site workers shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations unless otherwise noted in the above reference. At a minimum, the training shall have consisted of instruction in the topics outlined in the standard. Personnel who have not met the requirements for initial training shall not be allowed to work in any site activities in which they may be exposed to hazards (chemical or physical).

14.1.1 *Three Day Supervised On the Job Training*

In addition to the required initial hazardous waste operations training, each employee shall have received three days of directly supervised on-the-job training. This training will address the duties the employees are expected to perform.

14.2 Annual Eight-Hour Refresher Training

Annual eight-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualifications for fieldwork. The training will cover a review of 1910.120 requirements and related company programs and procedures.

14.3 Site-Specific Training

Prior to commencement of field activities, all field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. It will include site and facility layout, hazards and emergency services at the site, and will highlight all provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

14.4 On-Site Safety Briefings

Project personnel and visitors will be given on-site health and safety briefings daily by the FTL/SHSO to assist site personnel in safely conducting their work activities. A copy of the Daily Briefing Sign-In Sheet is contained in **Appendix H**. The briefings will include information on new operations to be conducted, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity to periodically update the crews on monitoring results. Prior to starting any new activity, a training session using the Activity Hazard Analysis will be held for crew members involved in the activity.

14.5 First Aid and CPR

The HSM will identify those individuals requiring first aid and CPR training to ensure that emergency medical treatment is available during field activities. It is anticipated that a minimum of one field person on-site at any one

time will have first aid and CPR training. The training will be consistent with the requirements of the American Red Cross Association or American Heart Association. If none are available on-site, then the HSM shall be notified.

14.6 Supervisory Training

Supervisors and health and safety personnel shall have completed an additional eight hours of specialized training in accordance with 29 CFR 1910.120.

15.0 LOGS, REPORTS AND RECORDKEEPING

Changes to the HASP will be documented in the Health and Safety log book and as appropriate, the HSM and/or PM will be notified. Daily tailgate meetings will be documented in the H&S log book as well as personnel on-site.

15.1 Medical and Training Records

Copies or verification of training (40-hour, 8-hour, supervisor, site-specific training and documentation of three day OJT) and medical clearance for hazardous waste site work and respirator use will be maintained on-site. Records for all subcontractor employees will also be kept on-site.

15.2 Incident Report and Investigation Form

The incident report and investigation form is to be completed for all accidents and incidents, including near misses. The form can be found in **Appendix G**.

15.3 Health and Safety Logbooks

The FTL/SHSO will maintain a logbook during site work. The daily site conditions, personnel, monitoring results and significant events will be recorded. The original logbooks will become part of the exposure records file.

16.0 FIELD PERSONNEL REVIEW

This form serves as documentation that field personnel have read, or have been informed of, and understand the provisions of the HASP. It is maintained on site by the FTL/SHSO as a project record. Each field team member shall sign this section after site-specific training is completed and before being permitted to work on site.

I have read, or have been informed of, the Health and Safety Plan and understand the information presented. I will comply with the provisions contained therein.

Name (Print and Sign)	***Date***

Appendix A
Safety Data Sheets

SAFETY DATA SHEET

Version 3.17
Revision Date 06/04/2015
Print Date 06/16/2015

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Acetone

Product Number : 650501
Brand : Sigma-Aldrich
Index-No. : 606-001-00-8

CAS-No. : 67-64-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.

P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Repeated exposure may cause skin dryness or cracking.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	C_3H_6O
Molecular weight	:	58.08 g/mol
CAS-No.	:	67-64-1
EC-No.	:	200-662-2
Index-No.	:	606-001-00-8
Registration number	:	01-2119471330-49-XXXX

Hazardous components

Component	Classification	Concentration
Acetone		
	Flam. Liq. 2; Eye Irrit. 2A; STOT SE 3; H225, H319, H336	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Acetone	67-64-1	TWA	500.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Hematologic effects Upper Respiratory Tract irritation Eye irritation Adopted values or notations enclosed are those for which changes are proposed in the NIC		

		See Notice of Intended Changes (NIC) Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	500 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Hematologic effects Upper Respiratory Tract irritation Eye irritation Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	750.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Hematologic effects Upper Respiratory Tract irritation Eye irritation Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	750 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Hematologic effects Upper Respiratory Tract irritation Eye irritation Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	1,000.000000 ppm 2,400.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	250.000000 ppm 590.000000 mg/m3	USA. NIOSH Recommended Exposure Limits

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Acetone	67-64-1	Acetone	50.0000 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

Derived No Effect Level (DNEL)

Application Area	Exposure routes	Health effect	Value
Workers	Skin contact	Long-term systemic effects	186mg/kg BW/d
Consumers	Ingestion	Long-term systemic effects	62mg/kg BW/d
Consumers	Skin contact	Long-term systemic effects	62mg/kg BW/d
Workers	Inhalation	Acute systemic effects	2420 mg/m3
Workers	Inhalation	Long-term systemic effects	1210 mg/m3
Consumers	Inhalation	Long-term systemic effects	200 mg/m3

Predicted No Effect Concentration (PNEC)

Compartment	Value
Soil	33.3 mg/kg
Marine water	1.06 mg/l
Fresh water	10.6 mg/l
Marine sediment	3.04 mg/kg
Fresh water sediment	30.4 mg/kg
Onsite sewage treatment plant	100 mg/l

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators

and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -94 °C (-137 °F)
f)	Initial boiling point and boiling range	56 °C (133 °F) at 1,013 hPa (760 mmHg)
g)	Flash point	-16.99 °C (1.42 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 13 %(V) Lower explosion limit: 2 %(V)
k)	Vapour pressure	533.3 hPa (400.0 mmHg) at 39.5 °C (103.1 °F) 245.3 hPa (184.0 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.791 g/mL at 25 °C (77 °F)
n)	Water solubility	completely miscible
o)	Partition coefficient: n-octanol/water	log Pow: -0.24
p)	Auto-ignition temperature	465.0 °C (869.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	23.2 mN/m at 20.0 °C (68.0 °F)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Bases, Oxidizing agents, Reducing agents, Acetone reacts violently with phosphorous oxychloride.

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 5,800 mg/kg
Remarks: Behavioral:Altered sleep time (including change in righting reflex). Behavioral:Tremor. Behavioral:Headache. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

LC50 Inhalation - Rat - 8 h - 50,100 mg/m3
Remarks: Drowsiness Dizziness Unconsciousness

LD50 Dermal - Guinea pig - 7,426 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation - 24 h

Respiratory or skin sensitisation
- Guinea pig
Result: Does not cause skin sensitisation.

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: AL3150000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Kidney - Irregularities - Based on Human Evidence
Skin - Dermatitis - Based on Human Evidence
Kidney - Irregularities - Based on Human Evidence
Skin - Dermatitis - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 5,540 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 8,800 mg/l - 48 h
Toxicity to algae	Remarks: No data available

12.2 Persistence and degradability

Biodegradability: Result: 91 % - Readily biodegradable
(OECD Test Guideline 301B)

12.3 Bioaccumulative potential

Does not bioaccumulate.

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1090 Class: 3 Packing group: II
Proper shipping name: Acetone
Reportable Quantity (RQ): 5000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1090 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: ACETONE

IATA
UN number: 1090 Class: 3 Packing group: II
Proper shipping name: Acetone

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Acetone	67-64-1	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Acetone	67-64-1	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Acetone	67-64-1	2007-03-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
STOT SE	Specific target organ toxicity - single exposure

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.17 Revision Date: 06/04/2015 Print Date: 06/16/2015

SAFETY DATA SHEET

Version 4.3
Revision Date 03/05/2015
Print Date 06/16/2015

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : cis-Dichloroethylene

Product Number : 48597
Brand : Supelco
Index-No. : 602-026-00-3

CAS-No. : 156-59-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Acute toxicity, Inhalation (Category 4), H332
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H332 Harmful if inhaled.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.

P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312	Call a POISON CENTER or doctor/ physician if you feel unwell.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	C2H2Cl2
Molecular weight	:	96.94 g/mol
CAS-No.	:	156-59-2
EC-No.	:	205-859-7
Index-No.	:	602-026-00-3

Hazardous components

Component	Classification	Concentration
cis-Dichloroethylene		
	Flam. Liq. 2; Acute Tox. 4; Aquatic Acute 3; Aquatic Chronic 3; H225, H332, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage temperature 2 - 8 °C

Handle and store under inert gas. Air and moisture sensitive. Light sensitive.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
cis-Dichloroethylene	156-59-2	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Eye irritation		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: light yellow
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-80.0 °C (-112.0 °F)
f)	Initial boiling point and boiling range	60.0 - 61.0 °C (140.0 - 141.8 °F)
g)	Flash point	6.0 °C (42.8 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.28 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available

r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LC50 Inhalation - Rat - 13700 ppm
Remarks: Behavioral:Somnolence (general depressed activity). Liver:Fatty liver degeneration.

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: KV9420000

narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene

Poison Inhalation Hazard: No

IMDG
UN number: 1150 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: 1,2-DICHLOROETHYLENE

IATA
UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
cis-Dichloroethylene	156-59-2	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
cis-Dichloroethylene	156-59-2	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
cis-Dichloroethylene	156-59-2	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H332	Harmful if inhaled.
H402	Harmful to aquatic life.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	1

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.3 Revision Date: 03/05/2015 Print Date: 06/16/2015

SAFETY DATA SHEET

Version 4.5
Revision Date 06/10/2015
Print Date 06/16/2015

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Tetrachloroethylene

Product Number : 371696
Brand : Sigma-Aldrich
Index-No. : 602-028-00-4

CAS-No. : 127-18-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Skin sensitisation (Category 1), H317
Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Acute aquatic toxicity (Category 2), H401
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.
H351 Suspected of causing cancer.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Perchloroethylene PCE
Formula	:	C_2Cl_4
Molecular weight	:	165.83 g/mol
CAS-No.	:	127-18-4
EC-No.	:	204-825-9
Index-No.	:	602-028-00-4

Hazardous components

Component	Classification	Concentration
Tetrachloroethylene		
	Skin Irrit. 2; Eye Irrit. 2A; Skin Sens. 1; Carc. 2; STOT SE 3; Aquatic Acute 2; Aquatic Chronic 2; H315, H317, H319, H336, H351, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Tetrachloroethylene	127-18-4	TWA	25.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		STEL	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		Potential Occupational Carcinogen Minimize workplace exposure concentrations. See Appendix A		
		See Table Z-2		
		TWA	100.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		CEIL	200.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Peak	300.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Tetrachloroethylene	127-18-4	Tetrachloroethylene	3ppm	In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to shift (16 hours after exposure ceases)			
		Tetrachloroethylene	0.5000 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		Prior to shift (16 hours after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 49 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -22 °C (-8 °F) - lit.
f)	Initial boiling point and boiling range	121 °C (250 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	25.3 hPa (19.0 mmHg) at 25.0 °C (77.0 °F) 17.3 hPa (13.0 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.623 g/cm3 at 25 °C (77 °F)
n)	Water solubility	0.15 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 2.53 at 23 °C (73 °F)
p)	Auto-ignition temperature	No data available
q)	Decomposition	No data available

	temperature	
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	32.1 mN/m at 20 °C (68 °F)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Strong bases

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - female - 3,005 mg/kg
(OECD Test Guideline 401)

LC50 Inhalation - Rat - male and female - 6 h - 28 mg/l

LD50 Dermal - Rabbit - 5,000 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation - 4 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation - 24 h

Respiratory or skin sensitisation
- Mouse
Result: May cause sensitisation by skin contact.
(OECD Test Guideline 429)

Germ cell mutagenicity
Hamster
ovary
Result: negative

OECD Test Guideline 474
Mouse - male
Result: negative

Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC:	2A - Group 2A: Probably carcinogenic to humans (Tetrachloroethylene)
NTP:	Reasonably anticipated to be a human carcinogen (Tetrachloroethylene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information

Repeated dose toxicity - Mouse - female - Oral - Lowest observed adverse effect level - 390 mg/kg
RTECS: KX3850000

narcosis, Liver injury may occur., Kidney injury may occur.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 5 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 7.50 mg/l - 48 h
Toxicity to algae	static test EC50 - Skeletonema costatum - > 16 mg/l - 7 h

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 11 % - Not readily biodegradable. (OECD Test Guideline 301C)

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 21 d - 0.00343 mg/l Bioconcentration factor (BCF): 49

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1897 Class: 6.1 Packing group: III
Proper shipping name: Tetrachloroethylene
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1897 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TETRACHLOROETHYLENE
Marine pollutant: yes

IATA
UN number: 1897 Class: 6.1 Packing group: III
Proper shipping name: Tetrachloroethylene

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Tetrachloroethylene	127-18-4	2007-07-01

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Tetrachloroethylene	127-18-4	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Tetrachloroethylene	127-18-4	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Tetrachloroethylene	127-18-4	2007-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Tetrachloroethylene	127-18-4	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity

Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H401	Toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.5 Revision Date: 06/10/2015 Print Date: 06/16/2015

SAFETY DATA SHEET

Version 4.6
Revision Date 03/02/2015
Print Date 06/16/2015

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Trichloroethylene

Product Number : 251402
Brand : Sigma-Aldrich
Index-No. : 602-027-00-9

CAS-No. : 79-01-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.
H341 Suspected of causing genetic defects.
H350 May cause cancer.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear eye protection/ face protection.
P280	Wear protective gloves.
P281	Use personal protective equipment as required.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	TCE Trichloroethene
Formula	:	C_2HCl_3
Molecular weight	:	131.39 g/mol
CAS-No.	:	79-01-6
EC-No.	:	201-167-4
Index-No.	:	602-027-00-9

Hazardous components

Component	Classification	Concentration
Trichloroethylene Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
	Skin Irrit. 2; Eye Irrit. 2A; Muta. 2; Carc. 1B; STOT SE 3; Aquatic Acute 3; Aquatic Chronic 3; H315, H319, H336, H341, H350, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Light sensitive. Handle and store under inert gas.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Trichloroethylene	79-01-6	TWA	10.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment cognitive decrement Renal toxicity Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen		
		STEL	25.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment cognitive decrement Renal toxicity Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen		
		Potential Occupational Carcinogen See Appendix C See Appendix A		
		See Table Z-2		
		TWA	100.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.19-1967		
		CEIL	200.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.19-1967		
		Peak	300.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.19-1967		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Trichloroethylene	79-01-6	Trichloroacetic acid	15.0000 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		Trichloroethanol	0.5000 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			
		Trichloroethylene		In blood	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			
		Trichloroethylene		In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -84.8 °C (-120.6 °F) - lit.
f)	Initial boiling point and boiling range	86.7 °C (188.1 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower	Upper explosion limit: 10.5 %(V)

	flammability or explosive limits	Lower explosion limit: 8 %(V)
k)	Vapour pressure	81.3 hPa (61.0 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.463 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 2.29log Pow: 5
p)	Auto-ignition temperature	410.0 °C (770.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Oxidizing agents, Strong bases, Magnesium

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 4,920 mg/kg

LC50 Inhalation - Mouse - 4 h - 8450 ppm

LD50 Dermal - Rabbit - > 20,000 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Severe skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation - 24 h

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.
In vitro tests showed mutagenic effects

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC:	1 - Group 1: Carcinogenic to humans (Trichloroethylene)
NTP:	Reasonably anticipated to be a human carcinogen (Trichloroethylene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: KX4550000

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Exposure to and/or consumption of alcohol may increase toxic effects., Gastrointestinal disturbance, Kidney injury may occur., narcosis
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 41 mg/l - 96.0 h
	LOEC - other fish - 11 mg/l - 10.0 d
	NOEC - Oryzias latipes - 40 mg/l - 10.0 d
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 18.00 mg/l - 48 h
Toxicity to algae	IC50 - Pseudokirchneriella subcapitata (green algae) - 175.00 mg/l - 96 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Does not bioaccumulate.

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1710 Class: 6.1 Packing group: III
Proper shipping name: Trichloroethylene
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1710 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TRICHLOROETHYLENE

IATA
UN number: 1710 Class: 6.1 Packing group: III
Proper shipping name: Trichloroethylene

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Trichloroethylene	79-01-6	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Trichloroethylene	79-01-6	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Trichloroethylene	79-01-6	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Trichloroethylene	79-01-6	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Trichloroethylene	CAS-No. 79-01-6	Revision Date 2011-09-01
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.	CAS-No. 79-01-6	Revision Date 2011-09-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H402	Harmful to aquatic life.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.6 Revision Date: 03/02/2015 Print Date: 06/16/2015

Appendix B
Activity Hazard Analyses

Project Identification Jay's Lucky Cleaners	**Location** 3220-3224 Long Beach Road, Oceanside, New York	**Estimated Dates** TBD
Phase of Work Mobilization/ Demobilization	**Page 1 of 1**	**Analysis Approved by** Kris Almskog, PM/HSM
TASKS	**HAZARDS**	**CONTROL MEASURES**
1. Mobilization and demobilization of equipment site tools, personnel	Slips/trips/falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Walk, do not run; • Wear footwear with soles that grip; • Unloading areas should be on even terrain; and • Mark and repair if possible tripping hazards.
	Manual lifting and material handling	• Instruct personnel on proper lifting techniques; • Use proper lifting techniques; and • Team lifting will be used for heavy loads or use mechanical lifting devices.
	Temperature extremes	• Drink plenty of fluids: • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; and • Stay in visual and verbal contact with your buddy.
	Vehicular traffic	• Spotters will be used when backing up trucks and heavy equipment and when moving equipment.
	Overhead hazards	• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1; • Ground personnel will stay clear of suspended loads; • Equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and • Overhead hazards will be identified prior to commencing work operations.
	Noise	• Ear plugs or ear muffs shall be worn for operations that exceed 85 decibels.
	Electrocution	• Equipment will be equipped with GFCI; • A licensed electrician will conduct electrical work; • Equipment will stay a minimum of 15 feet from overhead-energized electrical lines (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.
	Biological hazards	• Be alert to the presence of biological hazards; • Wear insect repellent; • Follow procedures in Section 4.2.2 for tick bites; • FTL/SHSO should be aware of on-site personnel with allergic reactions in insect bites and stings.

Project Identification	**Location**	**Estimated Dates**
Jay's Lucky Cleaners	3220-3224 Long Beach Road, Oceanside, New York	TBD
Phase of Work	**Page 1 of 2**	**Analysis Approved by**
Drilling		Kris Almskog, PM/HSM

TASKS	HAZARDS	CONTROL MEASURES
1. Drill to required depths and collect soil samples/install wells.	Chemical hazards	• Wear appropriate PPE per Table 6-1; • Perform air monitoring per Community Air Monitoring Plan; • Practice contamination avoidance; • Follow proper decontamination procedures; and • Wash hands/face before eating, drinking or smoking.
	Hand and power tool usage	• Equip electrical equipment with GFCI's; • Inspect electrical equipment and tools prior to use; • Daily inspections will be performed; • Remove broken or damaged tools from service; • Use the tool for its intended purpose; • Use in accordance with manufacturer instructions; and Tag and remove defective equipment.
	Temperature extremes	• Drink plenty of fluids: • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; and, • Stay in visual and verbal contact with your buddy.
	Manual lifting and material handling	• Instruct personnel on proper lifting techniques; • Use proper lifting techniques; and • Team lifting will be used for heavy loads or use mechanical lifting devices.
	Fire/Explosion	• ABC type fire extinguishers shall be readily available; • No smoking in work area.
	Biological hazards	• Be alert to the presence of biological hazards; • Wear insect repellent; • Follow procedures in Section 4.2.2 for tick bites; • FTL/SHSO should be aware of on-site personnel with allergic reactions in insect bites and stings.
	Heavy equipment	• Ground personnel will stay clear of suspended loads; • Ground personnel will stay out of the swing radius; • Eye contact with operators will be made before approaching equipment; • Equipment will not be approached on blind sides; • Equipment will be equipped with backup alarms or spotters shall be used.
	Slips/Trips/Falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Walk, do not run; • Wear footwear with soles that grip; • Unloading areas should be on even terrain; and mark and repair if possible tripping hazards are present.

	Electrocution	• Equipment will be equipped with GFCI; • A licensed electrician will conduct electrical work; • Equipment will stay a minimum of 15 feet from overhead-energized electrical lines (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.

Project Identification	Location	Estimated Dates
Jay's Lucky Cleaners	3220-3224 Long Beach Road, Oceanside, New York	TBD
Phase of Work	**Page 1 of 1**	**Analysis Approved by**
Drilling		Kris Almskog, PM/HSM

TASKS	HAZARDS	CONTROL MEASURES
	Noise	• Hearing protection mandatory at or above 85 dBA. • Instruct personnel how to properly wear heating protective devices. •Disposable ear plugs or other hearing protection required when working near noisy equipment..
	Steam/Heat/Splashing	• Use face shield and safety glasses or goggles; • Stay out of the splash/steam radius; • Do not direct steam at anyone; • Do not hold objects with your foot and steam area near it; • Direct spray to minimize spread of constituents of concern; and • Use shielding as necessary.
	Excavation hazards	• Follow 29 CFR 1926 Subpart P.
	Overhead hazards	• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1; • Ground personnel will stay clear of suspended loads; • Equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and • Overhead hazards will be identified prior to commencing work operations.
	Electrocution	• Equipment will be equipped with GFCI; • A licensed electrician will conduct electrical work; • Equipment will stay a minimum of 15 feet from overhead-energized electrical lines (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.

Project Identification	**Location**	**Estimated Dates**
Jay's Lucky Cleaners	3220-3224 Long Beach Road, Oceanside, New York	TBD
Phase of Work	**Page 1 of 1**	**Analysis Approved by**
Soil/Groundwater Sampling		Kris Almskog, PM/HSM

TASKS	HAZARDS	CONTROL MEASURES
1. Collect soil samples.	Chemical hazards	• Wear appropriate PPE per Table 6-1; • Practice contamination avoidance; • Follow proper decontamination procedures; and • Wash hands/face before eating, drinking or smoking.
	Temperature extremes	• Drink plenty of fluids: • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; and • Stay in visual and verbal contact with your buddy.
	Manual lifting and material handling	• Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
	Slips/Trips/Falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Walk, do not run; • Wear footwear with soles that grip; • Unloading areas should be on even terrain; and • Mark and repair if possible tripping hazards.
	Electrocution	• Equipment will be equipped with GFCI; • A licensed electrician will conduct electrical work; • Equipment will stay a minimum of 15 feet from overhead-energized electrical lines (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.

Project Identification Jay's Lucky Cleaners	**Location** 3220-3224 Long Beach Road, Oceanside, New York	**Estimated Dates** TBD
Phase of Work Decontamination	**Page 1 of 1**	**Analysis Approved by** Kris Almskog, PM/HSM
TASKS	**HAZARDS**	**CONTROL MEASURES**
1.Decontaminate equipment	Chemical hazards	• Wear appropriate PPE per Table 6-1; • Practice contamination avoidance; • Follow proper decontamination procedures; and • Wash hands/face before eating, drinking or smoking.
	Temperature extremes	• Drink plenty of fluids: • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; and • Stay in visual and verbal contact with your buddy.
	Manual lifting and material handling	• Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
	Slips/Trips/Falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Walk, do not run; • Wear footwear with soles that grip; • Unloading areas should be on even terrain; and • Mark and repair if possible tripping hazards.
	Electrocution	• Equipment will be equipped with GFCI; • A licensed electrician will conduct electrical work; • Equipment will stay a minimum of 15 feet from overhead-energized electrical lines (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.

Appendix C
Heat/Cold Stress Protocols

HEAT STRESS

Heat Stress (Hyperthermia)

Heat stress is the body's inability to regulate the core temperature. A worker's susceptibility to heat stress can vary according to his/her physical fitness, degree of acclimation to heat, humidity, age and diet.

1. Prior to site activity, the field team leader may make arrangements for heat stress monitoring (i.e., monitoring heart rate, body temperature, and body water loss) during actual site work if conditions warrant. In addition, the FTL is to ensure that each team member has been acclimatized to the prevailing environmental conditions, that personnel are aware of the signs and symptoms of heat sickness, that they have been adequately trained in first aid procedures, and that there are enough personnel on-site to rotate work assignments and schedule work during hours of reduced temperatures. Personnel should not consume alcoholic or caffeinated beverages but rather drink moderate levels of an electrolyte solution and eat well prior to commencing site work.

2. Although there is no specific test given during a baseline physical that would identify a person's intolerance to heat, some indicators are tobacco or medication use, dietary habits, body weight, and chronic conditions such as high blood pressure or diabetes.

3. *Heat cramps*, caused by profuse perspiration with inadequate fluid intake and salt replacement, most often afflict people in good physical condition who work in high temperature and humidity. Heat cramps usually come on suddenly during vigorous activity. Untreated, heat cramps may progress rapidly to heat exhaustion or heat stroke. First aid treatment: remove victim to a cool place and replace lost fluids with water.

4. Thirst is not an adequate indicator of heat exposure. Drinking fluid by itself does not indicate sufficient water replacement during heat exposure. A general rule, the amount of water administered should replace the amount of water lost, and it should be administered at regular intervals throughout the day. For every half pound of water lost, 8 ounces of water should be ingested. Water should be replaced by drinking 2 – 4 ounce servings during every rest period. A recommended alternative to water is an electrolyte drink split 50/50 with water.

5. *Heat exhaustion* results from salt and water loss along with peripheral pooling of blood. Like heat cramps, heat exhaustion tends to occur in persons in good physical health who are working in high temperatures and humidity. Heat exhaustion may come on suddenly as dizziness and collapse. Untreated, heat exhaustion may progress to heat stroke.

6. *Treatment for heat exhaustion*: Move the victim to a cool environment (e.g. air-conditioned room/car), lay victim down and fan him/her. If the air-conditioning is not available, remove the victim to a shaded area, remove shirt, and fan. If symptoms do not subside within an hour, notify 911 to transport to hospital.

7. *Heat stroke* results from the body's inability to dissipate excess heat. A true medical emergency that requires immediate care, it usually occurs when one ignores the signs of heat exhaustion and continues strenuous activities. Working when the relative humidity exceeds 60% is a particular problem. Workers in the early phase of heat stress may not be coherent of they will be confused, delirious or comatose. Changes in behavior, irritability and combativeness are useful early signs of heat stroke.

8. *Treatment of heat stroke*: Move the victim to a cool, air-conditioned environment. Place victim in a semi-reclined position with head elevated and strip to underclothing. Cool victim as rapidly as possible, applying ice packs to the arms and legs and massaging the neck and torso. Spray victim with tepid water and constantly fan to promote evaporation. Notify 911 to transport to hospital as soon as possible.

TABLE 1

SYMPTOMS OF HEAT STRESS

Heat cramps are caused by heavy sweating with inadequate fluid intake. Symptoms include;

- Muscle cramps
- Cramps in the hands, legs, feet and abdomen

Heat exhaustion occurs when body organs attempt to keep the body cool. Symptoms include;

- Pale, cool moist skin
- Core temperature elevated 1-2^{o}
- Thirst
- Anxiety
- Rapid heart rate
- Heavy sweating
- Dizziness
- Nausea

Heat stroke is the most serious form of heat stress. Immediate action must be taken to cool the body before serious injury and death occur. Symptoms are;

- Red, hot, dry skin
- Lack of perspiration
- Seizures
- Dizziness and confusion
- Strong, rapid pulse
- Core temperature of 104^{o} or above
- Coma

TABLE 2

HEAT STRESS INDICATORS

Heat stress indicator	When to measure	If Exceeds…	Action
Heart rate (pulse)	Beginning of rest period	110 beats per minute	Shorten next work period by 33%
Oral temperature	Beginning of rest period	99°F (after thermometer is under tongue for 3 minutes) 100.6°F	Shorten next work period by 33% Prohibit work in impermeable clothing
Body weight	1. Before workday begins (a.m.) 2. After workday ends (p.m.)		Increase fluid intake

COLD STRESS

Cold stress (Hypothermia)

In hypothermia the core body temperature drops below 95°F. Hypothermia can be attributed to a decrease in heat production, increased heat loss or both.

Prevention

Institute the following steps to prevent overexposure of workers to cold:

1. Maintain body core temperature at 98.6°F or above by encouraging workers to drink warm liquids during breaks (preferably not coffee) and wear several layers of clothing that can keep the body warm even when the clothing is wet.
2. Avoid frostbite by adequately covering hands, feet and other extremities. Clothing such as insulated gloves or mittens, earmuffs and hat liners should be worn. To prevent contact frostbite (from touching metal and cold surfaces below 20°F), workers should wear gloves. Tool handles should be covered with insulating material.
3. Adjust work schedules to provide adequate rest periods. When feasible, rotate personnel and perform work during the warmer hours of the day.
4. Provide heated shelter. Workers should remove their outer layer(s) of clothing while in the shelter to allow sweat to evaporate.
5. In the event that wind barriers are constructed around an intrusive operation (such as drilling), the enclosure must be properly vented to prevent the buildup of toxic or explosive gases or vapors. Care must be taken to keep a heat source away from flammable substances.
6. Using a wind chill chart such as the one in Table 3, obtain the equivalent chill temperature (ECT) based on actual wind speed and temperature. Refer to the ECT when setting up work warm-up schedules, planning appropriate clothing, etc. Workers should use warming shelters at regular intervals at or below an ECT of 20°F. For exposed skin, continuous exposure should not be permitted at or below an ECT of -25°F.

Frostbite

Personnel should be aware of symptoms of frostbite/hypothermia. If the following symptoms are noticed in any worker, he/she should immediately go to a warm shelter.

Condition	Skin Surface	Tissue Under Skin	Skin Color
Frostnip	Soft	Soft	Initially red, then white
Frostbite	Hard	Soft	White and waxy
Freezing	Hard	Hard	Blotchy, white to yellow-gray to gray

1. *Frostnip* is the incipient stage of frostbite, brought about by direct contact with a cold object or exposure of a body part to cool/cold air. Wind chill or cold water also can be major factors. This condition is not serious. Tissue damage is minor and the response to care is good. The tip of the nose, tips of ears, upper cheeks and fingers (all areas generally exposed) are most susceptible to frostnip.

2. *Treatment of frostnip*: Care for frostnip by warming affected areas. Usually the worker can apply warmth from his/her bare hands, blow warm air on the site, or, if the fingers are involved, hold them in the armpits. During recovery, the worker may complain of tingling or burning sensation, which is normal. If the condition does not respond to this simple care, begin treatment for frostbite.

3. *Frostbite*: The skin and subcutaneous layers become involved. If frostnip goes untreated, it becomes superficial frostbite. This condition is serious. Tissue damage may be serious. The worker must be transported to a medical facility for evaluation. The tip of the nose, tips of ears, upper cheeks and fingers (all areas generally exposed) are most susceptible to frostbite. The affected area will feel frozen, but only on the surface. The tissue below the surface must still be soft and have normal response to touch. *DO NOT* squeeze or poke the tissue. The condition of the deeper tissues can be determined by gently palpating the affected area. The skin will turn mottled or blotchy. It may also be white and then turn grayish-yellow.

4. *Treatment of frostbite*: When practical, transport victim as soon as possible. Get the worker inside and keep him/her warm. Do not allow any smoking or alcohol consumption. Thaw frozen parts by immersion, re-warming in a 100^{o}F to 106^{o}F water bath. Water temperature will

drop rapidly, requiring additional warm water throughout the process. Cover the thawed part with a dry sterile dressing. Do not puncture or drain any blisters.

NOTE: Never listen to myths and folk tales about the care of frostbite. *Never* rub a frostbitten or frozen area. *Never* rub snow on a frostbitten or frozen area. Rubbing the area may cause serious damage to already injured tissues. Do not attempt to thaw a frozen area if there is any chance it will be re-frozen.

5. *General cooling/Hypothermia*: General cooling of the body is known as systemic hypothermia. This condition is not a common problem unless workers are exposed to cold for prolonged periods of time without any shelter.

Body Temperature	°C	Symptoms
99-96	37-35.5	Intense, uncontrollable shivering
95-91	35.5-32.7	Violent shivering persists. If victim is conscious, he has difficulty speaking.
90-86	32-30	Shivering decreases and is replaced by strong muscular rigidity. Muscle coordination is affected. Erratic or jerkey movements are produced. Thinking is less clear. General comprehension is dulled. There may be total amnesia. The worker is generally still able to maintain the appearance of psychological contact with his surroundings.
85-81	29.4-27.2	Victim becomes irrational, loses contact with his environment, and drifts into a stuporous state. Muscular rigidity continues. Pulse and respirations are slow and the worker may develop cardiac arrhythmias.
80-78	26.6-18.5	Victim becomes unconscious. He does not respond to the spoken word. Most reflexes cease to function. Heartbeat becomes erratic
Below 78	25.5	Cardiac and respiratory centers of the brain fail. Ventricular fibrillation occurs; probably edema and hemorrhage in the lungs; death.

6. *Treatment of hypothermia*: Keep worker dry. Remove any wet clothing and replace with dry clothes, or wrap person in dry blankets. Keep person at rest. Do not allow him/her to move around. Transport the victim to a medical facility as soon as possible.

PWGC
Strategic Environmental Engineering Solutions

TABLE 3[(1)]
COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED AS AN EQUIVALENT TEMPERATURE (UNDER CALM CONDITIONS)

Estimated wind Speed (in mph)	Actual Temperature Reading (^{o}F)P											
	50	40	30	20	10	0	10	20	30	40	50	60
	Equivalent Chill Temperature (^{o}F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	15	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-146
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER in < hr with dry skin. Maximum danger of false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one minute			GREAT DANGER Flesh may freeze within 30 seconds.				
	Trench foot and imersion foot may occur at any point on this chart											

Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

(1) Reproduced from American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices for 1985-1986, p.01.

Appendix D
Medical Data Sheet

MEDICAL DATA SHEET

The brief medical data sheet shall be completed by on-site personnel and will be kept in the Support Zone by the HSO as a project record during the conduct of site operations. It accompanies any personnel when medical assistance is needed or if transport to a hospital is required.

Project:
Name: Home Telephone: _____
Address: _____
Age: _____ Height: _____ Weight: _____ Blood Type: _____

Name and Telephone Number of Emergency Contact: _____

Drug or Other Allergies: _____

Particular Sensitivities: _____

Do You Wear Contacts? _____

Provide A Check List Of Previous Illnesses: _____

What Medications Are You Presently Using?_____

Do You Have Any Medical Restrictions? _____

Name, Address, And Phone Number Of Personal Physician:

Appendix E
General Health and Safety Work Practices

GENERAL HEALTH AND SAFETY WORK PRACTICES

1. Site personnel must attend each day's Daily Briefing and sign the attendance sheet.

2. Any individual taking prescribed drugs shall inform the FTL/HSO of the type of medication. The FTL/HSO will review the matter with the HSM and the Corporate Medical Consultant (CMC), who will decide if the employee can safely work on-site while taking the medication.

3. The personal protective equipment specified by the FTL/HSO and/or associated procedures shall be worn by site personnel. This includes hard hats and safety glasses which must be worn in active work areas.

4. Facial hair (beards, long sideburns or mustaches) which may interfere with a satisfactory fit of a respirator mask is not allowed on any person who may be required to wear a respirator.

5. Personnel must follow proper decontamination procedures and shower as soon as possible upon completion of work shift.

6. Eating, drinking, chewing tobacco or gum, smoking and any other practice that may increase the possibility of hand-to-mouth contact is prohibited in the exclusion zone or the contamination reduction zone. (Exceptions may be permitted by the HSM to allow fluid intake during heat stress conditions).

7. Lighters, matches, cigarettes and other forms of tobacco are prohibited in the Exclusion Zone.

8. Signs and demarcations shall be followed. Such signs and demarcation shall not be removed, except as authorized by the FTL/HSO.

9. No one shall enter a permit-required confined space without a permit and appropriate training. Confined space entry permits shall be implemented as issued.

10. Personnel must follow Hot Work Permits as issued.

11. Personnel must use the Buddy System in the Exclusion Zone.

12. Personnel must follow the work-rest regimens and other practices required by the heat stress program.

13. Personnel must follow lockout/tagout procedures when working on equipment involving moving parts or hazardous energy sources.

14. No person shall operate equipment unless trained and authorized.

15. No one may enter an excavation greater than four feet deep unless authorized by the Competent Person. Excavations must be sloped or shored properly. Safe means of access and egress from excavations must be maintained.

16. Ladders and scaffolds shall be solidly constructed, in good working condition, and inspected prior to use. No one may use defective ladders or scaffolds.

17. Fall protection or fall arrest systems must be in place when working at elevations greater than six feet for temporary working surfaces and four feet for fixed platforms.

18. Safety belts, harnesses and lanyards must be selected by the Supervisor. The user must inspect the equipment prior to use. No defective personal fall protection equipment shall be used. Personal fall protection that has been shock loaded must be discarded.

19. Hand and portable power tools must be inspected prior to use. Defective tools and equipment shall not be used.

20. Ground fault interrupters shall be used for cord and plug equipment used outdoors or in damp locations. Electrical cords shall be kept out walkways and puddles unless protected and rated for the service.

21. Improper use, mishandling, or tampering with health and safety equipment and samples is prohibited.

22. Horseplay of any kind is prohibited.

23. Possession or use of alcoholic beverages, controlled substances, or firearms on any site is forbidden.

24. Incidents, no matter how minor, must be reported immediately to the Supervisor.

25. Personnel shall be familiar with the Site Emergency Action Plan, which is contained in Section 12 of the HASP/EAP.

The above Health and Safety Rules are not all inclusive and it is your responsibility to comply with regulations set forth by OSHA, the client, PWGC Supervisors, and the FTL/HSO.

Appendix F
Hospital Route Map and Directions

mapquest

Notes

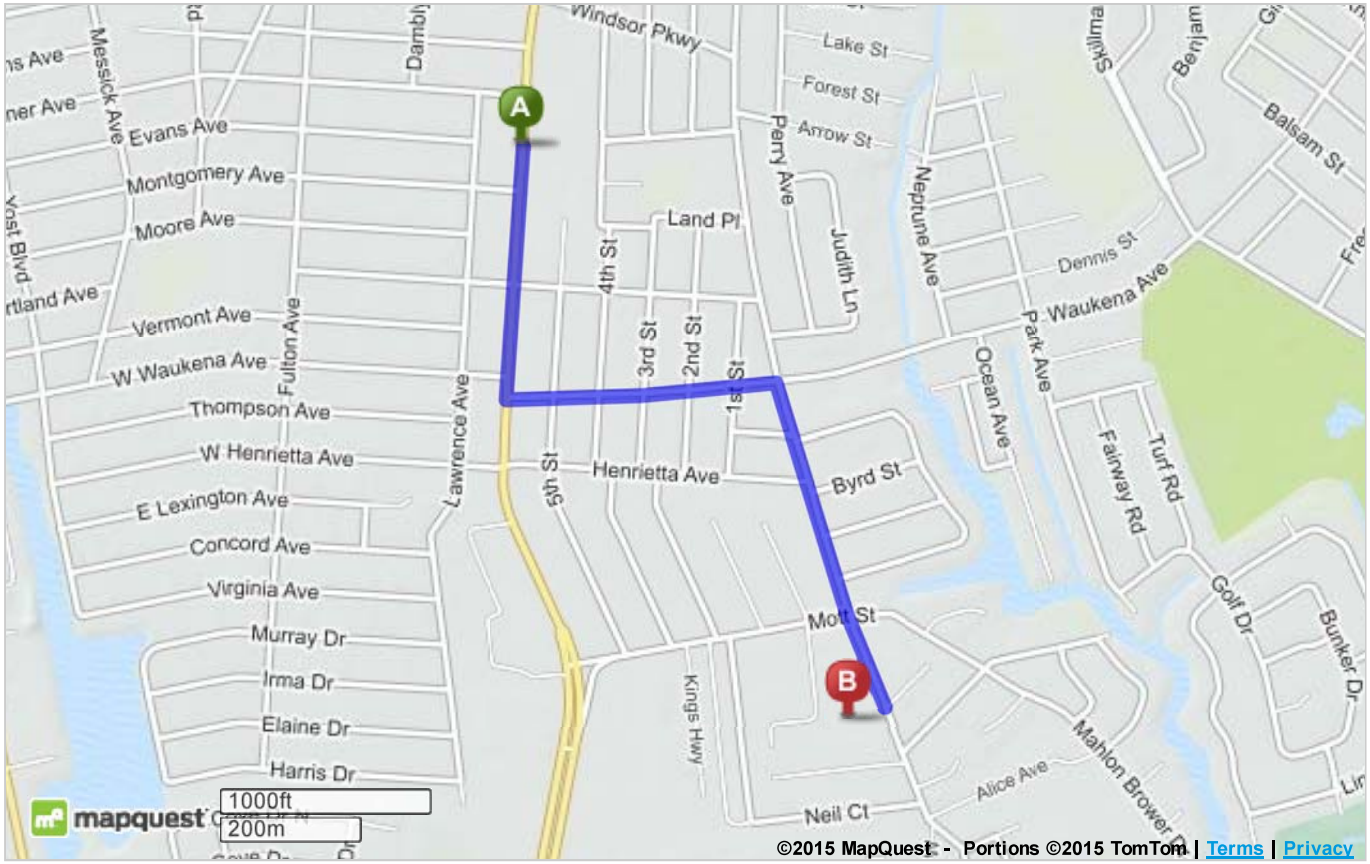
Trip to:

South Nassau Communities Hospital
3560 Oceanside Rd

Oceanside, NY 11572
(516) 763-3052
0.92 miles / 2 minutes

A	**3206 Long Beach Rd**, Oceanside, NY 11572-4110	**Download Free App**
	1. Start out going **south** on **Long Beach Rd** toward **Montgomery Ave**. Map	**0.3 Mi** *0.3 Mi Total*
	2. Take the 2nd **left** onto **Waukena Ave**. Map *Waukena Ave is just past W Waukena Ave* *Evergreen North Insurance is on the right* *If you reach Henrietta Ave you've gone a little too far*	**0.3 Mi** *0.6 Mi Total*
	3. Turn **right** onto **Oceanside Rd**. Map *Oceanside Rd is just past 1st St* *If you reach Neptune Ave you've gone about 0.1 miles too far*	**0.4 Mi** *0.9 Mi Total*
	4. **3560 OCEANSIDE RD** is on the **right**. Map *Your destination is 0.1 miles past Mott St* *If you reach Wrights Ln you've gone a little too far*	
B	**South Nassau Communities Hospital** 3560 Oceanside Rd, Oceanside, NY 11572 (516) 763-3052	

Total Travel Estimate: **0.92 miles - about 2 minutes**



Appendix G
Incident Report Form / Investigation Form

INCIDENT / NEAR MISS REPORT AND INVESTIGATION - PAGE 1 OF 2			
TYPE OF INCIDENT - CHECK ALL THAT APPLY			
☐ INJURY/ILLNESS	☐ VEHICLE DAMAGE	☐ PROPERTY DAMAGE	☐ FIRE
☐ SPILL/RELEASE	☐ PERMIT EXCEEDENCE	☐ NEAR MISS	☐ OTHER
GENERAL INFORMATION			
PROJECT NAME:	DATE OF REPORT:	REPORT NO.:	
DATE OF INCIDENT:	TIME:	DAY OF WEEK:	
LOCATION OF INCIDENT:			
WEATHER CONDITIONS:	ADEQUATE LIGHTING AT SCENE? ☐ YES ☐ NO ☐ N/A		
DESCRIBE WHAT HAPPENED (STEP BY STEP - USE ADDITIONAL PAGES IF NECESSARY)			
AFFECTED EMPLOYEE INFORMATION			
NAME:	EMPLOYEE: ☐ YES ☐ NO		
HOME ADDRESS:			
SOCIAL SECURITY NO.:	HOME PHONE NO.:		
JOB CLASSIFICATION:	YEARS IN JOB CLASSIFICATION:		
HOURS WORKED ON SHIFT PRIOR TO INCIDENT:	AGE:		
DID INCIDENT RELATE TO ROUTINE TASK FOR JOB CLASSIFICATION? ☐ YES ☐ NO			
INJURY/ILLNESS INFORMATION			
NATURE OF INJURY OR ILLNESS:			
OBJECT/EQUIPMENT/SUBSTANCE CAUSING HARM:			
FIRST AID PROVIDED? ☐ YES ☐ NO			
IF YES, WHERE WAS IT GIVEN: ☐ ON-SITE ☐ OFF-SITE			
IF YES, WHO PROVIDED FIRST AID:			
WILL THE INJURY/ILLNESS RESULT IN: ☐ RESTRICTED DUTY ☐ LOST TIME ☐ UNKNOWN			

INCIDENT / NEAR MISS REPORT AND INVESTIGATION - PAGE 2 OF 2 REPORT NO.
MEDICAL TREATMENT INFORMATION
WAS MEDICAL TREATMENT PROVIDED? ☐ YES ☐ NO
IF YES, WAS MEDICAL TREATMENT PROVIDED: ☐ ON-SITE ☐ DR.'S OFFICE ☐ HOSPITAL
NAME OF PERSON(S) PROVIDING TREATMENT:
ADDRESS WHERE TREATMENT WAS PROVIDED:
TYPE OF TREATMENT:
VEHICLE AND PROPERTY DAMAGE INFORMATION
VEHICLE/PROPERTY DAMAGED:
DESCRIPTION OF DAMAGE:
SPILL AND AIR EMISSIONS INFORMATION:
SUBSTANCE SPILLED OR RELEASED: FROM WHERE: TO WHERE:
ESTIMATED QUANTITY/DURATION:
CERCLA HAZARDOUS SUBSTANCE? ☐ YES ☐ NO
REPORTABLE TO AGENCY? ☐ YES ☐ NO SPECIFY:
WRITTEN REPORT: ☐ YES ☐ NO TIME FRAME:
RESPONSE ACTION TAKEN:
PERMIT EXCEEDENCE
TYPE OF PERMIT: PERMIT #:
DATE OF EXCEEDENCE: DATE FIRST KNOWLEDGE OF EXCEEDENCE:
PERMITTED LEVEL OR CRITERIA:
EXCEEDENCE LEVEL OR CRITERIA:
REPORTABLE TO AGENCY? ☐ YES ☐ NO SPECIFY:
WRITTEN REPORT: ☐ YES ☐ NO TIME FRAME:
RESPONSE ACTION TAKEN:
NOTIFICATIONS
NAMES OF PERSONNEL NOTIFIED: DATE/TIME:
CLIENT NOTIFIED: DATE/TIME:
AGENCY NOTIFIED: DATE/TIME:
CONTACT NAME:
PERSONS PREPARING REPORT
EMPLOYEE'S NAME:(PRINT) SIGN:
SUPERVISOR'S NAME:(PRINT) SIGN:

INVESTIGATIVE REPORT			
DATE OF INCIDENT:	DATE OF REPORT:	REPORT NUMBER:	
INCIDENT COST: ESTIMATED: $_____	ACTUAL: $_____		
OSHA RECORDABLE(S): □ YES □ NO # RESTRICTED DAYS ____ # DAYS AWAY FROM WORK ____			
CAUSE ANALYSIS			
IMMEDIATE CAUSES - WHAT ACTIONS AND CONDITIONS CONTRIBUTED TO THIS EVENT?			
BASIC CAUSES - WHAT SPECIFIC PERSONAL OR JOB FACTORS CONTRIBUTED TO THIS EVENT?			
ACTION PLAN			
REMEDIAL ACTIONS - WHAT HAS AND OR SHOULD BE DONE TO CONTROL EACH OF THE CAUSES LISTED?			
ACTION	PERSON RESPONSIBLE	TARGET DATE	COMPLETION DATE
PERSONS PERFORMING INVESTIGATION			
INVESTIGATOR'S NAME: (PRINT)	SIGN:	DATE:	
INVESTIGATOR'S NAME: (PRINT)	SIGN:	DATE:	
INVESTIGATOR'S NAME: (PRINT)	SIGN:	DATE:	
MANAGEMENT REVIEW			
PROJECT MANAGER: (PRINT)	SIGN:	DATE:	
COMMENTS:			
H&S MANAGER: (PRINT)	SIGN:	DATE:	
COMMENTS:			

EXAMPLES OF IMMEDIATE CAUSES

Substandard Actions

1. Operating equipment without authority
2. Failure to warn
3. Failure to secure
4. Operating at improper speed
5. Making safety devices inoperable
6. Removing safety devices
7. Using defective equipment
8. Failure to use PPE properly
9. Improper loading
10. Improper placement
11. Improper lifting
12. Improper position for task
13. Servicing equipment in operation
14. Under influence of alcohol/drugs
15. Horseplay

Substandard Conditions

1. Guards or barriers
2. Protective equipment
3. Tools, equipment, or materials
4. Congestion
5. Warning system
6. Fire and explosion hazards
7. Poor housekeeping
8. Noise exposure
9. Exposure to hazardous materials
10. Extreme temperature exposure
11. Illumination
12. Ventilation
13. Visibility

EXAMPLES OF BASIC CAUSES

Personal Factors

1. Capability
2. Knowledge
3. Skill
4. Stress
5. Motivation
6. Work Standards
7. Wear and tear
8. Abuse or misuse

Job Factors

1. Supervision
2. Engineering
3. Purchasing
4. Maintenance
5. Tools/equipment

MANAGEMENT PROGRAMS FOR CONTROL OF INCIDENTS

1. Leadership and administration
2. Management training
3. Planned inspections
4. Task analysis and procedures
5. Task observation
6. Emergency preparedness
7. Organizational rules
8. Accident/incident analysis
9. Personal protective equipment
10. Health control
11. Program audits
12. Engineering controls
13. Personal communications
14. Group meetings
15. General promotion
16. Hiring and placement
17. Purchasing controls

Appendix H
Daily Briefing Sign-In Sheet

DAILY BRIEFING SIGN-IN SHEET

Date: _____ Project Name/Location: _____

Person Conducting Briefing: _____

1. AWARENESS (topics discussed, special safety concerns, recent incidents, etc.)

_____

_____

_____

2. OTHER ISSUES (HASP/EAP changes, attendee comments, etc.)

_____

_____

_____

3. ATTENDEES (Print Name):

1.	21.
2.	22.
3.	23.
4.	24.
5.	25.
6.	26.
7.	27.
8.	28.
9.	29.
10.	30.
11.	31.
12.	32.
13.	33.
14.	34.
15.	35.
16.	36.
17.	37.
18.	38.
19.	39.
20.	40.

APPENDIX C

QUALITY ASSURANCE PROJECT PLAN

P.W. GROSSER CONSULTING, INC.
P.W. GROSSER CONSULTING ENGINEER & HYDROGEOLOGIST, P.C.
PHONE: 631.589.6353
PWGROSSER.COM
630 JOHNSON AVENUE, STE 7
BOHEMIA, NY 11716
LONG ISLAND • MANHATTAN • SARATOGA SPRINGS • SYRACUSE • SEATTLE • SHELTON

JAY'S LUCKY CLEANERS
3220-3224 LONG BEACH ROAD
OCEANSIDE, NEW YORK
NYSDEC BCP ID: C130219

QUALITY ASSURANCE PROJECT PLAN

SUBMITTED TO:

New York State Department of Environmental Conservation
Region 1
50 Circle Road
Stony Brook, New York 11790

PREPARED FOR:

United Properties Corp.
1975 Hempstead Turnpike, Suite 309
East Meadow, New York 11554

PREPARED BY:

P.W. Grosser Consulting, Inc.
630 Johnson Avenue, Suite 7
Bohemia, New York 11716
Phone: 631-589-6353
Fax: 631-589-8705

James Rhodes, PG, COO jimr@pwgrosser.com
Thomas Melia, PG, Sr. Project Manager thomasm@pwgrosser.com

PWGC Project Number: BBU1801

JULY 2020

QUALITY ASSURANCE PROJECTR PLAN
JAY'S LUCKY CLEANERS
NYSDEC BCP ID: C130219

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CLIENT DRIVEN SOLUTIONS PHONE: 631.589.6353 PWGROSSER.COM 630 JOHNSON AVENUE, STE 7 BOHEMIA, NY 11716
LONG ISLAND • MANHATTAN • ALBANY • SYRACUSE • SEATTLE • SHELTON

1.0 QUALITY ASSURANCE PROJECT PLAN

This Quality Assurance Project Plan (QAPP) presents the objectives, functional activities, methods, and QA/QC requirements associated with sample collection and laboratory analysis for characterization and remedial activities at the Jay's Lucky Cleaner's Site (C130219). The QAPP follows requirements detailed in New York State Department of Environmental Conservation (NYSDEC) DER-10, Section 2.

2.0 PROJECT ORGANIZATION

The investigative efforts defined in this RIWP will be implemented by PWGC on behalf of United Properties Corp. The following identifies the responsibilities of various organizations supporting the RI:

- The NYSDEC Project Manager (Sarken Dressler) will be responsible for reviewing and approving this work plan, coordinating approval of requested modifications, and providing guidance on regulatory requirements.
- The PWGC Program Manager (Kris Almskog and/or Paul Boyce) will provide technical expertise for review of the project plans, reports and ongoing field activities.
- The PWGC Quality Assurance Manager (Andrew Lockwood) will confirm the quality of work associated with the project is in accordance with all project plans.
- PWGC Project Manager (Thomas Melia) will be responsible for the day-to-day project management, task leadership, and project engineering support and for the planning and implementation of RI activities. The Project Manager is responsible for ensuring that the requirements of this RI work plan are implemented. The project manager will also act as the Site Health and Safety Manager (HSM).
- PWGC Field Team Leader (Kaitlyn Crosby or designee) will be responsible for sample collection, oversight of subcontractor personnel, and coordination of daily field activities. The Field Team Leader will act as the Site Health and Safety Officer ensuring implementation of the Site Health and Safety Plan.
- A NYSDOH Environmental Laboratory Accreditation Program (ELAP) certified laboratory (Alpha Analytical Laboratories of Westborough, Massachusetts ELAP ID 11148 and 11627) will be contracted to perform required analyses and reporting, including Analytical Services Protocol (ASP) Category B Deliverables, which will allow for data validation.
- An independent third-party data validator (Laboratory Data Consultants of Carlsbad, California) will be contracted to perform data validation and prepare a Data Usability Summary Report (DUSR) in accordance with Section 3.7.
- Subcontractors will perform surveying, drilling, remedial activities and/or sampling at the direction of the Field Team Leader in accordance with project work plans.

3.0 LABORATORY ANALYSIS

Requirements for sample analysis are described below. Samples will be submitted to a NYSDOH ELAP certified laboratory (Alpha Analytical) for analysis. Analytical methods, preservation, container requirements, and holding times are summarized below:

ANALYTICAL METHODS (SOIL)

Analyte/ Analyte Group	Matrix	Method/ SOP	Container(s) (number, size & type per sample)	Preservation	Preparation Holding Time	Analytical Holding Time	Estimated Number of Samples to be Collected
TAL Metals	Soil	EPA 6010C	1 x 2 oz, glass	Metals ex	6 months	6 months	12 to 24
TCL VOCs	Soil	EPA 8260C	3 x 40 ml VOA, glass vial	1 x Methanol 2 x DI H_2O Cool $\leq$ 6 °C	48 hours	14 Days	12 to 24
TCL SVOCs	Soil	EPA 8270D	1 x 8 oz, glass	Cool $\leq$ 6 °C	14 days	40 days	12 to 24
PCBs	Soil	EPA 8082A	1 x 8 oz, glass	Cool $\leq$ 6 °C	14 days	40 Days	12 to 24
Cyanide	Soil	EPA 9010C/9012B	1 x 250 ml, plastic	Cool $\leq$ 6 °C	14 days	14 days	12 to 24
Pesticides	Soil	EPA 8081B	1 x 8 oz, glass	Cool $\leq$ 6 °C	14 days	40 days	12 to 24
PFAS	Soil	EPA 537 (modified)	1 x 8 oz, glass	None	14 days	28 days	12 to 24
1,4-dioxane*	Soil	EPA 8270 (SIM)	1 x 8oz, glass	Cool $\leq$ 6 °C	14 days	40 days	12 to 24
*SIM Mode only necessary if EPA 8260 analysis cannot meet a MDL of 0.1 mg/kg							

ANALYTICAL METHODS (GROUNDWATER)

Analyte/ Analyte Group	Matrix	Method/ SOP	Container(s) (number, size & type per sample)	Preservation	Preparation Holding Time	Analytical Holding Time	Estimated Number of Samples to be Collected
Metals	Water	EPA 6020A	1 x 500 ml plastic	HNO_3	6 months	6 months	3
VOCs	Water	EPA 8260C	3 x 40 ml VOA, glass vial	HCl Cool $\leq$ 6 °C	48 hours	14 Days	3
SVOCs	Water	EPA 8270D	2 x 1000 ml, amber glass	Cool $\leq$ 6 °C	7 days	40 days	3
PCBs	Water	EPA 8082A	1 x 1000 ml, amber glass	Cool $\leq$ 6 °C	7 days	40 Days	3
Cyanide	Water	EPA 9010C/9012B	1 x 250 ml, plastic	NaOH	14 days	14 days	3
Pesticides	Water	EPA 8081B	1 x 500 ml, amber glass	Cool $\leq$ 6 °C	7 days	40 days	3

Analyte/ Analyte Group	Matrix	Method/ SOP	Container(s) (number, size & type per sample)	Preservation	Preparation Holding Time	Analytical Holding Time	Estimated Number of Samples to be Collected
PFAS	Water	EPA 537 (modified)	3 x 250 ml HDPE, unlined cap	Trizma Cool < 6 °C	14 days	28 days	3
1,4-Dioxane*	Water	EPA 8270D SIM Mode	2 x 1000 ml, amber glass	Cool ≤ 6 °C	7 days	40 days	3
*SIM Mode to be used to meet required detection limit of 0.35 ug/L							

Laboratory Method Detection Limits (MDLs) and Reporting Limits (RLs) for PFAS analysis are detailed in the tables below:

PFAS MDLs & RLs (SOIL)

Analyte	CAS Number	RL (ng/g)	MDL (ng/g)
Perfluorobutanoic Acid (PFBA)	375-22-4	1	0.0213
Perfluoropentanoic Acid (PFPeA)	2706-90-3	1	0.01035
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	1	0.0635
Perfluorohexanoic Acid (PFHxA)	307-24-4	1	0.064
Perfluoroheptanoic Acid (PFHpA)	375-85-9	1	0.064
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	1	0.057
Perfluorooctanoic Acid (PFOA)	335-67-1	1	0.04105
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	27619-97-2	1	0.198
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	1	0.136
Perfluorononanoic Acid (PFNA)	375-95-1	1	0.083
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	1	0.1205
Perfluorodecanoic Acid (PFDA)	335-76-2	1	0.072
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	39108-34-4	1	0.275
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	1	0.103
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1	0.056
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	1	0.097
Perfluorooctanesulfonamide (FOSA)	754-91-6	1	0.1025
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	1	0.09
Perfluorododecanoic Acid (PFDoA)	307-55-1	1	0.086
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1	0.062
Perfluorotetradecanoic Acid (PFTA)	376-06-7	1	0.07
PFOA/PFOS, Total		1	0.04105

PFAS MDLs & RLs (GROUNDWATER)

Analyte	CAS Number	RL (ng/L)	MDL (ng/L)
Perfluorobutanoic Acid (PFBA)	375-22-4	2	0.3732
Perfluoropentanoic Acid (PFPeA)	2706-90-3	2	0.464
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	2	0.38
Perfluorohexanoic Acid (PFHxA)	307-24-4	2	0.492
Perfluoroheptanoic Acid (PFHpA)	375-85-9	2	0.372
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	2	0.436
Perfluorooctanoic Acid (PFOA)	335-67-1	2	0.46
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	27619-97-2	2	0.194
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	2	0.52
Perfluorononanoic Acid (PFNA)	375-95-1	2	0.436
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	2	0.56
Perfluorodecanoic Acid (PFDA)	335-76-2	2	0.62
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	39108-34-4	2	0.2908
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	2	0.2504
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	2	0.424
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	2	0.386
Perfluorooctanesulfonamide (FOSA)	754-91-6	2	0.556
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	2	0.3728
Perfluorododecanoic Acid (PFDoA)	307-55-1	2	0.592
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	2	0.314
Perfluorotetradecanoic Acid (PFTA)	376-06-7	2	0.988
PFOA/PFOS, Total		2	0.46

3.1 Soil Samples

Soil samples will be collected as described in project work plans. Analysis will conform to NYSDEC Analytical Services Protocol (ASP) Category B data deliverables in accordance with NYSDEC DER-10, Appendix 2B, 1.0 (b), including calibration standards, surrogate recoveries, and chromatograms.

3.2 Groundwater Samples

Groundwater samples will be collected as described in project work plans. Analysis will conform to NYSDEC Analytical Services Protocol (ASP) Category B data deliverables in accordance with NYSDEC DER-10, Appendix 2B, 1.0 (b), including calibration standards, surrogate recoveries, and chromatograms.

3.3 Field/Laboratory Data Control Requirements

Quality Control (QC) procedures will be followed in the field and at the laboratory to facilitate that reliable data are obtained. When performing field sampling, care shall be taken to prevent the cross-contamination of sampling equipment, sample bottles, and other equipment that could compromise sample integrity. QC samples will include the following:

- Blind Duplicates – one per 20 environmental samples for each matrix sampled.
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) - one per 20 environmental samples for each matrix sampled.
- Equipment Blank – one per day for each matrix sampled.
- Field Blank – one per day when PFAS samples are collected.
- Trip Blank – one per day.

QA/QC Sample analysis will conform to NYSDEC ASP Category B data deliverables in accordance with NYSDEC DER-10, Appendix 2B, 1.0 (b), including calibration standards, surrogate recoveries, and chromatograms.

3.4 Special Sampling Considerations for PFAS Sampling

In the event that PFAS samples are collected, special consideration must be made to avoid cross contamination. There are several potential sources of PFAS that could contribute to the cross-contamination of environmental samples collected during the RI. Weatherproof clothing, pens, logbooks, cosmetics, personal hygiene products, insect repellents, and sampling equipment could contain PFAS that could lead to false positive sampling results.

To ensure that the analytical results obtained are representative of the actual site conditions several measures should be taken:

- Collection of appropriate field QA/QC samples (blanks, duplicates, equipment rinseate samples, etc.) as detailed in Section 5.3.
- Analysis by the analytical laboratory using established laboratory QA/QC procedures and methods as detailed in Section 5.3.
- During decon, non-dedicated equipment to be used for PFAS sampling will be rinsed with PFAS free water supplied by the laboratory. Equipment will be allowed to fully air dry before use.
- New high-density polyethylene (HDPE) tubing shall be used at each sample location.
- Groundwater samples will be collected in laboratory supplied HDPE containers.

- New nitrile gloves shall be worn between each sample interval.
- Only clean cotton or synthetic clothes shall be worn – preferably washed more than six times, and without the use of fabric softeners. No waterproof or insecticide treated clothing, boots or rain jackets made or treated with Teflon products shall be used at the collection site. This includes all Gore-Tex® and Tyvek® products.
- Do not apply moisturizers or hand creams to hands or face on the day of sampling. No sunblock or insect repellants. Do not bring packaged food to the work site or use aluminum foil.
- Field notes shall be taken using a computer tablet or by using ink pens on non-water proof plain paper attached to a metal clipboard. Do not use Sharpies or markers. Transcribe field notes to Chain-of-Custody forms and official field books when back in the office after the collection process.
- For groundwater samples use only laboratory supplied 250 ml polypropylene sample bottles. Sample bottles should be pre-preserved by the laboratory, if dictated by the analysis method.
- Print labels before going into the field and apply to the sample containers.
- Use only laboratory supplied PFAS-free water for trip, field and equipment blanks.
- Place each sample container in a separate polypropylene zip-lock bag.
- For the shipping coolers, use only regular crushed ice packaged in polypropylene zip-lock plastic bags.
- Use only laboratory supplied shipping coolers that were used to ship sample containers for this project. Tape the cooler shut before shipping samples to the laboratory.

3.5 Sample Identification

Each sample will be identified with a set of information relating individual sample characteristics. Required information consists of Sample Designation, Depth, Date, Time, and Matrix. Examples of sample IDs are shown below.

- EP001 (endpoint soil sample 001)
- SB001(0-2') (soil sample, boring 001 from 0 to 2 feet)
- GW001(6-8') (groundwater sample, soil boring 001 from 6 to 8 feet)
- MW004 (groundwater sample, permanent monitoring well 004)
- CW001 (10-15') (groundwater sample, cluster well 001, 10 to 15 foot interval)
- SV001 (permanent soil vapor point 001
- SS001 (temporary sub-slab vapor point 001)
- IA001 (indoor air sample 001)

- AA001 (ambient air quality sample 001)

Sample frequency, locations, depths, and nomenclature may change subject to field decisions and professional judgment.

3.6 Chain-of-Custody, Sample Packaging and Shipment

Each day that samples are collected, a chain-of-custody/request for analysis form will be completed and submitted to the laboratory with samples to be analyzed. A copy of the chain-of-custody will be retained by the Project Manager. The chain-of-custody will include the project name, sampler's signature, sample IDs, date and time of sample collection, and analysis requested.

Samples will be packaged and shipped in a manner that maintains sample preservation requirements during transport (i.e., ice to keep samples cool until receipt at the laboratory), ensures that sample holding times can be achieved by the laboratory, and prevents samples from being tampered with.

If a commercial carrier ships samples, a bill of lading (waybill) will be used as documentation of sample custody. Receipts for bills of lading and other documentation of shipment shall be maintained as part of the permanent custody documentation. Commercial carriers are not required to sign the chain-of-custody as long as it is enclosed in the shipping container and evidence tape (custody seal) remains in place on the shipping container.

3.7 Data Usability and Validation

The main purpose of the data is for use in defining the extent of contamination at the site, to aid in evaluation of potential human health and ecological exposure assessments, and to support remedial action decisions. Based upon this, data usability and validation will be performed as described below. Complete data packages will be archived in the project files, and if deemed necessary additional validation can be performed using procedures in the following sections.

3.7.1 Data Usability and Validation Requirements

Data usability and validation are performed on analytical data sets, primarily to confirm that sampling and chain-of-custody documentation are complete, sample IDs can be tied to specific sampling locations, samples were analyzed within the required holding times, and analyses are reported in conformance with NYSDEC ASP, Category B data deliverable requirements as applicable to the method utilized.

3.7.2 Data Usability and Validation Methods

A designee of the PWGC Project Manager will complete a data usability evaluation for the data collected during the RI and a data usability summary report (DUSR) will be prepared. The DUSR will be prepared in accordance with NYSDEC DER-10, Appendix 2B.

Independent third-party data validation will be performed on 5% of the sample data, or on one sample from each sample delivery group (SDG), whichever is greater. Data validation will be performed by a qualified subcontractor independent of the project.

4.0 FIELD EQUIPMENT CALIBRATION

Equipment will be inspected and approved by the Field Team Leader before being used. Equipment will be calibrated to factory specifications, if required. Monitoring equipment will be calibrated following manufacturers recommended schedules. Daily field response checks and calibrations will be performed as necessary (i.e. PID calibrations) following manufacturers standard operating procedures. Equipment calibrations will be documented in a designated field logbook.

5.0 EQUIPMENT DECONTAMINATION

In order to minimize the potential for cross-contamination, non-dedicated drilling and sampling equipment shall be properly decontaminated prior to and between sampling/drilling locations.

5.1 General Procedures

Drilling equipment will be decontaminated in a designated area. Sampling equipment and probes will be decontaminated in an area covered with plastic sheeting near the sampling location. Waste material generated during decontamination activities will be containerized, stored and disposed of in accordance with the procedures detailed in Section 5.9. Decontamination of sampling equipment shall be kept to a minimum, and wherever possible, dedicated sampling equipment shall be used. Personnel directly involved in equipment decontamination shall wear appropriate personal protective equipment (PPE).

5.2 Drilling Equipment

Drilling equipment shall be decontaminated prior to performance of the first boring/excavation and between all subsequent borings/excavations. This shall include hand tools, casing, augers, drill rods, temporary well material and other related tools and equipment. Water used during drilling and/or steam cleaning operations shall be from a potable source.

5.3 Sampling Equipment

Sampling equipment (i.e., trowels, knives, split-spoons, bowls, hand augers, etc...) will be decontaminated prior to each use as follows:

- Laboratory-grade glassware detergent and tap water scrub to remove visual contamination
- Generous tap water rinse
- Distilled water rinse

5.4 Meters and Probes

All meters and probes that are used in the field (other than those used solely for air monitoring purposes, e.g., PID meters) will be decontaminated between uses as follows:

- Laboratory-grade detergent and tap water solution wash
- Tap water rinse
- Distilled water rinse (triple rinse)

6.0 FIELD DOCUMENTATION

Documentation will take place on either appropriate forms or in a dedicated site logbook. Permanent black or blue ink will be used to record information in the logbook. Errors in field documentation will be lined through, initialed, dated, and corrected. Forms will be kept by the PWGC Field Team Leader during the field activities. Field activities will be documented in the field logbook. The logbook will contain waterproof pages that are consecutively numbered and be permanently bound with a hard cover. Upon completion of daily activities, unused portions of pages will be lined-through and initialed.

The primary purpose of the field logbook is to document the daily field activities and to provide descriptions of each activity. All entries in the field logbook will be recorded and dated by person making the entry.

APPENDIX D

COMMUNITY AIR MONITORING PLAN

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JAY'S LUCKY CLEANERS
3220-3224 LONG BEACH ROAD
OCEANSIDE, NEW YORK
NYSDEC BCP ID: C130219

COMMUNITY AIR MONITORING PLAN

SUBMITTED TO:

New York State Department of Environmental Conservation
Division of Environmental Remediation
50 Circle Road
Stony Brook, New York 11790

ON BEHALF OF:

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PWGC Project Number: UPC1905

JULY 2020

COMMUNITY AIR MONITORING PLAN
JAY'S LUCKY CLEANERS
NYSDEC BCP ID: C130219

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1.0 INTRODUCTION

This Community Air Monitoring Plan (CAMP) provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial investigation) from potential airborne contaminant releases resulting from Remedial Investigation (RI) at 3220-3224 Long Beach Road, Oceanside, New York.

The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the remedial work did not spread contamination off-site through the air.

Based on previous investigations at the site, the primary concerns for this site are volatile organic compounds (VOCs) and dust particulates.

1.1 Regulatory Requirements

This CAMP was established in accordance with the following requirements:

- 29 CFR 1910.120(h): This regulation specifies that air shall be monitored to identify and quantify levels of airborne hazardous substances and health hazards, and to determine the appropriate level of protection for workers.
- New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan (Appendix 1A): This guidance specifies that a community air-monitoring program shall be implemented to protect the surrounding community and to confirm that the work does not spread contamination off-site through the air.
- New York State Department of Environmental Conservation's (NYSDEC's) Fugitive Dust and Particulate Monitoring from DER-10 Technical Guidance for Site Investigation and Remediation (Appendix 1B) - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites: This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

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2.0 AIR MONITORING

The following sections contain information describing the types, frequency and location of real-time monitoring.

2.1 Real-Time Monitoring

This section addresses the real-time monitoring that will be conducted within the work area, and along the site's downwind perimeter, during all ground intrusive activities, such as drilling and test pit excavation.

The specific design and specifications of the remedial alternative will be more fully detailed in the Remedial Action Work Plan for the site.

2.1.1 Work Area

The following instruments will be used for work area monitoring:

- PhotoionizationDetector (PID)
- Dust Monitor

Table 1-1 presents a breakdown of each main activity and provides the instrumentation, frequency and location of the real-time monitoring for the site. Table 1-2 lists the Real-Time Air Monitoring Action Levels to be used in all work areas.

2.1.2 Community Air Monitoring Requirements

To establish ambient air background concentrations, air will be monitored at several locations around the site perimeter before investigation activities begin. These points will be monitored periodically in series during the site work. In addition, background levels at the property boundaries must be taken prior to commencement of the planned work.

Fugitive respirable dust will be monitored using a MiniRam Model PDM-3 aerosol monitor or equivalent, which is capable of measuring particulate matter less than 10 micrometers in size (PM-10). Air will be monitored for VOCs with a portable Photovac MicroTip PID or equivalent. Table 1-1 presents a breakdown of each main activity and provides the instrumentation, frequency and location of the real-time monitoring for the site. Table 1-2 lists the Real-Time Air Monitoring Action Levels to be used in all work areas. All air monitoring data is documented in a site log book by the designated site safety officer. PWGC's site safety officer or delegate must ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. All instruments will be zeroed daily and checked for accuracy. A daily log will be kept. If additional monitoring is

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required, the protocols will be developed and appended to this plan.

Table 1-1
Frequency and Location of Air Monitoring

ACTIVITY	AIR MONITORING INSTRUMENT	FREQUENCY AND LOCATION
Drilling, Sampling	PID	Continuous in Breathing Zone (BZ) and downwind perimeter of the work area during all ground intrusive activities or if odors become apparent during non-intrusive activities. Every 30 minutes in the BZ and at the downwind perimeter of the work area during non-intrusive activities.
Drilling, Sampling	Particulate (Dust, Mist or Aerosol) Meter	Continuous at the downwind perimeter of the work area during all ground intrusive activities. Every 30 minutes at the downwind perimeter of the work area during non-intrusive activities.

Table 1-2
Real-Time Air Monitoring Action Levels

AIR MONITORING INSTRUMENT	MONITORING LOCATION	ACTION LEVEL	SITE ACTION	REASON
PID	Breathing Zone	0-25 ppm, non-transient	None	Exposure below established exposure limits
PID	Breathing Zone	25-100 ppm, non-transient	Don APR	Based on potential exposure to VOCs
PID	Breathing Zone	>100 ppm, non-transient	Don ASR or SCBA, Institute vapor/odor suppression measures, Notify HSM.	Increased exposure to site contaminants, potential for vapor release to public areas.
PID	Work Area Perimeter*	< 1 ppm	None	Exposure below established exposure limits.
PID	Work Area Perimeter*	> 1 ppm	Stop work and implement vapor release response plan until readings return to acceptable levels, Notify HSM.	Increased exposure to site contaminants, potential for vapor release to public areas
Particulate (Dust, Mist or Aerosol) Meter	Work Area Perimeter*	< 150 µg/m^3	None	Exposure below established exposure limits.

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AIR MONITORING INSTRUMENT	MONITORING LOCATION	ACTION LEVEL	SITE ACTION	REASON
Particulate (Dust, Mist or Aerosol) Meter	Work Area Perimeter*	>150 µg/m^3	Stop work and immediately confirm the upwind background level. Implement dust suppression measures if the downwind PM-10 particulate level is 100 µg/m^3 greater than the upwind background level for a 15-minute period or if airborne dust is observed leaving the work area. Work may continue with dust suppression techniques provided that the downwind PM-10 particulate levels do not exceed 150 µg/m^3 above the upwind background level and provided that no visible dust is migrating from the work area. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 µg/m^3 above the upwind background level, stop work and reevaluate activities. Work may resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 µg/m^3 of the upwind background level and visible dust migration is prevented.	Increased exposure to site contaminants

* Monitoring location to be opposite the walls of occupied structures, next to vent intakes, as well as the downwind perimeter, unless they coincide.

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3.0 VAPOR EMISSION RESPONSE PLAN

This section is excerpted from the NYSDOH guidance for Community Air Monitoring Plan - Ground Intrusive Activities.

If the ambient air concentration of organic vapors exceeds 1 ppm above background at the perimeter of the work area, activities will be halted and monitoring continued. Vapor suppression measures can also be taken at this time. If the organic vapor level decreases below 1 ppm above background, work activities can resume.

If the organic vapor level is above 1 ppm at the perimeter of the work area or opposite the walls of occupied structures, activities must be shut down. When work shutdown occurs, downwind air monitoring as directed by the Site Health & Safety Officer (SHSO) will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission Response Plan Section.

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures: When work areas are within 20 feet of potentially exposed populations or occupied structures, continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s) (with appropriate pre-determined response levels and actions.) Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of work.
If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m3 or less at the monitoring point.

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Depending upon the nature of contamination and remedial activities, other parameters (e.g., exclusivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

Special Requirements for Indoor Work with Co-located Residences or Facilities: Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under "Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures" except that in this instance "nearby/occupied structures" would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g., weekends or evenings) when building occupancy is at a minimum.

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4.0 MAJOR VAPOR EMISSION RESPONSE PLAN

If any organic levels greater than 1 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If efforts to abate the emission source (see Section 5.0) are unsuccessful and if organic vapor levels are approaching 1 ppm above background for more than 15 minutes, then the Major Vapor Emission Response Plan shall automatically be placed into effect.

However, the Major Vapor Emission Response Plan shall be immediately placed in effect if organic vapor levels are greater than 10 ppm above background.

Upon activation, the following activities will be undertaken:

1. All emergency Response Contacts as listed in the Health & Safety Plan will go into effect.
2. The local police authorities will immediately be contacted by the Health & Safety Officer and advised of the situation.
3. Frequent air monitoring will be conducted at 15-minute intervals. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Health and Safety Officer.

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5.0 VAPOR SUPPRESSION TECHNIQUES

Vapor suppression techniques must be employed when action levels warrant the use of these techniques.

The techniques to be implemented for control of VOCs from stockpiled soil or from the open excavation will include one or more of the following:

- cover with plastic
- cover with “clean soil”
- application of hydro-mulch material or encapsulating foam
- limit working hours to favorable wind and temperature conditions

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6.0 DUST SUPPRESSION TECHNIQUES

Reasonable dust-suppression techniques must be employed during all work that may generate dust, such as drilling, excavation, grading, and placement of clean fill. The following techniques were shown to be effective for controlling the generation and migration of dust during remedial activities:

- Wetting equipment and excavation faces;
- Spraying water on buckets during excavation and dumping;
- Hauling materials in properly covered containers; and,
- Restricting vehicle speeds to 10 mph.

It is imperative that utilizing water for suppressing dust will not create surface runoff.

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7.0 DATA QUALITY ASSURANCE

7.1 Calibration

Instrument calibration shall be documented in the designated field logbook. All instruments shall be calibrated in accordance with manufacturer's instructions and specifications before each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

7.2 Operations

All instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on-site by the FOL/HSO for reference.

7.3 Data Review

The Field Team Leader FOL/SHSO will interpret all monitoring data based on Table 1-2 and his/her professional judgment. The FOL/HSO shall review the data with the HSM to evaluate the potential for worker and community exposure, upgrades/downgrades in level of protection, comparison to direct reading instrumentation and changes in the integrated monitoring strategy.

Monitoring and sampling data, along with all sample documentation will be periodically reviewed by the HSM.

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8.0 RECORDS AND REPORTING

All readings must be recorded and available for review by personnel from NYSDEC and NYSDOH. Should any of the action levels be exceeded, the NYSDEC Division of Air Resources and NYSDOH must be notified immediately (within one business day). CAMP data will be provided to NYSDOH on a weekly basis during remedial activities.

The notification shall include a description of the control measures implemented to prevent further exceedances.

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APPENDIX 1A
NYSDOH GENERIC CAMP

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

Overview

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

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

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

Community Air Monitoring Plan

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

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

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

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

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

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

December 2009

APPENDIX 1B
FUGITIVE DUST AND PARTICULATE MONITORING FROM DER-10 TECHNICAL GUIDANCE FOR SITE INVESTIGATIONS AND REMEDATION

Appendix 1B
Fugitive Dust and Particulate Monitoring

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

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

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

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

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

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

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

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

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

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

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

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

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

APPENDIX E

CITIZEN PARTICIPATION PLAN

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

Brownfield Cleanup Program

Citizen Participation Plan
for
Jay's Lucky Cleaners

December 2015

Revised July 2020

C130219
3220 to 3224 Long Beach Road
Oceanside, Nassau County, New York

Contents

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Note: The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site's investigation and cleanup process.

Revision Notes

Original Version December 2015
Revision 1 July 2020

- Updated for inclusion with Remedial Action Work Plan

Applicant: **United Properties Corp.**
Site Name: **Jay's Lucky Cleaners**
Site Address: **3220 to 3224 Long Beach Road, Oceanside, New York**
Site County: **Nassau County**
Site Number: **C130219**

1. What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A brownfield is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants who conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at:

http://www.dec.ny.gov/chemical/8450.html

2. Citizen Participation Activities

Why NYSDEC Involves the Public and Why It Is Important

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well-being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

- Involving citizens affected and interested in site investigation and cleanup programs is important for many reasons. These include:
- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment
- Improving public access to, and understanding of, issues and information related to a particular site and that site's investigation and cleanup process
- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process
- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community
- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

Project Contacts

Appendix A identifies NYSDEC project contact(s) to whom the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

Locations of Reports and Information

The locations of the reports and information related to the site's investigation and cleanup program also are identified in **Appendix A**. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC website. If this occurs, NYSDEC will inform the public in fact sheets distributed about the site and by other means, as appropriate.

Site Contact List

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the site (such as fieldwork), as well as availability of project documents and announcements about public comment periods.

The site contact list includes, at a minimum:

- Chief executive officer and planning board chairperson of each county, city, town and village in which the site is located;
- Residents, owners, and occupants of the site and properties adjacent to the site;
- The public water supplier which services the area in which the site is located;
- any person who has requested to be placed on the site contact list;
- the administrator of any school or day care facility located on or near the site for purposes of posting and/or dissemination of information at the facility;
- location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in **Appendix A**. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

Note: The first site fact sheet (usually related to the draft Remedial Investigation Work Plan) is distributed both by paper mailing through the postal service and through DEC Delivers, its email listserv service. The fact sheet includes instructions for signing up with the appropriate county listserv to receive future notifications about the site. See:

http://www.dec.ny.gov/chemical/61092.html

Subsequent fact sheets about the site will be distributed exclusively through the listserv, except for households without internet access that have indicated the need to continue to receive site information in paper form. Please advise the NYSDEC site project manager identified in Appendix A if that is the case. Paper mailings may continue during the investigation and cleanup process for some sites, based on public interest and need.

CP Activities

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The flowchart in Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.
- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

The public is encouraged to contact project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information.

This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

Technical Assistance Grant

NYSDEC must determine if the site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the site, as described in Section 5.

If the site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the

TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the site.

As of the date the declaration (page 2) was signed by the NYSDEC project manager, the significant threat determination for the site had not yet been made.

To verify the significant threat status of the site, the interested public may contact the NYSDEC project manager identified in **Appendix A**.

For more information about TAGs, go online at:

http://www.dec.ny.gov/regulations/2590.html

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program follows on the next page:

Citizen Participation Activities	Timing of CP Activity(ies)
Application Process:	
• Prepare site contact list • Establish document repository(ies)	At time of preparation of application to participate in the BCP.
• Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period • Publish above ENB content in local newspaper • Mail above ENB content to site contact list • Conduct 30-day public comment period	When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time.
After Execution of Brownfield Site Cleanup Agreement (BCA):	
• Prepare Citizen Participation (CP) Plan	Before start of Remedial Investigation **Note:** Applicant must submit CP Plan to NYSDEC for review and approval within 20 days of the effective date of the BCA.
Before NYSDEC Approves Remedial Investigation (RI) Work Plan:	
• Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan • Conduct 30-day public comment period	Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet.
After Applicant Completes Remedial Investigation:	
• Distribute fact sheet to site contact list that describes RI results	Before NYSDEC approves RI Report
Before NYSDEC Approves Remedial Work Plan (RWP):	
• Distribute fact sheet to site contact list about draft RWP and announcing 45-day public comment period • Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager) • Conduct 45-day public comment period	Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period.
Before Applicant Starts Cleanup Action:	
• Distribute fact sheet to site contact list that describes upcoming cleanup action	Before the start of cleanup action.
After Applicant Completes Cleanup Action:	
• Distribute fact sheet to site contact list that announces that cleanup action has been completed and that NYSDEC is reviewing the Final Engineering Report • Distribute fact sheet to site contact list announcing NYSDEC approval of Final Engineering Report and issuance of Certificate of Completion (COC)	At the time the cleanup action has been completed. **Note:** The two fact sheets are combined when possible if there is not a delay in issuing the COC.

3. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern that relate to the site. Additional major issues of public concern may be identified during the course of the site's investigation and cleanup process.

To date, no major issues of public concern have been identified. Additional major issues of public concern may be identified during the course of the Site's investigation and cleanup process. If issues are identified, the public will be kept informed and mitigation measures will be implemented. Some of those issues may include truck-related traffic, odor and noise issues.

4. Site Information

Appendix C contains a map identifying the location of the site.

Site Description

The subject site is located at 3220 to 3224 Long Beach Road, Oceanside, New York. The property is identified as Nassau County Section 43, Block 336, Lot 42. The site is bordered on the north by a commercial property, on the east by Long Beach Road, on the west by residential and commercial properties, and on the south by Montgomery Avenue.

The current property consists of one single-story retail strip building with three units and front and side parking lots that cover the remainder of the property. The entire property is approximately 0.23 acres in area. The building was originally constructed in 1959. There is currently no planned change to the usage of the Site.

A Site Location Map, and Site Plan are included in **Appendix C**.

History of Site Use, Investigation, and Cleanup

The prior and current usage of the site is summarized as follows:

- The exiting strip mall building was constructed in 1959. Prior to that, the site was undeveloped.
- The subject site has been utilized in the past by a, convenience store, surf shop, massage parlor, and drycleaner. A drycleaner has occupied a unit within the building since 1959.
- In March 2014, Merritt Environmental Consulting Corp. (MECC) performed a Focused Subsurface Site Investigation (FSSI) at the site. The FSSI identified tetrachloroethene (PCE) in groundwater beneath the site at concentrations in excess of NYSDEC standards which appeared to be associated with the drycleaning operation at the site.
- In September 2014, MECC performed additional groundwater sampling at the site. Three permanent monitoring wells were installed at the property, and groundwater samples were collected from each. Groundwater sampling results were consistent with the results of the March 2014 FSSI.
- In June 2018 PWGC submitted a Remedial Investigation (RI) report to NYSDEC. The primary findings of the RI included the presence of tetrachloroethene (PCE) in groundwater and soil vapor beneath the site at concentrations exceeding applicable NYSDEC/NYSDOH standards.

- In September 2018, PWGC implemented an Interim Remedial Measure (IRM) at the site consisting of the installation of a sub-slab depressurization system (SSDS) to mitigate soil vapor intrusion of TCE to the existing building.
- In October 2018, PWGC performed groundwater sampling for emerging contaminants 1,4-dioxane and perfluoroakyl and polyfluoroakyl substances (PFAS). PFAS was detected above USEPA advisory levels in two of three monitoring wells sampled; 1,4-dioxane was not detected.
- In July 2020, PWGC submitted a Remedial Action Work Plan (RAWP) to NYSDEC. The RAWP specifies a scope of work which includes pre-remediation collection of additional soil, groundwater and soil vapor samples, implementation of an in-situ bioremediation injection program, and preparation and implementation of a SMP which will include institutional controls (environmental easement) and engineering controls (continued operation of the SSDS and groundwater monitoring). NYSDEC approval of the RAWP is pending.

5. Investigation and Cleanup Process

Application

The Applicant has applied for and been accepted into New York's Brownfield Cleanup Program as a volunteer. This means that the Applicant was not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the site took place after the discharge or disposal of contaminants. The Volunteer must fully characterize the nature and extent of contamination onsite, and must conduct a "qualitative exposure assessment," a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the site and to contamination that has migrated from the site.

The Applicant in its Application proposes that the site will be used for commercial purposes.

To achieve this goal, the Applicant will conduct investigation and cleanup activities at the site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the site.

Investigation

The Applicant will conduct an investigation of the site officially called a "remedial investigation" (RI). This investigation will be performed with NYSDEC oversight. The Applicant must develop a remedial investigation workplan, which is subject to public comment.

The site investigation has several goals:

1) Define the nature and extent of contamination in soil, surface water, groundwater and any other parts of the environment that may be affected;
2) Identify the source(s) of the contamination;
3) Assess the impact of the contamination on public health and the environment; and
4) Provide information to support the development of a proposed remedy to address the contamination or the determination that cleanup is not necessary.

The Applicant submits a draft "Remedial Investigation Work Plan" to NYSDEC for review and approval. NYSDEC makes the draft plan available to the public review during a 30-day public comment period.

When the investigation is complete, the Applicant will prepare and submit a report that summarizes the results. This report also will recommend whether cleanup action is needed to address site-related contamination. The investigation report is subject to review and approval by NYSDEC.

NYSDEC will use the information in the investigation report to determine if the site poses a significant threat to public health or the environment. If the site is a "significant threat," it must be cleaned up using a remedy selected by NYSDEC from an analysis of alternatives prepared by the Applicant and approved by NYSDEC. If the site does not pose a significant threat, the Applicant may select the remedy from the approved analysis of alternatives.

Interim Remedial Measures

An Interim Remedial Measure (IRM) is an action that can be undertaken at a site when a source of contamination or exposure pathway can be effectively addressed before the site investigation and analysis of alternatives are completed. If an IRM is likely to represent all or a significant part of the final remedy, NYSDEC will require a 30-day public comment period.

Remedy Selection

When the investigation of the site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicant may recommend in its investigation report that no action is necessary at the site. In this case, NYSDEC would make the investigation report available for public comment for 45 days. NYSDEC then would complete its review, make any necessary revisions, and, if appropriate, approve the investigation report. NYSDEC would then issue a "Certificate of Completion" (described below) to the Applicant.

or

2. The Applicant may recommend in its investigation report that action needs to be taken to address site contamination. After NYSDEC approves the investigation report, the Applicant may then develop a cleanup plan, officially called a "Remedial Work Plan". The Remedial Work Plan describes the Applicant's proposed remedy for addressing contamination related to the site.

When the Applicant submits a draft Remedial Work Plan for approval, NYSDEC would announce the availability of the draft plan for public review during a 45-day public comment period.

Cleanup Action

NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy. The selected remedy is formalized in the site Decision Document.

The Applicant may then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH oversee the activities. When the Applicant completes cleanup activities, it will prepare a final engineering report that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the site.

Certificate of Completion

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the site, it will approve the Final Engineering Report. NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. The COC states that cleanup goals have been achieved and relieves the Applicant from future liability for site-related contamination, subject to certain conditions. The Applicant would be eligible to redevelop the site after it receives a COC.

Site Management

The purpose of site management is to ensure the safe reuse of the property if contamination will remain in place. Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

An *institutional control* is a non-physical restriction on use of the site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional

control may be used when the cleanup action leaves some contamination that makes the site suitable for some, but not all uses.

An *engineering control* is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that pumps and treats groundwater. Site management continues until NYSDEC determines that it is no longer needed.

Appendix A -
Project Contacts and Locations of Reports and Information

Project Contacts

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

New York State Department of Environmental Conservation (NYSDEC):

Mr. Sarken Dressler
Project Manager
NYSDEC Region 1
50 Circle Road
Stony Brook, New York 11790
631-444-0246

Mr. William Fonda
Public Participation Specialist
NYSDEC Region 1
50 Circle Road
Stony Brook, New York 11790
631-444-0350

Mr. Shaun J. Surani
Project Manager
New York State Department of Health (NYSDOH):
Empire State Plaza
Corning Tower, Room 1787
Albany, New York 12237
518-402-7860

Locations of Reports and Information

The facilities identified below are being used to provide the public with convenient access to important project documents:

Oceanside Public Library
30 Davison Avenue
Oceanside, New York 11572
516-776-2360
Hours:
M-F: 9:30AM to 9:00PM
Sa: 9:30AM to 5:00PM
Su: 12:00PM to 4:00PM

NYSDEC Region One
50 Circle Road
Stony Brook, NY 11790-2356
Attn: William Fonda
631-444-0350
Hours:
M-F: 9:00AM to 5:00PM

Appendix B - Site Contact List

1. Government Officials

Nassau County Executive
Laura Curran
Office of the County Executive
1550 Franklin Avenue
Mineola, New York 11501
516-626-4266

Nassau County Planning Commission
Mr. Marty Glennon, Chairman
1550 Franklin Ave.
Mineola, New York 11501
Phone: 516-571-9600

Town of Hempstead Supervisor
Donald X. Clavin, Jr.
Hempstead Town Hall
One Washington Street
Hempstead, New York 11550
516-489-6000

Town of Hempstead Zoning Board of Appeals Chairperson
David P. Weiss
Hempstead Town Hall
One Washington Street
Hempstead, NY 11550
516-489-5000

New York State Congressional District 4
Kathleen Rice
300 Garden City Plaza, Suite 200
Garden City, New York 11530
516-739-3008

New York State Senate District 9
Todd Kaminsky
55 Front Street
Rockville Center, NY 11570
516-766-8383

New York State Assembly District 20
Melissa Miller
2001 Park Street
Atlantic Beach, New York 11509
516-431-0500

Nassau County Legislative District 7
Howard J. Kopel
1550 Franklin Avenue
Mineola, New York 11501
516-571-6207

2. Adjacent Properties
North:
3200 Long Beach Road Oceanside, 11572
Block 336 Lot 9
Multi-use building, single occupant
Owner: Aldrich Management Co LLC

South:
3232 Long Beach Rd. Oceanside, 11572
Block 336 Lot 9
Commercial store
Owner: Aldrich Management Co LLC.

3232 Long Beach Rd. Oceanside, 11572
Block 337 Lot 24
Super Store
Owner: C & M Realty Co.

3231 Lawrence Ave. Oceanside, 11572
Block 337 Lot 49
Residential
Geerdts Jutta

East:
3221 Long beach Rd. Oceanside, 11572
Block 369 Lot 18
Shopping Plaza
Owner: Oceanside Plaza Assoc

West:
3208 Lawrence Ave. Oceanside, 11572
Block 331 Lot 134
Residential
Owner: Percival John

3223 Lawrence Ave. Oceanside, 11572
Block 336 Lot 102
Residential
Owner: Wilson Charlie Lee Jr

3217 Lawrence Ave. Oceanside, 11572
Block 336 Lot 104
Residential
Owner: Brimlow T & Robinson D & Warish P

3. Local News Media
Newsday
6 Corporate Center Drive
Melville, NY 11747

4. Public Water Supplier
New York American Water Co.
733 Sunrise Highway
Lynbrook, New York 11563

5. Requested
None to date

6. School or Day Care Facilities
(Within Approx. 0.25 miles of Site)

Fulton Avenue Elementary School
3252 Fulton Avenue
Oceanside, New York 11572

South Oceanside Road School
3210 Oceanside Road
Oceanside, New York 11572

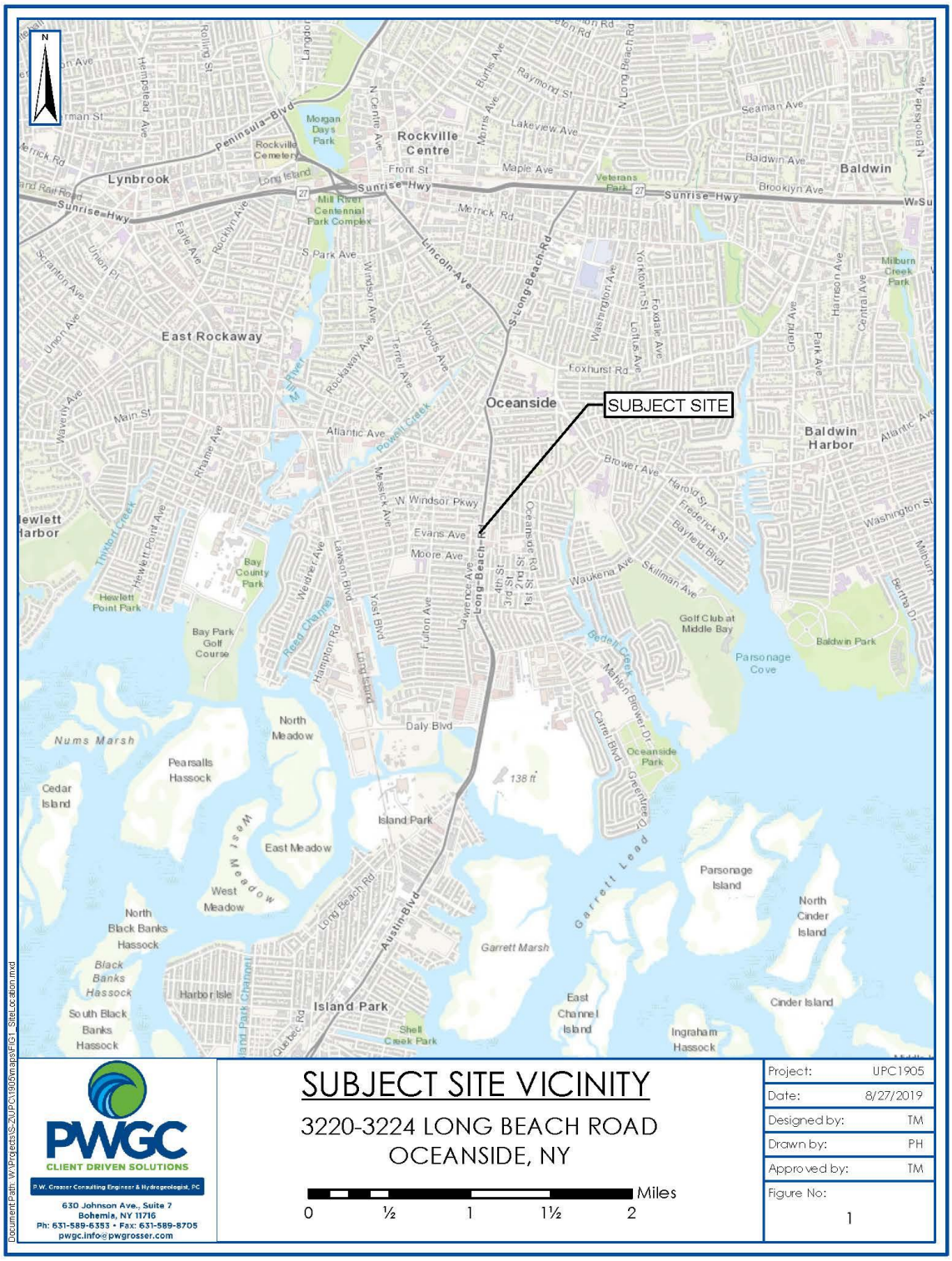
7. Document Repository
Oceanside Public Library
30 Davison Avenue
Oceanside, New York 11572
516-776-2360
Hours:
Monday through Friday: 9:30AM to 9:00PM
Saturday: 9:30AM to 5:00PM
Sunday: 12:00PM to 4:00PM

NYSDEC Region One
50 Circle Road
Stony Brook, NY 11790-2356
Attn: William Fonda
631-444-0350
Hours:
Monday through Friday: 9:00AM to 5:00PM

8. Community Board
None Identified

9. Community, Civic, Religious and Other Environmental Organizations
None Identified

Appendix C - Site Location Map



PWGC
CLIENT DRIVEN SOLUTIONS
P.W. Grosser Consulting Engineer & Hydrogeologist, PC
630 Johnson Ave., Suite 7
Bohemia, NY 11716
Ph: 631-589-6353 • Fax: 631-589-8705
pwgc.info@pwgrosser.com

Document Path: W:\Projects\S-Z\UPC\1905\Maps\FIG1 - SiteLocation.mxd

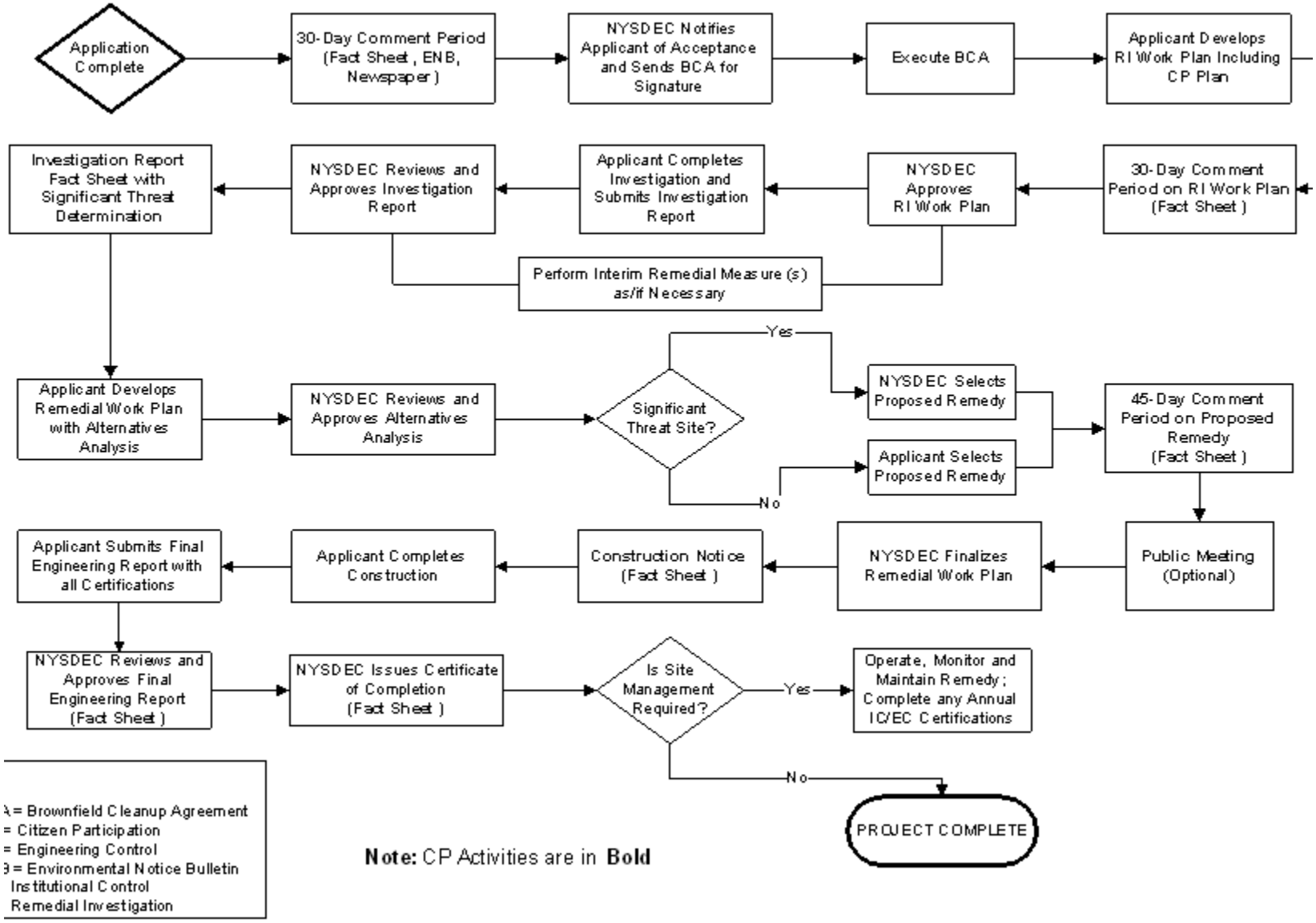
SUBJECT SITE VICINITY

3220-3224 LONG BEACH ROAD
OCEANSIDE, NY

0 ½ 1 1½ 2 Miles

Project:	UPC1905
Date:	8/27/2019
Designed by:	TM
Drawn by:	PH
Approved by:	TM
Figure No:	1

Appendix D– Brownfield Cleanup Program Process



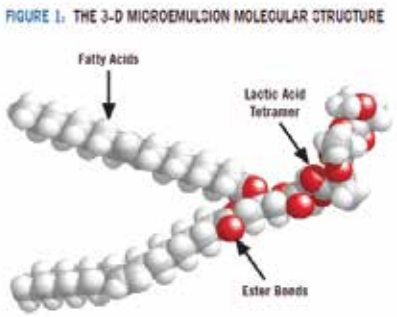
APPENDIX F

BIOREMEDIATION PRODUCT SPECIFICATIONS

3-D Microemulsion® Factory Emulsified Technical Description

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

Example of 3-D Microemulsion



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

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

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

Chemical Composition

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

3-D Microemulsion® Factory Emulsified Technical Description

Properties

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

Storage and Handling Guidelines

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

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

Applications

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

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

Health and Safety

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

REGENESIS®

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949.366.8000

European Headquarters
The Tramshed, Beehive Yard
Walcot St, Bath BA1 5BB, United Kingdom

S-MicroZVI Specification Sheet

S-MicroZVI Technical Description

S-MicroZVI™ is an *In Situ* Chemical Reduction (ISCR) reagent that promotes the destruction of many organic pollutants and is most commonly used with chlorinated hydrocarbons. It is engineered to provide an optimal source of micro-scale zero valent iron (ZVI) that is both easy to use and delivers enhanced reactivity with the target contaminants via multiple pathways. S-MicroZVI can destroy many chlorinated contaminants through a direct chemical reaction (**see Figure 1**). S-MicroZVI will also stimulate anaerobic biological degradation by rapidly creating a reducing environment that is favorable for reductive dechlorination.

S-MicroZVI is Best in Class For

- ☑ Longevity
- ☑ Kinetics
- ☑ Transport

Sulfidated ZVI

S-MicroZVI is composed of colloidal, sulfidated zero-valent iron particles suspended in glycerol using proprietary environmentally acceptable dispersants. The passivation technique of sulfidation, completed using proprietary processing methods, provides unparalleled reactivity with chlorinated hydrocarbons like PCE and TCE and increases its stability and longevity by minimizing undesirable side reactions. In addition to superior reactivity, S-MicroZVI is designed for easy handling that is unmatched by any ZVI product on the market. Shipped as a liquid suspension, S-MicroZVI requires no powder feeders, no thickening with guar, and pneumatic or hydraulic fracturing is not mandatory. When diluted with water prior to application, the resulting suspension is easy to inject using either direct push or permanent injection wells.

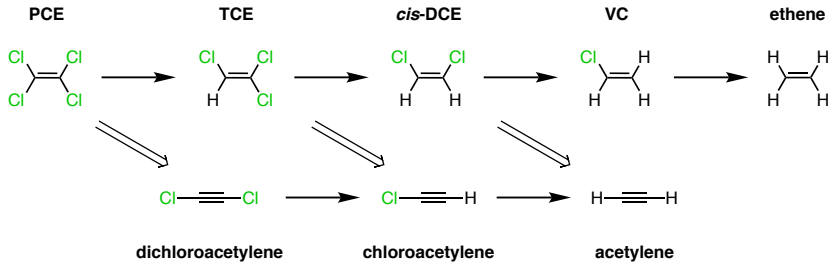

Figure 1: *Chlorinated ethene degradation pathways and products. The top pathway with single line arrows represent the reductive dechlorination (hydrogenolysis) pathway. The lower pathway with downward facing double line arrows represent the beta-elimination pathway.*

To see a list of treatable contaminants, view the S-MicroZVI treatable contaminants guide.

S-MicroZVI
Sulfidated Zero-Valent Iron

S-MicroZVI Specification Sheet

Chemical Composition

Iron, powders CAS 7439-89-6
Iron (II) sulfide CAS 1317-37-9
Glycerol CAS 56-81-8

Properties

Physical State: Liquid
Form: Viscous metallic suspension
Color: Dark gray
Odor: Slight
pH: Typically 7-9 as applied
Density: 15 lb/gal

Storage and Handling Guidelines

Storage:

- Use within four weeks of delivery
- Store in original containers
- Store at temperatures below 95F°
- Store away from incompatible materials

Handling:

- Never mix with oxidants or acids
- Wear appropriate personal protective equipment
- Do not taste or swallow
- Observe good industrial hygiene practices

Applications

S-MicroZVI is diluted with water on site and easily applied into the subsurface through low-pressure injections. S-MicroZVI can also be mixed with products like 3-D Microemulsion® or PlumeStop® prior to injection.

Health and Safety

The material is relatively safe to handle; however, avoid contact with eyes, skin and clothing. OSHA Level D personal protection equipment including: vinyl or rubber gloves and eye protection are recommended when handling this product. Please review the Safety Data Sheet for additional storage, and handling requirements here: S-MicroZVI SDS.

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European Offices (UK, Ireland, Belgium and Italy)
Email: europe@regenesis.com
Tel: +44 (0)1225 61 81 61

BDI PLUS® Technical Description

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

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

Species of Dehalococcoides sp. (DHC)

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

Chemical Composition

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

Properties

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

Storage and Handling Guidelines

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

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

BIO-DECHLOR INOCULUM

BDI PLUS® Technical Description

Applications

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

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

Health and Safety

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

REGENESIS

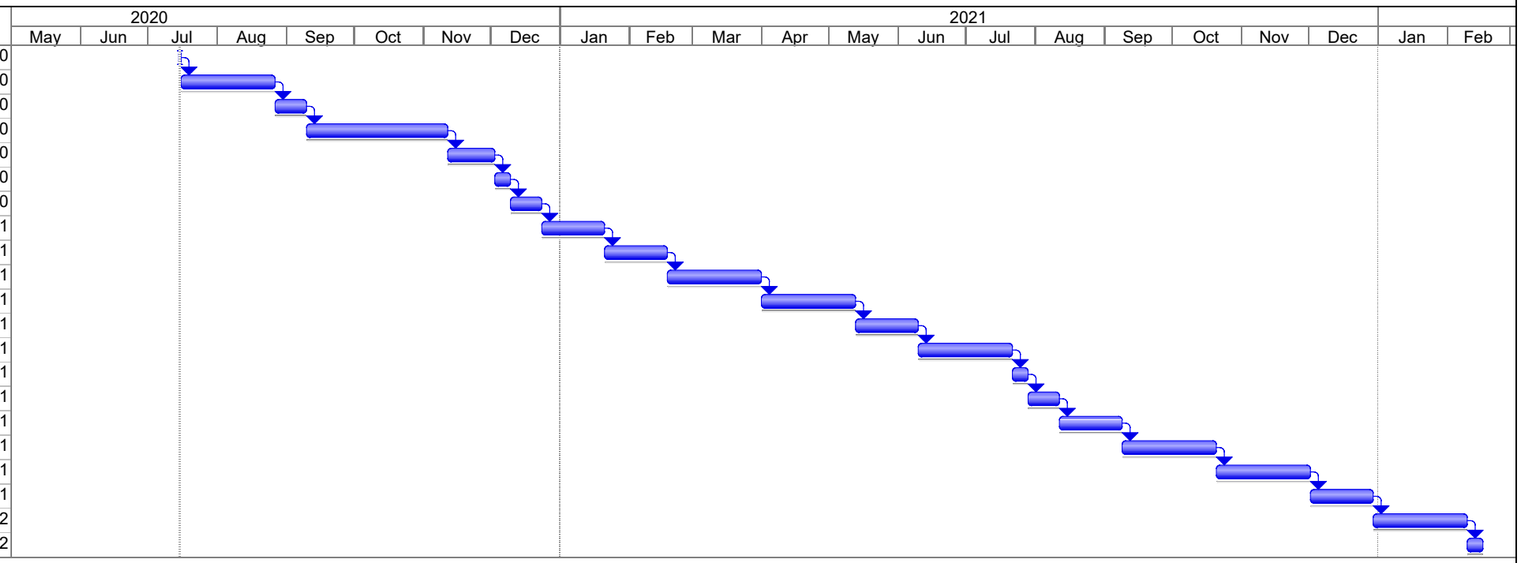
www.regenesis.com
1011 Calle Sombra, San Clemente CA 92673
949.366.8000

APPENDIX G

PROJECT SCHEDULE

Appendix G
Approximate Project Schedule
Jay's Lucky Cleaners (C130219)

ID	Task Name	Duration	Start	Finish
1	Revised RAWP Submitted to NYSDEC	1 day	Wed 7/15/20	Wed 7/15/20
2	NYSDEC Review & Approval of Revised RAWP	30 days	Thu 7/16/20	Wed 8/26/20
3	Public Notice & Fact Sheet Published	2 wks	Thu 8/27/20	Wed 9/9/20
4	45-Day Public Comment Period	45 days	Thu 9/10/20	Wed 11/11/20
5	Monitoring Well & Vapor Point Installation	3 wks	Thu 11/12/20	Wed 12/2/20
6	Pre-Remediaiton Groundwater & Soil Vapor Sampling	1 wk	Thu 12/3/20	Wed 12/9/20
7	Laboratory Analysis of Pre-Remediation Groundwater and So	2 wks	Thu 12/10/20	Wed 12/23/20
8	Pre-Remediation Baseline Sampling Report	4 wks	Thu 12/24/20	Wed 1/20/21
9	Remedial Design Plan (Bioremediaiton Injection Program)	4 wks	Thu 1/21/21	Wed 2/17/21
10	NYSDEC Review of Remedial Design Plan	30 days	Thu 2/18/21	Wed 3/31/21
11	Mobilization for Bioremediation Injection Program	6 wks	Thu 4/1/21	Wed 5/12/21
12	Bioremediation Injection Activities	4 wks	Thu 5/13/21	Wed 6/9/21
13	30-Day Waiting Period to Allow for Bioremediation Processes	30 days	Thu 6/10/21	Wed 7/21/21
14	Post-Remediation Groundwater and Soil Vapor Sampling	1 wk	Thu 7/22/21	Wed 7/28/21
15	Laboratory Analysis of Post-Remediation Groundwater and S	2 wks	Thu 7/29/21	Wed 8/11/21
16	Post-Remediation Baseline Sampling Report	4 wks	Thu 8/12/21	Wed 9/8/21
17	Final Engineering Report and Site Management Plan	6 wks	Thu 9/9/21	Wed 10/20/21
18	NYSDEC Review of FER & SMP	30 days	Thu 10/21/21	Wed 12/1/21
19	Address NYSDEC Comments on FER & SMP	4 wks	Thu 12/2/21	Wed 12/29/21
20	NYSDEC Review of Revised FER & SMP	30 days	Thu 12/30/21	Wed 2/9/22
21	NYSDEC Approval of FER & SMP	1 wk	Thu 2/10/22	Wed 2/16/22



Project: Project Schedule rev4
Date: Wed 7/15/20

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone