2840 Atlantic Avenue

BROOKLYN, NEW YORK 11207

SITE MANAGEMENT PLAN

NYSDEC Site Number: C224255

Prepared for:

Empire State Dairy LLC

3611 14th Avenue

Brooklyn, New York 11218

Prepared by:

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

DECEMBER 2022

CERTIFICATION STATEMENT

I , Erik Dee-Olsen, certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

Erik Dee-Olsen, PE

NYS PE License Number: 088835

December 22, 2022



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List of Acronyms

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
GHG	Green House Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
RSO	Remedial System Optimization
SAC	State Assistance Contract

SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program

EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Site Identification: C224255: 2840 Atlantic Avenue, Brooklyn, New York 11207

Institutional Controls:	1. The conditional Track 1 portion of the Site does not have use restrictions.[1]
	2. The "Track 4" area on the eastern portion of the Site can be used for restricted residential, commercial, and industrial purposes.[1]
Engineering Controls:	1. Cover system in the "Track 4" Area
	2. Network of four recovery wells in the "Track 4" area which will service Light Non-Aqueous Phase Liquid (LNAPL) removal methods.
	3. Sub-Slab Depressurization System (SSDS) below landmark building. (Activation to be determined after soil vapor evaluation)

Inspections:	Frequency
1. Cover inspection	Annually
Monitoring:	
1. SSDS (if activation is required)	Quarterly
2. Recovery well and monitoring well gauging and inspection	Monthly
2. Recovery well and monitoring well sampling, if warranted.	Quarterly
4. LNAPL Removal system maintenance	As necessary
Maintenance:	
1. SSDS Blower maintenance	Annually/As Necessary

Site Identification: C224255: 2840 Atlantic Avenue, Brooklyn, New York 11207

Reporting:	
1. Periodic Review Report	18 months after issue of COC, then annually

Further descriptions of the requirements listed above are provided in detail in the latter sections of this Site Management Plan.

1- ECs must be inspected at a frequency and in a manner defined in this SMP.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the post remedial program at the 2840 Atlantic Avenue Site located in Brooklyn, New York (hereinafter referred to as the "Site"). The Site is currently enrolled in the New York State Department of Environmental Conservation's (NYSDEC) Brownfield Cleanup Program (BCP), Site No. 224255.

2840 Atlantic Holdings LLC was the original volunteer to enter into a Brownfield Cleanup Agreement (BCA) as a volunteer on April 16, 2018 with the NYSDEC to remediate the site. The BCA was first amended on September 24, 2018 to add a prospective purchase 2840 Atlantic LLC. The BCA was amended for the second time on January 31, 2019 to add HP Brooklyn Dairy Housing Development Fund Company, Inc. (HP Inc.) as the new owner of the Site and Empire State Dairy LLC, an affiliate of HP Inc. as additional volunteers and to advise the NYSDEC that two additional tax lots totaling approximately 0.29 acres (notably 0.23 acre Tax Lot Block 3964 Lot 8(4) and 0.06 acre Tax Lot Block 3964 Lot 8(23) were being added to the original 0.7 acre BCP Site tax lot Block 3964 Lot 8, which were then merged into Lot 8 for a total new BCP Site acreage of 1.0009 acres[1]. Finally, a third BCA Amendment has been submitted to NYSDEC on August 10, 2022 indicating that Empire State Dairy LLC is now the owner of the BCP Site by deed dated January 28, 2022 and recorded February 10, 2022 and that original volunteer, 2840 Atlantic Holdings LLC, became an inactive company as of October 12, 2021 when it assigned its interest to Empire State Dairy LLC, and therefore, is no longer a Volunteer for this BCP Site.

A figure showing the Site location is included as **Figure 1** and a figure illustrating the boundaries of this Site is provided in **Figure 2**. The boundaries of the Site are more fully described in the metes and bounds Site description that is part of the Environmental Easement and on the Environmental Easement Survey provided in **Appendix D**.

[1] The original acreage of 0.7 acres and the added 0.29 acres total 0.99 acres but in the final easement survey a slight final acreage adjustment was made by the surveyor, who concluded the actual final acreage is 1.0009 acres.

After completion of the remedial work, some residual light non-aqueous phase liquid (LNAPL) impact remained beneath the defined "Track 4" area of the site, which is the defined area on the Site where Track 1 could not be attained due to the present of petroleum contamination and potential soil vapor impact stemming from an unidentified off-Site source which is hereafter referred to as "remaining contamination." The boundaries of the "Track 4" area are illustrated on **Figure 3**.

Institutional and Engineering Controls (ICs and ECs) have been incorporated into the Site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC and recorded with the Kings County Clerk requires compliance with this SMP and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC);

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the BCA for the site, and thereby subject to applicable penalties.

Reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the Site is provided in **Appendix A** of this SMP.

This SMP was prepared by PW Grosser Consulting Engineer and Hydrogeologist PC, (PWGC) on behalf of Empire State Dairy LLC in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 3, 2010, and the guidelines provided by the NYSDEC. This SMP addresses the

means for implementing the ICs and/or ECs that are required by the Environmental Easement for the Site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager, who is currently Mr. Steven Scharf, PE. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shut-down of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. In accordance with the Environmental Easement for the site, the NYSDEC will provide a notice of any approved changes to the SMP and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

- 60-day advance notice of any proposed changes in site use that are required under the terms of the BCA, 6NYCRR Part 375 and/or Environmental Conservation Law.
- 7-day advance notice of any field activity associated with the remedial program.
- 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan.
- Notice within 48-hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Future changes in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the BCA, and all approved work plans and reports, including this SMP.

- Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1 on the following page includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in **Appendix C** which covers the responsibilities of the owner and remedial party.

Table 1: Notifications*

Name	**Contact Information**
Steven Scharf, PE NYSDEC Project Manager	518-402-9702 steven.scharf@dec.ny.gov
John Robinson, PE NYSDOH Project Manager	518-402-7860 Johnathan.Robinson@health.ny.gov
Jane H. O'Connell NYSDEC Region 2 Remediation Engineer	718-482-4599 jane.oconnell@dec.ny.gov
Kelly Lewandowski NYSDEC Site Control	518-402-9553 kelly.lewandowski@dec.ny.gov
Empire State Dairy LLC BCP Volunteer	718-417-1616 samg@bushburg.com
Ryan Morley, PG PWGC Environmental Consultant	631-589-6353 RyanM@pwgrosser.com

* Note: Notifications are subject to change and will be updated as necessary.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location, Description, and History

The Site is located in the East New York neighborhood of Brooklyn, New York and is identified as Block 3964 and Lot 8 on the New York City Tax Map. The Site area is an approximately 1.0009-acres and is bounded by the following:

- North: Atlantic Avenue and a subterranean Long Island Rail Road train tunnel. Opposite Atlantic Avenue are mixed-use commercial and residential properties.
- East: Barney Street and commercial and residential properties.
- South: Commercial properties.
- West: Schenck Avenue, commercial properties.

The boundaries of the Site are more fully described in **Appendix D** which includes the environmental easement. The owner of the Site parcel at the time of issuance of this SMP is Empire State Dairy LLC.

Prior to 1908, the Site was developed with a lumber yard, retail stores, and dwellings back to 1887. The main building was constructed in approximately 1908 and expanded to the current extents by 1914/1915. The Site was utilized as a dairy and food products manufacturing facility from the time of construction until the mid to late 1970s. From the 1980s to 2016, the Site was utilized primarily as a plastics and floor tile products manufacturing facility. A 20,000-gallon fuel oil underground storage tank was present on the eastern portion of the property adjacent to a former loading dock area. Environmental investigations conducted in 2018 and 2019 identified fuel oil impacts to soil and groundwater beneath this UST area, including the presence of light non-aqueous phase liquid (LNAPL) in the groundwater. It was determined that the tank had leaked which resulted in the subsurface impact. This tank was removed from the Site in January 2022 as part of the remedial measures preformed under the BCP. The residual petroleum impact is located within the current “Track 4” area at the Site.

2.2 Physical Setting

2.2.1 Land Use

The Site is currently under redevelopment for the construction of a 12-story residential and school building which is incorporating an existing 3-story brick industrial landmark building abutting Atlantic Avenue into the design. The Site is zoned restricted residential and is currently in the super-structure construction phase as of December 2022. There are currently no occupants. Prior to redevelopment, the landmark building occupied roughly the northern one-third of the property while the remainder of the Site was vacant.

The properties adjoining the Site and surrounding the Site primarily include commercial and residential properties. The properties immediately east and north of the Site include commercial and residential properties; properties immediately to the west and south of the Site include commercial properties.

2.2.2 Geology and Hydrology

The elevation of the Site is approximately 44 feet above mean sea level. Groundwater beneath the Site is approximately 37 below feet below sidewalk grade and is estimated to flow in a southwesterly direction. Groundwater is approximately 15 feet below the basement floor of the newly constructed building on site.

Soils observed during previous environmental investigations beneath the central and southern portions of the property consisted primarily of historic fill characterized by the presence of concrete, cinders, and brick entrained within well graded sands with fines which extended from grade to a depth of five feet below grade. Soils beneath five feet primarily consisted of medium to coarse light brown sand with gravel to a depth of thirty feet below grade.

Soils beneath the landmark building generally consisted of historic fill characterized by the presence of concrete, cinders, and brick entrained within well graded sands with fines to a depth of one to three feet underlain by medium to coarse light brown sand.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for

the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

Environmental Investigation History:

A Remedial Investigation was completed at the Site from June 27, 2019, through July 26, 2019 and October 30, 2019 through November 1, 2019 and documented in a Remedial Investigation Report dated January 2020 prepared by Environmental Business Consultants, Inc. (EBC). The goals of the Remedial Investigation were to define the nature and extent of contamination in soil, groundwater and any other impacted media; to identify the source(s) of the contamination; to assess the impact of the contamination on public health and/or the environment; and to provide information to support the development of a Remedial Work Plan to address the contamination.

Activities completed under the RI:

- The installation of sixteen soil borings to collect thirty soil samples for laboratory analysis of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, PCBs, metals, and emerging contaminants.
- The installation of eight groundwater monitoring wells and the collection of groundwater samples from each well for laboratory analysis of VOCs, SVOCs, pesticides, PCBs, total and dissolved metals, and emerging contaminants.
- The collection of analysis of soil gas samples for VOCs from six sub slab vapor and six soil gas sampling locations.

The results of sampling performed during this RI identified free phase fuel oil present at the water table in an approximate 1,400 sf area around a closed-in-place 20,000-gallon underground storage tank (UST). Petroleum related VOCs and naphthalene were identified in soil near the water table in a sample collected near the tank. Slightly elevated levels of Polycyclic Aromatic Hydrocarbons (PAHs) were also reported in soil near the water table in three borings around the tank and are likely related to the fuel oil release.

According to the RIR prepared by EBC, the two monitoring wells installed at the former UST area (the “Track 4” area) were identified to contain LNAPL as well as concentrations of dissolved phase fuel oil constituents such as VOCs and naphthalene. A

monitoring well located approximately 45 feet down gradient of the former UST area contained concentrations of petroleum VOCs and naphthalene as well; however, the concentrations of dissolved phase VOCs and naphthalene were identified to be lower at this location and LNAPL was not observed.

Based on the observed thickness of the LNAPL which appeared in the wells adjacent to the former tank area, accurate thickness measurements could not be recorded and was likely a thick heating oil such as #4 or #6 fuel oil.

The historic fill material was also found across the Site to depths of 1 to 5 feet below grade. Depending on location, the historic fill material contained PCB Alocor-1254, one or more metals including arsenic, copper, lead, and mercury, pesticides, and PAHs at concentrations greater than Unrestricted Use and / or Restricted Residential SCOs within the southern and central portion of the Site. Silty sand is present immediately below this layer. Soil beneath the landmark building met Unrestricted Use SCOs with the exception of the 0–2-foot interval on the southeast corner in the former loading dock area. Soils beneath five feet on the southern and central portions of the Site met Unrestricted Use SCOs with the exception of the former UST area on eastern portion of the Site where petroleum impacts were observed to extend below 25 feet below grade.

Chlorinated VOCs in soil vapor included tetrachloroethene (PCE) which was detected at concentrations ranging from 7.86 $\mu g/m^3$ to 922 $\mu g/m^3$, and trichloroethene TCE which was detected at concentrations ranging from 0.55 $\mu g/m^3$ to 148 $\mu g/m^3$. The highest detections were reported in sub-slab samples located near the north property line.

Environmental Remediation History:

Remedial activities performed at the Site were executed in adherence to the NYSDEC approved Remedial Action Work Plan prepared by AMC Engineering, PLLC dated January 2021. Remedial activities commenced in December 2021 and shall conclude in December 2022. The main components of the remedial action included:

- Removal of soils exceeding Unrestricted Use SCOs from the top five feet of soil/fill from the central and southern portions of the Site. Removal of petroleum impacted soils to a depth of 25 feet below grade at the “Track 4” area.

- Installation of a cover system consisting of building slabs and foundation walls across the Site including the "Track 4" zone on the eastern portion of the Site were a 20,000-gallon petroleum UST had leaked.
- Installation of four 4-inch diameter recovery wells within the "Track 4" area. These wells were installed to service the light non-aqueous phase liquid (LNAPL) recovery system which is managed under this SMP. Prior to the installation of the revery system, free product was removed during multiple vacuum enhanced fluid recovery (VEFR) events. Two monitoring wells were installed down gradient of the recovery wells to monitor that LNAPL is confined to the "Track 4" area.
- Installation of subgrade perforated piping for a sub-slab depressurization system (SSDS) beneath the landmark building on the northern portion of the property. This SSDS will be activated, if deemed necessary, following the soil vapor evaluation testing protocols outlined in this SMP.

2.4 Remedial Action Objectives

Based on the results of previous environmental investigations performed in June through October of 2019, the following Remedial Action Objectives (RAOs) were identified for this Site.

2.4.1 Groundwater RAOs

RAOs for Public Health Protection

- Prevent ingestion of groundwater containing contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles emanating from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer, to the extent practicable, to pre-release conditions.
- Remove the source of ground or surface water contamination.

2.4.2 Soil RAOs

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of, or exposure to, contaminants volatilizing from contaminated soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

2.4.3 Soil Vapor RAOs

RAOs for Public Health Protection

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

2.5 Remaining Contamination

2.5.1 Soil/Fill

Following remedial activities, end-point sample results demonstrated that soils at the Site meet Unrestricted Use Soil Cleanup Objectives, including within the "Track 4" area beneath the former fuel oil UST. The soils at the terminal excavation depth of 25 feet below grade in the former UST area contained petroleum odors and photoionization detector (PID) readings ranging from 2 parts-per-million (ppm) to approximately 12 ppm.

The Site cover system in place in the "Track 4" area prevents direct contact with soils with petroleum odors. The Site cover system also overlays the vapor barrier system installed across the site as a best construction practice and resilience measure, as well as the SSDS components beneath the landmark building.

2.5.2 Groundwater

Groundwater impact at the Site is concentrated to the "Track 4" area on the eastern portion of the Site where the former 20,000-gallon fuel oil UST was located. Impact to groundwater consists of the presence of LNAPL and to a lesser extent dissolved phase

petroleum VOCs. This residual groundwater impact is being addressed via a LNAPL recovery system which is detailed in this SMP. The recovery locations of the wells which service the LNAPL recovery system are shown on **Figure 3**.

Outside of the "Track 4" area, groundwater impact consisted of low-level concentrations of SVOCs, metals, PCBs greater than ambient groundwater quality standards (AWQS) and PFAS at concentrations greater than the United States Environmental Protection Agency (USEPA) drinking water advisory level and State Drinking Water Maximum Contaminant Levels (MCLs), which is typical for groundwater quality in an urban area such as Brooklyn and are not indicative of an on-site point source of impact at levels which requires remediation.

2.5.5 Soil Vapor

During the subsurface investigations in 2019, elevated concentrations of PCE and TCE were detected in sub-slab soil vapor samples beneath the landmark building on the northern portion of the property. TCE and PCE were not identified in soil samples or groundwater samples collected from the site and the subject property is unlikely to have been the source of the PCE/TCE soil vapor impact. The presence of PCE and TCE in soil vapor is likely emanating from an off-Site source. To mitigate against soil vapor intrusion, a vapor barrier system was installed beneath the landmark building and under the foundations of the new building, as well as SSDS piping beneath the landmark building which can be activated based on future indoor air sampling results. The SSDS, if activated, will be considered an engineering control for the site to mitigate against vapor intrusion from unidentified off-site sources. The vapor barrier which has been installed beneath the site is considered a best construction practice and resiliency measure and not an engineering control

The site cap system and SSDS piping layout is illustrated on **Figure 4**.

3. INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the Site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of IC/ECs on the Site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and
- Provisions necessary to identify or establish methods for implementing the IC/ECs required by the site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

A series of ICs is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and (3) limit the use and development of the Site to restricted-residential uses only until such time as the Environmental Easement can be terminated. Adherence to these ICs on the Site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on **Figure 4** which illustrates the SSDS, Vapor Barrier, and Site Cover. These ICs are:

- The property may be used for Track 1-Conditional.
- ECs must be operated and maintained as specified in this SMP;

- ECs must be inspected at a frequency and in a manner defined in the SMP.
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDEC and/or NYSDOH to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
- Groundwater and other environmental or public health monitoring within the "Track 4" area must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- Future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the continuing remedial activities must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement.

3.3 Engineering Controls

3.3.1 Site Cover System

Exposure to residual contamination at the "Track 4" area of the Site is prevented by a cover system. This cover system is comprised of an approximately 12 inches thick concrete foundation system that extends under the entire foundation of the newly constructed building on the central and southern portions of the Site as well the historical landmark building.

The composite cover system is designed to protect occupants of the building from coming into contact with residual impact in the soils beneath the "Track 4" area.

Figure 4 presents the locations of the cover system. The Excavation Work Plan (EWP) provided in **Appendix B** outlines the procedures required to be implemented in the event the cover system is breached, penetrated, or temporarily removed and any underlying remaining contamination is disturbed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any

work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) provided in **Appendix G**.

The composite cover system is a permanent control, and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

3.3.2 Sub-Slab Depressurization System (SSDS)

The piping components for a SSDS have been installed below the concrete foundation slab and vapor barrier of the historical landmark building which occupies the northern portion of the Site. The SSDS is a contingency to further protect against the potential for the migration of soil vapors into the building, if deemed necessary.

SSDSs are designed to vent volatile compounds in a vapor phase from under the building foundation and prevent the volatile compounds from entering the building. SSDSs utilize an in-situ process employing a network of sub-slab perforated collection piping where a blower is utilized to create a negative pressure gradient that causes movement of vapors toward the collection piping. The volatile constituents are readily removed from the subsurface through the riser pipe connected to the network of collection pipes. The extracted volatile compounds are then discharged to the atmosphere above the roofline.

The SSDS piping is constructed of 4-inch-diameter high density polyethylene (HDPE) and piped to a riser pipe which extends above the base floor. In addition, three permanent vacuum monitoring/sub-slab vapor sampling points have been installed into the floor of the landmark building to gauge the effectiveness of the SSDS, if necessary. If it is determined that activation of the SSDS will be required, the system will be outfitted with a blower to create negative pressure beneath the slab. During the installation process of the SSDS, the components of the system were inspected to ensure proper installation of the components.

To determine if activation of the SSDS is necessary, the indoor air in the ground floor of the landmark building will be analyzed once fully enclosed and following the activating of the HVAC system during the “heating season” period by collecting vapor samples from each of the three vacuum monitoring points installed through the floor as

well as three corresponding and co-located ambient indoor air samples. Analytical results will be assessed using the NYSDOH decision matrices and if a "MITIGATE" determination is triggered by the data results, the SSDS will be activated. If a "NO FURTHER ACTION" determination is triggered, then the SSDS will remain inactive. If a "MONITORING" determination is triggered, then additional soil vapor monitoring will be performed to determine if the system need to be activated. The testing to be performed to determine if SSDS activation is necessary will be conducted once the ground floor of the landmark building has been enclosed as designed. As part of the sample collection process, an NYSDOH indoor air inventory form will be completed and included in the appropriate reports prepared for NYSDEC.

Procedures for operating and maintaining the SSDS, if necessary, are documented in the Operation and Maintenance Plan included as **Appendix J**. As built drawings, signed and sealed by a professional engineer, are included in **Appendix I.** Plans which illustrate the future mechanical components of the SSDS, which will be installed if activation is deemed necessary will be provided to NYSDEC for review if SSDS activation is required. **Figure 4** shows the location of the ECs for the site.

In the event that monitoring data indicates that the SSDS may no longer be required after activation, a proposal to discontinue the SSDS will be submitted by the remedial party to the NYSDEC and NYSDOH.

3.3.3 "Track 4" Area LNAPL Recovery System

To address the presence of residual petroleum impact in the form of LNAPL in groundwater beneath the "Track 4" area, a network of four 4-inch diameter recovery wells has been installed as illustrated on **Figure 3**. These four wells were installed in July 2022 and have contained observable LNAPL since their installation. The thickness of the LNAPL within each well will be monitored by measuring its thickness using an interface probe programmed to differentiate between LNAPL and water. If LNAPL thicknesses cannot be accurately measured using an interface probe, measurements will be attempted with water-finding-paste and a tape measure. The LNAPL thickness readings will be used to determine the rate of LNAPL removal events and methods.

These wells will be utilized for the removal of LNAPL via vacuum enhanced fluid recovery (VEFR) and/or via two spill buster units, the details of which are included in **Appendix K**. VEFR events were performed on August 12, 2022, and September 27, 2022, during the remedial phase of the project. An approximate combined total of 295 gallons of LNAPL/oily water was removed from the four wells via VEFR as of the date of this SMP.

Prior to the installation of the spill busters, a routine VEFR schedule will be established which will include weekly VEFR events on the four recovery wells for the first quarter of 2023. The results of the weekly LNAPL removal events will be documented in a report and submitted to NYSDEC following the first quarter of 2023. After NYSDEC's review of this report, the VEFR schedule will be reassessed and/or the installation of the full-time spill buster units will be determined. In addition to VEFR, manual LNAPL removal may be conducted via a bailer or absorbent sock technique. LNAPL removed manually will be placed into a 55-gallon drum for storage and eventual off-site disposal.

The spill buster, which is a level troll, seeks the more viscous LNAPL floating on top of the groundwater within a well and extracts LNAPL from the well and discharges it into a 55-gallon drum. VEFR events will be performed, as needed based on the judgement of the PE, to supplement the LNAPL removal of the spill buster or during period when the spill busters are not active. Manual LNAPL removal events through the use of LNAPL bailers or petroleum absorbent socks may also be utilized from time to time.

In addition to the four recovery wells, two 2-inch monitoring wells were installed to the south and downgradient of the "Track 4" area to monitor if LNAPL is migrating outside of the "Track 4" area. As of the date of this SMP, LNAPL has not appeared in the two monitoring wells since installation in July 2022. Construction logs for the recovery wells and monitoring wells are included as **Appendix E**.

Based on direction form the NYSDEC, a third 2-inch monitoring well will be installed within the sidewalk along Barbey Street and upgradient of the "Track 4" area. The reasoning for this well is to attempt to triangulate groundwater flow, which has previously been established to flow south-southwest. This third, upgradient monitoring well is anticipated to be installed during the first PRR period.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the site are included in the Quality Assurance Project Plan provided in **Appendix F**.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media, namely groundwater and soil vapor.
- Assessing compliance with applicable NYSDEC standards, criteria, and guidance (SCGs), particularly groundwater standards.
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for recovery wells and monitoring wells;
- Recovery well and monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 6.0 of this SMP.

4.2 Sitewide Inspection

Site-wide inspections will be once per year. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in **Appendix H** – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that site records are up to date.

Inspections of remedial components installed at the site will be conducted as necessary. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If site records are complete and up to date.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, verbal notice to the NYSDEC must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the Site by a qualified environmental professional, as determined by the

NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 EC Monitoring and Sampling

4.3.1 Composite Cover System Monitoring

The composite cover system, namely the building slab and foundation walls, will be monitored annually to document existing conditions of the cover system and to ensure that the cover system is not breached without proper notification and oversight. The cover system is in place to prevent human exposure to remaining contaminated soil/fill in the "Track 4" area and to help mitigate soil vapor intrusion at the Site.

The cover system will be inspected at a minimum of once a year. The status, including the existing condition and signs of past excavation patching of the cover system, will be observed and recorded.

4.3.2 Groundwater Monitoring

A groundwater monitoring program will be implemented to gauge the effectiveness of the LNAPL recovery system and that groundwater contaminant levels are meeting RAOs.

The network of four recovery wells and two monitoring wells was installed during the remedial activities at the site. The recovery wells and monitoring wells are located in the basement of the eastern portion of the site with the recovery wells located within the "Track 4" zone and the monitoring wells located downgradient of the "Track 4" zone. Due to the depth to groundwater at the Site of approximately 13 to 14 feet below basement slab level, the recovery wells were installed utilizing a Geoprobe 7822 drill rig and constructed of 4-inch diameter PVC riser pipe from grade to a depth of ten feet below the basement and then a ten-foot-long section of 0.020 mil slotted PVC well screen to the bottom. The two monitoring wells are made with the same material with the exception of the diameter, which is 2-inches. Recovery well and monitoring well construction logs are included as **Appendix E**. As directed by the NYSDEC, a third, upgradient monitoring well will be installed at the site during the first PRR period. Once installed, this well will be included in the routine sampling and monitoring schedule.

Sampling Protocol

Prior to sampling, each well will be gauged with an electronic interface probe to measure the depth to LNAPL, if present, and the depth to water. The thickness of the LNAPL within the well should also be measured; however, it is understood that due to the viscosity of the LNAPL, accurate thickness measurements may be unattainable. If LNAPL is present, then a groundwater sample will not be collected and the presence of LNAPL will be noted.

If LNAPL is not present, wells will be purged using a decontaminated submersible pump, peristaltic pump, Waterra pump, or similar, fitted with disposal polyethylene tubing under low flow conditions. During purging, the groundwater parameters pH, temperature, conductivity, oxygen reduction potential (ORP), turbidity, and dissolved oxygen will be monitored every three minutes with a Horiba U52 water quality instrument or similar. When measurements stabilize in accordance with the United States Environmental Protection Agency (USEPA) standard operating procedure EQASOP-GW001, purging will be deemed completed and the Horiba will be disconnected. The groundwater samples will then be collected directly from the tubing and placed in pre-cleaned laboratory supplied glassware and packed in a cooler on ice and delivered to a NYSDOH ELAP certified laboratory under chain-of-custody seal. The groundwater samples will be analyzed for CP-51 List VOCs per USEPA Method 8260 and CP-51 List SVOCs by USEPA Method 8270.

Monitoring Well Repairs, Replacement, and Decommissioning

If biofouling or silt accumulation occurs in the on-Site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced (as per the Monitoring Plan) if an event renders the wells unusable or no longer required.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance. The wells will be purged as needed if it is observed that sediment infiltration into the interior of the wells has impacted its recharge capacity and/or overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of monitoring wells for the purpose of replacement and the repair or decommissioning and

replacement process will be documented in the subsequent periodic report. Well decommissioning without replacement will be done only with the prior approval of NYSDEC. Well abandonment will be performed in accordance with NYSDEC's Policy "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless otherwise approved by the NYSDEC.

4.3.3 SSDS Pre-Activation Sampling

Once the ground floor of the landmark building is enclosed, soil vapor samples will be collected from each of the three vacuum monitoring points in accordance with NYSDOH guidance along with three indoor air samples and one outdoor ambient air sample positioned at an up-wind location. If sample results yield one or more "MONITOR/MITIGATE" determinations when compared to the NYSDOH soil vapor decision matrices, then the SSDS will be activated. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

4.3.4 Soil Vapor Monitoring and Sampling

The first round of soil vapor monitoring will be conducted once the ground floor of the landmark building, where the SSDS is located, during the first heating season once the HVAC system is activated.. As per Section 4.3.3, the first round of soil vapor sampling will be conducted to determine if the system requires activation. **If the SSDS requires activation, the following routine items will be followed:**

Monitoring of the SSDS will consist of recording gauge readings and collecting influent vapor samples. An Operations and Maintenance (O&M) Manual for the SSDS, detailing the specific gauges and meters to be recorded, is included in **Appendix J**. O&M will continue until the RAOs have been achieved. Modifications or shutdowns to the SSDS will be performed in consultation with the NYSDEC and NYSDOH.

A network of three vacuum monitoring points has also been installed at the site to evaluate the effectiveness of the SSDS to create negative pressure in the subsurface which creates a vacuum atmosphere to mitigate soil vapor intrusion into the building. Locations of the vacuum monitoring points are shown on the SSDS as-built engineering drawings

included as **Appendix I**.If activation of the SSDS is not deemed to be necessary, then routine air monitoring will not be necessary.

Sampling Protocol

Observations (e.g., system component integrity, etc.) will be noted on the system performance log. The system performance log will serve as the inspection form for the SSDS, if activation is deemed necessary. If activated, vacuum readings will be collected from the permanent vapor monitoring points by temporarily replacing the point cover cap outfitted with a brass barb or equivalent. The barb will be outfitted with ¼ inch diameter tubing connected to a vacuum gauge and vacuum readings will be recorded in the system performance logs.

In addition to routine system monitoring, influent vapor samples will be collected to verify the system's effectiveness and compliance with discharge requirements, if the system is activated. The inspection and log forms included in **Appendix J** will be filled out during system inspection events.

Routine SSDS Inspections and Sampling

If activation of the SSDS is deemed necessary, then a routine yearly sampling and inspection schedule will be adhered too and documented in the following PRRs. The sampling and inspection visits will include the following:

- Collection of indoor air samples from the same three locations that indoor air sampling was conducted during the initial assessment. This sampling will be conducted during the heating season.
- Collection of vacuum readings form the vacuum monitoring points.
- Collection of influent vapor samples through a sampling port in the riser pipe.
-

The results of the routine SSDS sampling and inspection visits will be documented in the following PRR after each event.

SSDS Deactivation Protocol

Following the first year of routine sampling, the collection of indoor air samples may not be deemed necessary if the SSDS's effectiveness has proven to be effective. The discontinuation or reduction of indoor air sampling will be discussed with NYSDEC after these events are performed.

If it is deemed that the SSDS is no longer necessary to address vapor intrusion, then a SSDS shut-down assessment will be performed. This shut-down assessment will consist of the following steps in accordance with NYSDOH guidance:

- Deactivation of the SSDS followed by waiting period of a minimum of six-weeks to allow for neutral sub-slab conditions to be established.
- Following the six week shut down period, a soil vapor intrusion assessment will be conducted during the heating season by collecting sub-slab samples from each of the three vacuum monitoring points along with the collection of three indoor air sample which will be co-located with the sub-slab samples.
    - If analytical results yield a decision of "NO FURTEHR ACTION" when examined using the NYSDOH decision matrices after this sampling event, then the SSDS will remain inactive, and the sampling procedure will be repeated during the following heating season. If analytical results again yield decisions of "NO FURTHER ACTION" after this second sampling event, then permanent shut down of the SSDS will be requested to NYSDEC/NYSDOH.
    - If analytical results yield one or more decisions of "MONITOR/MITIGATE," then the SSDS will be reactivated and routine OM&M and sampling procures will resume.
- A shut-down assessment work plan, detailing the specifics of the SSDS pulsing and sampling methods, will be submitted to NYSDEC/NYSDOH for review and approval prior to the start of such efforts.

4.4.2 Monitoring QA/QC and Sampling Protocol

Sampling and analyses will be performed in accordance with the requirements of the Quality Assurance Project Plan (QAPP) prepared for the Site (**Appendix F**). Main Components of the QAPP include:

- QA/QC Objectives for Data Measurement.
- Sampling Program:
    - Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservative will be tagged as such.
    - Sample holding times will be in accordance with the NYSDEC ASP requirements.
    - Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary.
- Sample Tracking and Custody;
- Calibration Procedures:
    - Field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions.
    - The laboratory will follow all calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.
- Analytical Procedures;
- Preparation of a Data Usability Summary Report (DUSR), which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. Analytical data should be validated a frequency of 5% of all samples or one sample per laboratory submission, which ever is greater.
- Internal QC and Checks;

- QA Performance and System Audits;
- Preventative Maintenance Procedures and Schedules;
- Corrective Action Measures.

A table summarizing the routine monitoring schedule is included on Table 1 below.

Table 1 – SSDS (if necessary) and Groundwater Monitoring Schedule

Sampling Location	**Schedule**				
	CP-51 VOCs and SVOCs	Gauging	Vacuum Pressure	VOCs	Frequency
Sub-Slab Vapor Points			X		Annually (During Heating Season)
Indoor Air				X	Annually (During Heating Season)
Recovery Wells	X (If no LNAPL)	X			Monthly Gauging/ Quarterly Sampling
Monitoring Wells	X	X			Monthly Gauging/ Quarterly Sampling

Please note that maintenance visits to tend to remedial and mitigation system may be performed at higher frequencies, as needed.

5.0 ONGOING REMEDIAL SYSTEM OPERATION AND MAINTENANCE PLAN

5.1 General

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor, and maintain the mechanical components of the long term remedial measure at the site, which is the LNAPL recovery system. This Operation and Maintenance Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the site to operate and maintain the LNAPL recovery system;
- Will be updated periodically to reflect changes in site conditions or the manner in which the LNAPL recovery system is operated and maintained.

The SSDS is classified as a mitigation system and not a remedial system. Operation and Maintenance information regarding the SSDS is provided in **Appendix J** - Operation and Maintenance Manuals. Further information regarding the Operation and Maintenance of the LNAPL recovery system is included in **Appendix K**. A copy of this Operation and Maintenance Manual, along with the complete SMP, is to be maintained at the Site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 LNAPL Recovery System Performance Criteria

LNAPL Recovery System

The four LNAPL recovery wells within the "Track 4" area will be serviced by two Magnum Spill Buster devices which will operate full-time. These devices operate by lowering a submersible pump outfitted with an automatic leveler programmed to seek the more viscous floating LNAPL on top of the water within a well. The leveler allows the pump to target the removal of LNAPL and not water. These devices are operated via electricity and can be mobilized to different locations as necessary. The product specification and guidebook for the Magnum Spill Buster is included in **Appendix K**.

The spill buster is comprised of a self-leveling pump (called an auto-seeker), which is attached to power and hose cable mounted onto a reel, and an electrical control dashboard

that is used to control the settings for each pump. The pump operates by using controlled volumes of compressed air to create a vacuum at the pump to extract LNAPL from the well. Each Spill Buster device is equipped with a 55-gallon drum which is the storage container for the recovered LNAPL. The drum will be outfitted with a feature that will deactivate the pump once the drum reaches capacity to protect against overflows. Once the drum reaches capacity, a vacuum truck will be used to remove the recovered oil from the drum and transport the LNAPL off site for disposal.

Prior to the installation of the spill buster units, a routine VEFR schedule will be established which will include approximately one VEFR event per week to gauge the wells and remove LNAPL. Manual LNAPL removal may also be conducted as well.

If the spill busters cannot be utilized at a given time for reasons such as active construction or building activities, then a vacuum truck will be mobilized to the site and VEFR events will be performed on each well or LNAPL will be removed manually using liquid bailing devices such as PVC or polyethene well bailers. These VEFR/bailing events will occur monthly, at minimum, for the period of time the spill busters are not active.

VEFR and/or bailing events may also replace the service of the spill buster at recovery wells which demonstrate minimal, yet recoverable, levels of LNAPL that cannot be effectively addressed with the spill buster's pump.

In addition, the two existing downgradient monitoring wells, as well as a third upgradient monitoring well which will be installed in 2023, will be gauged monthly to monitor for the presence of LNAPL to confirm that residual LNAPL remains confined to the "Track 4" area.

LNAPL Recovery System Operation: Routine Operation Procedures

Routine operation procedures associated with the LNAPL recovery system include the following:

- A system inspection log will be kept for each site visit that will include well gauging measurements, recovered LNAPL measurements, and system inspections. Adjustments and repairs will be made on an as needed basis to keep the system operating as designed. Inspection logs will also be

completed during VEFR events and will include estimated volumes of removed LNAPL.

- The system is designed to operate 24 hours a day, 7 days a week until the remedial action objectives (RAOs) are reached. Limited system shutdowns may occur during maintenance activities. The NYSDEC will be consulted regarding any modifications to the SVE system's operating schedule. The operation periods of the system may be reduced if LNAPL levels become minimal and full-time operation is no longer necessary or effective.
- Recovered LNAPL will be removed from the drums via a vacuum truck which will transport the material off site for disposal. Disposal manifests will be included in the yearly PRRs. The drums will be emptied, as needed, when they have reached, or are nearing, capacity.

System Operation: Routine Equipment Maintenance

The key components of the Spill Buster are the self-leveling pump, the power and hose cable, and electrical control box. Specific equipment maintenance activities will include:

- System monitoring, including recording system operational parameters,
- Maintenance of pump, including replacing hose line as needed,
- Modification to power controls as needed.
- Visual inspections of the pump and drum.
- Housekeeping inspections of the spill busters.

System Operation: Non-Routine Equipment Maintenance

Non-routine equipment maintenance associated with the LNAPL recovery system includes the following:

- Replace the pumps in the event damage or ware & tare has rendered it ineffective.

- Replacement of drums if corrosion, punctures, or other integrity issues are observed.

6.0 REPORTING REQUIREMENTS

6.1 Site Management Reports

Site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in **Appendix H.** These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 3 and summarized in the Periodic Review Report.

Table 3: Schedule of Periodic Review Reports

Task/Report	Reporting Frequency*
Periodic Review Report (PRR)	18 months following issue of COC, then annually

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC.

PRRs will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc.);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;

- A figure illustrating sample type and sampling locations;
- Copies of laboratory data sheets, and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link:

- http://www.dec.ny.gov/chemical/62440.html.

6.2 Periodic Review Report

A Periodic Review Report (PRR) will be submitted to the Department beginning eighteen (18) months after the Certificate of Completion is issued. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually to the Department or at another frequency as may be required by the Department. In the event the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in **Appendix D** – Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment, and certification of Ecs/Ics required by the remedy for the Site.
- Results of the required annual Site inspections and severe condition inspections, if applicable.
- All applicable site management forms and other records generated for the Site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends.
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC

EquIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

- Disposal manifest for LNAPL/oily water removed from the drums servicing the Spill Buster, LNAPL/oily water removed from bailing events, and LNAPL/oily water removed from VEFR events.

- A Site evaluation, which includes the following:

  – The compliance of the remedy with the requirements of the site-specific RAWP and Decision Document;

  – The operation and the effectiveness of treatment and/or mitigation units, etc., including identification of any needed repairs or modifications;

  – Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;

  – Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan; and

  – Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals as specified by the Decision Document.

  – The overall performance and effectiveness of the remedy.

- A performance summary for remedial and/or mitigation systems at the site during the calendar year, including information such as:

  – The number of days the system operated for the reporting period;

  – The contaminant mass removed;

  – A description of breakdowns and/or repairs along with an explanation for any significant downtime;

  – A description of the resolution of performance problems;

  – Alarm conditions;

  – Trends in equipment failure;

  – A summary of the performance, effluent and/or effectiveness monitoring; and

  – Comments, conclusions, and recommendations based on data evaluation.

6.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a Professional Engineer licensed to practice in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"*For each institutional or engineering control identified for the site, I certify that all of the following statements are true:*

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor,

pursuant to Section 210.45 of the Penal Law. I, Dr. Mark Dong, of Luciano, LLC, am certifying as Owner's Designated Site Representative

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the site is located and the NYSDOH Bureau of Environmental Exposure Investigation. The Periodic Review Report may need to be submitted in hard-copy format, as requested by the NYSDEC project manager.

6.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC.

6.4 Remedial Site Optimization Report

A remedial site optimization (RSO) is an effort or action implemented enhance and/or improve the effectiveness and cost-efficiently of the remediation.

In the event that an RSO is to be performed an RSO report will be submitted to the Department for approval. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. An update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the site is located, Site Control and the NYSDOH Bureau of Environmental Exposure Investigation.

7.0 REFERENCES

6NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.

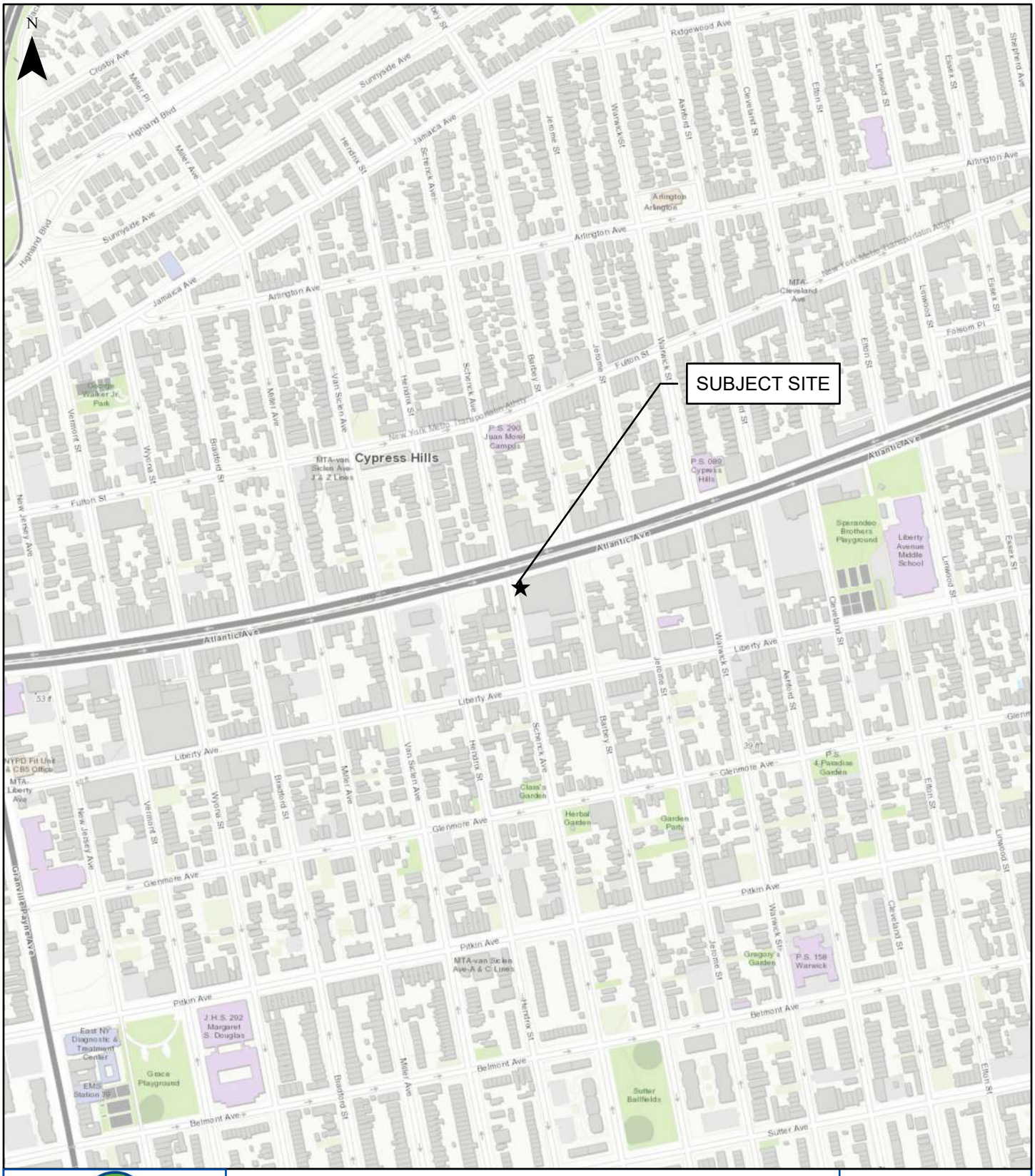
NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".

NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).

NYSDEC – MARCH 2021 Decision Document for 2840 Atlantic Avenue – C224255

AMC Engineering, PLLC – March 2020 (Revised January 2021) Remedial Action Work Plan

FIGURES



PWGC
CLIENT DRIVEN SOLUTIONS

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Bohemia, NY 11716
Ph: 631-589-6353 • Fax: 631-589-8705
pwgc.info@pwgrosser.com

SITE LOCATION

2840 Atlantic Avenue
Brooklyn, NY 11207

0 — ¼ Miles

Project:	ZDG2101
Date:	9/28/2022
Designed by:	JP
Drawn by:	AM
Approved by:	JP
Figure No:	1

Document Path: G:\Shared drives\ZDG_GIS\ZDG_GIS.aprx



Document Path: G:\Shared drives\ZDG_GIS\Map Files\FIG02_SitePlan.mxd

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REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION:

Project:	ZDG2102	Designed by:	RM
Date:	8/24/2021	Drawn by:	UC
Scale:	AS SHOWN	Approved by:	RM

SITE PLAN

2840 Atlantic Ave,
Brooklyn, NY

FIGURE NO:

2



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REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION:

Project:	ZDG2101	Designed by:	RM
Date:	7/5/2022	Drawn by:	OA
Scale:	AS SHOWN	Approved by:	RM

Recovery & Monitoring Well Locations

2840 Atlantic Ave,
Brooklyn, NY

FIGURE NO:

3

Document Path: G:\Shared drives\ZDG_GIS\ArcProProject\ArcProProject\ArcProProject.aprx



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REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION:

Project:	ZDG2101	Designed by:	JP
Date:	10/5/2022	Drawn by:	AM
Scale:	AS SHOWN	Approved by:	JP

SSDS and Site Cover

2840 Atlantic Avenue
Brooklyn, NY 11207

FIGURE NO:

5

Document Path: G:\Shared drives\ZDG_GIS\ZDG_GIS.aprx

APPENDIX A – LIST OF SITE CONTACTS

Name	Phone/Email Address
Empire State Dairy LLC – Sam Goldstein Owner Representative	718-417-1616 samg@bushburg.com
Ryan Morley, PG, (PWGC) – QEP	516-441-5800 (ryanm@pwgrosser.com)
Michael Scanlon, PE (PWGC) – Engineer of Record	631-589-6353 (whenfling@pwgrosser.com)
Steven Scharf, PE (NYSDEC)	518-402-9656 (steven.scharf@dec.ny.gov)
Jane O'Connell, PE (NYSDEC)	718-482-6725 (jane.oconnell@def.ny.gov)
Johnathan Robinson (NYSDOH)	518-402-7860 (Johnathan.Robinson@health.ny.gov)
Kelly Lewandowski NYSDEC Site Control	518-402-9553 (kelly.lewandowski@dec.ny.gov)
Linda Shaw, Esq. (Attorney)	585-546-8430 (lshaw@nyenvlaw.com)

APPENDIX B – EXCAVATION WORK PLAN (EWP)

B-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the NYSDEC. The table below includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix A.

Table Notifications*

Jane H. O'Connell NYSDEC Regional Remediation Engineer	718-482-4599 jane.oconnell@dec.ny.gov
Steven Scharf, PE	518-402-9656 Steven.Scharf@dec.ny.gov
Kelly Lewandowski NYSDEC Site Control	518-402-9553 kelly.lewandowski@dec.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;

- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix E of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

B-2 SOIL SCREENING METHODS

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

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Section 7 of this Appendix.

B-3 SOIL STAGING METHODS

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

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

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

B-4 MATERIALS EXCAVATION AND LOAD-OUT

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

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site.

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

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete Truck wash waters will be collected and disposed of off-site in an appropriate manner.

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

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

B-5 MATERIALS TRANSPORT OFF-SITE

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

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

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

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site. Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development. Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

B-6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

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

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

B-7 MATERIALS REUSE ON-SITE

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

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

B-8 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with

applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, and will be managed off-site, unless prior approval is obtained from NYSDEC.

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

B-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored. The existing cover system is comprised of a concrete slab approximately 12 inches thick. Restoration will include repairing the slab to match the pre-existing thickness. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

B-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the Site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the Site.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d)which include the stricter of the following:

- Unrestricted Use SCOs

Soils that meet ‘exempt’ fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the Site without prior approval by NYSDEC. Solid waste will not be imported onto the Site.

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

B-11 STORMWATER POLLUTION PREVENTION

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

B-12 EXCAVATION CONTINGENCY PLAN

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

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

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

B-13 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan (CAMP) provides measures for protection the downwind community (i.e., off-Site receptors including residences, businesses, and on-Site workers not directly involved in subsurface activities) from potential airborne contaminant releases resulting from subsurface activities at the Site.

The CAMP was established in accordance with the following requirements and will comply with the NYSDOH Generic CAMP and the Fugitive Dust and Particulate Monitoring as per DER-10:

- New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan: 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 (NYSDEC) Technical and Guidance Memorandum (TAGM) #4031 - 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.

Fugitive respirable dust will be monitored using a MiniRam Model PDM-3 aerosol monitor or equivalent. Air will be monitored for VOCs with a portable Photovac MicroTip photoionization detector (PID), or equivalent. **Table B-1** lists the Real-Time Air Monitoring Action Levels to be used for CAMP monitoring. Air monitoring data shall be documented in a Site logbook by the designated Site safety officer. The QEP's Site safety officer or delegate shall calibrate and maintain air monitoring instruments in accordance with manufacturer's specifications. Instruments shall be zeroed daily and checked for accuracy and a daily log shall be kept.

When CAMP monitoring is performed during ground intrusive activities, exceedances above the action levels will be reported to NYSDEC and NYSDOH within one business day following field activities. The noted exceedances will be reported along with a reason for the exceedance, corrective actions to address the exceedances, and details regarding the corrective actions' effectiveness. Below are CAMP action levels for the work zone and downwind community.

Table B-1 - Air Monitoring Action Levels for CAMP

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.
DOWNWIND COMMUNITY ACTION LEVELS				
PID	Work Area Perimeter	< 5 ppm	None	Exposure below established exposure limits.
PID	Work Area Perimeter	> 5 ppm	Stop work and implement vapor release response plan until readings return	Increased exposure to Site contaminants, potential for vapor release to public areas

AIR MONITORING INSTRUMENT	MONITORING LOCATION	ACTION LEVEL	SITE ACTION	REASON
			to acceptable levels, Notify HSM.	
Aerosol Monitor	Work Area Perimeter	>100 but < 150 μg/m^3 for 15 minutes	Institute dust suppression measures, Notify HSM.	Work to continue if particulate concentrations remain below 150 μg/m^3
Aerosol Monitor	Work Area Perimeter	>150 μg/m^3	Stop work and implement dust suppression measures until readings return to acceptable levels, Notify HSM.	Stop work and implement dust suppression techniques until readings return to acceptable levels, Notify HSM.

B-14 WORKER AIR MONITORING

Air monitoring in the work zone/breathing zone will be performed in accordance with 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. Action levels for work zone air monitoring are detailed in table 2-B below:

Table B-1 - Air Monitoring Action Levels for Work Zone

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.

B-15 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-Site. Specific odor control methods to be used on a routine basis may include limiting open

excavations, use of tarping, hydromulch, or encapsulant to cover soils during excavations, direct loading of soils, use of chemical odorants, piping discharge SSDS air outside and away from occupied areas, use of vapor phase carbon units to filter air, and monitoring air at and beyond property lines. If nuisance odors are identified at the Site boundary, or if odor complaints are received, work will be halted, and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the property owner's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

B-16 DUST CONTROL PLAN

A dust suppression plan that addresses dust management during invasive on-Site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-Site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-Site roads will be limited in total area to minimize the area required for water truck sprinkling.

B-17 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

Attached on the following page are appendix 1-A from DER-10, Generic CAMP, and appendix 1-B from DER-10, Fugitive Dust and Particulate Monitoring.

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

Overview

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

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

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

Community Air Monitoring Plan

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

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

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

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

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

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

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

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

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

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

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

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

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

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

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

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

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

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

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

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

APPENDIX C
RESPONSIBILITIES of
OWNER and REMEDIAL PARTY

Responsibilities

The responsibilities for implementing the Site Management Plan ("SMP") for the 2840 Atlantic Avenue site (the "site"), number C224255, are divided between the site owner and a Remedial Party, as defined below. The owner(s) is/are currently listed as: Empire State Dairy LLC (the "owner").

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party ("RP") refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation ("NYSDEC") is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf. The RP is:

- PW Grosser Consulting Engineer & Hydrogeologist, PC.

Nothing on this page shall supersede the provisions of an Environmental Easement, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the site.

Site Owner's Responsibilities:

1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the site.

2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in a Environmental Easement remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon the RP's request, in order to allow the RP to include the certification in the site's Periodic Review Report (PRR) certification to the NYSDEC.

3) In the event the site is delisted, the owner remains bound by the Environmental Easement and shall submit, upon request by the NYSDEC, a written certification that the Environmental Easement is still in place and has been complied with.

4) The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.

5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. In the event that damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated the Notifications section of this SMP.

6) In the event some action or inaction by the owner adversely impacts the site, the owner must notify the site's RP and the NYSDEC in accordance with the time frame indicated in the Notifications section of this SMP and (ii) coordinate the performance of necessary corrective actions with the RP.

7) The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site property. 6 NYCRR Part contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 2.4 of the SMP. A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html.

8) Until such time as the NYSDEC deems the vapor mitigation system unnecessary, the owner shall operate the system, pay for the utilities for the system's operation, and report any maintenance issues to the RP and the NYSDEC.

9) In accordance with the tenant notification law, within 15 days of receipt, the owner must supply a copy of any vapor intrusion data, that is produced with respect to structures and that exceeds NYSDOH or OSHA guidelines on the site, whether produced by the NYSDEC, RP, or owner, to the tenants on the property. The owner must otherwise comply with the tenant and occupant notification provisions of Environmental Conservation Law Article 27, Title 24.

Remedial Party Responsibilities

1) The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.

2) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.

3) Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.

4) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).

5) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html .

6) The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section the notifications of the SMP.

7) The RP is responsible for the proper maintenance of any installed vapor intrusion mitigation systems associated with the site, as required in this SMP.

8) The RP is responsible for the proper monitoring and maintenance of any installed drinking water treatment system associated with the site, as required in Section 5 or Appendix J (Operation, Monitoring and Maintenance Manual).

9) Prior to a change in use that impacts the remedial system or requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.

10) Any change in use, change in ownership, change in site classification (*e.g.*, delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the Department to discuss the need to update such documents.

Change in RP ownership and/or control and/or site ownership does not affect the RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future site owners and RPs and their successors and assigns are required to carry out the activities set forth above.

APPENDIX D – ENVIRONMENTAL EASEMENT

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

This page is part of the instrument. The City Register will rely on the information provided by you on this page for purposes of indexing this instrument.The information on this page will control for indexing purposes in the event of any conflict with the rest of the document.

2022121501214001001EFBA0

RECORDING AND ENDORSEMENT COVER PAGE **PAGE 1 OF 12**

Document ID: 2022121501214001 Document Date: 12-12-2022 Preparation Date: 12-15-2022
Document Type: EASEMENT
Document Page Count: 11

PRESENTER:
INFINITY LAND SERVICES LLC *IL11618*
AS AGENT FOR OLD REPUBLIC NATIONAL TITLE INSURANCE
2361 NOSTRAND AVENUE, SUITE 802
BROOKLYN, NY 11210
718-338-4200

RETURN TO:
INFINITY LAND SERVICES LLC *IL11618*
AS AGENT FOR OLD REPUBLIC NATIONAL TITLE INSURANCE
2361 NOSTRAND AVENUE, SUITE 802
BROOKLYN, NY 11210
718-338-4200

PROPERTY DATA

Borough	Block	Lot	Unit	Address
BROOKLYN	3964	8	Entire Lot	2840 ATLANTIC AVENUE

Property Type: COMMERCIAL REAL ESTATE Easement

CROSS REFERENCE DATA

CRFN_____ *or* DocumentID_____ *or* _____ Year_____ Reel____ Page_____ *or* File Number_____

PARTIES

GRANTOR/SELLER:
EMPIRE STATE DAIRY LLC
3611 14TH AVENUE, SUITE 215
BROOKLYN, NY 11218

GRANTEE/BUYER:
NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 BROADWAY, 14TH FLOOR
ALBANY, NY 12233-1500

FEES AND TAXES

Mortgage :

Mortgage Amount:	$	0.00
Taxable Mortgage Amount:	$	0.00
Exemption:		
TAXES: County (Basic):	$	0.00
City (Additional):	$	0.00
Spec (Additional):	$	0.00
TASF:	$	0.00
MTA:	$	0.00
NYCTA:	$	0.00
Additional MRT:	$	0.00
TOTAL:	$	0.00
Recording Fee:	$	92.00
Affidavit Fee:	$	0.00

Filing Fee: $ 0.00

NYC Real Property Transfer Tax: $ 0.00

NYS Real Estate Transfer Tax: $ 0.00

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK
Recorded/Filed 12-20-2022 16:56
City Register File No.(CRFN): **2022000456068**

City Register Official Signature

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made (as of) this 12th day of December, 2022, between Owner, Empire State Dairy LLC, having an office at c/o Bushburg Properties LLC, 3611 14th Avenue, Suite 400, Brooklyn, NY 11218 (the "Grantor"), and The People of the State of New York (the "Grantee"), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 2840 Atlantic Avenue in the City of New York, County of Kings and State of New York, known and designated on the tax map of the New York City Department of Finance as tax map parcel number: Block 3964 Lot 8, being the property conveyed to Grantor by deed dated January 28, 2022 and recorded in the City Register of the City of New York as CRFN 2022000062849.

WHEREAS, the property subject to this Environmental Easement (the "Controlled Property") comprises approximately 1.0009 +/- acres, and is hereinafter more fully described in the Land Title Survey dated July 2, 2018 and last revised November 18, 2022 prepared by Vincent M. Teutonico, Registration No. 050307, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is

extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement, Index No. C224255-11-17, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) A .9605 +/- portion of the Controlled Property, as described in Schedule B, may be used for:

Unrestricted Use as described in 6 NYCRR Part 375-1.8 (g)(1)(i); Residential as described in in 6 NYCRR Part 375-1.8(g)(2)(i), Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv);

(2) A .0403-acre +/- portion of the Controlled Property, as described in Schedule C, may be used for:

Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv);

(4) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(5) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(6) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Kings County

Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(7) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(8) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(9) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(10) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(11) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(12) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

C. The .403-acre +/- portion of the Controlled Property described in Schedule C shall be used for any of the uses provided in Section 2.A.2 herein, including but not limited to Restricted Residential use as described in 6NYCRR Part 375-1.8(g)(2)(ii) but shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

E. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

F. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

G. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

H. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

I. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: C224255
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section

Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

11. Consistency with the SMP. To the extent there is any conflict or inconsistency between the terms of this Environmental Easement and the SMP, regarding matters specifically addressed by the SMP, the terms of the SMP will control.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Empire State Dairy LLC:

By: _____

Print Name: Abraham J Hoffmen

Title: Member Date: 12/6/22

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF Kings)

On the 6th day of December, in the year 20 22, before me, the undersigned, personally appeared Abraham J Hoffmen, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

GITTY WALDMAN
NOTARY PUBLIC, STATE OF NEW YORK
Registration No. 01WA6311497
Qualified in Kings County
Commission Expires September 15, 2026

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting by and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
Andrew O. Guglielmi, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 12th day of December, in the year 2022 before me, the undersigned, personally appeared Andrew O. Guglielmi, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

JENNIFER ANDALORO
Notary Public, State of New York
No. 02AN6098246
Qualified in Albany County
Commission Expires January 14, 2024

SCHEDULE "A" PROPERTY DESCRIPTION

ALL that certain plot, piece or parcel of land, situated, lying and being In the Borough of Brooklyn, County of Kings, City and state of New York, bounded and described as follows:

BEGINNING at the southeasterly corner of Atlantic Avenue and Schenck Avenue;

RUNNING THENCE southerly along the easterly side on Schenck Avenue, 235 feet;

THENCE easterly at right angles to Schenck Avenue, 100 feet;

THENCE northerly parallel with Schenck Avenue, 50 feet;

THENCE easterly at right angles to Schenck Avenue, 100 feet to the westerly side of Barbey Street;

THENCE northerly along the westerly side of Barbey Street, 201 feet to the southwesterly corner of Atlantic Avenue and Barbey Street;

THENCE westerly along the southerly side of Atlantic Avenue 200 feet 8 inches (deed) 200 feet 7 5/8 inches (survey) to the point or place of BEGINNING.

FOR INFORMATION PURPOSES ONLY, 2840 Atlantic Avenue, Brooklyn, NY 11207 a/k/a Block 3964 lot 8 on the KINGS County Tax Map.

For conveyancing only:
TOGETHER with all the right, title and interest of the party of the first part, of, in and to the land lying in the street in front of and adjoining said premises.

AREA- 43,600 SQ. FT. -1,0009 ACRE

SCHEDULE "B" – UNRESTRICTED USE (CONDITIONAL TRACK 1)
EASEMENT AREA

ALL that certain plot, piece or parcel of land, situated, lying and being in the Borough of Brooklyn, County of Kings, City and state of New York, bounded and described as follows:

BEGINNING at the southeasterly corner of Atlantic Avenue and Schenck Avenue;

RUNNING THENCE southerly along the easterly side on Schenck Avenue, 235 feet;

THENCE easterly at right angles to Schenck Avenue, 100 feet;

THENCE northerly parallel with Schenck Avenue, 50 feet;

THENCE easterly at right angles to Schenck Avenue, 100 feet to the westerly side of Barbey street;

THENCE northerly along the westerly side of Barbey Street, 92 feet 11 inches to a point on the westerly side of Barbey Street;

THENCE westerly at right angles to Barbey Street 63 feet 5 inches;

THENCE northerly and parallel with Barbey Street 27 feet 9 inches;

THENCE easterly and at right angles with Barbey Street 63 feet 5 inches;

THENCE northerly along the westerly side of Barbey Street 80 feet 4 inches to intersection of the westerly side of Barbey Street and the southerly side of Atlantic Avenue;

THENCE westerly along the southerly side of Atlantic Avenue 200 feet B inches (deed) 200 feet 7 5/8 inches (survey) to the point or place of BEGINNING.

FOR INFORMATION PURPOSES ONLY, 2840 Atlantic Avenue, Brooklyn, NY 11207 a/k/a Block 3964 lot 8 on the KINGS County Tax Map.

AREA- 41,840.35 SQ. FT. 0.09605 ACRE

SCHEDULE "C" RESTRICTED RESIDENTIAL (TRACK 4)
EASEMENT AREA

ALL that certain plot, piece or parcel of land, situated, lying and being in the Borough of Brooklyn, County of Kings, City and state of New York, bounded and described as follows:

BEGINNING at the intersection of the westerly side of Barbey Street and the southerly side of Atlantic Avenue;

RUNNING THENCE southerly along the westerly side of Barbey Street 80 feet 4 inches;

THENCE westerly and at right angles to Barbey Street 63 feet 4 inches;

THENCE southerly and parallel with Barbey Street 27 feet 9 inches;

THENCE easterly and at right angles to Barbey Street 63 feet 5 inches;

THENCE northerly along the westerly side of Barbey Street 27 feet 9 inches to the point or place of BEGINNING.

AREA- 1,759.64 SQ. FT. -0.0403 ACRE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Office of the General Counsel
625 Broadway, 14th Floor, Albany, New York 12233-1500
P: (518) 402-9185 | F: (518) 402-9018
www.dec.ny.gov

VIA FEDERAL EXPRESS

December 14, 2022

Marc Herskowitz
President & CEO
Infinity Land Services LLC
2361 Nostrand Avenue
Suite 802
Brooklyn, NY 11210

RE: Environmental Easement Package
Site Name: 2840 Atlantic Avenue
Site No.: C224255

Dear Mr. Herskowitz,

Enclosed please find a fully executed Environmental Easement, TP-584 and NYC-RPT tax forms required for recording.

Once the Environmental Easement is recorded, the local municipality will need to be notified via Certified Mail, Return Receipt Requested.

Please return to this office, copies of the recorded easement marked by the County Clerk's Office with the date and location of recording, and a certified copy of the municipal notices. The information from the recorded easement and notices are necessary to process the Certificate of Completion.

If you have any further questions or concerns relating to this matter, please contact our office at (518) 402-8599.

Sincerely,

Cheryl Salem
Legal Assistant I
Remediation Bureau

ec: J. Andaloro, Esq., NYSDEC



After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 12th day of December, 2022, between Owner, Empire State Dairy LLC, having an office at c/o Bushburg Properties LLC, 3611 14th Avenue, Suite 400, Brooklyn, NY 11218 (the "Grantor"), and The People of the State of New York (the "Grantee"), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 2840 Atlantic Avenue in the City of New York, County of Kings and State of New York, known and designated on the tax map of the New York City Department of Finance as tax map parcel number: Block 3964 Lot 8, being the property conveyed to Grantor by deed dated January 28, 2022 and recorded in the City Register of the City of New York as CRFN 2022000062849.

WHEREAS, the property subject to this Environmental Easement (the "Controlled Property") comprises approximately 1.0009 +/- acres, and is hereinafter more fully described in the Land Title Survey dated July 2, 2018 and last revised November 18, 2022 prepared by Vincent M. Teutonico, Registration No. 050307, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is

extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement, Index No. C224255-11-17, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) A .9605 +/- portion of the Controlled Property, as described in Schedule B, may be used for:

Unrestricted Use as described in 6 NYCRR Part 375-1.8 (g)(1)(i); Residential as described in in 6 NYCRR Part 375-1.8(g)(2)(i), Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv);

(2) A .0403-acre +/- portion of the Controlled Property, as described in Schedule C, may be used for:

Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv);

(4) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(5) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(6) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Kings County

Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(7) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(8) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(9) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(10) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(11) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(12) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

C. The .403-acre +/- portion of the Controlled Property described in Schedule C shall be used for any of the uses provided in Section 2.A.2 herein, including but not limited to Restricted Residential use as described in 6NYCRR Part 375-1.8(g)(2)(ii) but shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

E. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

F. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

G. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

H. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

I. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: C224255
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section

Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

11. Consistency with the SMP. To the extent there is any conflict or inconsistency between the terms of this Environmental Easement and the SMP, regarding matters specifically addressed by the SMP, the terms of the SMP will control.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Empire State Dairy LLC:

By: _____

Print Name: Abraham J Hoffman

Title: Member Date: 12/6/22

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF Kings)

On the 6th day of December, in the year 20 22, before me, the undersigned, personally appeared Abraham J Hoffman, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

GITTY WALDMAN
NOTARY PUBLIC, STATE OF NEW YORK
Registration No. 01WA6311497
Qualified in Kings County
Commission Expires September 15, 2026

GITTY WALDMAN
NOTARY PUBLIC, STATE OF NEW YORK
Registration No. 01WA6211467
Qualified in Kings County
Commission Expires September 19, 2026

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting by and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: Andrew Guglielmi
Andrew O. Guglielmi, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 12th day of December, in the year 2022 before me, the undersigned, personally appeared Andrew O. Guglielmi, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

Jennifer Andaloro
Notary Public - State of New York

JENNIFER ANDALORO
Notary Public, State of New York
No. 02AN6098246
Qualified in Albany County
Commission Expires January 14, 2024

SCHEDULE "A" PROPERTY DESCRIPTION

ALL that certain plot, piece or parcel of land, situated, lying and being 1n the Borough of Brooklyn, County of Kings, City and state of New York, bounded and described as follows:

BEGINNING at the southeasterly corner of Atlantic Avenue and Schenck Avenue;

RUNNING THENCE southerly along the easterly side on Schenck Avenue, 235 feet;

THENCE easterly at right angles to Schenck Avenue, 100 feet;

THENCE northerly parallel with Schenck Avenue, 50 feet;

THENCE easterly at right angles to Schenck Avenue, 100 feet to the westerly side of Barbey Street;

THENCE northerly along the westerly side of Barbey Street, 201 feet to the southwesterly corner of Atlantic Avenue and Barbey Street;

THENCE westerly along the southerly side of Atlantic Avenue 200 feet 8 inches (deed) 200 feet 7 5/8 inches (survey) to the point or place of BEGINNING.

FOR INFORMATION PURPOSES ONLY, 2840 Atlantic Avenue, Brooklyn, NY 11207 a/k/a Block 3964 lot 8 on the KINGS County Tax Map.

For conveyancing only:
TOGETHER with all the right, title and interest of the party of the first part, of, in and to the land lying in the street in front of and adjoining said premises.

AREA- 43,600 SQ. FT. -1,0009 ACRE

SCHEDULE "B" – UNRESTRICTED USE (CONDITIONAL TRACK 1)
EASEMENT AREA

ALL that certain plot, piece or parcel of land, situated, lying and being in the Borough of Brooklyn, County of Kings, City and state of New York, bounded and described as follows:

BEGINNING at the southeasterly corner of Atlantic Avenue and Schenck Avenue;

RUNNING THENCE southerly along the easterly side on Schenck Avenue, 235 feet;

THENCE easterly at right angles to Schenck Avenue, 100 feet;

THENCE northerly parallel with Schenck Avenue, 50 feet;

THENCE easterly at right angles to Schenck Avenue, 100 feet to the westerly side of Barbey street;

THENCE northerly along the westerly side of Barbey Street, 92 feet 11 inches to a point on the westerly side of Barbey Street;

THENCE westerly at right angles to Barbey Street 63 feet 5 inches;

THENCE northerly and parallel with Barbey Street 27 feet 9 inches;

THENCE easterly and at right angles with Barbey Street 63 feet 5 inches;

THENCE northerly along the westerly side of Barbey Street 80 feet 4 inches to intersection of the westerly side of Barbey Street and the southerly side of Atlantic Avenue;

THENCE westerly along the southerly side of Atlantic Avenue 200 feet B inches (deed) 200 feet 7 5/8 inches (survey) to the point or place of BEGINNING.

FOR INFORMATION PURPOSES ONLY, 2840 Atlantic Avenue, Brooklyn, NY 11207 a/k/a Block 3964 lot 8 on the KINGS County Tax Map.

AREA- 41,840.35 SQ. FT. 0.09605 ACRE

SCHEDULE "C" RESTRICTED RESIDENTIAL (TRACK 4)
EASEMENT AREA

ALL that certain plot, piece or parcel of land, situated, lying and being in the Borough of Brooklyn, County of Kings, City and state of New York, bounded and described as follows:

BEGINNING at the intersection of the westerly side of Barbey Street and the southerly side of Atlantic Avenue;

RUNNING THENCE southerly along the westerly side of Barbey Street 80 feet 4 inches;

THENCE westerly and at right angles to Barbey Street 63 feet 4 inches;

THENCE southerly and parallel with Barbey Street 27 feet 9 inches;

THENCE easterly and at right angles to Barbey Street 63 feet 5 inches;

THENCE northerly along the westerly side of Barbey Street 27 feet 9 inches to the point or place of BEGINNING.

AREA- 1,759.64 SQ. FT. -0.0403 ACRE

TP-584-NYC (9/19)

Department of Taxation and Finance

Combined Real Estate Transfer Tax Return, Credit Line Mortgage Certificate, and Certification of Exemption from the Payment of Estimated Personal Income Tax for the Conveyance of Real Property Located in New York City

Recording office time stamp

See Form TP-584-NYC-I, Instructions for Form TP-584-NYC, *before completing this form. Print or type.*

Schedule A – Information relating to conveyance

Grantor/Transferor

☐ Individual
☐ Corporation
☐ Partnership
☐ Estate/Trust
☐ Single member LLC
☑ Multi-member LLC
☐ Other

Name *(if individual, last, first, middle initial)* (☐ *mark an X if more than one grantor)*: EMPIRE STATE DAIRY LLC

Social Security number (SSN):

Mailing address: 3611 14TH AVENUE SUITE 215

SSN:

City	State	ZIP code
BROOKLYN	NY	11218

Employer identification number (EIN): 35 2637419

Single member's name if grantor is a single member LLC *(see instructions)*

Single member EIN or SSN:

Grantee/Transferee

☐ Individual
☐ Corporation
☐ Partnership
☐ Estate/Trust
☐ Single member LLC
☐ Multi-member LLC
☑ Other

Name *(if individual, last, first, middle initial)* (☐ *mark an X if more than one grantee)*: NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SSN:

Mailing address: 625 BROADWAY 14TH FLOOR

SSN:

City	State	ZIP code
ALBANY	NY	12233-1500

EIN: 14 6013200

Single member's name if grantee is a single member LLC *(see instructions)*

Single member EIN or SSN:

Location and description of property conveyed

Tax map designation – section, block & lot *(include dots and dashes)*	SWIS code (six digits)	Street address	City, town, or village	County
3 - 3964 - 8	650000	2840 ATLANTIC AVENUE	NEW YORK	BROOKLYN / KINGS

Type of property conveyed *(mark an X in applicable box)*

1 ☐ One- to three-family house
2 ☐ Residential cooperative
3 ☐ Residential condominium
4 ☐ Vacant land
5 ☑ Commercial/Industrial
6 ☐ Apartment building
7 ☐ Office building
8 ☐ Four-family dwelling
9 ☐ Other _____

Date of conveyance: ____ / ____ / ____ (month / day / year)

☐ Contract executed on or before April 1, 2019 *(see instructions)*

Percentage of real property conveyed which is residential real property 0 % *(see instructions)*

Condition of conveyance *(mark all that apply)*

a. ☐ Conveyance of fee interest
b. ☐ Acquisition of a controlling interest (state percentage acquired _____ %)
c. ☐ Transfer of a controlling interest (state percentage transferred _____ %)
d. ☐ Conveyance to cooperative housing corporation
e. ☐ Conveyance pursuant to or in lieu of foreclosure or enforcement of security interest *(attach Form TP-584.1, Schedule E)*
f. ☐ Conveyance which consists of a mere change of identity or form of ownership or organization *(attach Form TP-584.1, Schedule F)*
g. ☐ Conveyance for which credit for tax previously paid will be claimed *(attach Form TP-584.1, Schedule G)*
h. ☐ Conveyance of cooperative apartment(s)
i. ☐ Syndication
j. ☐ Conveyance of air rights or development rights
k. ☐ Contract assignment
l. ☐ Option assignment or surrender
m. ☐ Leasehold assignment or surrender
n. ☐ Leasehold grant
o. ☑ Conveyance of an easement
p. ☐ Conveyance for which exemption from transfer tax claimed *(complete Schedule B, Part 4)*
q. ☐ Conveyance of property partly within and partly outside the state
r. ☐ Conveyance pursuant to divorce or separation
s. ☑ Other *(describe)* ENVIRONMENTAL EASEMENT

For recording officer's use	Amount received	Date received	Transaction number
	Schedule B, Part 1 $		
	Schedule B, Part 2 $		
	Schedule B, Part 3 $		

Schedule B – Real estate transfer tax return (Tax Law, Article 31)

Part 1 – Computation of tax due *(in addition to the tax on line 4, you must compute the tax on lines 5a and 5b, if applicable)*

1	Enter amount of consideration for the conveyance *(if you are claiming a total exemption from tax, mark the exemption claimed box, enter consideration and proceed to Part 4)* ☐ **Exemption claimed**	1.	0 00
2	Continuing lien deduction *(see instructions if property is taken subject to mortgage or lien)*	2.	0 00
3	Taxable consideration *(subtract line 2 from line 1)*	3.	0 00
4	Tax: $2 for each $500, or fractional part thereof, of consideration on line 3	4.	0 00
5a	Tax: $1.25 for each $500, or fractional part thereof, of consideration for the conveyance of residential real property located in New York City if the amount on line 3 is $3 million or more *(see instructions)*	5a.	0 00
5b	Tax: $1.25 for each $500, or fractional part thereof, of consideration for the conveyance of property located in New York City other than residential real property, if the amount on line 1 is $2 million or more *(see instructions)*	5b.	0 00
6	Total before credit(s) claimed *(add lines 4, 5a, and 5b)*	6.	0 00
7	Amount of credit claimed for tax previously paid *(see instructions and attach Form TP-584.1, Schedule G)*	7.	0 00
8	Total tax due* *(subtract line 7 from line 6)*	8.	0 00

Part 2 – Computation of additional tax due on the conveyance of residential real property for $1 million or more *(see instructions)*

1	Enter amount of consideration for conveyance *(from Part 1, line 1)*	1.	0 00
2	Taxable consideration *(multiply line 1 by the percentage of the premises which is residential real property, as shown in Schedule A)*	2.	0 00
3	Total additional transfer tax due* *(multiply line 2 by 1% (.01))*	3.	0 00

Part 3 – Computation of supplemental tax due on the conveyance of residential real property, or interest therein, located in New York City, for $2 million or more *(see instructions)*

1	Enter amount of consideration for conveyance *(from Part 1, line 1)*	1.	0 00
2	Taxable consideration *(multiply line 1 by the percentage of the premises which is residential real property, as shown in Schedule A)*	2.	0 00
3	Total supplemental transfer tax due* *(multiply line 2 by tax rate, see instruction for rates)*	3.	0 00

*** The total tax (from Part 1, line 8; Part 2, line 3; and Part 3, line 3 above) is due within 15 days from the date of conveyance.**

Part 4 – Explanation of exemption claimed on Part 1, line 1 *(mark any boxes that apply)*

The conveyance of real property is exempt from the real estate transfer tax for the following reason:

a. Conveyance is to the United Nations, the United States of America, New York State, or any of their instrumentalities, agencies, or political subdivisions (or any public corporation, including a public corporation created pursuant to agreement or compact with another state or Canada) ..... a ☐

b. Conveyance is to secure a debt or other obligation ..... b ☐

c. Conveyance is without additional consideration to confirm, correct, modify, or supplement a prior conveyance ..... c ☐

d. Conveyance of real property is without consideration and not in connection with a sale, including conveyances conveying realty as bona fide gifts ..... d ☐

e. Conveyance is given in connection with a tax sale ..... e ☐

f. Conveyance is a mere change of identity or form of ownership or organization where there is no change in beneficial ownership. (This exemption cannot be claimed for a conveyance to a cooperative housing corporation of real property comprising the cooperative dwelling or dwellings.) Attach Form TP-584.1, Schedule F ..... f ☐

g. Conveyance consists of deed of partition ..... g ☐

h. Conveyance is given pursuant to the federal Bankruptcy Act ..... h ☐

i. Conveyance consists of the execution of a contract to sell real property, without the use or occupancy of such property, or the granting of an option to purchase real property, without the use or occupancy of such property ..... i ☐

j. Conveyance of an option or contract to purchase real property with the use or occupancy of such property where the consideration is less than $200,000 and such property was used solely by the grantor as the grantor's personal residence and consists of a one-, two-, or three-family house, an individual residential condominium unit, or the sale of stock in a cooperative housing corporation in connection with the grant or transfer of a proprietary leasehold covering an individual residential cooperative apartment ..... j ☐

k. Conveyance is not a conveyance within the meaning of Tax Law, Article 31, § 1401(e) *(attach documents supporting such claim)* ..... k ☐

Schedule C – Credit Line Mortgage Certificate (Tax Law, Article 11)

Complete the following only if the interest being transferred is a fee simple interest.
I (we) certify that: *(mark an **X** in the appropriate box)*

1. ☐ The real property being sold or transferred is not subject to an outstanding credit line mortgage.

2. ☐ The real property being sold or transferred is subject to an outstanding credit line mortgage. However, an exemption from the tax is claimed for the following reason:
   a ☐ The transfer of real property is a transfer of a fee simple interest to a person or persons who held a fee simple interest in the real property (whether as a joint tenant, a tenant in common or otherwise) immediately before the transfer.

   b ☐ The transfer of real property is (A) to a person or persons related by blood, marriage or adoption to the original obligor or to one or more of the original obligors or (B) to a person or entity where 50% or more of the beneficial interest in such real property after the transfer is held by the transferor or such related person or persons (as in the case of a transfer to a trustee for the benefit of a minor or the transfer to a trust for the benefit of the transferor).

   c ☐ The transfer of real property is a transfer to a trustee in bankruptcy, a receiver, assignee, or other officer of a court.

   d ☐ The maximum principal amount secured by the credit line mortgage is $3,000,000 or more, and the real property being sold or transferred is **not** principally improved nor will it be improved by a one- to six-family owner-occupied residence or dwelling.

   Note: for purposes of determining whether the maximum principal amount secured is $3,000,000 or more as described above, the amounts secured by two or more credit line mortgages may be aggregated under certain circumstances. See TSB-M-96(6)-R for more information regarding these aggregation requirements.

   e ☐ Other *(attach detailed explanation)*.

3. ☐ The real property being transferred is presently subject to an outstanding credit line mortgage. However, no tax is due for the following reason:
   a ☐ A certificate of discharge of the credit line mortgage is being offered at the time of recording the deed.

   b ☐ A check has been drawn payable for transmission to the credit line mortgagee or his agent for the balance due, and a satisfaction of such mortgage will be recorded as soon as it is available.

4. ☐ The real property being transferred is subject to an outstanding credit line mortgage recorded in _____ (insert liber and page or reel or other identification of the mortgage). The maximum principal amount of debt or obligation secured by the mortgage is _____. No exemption from tax is claimed and the tax of _____ is being paid herewith. *(Make check payable to county clerk where deed will be recorded or, if the recording is to take place in New York City but not in Richmond County, make check payable to the **NYC Department of Finance.**)*

Signature (both the grantor(s) and grantee(s) must sign)

The undersigned certify that the above information contained in schedules A, B, and C, including any return, certification, schedule, or attachment, is to the best of his/her knowledge, true and complete, and authorize the person(s) submitting such form on their behalf to receive a copy for purposes of recording the deed or other instrument effecting the conveyance.

Grantor signature	Title	Grantee signature	Title
	Member	Andrew Duglin	Director
Grantor signature	Title	Grantee signature	Title

Reminder: Did you complete all of the required information in Schedules A, B, and C? Are you required to complete Schedule D? If you marked *e*, *f*, or *g* in Schedule A, did you complete Form TP-584.1? If the contract was executed prior to April 1, 2019, did you attach the necessary verification? Have you attached your check(s) made payable to the county clerk where recording will take place or, if the recording is in the New York City boroughs of Manhattan, Bronx, Brooklyn, or Queens, to the ***NYC Department of Finance***? If no recording is required, send this return and your check(s), made payable to the ***NYS Department of Taxation and Finance***, directly to the NYS Tax Department, RETT Return Processing, PO Box 5045, Albany NY 12205-0045. If not using U.S. Mail, see Publication 55, *Designated Private Delivery Services*.

Signature (both the grantor(s) and grantee(s) must sign)

The undersigned certify that the above information contained in schedules A, B, and C, including any return, certification, schedule, or attachment, is to the best of his/her knowledge, true and complete, and authorize the person(s) submitting such form on their behalf to receive a copy for purposes of recording the deed or other instrument effecting the conveyance.

Grantor signature	Title	Grantee signature	Title
Grantor signature	Title	Grantee signature	Title

Schedule D – Certification of exemption from the payment of estimated personal income tax (Tax Law, Article 22, § 663)

Complete the following only if a fee simple interest or a cooperative unit is being transferred by an individual or estate or trust.

If the property is being conveyed by a referee pursuant to a foreclosure proceeding, proceed to Part 2, mark the second box under *Exemptions for nonresident transferor(s)/seller(s)*, and sign at bottom.

Part 1 – New York State residents

If you are a New York State resident transferor(s)/seller(s) listed in Form TP-584-NYC, Schedule A (or an attachment to Form TP-584-NYC), you must sign the certification below. If one or more transferors/sellers of the real property or cooperative unit is a resident of New York State, **each** resident transferor/seller must sign in the space provided. If more space is needed, photocopy this Schedule D and submit as many schedules as necessary to accommodate all resident transferors/sellers.

Certification of resident transferor(s)/seller(s)

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor(s)/seller(s) as signed below was a resident of New York State, and therefore is not required to pay estimated personal income tax under Tax Law, § 663(a) upon the sale or transfer of this real property or cooperative unit.

Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

Note: A resident of New York State may still be required to pay estimated tax under Tax Law, § 685(c), but not as a condition of recording a deed.

Part 2 – Nonresidents of New York State

If you are a nonresident of New York State listed as a transferor/seller in Form TP-584-NYC, Schedule A (or an attachment to Form TP-584-NYC) but are not required to pay estimated personal income tax because one of the exemptions below applies under Tax Law, § 663(c), mark the box of the appropriate exemption below. If any one of the exemptions below applies to the transferor(s)/seller(s), that transferor(s)/seller(s) is not required to pay estimated personal income tax to New York State under Tax Law, § 663. **Each** nonresident transferor/seller who qualifies under one of the exemptions below must sign in the space provided. If more space is needed, photocopy this Schedule D and submit as many schedules as necessary to accommodate all nonresident transferors/sellers.

If none of these exemption statements apply, you must complete Form IT-2663, *Nonresident Real Property Estimated Income Tax Payment Form*, or Form IT-2664, *Nonresident Cooperative Unit Estimated Income Tax Payment Form*. For more information, see *Payment of estimated personal income tax,* on Form TP-584-NYC-I, page 1.

Exemption for nonresident transferor(s)/seller(s)

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor(s)/seller(s) (grantor) of this real property or cooperative unit was a nonresident of New York State, but is not required to pay estimated personal income tax under Tax Law, § 663 due to one of the following exemptions:

☐ The real property or cooperative unit being sold or transferred qualifies in total as the transferor's/seller's principal residence (within the meaning of Internal Revenue Code, section 121) from _____ (Date) to _____ (Date) *(see instructions)*.

☐ The transferor/seller is a mortgagor conveying the mortgaged property to a mortgagee in foreclosure, or in lieu of foreclosure with no additional consideration.

☐ The transferor or transferee is an agency or authority of the United States of America, an agency or authority of the state of New York, the Federal National Mortgage Association, the Federal Home Loan Mortgage Corporation, the Government National Mortgage Association, or a private mortgage insurance company.

Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

Certification of resident transferor(s)/seller(s)

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor(s)/seller(s) as signed below was a resident of New York State, and therefore is not required to pay estimated personal income tax under Tax Law, section 663(a) upon the sale or transfer of this real property or cooperative unit.

Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

Exemption for nonresident transferor(s)/seller(s)

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor(s)/seller(s) (grantor) of this real property or cooperative unit was a nonresident of New York State, but is not required to pay estimated personal income tax under Tax Law, section 663 due to one of the following exemptions:

☐ The real property or cooperative unit being sold or transferred qualifies in total as the transferor's/seller's principal residence (within the meaning of Internal Revenue Code, section 121) from _____ (Date) to _____ (Date) *(see instructions)*.

☐ The transferor/seller is a mortgagor conveying the mortgaged property to a mortgagee in foreclosure, or in lieu of foreclosure with no additional consideration.

☐ The transferor or transferee is an agency or authority of the United States of America, an agency or authority of the state of New York, the Federal National Mortgage Association, the Federal Home Loan Mortgage Corporation, the Government National Mortgage Association, or a private mortgage insurance company.

Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

NEW YORK CITY DEPARTMENT OF FINANCE

NYC - RPT

Department of Finance

REAL PROPERTY TRANSFER TAX RETURN

(Pursuant to Title 11, Chapter 21, NYC Administrative Code)

▲ DO NOT WRITE IN THIS SPACE ▲
FOR OFFICE USE ONLY

GRANTOR

● Name EMPIRE STATE DAIRY LLC

● Grantor is a(n): (check one) ☐ individual ☐ partnership ☐ corporation ☐ single member LLC ☑ multiple member LLC (see instructions) ☐ other _____

Telephone Number

● Permanent mailing address after transfer (number and street) 3611 14TH AVENUE SUITE 215

● City and State BROOKLYN, NY

Zip Code 11218

● Single member's name if grantor is a single member LLC

SOCIAL SECURITY NUMBER

OR

EMPLOYER IDENTIFICATION NUMBER 35-2637419

SINGLE MEMBER EIN OR SSN

GRANTEE

● Name NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION

● Grantee is a(n): (check one) ☐ individual ☐ partnership ☐ corporation ☐ single member LLC ☐ multiple member LLC (see instructions) ☑ other GOVERNMENT ENTITY

Telephone Number

● Permanent mailing address after transfer (number and street) 625 BROADWAY 14TH FLOOR

● City and State ALBANY, NY

Zip Code 12233-1500

● Single member's name if grantee is a single member LLC

SOCIAL SECURITY NUMBER

OR

EMPLOYER IDENTIFICATION NUMBER 14-6013200

SINGLE MEMBER EIN OR SSN

PROPERTY LOCATION

LIST EACH LOT SEPARATELY. ATTACH A RIDER IF ADDITIONAL SPACE IS REQUIRED

● Address (number and street)	Apt. No.	Borough	Block	Lot	# of Floors	Square Feet	● Assessed Value of Property
2840 ATLANTIC AVENUE		BROOKLYN	3964	8	3	36,000	1,957,500.00

● DATE OF TRANSFER TO GRANTEE: _____

● PERCENTAGE OF INTEREST TRANSFERRED: 0 %

CONDITION OF TRANSFER. See Instructions

● Check (✓) all of the conditions that apply and fill out the appropriate schedules of this return. Additionally, Schedules1 and 2 **must** be completed for all transfers.

a. ☐ ..... Arms length transfer
b. ☐ ..... Transfer in exercise of option to purchase
c. ☐ ..... Transfer from cooperative sponsor to cooperative corporation
d. ☐ ..... Transfer by referee or receiver (complete Schedule A)
e. ☐ ..... Transfer pursuant to marital settlement agreement or divorce decree (complete Schedule I)
f. ☐ ..... Deed in lieu of foreclosure (complete Schedule C)
g. ☐ ..... Transfer pursuant to liquidation of an entity (complete Schedule D)
h. ☐ ..... Transfer from principal to agent, dummy, strawman or conduit or vice-versa (complete Schedule E)
i. ☐ ..... Transfer pursuant to trust agreement or will (attach a copy of trust agreement or will)
j. ☐ ..... Gift transfer not subject to indebtedness
k. ☐ ..... Gift transfer subject to indebtedness
l. ☐ ..... Transfer to a business entity in exchange for an interest in the business entity (complete Schedule F)
m. ☐ ..... Transfer to a governmental body
n. ☐ ..... Correction deed
o. ☐ ..... Transfer by or to a tax exempt organization (complete Schedule G)
p. ☐ ..... Transfer of property partly within and partly without NYC
q. ☐ ..... Transfer of successful bid pursuant to foreclosure
r. ☐ ..... Transfer by borrower solely as security for a debt or a transfer by lender solely to return such security
s. ☐ ..... Transfer wholly or partly exempt as a mere change of identity or form of ownership. Complete Schedule M)
t. ☐ ..... Transfer to a REIT or to a corporation or partnership controlled by a REIT. (Complete Schedule R)
u. ☐ ..... Other transfer in connection with financing (describe): _____
v. ☐ .....A grant or assignment of a leasehold interest in a tax-free NY area
w. ☐ ..... Transfer to an HDFC or an entity controlled by an HDFC. (Complete Schedule L)
x. .....Reserved
y. .....Reserved
z. ☑ ..... Other (describe) ENVIRONMETNAL EASEMENT

2022072100277102

● TYPE OF PROPERTY (✓)

a. ☐ ..... 1-3 family house
b. ☐ ..... Individual residential condominium unit
c. ☐ ..... Individual cooperative apartment
d. ☐ ..... Commercial condominium unit
e. ☐ ..... Commercial cooperative
f. ☐ ..... 4 family dwelling
g. ☐ ..... Apartment building
h. ☐ ..... Office building
i. ☐ ..... Industrial building
j. ☐ ..... Utility
k. ☑ ..... OTHER (describe): COMMERCIAL REAL ESTATE

● TYPE OF INTEREST (✓)

Check box at LEFT if you intend to record a document related to this transfer. Check box at RIGHT if you do not intend to record a document related to this transfer.

	REC.		NON REC.
a.	☐	Fee	☐
b.	☐	Leasehold Grant	☐
c.	☐	Leasehold Assignment or Surrender	☐
d.	☐	Easement	☑
e.	☐	Subterranean Rights	☐
f.	☐	Development Rights	☐
g.	☐	Stock	☐
h.	☐	Partnership Interest	☐
i.	☐	OTHER. (describe): ENVIRONMENTAL EASEMENT	☑

SCHEDULE 1 - DETAILS OF CONSIDERATION

COMPLETE THIS SCHEDULE FOR ALL TRANSFERS AFTER COMPLETING THE APPROPRIATE SCHEDULES ON PAGES 5 THROUGH 12. ENTER "ZERO" ON LINE 11 IF THE TRANSFER REPORTED WAS WITHOUT CONSIDERATION.

1. Cash	● 1.	0 00
2. Purchase money mortgage	● 2.	0 00
3. Unpaid principal of pre-existing mortgage(s)	● 3.	0 00
4. Accrued interest on pre-existing mortgage(s)	● 4.	0 00
5. Accrued real estate taxes	● 5.	0 00
6. Amounts of other liens on property	● 6.	0 00
7. Value of shares of stock or of partnership interest received	● 7.	0 00
8. Value of real or personal property received in exchange	● 8.	0 00
9. Amount of Real Property Transfer Tax and/or other taxes or expenses of the grantor which are paid by the grantee	● 9.	0 00
10. Other (describe): _____	● 10.	0 00
11. **TOTAL CONSIDERATION** (add lines 1 through 10 - must equal amount entered on line 1 of Schedule 2) (see instructions)	● 11.	$ 0 00

See instructions for special rules relating to transfers of cooperative units, liquidations, marital settlements and transfers of property to a business entity in return for an interest in the entity.

SCHEDULE 2 - COMPUTATION OF TAX

A. **Payment**	Pay amount shown on line 15 - *See Instructions*	Payment Enclosed

1. Total Consideration (from line 11, above)	● 1.	0 00
2. Excludable liens (see instructions)	● 2.	0 00
3. Consideration (line 1 less line 2)	● 3.	0 00
4. Tax Rate (see instructions)	● 4.	0 %
5. HDFC Exemption (see Schedule L, line 15)	● 5.	0 00
6. Consideration less HDFC Exemption (line 3 less line 5)	● 6.	0 00
7. Percentage change in beneficial ownership (see instructions)	● 7.	100 %
8 Taxable consideration (multiply line 6 by line 7)	● 8.	0 00
9. Tax (multiply line 8 by line 4)	● 9.	0 00
10. Credit (see instructions)	● 10.	0 00
11. Transfer tax previously paid (see Schedule L, line 18)	● 11.	0 00
12. Tax due (line 9 less line 10 and 11) (if the result is negative, enter zero)	● 12.	0 00
13. Interest (see instructions)	● 13.	0 00
14. Penalty (see instructions)	● 14.	0 00
15. **Total Tax Due** (add lines 12, 13 and 14)	● 15.	$ 0 00

202207210027710102

GRANTOR'S ATTORNEY ▼

Name of Attorney: LINDA R. SHAW, ESQ. KNAUF SHAW LLP			Telephone Number: (585) 546-8430
Address (number and street): 1400 CROSSROADS BUILDING 2 STATE STREET		City and State: ROCHESTER, NY	Zip Code: 14614
EMPLOYER IDENTIFICATION NUMBER: 90-0002818	OR	SOCIAL SECURITY NUMBER:	

GRANTEE'S ATTORNEY ▼

Name of Attorney: NYS DEC GENERAL COUNSEL			Telephone Number: (518) 402-9518
Address (number and street): 625 BROADWAY 14TH FLOOR		City and State: ALBANY, NY	Zip Code: 12233-1500
EMPLOYER IDENTIFICATION NUMBER: 14-6013200	OR	SOCIAL SECURITY NUMBER:	

CERTIFICATION ▼

I swear or affirm that this return, including any accompanying schedules, affidavits and attachments, has been examined by me and is, to the best of my knowledge, a true and complete return made in good faith, pursuant to Title 11, Chapter 21 of the Administrative Code and the regulations issued thereunder.

GRANTOR

Sworn to and subscribed to before me on this 27th day of July, 2022.

35-2637419
EMPLOYER IDENTIFICATION NUMBER OR SOCIAL SECURITY NUMBER

EMPIRE STATE DAIRY LLC
Abraham J Hoffman
Name of Grantor

Signature of Notary

Signature of Grantor

Notary's stamp or seal

GITTY WALDMAN
NOTARY PUBLIC, STATE OF NEW YORK
Registration No. 01WA6311497
Qualified in Kings County
Commission Expires September 15, 2022

GRANTEE

Sworn to and subscribed to before me on this 12th day of December, 2022.

14-6013200
EMPLOYER IDENTIFICATION NUMBER OR SOCIAL SECURITY NUMBER

NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Name of Grantee

Signature of Notary

Signature of Grantee

Notary's stamp or seal

JENNIFER ANDALORO
Notary Public, State of New York
No. 02AN6098246
Qualified in Albany County
Commission Expires January 14, 2024

2022072100277101

GAS VALVE | PARKING METER | TRAFFIC SIGN | HYDRANT HYD. | TREE PIT | LIGHT POST | CATCH BASIN | (NOT FOR TAX PURPOSES) JOB # 3964K4.0.23#13781 | UTILITY POLE | PHONE TEL. | WATER VALVE | D.W.E. WATER | TEL. MANHOLE | SEWER MANHOLE | ELECTRIC MANHOLE | ENVIRONMENTAL EASEMENT AREA | CL. CLEAR | L.A. LOW AREA | W.W. WINDOW WELL | C.D. CELLAR DOOR | R.C. RISED CONCRETE | S.G.H. SAFETY GATE & HOUSING | F.E. FIRE ESCAPE | ENT.UND. ENTRANCE UNDER | A. AREAWAY | RT. RIGHT | CL. CENTERLINE | TC. TOP OF CURB | BC. BOTTOM OF CURB | LG. LEGAL GRADE | PI. POINT OF INTERSECTION | TW. TOP OF WALL | BW. BOTTOM OF WALL | F.F FIRST FLOOR | B.F BASEMENT FLOOR | L.F LOWER FLOOR | EL. SPOT ELEVATION | EP. EDGE OF PAVE

DEED DESCRIPTION AND BROWNFIELD CLEANUP PROGRAM SITE BOUNDARY

DEED DESCRIPTION/ENVIRONMENTAL EASEMENT AREA:

ALL that certain plot, piece or parcel of land, situated, lying and being in the Borough of Brooklyn, County of Kings, City and state of New York, bounded and described as follows:

BEGINNING at the southeasterly corner of Atlantic Avenue and Schenck Avenue;

RUNNING THENCE southerly along the easterly side on Schenck Avenue, 235 feet;

THENCE easterly at right angles to Schenck Avenue, 100 feet;

THENCE northerly parallel with Schenck Avenue, 50 feet;

THENCE easterly at right angles to Schenck Avenue, 100 feet to the westerly side of barbey street;

THENCE northerly along the westerly side of Barbey Street, 201 feet to the southwesterly corner of Atlantic Avenue and Barbey Street;

THENCE westerly along the southerly side of Atlantic Avenue 200 feet 8 inches (deed) 200 feet 7-3/8 inches (survey) to the point or place of BEGINNING.

FOR INFORMATION PURPOSES ONLY: 2840 Atlantic Avenue, Brooklyn, NY 11207 a/k/a BLock 3964 lot 8 on the KINGS County Taz Map.

For conveyancing only:
TOGETHER with all the right, title and interest of the party of the first part, of, in and to the land lying in the street in front of and adjoining said premises.

AREA= 43,600 SQ. FT. =1.0009 ACRE

CONDITIONAL TRACK 1 REMEDY AREA:

ALL that certain plot, piece or parcel of land, situated, lying and being in the Borough of Brooklyn, County of Kings, City and state of New York, bounded and described as follows:

BEGINNING at the southeasterly corner of Atlantic Avenue and Schenck Avenue;

RUNNING THENCE southerly along the easterly side on Schenck Avenue, 235 feet;

THENCE easterly at right angles to Schenck Avenue, 100 feet;

THENCE northerly parallel with Schenck Avenue, 50 feet;

THENCE easterly at right angles to Schenck Avenue, 100 feet to the westerly side of Barbey street;

THENCE northerly along the westerly side of Barbey Street, 92 feet 11 inches to a point on the westerly side of Barbey street;

THENCE westerly at right angles to Barbey street 63 feet 5 inches;

THENCE northerly and parallel with Barbey Street 27 feet 9 inches;

THENCE easterly and at right angles with Barbey Street 63 feet 5 inches;

THENCE northerly along the westerly side of Barbey street 80 feet 4 inches to intersection of the westerly side of Barbey Street and the southerly side of Atlantic Avenue;

THENCE westerly along the southerly side of Atlantic Avenue 200 feet 8 inches (deed) 200 feet 7-3/8 inches (survey) to the point or place of BEGINNING.

FOR INFORMATION PURPOSES ONLY: 2840 Atlantic Avenue, Brooklyn, NY 11207 a/k/a BLock 3964 lot 8 on the KINGS County Tax Map.

AREA= 41,840.35 SQ. FT. =0.9605 ACRE

TRACK 4 REMEDY AREA:

ALL that certain plot, piece or parcel of land, situated, lying and being in the Borough of Brooklyn, County of Kings, City and state of New York, bounded and described as follows:

BEGINNING at the intersection of the westerly side of Barbey Street and the southerly side of Atlantic Avenue;

RUNNING THENCE southerly along the westerly side of Barbey Street 80 feet 4 inches;

THENCE westerly and at right angles to Barbey street 63 feet 5 inches;

THENCE southerly and parallel with Barbey Street 27 feet 9 inches;

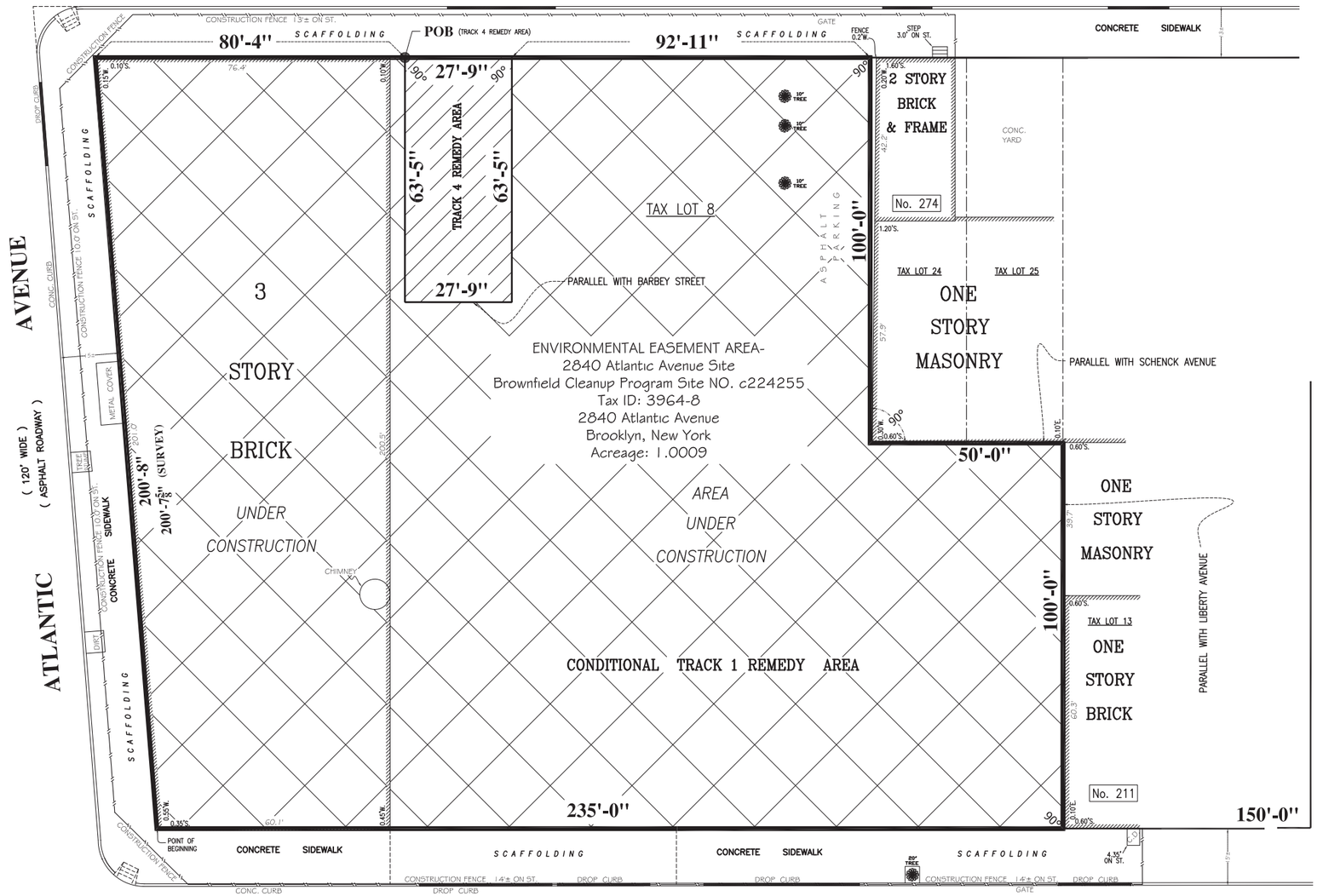
THENCE easterly and at right angles to Barbey Street 63 feet 5 inches;

THENCE northerly along the westerly side of Barbey Street 27 feet 9 inches to the point or place of BEGINNING.

AREA= 1,759.64 SQ. FT. =0.0403 ACRE

LEGEND

- BCP SITE BOUNDARY/ENVIRONMENTAL EASEMENT AREA
- TRACK 4 REMEDY AREA
- CONDITIONAL TRACK 1 REMEDY AREA



"This property is subject to an environmental easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the New York Environmental Conservation Law. The engineering and institutional controls for this Easement are set forth in the Site Management Plan (SMP). A copy of the SMP must be obtained by any party with an interest in the property. The SMP can be obtained from NYS Department of Environmental Conservation, Division of Environmental Remediation, Site Control Section, 625 Broadway, Albany, NY 12233 or at derweb@dec.ny.gov."

BCP SITE No. C224255
2840 Atlantic Avenue Brooklyn New York
Tax ID: 3964-8 Acreage: 1.0009

Certified Only To:

0' 4' 8' 16' 24' 32' FEET
0 1 2 3 4 5 7 8 9 10 METERS

UNAUTHORIZED ALTERATIONS OR ADDITIONS TO THIS SURVEY IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW. COPIES OF THIS SURVEY MAP NOT BEARING THE LAND SURVEYOR'S INKED SEAL OR EMBOSSED SEAL SHALL NOT BE CONSIDERED TO BE A VALID TRUE COPY. GUARANTEES OR CERTIFICATIONS INDICATED HEREON SHALL RUN ONLY TO THE PERSON FOR WHOM THE SURVEY IS PREPARED, AND ON HIS BEHALF TO THE TITLE COMPANY, GOVERNMENTAL AGENCY AND LENDING INSTITUTION LISTED HEREON, AND TO THE ASSIGNEES OF THE LENDING INSTITUTION. GUARANTEES OR CERTIFICATION ARE NOT TRANSFERABLE TO ADDITIONAL INSTITUTIONS OR SUBSEQUENT OWNERS.

SURVEYED :	JULY 02, 2018
UPDATED :	NOVEMBER 18, 2022
SCALE:	1"=20'
BLOCK:	3964
LOT(S):	8
SECTION:	13
COUNTY:	KINGS
DWG BY:	AAA-Ro

ENVIRONMENTAL EASEMENT

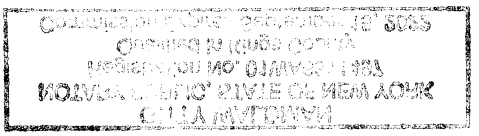
STATEWIDE LAND SURVEYING P.C.
16 Flagg Pl., Staten Island, NY 10304

SURVEY PREPARED FOR
AAA GROUP
INFO@AAAGROUPONLINE.COM
TEL. (718) 387-9800 , FAX 384-5050

This is to certify that I am a Licensed Land Surveyor and that this plan was completed on July 01, 2022 from notes of an instrument survey performed on July 02, 2018. Updated on November 18, 2022.

Registration No. 050307 within the State of NEW YORK

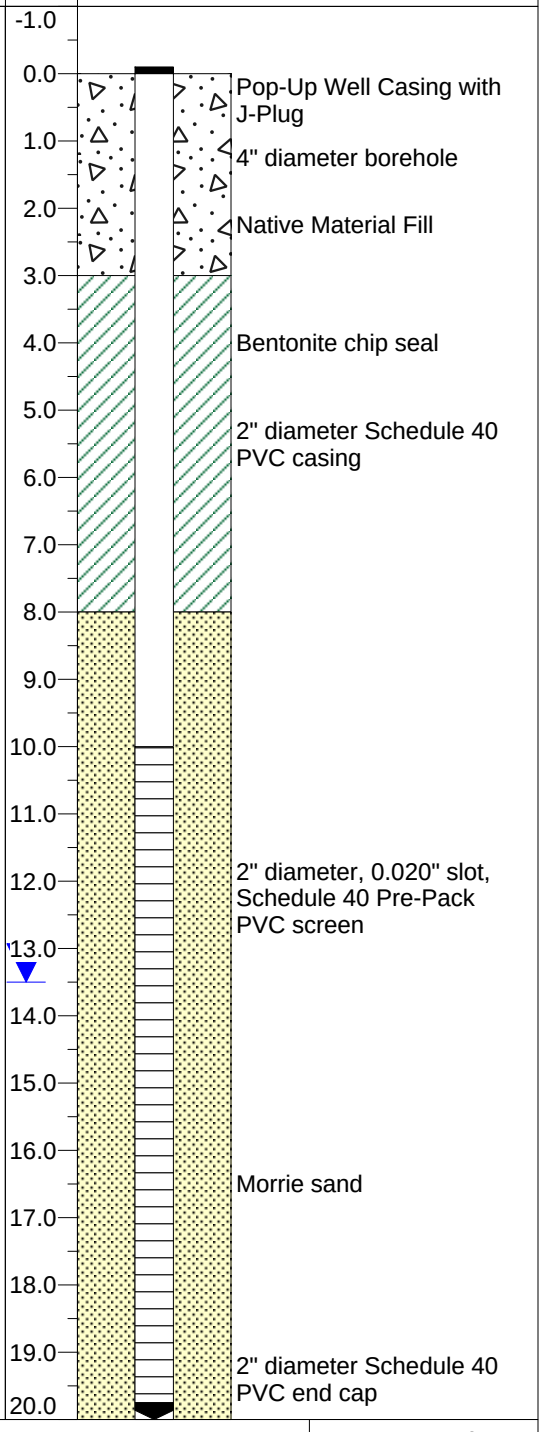
VINCENT M. TEUTONICO L.S. Pres.
Registration No. 050307



APPENDIX E – RECOVERY WELL AND MONITORING WELL CONSTRUCTION LOGS

PROJECT #:	ZDG2101		
SITE ADDRESS:	2840 Atlantic Ave. Brooklyn, NY		
BORING ID:	MW-1	BORING DEPTH (FT): 20	CORE LENGTH (FT): NA
WELL ID:	MW-1	BORING DIAMETER (IN): 4	WELL DIAMETER (IN): 2
DRILLING CONTRACTOR:	Associated Environmental	DATE STARTED: 06/30/2022	DATE FINISHED: 06/30/2022
DRILLING METHOD:	Auger Drilling	TIME STARTED: NA	TIME FINISHED: NA
DRILLING EQUIPMENT:	Geoprobe 6610	LATITUDE: N/A	LONGITUDE: N/A
SAMPLING METHOD:	NA	PROJECT MANAGER: Ryan Morley	LOGGED BY: David Victome

DEPTH (feet)	SAMPLE INTERVAL	USCS KEY	RECOVERY (feet)	DESCRIPTION NAME (USCS): color, moist, plasticity, gravel, odor	PID Reading (ppm)

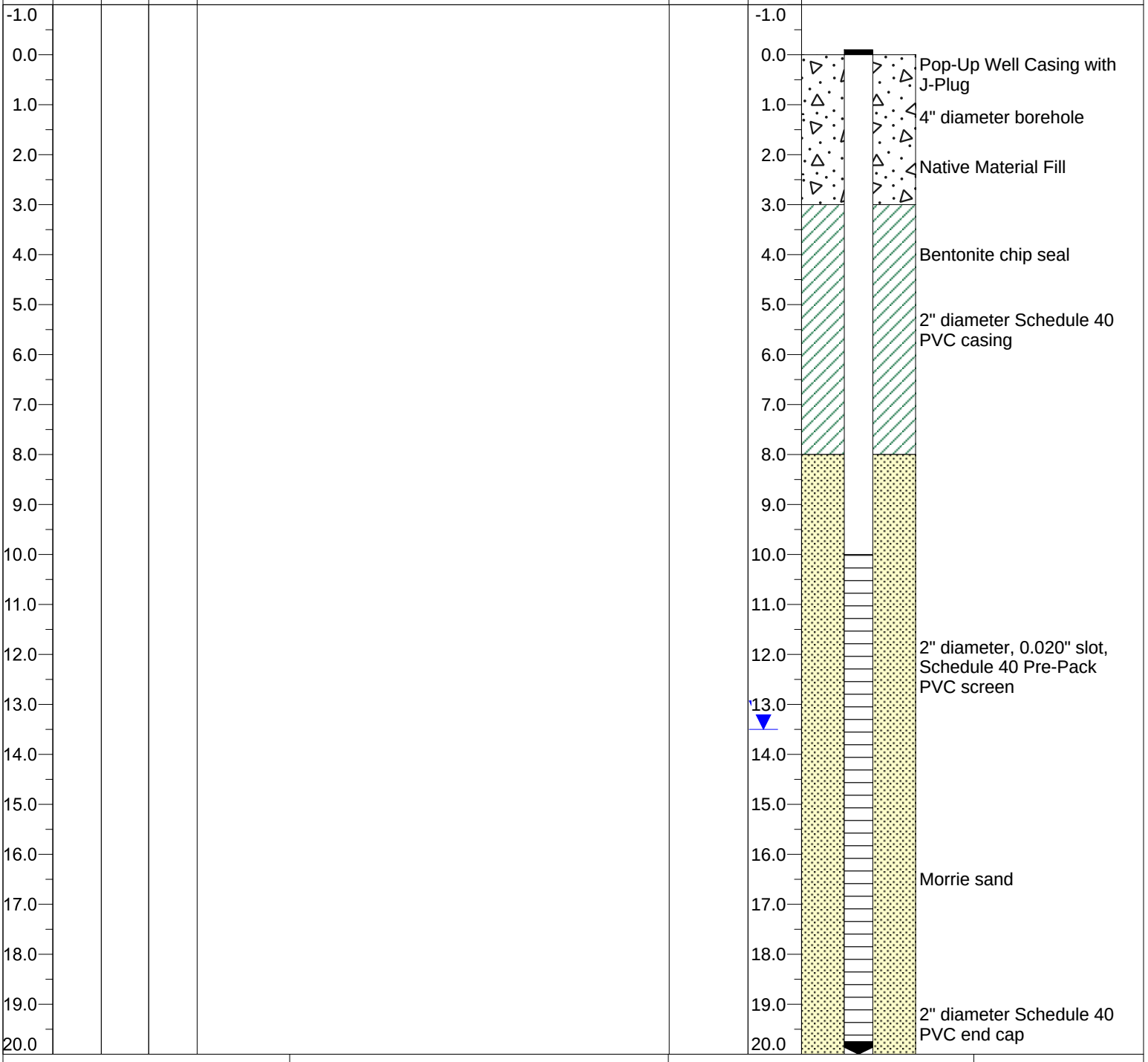


PROJECT #:	ZDG2101
SITE ADDRESS:	2840 Atlantic Ave. Brooklyn, NY
BORING ID:	MW-2
WELL ID:	MW-2
DRILLING CONTRACTOR:	Associated Environmental
DRILLING METHOD:	Auger Drilling
DRILLING EQUIPMENT:	Geoprobe 6610
SAMPLING METHOD:	NA

PWGC

BORING DEPTH (FT): 20	CORE LENGTH (FT): NA
BORING DIAMETER (IN): 4	WELL DIAMETER (IN): 2
DATE STARTED: 06/30/2022	DATE FINISHED: 06/30/2022
TIME STARTED: NA	TIME FINISHED: NA
LATITUDE: N/A	LONGITUDE: N/A
PROJECT MANAGER: Ryan Morley	LOGGED BY: David Victome

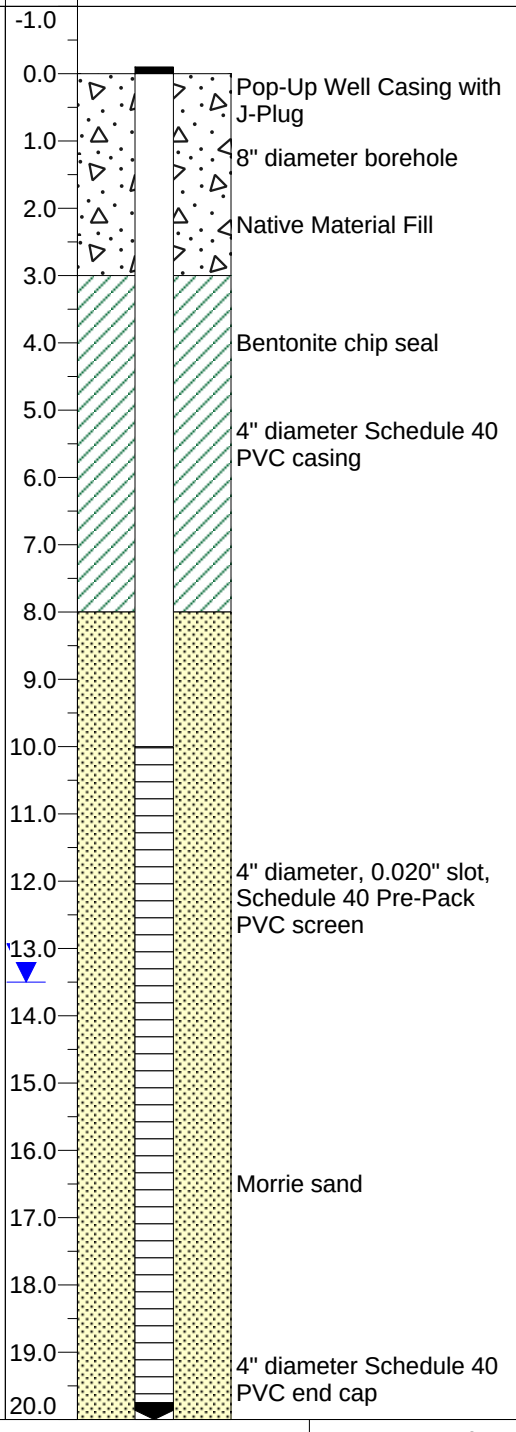
DEPTH (feet)	SAMPLE INTERVAL	USCS KEY	RECOVERY (feet)	DESCRIPTION NAME (USCS): color, moist, plasticity, gravel, odor	PID Reading (ppm)



P.W. Grosser Consulting	**End of Boring Depth (feet):** 20	**Water Table Symbol:** ▼	Page 1 of 1

PROJECT #:	ZDG2101		
SITE ADDRESS:	2840 Atlantic Ave. Brooklyn, NY		
BORING ID:	RW-1	BORING DEPTH (FT): 20	CORE LENGTH (FT): NA
WELL ID:	RW-1	BORING DIAMETER (IN): 8	WELL DIAMETER (IN): 4
DRILLING CONTRACTOR:	Associated Environmental	DATE STARTED: 06/30/2022	DATE FINISHED: 06/30/2022
DRILLING METHOD:	Auger Drilling	TIME STARTED: NA	TIME FINISHED: NA
DRILLING EQUIPMENT:	Geoprobe 6610	LATITUDE: N/A	LONGITUDE: N/A
SAMPLING METHOD:	NA	PROJECT MANAGER: Ryan Morley	LOGGED BY: David Victome

DEPTH (feet)	SAMPLE INTERVAL	USCS KEY	RECOVERY (feet)	DESCRIPTION NAME (USCS): color, moist, plasticity, gravel, odor	PID Reading (ppm)
-1.0 to 20.0					



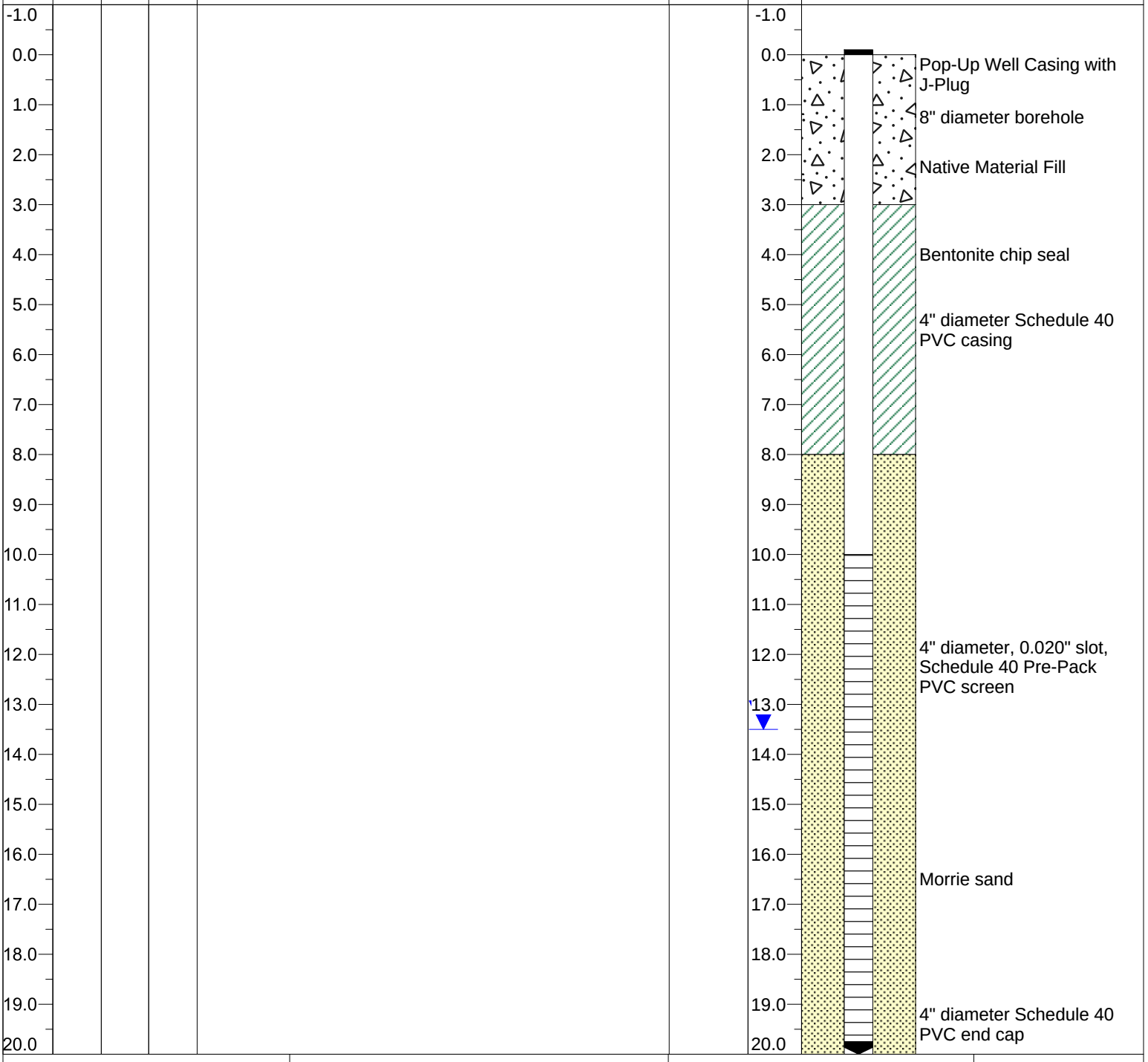
WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

PROJECT #:	ZDG2101
SITE ADDRESS:	2840 Atlantic Ave. Brooklyn, NY
BORING ID:	RW-2
WELL ID:	RW-2
DRILLING CONTRACTOR:	Associated Environmental
DRILLING METHOD:	Auger Drilling
DRILLING EQUIPMENT:	Geoprobe 6610
SAMPLING METHOD:	NA

PWGC

BORING DEPTH (FT): 20	CORE LENGTH (FT): NA
BORING DIAMETER (IN): 8	WELL DIAMETER (IN): 4
DATE STARTED: 06/30/2022	DATE FINISHED: 06/30/2022
TIME STARTED: NA	TIME FINISHED: NA
LATITUDE: N/A	LONGITUDE: N/A
PROJECT MANAGER: Ryan Morley	LOGGED BY: David Victome

DEPTH (feet)	SAMPLE INTERVAL	USCS KEY	RECOVERY (feet)	DESCRIPTION NAME (USCS): color, moist, plasticity, gravel, odor	PID Reading (ppm)



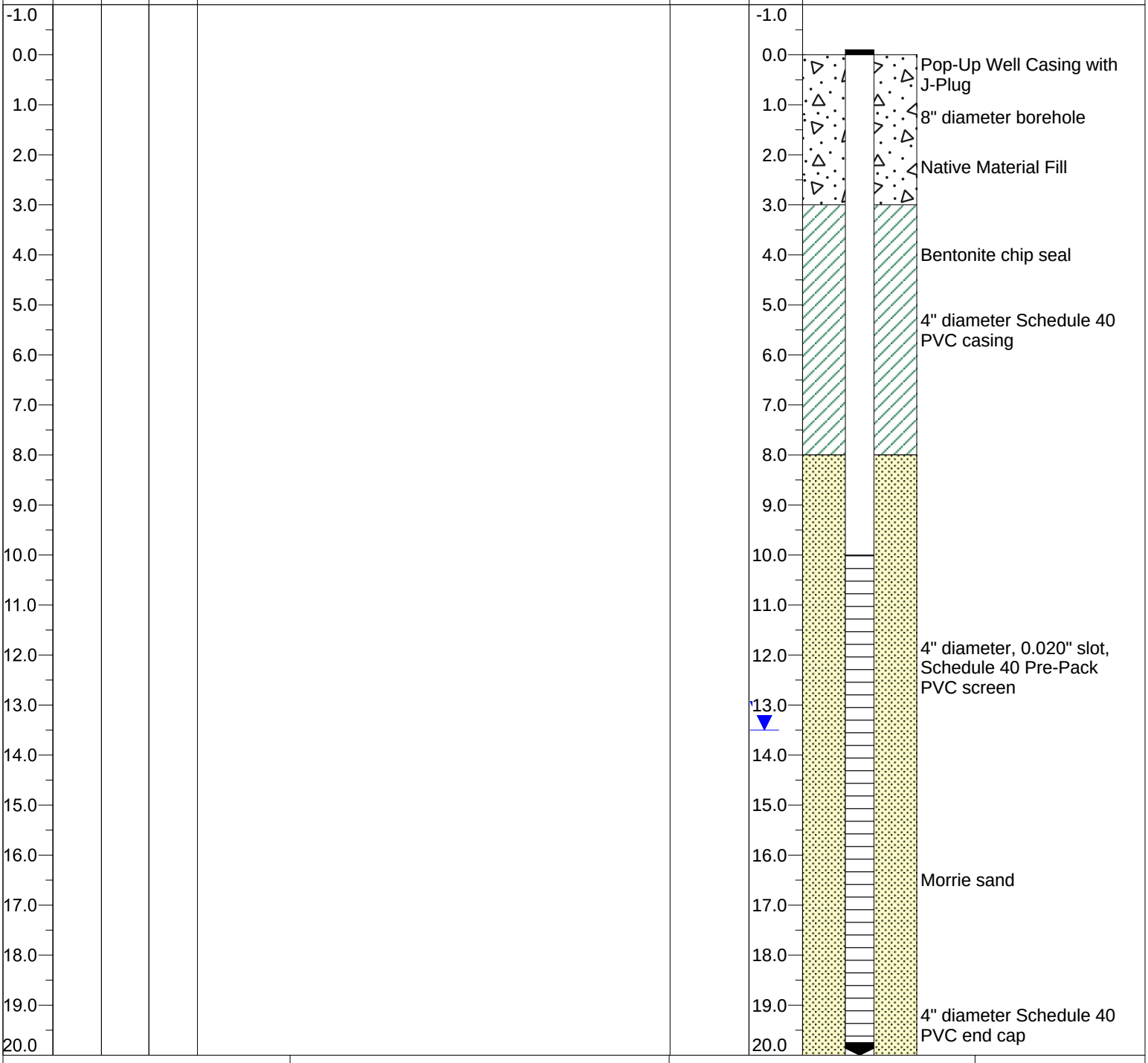
P.W. Grosser Consulting	**End of Boring Depth (feet):** 20	**Water Table Symbol:** ▼	Page 1 of 1

PROJECT #:	ZDG2101
SITE ADDRESS:	2840 Atlantic Ave. Brooklyn, NY
BORING ID:	RW-3
WELL ID:	RW-3
DRILLING CONTRACTOR:	Associated Environmental
DRILLING METHOD:	Auger Drilling
DRILLING EQUIPMENT:	Geoprobe 6610
SAMPLING METHOD:	NA

PWGC

BORING DEPTH (FT): 20	CORE LENGTH (FT): NA
BORING DIAMETER (IN): 8	WELL DIAMETER (IN): 4
DATE STARTED: 06/30/2022	DATE FINISHED: 06/30/2022
TIME STARTED: NA	TIME FINISHED: NA
LATITUDE: N/A	LONGITUDE: N/A
PROJECT MANAGER: Ryan Morley	LOGGED BY: David Victome

DEPTH (feet)	SAMPLE INTERVAL	USCS KEY	RECOVERY (feet)	DESCRIPTION NAME (USCS): color, moist, plasticity, gravel, odor	PID Reading (ppm)



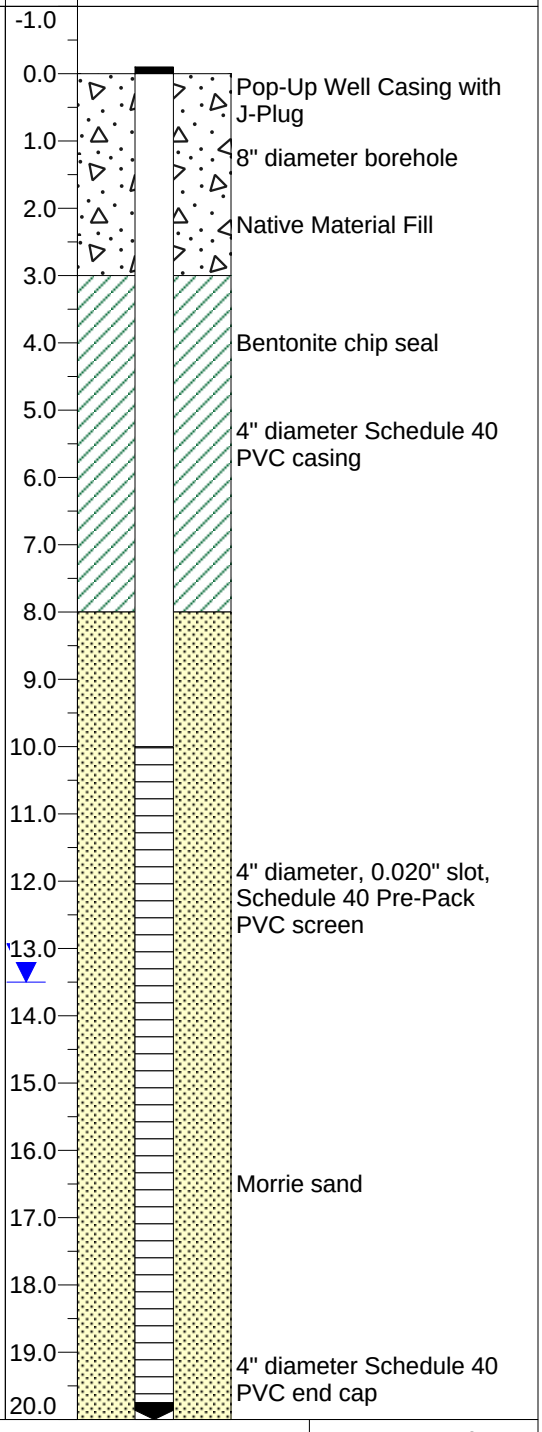
P.W. Grosser Consulting	**End of Boring Depth (feet):** 20	**Water Table Symbol:** ▼	Page 1 of 1

PROJECT #:	ZDG2101
SITE ADDRESS:	2840 Atlantic Ave. Brooklyn, NY
BORING ID:	RW-4
WELL ID:	RW-4
DRILLING CONTRACTOR:	Associated Environmental
DRILLING METHOD:	Auger Drilling
DRILLING EQUIPMENT:	Geoprobe 6610
SAMPLING METHOD:	NA

PWGC

BORING DEPTH (FT): 20	CORE LENGTH (FT): NA
BORING DIAMETER (IN): 8	WELL DIAMETER (IN): 4
DATE STARTED: 06/30/2022	DATE FINISHED: 06/30/2022
TIME STARTED: NA	TIME FINISHED: NA
LATITUDE: N/A	LONGITUDE: N/A
PROJECT MANAGER: Ryan Morley	LOGGED BY: David Victome

DEPTH (feet)	SAMPLE INTERVAL	USCS KEY	RECOVERY (feet)	DESCRIPTION NAME (USCS): color, moist, plasticity, gravel, odor	PID Reading (ppm)



P.W. Grosser Consulting	**End of Boring Depth (feet):** 20	**Water Table Symbol:** ▼	Page 1 of 1

APPENDIX F– QUALITY ASSURANCE PROJECT PLAN

2840 ATLANTIC AVENUE
BROOKLYN, NEW YORK 11207
NYSDEC BCP SITE: C224255
BLOCK: 3964, LOT: 8

SITE MANAGEMENT PLAN
QUALITY ASSURANCE PROJECT PLAN

SUBMITTED TO:

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

ON BEHALF OF:

Empire Dairy, LLC
3611 14th Avenue
Brooklyn, New York 11218

PREPARED BY:

P.W. Grosser Consulting, Inc.
630 Johnson Avenue, Suite 7
Bohemia, New York 11716
Phone: 631-589-6353
Fax: 631-589-8705

Ryan Morley, Project Manager RyanM@pwgrosser.com

PWGC Project Number: ZDG2101

DECEMBER 2022

2840 ATLANTIC AVENUE, BROOKLYN, NEW YORK
NYSDEC BCP ID C224255
QUALITY ASSURANCE PROJECT PLAN

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1.0 INTRODUCTION

P.W. Grosser Consulting Engineer & Hydrogeologist, PC (PWGC) has prepared this Quality Assurance Project Plan (QAPP) for post-remedial activities to be undertaken at the property located at 2840 Atlantic Avenue in Brooklyn, New York if necessary. This QAPP has been prepared to define the quality assurance (QA) and quality control (QC) measures to be implemented, to verify the integrity of the work to be performed at the site, and that the data collected will be of the appropriate type and quality needed for the intended use. Specifically, this QAPP addresses the following:

- Description of Project
- Organization and Responsibilities of Project Personnel
- Project Objectives, including Quality Assurance Objectives for Data
- Overview of Field Sampling Program and Procedures
- Sample Packaging and Shipping
- Sample Documentation
- Sample Analytical Program
- Quality Assurance/Quality Control Procedures

Post remedial activities, as specified in the Site Management Plan (SMP) for the site, may include:

- Recovery well and monitoring well gauging and/or sampling
- Soil vapor and/or ambient air sampling.

2.0 PROJECT ORGANIZATION AND PERSONNEL RESPONSIBILITIES

The monitoring efforts defined in the Site Management Plan (SMP) will be coordinated by PWGC on behalf of Empire Dairy, LLC. The New York State Department of Environmental Conservation (NYSDEC) is the lead regulatory agency overseeing monitoring and inspections at the site. An organization structure has been developed to identify the roles and responsibilities of the various parties involved with the project, as discussed below.

The **NYSDEC Project Manager** will be responsible for reviewing and approving work plans and amendments, coordinating approval of requested modifications, and providing guidance on regulatory requirements.

The **Project Director** will provide technical expertise for review of the project plans, reports and ongoing field activities. The program manager will be responsible for the coordination of the overall post-BCP activities with the NYSDEC. The Project Director will act as the project's Quality Assurance Manager.

The **Project Manager** will be responsible for the day to day project management, task leadership, and project engineering support and for the implementation of the SMP. The Project Manager is responsible for ensuring that the requirements of the remediation are implemented. The project manager will also act as the site Health and Safety Manager (HSM).

The **Field Team Leader** will be responsible for sample collection, oversight of subcontractor personnel, and coordination of 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 (to be determined) will be contracted to perform required analyses and reporting, including Analytical Services Protocol (ASP) Category B Deliverables, which will allow for data validation.

Subcontractors will perform remedial construction, surveying, drilling, and/or sampling at the direction of the Field Team Leader in accordance with this work plan.

3.0 QUALITY ASSURANCE PROJECT OBJECTIVES

The objective of this QA/QC plan is to ensure proper and consistent inspection and sampling measures are performed during field activities during the continued monitoring phase for the duration of this SMP's lifespan.

3.1 Data Quality Objective Process

Data quality objectives (DQOs) are qualitative and quantitative statements that specify the quality of the data required to support decisions during routine monitoring activities. DQOs can be defined as what the end user expects to obtain from the analysis results, and are developed through a seven-step process:

- Step 1 State the problem
- Step 2 Identify the decision
- Step 3 Identify inputs to the decision
- Step 4 Define the study boundaries
- Step 5 Develop a decision rule
- Step 6 Specify limits on decision errors
- Step 7 Optimize the decision for obtaining data

For the site, screening data generated by rapid, less precise methods of analysis (PID screening, collection of groundwater field parameters, etc.) will achieve a data use level for site characterization and monitoring. Definitive laboratory analytical data generated during endpoint soil sampling will achieve a data use level to support an assessment of the overall effectiveness of the site remedy. Specifically, these data will be used to:

- Monitor the residual fuel oil impact in groundwater beneath the Track 4 area, as defined in the SMP.
- Monitor sub-slab soil vapor and indoor air quality, if the SSDS is activated.

3.2 Data Quality Categories

DQOs are composed of written expectations for precision, accuracy, representativeness, completeness and comparability of a data set (see Section 3.3). The DQO process provides a logical basis for linking the QA/QC procedures to the intended use of the data, primarily through the decision maker's acceptable limits on decision error. Two descriptive data categories - screening data and definitive data - will be used for the site.

Screening data are generated by rapid, less precise methods of analysis and are deemed non-critical to project objectives. Portable instruments to be used during remedial action to collect screening data include:

- Photoionization detector (PID) or Flame ionization detector (FID)
- Aerosol/dust monitor

Definitive data are generated using specific analytical methods and guidelines and have satisfied known QA/QC requirements. Analytical data provided by an off-site laboratory shall be definitive data, and are deemed critical to project objectives. QA/QC elements of definitive data include determination and documentation of calibrations, detection limits, method blanks, and matrix spike recoveries.

3.3 QA/QC Characteristics

The overall QA/QC objective for remediation monitoring activities is to develop and implement procedures that will provide data of known and documented quality. QA/QC characteristics for data include precision, accuracy, representativeness, completeness, and comparability (PARCC). Data quality objectives for each of these parameters are determined based on the level of data required. Descriptions of these characteristics are provided below, and specific QA objectives for both screening and definitive data are presented in Table 3-1. Analytical matrices and methods are provided on the table for analysis that is anticipated to be performed during the SMP phase of the project and for analysis that are not anticipated.

Table 3-1
Laboratory Methods

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
PFAS	Soil	EPA 1633	1 x 8 oz, glass	None	14 days	28 days	12 to 24
*SIM Mode only necessary if EPA 8260 analysis cannot meet a MDL of 0.1 mg/kg							

ANALYTICAL METHODS (SOIL VAPOR)

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
VOCs	Soil Vapor	USEPA TO-15	6L SUMMA Canister	None	None	30	5

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	6
VOCs	Water	EPA 8260C	3 x 40 ml VOA, glass vial	HCl Cool $\leq$ 6 °C	48 hours	14 Days	6
SVOCs	Water	EPA 8270D	2 x 1000 ml, amber glass	Cool $\leq$ 6 °C	7 days	40 days	6
PCBs	Water	EPA 8082A	1 x 1000 ml, amber glass	Cool $\leq$ 6 °C	7 days	40 Days	6
Cyanide	Water	EPA 9010C/9012B	1 x 250 ml, plastic	NaOH	14 days	14 days	6
PFAS	Water	EPA 1633	3 x 250 ml HDPE, unlined cap	Trizma Cool < 6 °C	14 days	28 days	6
*SIM Mode to be used to meet required detection limit of 0.35 ug/L							

Notes:

Abbreviations include:

%R = Percent Recovery
GC = Gas Chromatography
N/A = Not Applicable
NTU = Nephelometric Turbidity Units
TAL = Target Analyte List
TCL = Target Compound List
CRQL = Contract Required Quantitation Limit
MDL = Method Detection Limit
VOCs = Volatile Organic Compounds
RPD = Relative Percent Difference

* Precision dependent on meter and scale.

Precision is the measurement of agreement in repeated tests of the same or identical samples, under prescribed conditions. Analytical precision can be expressed in terms of Standard Deviation (SD), Relative Standard Deviation (RSD) and/or Relative Percent Difference (RPD). The precision of analytical environmental samples has two components - laboratory precision and sampling precision. Laboratory precision is determined by replicate measurements of laboratory duplicates and by analysis of reference materials. The objectives for laboratory precision are specified in the analytical methodologies and are presented on Table 3-1. The precision of the field sampling effort is determined by the analysis of field duplicate samples. Field duplicate analysis will be performed at a rate of five percent (i.e., one duplicate collected for every 20 samples). Acceptance criteria for duplicates analyzed by an off-site laboratory shall be an RPD of 25 percent. The precision limits provided in Table 3-1 for the screening measurements are acceptance criteria for duplicate and calibration analyses of field measurement parameters.

Accuracy is the degree of agreement of a measured sample result or average of results with an accepted reference or true value. It is the quantitative measurement of the bias of a system, and is expressed in terms of percent recovery (%R). Measurements of accuracy for the laboratory include surrogate spike, laboratory control spike, matrix spike and matrix spike duplicate samples. The laboratory must meet or exceed control limit objectives, as stated in Table 3-1 and the applicable methodologies.

Representativeness is the degree to which the results of the analyses accurately and precisely represent a characteristic of a population, a process condition, or an environmental condition. In this case, representativeness is the degree to which the data reflect the contaminants present and their concentration magnitudes in the sampled site areas. Representativeness of data will be ensured through the selection of sampling locations and implementation of approved sampling procedures. Results from environmental field duplicate sample analyses can be used to assess representativeness, in addition to precision.

Completeness is defined as the percentage of samples that meet or exceed all the criteria objective levels for accuracy, precision and detection limits within a defined time period or event. It is the measure of the number of data "points" which are judged to be valid, usable results. The objective for completeness for this project is 90 percent, and will be calculated by dividing the number of usable data results (i.e., all results not considered to be "rejected" and all samples able to be analyzed) by the number of possible data results (i.e., the total number of field samples collected), and then multiplying by 100 percent.

Comparability is the degree of confidence with which results from two or more data sets, or two or more laboratories, may be compared. To achieve comparability, standard environmental methodologies will be employed in the field and in the laboratory. See Table 3-1 and Section 6.0 for analysis methods and detection limits for this field investigation.

3.4 Impact of Failure to Meet Data Quality Objectives

The QA objectives presented in Table 3-1 represent the data quality necessary to meet the project's technical goals. The QA/QC efforts discussed in this QAPP focus on controlling measurement error, and ultimately providing a database for estimating the uncertainty in the measurement data for the project. QA objectives will be evaluated throughout the SMP monitoring effort to see if the results for the project meet the stated objectives. If these objectives are not being met, the precision and/or accuracy of the sampling data will be decreased, and corrective actions shall be taken, as documented in Section 13.0.

4.0 SITE MANAGEMENT MONITORING ACTIVITIES

This section provides an overview of the planned monitoring operations by matrix and type of procedures. It also includes activities that may be necessary in the future to supplement the existing groundwater monitoring well network (i.e., site survey; monitoring well installation, etc.). Field monitoring and sampling activities include the following:

- Mobilization and demobilization, if necessary.
- Waste Characterization, if necessary.
- Soil Excavation and Removal, if necessary.
- Recovery and monitoring well sampling.
- SSDS monitoring and sampling, if necessary.

4.1 SMP Monitoring Procedures

SMP monitoring activities to be performed at the site will be conducted in accordance with established technical guidelines, methods, policies and Standard Operating Procedures (SOPs). The subsections below present an overview of the sampling program procedures; a more detailed discussion of the monitoring activities is presented in the SMP.

4.1.1 Mobilization and Demobilization

If necessary, he mobilization effort will consist of logistical planning, identification of sampling locations, equipment mobilization to the site, and field personnel orientation. The orientation meeting will familiarize the sampling team with a brief history of the site, health and safety requirements, and SMP monitoring procedures. Mobilization and demobilization will take place before and after completion of routine periodic SMP monitoring events. Demobilization will consist of site area clean-up, staging and inventory of monitoring-derived wastes, decontamination and demobilization of field equipment, and organization of monitoring records.

4.1.2 Waste Characterization

If impacted soils are to be excavated and removed from the site for disposal, waste characterization samples will be collected to allow for a disposal facility to be selected a waste approval granted prior to the start of excavation activities. Verification sampling procedures and frequency will be in accordance with the requirements of the prospective disposal facility.

4.1.3 Soil Excavation and Removal

If necessary, soils will be excavated from the proposed excavation area utilizing an excavator and/or hand tools. Soils will be screened during excavation and stockpiled on site either adjacent to the work area or nearby an access

area for the material to place into a truck for off-site disposal. Soils will be screened utilizing a photoionization detector (PID) capable of detecting the presence of VOCs. Soils exhibiting significantly elevated PID responses or odors may be segregated and stockpiled from other soils being excavated. Trees, shrubs and underbrush within the excavation area will be cleared and disposed of as necessary.

4.1.4 Recovery Well and Monitoring Well Sampling

Prior to sampling, each well will be gauged with an electronic interface probe to measure the depth to LNAPL, if present, and the depth to water. The thickness of the LNAPL within the well should also be measured; however, it is understood that due to the viscosity of the LNAPL, accurate thickness measurements may be unattainable. If LNAPL is present, then a groundwater sample will not be collected and the presence of LNAPL will be noted.

If LNAPL is not present, wells will be purged using a decontaminated submersible pump, peristaltic pump, Waterra pump, or similar, fitted with disposal polyethylene tubing under low flow conditions. During purging, the groundwater parameters pH, temperature, conductivity, oxygen reduction potential (ORP), turbidity, and dissolved oxygen will be monitored every three minutes with a Horiba U52 water quality instrument or similar. When measurements stabilize in accordance with the United States Environmental Protection Agency (USEPA) standard operating procedure EQASOP-GW001, purging will be deemed completed and the Horiba will be disconnected. The groundwater samples will then be collected directly from the tubing and placed in pre-cleaned laboratory supplied glassware and packed in a cooler on ice and delivered to a NYSDOH ELAP certified laboratory under chain-of-custody seal. The groundwater samples will be analyzed for CP-51 List VOCs per USEPA Method 8260 and CP-51 List SVOCs by USEPA Method 8270.

4.1.5 SSDS Monitoring and Sampling

If the SSDS is activated, observations (e.g., system component integrity, etc.) will be noted on the system performance log. The system performance log will serve as the inspection form for the SSDS, if activation is deemed necessary. If activated, vacuum readings will be collected from the permanent vapor monitoring points by temporarily replacing the point cover cap outfitted with a brass barb or equivalent. The barb will be outfitted with ¼ inch diameter tubing connected to a vacuum gauge and vacuum readings will be recorded in the system performance logs.

Soil vapor samples will be collected from the vapor monitoring points in accordance with NYSDOH guidance by creating a seal around the sampling location and inserting a tube into a laboratory provided SUMMA can sampler

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that extents into the sampling location. Ambient air samples will be collected with laboratory provided SUMMA cans as well. Soil vapor samples and ambient air samples will be collected for USEPA method TO-15 for VOCs.

5.0 SAMPLE CUSTODY AND DOCUMENTATION

For samples collected from the site for laboratory analysis, 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.

Identification and documentation of samples are important in maintaining data quality. Strict custody procedures are necessary to ensure the integrity of the environmental samples. Sections below address sample identification, packaging, shipping, and documentation.

5.1 Sample Identification System

The method of identification of a sample depends on the type of measurement or analysis performed. When field screening measurements (e.g., pH, conductivity) are made, data are recorded directly in logbooks. Identifying information such as project name, sample location and depth, date and time, name of sampler, field observations, remarks, etc. shall be recorded.

Each sample collected for off-site laboratory analysis during the field investigation will be specifically designated by PWGC for unique identification. Samples will be identified using a letter code to indicate sample collection methodology. A letter code (see below) will follow, along with the name and/or number that identifies the specific location where the sample was collected. Field equipment blanks will be denoted by the letter code "FB" and trip

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blanks with "TB." Sample collection date and time will be recorded in the field logbook, chain of custody as well as the sample label.

At a minimum, all location and identification information for the samples shall be recorded in the field sampling logbook, and on the appropriate chain of custody record form for shipment.

5.2 Sample Custody, Packaging and Shipping

Sample custody shall be strictly maintained and carefully documented each time sample material is collected, transported, received, prepared, and analyzed. Custody procedures are necessary to ensure the integrity of the samples, and samples collected during SMP monitoring activities must be traceable from the time the samples are collected until they are disposed of and/or stored, and their derived data are used in the subsequent monitoring report. Sample custody is defined as (1) being in the sampler's possession; (2) being in the sampler's view, after being in the sampler's possession; (3) being locked in a secured container, after being in the sampler's possession; and (4) being placed in a designated secure area.

5.2.1 Field Custody, Packaging and Shipping Procedures

Field custody procedures shall be implemented for each sample collected. The field sampler shall be responsible for the care and custody of the samples until they are properly transferred or dispatched. To maintain the integrity of the samples, the samples are to be stored in a designated, secure area and/or be custody sealed in the appropriate containers prior to shipment.

Each environmental sample will be properly identified and individually labeled. Labels will be filled out in indelible ink with at least the following information: sample identification (see Section 5.1), type and matrix of sample, date and time of sample acquisition, name of sampler, analysis required, and preservation (as necessary). The sample label will be securely attached to the sample container.

Environmental samples being analyzed by off-site laboratories will be properly packaged and shipped for analysis. Samples are to be packed with sufficient wet ice to cool the samples to 4°C. Additionally, each cooler will be packed with a cooler temperature blank. Lastly, the cooler should be filled with adequate cushioning material to minimize the possibility of container breakage.

A laboratory supplied completed chain of custody form will be included with all sample shipments.

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When the samples are being shipped by an overnight delivery service to the laboratory, the chain of custody form and any other paperwork shall be checked against the sample labels and field documentation, and then placed in a waterproof sealable plastic bag and taped securely to the inside lid of the cooler. The cooler must then be secured, with custody seals affixed over the lid opening in at least two locations, and the cooler wrapped with strapping tape (without obscuring the custody seals). Orientation "this end up" arrows shall be drawn or attached on two sides of the cooler, and a completed overnight delivery service shipping label shall be attached to the top of the cooler.

Samples to be shipped by an overnight delivery service shall be shipped within 24 hours of sample collection and arrive at the laboratory within 24 hours of sample shipment. A member of the field team will notify the laboratory of a sample shipment.

5.2.2 Laboratory Custody Procedures

The following generally summarizes laboratory custody procedures; more detailed operations are presented in the laboratory's SOPs.

- A designated sample custodian will accept custody of the shipped samples and will verify that the information on the sample labels matches that on the chain of custody record(s),
- The laboratory custodian will use the sample label number or assign a unique laboratory number to each sample label and will assure that all samples are transferred to the proper analyst or stored in the appropriate secure area; and,
- Laboratory personnel are responsible for the care and custody of samples from the time they are received until the sample is exhausted or returned to the custodian or sample storage area. Internal chain of custody records shall be maintained by the laboratory.

The laboratory shall communicate with PWGC personnel by telephone, email or facsimile, as necessary, throughout the process of sample scheduling, shipment, analysis and data reporting, to ensure that samples are properly processed. If a problem occurs during sample shipment or receipt (e.g., a sample container arrives broken or with insufficient sample volume, a sample was not preserved correctly, a sample was not listed on the chain of custody, etc.), the laboratory shall immediately notify the appropriate person for resolution.

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Samples received by the laboratory will be retained until analyses and QA checks are completed. When sample analyses and necessary QA checks have been completed, the unused portion of the sample and the sample container must be disposed of properly by the laboratory. All identifying tags, data sheets, and laboratory records shall be retained as part of the permanent documentation.

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6.0 ANALYTICAL REQUIREMENTS

Analytical services will be provided by a NYSDOH ELAP approved laboratory. The laboratory will follow NYSDEC Analytical Sampling Protocol (ASP) and provide data in results only format, with the exception of the final round of sampling in which data will be reported with Category B deliverables (ASP-B). Analyses not available using ASP-B will be provided in results only format. Samples will be analyzes as follows:

6.1.1 Groundwater Samples

Groundwater samples collected from monitoring wells will be collected as described in the SMP. Each verification groundwater sample will be analyzed for CP-51 VOCs by USEPA Method 8260 and CP-51 SVOCs by USEPA Method 8270. Glassware will be supplied pre-cleaned and pre-preserved by the analytical laboratory. Sample preservation will consist of: storage in a cooler on ice to a temperature of 4ºC.

6.1.2 Vapor and Air Samples

Vapor samples will be collected from the SSDS monitoring points and ambient air samples will be collected as described in the SMP. Each sample will be analyzed for VOCs by USEPA Method TO-15. Samples will be collected in laboratory supplied batch-certified SUMMA canisters. The hold time for VOC analysis is 14 days.

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7.0 DECONTAMINATION PROCEDURES

In order to minimize the potential for cross-contamination, non-dedicated drilling and sampling equipment shall be properly decontaminated prior to and between sampling/possible drilling locations.

7.1.1 General Procedures

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 protective equipment.

7.1.2 Sampling Equipment

Sampling equipment (i.e., trowels, knives, split-spoons, bowls, hand augers, submersible pumps, 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

7.1.3 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)

Decontamination of sampling equipment will be kept to a minimum in the field, and wherever possible, dedicated disposable sampling equipment will be used. Decontamination fluids will be stored in US Department of Transportation (DOT)-approved 55-gallon drums or in an on-site storage tank (liquids only) until proper disposal. Personnel directly involved in equipment decontamination will wear protective clothing in accordance with the project Health and Safety Plan (HASP).

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8.0 QUALITY ASSURANCE/QUALITY CONTROL SAMPLE REQUIREMENTS

This section will discuss the type and quantities of QA/QC samples to be utilized during implementation of the field program.

8.1 Field Quality Control Samples

The subsections below present general information and guidance on field QC samples, including definition and frequency of QC blanks. Field QC samples will be labeled and shipped according to the procedures outlined in Section 5.0.

8.1.1 Equipment Blanks

An equipment blank will be collected to evaluate the potential for contamination of environmental samples from inadequate decontamination of field equipment. Equipment blanks shall be collected by pouring laboratory supplied distilled/deionized (DI) water over and/or through decontaminated non-disposable equipment or disposable equipment and collecting the rinsate. Equipment blanks will be collected at a frequency of one per decontamination event per type of sampling equipment, not to exceed one per day per sample matrix. Preservation and analysis of equipment blanks will be identical to that of the associated environmental samples.

8.1.2 Trip Blanks

A trip blank serves to detect possible cross-contamination of samples resulting from handling, storage and shipment procedures. In the event that VOC analysis is necessary, trip blanks will accompany VOC glassware in transit through sample collection and shipment to the laboratory. In addition, trip blanks are stored by the laboratory under the same conditions as the environmental samples. A trip blank will accompany each cooler containing samples submitted for VOC analysis (if any), and will be preserved as per the groundwater samples and analyzed identically to the associated environmental samples. VOC samples will be consolidated in one cooler for daily shipment, if possible, to minimize the number of trip blanks required in the field program. Due to the lack of VOC impact identified at the site, it is not anticipated that trip blanks will be necessary during remedial action.

8.1.3 Temperature Blanks

A temperature blank will be sent with each cooler of samples to verify that the cooler temperature has been maintained at 4ºC. One non-preserved VOA vial shall be filled with either potable or DI water, and labeled with "USEPA cooler temperature indicator" and the date. If supplied, the laboratory's temperature blank will be used in place of the VOA vial. The laboratory shall record the temperature of the blank water on the chain of custody immediately upon cooler arrival.

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8.1.4 Field Environmental Duplicate Samples

Duplicate environmental samples will be analyzed by the off-site laboratories to evaluate the reproducibility of the sampling procedures. Duplicate samples will be collected at a rate of five percent of the total samples for each specific matrix for each type of analysis (i.e., one duplicate for up to every 20 samples). The duplicate samples will be collected from the same location and at the same time as the original environmental sample; however, the duplicated samples will be "coded" in such a manner that the laboratory will not be able to determine of which original field sample they are duplicated (i.e., "blind" duplicates). For example, the duplicate sample of location EP001 may be "coded" as location EP051, as long as there are not more than fifty endpoint samples being collected (i.e., the coded sample name should not be assigned a legitimate sample location identification). An explanation of the duplicate "coding" must be written in the field logbook. Preservation and analysis of duplicate samples will be identical to those for the environmental samples. Precision of field data will be evaluated based on the calculation of Relative Percent Difference (RPD), with acceptance criteria of 25 percent for the off-site laboratory samples. Blind duplicate samples will be collected in the same manner as the environmental samples.

8.2 Laboratory Quality Control Samples

General information and guidance on laboratory QC samples are presented in the subsections below. A summary of QC procedures, frequencies, criteria, and corrective actions for the samples, as determined by the applicable method guidelines.

8.2.1 Method Blanks/Preparation Blanks

A method blank (for organics) or a preparation blank (for inorganics) will be analyzed with every batch of samples to ensure that contamination has not occurred during the analytical process. Method blanks consist of a portion of analyte-free water or solid that is processed through the entire sample procedure the same as an environmental sample.

8.2.2 Matrix Spikes/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate samples (also known as spike/duplicate samples) will be used to assess precision and accuracy of the analytical methods. In this procedure, three aliquots of an actual field sample are collected at a specific location, and two aliquots are “spiked” by the addition of known amounts of an analyte or analytes and these samples are then analyzed identically to the field samples. A comparison of the resulting concentration to the original sample concentration and among the two “spiked” sample concentrations provides information on the ability of the analytical procedure to generate a correct result from the sample. Matrix spike/matrix spike duplicate samples will be collected in the field at a rate of five percent, and will be analyzed on

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a per batch basis, with up to 20 samples per week constituting a batch. The validity of matrix spike/matrix spike duplicate recovery and relative percent difference values will be determined using the acceptance criteria

8.2.3 Laboratory Control Samples

A laboratory control sample (LCS) consists of an analyte-free water or solid phase sample that is spiked with target analytes at a known concentration. The LCS shall be analyzed for every batch of samples (i.e., 1 per 20) to assess the ability of the analytical procedure to generate a correct result without matrix effects/interferences affecting the analysis. The percent recoveries for the LCS compounds will be compared to QC limits stated in the appropriate methods.

8.2.4 Surrogate Compounds

Surrogates (also known as System Monitoring Compounds) are compounds of known concentrations added to every organic analysis sample for analytical chromatography methods at the beginning of the sample preparation to monitor their recovery. Surrogate recoveries will be used to assess potential matrix interferences and to monitor any potential effects of sample preparation and analysis on final analyte concentrations. The recovery values will be compared to values established in the applicable methodologies to determine the validity of the data.

8.2.5 Internal Standards

Internal standards are used to provide instrument correction for variation in instrument performance and injection volumes. Internal standards also establish relative response factors for the analytes.

8.2.6 Interference Check Samples

An interference check sample (ICS), which contains target analytes at known concentrations, verifies the laboratory's interelement and background correction factors. Analysis of ICS samples is unique to metals analysis using the inductively coupled plasma (ICP) method.

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9.0 INSTRUMENT CALIBRATION AND PREVENTIVE MAINTENANCE

9.1 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.

The Field Team Leader or his designee will be responsible for ensuring that instrumentation are of the proper range, type and accuracy for the measurement/test being performed, and that all of the equipment are calibrated at their required frequencies, according to their specific calibration protocols/procedures.

All field measurement instruments must be calibrated according to the manufacturer's instructions prior to the commencement of the day's activities. Exceptions to this requirement shall be permitted only for instruments that have fixed calibrations pre-set by the equipment manufacturer. Calibration information shall be documented on in a designated field logbook. Information to be recorded includes the date, the operator, and the calibration standards (concentration, manufacturer, lot number, expiration date, etc.). All project personnel using measuring equipment or instruments in the field shall be trained in the calibration and usage of the equipment and are personally responsible for ensuring that the equipment has been properly calibrated prior to its use.

In addition, all field instruments must undergo response verification checks at the end of the day's activities and at any other time that the user suspects or detects anomalies in the data being generated. The checks consist of exposing the instrument to a known source of analyte (e.g., the calibration solution), and verifying a response. If an unacceptable instrument response is obtained during the check the data shall be labeled suspect, the problem documented in the site logbook, and appropriate corrective action taken.

Any equipment found to be out of calibration shall be recalibrated. When instrumentation is found to be out of calibration or damaged, an evaluation shall be made to ascertain the validity of previous test results since the last calibration check. If it is necessary to ensure the acceptability of suspect items, the originally required tests shall be repeated (if possible), using properly calibrated equipment. Any instrument consistently found to be out of calibration shall be repaired or replaced.

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9.2 Preventive Maintenance

Field equipment shall be maintained at its proper functional status in accordance to manufacturer manual specifications. A check of the equipment shall be performed before field activities begin, and any potential spare parts (e.g., batteries, connectors, etc.) and maintenance tools will be brought on site, to minimize equipment downtime during the field activities. Visual checks of the equipment will be conducted on a daily basis. Routine preventive maintenance shall be performed to assure proper operation of the equipment. Any maintenance performed on field equipment will be documented in the designated field logbook and shall be undertaken by personnel who have the appropriate skills and/or training in the type of maintenance required.

10.0 DATA REDUCTION, VALIDATION, AND REPORTING

Standard methods and references will be used as guidelines for data handling, reduction, validation, and reporting. All data for the project will be compiled and summarized with an independent verification at each step in the process to prevent transcription/typographical errors. Any computerized entry of data will also undergo verification review.

10.1 Data Reduction

10.1.1 Field Data Reduction

Field instrumentation data will be reported by site personnel in field logbooks associated with the monitoring event. At the end of each monitoring event, the field screening data results shall be summarized in tabulated form, as warranted.

10.1.2 Laboratory Data Reduction

All data generated by the off-site laboratory will be reported in a specified format containing all required elements to perform data validation. Analytical results shall be presented on standard NYSDEC ASP-B forms (when necessary) or equivalents, and include the dates the samples were received and analyzed, and the actual methodology used. Laboratory QA/QC information required by the method protocols will be compiled, including the application of data QA/QC qualifiers as appropriate. In addition, laboratory worksheets, laboratory notebooks, chains-of-custody, instrument logs, standards records, calibration records, and maintenance records, as applicable, will be provided in the laboratory data packages to determine the validity of data.

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10.1.3 Project Data Reduction

Following receipt of the laboratory analytical results by PWGC, the data results will be compiled and presented in an appropriate tabular form. Where appropriate, the impacts of QA/QC qualifiers resulting from laboratory or external validation reviews will be assessed in terms of data usability.

10.1.4 Non-Direct Measurements

If information necessary for the project has not been measured directly in the field, non-direct measurement data may be obtained from literature files, texts, computer databases, etc. References utilized will be acknowledged sources within the specific discipline. An explanation of the rationale behind using the reference and a description of any concern regarding the use of the referenced data (e.g., uncertainty, conflicting literature, etc.) shall be made within the report. Non-direct measurement data, after usage, will be filed within the project files for the length of the project.

10.2 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 use 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. It is anticipated that data validation will be performed on data collected during the final round of sampling, only.

10.2.1 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 to NYSDEC ASP, Category 2 data deliverable requirements as applicable to the method utilized.

10.2.2 Data Usability and Validation Methods

If deemed necessary by NYSDEC, a data usability evaluation for the data collected and a data usability summary report (DUSR) will be prepared each sampling event performed under the requirements of the SMP. The DUSR will be prepared in accordance with NYSDEC DER-10, Appendix 2B.

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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.

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11.0 CORRECTIVE ACTION

Review and implementation of systems and procedures may result in recommendations for corrective action. Any deviations from the specified procedures within approved project plans due to unexpected site-specific conditions shall warrant corrective action. All errors, deficiencies, or other problems shall be brought to the immediate attention of the PWGC PM, who in turn shall contact the Quality Assurance/Data Quality Manager or his designee (if applicable).

Procedures have been established to ensure that conditions adverse to data quality are promptly investigated, evaluated and corrected. These procedures for review and implementation of a change are as follows:

- Define the problem.
- Investigate the cause of the problem.
- Develop a corrective action to eliminate the problem, in consultation with the personnel who defined the problem and who will implement the change.
- Complete the required form describing the change and its rationale (see below for form requirements).
- Obtain all required written approvals.
- Implement the corrective action.
- Verify that the change has eliminated the problem.

During the project, all changes to the SMP will be documented in field logs/sheets and the PWGC PM will be advised.

If any problems occur with the laboratory or analyses, the laboratory must immediately notify the PM, who will consult with other project staff. All approved corrective actions shall be controlled and documented.

All corrective action documentation shall include an explanation of the problem and a proposed solution which will be maintained in the project file or associated logs. Each report must be approved by the necessary personnel (e.g., the PM) before implementation of the change occurs. The PWGC PM shall be responsible for controlling, tracking, implementing, and distributing identified changes.

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APPENDIX G – HEALTH AND SAFETY PLAN

2840 ATLANTIC AVENUE
BROOKLYN, NEW YORK 11207
NYSDEC BCP SITE: C224255
BLOCK: 3964, LOT: 8

SITE MANAGEMENT PLAN
HEALTH AND SAFETY PLAN

SUBMITTED TO:

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

ON BEHALF OF:

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PWGC Project Number: ZDG2101

DECEMBER 2022

P.W. GROSSER CONSULTING INC.
PROJECT No. ZDG2101

HEALTH AND SAFETY PLAN

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BROOKLYN, NEW YORK 11207
BCP Site # C224255

Submitted:
November 2022

Prepared for:
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2840 ATLANTIC AVENUE, BROOKLYN, NEW YORK
NYSDEC BCP ID C224255
HEALTH AND SAFETY PLAN

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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 post-remedial activities at 2840 Atlantic Avenue in Brooklyn, New York, if such activities occur. 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.

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2.0 INTRODUCTION

2.1 Purpose

This HASP addresses the minimum health and safety practices that will be employed by site workers participating in post-remedial activities, if necessary, at the project site located at 2840 Atlantic Avenue, Brooklyn, 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 for review and acceptance.

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).

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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.

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.

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4.0 POTENTIAL HAZARDS OF THE SITE

This section presents an assessment of the chemical, biological, and physical hazards that may be encountered during SMP monitoring activities and/or soil disturbing events. Additional information can be found in **Appendix A** - Material Safety Data Sheets or in **Appendix B** - Activity Hazard Analyses.

4.1 Chemical Hazards

Soil and groundwater beneath the Track 4 Cap area contain residual fuel oil impacts stemming from the former presence of a tank in this area and soil vapor is impacted with chlorinated solvents stemming from an unidentified off site source.

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 on the Chemical Data Sheets found in **Appendix**

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4.2 Biological Hazards

Work will be performed in a highly urban area within the City of New York. Potential exists 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.

4.2.1 Animals

Sites are located in predominantly commercial/urban areas. It is unlikely that significant amounts of wildlife will be encountered. However, workers shall use discretion and avoid contact with animals, if necessary.

4.2.2 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.

4.2.3 Plants

Hazardous plants such as poison ivy and poison oak may be present at the site. In the event that these plants are present, the FTL/SHSO should identify susceptible individuals and workers shall avoid contact with these plants.

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4.3 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.

4.3.1 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**.

4.3.2 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.

4.3.3 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.

4.3.4 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).

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4.3.5 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.

4.3.6 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.

4.3.7 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.

4.3.8 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.

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5.0 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. Excavation.
3. Soil and Groundwater sampling.
4. Decontamination.

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

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6.0 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.

6.1 PPE Abbreviations

HEAD PROTECTION	EYE/FACE PROTECTION	FOOT PROTECTION
HH = Hard Hat	APR = Full Face Air Purifying Respirator	Neo = Neoprene
		OB = Overboot
HEARING PROTECTION	MFS = Mesh Face shield	Poly = polyethylene coated boot
EP = ear plugs	PFS =Plastic Face shield	Rub = rubber slush boots
EM = ear muffs	SG = ANSI approved safety glasses with side shields	STB = Leather work boots with steel toe

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HAND PROTECTION	BODY PROTECTION	RESPIRATORY PROTECTION
Cot = cotton	WC = work clothes	APR = Full-face air purifying respirator with organic vapor cartridges
But = Butyl	Cot Cov = Cotton Coveralls	
LWG = Leather Work Gloves	Poly = Polyethylene coated Tyvek® coveralls	ASR = Full face air supplied respirator with escape bottle
Neo = Neoprene	Saran = Saranex coated coveralls	SCBA = Self-contained breathing apparatus
Nit = Nitrile	Tyvek® = Uncoated Tyvek® coveralls	
Sur = Surgical		

6.2 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.
- 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 residual fuel oil compounds in soil and groundwater beneath the Trak 4 area and chlorinated solvents in soil vapor emanating from off site are the primary contaminant of concern.

Exposure routes for these chemicals include 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.

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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
Excavation, loading and backfilling	HH	SG	STB	WG	WC	EM or EP	None initially APR if action levels exceeded
Drilling Activities	HH	SG	STB	WG	WC	EM or EP	None initially APR if action levels exceeded
Soil/GW 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

6.3 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°C.
- Total airborne concentration of contaminants is anticipated to be less than 200 ppm.
- The humidity is expected to be less than 85%.
- 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 (e.g., 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.

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- 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.

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7.0 ZONES, PROTECTION AND COMMUNICATION

7.1 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

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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.

7.2 Contamination Control

Decontamination areas will be established for the following activities.

- Drilling/Sampling Activities
- Excavation

7.2.1 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.

7.3 Communication

- Each team member will have a Nextel 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.

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8.0 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).

8.1 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.

8.2 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.

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9.0 SAFETY CONSIDERATIONS

9.1 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.

9.2 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.

9.3 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.

9.4 Drill Rigs

When conducting drilling activities, the opportunity of encountering fire and explosion hazards exists from underground utilities and gases. The locations of underground utilities will be verified prior to performing any intrusive activities. Additionally, because of the inherently hazardous nature of drilling operations, safety and accident prevention are crucial when drilling operations are performed. Most drilling accidents occur as a direct result of lack of training and supervision, improper handling of equipment, and unsafe work practices. Hazards include: assembling and disassembling rigs, rotary and auger drilling, and grouting. The drilling contractor shall perform drilling in accordance with its own Health & Safety Program for Drill Rig Safety.

9.4.1 Safety During Drilling Operations

- Safety requires the attention and cooperation of every worker and site visitor.
- Do not drive the drill rig from hole to hole with the mast (derrick) in the raised position.
- Before raising the mast (derrick), look up to check for overhead obstructions.
- Maintain a minimum of 15 feet clearance from all overhead electric lines.

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- Before raising the mast (derrick), all drill rig personnel (with the exception of the operator) and visitors shall be cleared from the areas immediately to the rear and the sides of the mast. All drill rig personnel and visitors shall be informed that the mast is being raised prior to raising it.
- Before the mast (derrick) of a drill rig is raised and drilling is commenced, the drill rig must first be leveled and stabilized with leveling jacks and/or solid cribbing. Lower the mast (derrick) only when the leveling jacks are down and do not raise the leveling jack pads until the mast (derrick) is lowered completely.
- The operator of a drill rig shall only operate a drill rig from the position of the controls.
- Throwing or dropping tools shall not be permitted. All tools shall be carefully passed by hand between personnel or a hoist line shall be used.
- Do not consume alcoholic beverages or other depressants or chemical stimulants prior to starting work on a drill rig or while on the job.
- All unattended boreholes must be adequately covered or otherwise protected to prevent drill rig personnel, site visitors, or animals form stepping or falling into the hole.
- Terminate drilling operations during an electrical storm and move the entire crew away from the drill rig.

9.5 Excavation

Although extensive excavation is not anticipated for the scope of this project, 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; 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.

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10.0 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.

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11.0 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.

11.1 Responsibilities

11.1.1 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.

11.1.2 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.

11.1.3 Emergency Coordinator

The Emergency Coordinator for the project is the FTL/SHSO.

The Emergency Coordinator shall make contact with Local Emergency Response personnel prior to beginning work on site. In these contacts the emergency coordinator 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 emergency coordinator will locate emergency phone numbers and identify hospital routes prior to beginning work on site. The emergency coordinator shall make necessary arrangements to be prepared for any emergencies that could occur.

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

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11.1.4 Site Personnel

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

11.2 Communication

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

11.2.1 Hand Signals

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

11.2.2 Field Radios and Cell Phones

PWGC field personnel are provided cellular phones with telephone and two-way radio capabilities for site communication and emergency use.

11.3 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.

11.4 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.

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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.

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Table 13-1

Emergency Telephone Numbers

Contact	Firm or Agency	Telephone Number
Police		911
Fire		911
Hospital	Jamaica Hospital Medical Center	(718) 206-6000
Ambulance		911
Project Manager/Health and Safety Manager	Thomas Melia PWGC	(631) 589-6353
Field Team Lead/Site Health & Safety Officer	Ryan Morley PWGC	(631) 589-6353
NYSDEC Site Contact	Sadique Ahmed	(518) 402-9656
Poison Control Center		(800) 962-1253
Chemtrec		(800) 424-9300

11.5 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-

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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.**

11.6 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.

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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.

11.7 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).

11.7.1 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.

11.8 Overt Chemical Exposure

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

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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.

11.9 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.

11.10 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.

11.11 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.

11.12 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 of 50 to 100 feet around the spill area should be established depending on the size of the spill. The following seven steps should be taken by the Emergency Coordinator:

- 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;

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- 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.

11.13 Emergency Equipment

The following minimum emergency equipment 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.

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12.0 TRAINING

12.1 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).

12.1.1 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.

12.2 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.

12.3 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.

12.4 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.

12.5 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.

12.6 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.

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13.0 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.

13.1 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.

13.2 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**.

13.3 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.

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14.0 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***

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APPENDIX A
CHEMICAL DATA SHEETS

SAFETY DATA SHEET

Creation Date 04-Feb-2010 **Revision Date** 24-Dec-2021 **Revision Number** 7

1. Identification

Product Name **1,2-Dichloroethane**

Cat No. : **E175-4; E175-20; E175-500; E175RS-19; E175RS-50; E190-4**

CAS No 107-06-2
Synonyms Ethylene dichloride; Ethylene chloride (Certified ACS/Spectranalyzed)

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 2
Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Vapors	Category 3
Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system, Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Heart, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
Harmful if swallowed
Causes skin irritation
Causes serious eye irritation
Toxic if inhaled
May cause respiratory irritation
May cause drowsiness or dizziness
May cause cancer
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Keep cool
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician
Skin
If skin irritation occurs: Get medical advice/attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)

WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Ethylene dichloride	107-06-2	>95

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Remove to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately.

Most important symptoms and effects Difficulty in breathing. May cause cardiac arrhythmia. May cause central nervous system depression: Symptoms may include tightness in the chest, flushing, headache, nausea, vomiting, respiratory depression, weakness, irregular heartbeat, abdominal pain, convulsions, and shock

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam. Water mist may be used to cool closed containers.

Unsuitable Extinguishing Media Water may be ineffective

Flash Point 13 °C / 55.4 °F

Method - No information available

Autoignition Temperature 440 °C / 824 °F

Explosion Limits

Upper 15.9 vol %

Lower 6.2 vol %

Sensitivity to Mechanical Impact No information available

Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical

Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Keep product and empty container away from heat and sources of ignition. Thermal decomposition can lead to release of irritating gases and vapors.

Hazardous Combustion Products

Carbon monoxide (CO). Carbon dioxide (CO_2). Phosgene. Hydrogen chloride gas.

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
3	3	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Should not be released into the environment. See Section 12 for additional Ecological Information.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Do not ingest. If swallowed then seek immediate medical assistance. Use only under a chemical fume hood. Do not breathe mist/vapors/spray. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. Take precautionary measures against static discharges.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, sparks and flame. Incompatible Materials. Strong oxidizing agents. Bases. Alkali metals.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Ethylene dichloride	TWA: 10 ppm	(Vacated) TWA: 1 ppm (Vacated) TWA: 4 mg/m³ Ceiling: 100 ppm (Vacated) STEL: 2 ppm (Vacated) STEL: 8 mg/m³ TWA: 50 ppm	IDLH: 50 ppm TWA: 1 ppm TWA: 4 mg/m³ STEL: 2 ppm STEL: 8 mg/m³	TWA: 40 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Use only under a chemical fume hood. Use explosion-proof electrical/ventilating/lighting equipment. Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166. Tight sealing safety goggles. Face protection shield.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	sweet
Odor Threshold	400 ppm
pH	No information available
Melting Point/Range	-35 °C / -31 °F
Boiling Point/Range	81 - 85 °C / 177.8 - 185 °F
Flash Point	13 °C / 55.4 °F
Evaporation Rate	6.5 (Butyl Acetate = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	15.9 vol %
Lower	6.2 vol %
Vapor Pressure	65 mmHg @ 29 °C
Vapor Density	3.4
Specific Gravity	1.250
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	440 °C / 824 °F
Decomposition Temperature	No information available
Viscosity	0.8 mPa s at 20 °C
Molecular Formula	C2 H4 Cl2
Molecular Weight	98.96

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition.

Incompatible Materials Strong oxidizing agents, Bases, Alkali metals

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2), Phosgene, Hydrogen chloride gas

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ethylene dichloride	625 mg/kg (Rat) 413 mg/kg (Mouse)	2800 mg/kg (Rabbit)	28.79 mg/L (Rat) 1h 7.8 mg/l (Rat) 4h

Toxicologically Synergistic No information available

Products

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes, respiratory system and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Ethylene dichloride	107-06-2	Group 2B	Reasonably Anticipated	Not listed	X	Not listed

IARC (International Agency for Research on Cancer)

NTP: (National Toxicity Program)

IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans
NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system Central nervous system (CNS)
STOT - repeated exposure Kidney Liver Heart Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed May cause central nervous system depression: Symptoms may include tightness in the chest, flushing, headache, nausea, vomiting, respiratory depression, weakness, irregular heartbeat, abdominal pain, convulsions, and shock

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Ethylene dichloride	EC50: > 433 mg/L, 96h (Pseudokirchneriella subcapitata) EC50: = 166 mg/L, 96h static (Desmodesmus subspicatus)	LC50: 230 - 710 mg/L, 96h flow-through (Lepomis macrochirus) LC50: 110 - 123 mg/L, 96h flow-through (Pimephales promelas) LC50: = 225 mg/L, 96h static (Oncorhynchus mykiss)	Not listed	EC50: 140 - 190 mg/L, 48h Static (Daphnia magna)

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow

Ethylene dichloride	1.45

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Ethylene dichloride - 107-06-2	U077	-

14. Transport information

DOT

UN-No	UN1184
Proper Shipping Name	ETHYLENE DICHLORIDE
Hazard Class	3
Subsidiary Hazard Class	6.1
Packing Group	II

TDG

UN-No	UN1184
Proper Shipping Name	ETHYLENE DICHLORIDE
Hazard Class	3
Subsidiary Hazard Class	6.1
Packing Group	II

IATA

UN-No	UN1184
Proper Shipping Name	ETHYLENE DICHLORIDE
Hazard Class	3
Subsidiary Hazard Class	6.1
Packing Group	II

IMDG/IMO

UN-No	UN1184
Proper Shipping Name	ETHYLENE DICHLORIDE
Hazard Class	3
Subsidiary Hazard Class	6.1
Packing Group	II

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Ethylene dichloride	107-06-2	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export

Component	CAS No	**TSCA 12(b)** - Notices of Export
Ethylene dichloride	107-06-2	Section 4

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Ethylene dichloride	107-06-2	X	-	203-458-1	X	X	X	X	X	KE-10121

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Ethylene dichloride	107-06-2	>95	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Ethylene dichloride	X	100 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Ethylene dichloride	X		-

OSHA - Occupational Safety and Health Administration: Not applicable

CERCLA: This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Ethylene dichloride	100 lb 1 lb	-

California Proposition 65 This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Ethylene dichloride	107-06-2	Carcinogen	10 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Ethylene dichloride	X	X	X	X	-

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security: This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade: Serious risk, Grade 3

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Ethylene dichloride	Carcinogenic Category 1B,Article 57 Application date: May 22, 2016	Use restricted. See item 28. (see link for restriction details)	SVHC Candidate list - Carcinogenic, Article 57a

	Sunset date: November 22, 2017 Exemption - None	Use restricted. See item 75. (see link for restriction details)	

After the sunset date the use of this substance requires either an authorization or can only be used for exempted uses, e.g. use in scientific research and development which includes routine analytics or use as intermediate.

https://echa.europa.eu/authorisation-list
https://echa.europa.eu/substances-restricted-under-reach
https://echa.europa.eu/candidate-list-table

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Ethylene dichloride	107-06-2	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Ethylene dichloride	107-06-2	Not applicable	Not applicable	X	Annex I - Y45

16. Other information

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Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

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Print Date 24-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET: PERCHLOROETHYLENE

IN CASE OF TRANSPORTATION EMERGENCY CONTACT:
CHEMTREC:(800) 424-9300

ALL OTHER INQUIRIES:
(770) 904-7042 // www.ciscochem.com
266 Rue Cezzan Lavonia, GA 30553



1. IDENTIFICATION
SUBSTANCE: TETRACHLOROETHYLENE

TRADE NAMES/SYNONYMS:
PERCHLOROETHYLENE; 1,1,2,2-TETRACHLOROETHYLENE; ETHYLENE TETRACHLORIDE; PERC; TETRACHLORETHYLENE; PERCHLORETHYLENE; TETRACHLOROETHENE

CHEMICAL FAMILY: halogenated, aliphatic

2. HAZARDS IDENTIFICATION
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: colorless
PHYSICAL FORM: volatile liquid
ODOR: faint odor, sweet odor
MAJOR HEALTH HAZARDS: respiratory tract irritation, skin irritation, eye irritation, central nervous system depression, cancer hazard (in humans)

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, mood swings, loss of coordination, blurred vision, lung congestion, kidney damage, liver damage
LONG TERM EXPOSURE: irritation, nausea, stomach pain, loss of appetite, headache, drowsiness, dizziness, disorientation, sleep disturbances, pain in extremities, loss of coordination, blurred vision, hormonal disorders, internal bleeding, heart damage, liver damage, birth defects, brain damage, tumors, cancer
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation (possibly severe)
LONG TERM EXPOSURE: irritation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
INGESTION:
SHORT TERM EXPOSURE: same as effects reported in short term inhalation
LONG TERM EXPOSURE: same as effects reported in long term inhalation

3. COMPOSITION
COMPONENT: TETRACHLOROETHYLENE
CAS NUMBER: 127-18-4
PERCENTAGE: 100.0

Hazardous: YES

4. FIRST AID MEASURES

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:
Wash skin with soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire hazard.

EXTINGUISHING MEDIA: carbon dioxide, regular dry chemical
Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For tank, rail car or tank truck, evacuation radius: 800 meters (1/2 mile).

FLASH POINT: No data available.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode

6. ACCIDENTAL RELEASE MEASURES

SOIL RELEASE:
Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material.

WATER RELEASE:
Absorb with activated carbon. Remove trapped material with suction hoses. Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Small liquid spills: Absorb with sand or other non-combustible material. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

7. HANDLING AND STORAGE

Store in a cool, dry, ventilated area away from sources of heat or ignition. Isolate from flammable materials. Protect from direct sunlight. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or

smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. EXPOSURE CONTROLS AND PERSONAL PROECTION

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL): 100 ppm (TWA), 200 ppm (ceiling),
300 ppm/5min/3-hour (max)
-ACGIH Threshold Limit Value (TLV):
25 ppm (TWA), 100 ppm (STEL); listed as A3, animal carcinogen

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, Industrial Ventilation, A Manual of Recommended Practices, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

CLOTHING: Wear appropriate chemical resistant clothing. GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

At any detectable concentration -
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive- pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure- demand or other positive-pressure mode.

Escape -
Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister.
Any appropriate escape-type, self-contained breathing apparatus.

For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive- pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure- demand or other positive-pressure mode.
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid
APPEARANCE: clear
COLOR: colorless
PHYSICAL FORM: volatile liquid
ODOR: faint odor, sweet odor
MOLECULAR WEIGHT: 165.83
MOLECULAR FORMULA: Cl2-C-C-Cl2
BOILING POINT: 250 F (121 C)
FREEZING POINT: -2 F (-19 C)
VAPOR PRESSURE: 14 mmHg @ 20 C

VAPOR DENSITY (air=1): 5.83
SPECIFIC GRAVITY (water=1): 1.6227
WATER SOLUBILITY: 0.015%
PH: Not available
VOLATILITY: Not available
ODOR THRESHOLD: 50 ppm
EVAPORATION RATE: 2.8 (butyl acetate=1)
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: alcohol, ether, benzene, chloroform, oils

10. STABILITY AND REACTIVITY

Stability:
Stable under ordinary conditions of use and storage. Slowly decomposed by light. Deteriorates rapidly in warm, moist climates.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition. Hydrogen chloride gas and phosgene gas may be formed upon heating. Decomposes with moisture to yield trichloroacetic acid and hydrochloric acid.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong acids, strong oxidizers, strong alkalis, especially NaOH, KOH; finely divided metals, especially zinc, barium, lithium. Slowly corrodes aluminum, iron and zinc.

Conditions to Avoid:
Moisture, light, heat and incompatibles.

11. TOXICOLOGICAL INFORMATION

TETRACHLOROETHYLENE:
IRRITATION DATA: 810 mg/24 hour(s) skin-rabbit severe; 500 mg/24 hour(s) skin-rabbit mild; 162 mg eyes-rabbit mild; 500 mg/24 hour(s) eyes-rabbit mild

TOXICITY DATA: 4100 ppm/6 hour(s) inhalation-rat LC50; >10000 mg/kg skin-rabbit LD50 (Dow); 2629 mg/kg oral-rat LD50

CARCINOGEN STATUS: NTP: Anticipated Human Carcinogen; IARC: Human Limited Evidence, Animal Sufficient Evidence, Group 2A; ACGIH: A3 -Confirmed Animal Carcinogen; EC: Category 2

LOCAL EFFECTS:
Irritant: inhalation, skin, eye

ACUTE TOXICITY LEVEL:
Moderately Toxic: ingestion
Slightly Toxic: inhalation

TARGET ORGANS: central nervous system

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: eye disorders, heart or cardiovascular disorders, kidney disorders, liver disorders, nervous system disorders, skin disorders and allergies

TUMORIGENIC DATA: Available.

MUTAGENIC DATA: Available.

REPRODUCTIVE EFFECTS DATA: Available.

ADDITIONAL DATA: May be excreted in breast milk. Alcohol may enhance the toxic effects. Stimulants such as epinephrine may induce ventricular fibrillation.

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

FISH TOXICITY: 8430 ug/L 96 hour(s) LC50 (Mortality) Flagfish (Jordanella floridae)

INVERTEBRATE TOXICITY: 7500 ug/L 48 hour(s) EC50 (Immobilization) Water flea (Daphnia magna)

ALGAL TOXICITY: 509000 ug/L 96 hour(s) EC50 (Photosynthesis) Diatom (Skeletonema costatum)

FATE AND TRANSPORT:

BIOCONCENTRATION: 49 ug/L 1-21 hour(s) BCF (Residue) Bluegill (Lepomis macrochirus) 3.43 ug/L

Environmental Fate:
When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into water, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals.

Environmental Toxicity:
The LC50/96-hour values for fish are between 1 and 10 mg/l. The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. TRANSPORT INFORMATION

Domestic (Land, D.O.T.)

Proper Shipping Name: TETRACHLOROETHYLENE Hazard Class: 6.1
UN/NA: UN1897
Packing Group: III
Information reported for product/size: 20L
International (Water, I.M.O.)

Proper Shipping Name: TETRACHLOROETHYLENE Hazard Class: 6.1
UN/NA: UN1897
Packing Group: III
Information reported for product/size: 20L

Proper shipping paperwork:

UN 1897, Tetrachoroethylene, 6.1, PG III

Marine Pollutant

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): TETRACHLOROETHYLENE (PERCHLOROETHYLENE): 100 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES

(40 CFR 355 Subpart B): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES
(40 CFR 355 Subpart C): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370 Subparts B and C):
ACUTE: Yes
CHRONIC: Yes
FIRE: No
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65): TETRACHLOROETHYLENE (PERCHLOROETHYLENE)

OSHA PROCESS SAFETY (29 CFR 1910.119): Not regulated.
STATE REGULATIONS:
California Proposition 65:
Known to the state of California to cause the following: TETRACHLOROETHYLENE (PERCHLOROETHYLENE) Cancer (Apr 01, 1988)

CANADIAN REGULATIONS: WHMIS CLASSIFICATION: D2

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed. CANADA INVENTORY (DSL/NDSL): Not determined.

16. OTHER INFORMATION

NFPA Ratings: Health: 2 Flammability: 0 Reactivity: 0

Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends
on level and duration of exposure.

Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

Product Use:
Laboratory Reagent.

CISCO provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product.
Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. CISCO MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

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Date Created: 5/18/2015
Date Updated: 6/11/2015

INDENO(1,2,3-cd)PYRENE

0730
March 1999

CAS No: 193-39-5
RTECS No: NK9300000

o-Phenylenepyrene
2,3-Phenylenepyrene
$C_{22}H_{12}$
Molecular mass: 276.3

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		**AVOID ALL CONTACT!**	
Inhalation		Local exhaust or breathing protection.	Fresh air, rest.
Skin		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
Eyes		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	

EMERGENCY RESPONSE	SAFE STORAGE
	Provision to contain effluent from fire extinguishing. Well closed.

IPCS
International Programme on Chemical Safety

Prepared in the context of cooperation between the International Programme on Chemical Safety and the European Commission © IPCS 2005

SEE IMPORTANT INFORMATION ON THE BACK.

IMPORTANT DATA

Physical State; Appearance
YELLOW CRYSTALS

Chemical dangers
Upon heating, toxic fumes are formed.

Occupational exposure limits
TLV not established.
MAK: Carcinogen category: 2; (DFG 2004).

Routes of exposure
The substance can be absorbed into the body by inhalation of its aerosol and through the skin.

Inhalation risk
Evaporation at 20•C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

Effects of long-term or repeated exposure
This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 536•C
Melting point: 164•C
Solubility in water: none
Octanol/water partition coefficient as log Pow: 6.58

ENVIRONMENTAL DATA

This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in fish.

NOTES

Indeno(1,2,3-cd)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing Indeno(1,2,3-c,d)pyrene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3.
Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.
Card has been partly updated in October 2005. See section Occupational Exposure Limits.

ADDITIONAL INFORMATION

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BARIUM

1052
October 1999

CAS No: 7440-39-3
RTECS No: CQ8370000
UN No: 1400

Ba
Atomic mass: 137.3

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Flammable. Many reactions may cause fire or explosion.	NO open flames, NO sparks, and NO smoking. NO contact with water.	Special powder, dry sand, NO hydrous agents, NO water.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		**PREVENT DISPERSION OF DUST! STRICT HYGIENE!**	
Inhalation	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
Skin	Redness.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
Eyes	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT wash away into sewer.	UN Hazard Class: 4.3 UN Pack Group: II

EMERGENCY RESPONSE	STORAGE
Transport Emergency Card: TEC (R)-43G12	Separated from halogenated solvents, strong oxidants, acids. Dry. Keep under inert gas, oil or oxygen-free liquid.

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IMPORTANT DATA

Physical State; Appearance
YELLOWISH TO WHITE LUSTROUS SOLID IN VARIOUS FORMS.

Physical dangers
Dust explosion possible if in powder or granular form, mixed with air.

Chemical dangers
The substance may spontaneously ignite on contact with air (if in powder form). The substance is a strong reducing agent and reacts violently with oxidants and acids. Reacts violently with halogenated solvents. Reacts with water, forming flammable/explosive gas (hydrogen - see ICSC 0001), causing fire and explosion hazard.

Occupational exposure limits
TLV: 0.5 mg/m^3 (as TWA) (ACGIH 1999).

Routes of exposure
The substance can be absorbed into the body by ingestion.

Effects of short-term exposure
The substance irritates the eyes, the skin and the respiratory tract.

PHYSICAL PROPERTIES

Boiling point: 1640°C
Melting point: 725°C
Density: 3.6 g/cm^3
Solubility in water: reaction

ENVIRONMENTAL DATA

NOTES

Reacts violently with fire extinguishing agents such as water, bicarbonate, powder, foam, and carbon dioxide.
Rinse contaminated clothes (fire hazard) with plenty of water.

ADDITIONAL INFORMATION

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CHROMIUM

0029
October 2004

CAS No: 7440-47-3
RTECS No: GB4200000

Chrome
(powder)
Cr
Atomic mass: 52.0

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Combustible under specific conditions.	No open flames if in powder form.	In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION		Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	

EXPOSURE		PREVENT DISPERSION OF DUST!	
Inhalation	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
Skin		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
Eyes	Redness.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.	

EMERGENCY RESPONSE	SAFE STORAGE

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IMPORTANT DATA

Physical State; Appearance
GREY POWDER

Physical dangers
Dust explosion possible if in powder or granular form, mixed with air.

Chemical dangers
Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances, causing fire and explosion hazard.

Occupational exposure limits
TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m^3 as TWA; A4; (ACGIH 2004).
MAK not established.

Inhalation risk
A harmful concentration of airborne particles can be reached quickly when dispersed.

Effects of short-term exposure
May cause mechanical irritation to the eyes and the respiratory tract.

PHYSICAL PROPERTIES

Boiling point: 2642•Ć
Melting point: 1900•Ć
Density: 7.15 g/cm^3
Solubility in water: none

ENVIRONMENTAL DATA

NOTES

The surface of the chromium particles is oxidized to chromium(III)oxide in air.
See ICSC 1531 Chromium(III) oxide.

ADDITIONAL INFORMATION

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LEAD

0052
October 2002

CAS No: 7439-92-1
RTECS No: OF7525000

Lead metal
Plumbum
(powder)
Pb
Atomic mass: 207.2

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	**See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.**	**PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!**	
Inhalation		Local exhaust or breathing protection.	Fresh air, rest.
Skin		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
Eyes		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles.	

EMERGENCY RESPONSE	SAFE STORAGE
	Separated from food and feedstuffs and incompatible materials. See Chemical Dangers.

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IMPORTANT DATA

Physical State; Appearance
BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.

Physical dangers
Dust explosion possible if in powder or granular form, mixed with air.

Chemical dangers
On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.

Occupational exposure limits
TLV: 0.05 mg/m^3 as TWA; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004).
MAK: Carcinogen category: 3B; Germ cell mutagen group: 3A; (DFG 2004).
EU OEL: as TWA 0.15 mg/m^3; (EU 2002).

Routes of exposure
The substance can be absorbed into the body by inhalation and by ingestion.

Inhalation risk
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

Effects of long-term or repeated exposure
The substance may have effects on the blood, bone marrow, central nervous system, peripheral nervous system and kidneys, resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Boiling point: 1740•C
Melting point: 327.5•C
Density: 11.34 g/cm^3
Solubility in water: none

ENVIRONMENTAL DATA

Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.

NOTES

Depending on the degree of exposure, periodic medical examination is suggested.
Do NOT take working clothes home.
Card has been partly updated in April 2005. See section Occupational Exposure Limits.

ADDITIONAL INFORMATION

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MERCURY

0056
April 2004

CAS No: 7439-97-6
RTECS No: OV4550000
UN No: 2809
EC No: 080-001-00-0

Quicksilver
Liquid silver
Hg
Atomic mass: 200.6

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.

EXPOSURE		**STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!**	**IN ALL CASES CONSULT A DOCTOR!**
Inhalation	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
Skin	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
Eyes		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.

SPILLAGE DISPOSAL	**PACKAGING & LABELLING**	
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.	T Symbol N Symbol R: 23-33-50/53 S: (1/2-)7-45-60-61 UN Hazard Class: 8 UN Pack Group: III	Special material. Do not transport with food and feedstuffs.

EMERGENCY RESPONSE	**STORAGE**
Transport Emergency Card: TEC (R)-80GC9-II+III	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs. Well closed.

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IMPORTANT DATA

Physical State; Appearance
ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.

Chemical dangers
Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.

Occupational exposure limits
TLV: 0.025 mg/m^3 as TWA; (skin); A4; BEI issued; (ACGIH 2004).
MAK: 0.1 mg/m^3; Sh; Peak limitation category: II(8); Carcinogen category: 3B; (DFG 2003).

Routes of exposure
The substance can be absorbed into the body by inhalation of its vapour and through the skin, also as a vapour!

Inhalation risk
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20•Ċ.

Effects of short-term exposure
The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous system and kidneys. The effects may be delayed. Medical observation is indicated.

Effects of long-term or repeated exposure
The substance may have effects on the central nervous system and kidneys, resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. May cause inflammation and discoloration of the gums. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

PHYSICAL PROPERTIES

Boiling point: 357•Ċ
Melting point: -39•Ċ
Relative density (water = 1): 13.5
Solubility in water: none
Vapour pressure, Pa at 20•Ċ: 0.26
Relative vapour density (air = 1): 6.93
Relative density of the vapour/air-mixture at 20•Ċ (air = 1): 1.009

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.

NOTES

Depending on the degree of exposure, periodic medical examination is indicated.
No odour warning if toxic concentrations are present.
Do NOT take working clothes home.

ADDITIONAL INFORMATION

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NICKEL

0062
October 2001

CAS No: 7440-02-0 (powder)
RTECS No: QR5950000 Ni
EC No: 028-002-00-7 Atomic mass: 58.7

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Flammable as dust. Toxic fumes may be released in a fire.		Dry sand. NO carbon dioxide. NO water.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		**PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!**	
Inhalation	Cough. Shortness of breath.	Local exhaust or breathing protection.	Fresh air, rest.
Skin		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
Eyes		Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Vacuum spilled material. Carefully collect remainder, then remove to safe place. Personal protection: P2 filter respirator for harmful particles.	Xn Symbol R: 40-43 S: (2-)22-36

EMERGENCY RESPONSE	SAFE STORAGE
	Separated from strong acids.

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IMPORTANT DATA

Physical State; Appearance
SILVERY METALLIC SOLID IN VARIOUS FORMS.

Physical dangers
Dust explosion possible if in powder or granular form, mixed with air.

Chemical dangers
Reacts violently, in powder form, with titanium powder and potassium perchlorate, and oxidants such as ammonium nitrate, causing fire and explosion hazard. Reacts slowly with non-oxidizing acids and more rapidly with oxidizing acids. Toxic gases and vapours (such as nickel carbonyl) may be released in a fire involving nickel.

Occupational exposure limits
TLV: (Inhalable fraction) 1.5 mg/m^3 as TWA; A5 (not suspected as a human carcinogen); (ACGIH 2004).
MAK: (Inhalable fraction); sensitization of respiratory tract and skin (Sah); Carcinogen category: 1; (DFG 2004).

Routes of exposure
The substance can be absorbed into the body by inhalation of the dust.

Inhalation risk
Evaporation at 20•C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

Effects of short-term exposure
May cause mechanical irritation. Inhalation of fumes may cause pneumonitis.

Effects of long-term or repeated exposure
Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation exposure may cause asthma. Lungs may be affected by repeated or prolonged exposure. This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 2730•C
Melting point: 1455•C
Density: 8.9 g/cm^3
Solubility in water: none

ENVIRONMENTAL DATA

NOTES

At high temperatures, nickel oxide fumes will be formed.
Depending on the degree of exposure, periodic medical examination is suggested.
The symptoms of asthma often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential.
Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance.
Card has been partly updated in April 2005. See section Occupational Exposure Limits.

ADDITIONAL INFORMATION

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ZINC POWDER

1205
October 1994

CAS No: 7440-66-6
RTECS No: ZG8600000
UN No: 1436 (zinc powder or dust)
EC No: 030-001-00-1

Blue powder
Merrillite
(powder)
Zn
Atomic mass: 65.4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with acid(s), base(s) and incompatible substances (see Chemical Dangers).	Special powder, dry sand, NO other agents. NO water.
EXPLOSION	Risk of fire and explosion on contact with acid(s), base(s), water and incompatible substances.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Prevent deposition of dust.	In case of fire: cool drums, etc., by spraying with water but avoid contact of the substance with water.
EXPOSURE		**PREVENT DISPERSION OF DUST! STRICT HYGIENE!**	
Inhalation	Metallic taste and metal fume fever. Symptoms may be delayed (see Notes).	Local exhaust.	Fresh air, rest. Refer for medical attention.
Skin	Dry skin.	Protective gloves.	Rinse and then wash skin with water and soap.
Eyes		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	PACKAGING & LABELLING	
Extinguish or remove all ignition sources. Do NOT wash away into sewer. Sweep spilled substance into containers. then remove to safe place. Personal protection: self-contained breathing apparatus.	F Symbol N Symbol R: 15-17-50/53 S: (2-)7/8-43-46-60-61 UN Hazard Class: 4.3 UN Subsidiary Risks: 4.2	Airtight.

EMERGENCY RESPONSE	SAFE STORAGE
Transport Emergency Card: TEC (R)-43GWS-II+III NFPA Code: H0; F1; R1	Fireproof. Separated from acids, bases oxidants. Dry.

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IMPORTANT DATA

Physical State; Appearance
ODOURLESS GREY TO BLUE POWDER.

Physical dangers
Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc.

Chemical dangers
Upon heating, toxic fumes are formed. The substance is a strong reducing agent and reacts violently with oxidants. Reacts with water and reacts violently with acids and bases forming flammable/explosive gas (hydrogen - see ICSC0001). Reacts violently with sulfur, halogenated hydrocarbons and many other substances causing fire and explosion hazard.

Occupational exposure limits
TLV not established.

Routes of exposure
The substance can be absorbed into the body by inhalation and by ingestion.

Inhalation risk
Evaporation at 20•C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

Effects of short-term exposure
Inhalation of fumes may cause metal fume fever. The effects may be delayed.

Effects of long-term or repeated exposure
Repeated or prolonged contact with skin may cause dermatitis.

PHYSICAL PROPERTIES

Boiling point: 907•C
Melting point: 419•C
Relative density (water = 1): 7.14
Solubility in water: reaction
Vapour pressure, kPa at 487•C: 0.1
Auto-ignition temperature: 460•C

ENVIRONMENTAL DATA

NOTES

Zinc may contain trace amounts of arsenic, when forming hydrogen, may also form toxic gas arsine (see ICSC0001 and ICSC0222).
Reacts violently with fire extinguishing agents such as water, halons, foam and carbon dioxide.
The symptoms of metal fume fever do not become manifest until several hours later.
Rinse contaminated clothes (fire hazard) with plenty of water.
Card has been partly updated in April 2005. See sections EU classification, Emergency Response.

ADDITIONAL INFORMATION

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Material Safety Data Sheet

Version 4.1
Revision Date 01/17/2012
Print Date 07/26/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene
Product Number	:	123897
Brand	:	Aldrich
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Harmful by ingestion., Carcinogen

GHS Classification
Acute toxicity, Oral (Category 4)
Carcinogenicity (Category 2)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 4)

GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)

H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H413	May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P273	Avoid release to the environment.
P281	Use personal protective equipment as required.

HMIS Classification

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	0
Physical hazards:	0

NFPA Rating

Health hazard:	1
Fire:	0

Reactivity Hazard: 0

Potential Health Effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Skin	Harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	Harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : 4,4′-DDE

Formula : $C_{14}H_8Cl_4$

Molecular Weight : 318.03 g/mol

Component	Concentration
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	
CAS-No. 72-55-9 EC-No. 200-784-6	-

4. 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
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

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

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

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.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) 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).

Hand 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.

Eye 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 and 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.

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	solid
Colour	no data available

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 88 - 90 °C (190 - 194 °F)
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	< 0.00001 hPa (< 0.00001 mmHg)
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 6.51
Relative vapour	no data available

density	
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents, Strong bases

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 880.0 mg/kg

Inhalation LC50
no data available

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

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

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	Harmful if swallowed.
Skin	Harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

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

Synergistic effects
no data available

Additional Information
RTECS: Not available

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 0.2 - 0.3 mg/l - 96.0 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.03 - 0.04 mg/l - 96.0 h
	LC50 - Salmo salar (Atlantic salmon) - 0.05 - 0.18 mg/l - 96.0 h

Persistence and degradability
no data available

Bioaccumulative potential

Bioaccumulation	Gambusia affinis (Mosquito fish) - 33 d Bioconcentration factor (BCF): 12,037

Mobility in soil
no data available

PBT and vPvB assessment

no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

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: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)
Marine pollutant: Marine pollutant
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)
Marine pollutant: Marine pollutant

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)

15. REGULATORY INFORMATION

OSHA Hazards
Harmful by ingestion., Carcinogen

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

SARA 313 Components
SARA 313: 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
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	2009-07-17

New Jersey Right To Know Components

	CAS-No.	Revision Date
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	2009-07-17

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. 2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	2010-06-11

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. 2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	CAS-No. 72-55-9	Revision Date 2010-06-11

16. OTHER INFORMATION

Further information

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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.

Material Safety Data Sheet

Version 4.3
Revision Date 01/17/2012
Print Date 07/26/2012

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	4,4′-DDT
Product Number	:	386340
Brand	:	Aldrich
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Carcinogen, Toxic by ingestion, Toxic by skin absorption

Target Organs

Liver, Pancreas.

GHS Classification
Acute toxicity, Dermal (Category 3)
Acute toxicity, Oral (Category 3)
Carcinogenicity (Category 2)
Specific target organ toxicity - repeated exposure, Oral (Category 1)
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 4)

GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H301 + H311	Toxic if swallowed or in contact with skin
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.
H400	Very toxic to aquatic life.
H413	May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P314	Get medical advice/ attention if you feel unwell.

HMIS Classification

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

NFPA Rating

Health hazard:	2
Fire:	2
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Skin	Toxic if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane
1,1-Bis(4-chlorophenyl)-2,2,2-trichloroethane

Formula : $C_{14}H_9Cl_5$

Molecular Weight : 354.49 g/mol

Component		Concentration
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane		
CAS-No.	50-29-3	-
EC-No.	200-024-3	
Index-No.	602-045-00-7	

4. 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. Take victim immediately to hospital. Consult a physician.

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

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

5. FIREFIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

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

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

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.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	TWA	0.5 mg/m3	USA. NIOSH Recommended Exposure Limits
Remarks	Potential Occupational Carcinogen See Appendix A			
		TWA	1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Liver damage Confirmed animal carcinogen with unknown relevance to humans			
		TWA	1 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin notation			
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Skin designation Substance listed; for more information see OSHA document 1910.1044			

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) 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).

Hand 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.

Eye 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 and 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.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	solid
Colour	no data available

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 107 - 110 °C (225 - 230 °F) - lit.
Boiling point	260.0 °C (500.0 °F)
Flash point	72.0 - 77.0 °C (161.6 - 170.6 °F)
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	0.0000021 hPa (0.0000016 mmHg) at 20.0 °C (68.0 °F)
Density	0.99 g/cm3
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 6.91
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Oxidizing agents, Iron and iron salts.

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 87.0 mg/kg

Inhalation LC50
no data available

Dermal LD50
LD50 Dermal - rabbit - 300.0 mg/kg
Remarks: Behavioral:Tremor. Behavioral:Muscle weakness. Behavioral:Ataxia.

Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
NTP:	Reasonably anticipated to be a human carcinogen (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
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

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
Ingestion - Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	Toxic if swallowed.

Skin	Toxic if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
CNS stimulation.

Synergistic effects
no data available

Additional Information
RTECS: KJ3325000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 0.01 mg/l - 96.0 h
	LC50 - Lepomis macrochirus (Bluegill) - 0.01 mg/l - 96.0 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.003400 mg/l - 96.0 h
	LOEC - Oncorhynchus mykiss (rainbow trout) - 150 mg/l - 3.0 d
	NOEC - Oncorhynchus mykiss (rainbow trout) - 113 mg/l - 3.0 d
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 0.00108 mg/l - 48 h
Toxicity to algae	LC100 - Scenedesmus quadricauda (Green algae) - > 20 mg/l - 7 d

Persistence and degradability

Bioaccumulative potential

Bioaccumulation	Oncorhynchus mykiss (rainbow trout) - 20 d Bioconcentration factor (BCF): 46,670

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

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: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: Severe marine pollutant
Poison Inhalation Hazard: No

IMDG

UN number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
Marine pollutant: Marine pollutant

IATA
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)

15. REGULATORY INFORMATION

OSHA Hazards
Carcinogen, Toxic by ingestion, Toxic by skin absorption

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

SARA 313 Components
SARA 313: 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
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	2007-03-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1990-06-15

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1990-06-15

16. OTHER INFORMATION

Further information
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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.

SAFETY DATA SHEET

1. Identification

Product identifier **PetroFix**

Other means of identification None.

Recommended use Remediation of contaminants in soil and groundwater.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company Name Regenesis

Address 1011 Calle Sombra
San Clemente, CA 92673 USA

General information 949-366-8000

E-mail CustomerService@regenesis.com

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

USA, Canada, Mexico 1-800-424-9300

International 1-703-527-3887

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards Not classified.

OSHA defined hazards Not classified.

Label elements

Hazard symbol None.

Signal word None.

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

Precautionary statement

Prevention Observe good industrial hygiene practices.

Response Wash hands after handling.

Storage Store away from incompatible materials.

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

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

Supplemental information None.

3. Composition/information on ingredients

Mixtures

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

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

4. First-aid measures

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

5. Fire-fighting measures

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

6. Accidental release measures

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

7. Handling and storage

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

8. Exposure controls/personal protection

Occupational exposure limits

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

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

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Activated carbon <10 µm (CAS 7440-44-0)	TWA	2 mg/m3	Respirable fraction.

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Calcium sulfate dihydrate (CAS 10101-41-4)	TWA	10 mg/m3	Inhalable fraction.

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

Appropriate engineering controls Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin protection

Hand protection Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.

Skin protection

Other Wear suitable protective clothing.

Respiratory protection In case of insufficient ventilation, wear suitable respiratory equipment.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state Liquid.

Form Aqueous suspension.

Color Not available.

Odor Not available.

Odor threshold Not available.

pH 8 - 10

Melting point/freezing point Not available.

Initial boiling point and boiling range 212 °F (100 °C)

Flash point Not available.

Evaporation rate Not available.

Flammability (solid, gas) Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) Not available.

Flammability limit - upper (%) Not available.

Vapor pressure Not available.

Vapor density Not available.

Relative density Not available.

Solubility(ies)

Solubility (water) Not available.

Partition coefficient (n-octanol/water) Not available.

Auto-ignition temperature Not available.

Decomposition temperature Not available.

Viscosity Not available.

Other information

Explosive properties Not explosive.

Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Contact with incompatible materials. Avoid drying out product. May generate combustible dust if material dries.
Incompatible materials	Strong oxidizing agents. Acids.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

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

Information on toxicological effects

Acute toxicity Not expected to be acutely toxic.

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

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

Respiratory or skin sensitization

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

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not regulated.

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

12. Ecological information

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

Persistence and degradability	No data is available on the degradability of this product.
Bioaccumulative potential	No data available.
Mobility in soil	No data available.
Other adverse effects	None known.

13. Disposal considerations

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

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

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

15. Regulatory information

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

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

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical	No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

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

Not regulated.

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

Not regulated.

Safe Drinking Water Act (SDWA)	Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Calcium sulfate dihydrate (CAS 10101-41-4)

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

Not listed.

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

Not listed.

US. Rhode Island RTK

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

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 2016 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

International Inventories

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

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

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

Issue date 15-February-2018

Revision date -

Version # 01

HMIS® ratings Health: 1
Flammability: 1
Physical hazard: 0

NFPA ratings



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

SAFETY DATA SHEET

1. Identification

Product identifier **PetroFix Electron Acceptor Blend**

Other means of identification None.

Recommended use Remediation of soils and groundwater.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company Name Regenesis

Address 1011 Calle Sombra
San Clemente, CA 92673 USA

General information 949-366-8000

E-mail CustomerService@regenesis.com

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

USA, Canada, Mexico 1-800-424-9300

International 1-703-527-3887

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards Serious eye damage/eye irritation Category 2B

OSHA defined hazards Not classified.

Label elements

Hazard symbol None.

Signal word Warning

Hazard statement Causes eye irritation.

Precautionary statement

Prevention Wash thoroughly after handling.

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

Storage Store away from incompatible materials.

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

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

Supplemental information None.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Ammonium sulfate	7783-20-2	40 - 60
Sodium nitrate	7631-99-4	40 - 60

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

4. First-aid measures

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

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

Eye contact	Do not rub eyes. Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. Get medical attention if symptoms occur.
Most important symptoms/effects, acute and delayed	Irritation of eyes. Exposed individuals may experience eye tearing, redness, and discomfort. Dusts may irritate the respiratory tract, skin and eyes.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Use extinguishing agent suitable for type of surrounding fire.
Unsuitable extinguishing media	None known.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed. Combustion products may include: nitrogen oxides, sulfur oxides, ammonia.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Use water spray to cool unopened containers.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	Material will not burn.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Avoid the generation of dusts during clean-up. Collect dust using a vacuum cleaner equipped with HEPA filter. Stop the flow of material, if this is without risk. Large Spills: Wet down with water and dike for later disposal. Absorb in vermiculite, dry sand or earth and place into containers. Shovel the material into waste container. Following product recovery, flush area with water. Small Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal. Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

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

8. Exposure controls/personal protection

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

Appropriate engineering controls	Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. If engineering measures are not sufficient to maintain concentrations of dust particulates below the Occupational Exposure Limit (OEL), suitable respiratory protection must be worn. If material is ground, cut, or used in any operation which may generate dusts, use appropriate local exhaust ventilation to keep exposures below the recommended exposure limits. Provide eyewash station.

Individual protection measures, such as personal protective equipment

Eye/face protection	Unvented, tight fitting goggles should be worn in dusty areas.
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.
Skin protection	
Other	Wear suitable protective clothing.
Respiratory protection	In case of insufficient ventilation, wear suitable respiratory equipment. Wear NIOSH approved respirator appropriate for airborne exposure at the point of use. Appropriate respirator selection should be made by a qualified professional. Recommended use: Wear respirator with dust filter.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

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

10. Stability and reactivity

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

11. Toxicological information

Information on likely routes of exposure

Inhalation	Dust may irritate respiratory system.
Skin contact	Dust or powder may irritate the skin.
Eye contact	Causes eye irritation.
Ingestion	May cause discomfort if swallowed.
Symptoms related to the physical, chemical and toxicological characteristics	Irritation of eyes. Exposed individuals may experience eye tearing, redness, and discomfort. Dusts may irritate the respiratory tract, skin and eyes.

Information on toxicological effects

Acute toxicity	Not expected to be acutely toxic.
Skin corrosion/irritation	Prolonged skin contact may cause temporary irritation.
Serious eye damage/eye irritation	Causes eye irritation.

Respiratory or skin sensitization

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

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not regulated.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not an aspiration hazard.
Further information	Nitrate poisoning resulting in methemoglobinemia manifested as cyanosis is rare, but possible for people with specific susceptibility traits.

12. Ecological information

Ecotoxicity	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	The product solely consists of inorganic compounds which are not biodegradable.
Bioaccumulative potential	No data available.
Mobility in soil	No data available.
Other adverse effects	None known.

13. Disposal considerations

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

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

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

15. Regulatory information

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

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

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical	Yes
Classified hazard categories	Serious eye damage or eye irritation

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Ammonium sulfate	7783-20-2	40 - 60
Sodium nitrate	7631-99-4	40 - 60

Other federal regulations

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

Not regulated.

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

Not regulated.

Safe Drinking Water Act (SDWA)	Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

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

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

Sodium nitrate (CAS 7631-99-4)

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

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

US. Rhode Island RTK

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

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 2016 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

International Inventories

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

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

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

Issue date 15-August-2018

Revision date -

Version # 01

HMIS® ratings
Health: 1
Flammability: 0
Physical hazard: 0

NFPA ratings



Disclaimer

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

SAFETY DATA SHEET

1. Identification

Product identifier **TRICHLOROETHYLENE**

Other means of identification

CAS number 79-01-6

Synonyms TCE

Recommended use General purpose solvent.

Recommended restrictions Use in accordance with manufacturer's recommendations.

Manufacturer/Importer/Supplier/Distributor information

Company Name Greenfield Global USA Inc.

Address 1101 Isaac Shelby Drive
Shelbyville, KY 40065
USA

Telephone 502.232.7600

Fax 502.633.6100

Company Name Greenfield Global USA Inc.

Address 58 Vale Road
Brookfield, CT 06804
USA

Telephone 203.740.3471

Fax 203.740.3481

Emergency phone number

USA CHEMTREC: 1.800.424.9300 (CCN 17213)

International CHEMTREC: +1.703.527.3887 (CCN 17213)

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2
	Sensitization, skin	Category 1B
	Germ cell mutagenicity	Category 2
	Carcinogenicity	Category 1B
	Specific target organ toxicity, single exposure	Category 3 narcotic effects
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 3
	Hazardous to the aquatic environment, long-term hazard	Category 3

OSHA defined hazards Not classified.

Label elements



Signal word Danger

Hazard statement	Causes skin irritation. May cause an allergic skin reaction. Causes serious eye irritation. May cause drowsiness or dizziness. Suspected of causing genetic defects. May cause cancer. Harmful to aquatic life with long lasting effects.
Precautionary statement	
Prevention	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid breathing mist/vapor. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Contaminated work clothing must not be allowed out of the workplace. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.
Response	If on skin: Wash with plenty of water. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If exposed or concerned: Get medical advice/attention. Call a poison center/doctor if you feel unwell. If skin irritation or rash occurs: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. Take off contaminated clothing and wash before reuse.
Storage	Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

3. Composition/information on ingredients

Substances

Chemical name	Common name and synonyms	CAS number	%
Trichloroethylene	TCE	79-01-6	100

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

4. First-aid measures

Inhalation	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.
Skin contact	Remove contaminated clothing immediately and wash skin with soap and water. In case of eczema or other skin disorders: Seek medical attention and take along these instructions. Wash contaminated clothing before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Most important symptoms/effects, acute and delayed	May cause drowsiness and dizziness. Headache. Nausea, vomiting. Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.
General information	IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed. Combustion products may include: hydrogen chloride gas.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.

General fire hazards No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Avoid breathing mist/vapor. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up This product is slightly soluble in water. Prevent product from entering drains.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. Put material in suitable, covered, labeled containers. For waste disposal, see section 13 of the SDS.

Environmental precautions Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid breathing mist/vapor. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. Wear appropriate personal protective equipment. Avoid release to the environment. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities Store locked up. Store in tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-2 (29 CFR 1910.1000)

Material	Type	Value
Trichloroethylene (CAS 79-01-6)	Ceiling	200 ppm
	TWA	100 ppm

US. ACGIH Threshold Limit Values

Material	Type	Value
Trichloroethylene (CAS 79-01-6)	STEL	25 ppm
	TWA	10 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Material	Type	Value
Trichloroethylene (CAS 79-01-6)	Ceiling	2 ppm
	TWA	25 ppm

Biological limit values

ACGIH Biological Exposure Indices

Material	Value	Determinant	Specimen	Sampling Time
Trichloroethylene (CAS 79-01-6)	15 mg/l	Trichloroacetic acid	Urine	*
	0.5 mg/l	Trichloroethanol, without hydrolysis	Blood	*

* - For sampling details, please see the source document.

Exposure guidelines

US. NIOSH: Pocket Guide to Chemical Hazards

Trichloroethylene (CAS 79-01-6)	Can be absorbed through the skin.

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

Individual protection measures, such as personal protective equipment

Eye/face protection Chemical goggles are recommended.

Skin protection

Hand protection Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier. Be aware that the liquid may penetrate the gloves. Frequent change is advisable.

Skin protection

Other Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Respirator type: Chemical respirator with organic vapor cartridge.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Observe any medical surveillance requirements. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

9. Physical and chemical properties

Appearance

Physical state	Liquid.
Form	Liquid.
Color	Clear. Colorless.
Odor	Not available.
Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	-120.64 °F (-84.8 °C)
Initial boiling point and boiling range	188.1 °F (86.7 °C)
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%)	8 % v/v
Flammability limit - upper (%)	10.5 % v/v
Vapor pressure	81.3 hPa (61.0 mmHg) (68 °F (20 °C))
Relative density	1.463 (77 °F (25 °C))

Solubility(ies)

Solubility (water)	Slightly soluble in water.
Partition coefficient (n-octanol/water)	2.29 log Pow
Auto-ignition temperature	770 °F (410 °C)
Decomposition temperature	Not available.
Viscosity	Not available.

Other information

Explosive properties	Not explosive.
Molecular formula	C2HCL3
Molecular weight	131.39 g/mol
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	Hydrogen chloride gas.

11. Toxicological information

Information on likely routes of exposure

Inhalation	May cause drowsiness and dizziness. Prolonged inhalation may be harmful.
Skin contact	Causes skin irritation. May cause an allergic skin reaction. May be absorbed through the skin.
Eye contact	Causes serious eye irritation.
Ingestion	Expected to be a low ingestion hazard.
Symptoms related to the physical, chemical and toxicological characteristics	May cause drowsiness and dizziness. Headache. Nausea, vomiting. Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash.

Information on toxicological effects

Acute toxicity Not expected to be acutely toxic.

Product	Species	Test Results
Trichloroethylene (CAS 79-01-6)		
Acute		
Dermal		
LD50	Rabbit	> 20000 mg/kg
Inhalation		
Vapor		
LC50	Rat	12000 ppm, 4 Hours
Oral		
LD50	Rat	5400 mg/kg

Skin corrosion/irritation	Causes skin irritation.
Serious eye damage/eye irritation	Causes serious eye irritation.

Respiratory or skin sensitization

Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	May cause an allergic skin reaction.
Germ cell mutagenicity	Suspected of causing genetic defects.
Carcinogenicity	May cause cancer.

IARC Monographs. Overall Evaluation of Carcinogenicity

Trichloroethylene (CAS 79-01-6) 1 Carcinogenic to humans.

NTP Report on Carcinogens

Trichloroethylene (CAS 79-01-6) Known To Be Human Carcinogen.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not regulated.

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

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

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful. Prolonged exposure may cause chronic effects.

12. Ecological information

Ecotoxicity Harmful to aquatic life with long lasting effects.

Product		Species	Test Results
Trichloroethylene (CAS 79-01-6)			
Aquatic			
Acute			
Fish	LC50	Pimephales promelas	40.7 mg/l, 96 Hours
Chronic			
Crustacea	EC50	Daphnia magna	20.8 mg/l, 16 days

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

Bioaccumulative potential

Partition coefficient n-octanol / water (log Kow)
2.29, log Pow

Mobility in soil The product is slightly soluble in water. Expected to have low mobility in soil.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Incinerate the material under controlled conditions in an approved incinerator. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code D040: Waste Trichloroethylene
The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

US RCRA Hazardous Waste U List: Reference

Trichloroethylene (CAS 79-01-6) U228

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

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

14. Transport information

DOT

UN number UN1710
UN proper shipping name Trichloroethylene (TRICHLOROETHYLENE RQ = 100 lb)
Transport hazard class(es)
Class 6.1
Subsidiary risk -
Label(s) 6.1
Packing group III
Environmental hazards
Marine pollutant No.
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.
Special provisions IB3, N36, T4, TP1
Packaging exceptions 153
Packaging non bulk 203

Packaging bulk 241

IATA

UN number UN1710
UN proper shipping name Trichloroethylene
Transport hazard class(es)
Class 6.1
Subsidiary risk -
Packing group III
Environmental hazards No.
ERG Code 6A
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number UN1710
UN proper shipping name TRICHLOROETHYLENE
Transport hazard class(es)
Class 6.1
Subsidiary risk -
Packing group III
Environmental hazards
Marine pollutant No.
EmS F-A, S-A
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

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

15. Regulatory information

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

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

Trichloroethylene (CAS 79-01-6) 0.1 % One-Time Export Notification only.

CERCLA Hazardous Substance List (40 CFR 302.4)

Trichloroethylene (CAS 79-01-6) Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not regulated.

Toxic Substances Control Act (TSCA) This substance is on the TSCA 8(b) inventory and is designated “active”.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

Classified hazard categories
Skin corrosion or irritation
Serious eye damage or eye irritation
Respiratory or skin sensitization
Germ cell mutagenicity
Carcinogenicity
Specific target organ toxicity (single or repeated exposure)

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Trichloroethylene	79-01-6	100

Other federal regulations

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

Trichloroethylene (CAS 79-01-6)

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

Not regulated.

Clean Water Act (CWA) Section 112(r) (40 CFR 68.130)	Hazardous substance Priority pollutant Toxic pollutant
Safe Drinking Water Act (SDWA)	Contains component(s) regulated under the Safe Drinking Water Act.

US state regulations

US. Massachusetts RTK - Substance List

Trichloroethylene (CAS 79-01-6)

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

Trichloroethylene (CAS 79-01-6)

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

Trichloroethylene (CAS 79-01-6)

US. Rhode Island RTK

Trichloroethylene (CAS 79-01-6)

California Proposition 65



WARNING: This product can expose you to Trichloroethylene, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

California Proposition 65 - CRT: Listed date/Carcinogenic substance

Trichloroethylene (CAS 79-01-6) Listed: April 1, 1988

California Proposition 65 - CRT: Listed date/Developmental toxin

Trichloroethylene (CAS 79-01-6) Listed: Jan 31, 2014

California Proposition 65 - CRT: Listed date/Male reproductive toxin

Trichloroethylene (CAS 79-01-6) Listed: Jan 31, 2014

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

Trichloroethylene (CAS 79-01-6)

International Inventories

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

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

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

Issue date	16-April-2019
Revision date	-
Version #	01
HMIS® ratings	Health: 2* Flammability: 1 Physical hazard: 0

Disclaimer

This product is subject to Greenfield Global USA Inc.’s terms and conditions, which can be found at http://www.greenfield.com/tc-po-us/. Greenfield cannot anticipate all conditions under which this information and this product, or the products of other manufacturers in combination with this product, may be used. The user is responsible for the proper and safe use, handling, storage and disposal of the product, and assumes liability for any loss, injury, damage or expense arising from any failure to do so. The data in this sheet is based on information and experience available at the time of writing.

APPENDIX B
ACTIVITY HAZARD ANALYSES

Project Identification 2840 Atlantic Ave.	Location Various	Estimated Dates TBD
Phase of Work Mobilization/ Demobilization	**Page 1 of 1**	**Analysis Approved by** Paul Boyce, PE, 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 and the electrified third rail (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 2840 Atlantic Ave.	Location Various	Estimated Dates TBD
Phase of Work Excavation	**Page 1 of 2**	**Analysis Approved by** Paul Boyce, PE, PM/HSM
TASKS	**HAZARDS**	**CONTROL MEASURES**
1. Excavate to required depths; soil handing and transport	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 and the electrified third rail (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.

Project Identification 2840 Atlantic Ave.	Location Various	Estimated Dates TBD
Phase of Work Drilling	**Page 2 of 2**	**Analysis Approved by** Paul Boyce, PE, 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 and the electrified third rail (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.
	Track Hazards	• Caution will be used when working in close proximity to the electrified third rail (see “Electrocution” above). • Workers are required to have completed NYCT Track Safety Training • Flag men will be used when necessary (e.g., working in limited access track areas).

Project Identification 2840 Atlantic Ave.	Location Various	Estimated Dates TBD
Phase of Work Soil/Groundwater Sampling	**Page 1 of 1**	**Analysis Approved by** Paul Boyce, PE, PM/HSM
TASKS	**HAZARDS**	**CONTROL MEASURES**
1.Collect soil/groundwater 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 and the electrified third rail (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.
	Track Hazards	• Caution will be used when working in close proximity to the electrified third rail (see "Electrocution" above). • Workers are required to have completed NYCT Track Safety Training • Flag men will be used when necessary (e.g., working in limited access track areas).

Project Identification 2840 Atlantic Ave	Location Various	Estimated Dates TBD
Phase of Work Decontamination	**Page 1 of 1**	**Analysis Approved by** Paul Boyce, PE, 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 and the electrified third rail (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.
	Track Hazards	• Caution will be used when working in close proximity to the electrified third rail (see "Electrocution" above). • Workers are required to have completed NYCT Track Safety Training • Flag men will be used when necessary (e.g., working in limited access track areas).

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.

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 1-2o
- 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 104o or above
- Coma

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 (after thermometer is under tongue for 3 minutes)	Shorten next work period by 33% Prohibit work in impermeable clothing
Body Weight	1. Before workday begins 2. After workday ends		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 98.6oF 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 included below, 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-grey to grey

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°F to 106°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 Temp (°F)	Body Temp (°C)	Symptoms
99-96	37-35.5	Intense uncontrollable shivering
95-91	35.5-32.7	Violent shivering persists. If victim is conscious, has difficulty speaking.
90-86	32.6-30	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	29.9-27.2	Victim becomes irrational, loses contact with his environment, and drifts into a stupor. Muscular rigidity continues. Pulse and respirations are slow and the worker may develop cardiac arrhythmias.
80-78	27.1-25.5	Victim becomes unconscious. He does not respond to the spoken word. Most reflexes cease to function. Heartbeat becomes erratic
Below 78	Below 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
CLIENT DRIVEN SOLUTIONS

COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED AS AN EQUIVALENT TEMPERATURE (UNDER CALM CONDITIONS)

Estimated wind Speed (in mph)	Actual Temperature Reading (^{0}F)P											
	50	40	30	20	10	0	10	20	30	40	50	60
	Equivalent Chill Temperature (^{0}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 should 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. This form is optional, but recommended.

Project Site:			
Name:			
Age:	Height:	Weight:	Blood Type:
Employer:			
Employer Phone #:			
Emergency Contact Name:			
Emergency Contact Phone #:			
Personal Physician Name:			
Personal Physician Phone #:			
Allergies or Sensitivities:			
Previous and/or Chronic Illnesses:			
Medications:			
Medical Restrictions:			

APPENDIX E
GENERAL HEALTH AND SAFETY WORK PRACTICES

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 • SHELTON

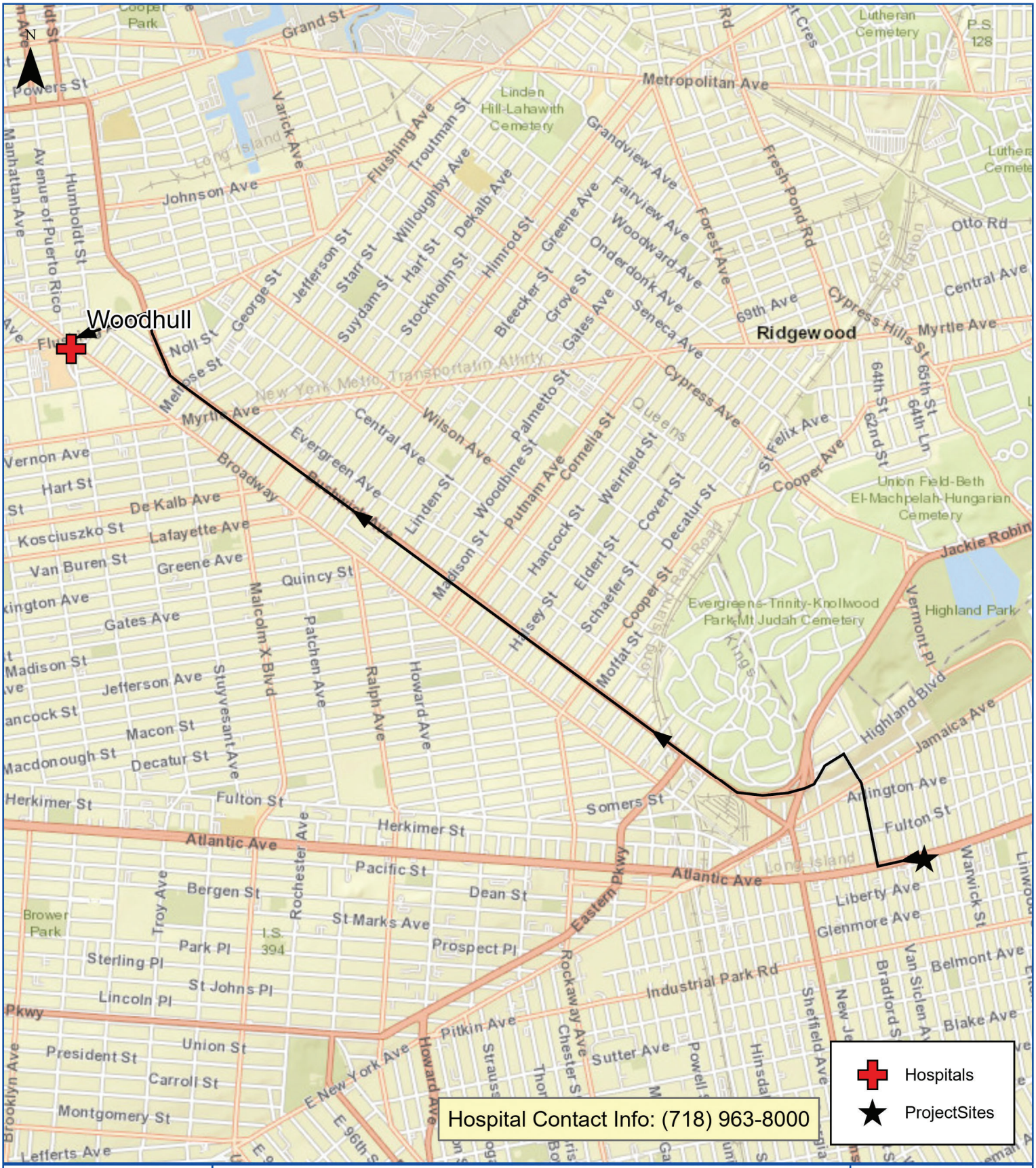
GENERAL HEALTH AND SAFETY WORK PRACTICES

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



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Bohemia, NY 11716
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pwgc.info@pwgrosser.com

HOSPITAL ROUTE

2840 Atlantic Avenue, Brooklyn, NY
to
760 Broadway, Brooklyn, NY

0 0 0 0 0 Miles

Project:	ZDG2101
Date:	9/30/2022
Designed by:	RM
Drawn by:	FT
Approved by:	RM
Figure No:	HASP-1

Document Path: G:\Shared drives\ZDG_GIS\ZDG_GIS.aprx

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:

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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

PWGC
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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 H

SITE MANAGEMENT FORMS

Summary of Green Remediation Metrics for Site Management

Site Name: _____ Site Code: _____
Address: _____ City: _____
State: _____ Zip Code: _____ County: _____

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date: _____

Current Reporting Period
Reporting Period From: _____ To: _____

Contact Information
Preparer's Name: _____ Phone No.: _____
Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		

Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

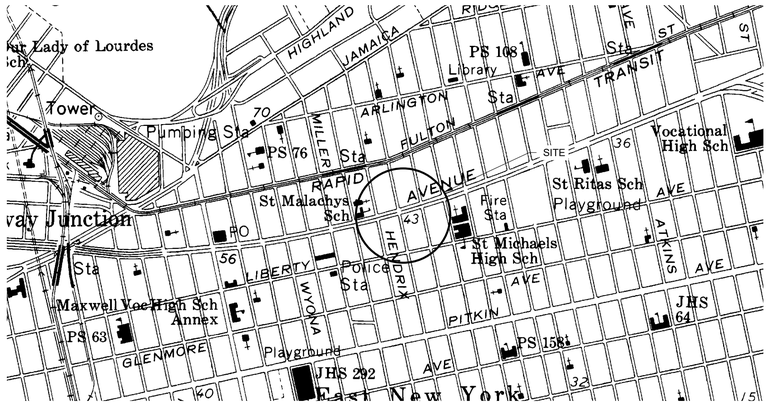
Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

CERTIFICATION BY CONTRACTOR
I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application. _____ **Date** **Contractor**

APPENDIX I

SSDS As- Built and Plans



BASEMAP REFERENCE: NYC GIS

VICINITY MAP

N.T.S.

Scope of Work

INSTALLATION OF PASSIVE SUB-SLAB DEPRESSURIZATION SYSTEM (SSDS) AT 2840 ATLANTIC AVENUE, BROOKLYN NEW YORK AS SHOWN ON THESE PLANS. THE BUILDING IS APPROXIMATELY 19,000 SF.

THE WORK INCLUDES:

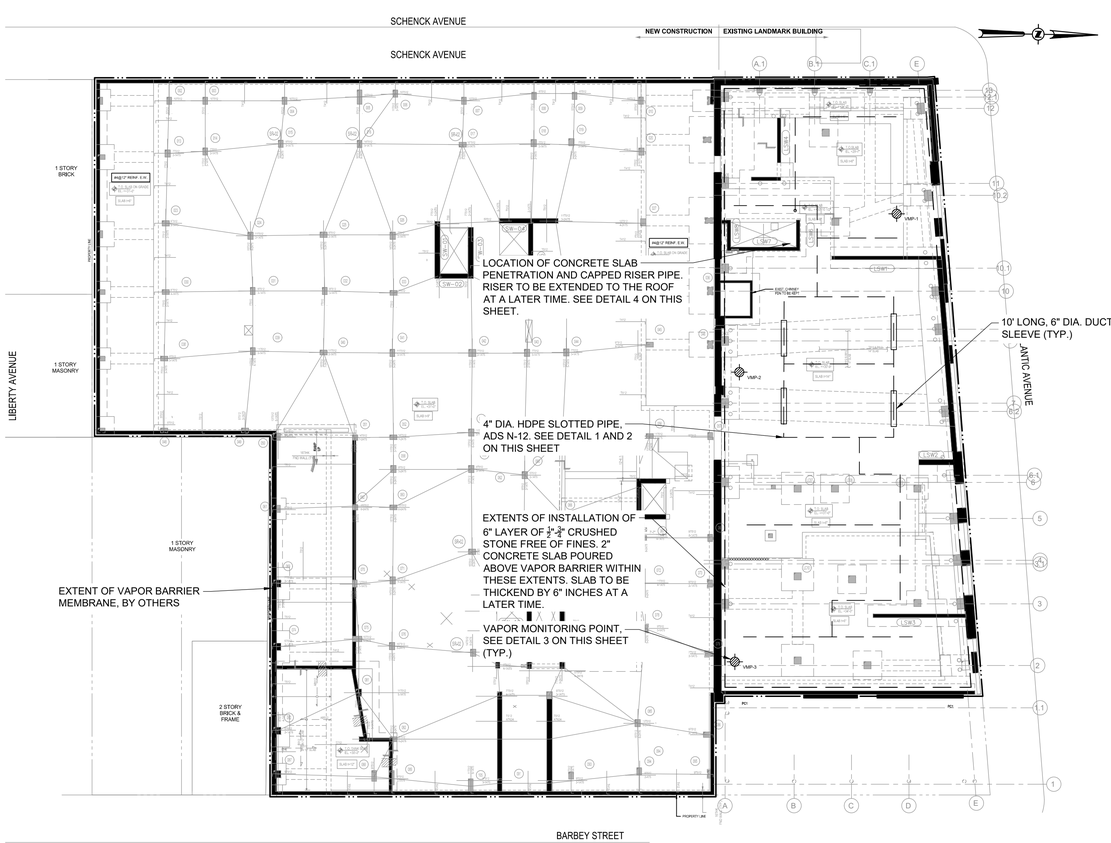
1. INSTALLATION OF PERFORATED PIPING
2. INSTALLATION OF RISER PIPING AND EQUIPMENT
3. INSTALLATION OF VAPOR BARRIER (THE VAPOR BARRIER WAS INSTALLED AS A BEST CONSTRUCTION PRACTICE AND RESILIENCY MEASURE, NOT AN ENGINEERING CONTROL).

Legend

- SLOTTED HDPE PIPING
- VAPOR BARRIER MEMBRANE EXTENTS
- VMP-# — VAPOR MONITORING POINT

General Notes

1. LOCATION OF RISER COORDINATED WITH ARCHITECT.
2. CRUSHED STONE COMPACTED PER GEOTECHNICAL REQUIREMENTS.
3. SSDS TO BE COMPLETED IN 2023.



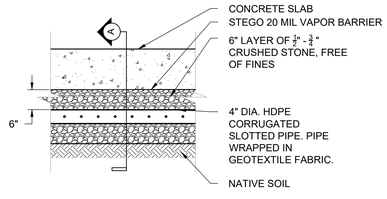
REFERENCE:
1. STRUCTURAL PLANS BY WSP USA DATED 09/24/2020 - CELLAR LEVEL AND FOUNDATION REINF. PLAN - F0-301.00

SUB-SLAB DEPRESSURIZATION SITE PLAN

SCALE: 1" = 20'

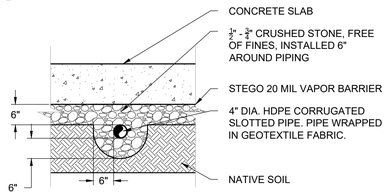
0 20 40

SCALE: 1" = 20'



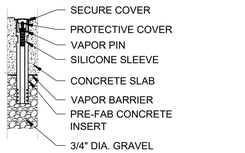
1 — PERFORATED PIPE DETAIL

N.T.S.



2 — PERFORATED PIPE SECTION A

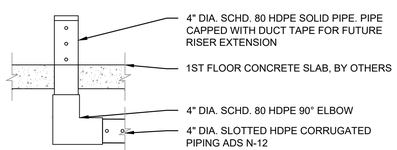
N.T.S.



NOTES:
1. BASIS OF DETAIL
   MAKE: VAPOR PIN ENTERPRISES, INC
   MODEL: VAPOR PIN
2. INSTALL VAPOR VIN PER MANUFACTURER'S INSTRUCTIONS

3 — TYPICAL MONITORING POINT DETAIL

SCALE: NOT TO SCALE



4 — RISER DETAIL

SCALE: NOT TO SCALE

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CONSULTANTS

Number	Revision Description	Revision Date
7		
6		
5		
4		
3		
2		
1		

Designed By	WSH	Date Submitted	
Drawn By	WSH	Date Created	12/20/2022
Approved By	EDO	Scale	AS NOTED

Client:
2840 ATLANTIC HOLDINGS, LLC
777 LAKE ZURICH ROAD, #195
BARRINGTON, ILLINOIS 60010

Project:
PASSIVE SSDS AND VAPOR BARRIER AS-BUILTS

Project Address:
2840 ATLANTIC AVENUE
BROOKLYN, NY 11207

County Tax Map Number: | Contract Number:

Regulatory Reference Number:

Title of Drawing:

SSDS AND VAPOR BARRIER SITE PLAN

Drawing Number:
EN-100

Sheet 1 of 1

PWGC Project Number:
ZDG2101

LICENSED PROFESSIONAL ENGINEER — ERIK JOSEPH DEE-OSEN — STATE OF NEW YORK — 088835-01

Unauthorized alteration or addition to this drawing and related documents is a violation of Section 7209 of the New York State Education Law

PWG FILE NAME: P:\Projects 5-DDG - ZDG Commission\2101 - 2840 Atlantic Ave-ACP-5\SSDS Design\ACAD\2021\10 SSDS\2101_SSDS As-Built.dwg [EN-100]
PLOT DATE/TIME: Dec 20, 2022 2:24pm By: dwerling

APPENDIX J
O&M MANUAL FOR SSDS

2840 ATLANTIC AVENUE
BROOKLYN, NEW YORK 11207
BLOCK 3964, LOT 8
FORMER EMPIRE DAIRY SIRE

VAPOR MITIGATION SYSTEM OPERATION, MAINTENANCE, AND MONITORING PLAN

PREPARED FOR:

Empire State Dairy LLC
3611 14th Avenue
Brooklyn, New York 11218

PREPARED BY:

P.W. Grosser Consulting Engineer & Hydrogeologist, PC.
630 Johnson Avenue, Suite 7
Bohemia, New York 11716
Phone: 631-589-6353

PWGC Project Number: ZDG2101

DECEMBER 2022

OPERATION, MAINTENANCE, AND MONITORING PLAN
2840 ATLANTIC AVENUE,
BROOKLYN, NEW YORK 11207

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2.0 OM&M OF COMPOSITE COVER SYSTEM 4

3.0 OM&M OF SSDS 4

3.1 SSDS Start-up Plan 4

3.1.1 SSDS Start-up Plan Steps 4

3.2 System Components 5

3.3 Routine System OM&M 5

3.4 Non-Routine System OM&M 6

APPENDICES

Appendix A Manufacturer Specifications

Appendix B OM&M Log

Appendix C Groundwater Monitoring Well Sampling Log

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ONE PENN PLAZA, 36TH FLOOR NEW YORK, NY 10119
LONG ISLAND • MANHATTAN • SARATOGA SPRINGS • SYRACUSE • SEATTLE • SHELTON

ACRONYM	DEFINITION
AMEC	AMEC E&E LP
AWQS	Ambient Water Quality Standard
DO	Dissolved Oxygen
O&M	Operation & Maintenance
OM&M	Operation, Maintenance, & Monitoring
ORP	Oxygen Reduction Potential
PE	Professional Engineer
SSDS	Sub-Slab Depressurization System
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
W.C.	Water Column

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1.0 INTRODUCTION

This Operation, Maintenance, and Monitoring (OM&M) Plan provides a description of the measures necessary to operate, monitor, and maintain the vapor intrusion mitigation system for the site.

As part of construction, several protective systems were installed. These include:

1. Composite Cover System
2. Vapor Barrier System
3. Sub-Slab Depressurization System (SSDS) – *Activation may not be necessary*

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2.0 OM&M OF COMPOSITE COVER SYSTEM

This composite cover system is comprised of an impermeable surface across the entire site in the form of a building slab measuring approximately 12 inches in thickness and subgrade foundation walls measuring approximately 8 inches in thickness.

The system will be inspected annually, and its performance certified by a professional engineer (PE). The composite cover system does not require any special operation and maintenance (O&M) activities. If the system is breached during future construction activities, the system will be rebuilt by reconstructing the system according to the original design and tying newly constructed cover layers into existing cover layers to form a continuous layer.

If the composite cover system and underlying residual soil/material must be disturbed, the protocols outlined in the PWGC November 2022 Site Management Plan that OM&M Plan is attached to.

3.0 OM&M OF SSDS

If deemed necessary, a SSDS will be activated beneath landmark building at the site. Sub-slab depressurization is a mitigation technology that creates a negative pressure gradient between the occupied space and the sub-slab allowing for vapors to be drawn through piping and/or a breathable membrane and exhausted to the atmosphere. This mitigates against potential volatile chemicals from moving from the sub-surface into the indoor air of the overlying building.

As per the NYSDEC Decision Document for the site, the SSDS will only be activated if the results of the initial post-remedial soil vapor/indoor air analysis determine that enhanced vapor mitigation measures beyond the vapor barrier are necessary.

3.1 SSDS Start-up Plan

In the event the system needs to be activated, start-up and testing of the SSDS shall be conducted to ensure the system operates effectively for mitigation. System vacuum will be balanced for efficient removal of vapors and vacuum below the building slab. Review of system components post start-up will be conducted including but not limited to;

- Inspection of piping, fittings, & equipment to ensure there are no leaks;
- Measuring of vacuum below the building's slab at designated vacuum monitoring points;
- Collection of indoor air samples;
- Review of equipment to ensure it is operating according to manufacturer's specifications; and
- System alarms are functional.

If for any reason the system is not operating per design, the system will be troubleshot, and deficient items will be corrected.

3.1.1 SSDS Start-up Plan Steps

The following Low Vacuum Alarm Testing is required:

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- Follow all installation instructions as indicated by the manufacturer
- Disconnect pressure tubing from the riser pipe
    - Alarm should trigger on the building management system
- Connect pressure tubing to the riser pipe
    - Alarm should reset on the building management system
- Reconnect tubing, test complete

3.2 System Components

The SSDS system is comprised of the following components within the occupied spaces of the landmark building, if activated:

- Riser Piping – Risers penetrate the concrete building foundation at the connection to the TerraVent and continue vertically through the building to the Fantech® Rn4EC fans on the roof.
- Fantech® Rn4EC – A Fantech® Rn4EC fan is installed on the terminus of each riser on the roof with the exhaust a minimum of 10-feet from fresh air intakes. Vacuum should be within normal operating range, with a minimum vacuum of 0.004" of water column (W.C.).
- Vacuum Gauges – Installed on the riser piping on the first floor of the building, upstream of the Fantech® Rn4EC fans .
- Low Vacuum Alarms – The system is equipped with low vacuum alarms which are connected to the building management system which are triggered when the system's vacuum drops below the normal operating range. Alarms are installed on each riser pipe.
- Vapor Monitoring Points – Monitoring points are installed within the slab to measure and monitor the system's vacuum.

Manufacturer specifications for the mechanical components of the systems are included in **Appendix A**.

3.3 Routine System OM&M

Routine OM&M of the SSDS system, including vapor monitoring points, should be performed on a quarterly basis for the first year of operation, if activation is necessary, and then annually thereafter and will include assessing the system's current condition.

A visual inspection of the complete system will be conducted during each monitoring event. Unscheduled inspections and/or sampling may take place when a suspected failure of the SSDS has been reported or an emergency occurs that is deemed likely to affect the operation of the system. The inspection should include review of system components including piping, concrete slab integrity, radon fans, low vacuum alarms, and vapor monitoring points to ensure components are functioning effectively. If leaks are observed, they should be immediately repaired. Additionally, the location of the exhaust vent should be observed to ensure no air intakes have been located within a 10' radius.

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The system's performance should be monitored to ensure a proper minimum vacuum is observed at monitoring points. Each vacuum monitoring point shall be tested for a minimum vacuum of 0.004" water column (W.C.). If vacuum does not meet the minimum requirement of 0.004" W.C., the system should be adjusted to meet the condition. Vacuum readings should be recorded on the OM&M Logs (**Appendix B**) for each event. If any readings are not within their specified operation range, any equipment is observed to be malfunctioning or the system is not performing within specifications; maintenance and repair is required immediately.

Building owner and tenants shall be informed of the SSDS and provided with this OM&M Plan. Inspection forms are included in **Appendix B**.

3.4 Non-Routine System OM&M

In the event that non-routine maintenance is needed, the following information will be recorded and included in the subsequent status report:

- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Damage;
- Level and duration of reduced effectiveness;
- Other repairs or adjustments made to the system
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents; and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc.

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ONE PENN PLAZA, 36TH FLOOR
NEW YORK, NY 10119
LONG ISLAND • MANHATTAN • SARATOGA SPRINGS • SYRACUSE • SEATTLE • SHELTON

APPENDIX A
MANUFACTURER'S SPECIFICATIONS

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ONE PENN PLAZA, 36TH FLOOR
NEW YORK, NY 10119
LONG ISLAND • MANHATTAN • SARATOGA SPRINGS • SYRACUSE • SEATTLE • SHELTON

Installation and Operation Manual
Manuel d'installation et d'opération

Item #: 142001
Rev Date: 2021-12-09

Rn2EC / Rn4EC

Inline EC Radon Fan • Ventilateur pour radon en ligne EC

PARTS IN THE BOX (Rn2EC)
Inline Radon Fan Rn, 1 pc
Operation and Installation Manual, 1 pc

PARTS IN THE BOX (Rn4EC)
Inline Radon Fan Rn, 1 pc
LDVI™ Couplings, 2 pcs
Operation and Installation Manual, 1 pc

PIÈCES DANS LA BOÎTE (Rn2EC)
Ventilateur pour radon en ligne Rn, 1 pc
Manuel d'installation, 1 pc

PIÈCES DANS LA BOÎTE (Rn4EC)
Ventilateur pour radon en ligne Rn, 1 pc
Couplages LDVI™, 2 pcs
Manuel d'installation, 1 pc



Rn2EC **Rn4EC**

Technical / Customer Support:
Support technique et service à la clientèle
United States 800.747.1762 **Canada** 800.565.3548

fantech®
a systemair company

Note	Warning / Important note Avertissement / Note importante	Information	Technical information Information technique	Practical tip Conseil pratique

DO NOT CONNECT POWER SUPPLY until fan is completely installed.
Make sure electrical service to the fan is in the locked "OFF" position.

1. Fantech recommends installation of this product by a trained, licensed, certified mitigation professional. Incorrect installation will void any and all product warranties or liability. Verification of safe/acceptable radon levels after installation is required.

   Check your local code restrictions for additional safety measures that may be needed for proper code compliant installation.

2. This fan has rotating parts and safety precaution should be exercised during installation, operation and maintenance.

3. WARNING! TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS - OBSERVE THE FOLLOWING:
   a. Use this unit in the manner intended by the manufacturer. If you have any questions, contact your manufacturer's representative or contact us directly.

   b. CAUTION: Before installation, servicing or cleaning unit, switch power off at service panel and lock the service disconnection means to prevent power from being switched on accidentally. When the service disconnection means cannot be locked, securely fasten a prominent warning device, such as tag, to the panel.

   c. Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction.

   d. The combustion airflow needed for safe operation of fuel burning equipment may be affected by this unit's operation. Follow the heating equipment manufacturer's guidelines and safety standards such as those published by the National Fire Protection Association (NFPA), the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) and the local code authorities.

   e. When cutting or drilling into wall and ceiling, do not damage electrical wiring and other hidden utilities.

   f. Ducted fans must always be vented to the outdoors.

4. WARNING! Check voltage at the fan to see if it corresponds to the motor name plate.

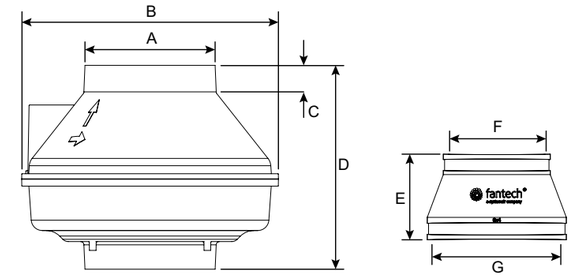
5. For radon mitigation use only. DO NOT use to exhaust hazardous or explosive materials and vapors.

6. Do not use this fan with any solid state speed control device.

GUARDS MUST BE INSTALLED WHEN FAN IS WITHIN REACH OF PERSONNEL OR WITHIN SEVEN (7) FEET OF WORKING LEVEL OR WHEN DEEMED ADVISABLE FOR SAFETY.

The ducting from this fan to the outside of the building has a strong effect on the air flow, noise and energy use of the fan. Use the shortest, straightest duct routing possible for best performance, and avoid installing the fan with smaller ducts than recommended. Insulation around the ducts can reduce energy loss and inhibit mold growth. Fans installed with existing ducts may not achieve their rated air flow.

DIMENSIONS



Model/ Modèle	A	B	C	D	E	F	G
Rn2EC	4 15/32 (114)	10 (254)	1 1/4 (32)	9 1/4 (235)	-	-	-
Rn4EC-3	5 7/8 (149)	11 1/2 (292)	1 1/4 (32)	9 1/4 (235)	4 (102)	3 1/2 (89)	6 (152)
Rn4EC-4	5 7/8 (149)	11 1/2 (292)	1 1/4 (32)	9 1/4 (235)	4 (102)	4 1/2 (114)	6 (152)

Dimensions in inches (mm).
Dimensions en pouces (mm)

INSTALLATION

Rn2EC-3 & Rn4EC-3 are designed for use with 3" schedule 40 PVC pipe.
Rn2EC-4 & Rn4EC-4 are designed for use with 4" schedule 40 PVC pipe.

Prior to installation, the suction pipe should be terminated at the exterior wall. The suction pipe should be installed with slight incline to drain water from the fan.

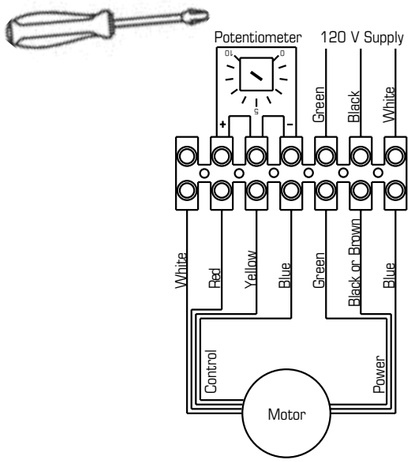
Radon fans are to be installed in the vertical orientation ONLY.



DO NOT connect fan directly to building structure

WIRING DIAGRAM

To reduce fan speed use a small screwdriver and turn potentiometer knob counter clockwise



WARRANTY

Five (5) Year Warranty

This warranty supersedes all prior warranties

DURING ENTIRE WARRANTY PERIOD:
Fantech will repair or replace any part which has a factory defect in workmanship or material. Product may need to be returned to the Fantech factory, together with a copy of the bill of sale and identified with RMA number.

FOR FACTORY RETURN YOU MUST:

- Have a Return Materials Authorization (RMA) number. This may be obtained by calling Fantech either in the USA at 1.800.747.1762 or in CANADA at 1.800.565.3548. Please have bill of sale available.
- The RMA number must be clearly written on the outside of the carton, or the carton will be refused.
- All parts and/or product will be repaired/replaced and shipped back to buyer; no credit will be issued.

OR
The Distributor may place an order for the warranty part and/or product and is invoiced. The Distributor will receive a credit equal to the invoice only after product is returned prepaid and verified to be defective.

FANTECH WARRANTY TERMS DO NOT PROVIDE FOR REPLACEMENT WITHOUT CHARGE PRIOR TO INSPECTION FOR A DEFECT. REPLACEMENTS ISSUED IN ADVANCE OF DEFECT INSPECTION ARE INVOICED, AND CREDIT IS PENDING INSPECTION OF RETURNED MATERIAL. DEFECTIVE MATERIAL RETURNED BY END USERS SHOULD NOT BE REPLACED BY THE DISTRIBUTOR WITHOUT CHARGE TO THE END USER, AS CREDIT TO DISTRIBUTOR'S ACCOUNT WILL BE PENDING INSPECTION AND VERIFICATION OF ACTUAL DEFECT BY FANTECH.

THE FOLLOWING WARRANTIES DO NOT APPLY:

- Damages from shipping, either concealed or visible. Claim must be filed with freight company.
- Damages resulting from improper wiring or installation.
- Damages or failure caused by acts of God, or resulting from improper consumer procedures, such as:
    1. Improper maintenance
    2. Misuse, abuse, abnormal use, or accident, and
    3. Incorrect electrical voltage or current.
- Removal or any alteration made on the Fantech label control number or date of manufacture.
- Any other warranty, expressed, implied or written, and to any consequential or incidental damages, loss or property, revenues, or profit, or costs of removal, installation or reinstallation, for any breach of warranty.

WARRANTY VALIDATION

- The user must keep a copy of the bill of sale to verify purchase date.
- These warranties give you specific legal rights, and are subject to an applicable consumer protection legislation. You may have additional rights which vary from state to state.

Limitation of Warranty and Liability

This warranty does not apply to any Fantech product or part which has failed as a result of faulty installation or abuse, incorrect electrical connections or alterations made by others, or use under abnormal operating conditions or misapplication of the product or parts. We will not approve for payment any repair not made by us or our authorized agent without prior written consent. The foregoing shall constitute our sole and exclusive warranty and our sole exclusive liability, and is in lieu of any other warranties, whether written, oral, implied or statutory. There are no warranties which extend beyond the description on the page hereof. In no event, whether as a result of breach of contract, or warranty or alleged negligence, defect incorrect advice or other causes, shall Fantech be liable for special or consequential damages, including, but not limited to, loss of profits or revenue, loss of use of equipment or any other associated equipment, cost of capital, cost of substitute equipment, facilities or services, downtime costs, or claims of customers of purchase for such damages. Fantech neither assumes or authorizes any person to assume for it any other liability in connection with the sale of product(s) or part(s). Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages so the above limitations and exclusions may not apply to you.

Warning

Fantech products are designed and manufactured to provide reliable performance, but they are not guaranteed to be 100% free from defects. Even reliable products will experience occasional failures and this possibility should be recognized by the user. If these products are used in a life support ventilation system where failure could result in loss or injury, the user should provide adequate backup ventilation, supplementary natural ventilation, failure alarm system, or acknowledge willingness to accept the risk of such loss or injury.

Note	Avertissement / Note imortante	Information	Information technique	Conseil pratique

NE PAS BRANCHER À L'ALIMENTATION ÉLECTRIQUE avant l'installation complète du ventilateur.
Assurez-vous que l'alimentation électrique du ventilateur est en position hors tension verrouillée (OFF).

1. Fantech recommande l'installation de ce produit par un professionnel de l'atténuation formé, agréé et certifié. Une installation incorrecte entraînera l'annulation de toutes les garanties ou responsabilités du produit. La vérification des niveaux de radon sécuritaires / acceptables après l'installation est requise.

   Vérifiez les restrictions de votre code local pour les mesures de sécurité supplémentaires qui peuvent être nécessaires pour une installation conforme au code approprié.
2. Ce ventilateur comporte des pièces rotatives; il est essentiel de faire preuve de prudence pendant l'installation, le fonctionnement et l'entretien.
3. AVERTISSEMENT! POUR RÉDUIRE LE RISQUE D'INCENDIE, D'ÉLECTROCUTION OU DE BLESSURES, VEUILLEZ RESPECTER LES RÈGLES SUIVANTES :
   a. Utilisez cet appareil de la manière prévue par le fabricant. Si vous avez des questions, communiquez avec le représentant du fabricant ou directement avec nous.
   b. MISE EN GARDE : Avant d'installer, de réparer ou de nettoyer l'appareil, coupez l'alimentation électrique au panneau de service et bloquez les dispositifs de sectionnement pour éviter que l'alimentation ne soit rétablie par accident. Si les dispositifs de sectionnement ne peuvent pas être bloqués, apposez une note d'avertissement bien visible, comme une étiquette, sur le panneau de service.
   c. Tous les travaux relatifs à l'installation et aux fils électriques devraient être effectués par un technicien qualifié, conformément aux normes et aux règlements en vigueur, y compris les travaux de construction classés résistants au feu.
   d. Le fonctionnement de cet appareil pourrait modifier la circulation d'air de combustion nécessaire au fonctionnement sécuritaire des appareils de combustion. Suivez les consignes du fabricant pour les appareils de chauffage et respectez les normes de sécurité comme celles établies par la National Fire Protection Association (NFPA), la American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) ainsi que les codes des autorités locales.
   e. Lorsque vous coupez ou percez un mur ou un plafond pour l'installation de l'appareil, assurez-vous de ne pas endommager le câblage électrique et les autres services publics cachés.
   f. Les conduits d'air des ventilateurs doivent toujours être éventés à l'extérieur.
4. AVERTISSEMENT! Vérifiez la tension du ventilateur pour confirmer qu'elle correspond à celle inscrite sur la plaque signalétique du moteur.
5. Uniquement pour la mise en oeuvre de mesures d'atténuation du radon. NE PAS utiliser pour évacuer des vapeurs ou des substances dangereuses ou explosives.
6. Ne pas utiliser cet appareil avec une commande de vitesse à semiconducteurs.

DES DISPOSITIFS PROTECTEURS DOIVENT ÊTRE INSTALLÉS SI LE VENTILATEUR SE TROUVE À PORTÉE DE MEMBRES DU PERSONNEL OU À SEPT (7) PIEDS OU MOINS DU NIVEAU DE FONCTIONNEMENT OU LORSQU'ILS SONT JUGÉS NÉCESSAIRES POUR DES RAISONS DE SÉCURITÉ

Le conduit de raccordement de ce ventilateur avec l'extérieur de l'immeuble a un effet important sur le débit d'air, le bruit et la consommation d'énergie du ventilateur. Veuillez utiliser le conduit le plus court et le plus droit possible pour obtenir un rendement optimal, et évitez d'installer des conduits plus petits que ceux recommandés pour le ventilateur. L'isolation autour des conduits peut réduire les pertes d'énergie et empêcher la moisissure. Les ventilateurs installés avec des conduits existants pourraient ne pas offrir le débit d'air nominal.

INSTALLATION

Le modèle Rn2EC-3 & Rn4EC-3 est conçu pour un usage avec des conduits de PVC de série 40 de 3 po.
Le modèle Rn2EC-4 & Rn4EC-4 est conçu pour un usage avec des conduits de PVC de série 40 de 4 po.

Avant l'installation, il faut prévoir une sortie pour le tuyau d'aspiration sur un mur extérieur. Le tuyau d'aspiration devrait être installé avec une pente légère pour drainer l'eau du ventilateur.

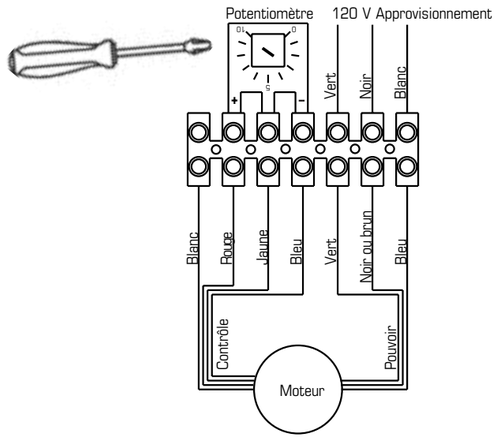
! Les ventilateurs à radon doivent être installés dans le sens vertical SEULEMENT.



! NE PAS attacher le ventilateur directement dans la structure du bâtiment.

SCHÉMA ÉLECTRIQUE

Pour réduire la vitesse du ventilateur, utilisez un petit tournevis et tournez le bouton du potentiomètre dans le sens inverse des aiguilles d'une montre.



GARANTIE

Garantie de 5 ans

Cette garantie remplace toutes les garanties précédentes.

DURANT TOUTE LA PÉRIODE DE GARANTIE:
Fantech s'engage à réparer ou à remplacer toute pièce présentant un défaut d'usine en matière de qualité d'exécution ou de matériau. Il sera peut être nécessaire de retourner le produit à l'usine Fantech, accompagné d'une copie du contrat de vente et du numéro d'autorisation de retour.

POUR RETOURNER UN PRODUIT À L'USINE, VOUS DEVEZ:
- Obtenir un numéro d'autorisation de retour; pour ce faire, communiquer avec Fantech aux États-Unis au numéro 1.800.747.1762, ou au Canada, au numéro 1.800.565.3548. Veuillez avoir votre contrat de vente à portée de la main.
- S'assurer que le numéro d'autorisation de retour est lisible sur l'extérieur de la boîte, sinon la boîte sera refusée.
- Toutes les pièces et/ou le produit seront réparés ou remplacés puis retournés à l'acheteur. Aucun crédit ne sera accordé.

OU
Le Distributeur peut commander une pièce ou un produit couvert par la garantie; la facture lui sera envoyée. Le distributeur ne sera crédité du montant de sa facture qu'après que le produit a été retourné port payé et qu'il a été trouvé défectueux.

LES TERMES DE LA GARANTIE DE Fantech NE PRÉVOIENT PAS DE REMPLACEMENT SANS FRAIS AVANT QUE LA PIÈCE OU LE PRODUIT DÉFECTUEUX AIT ÉTÉ INSPECTÉ. LES PRODUITS OU PIÈCES REMPLACÉS AVANT L'INSPECTION DE LA DÉFECTUOSITÉ SERONT FACTURÉS ET LE MONTANT DU CRÉDIT EST FONCTION DE L'INSPECTION DE LA PIÈCE OU DU PRODUIT RETOURNÉ. LE DISTRIBUTEUR NE DOIT PAS REMPLACER SANS FRAIS POUR L'UTILISATEUR FINAL L'ÉQUIPEMENT DÉFECTUEUX RETOURNÉ PAR L'UTILISATEUR FINAL, CAR LE COMPTE DU DISTRIBUTEUR NE SERA CRÉDITÉ QU'APRÈS L'INSPECTION ET LA VÉRIFICATION PAR FANTECH DE LA DÉFECTUOSITÉ.

LES GARANTIES NE S'APPLIQUENT PAS DANS LES CAS SUIVANTS:
- Dommages dus au transport (dissimulés ou visibles). Les réclamations doivent être faites à la compagnie de fret.
- Dommages dus au mauvais câblage ou à l'installation inappropriée.
- Dommages ou défectuosité causés par une calamité naturelle ou résultant d'une procédure irrégulière de l'acheteur, notamment :
  1. Entretien irrégulier
  2. Mauvais usage, usage abusif, usage anormal ou accident
  3. Tension ou courant électrique incorrect
- Enlèvement ou toute modification du numéro de contrôle ou de la date de fabrication de l'étiquette Fantech
- Toute autre garantie expresse, écrite ou implicite, pour les dommages accidentels ou indirects, perte de biens, de recettes, manque à gagner ou coûts relatifs à la dépose, à l'installation ou à la réinstallation, en cas de violation de garantie.

CERTIFICATION DE LA GARANTIE:
- L'utilisateur doit conserver une copie du contrat de vente pour confirmer la date d'achat.
- Les présentes garanties vous donnent des droits spécifiques reconnus par la loi et sont régies par les lois sur la protection du consommateur appropriées. Il est possible que différents états offrent d'autres droits.

Limites de garanties et de responsabilités

Cette garantie ne s'applique à aucun produit de Fantech ou à aucune pièce détachée dont la défectuosité relève d'une erreur d'installation ou d'abus ou de mauvaise installation électrique ou dut à des modifications extérieures ou utilisées dans des conditions anormales ou encore une mauvaise installation du produit ou des pièces détachées. Nous n'approuverons aucun remboursement pour des réparations qui ne sont pas effectuées par un agent américain ou un agent autorisé sans un accord écrit. Ce dernier constituera notre seule et exclusive garantie et notre seule exclusive responsabilité et tient lieu de toute autre garantie ou bien écrite ou orale implicite ou statuaire. Aucune garantie ne s'appliquera au-delà des descriptions faites de la page ci-dessus. En aucun cas, que ce soit pour une rupture de contrat ou de garanties ou des dommages dut à la négligence ou a des conseils incorrects ou autres causes, Fantech ne pourra être tenu pour responsable des dommages particuliers ou consécutifs, incluant mais pas limités aux pertes et profits ou bénéfices perte de matériel ou autres matériels associés. Coût du capital, coût des équipements de remplacement, matériels ou services, coût de temps d'arrêt ou les réclamations des clients pour de tels dommages. Fantech ne délègue ou autorise aucune personne d'assumer sa responsabilité sur la vente du produit ou des pièces détachées. Certaines juridictions ne permettent pas l'exclusion de la limitation des dommages accidentels ou consécutifs ainsi ces limitations ci-dessus et les exclusions ne s'appliquent pas à vous.

Avertissement

Les produits de Fantech sont conçus et fabriqués pour produire des performances fiables, mais il n'y a aucune garantie qu'ils soient 100% sans défaut. Les plus produits les plus fiables ont occasionnellement des défectuosités et cette possibilité devraient être reconnu par les usagers. Si ces produits sont utilisés comme une source de ventilation ou leur panne risque de mettre en danger des vies humaines ou entraîner des blessures, les usagers devront avoir une source de ventilation de secours en addition à une ventilation naturelle, le défaut de système d'alarme ou la connaissance de ces conditions entraînent sa responsabilité envers de telles pertes ou blessures.

Fantech reserves the right to make technical changes.
For updated documentation please refer to www.fantech.net

Fantech se réserve le droit de faire des changements techniques. Pour de la documentation à jour, s'il vous plaît se référer au www.fantech.net

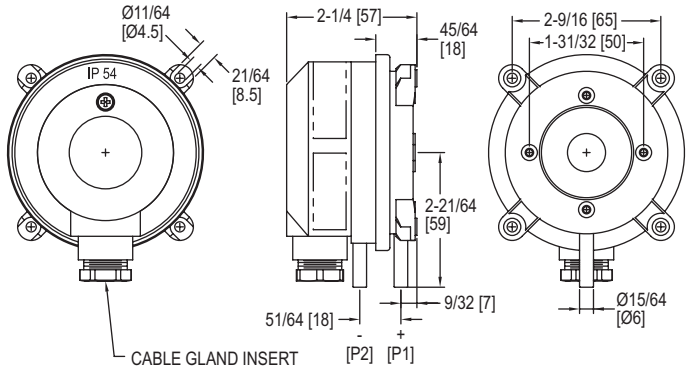
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Series ADPS Differential Pressure Switch

Specifications - Installation and Operating Instructions





The **Series ADPS Adjustable Differential Pressure Switch** is designed for overpressure, vacuum, and differential pressure applications. The scaled adjustment knob allows changes to the switching pressure to be made without a pressure gage. The ADPS is available with settings from 0.08 in w.c. (20 Pa) to 20 in w.c. (5000 Pa). The silicone diaphragm and PA 6.6 body make the Series ADPS perfect for use with air and other noncombustible gases. The Series ADPS can be used in monitoring air filters, ventilators, and industrial cooling-air circuits along with controlling air and fire-protection flaps and many other applications.

Use only with mediums such as air, or other noncombustible or non-aggressive gases. Otherwise operating faults or accidents may occur.

Mounting Switch

First check the pressure switch to ascertain whether any damage is visible on the housing. If the housing is leaky because of damage, the pressure switch must not be used.

Switching pressure specifications apply to vertical installation which is also the recommended position with pressure connections pointing downwards.

Only if there is no potential for condensate forming can you mount the pressure switch horizontally. In this case, however, the switching values are approximately 0.08 in w.c. (20 Pa) higher as indicated on the scale. In the horizontal position, the pressure switch should be mounted 'lying down' only (that is to say with the electrical connections pointing upwards). Do not mount the pressure switch in a hanging position (that is to say, not 'overhead' with the electrical connections pointing downwards). Otherwise the device will function inaccurately.

a) Mounting with screws or brackets
   1. To mount the pressure switch, L-shaped A-288 and S-shaped A-289 mounting brackets can be ordered separately. To secure the device on the rear side of the housing, only use the sheet metal screws (3.5 x 8 mm) which are supplied together with the mounting brackets. Under no circumstances must you use longer screws. Otherwise, the base of the housing could be punctured resulting in the pressure switch leaking.
   2. You can also mount the pressure switch directly on a wall. To do this use screws with a maximum diameter of 0.315″ (8.0 mm), if you use the outer mounting lugs to screw the device in place. Do not tighten the screws so much that the base of the device is deformed. Otherwise, the pressure switch can be shifted out of position, or leak.

SPECIFICATIONS

Service: Air and noncombustible, compatible gases.
Wetted Materials: Diaphragm material: Silicone; Housing material and switch body: POM and PA 6.6; Cover: Polystyrene.
Temperature Limits: Process and ambient temperature: -4 to 185°F (-20 to 85°C); Storage: -40 to 185°F (-40 to 85°C).
Pressure Limits: Max operating pressure: 40 in w.c. (10 kPa) for all pressure ranges.
Switch Type: Single-pole double-throw (SPDT).
Repeatability: ±15% FS.
Electrical Rating: Standard: Max, 1.5A/250 VAC, max switching rate: 6 cycles/min; Gold contact option: 0.1 A/ 24 VDC.
Electrical Connections: Push-on screw terminals. M20x1.5 with cable strain relief or optional 1/2″ NPT connection.
Process Connections: 5/16″ (7.94 mm) outside diameter tubing, 1/4″ (6.0 mm) inside diameter tubing.
Mounting Orientation: Vertically, with pressure connections pointing downwards.
Mechanical Working Life: Over 10^6 switching operations.
Weight: 4.4 oz (125 g).
Enclosure Rating: IP54.
Agency Approvals: CE, RoHS.

Installing Hoses

Important: Pressure tubing cannot be kinked. Pay particular attention to this point if you run hoses over an edge. It is better to form a loop. If the hoses are kinked, the device cannot function accurately.

a) For connection to the pressure switch two fittings inherent in the housing are provided for hoses with an internal diameter of 1/4″ (6.0 mm).
   1. Connect a hose with the higher pressure to socket P1 which is located on the lower section of the housing.
   2. Connect a hose with the lower pressure to socket P2 which is located on the middle section of the housing.

After you have installed the hoses, it is absolutely essential to check them for tightness of fit at the connection points and to make sure that they run without any kinks.

DWYER INSTRUMENTS, INC.
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46360, U.S.A.
Phone: 219-879-8000 www.dwyer-inst.com
Fax: 219-872-9057 e-mail: info@dwyermail.com

Electrical Connection

Work on electrical installations must only be carried out by electricians who are specifically trained for this purpose.

⚠ CAUTION First make sure that there is no voltage on the connecting cable while you are working on the electrical connections. Otherwise, a possible electric shock may result and the connected equipment may be damaged. The connecting cable can be run to the pressure switch from three sides, according to choice. The screw cable connection has a plug-in design for this purpose. Rotate protective cover accordingly.

For cable gland models, the seal in the screw cable connection is designed for cables with alternative sheath diameters of 0.275″ (7 mm) or 0.393″ (10 mm). Only use these sizes – otherwise the screw cable connection cannot seal adequately.

1. If using a 0.275″ (7 mm) connecting cable, you can line up the press nut, the plain washer and the sealing ring directly on the cable.
2. If using a 0.393″ (10 mm) connecting cable, you must first break the inner rubber ring out of the sealing ring directly on the cable. Then line up the press nut, the plain washer and the sealing ring on the cable.

Wiring

The switching device in this pressure switch is designed as a change-over contact as can be seen from the wiring diagram (Figure 1). The rest position is shown in Figure 1 (pressure below the activation switch point on dial).

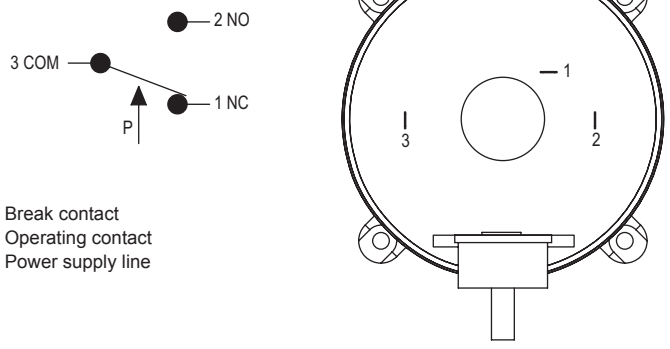
1. In the instance where pole 3 (COM) closes to Pole 2, the pressure is increasing (NO).
2. In the instance where pole 3 (COM) closes to Pole 1, the pressure is decreasing (NC).

Protect the feed line (to pole 3) by fuse, either in control system or along the line, and do so with:

1. Max 1.5 A / 250 VAC, if you are loading the contact with an resistive load.
2. Max 0.4 A / 250 VAC, if you are loading the contact with an inductive load (such as relay).
3. Max 0.1 A / 24 VDC, if you are using the pressure switch in the weak current version with gold-plated contacts.

The connections are intended for crimp-type sockets, 0.25 in (6.3 mm).

1. Make sure the crimp connection is perfect, and that the cable lugs fit properly on to the connections.
2. If you do not have any crimp-type sockets available, you can also use the cable lugs which are supplied with mounted screw terminals. However, these are only intended for rigid copper wire.
3. On flex, it is either necessary to crimp on strand end sleeves – and then you can also screw the strands on – or to crimp cable lugs on directly as previously described.



1. Break contact
2. Operating contact
3. Power supply line

Figure 1

Setting the Pressure Range

Make absolutely certain that there is no voltage on the electrical connections before you carry out any setting on the pressure switch. Otherwise, it could be fatal if you accidentally touch the electrical connections or the metal adjusting screw while you are performing the settings.

a) Use the adjustment dial to set the pressure which should trip the switch on an increase of pressure.
   1. The indications on the dial are only correct for the vertical mounting position.
   2. When the pressure falls, the switch returns to its resting position as soon as the pressure falls below the dead band.

Attaching Cover

a) Insert the screw cable connection into the recess provided for this purpose on the housing.
b) Then place the housing cover in position and screw it down evenly on to the pressure switch.

Testing the Setting

Do not operate the system until the housing is closed. Otherwise there is the possibility of an electric shock if you accidentally touch live parts.

Check the trip and reset pressures by slowly increasing the pressure and then allowing it to fall again.

Important: Observe the maximum permissible operating pressure of 40 in w.c. (10 kPa) which is indicated in the data sheet. Otherwise the pressure switch may be damaged.

MAINTENANCE

Upon final installation of the Series ADPS Adjustable Differential Pressure Switch, no routine maintenance is required. A periodic check of system operation is recommended. The Series ADPS is not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact customer service to receive a return goods authorization number before shipping.

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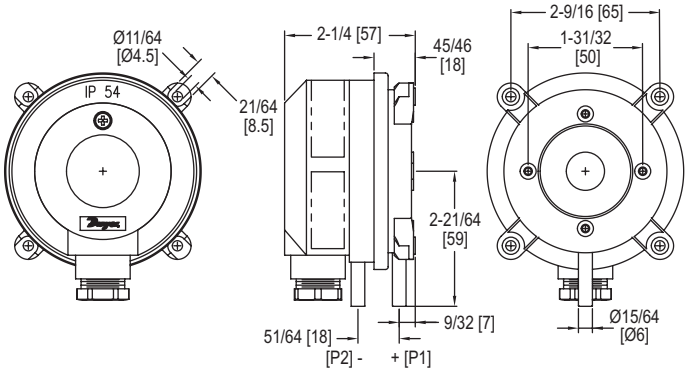
FR# 443602-00 Rev. 3

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Series EDPS Adjustable Differential Pressure Switch

Specifications - Installation and Operating Instructions





The **Series EDPS Adjustable Differential Pressure Switch** is designed for overpressure, vacuum, and differential pressure applications. The scaled adjustment knob allows changes to the switching pressure to be made without a pressure gage. The EDPS is available with settings from 0.08 in w.c. (20 Pa) to 16 in w.c. (4000 Pa). The silicone diaphragm and PA 6.6 body make the Series EDPS perfect for use with air and other noncombustible gases. The Series EDPS can be used in monitoring air filters, ventilators, and industrial cooling-air circuits along with controlling air and fire-protection flaps and many other applications.

Adjustable differential pressure switches are for monitoring overpressure, vacuum and differential pressure of air or other noncombustible, non-aggressive gases. Possible fields of application include:

- Monitoring air filters and ventilators
- Overheating protection for fan heaters
- Controlling air and fire-protection dampers
- Monitoring industrial cooling air circuits
- Monitoring flows in ventilation ducts
- Frost protection for heat exchange

Use only with mediums such as air, or other noncombustible or non-aggressive gases. Otherwise operating faults or accidents may occur.

Mounting

First check the pressure switch to ascertain whether any damage is visible on the housing. If the housing is leaky because of damage, the pressure switch must not be used.

Switching pressure specifications apply to vertical installation which is also the recommended position with pressure connections pointing downwards. If the switches are installed horizontally with AMP connection terminals, the switching values are approximately 0.08 in w.c. (20 Pa) higher.

a) Mounting Position

1. You should mount the pressure switch vertically, with pressure connections pointing downwards. Only then is it possible to drain any condensation moisture, which might occur.

Only if there is no potential for condensate forming can you mount the pressure switch horizontally. In this case, however, the switching values are approximately 0.08 in w.c. (20 Pa) higher as indicated on the scale. In the horizontal position, the pressure switch should be mounted 'lying down' only, that is to say with the electrical connections pointing upwards. Do not mount the pressure switch in a hanging position (that is to say, not 'overhead' with the electrical connections pointing downwards). Otherwise the device will function inaccurately.

SPECIFICATIONS

Service: Air and noncombustible, compatible gases.
Materials: Diaphragm material: Silicone; Housing material: Switch body: PA 6.6, Cover: Polystyrene. Materials UL94 V-0 rated.
Temperature Limits: Process and ambient temperature: -4 to 140°F (-20 to 60°C); Storage: -40 to 185°F (-40 to 85°C).
Pressure Limits: Max operating pressure: 40 in w.c. (10 kPa) for all pressure ranges.
Switch Type: Single-pole double-throw (SPDT).
Electrical Rating: Max 1.0 A/250 VAC, 50-60 Hz, max switching rate: 6 cycles/min
Electrical Connections: Push-on screw terminals. 1/2″ NPT connection. M20x1.5 with cable strain relief optional.
Process Connections: 5/16″ (7.94 mm) outside diameter tubing, 1/4″ (6.0 mm) inside diameter tubing.
Mounting Orientation: Vertically, with pressure connections pointing downwards.
Mechanical Working Life: Over 10^6 switching operations.
Weight: 4.4 oz (125 g).
Enclosure Rating: NEMA 3, IP54.
Agency Approvals: CE; ETL approved to UL508 and CSA C22.2#14.

b) Mounting with Screws or Brackets

1. To mount the pressure switch, L-shaped A-288 and S-shaped A-289 mounting brackets can be ordered separately. To secure the device on the rear side of the housing, only use the sheet metal screws (3.5 x 8 mm) which are supplied together with the mounting brackets. Under no circumstances must you use longer screws. Otherwise, the base of the housing could be punctured resulting in the pressure switch leaking.
2. Alternately you can also use the snap-on brackets - to remove it pull upwards.
3. You can also mount the pressure switch directly on a wall. To do this use screws with a maximum diameter of 0.315″ (8.0 mm), if you use the outer mounting lugs to screw the device in place. Do not tighten the screws so much that the base of the device is deformed. Otherwise, the pressure switch can be shifted out of position, or leak.

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Installing Hoses
Important: Pressure tubing cannot be kinked. Pay particular attention to this point if you run hoses over an edge. It is better to form a loop. If the hoses are kinked, the device cannot function accurately.

a) For connection to the pressure switch two fittings inherent in the housing are provided for hoses with an internal diameter of 1/4″ (6.0 mm).
   1. Connect a hose with the higher pressure to socket P1 which is located on the lower section of the housing.
   2. Connect a hose with the lower pressure to socket P2 which is located on the middle section of the housing.

After you have installed the hoses, it is absolutely essential to check them for tightness of fit at the connection points, and to make sure that they run without any kinks.

Electrical Connection
Work on electrical installations must only be carried out by electricians who are specifically trained for this purpose.

CAUTION: First make sure that there is no voltage on the connecting cable while you are working on the electrical connections. Otherwise, a possible fatal electric shock may result and the connected equipment may be damaged.

a) The connecting cable can be run to the pressure switch from three sides, according to choice. The screw cable connection has a plug-in design for this purpose.

The seal in the screw cable connection is designed for cables with alternative sheath diameters of 0.275″ (7 mm) or 0.393″ (10 mm). Only use these sizes – otherwise the screw cable connection cannot seal adequately.

   1. If using a 0.275″ (7 mm) connecting cable, you can line up the press nut, the plain washer and the sealing ring directly on the cable.
   2. If using a 0.393″ (10 mm) connecting cable, you must first break the inner rubber ring out of the sealing ring directly on the cable. Then line up the press nut, the plain washer and the sealing ring on the cable.

b) The switching device in this pressure switch is designed as a change-over contact, as can be seen from the wiring diagram. The rest position is shown in the drawing (pressure below the upper switching point).
   1. In the instance where pole 3 (COM) closes to Pole 2, the pressure is increasing (NO);
   2. In the instance where pole 3 (COM) closes to Pole 1, the pressure is decreasing (NC).

c) Protect the feed line (to pole 3) by a time-lag fuse, either in control system or along the line, and do so with:
   1. Max.1.0 A/250 VAC, 50-60 Hz, if you are loading the contact with a resistive load;
   2. Max 0.4 A/250 VAC, 50-60 Hz, if you are loading the contact with an inductive load (such as relay);

d) The connections are intended for crimp-type sockets, 0.25″ (6.3 mm).
   1. Make sure the crimp connection is perfect, and that the cable lugs fit properly on to the connections.
   2. If you do not have any crimp-type sockets available, you can also use the cable lugs which are supplied with mounted screw terminals. However, these are only intended for rigid copper wire.
   3. On flex, it is either necessary to crimp on strand end sleeves – and then you can also screw the strands on – or to crimp cable lugs on directly, as previously described.

Setting the Pressure Range
Make absolutely certain that there is no voltage on the electrical connections before you carry out any setting on the pressure switch. Otherwise, it could be fatal if you accidentally touch the electrical connections or the metal adjusting screw while you are performing the settings.

a) Use the setting screw to set the pressure which should trip the switch on increase of pressure.
   1. The indications on the setting screw is only correct for the vertical mounting position.
   2. When the pressure falls, the switch returns into its resting position as soon as the pressure falls below the dead band.

Closing the Switch

a) Insert the screw cable connection into the recess provided for this purpose on the housing.
b) Then place the housing cover in position, and screw it down evenly on to the pressure switch.

Testing the Setting
Do not operate the system until the housing is closed. Otherwise there is the possibility of a fatal electric shock if you accidentally touch live parts. Check the trip and reset pressures, by slowly increasing the pressure and then allowing it to fall again.

Important: Observe the maximum permissible operating pressure of 40 in w.c. (10 kPa) which is indicated in the data sheet. Otherwise the pressure switch may be damaged.

MAINTENANCE
Upon final installation of the Series EDPS Adjustable Differential Pressure Switch, no routine maintenance is required. A periodic check of system calibration is recommended. The Series EDPS is not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact customer service to receive a return goods authorization number before shipping.

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APPENDIX B
OM&M LOGS

P.W. GROSSER CONSULTING, INC.
P.W. GROSSER CONSULTING ENGINEER & HYDROGEOLOGIST, P.C.
PHONE: 212.786.7420
PWGROSSER.COM
ONE PENN PLAZA, 36TH FLOOR
NEW YORK, NY 10119
LONG ISLAND • MANHATTAN • SARATOGA SPRINGS • SYRACUSE • SEATTLE • SHELTON

Inspector's Name: _____ Inspection Time: _____

Inspection Date: _____ Weather Conditions: _____

YES	NO	
☐	☐	Are any Low Vacuum Alarms on? Check BMS status of alarm.
☐	☐	Are the Low Vacuum Alarms functioning? Check BMS status of alarm through testing.
☐	☐	Are the vacuum monitoring points accessible?
☐	☐	Are the vacuum monitoring points properly secured?
☐	☐	Are there any cracks, gaps, holes, penetrations, etc. observed in the building slab/vapor barrier?
☐	☐	Any visual damage to piping?
☐	☐	Are Fantech® Rn4EC Fans on?
☐	☐	Are sample ports/vacuum gauges in good condition?

Vacuum Monitoring Points

Monitoring Point ID	Vacuum (" WC)	PID (ppm)	Notes
VMP-1			
VMP-2			
VMP-3			

Comments: _____

_____

Maintenance Items: _____

P.W. Grosser Consulting, Inc. • P.W. Grosser Consulting Engineer & Hydrogeologist, PC
630 Johnson Ave., Suite 7 • Bohemia, NY 11716
PH 631.589.6353 • FX 631.589.8705 • www.pwgrosser.com
New York, NY • Syracuse, NY • Shelton, CT

APPENDIX K
SPILL BUSTER PRODUCT AND OPERATION DETAILS

System Specifications

Magnum Spill Buster

System Specifications

Complete Magnum Spill Buster™ System includes: Magnum Spill Buster™ Control Box, Magnum Spill Buster™ Probe with 50’ down well cable, Auto Seeker with 30’ cable, and Product Tank Shutoff Probe with 30’ cable, and 50 ft. Nylon Product Discharge Tubing.

Input Power: 115vac or 230vac, 100 watts max. or 24vdc, 75 watts max. with optional battery cable and deep discharge batteries. A 5 amp AC circuit breaker is built into the System Power switch.

Operating Temperature Range:

Ambient air temperature of -40F to +140F (-40C to 60C).

Pumping Rate:

Up to 46 gal/hr (175 liter/hr) @ 0 psi (zero depth & no discharge back pressure), or up to 37 gal/hr (140 liter/hr) @ 25 psi discharge back pressure.

Product Viscosity:

Products with viscosity of less than 10 Cp at 70 degrees F. Examples: gasoline, diesel fuel, #2 heating oil, JP-4, JP-5, paint thinners.

Well Diameter:

2 inch minimum for product recovery only.

Standard Well Depth:

50 ft.(15.2m.) max

Maximum Well Depth:

150 ft (45.7 m) on special order with 150 ft (45.7m) down-well cable.

Probe

The Probe is certified compliant with NEC2011 specifications for use in Class 1, Div 1 locations. DC power for the pump is supplied using a conductor pair that has an over woven metal shield along with a Tefzel overcoat. The signal wires also have a separate over woven metal shield. The two cable bundles, along with the discharge tubing, are contained in a tough woven plastic protective scuff jacket.

Probe Dimensions:

1.93” (4.9cm) dia. x 15.25” (38.7cm) long [cable size including the discharge tube is 5/8” thickness x 1 1/2’ width]. Standard Probe cable length is 50 ft. (15.2m)

Control Box

Certified IS barriers are wired into the Probe and Override circuits in the Control Box in order to make them compliant with NEC2011 specifications.

Dimensions & Weight:

14” (36cm) wide x 23” (59cm) high x 6” (15.4cm) deep. An additional 10” is required below for cable exit and an additional 14” is required in front and to the left for door swing. Weight: 25 lbs. (11.34 kg)

Standard Auto Seeker

The Standard Auto Seeker is not rated for use in hazardous locations.

Dimensions & Weight (with 50’ probe attached)**:** 14” (36cm) wide and deep; 20” tall (15.8cm). Weight: 32 lbs. (14.51 kg)

Optional Explosion Proof Auto Seeker

The Explosion Proof Auto Seeker is certified compliant with NEC2011 specifications for use in Class 1 Div 1 locations. Connections to all cabling now have positive threaded Mil-Spec circular connectors.

Dimensions & Weight (with 50’probe attached)**:** 52 lbs. (23.59 kg)

Minimum Well Head Clearance for EXPLOSION PROOF AUTO SEEKER: 28”x24”x24” Deep (71 cm x 61 cm x 61 cm deep). **(Does not apply to Standard Auto Seeker, which must be mounted outside of any classified hazardous areas)**

Optional Explosion Proof Enclosure for the Control Box

The Explosion Proof enclosure is certified compliant with NEC2011 specifications for use in Class 1 Div 1 locations. Comes with the control box mounted in a certified XP enclosure and includes three XP cable feed through fittings with Chico® seals.

Dimensions & Weight: 29” (73.66cm) tall; 11’ (27.9cm) deep; 18’ (45.7cm) wide, with an additional 18” required in front and to the left for door swing and an additional 10” (25.4cm) required below for cable exit. Weight (with Control Box mounted inside): 210 lbs. (95.25 kg)

Optional Explosion Proof Enclosure AC Power Switch

This feature provides a convenient AC power switch mounted directly to the XP control box enclosure to enable the Spill Buster to be turned on and off at the box instead of back at the AC main power panel.

Standard Extension Cable length: 30 ft (9.1m) from Control Box to well head.

Override Product Tank Probe: Threads into a standard 2” barrel bung. Standard cable length is 30 ft (9.1m)

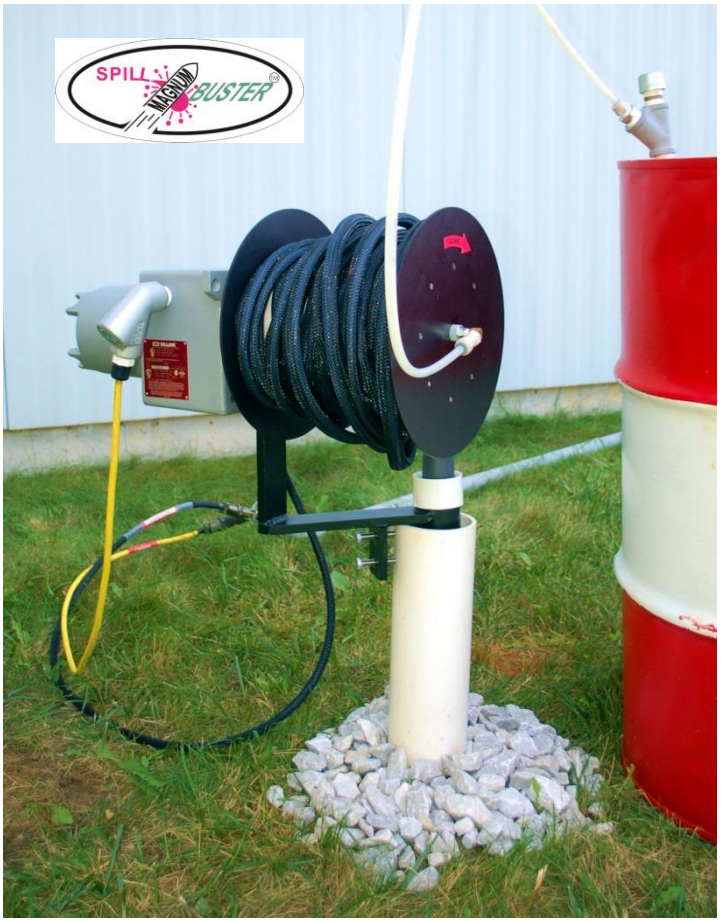
Total System Shipping Weight

Complete Standard Magnum System –aprox. 68 lbs. (30.84 kg)

Complete Magnum System with Explosion Proof Auto Seeker- aprox. 92 lbs. (41.73 kg)

Complete Explosion Proof Magnum System- aprox. 277 lbs. (125.65 kg) (includes Exp. Enclosure for Control Box)

Magnum Spill Buster
Product Recovery System



Operator's Manual
PN 3013

Rev C

REVISIONS			
REV	**DESCRIPTION**	**INITIALS**	**DATE**
	Initial Release	DFB	11/08/13
A	Added details for solar power operation	DFB	03/10/14
B	Added details for Modular Solar Power Unit	DFB	09/02/15
C	Added more details on Modular Solar Power Unit & Water Depression Pump with Certified Power Wires	DFB	12/15/15

Magnum Spill Buster Limited Warranty

All references to the customer herein shall mean the Purchaser or the Lessee as applicable. CLEAN EARTH TECHNOLOGY, INC. (CET) warrants the Magnum Spill Buster System to be free of substantial defects in material and workmanship for one year from the date of shipment. Pumps are warrantied for 90 days. CET's sole responsibility under this warranty shall be to either repair or replace, at its option, any component which fails during the applicable warranty period because of defect in workmanship or material. No other liabilities shall be assumed by the manufacturer or its agents, nor are they expressed or implied.

This warranty is contingent upon proper use of the Magnum Spill Buster System by the Customer in accordance with CET's published specifications. This warranty shall not be valid if the alleged defect is the result of abuse, misuse, accident, alteration, neglect, unauthorized repair, or acts of nature. Any repair shall be deemed unauthorized unless it is made by CET or with the written consent of CET. This warranty is the sole warranty made by CET to the Customer and is in lieu of all other warranties or obligations, expressed or implied.

System upgrades will be made available to customers as they are completed. Clean Earth Technology, Inc. is not obligated to provide those upgrades without cost.



WARNING: Logic board dip switch settings other than those shown herein are not approved by Clean Earth Technology, Inc., and may cause spillage of product. Please consult the factory for alternate settings.



WARNING: In the event that equipment is returned to the factory for any reason, a complete decontamination must be done before shipment. See page 93 of this manual for the decontamination procedure. Shipping hazardous materials improperly may be a Federal offense.



WARNING: Unauthorized user modifications or application beyond the published specifications may result in electrical shock hazards or improper operation. Clean Earth Technology, Inc. will not be responsible for any injuries sustained due to unauthorized equipment modifications.

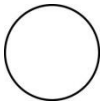
Restrictions and Liabilities

Information in this document is subject to change and does not represent a commitment by Clean Earth Technology, Inc. Changes made to the information in this document will be incorporated in new editions of the publication. No responsibility is assumed by Clean Earth Technology, Inc. for the use or reliability of software or equipment that is not supplied by Clean Earth Technology, Inc. or by its affiliated dealers.

Safety Considerations

Use of this instrument is restricted to qualified personnel who recognize shock hazards and are familiar with safety precautions used when operating electrical equipment. Read the manual carefully before operating the Magnum Spill Buster.

The following warnings and informational symbols may be found on the Magnum Spill Buster and/or in this manual:

Symbol	Description
	Caution: Risk of electric shock
	Direct / Alternating Current
	Direct Current
	Alternating Current
	Protective Earth (ground)
	Warning: Refer to accompanying documentation
	Off (Power: disconnection from Mains)
	On (Power: Connection to Mains)



Hazard Warnings

- Warning! Explosive Vapors. Always disconnect AC power at its source prior to connecting/disconnecting any wires and/or cable connections located within any hazardous locations.

- Warning! Explosive Vapors. The control panel and Standard Auto Seeker are not explosion proof or intrinsically safe, and should be located outside of any classified hazardous areas where explosive vapors may be present.

- Warning! Electrical Shock. Correct grounding is absolutely necessary for the system to work properly and safely. Failure to do so may result in damage to the system and/or electrical shock, which may result in serious injury or death.

- Warning! Electrical Shock. All AC Power wiring must be done by a qualified electrician. Disconnect AC power at its source prior to connecting/disconnecting any wires at the terminal block. Electrical shock may result in serious injury or death.

- Warning! Chemical Incompatibility. Due to possible adverse reactions with some of the materials used in the standard Magnum Spill Buster, it should not be used to pump any Halogenated Hydrocarbon (HHC) solvent containing any of the following elements (examples are not all inclusive):

    - Flourine (f) "-flour-" Examples: Dichloroflouromethane, Trichloroflouromethane.
    - Bromine (Br) "-bromo-" Examples: Methyl bromine, Ethylene dibromide.
    - Chlorine (C1) "-chloro-" Examples: Perchloroethylene, Trichloroethane, Dichloromethane.
    - Iodine (I) "-iodi-" Examples: N-butyl Iodide, Methyl Iodide.

    If remediation of an HHC solvent is required, we can build the Magnum with an epoxy probe in place of standard materials and an alternate pump. Failure to heed this warning could result in severe damage to the system and the resultant possibility of injury to personnel and damage to the surrounding site.

Any chemical of concern (COC) that may be present on a site must be disclosed to Clean Earth Technology at the time of all requests for quotes. Disclosure of COCs must also be made if a system is moved from its original site to another where COCs are present.

Precautions

The following precautions are provided to help you avoid damaging the system:

- **Caution: Service.** Authorized service personnel should service the Magnum Spill Buster. Only qualified technical personnel should perform troubleshooting and service procedures on internal components.
- **Caution: Site Security.** Access to the site and to the Magnum Spill Buster System must be controlled at all times. The equipment is specialized and must only be operated by qualified and trained personnel. Locked sheds, vaults, and fenced enclosures are

good examples of a secured site. Clean Earth Technology does not warranty damage to equipment due to vandalism or negligence.

- **Caution: Proper Grounding.** It is absolutely necessary to ground every system, whether powered by AC or battery-operated. Always call the factory if you have any questions about the proper way to ground your Magnum.
- **Caution: Regular Maintenance.** The down-well probe and pump should be regularly inspected and maintained, as detailed in Section 5.0, page 70. The frequency of maintenance will depend on your site conditions. We recommend that you start with weekly checks of the pump and probe until experience dictates that a lengthier interval will suffice. Failure to provide regular maintenance will damage your Magnum and may result in unsafe operating conditions. Clean Earth Technology is not responsible for damage to equipment or injury to personnel resulting from improper maintenance practices.

The policy below applies to both equipment sales and repair orders. For a Return Material Authorization number, please call our Service Department. (802) 425-3710

Clean Earth Technology, Inc.

Environmental Equipment Return Policy

This policy refers to ANY EQUIPMENT OR PARTS being returned to Clean Earth Technology, Inc. (CET), whether:

- Customer owned, leased, or rented.
- In warranty or out of warranty

NO equipment or parts should be shipped to CET without first contacting our service department for a Return Material Authorization number (RMA). Contact our service department at **(802) 425-3710** to be assigned an RMA number.

- CET reserves the right to refuse delivery of any equipment without a CET RMA number clearly displayed on the exterior of the package(s).
- CET reserves the right to refuse delivery of any equipment improperly decontaminated.
- CET reserves the right to add a fee of $500.00 to the repair invoice of any equipment or parts not decontaminated to the satisfaction of CET.

Environmental Equipment Return Guidelines

- All equipment must be thoroughly cleaned, purged of product and decontaminated prior to shipment to CET. NOTE: CET recommends the use of Personal Protective Equipment, level C or D, as defined in OSHA 29 CFR 1910.120.

- CAREFULLY FOLLOW THE EQUIPMENT DECONTAMINATION PROCEDURES FOUND ON PAGE 93 OF THIS MANUAL

Any equipment or parts shipped to CET must include the following documentation:
CET RMA/Repair Order form completed by customer. An "RMA number/REPAIR ORDER" form to copy is found on page 97.

- Description/name of product pumped.
- Reason for return.
- The CET RMA number clearly marked on the outside of ALL packages and paperwork.

All items being returned (including all warranty-claim shipments) must be sent freight prepaid to our factory location:

Clean Earth Technology, Inc.
445 Long Point Road
N. Ferrisburgh, VT. 05473

When you ship an item to CET, we recommend using UPS, FedEx, or another reputable shipper. We also recommend that you insure your shipment for its actual replacement cost. Clean Earth Technology will not be responsible for lost shipments or instruments that are received in damaged condition due to improper packaging or handling.

Use the original carton and packaging material for shipment. If they are not available, we recommend the following guide for repackaging:

- Use a double walled carton of sufficient strength for the weight being shipped.
- Use sufficient industry approved, shock-absorbent packing material to protect all surfaces and projecting parts. The items packed should not be able to slide or shift their position within the box.

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Product Introduction

The Magnum Spill Buster™ family of equipment is an automated free phase petroleum contamination pumping system. It is specifically designed to remove NAPL petroleum product from the water table via a 2″ or larger diameter well. Its unique auto-seeking device allows the pump intake to automatically follow the elevation of the oil/water interface as it fluctuates throughout the entire length of the well. The Magnum Spill Buster will not pump any amount of water.



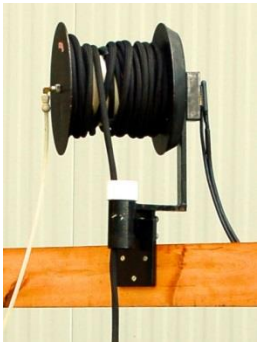
Control Boxes mounted in a NEMA enclosure

The Magnum Spill Buster is composed of three interactive modules: The Control Box, the Auto Seeker, and the down well Probe.

The **Control Box** coordinates and displays the condition of the system operation and also allows certain system parameters to be varied.



Magnum Control Box with protective cover removed



Standard Auto Seeker

The **Auto Seeker** is a small, motorized, reel assembly that automatically raises and lowers the probe to follow the NAPL interface through the entire depth of the well.

The 1.93” diameter **Probe** contains the patented ALPHA ARRAY™ interface sensors, as well as a small but powerful 12vdc electric product pump.



Magnum Spill Buster Probe



“Exploded” view of the Probe,
Showing the pump, filter, spring and end cap

The Spill Buster may also be used in a dual pump mode by adding a water depression control box and water pump (See page 57).

The Magnum Spill Buster has several options for its power source. Where electrical connection is available, the system can be hard wired for 115/230 VAC at 60 Hz. The operating system will also automatically adjust to European 230 VAC at 50 Hz.



Battery power is also an option via two deep cycle 12V batteries in series for 24 VDC power. On remote sites where power is not available, the Magnum can run on solar power (See page 50).

The Magnum Spill Buster can be used on a wide variety of groundwater remediation sites. Many of these sites contain classified hazardous areas with restrictions on the type of equipment that can be used within them. It is very important for the operator to be aware of all applicable codes on their site and confirm that their planned use of the Magnum Spill Buster is in compliance. Please note that we offer a range of options for meeting the requirements on different kinds of site situations, including versions that mount the Auto Seeker and/or Control Box in explosion proof containers for use in Class 1, Division 1, hazardous zones.



Control Box mounted inside explosion proof enclosure

The following section on the terms “Intrinsic Safety” and “Explosion Proof” provides more detail on the differences between the two and gives examples of how the Magnum Spill Buster systems’ design incorporates them.



NEC 2011 compliant explosion proof Auto Seeker

Explosion Proof and Intrinsic Safety 101

Portions of the standard Spill Buster system operate in various “classified” flammable or explosive vapor zones or areas as defined in the US under the NEC codes. The location of the equipment on the site must be designed properly; or the equipment must be enclosed in appropriate enclosures, to prevent ignition of these vapors should the failure of a component occur. Since this is such an important topic we will present a few basics in this manual to help you or your customers understand the meaning of the various terms defining safe use when planning or installing our equipment. Please note that what we have written here is not meant to supersede anything that may be written in detail in the NEC codes or applicable local codes. ***It is your responsibility*** **and the responsibility of the Authority Having Jurisdiction** to study and follow these codes.

The Magnum Spill Buster system may need to be partially or completely located in areas that are classified as “Class 1, Division 1, Hazardous Atmospheres” as defined in the NEC code section 500. A Class 1, Division 1, safety rating is the highest rating in the US for flammable and combustible zones. There are several methods to insure that electrical systems are safe to operate in these areas. The Standard Spill Buster system can be modified when required to utilize two of these basic methods to achieve safe operations in these atmospheres per NEC 2011 electrical codes: the Intrinsically Safe method, and the Explosion Proof Enclosure method.

The sections below provide a brief explanation of these two methods and the different ways in which they make an electrical system safe for operation in Class 1 Div. 1 areas.

Intrinsic Safety

Intrinsic safety (IS) is a protection technique for safe operation of electrical equipment in hazardous areas by limiting the energy available for ignition of explosive well gases. The concept of (IS) circuits was originally driven by some devastating coal mine explosions in Europe due to “firedamp” gases being ignited by “electrical shorts” in the wiring of early communication devices such as the electric telegraph.

In signal and control circuits that can operate with low currents and voltages, the intrinsic safety approach simplifies circuits and reduces installation costs over other protection methods. High-power circuits such as electric motors or lighting cannot use intrinsic safety methods for protection.

One of the most common methods for protection is to limit the current by using multiple series resistors (assuming that resistors always fail open); and to limit the voltage with multiple Zener devices to ground (assuming diodes always fail shorted). Approval standards for intrinsic safety barriers require that the barrier maintains approved levels of voltage and current to the specified

components. This is accomplished by preventing ignition of the protected device and stopping sparking of damaged wiring to the protected components.

An example of an Intrinsically Safe (IS) certified Zener barrier is shown here. Signals going to an electrical device located in a classified zone are wired into one end of the modular barrier and then wired out into the classified zone. These are a standard production item and are certified Intrinsically Safe by various 3rd body testing laboratories.



Explosion Proof Enclosures

Explosion Proof (EXP) enclosures are not intended to seal the electrical equipment they contain from the entry of explosive atmospheres that may be outside the enclosure. Instead, they prevent any explosion that might occur within the enclosure from initiating a secondary fire or explosion in the surrounding area outside of the enclosure. Since they are not tightly sealed, liquids and gases may flow into the enclosure.

EXP enclosures are usually made of heavy cast aluminum or stainless steel and are of sufficient thermal mass and mechanical strength to safely contain an explosion should ignition of the flammable material occur within the housing. These enclosures are typically produced with wide, flat, flanges but may not have a gasket between those flanges. Should an explosive mixture ignite inside the enclosure because of an electrical short or an overheated component, the design of the flanges cools down any hot gases escaping between them enough to prevent the ignition of the external combustive atmosphere.

This is important to understand because it means that by design these enclosures are neither completely air tight nor waterproof. The EXP enclosure that can be used with the Magnum's control box includes a window to allow the operator to see the instrument panel. We strongly recommend that these enclosures be mounted in an upright position and raised off of the ground to prevent possible internal flooding. If the housing must be at ground level, and especially if it is laid flat with the control panel window in the horizontal position, a protective cover should be used to keep rain from leaking inside the enclosure and flooding the control box electronics.

Another example of the Explosion Proof methodology would be the manner in which electrical wire is fed through piping. Per the NEC electrical code spelled out in section 500, cabling fed through piping usually utilizes tapered pipe threads. The code requires a minimum engagement of six threads; and since it is tapered, the spaces between the threads get tighter as the pipe is tightened up. There still is the potential for vapors to leak through these threads, but once again any hot gases escaping through the threads are cooled enough to prevent a secondary explosion.

A third example of EXP methodology would be the use of a multi-conductor cable feed through. The feed through fittings are once again designed to be strong enough to contain an explosion.

These fittings leave sufficient room to provide for stripping the outermost wire jacket and enough room for separating the individual wires from each other. A powdered mixture is then mixed together with water and poured in through an access plug to completely surround each conductor. A common material used is a compound from Cooper Crouse-Hinds called Chico®, which cures to a cement-like consistency. In the event of an internal explosion, any hot, explosive gases escaping through the hardened Chico are cooled before entering the explosive atmosphere outside.

Here are examples of these two types of enclosures:





Flammability and Combustible Liquids Definitions 101

When using a Spill Buster system it is important to understand the difference between the definition of flammable liquids and combustible liquids. All flammable and combustible liquids will vaporize into flammable gases at certain temperatures and pressures. The temperature point at which a liquid turns to a gas vapor is referred to as the “flashpoint” of the liquid. The determination of the flashpoint for each flammable or combustible liquid is done by performing what is commonly known as the “closed cup” flashpoint test.

It should be mentioned that flashpoint was selected as the basis for classification of flammable and combustible liquids because it is directly related to a liquid's ability to generate vapor, i.e., its volatility. ***Since it is the vapor of the liquid, not the liquid itself that burns, vapor generation becomes the primary factor in determining the fire or explosive hazard.***

Furthermore, the liquids vapor pressure is an important factor and is a measure of a liquid's propensity to evaporate. The higher the vapor pressure, the more volatile the liquid and, thus, the more readily the liquid gives off flammable or explosive vapors.

The results of flashpoint testing have been used to help regulating bodies determine the temperatures at which potentially combustible liquids turn into a vapor, creating a flammable or explosive gas.

Hazardous locations are further defined by means of the class/division system and have been formulated by the NEC, CSA, OSHA, and the National Fire Protection Association (NFPA). These definitions are as follows:

Flammable Liquids

Flammable fluids are defined as liquids having closed cup flash points below 100°F (37°C). Flammable liquids are referred to as Class I liquids.

◆ A class IA flammable liquid is a liquid with a flashpoint below 73ºF (22.8ºC) and a boiling point below 100ºF (37.8ºC). An example of a class IA liquid is n-pentane, since its flashpoint and boiling point are 56ºF (49ºC) and 97ºF (36ºC), respectively.

◆ A class IB flammable liquid is a liquid with a flashpoint below 73ºF (22.8ºC) and a boiling point at or above 100ºF (37.8ºC). An example of a class IB liquid is acetone, since

its flashpoint and boiling point are 0ºF (18ºC) and 133ºF (56ºC), respectively.

◆ A class IC flammable liquid is a liquid with a flashpoint at or above 73ºF (22.8ºC) and

below 100ºF (37.8ºC). An example of a class IC liquid is turpentine, since its flashpoint

lies in the range from 95 to 102ºF (35 to 39ºC).

Combustible Liquids

Combustible fluids are defined as liquids having closed cup flash points at or above 100°F (37°C). Combustible liquids are referred to as Class II or Class III liquids.

◆ Class II liquids - flash points at or above 100°F (37.8°C) and below 140°F (60°C).

◆ Class IIIA liquids - flash points at or above 140°F (60°C) and below 200°F (93.4°C). c.

◆ Class IIIB liquids - flash points at or above 200°F (93.4°C).

An example of a Combustible liquid is the Lamplight® Ultra Pure Red Paraffin Lamp Oil that CET uses for testing new and repaired units before shipment. This material has a flashpoint of 250F (121C) making it a class III liquid. Furthermore, its low toxicity makes it a safe testing fluid due to its high ignition temperature and the lack of chemicals that are listed in the CERCLA Hazardous Substance list. CET uses a red colored fluid but it also can be found in clear, or colored green or blue.

This fluid is easily found and can also be used as a pump priming fluid as defined on page 76.

1.0 System Installation

8 Easy Installation Steps

1. Set up Control Box Page 9

2. Install Auto Seeker Page 11

3. Install Product Tank Inlet Fitting and Product Tube Page 14

4. Install Product Tank Override Probe Page 15

5. Ground System Page 16

6. Connect System Cables and Power Cables Page 18

7. Power Test Page 30

8. Pump Flooding Procedure Page 32

Time: Set-up time for the complete system should take from 30 to 60 minutes after connection to the power source is complete.

System Equipment List

NEMA 4 weatherproof main Control Box (NON-Explosion proof)
(For a complete Explosion Proof system, Control Box can be mounted in a Class 1 Div. 1 rated enclosure.)

For a Standard Magnum System: Auto Seeker System (NON Explosion proof) with 30 foot power cable extension
For a Magnum System w/Explosion Proof Auto Seeker: Auto Seeker System mounted in Class 1, Div. 1 rated explosion proof enclosure with 30 foot power cable extension

NEC 2011 section 500 compliant Product Probe with 50 foot probe product tube. Longer probe cable lengths available upon request.

Product Tank Inlet Fitting

50 foot nylon product discharge tube

NEC 2011 section 500 compliant Product Tank Override Probe with bung and 30 foot cable

30 foot Probe signal and power cable extension. Longer extension cables available upon request.

30 foot Auto Seeker power cable extension. Longer extension cables available upon request.

One Pump Flooding Kit per order consisting of syringe, o-ring, and tubing.

Site Security

Warning

Access to the site and to the Magnum Spill Buster System must be controlled at all times. The equipment is specialized and must only be operated by qualified and trained personnel.

Secure every site. Locked sheds, vaults and fenced enclosures are good examples of a secured site. Clean Earth Technology does not warranty damage to equipment due to vandalism or negligence.

Control Box Installation

- .**Warning-** All AC Power wiring must be done by a qualified electrician who is familiar with all appropriate NEC and/or local codes. Electrical shock may result in serious injury or death.
- **Warning-** Explosive Vapors. Always disconnect AC power at its source prior to connecting/disconnecting any wires and/or cable connections located within any hazardous locations.

The standard Control Panel in its NEMA-4 enclosure is not rated for use in any classified explosive locations, as determined by the Authority Having Jurisdiction (AHJ). The control box can be used with an Explosion Proof (XP) Auto Seeker and meet all Class 1, Div 1 requirements as long as the panel is mounted in a nonhazardous area.



Standard Control Box with covers off



Standard Control Box with covers on

Location

Mount the Control Box in a suitable non classified location (refer to all safety codes applicable to your site). Typical installations are in sheds, vaults, on the side of a building, or on a utility type pedestal mount. If the control panel is mounted vertically and the box door is latched with the I/O Extension cover correctly installed, the unit is weatherproof.

If the Control Box must be located in a Class 1, Div 1 or 2 areas, Clean Earth Technology can provide an explosion proof enclosure. This type of enclosed Control Box looks like the units shown in the figures below.

Warning

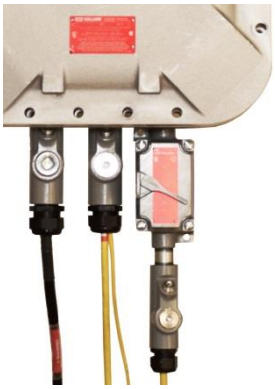
Control Box must be located outside of any classified hazardous areas. This includes explosive atmospheres or vapors. Refer to all applicable codes.



Standard Control Box mounted in an Explosion Proof enclosure with cover removed.



Standard Control Box mounted in an XP enclosure. Note the XP power switch box located at the bottom right.



The XP power switch box located at bottom right will switch either AC or Solar DC.

Without the optional XP power switch, the XP Control Box must be turned on and off at the circuit breaker panel for the input power.

1. Ensure the unit is de-energized. Mount the Control Box in a suitable location (refer to all safety codes applicable to your site). Typical installations are in sheds, vaults, on the side of a building, interior of a building or on a utility type pedestal mount.

2. If the Control Box is installed in an explosion proof enclosure, it must be mounted in a vertical orientation to prevent the potential of rain water leakage and accumulation within the enclosure. (See “Explosion Proof 101” on page 3 for an explanation of the enclosure’s design in regards to weather proofing).

3. To meet the Intrinsically Safe (IS) requirements of this unit, a grounding circuit of one (1) ohm or less to the grounding electrode is required.

4. If the extension cables leading from the Control Box to the Auto Seeker and/or Override Probe must pass through an unclassified area the cables must be must be sealed at each boundary in accordance with NEC & local code requirements to prevent migration of combustible vapors within the cable. It is the responsibility of the AHJ and the local installer to meet the requirements of the local area.

5. For the initial installation of a Control Box mounted in an explosion proof enclosure, do not close the door or secure the bolts around the flange until after the initial pump power test has been performed (See page 30).

Installing the Standard Auto Seeker

If installing an Explosion Proof Auto Seeker, skip to page 12.



The Auto Seeker system is an integral part of the Magnum Spill Buster system. It is turned ON and OFF with the System Power switch on the Control Panel. The Auto Seeker is controlled by the Product Recovery Cycle (PRC) control switch.

The Standard Auto Seeker is not rated explosion proof or intrinsically safe. It should be mounted outside of all classified hazardous zones. (See Section 1.1 for information on installing an Auto Seeker with an Explosion Proof enclosure). Refer to all applicable NEC and local codes to determine how and where the Auto Seeker should be installed on your site.

On many sites it is possible to move the Standard Auto Seeker from the classified hazardous area by raising it above the well head. For example, the use of a wood or metal scaffolds such as the one pictured here may accomplish this.

Installation

For the example shown above a custom adapter clamp plate was bolted to the wooden cross support as shown to the right. Slide the Auto Seeker mounting bracket clamp on to the adaptor plate and then thread the 2 clamping bolts in all the way until the ends engage the adapter plate. Then using a wrench to tighten the bolts until the Auto Seeker is securely supported on the adapter plate. Finally, carefully guide the probe through the white PVC collar and steel tube on the mounting bracket and let it hang there until the system is fully installed.



"Home" Position

The Standard Auto Seeker system is shipped from the factory with the Probe fully wound on the reel. This is its “home” position. It is critical that the Probe NOT be unwound from the reel except by use of the motorized reel. The position of the Probe on the reel is synchronized with a cable inside the reel housing. Refer to “Unwinding the Probe Manually” on page 30 for the correct way to advance or retract the Probe by hand so that synchronization is maintained.

Product Seeking

After the system is fully installed and the system is turned ON, the Auto Seeker will automatically track the water table. [See 2.0 System Operation - Magnum Spill Buster System Cycle, page 36]

NOTE: Always perform the pump flooding procedure found on page 32 before lowering probe inside well.

Installing the Explosion Proof Auto Seeker



The Explosion Proof Auto Seeker system is an integral part of the Magnum Spill Buster system. It is turned ON and OFF with the System Power switch on the Control Panel. The Auto Seeker is controlled by the Product Recovery Cycle (PRC) control switch.

Adapters



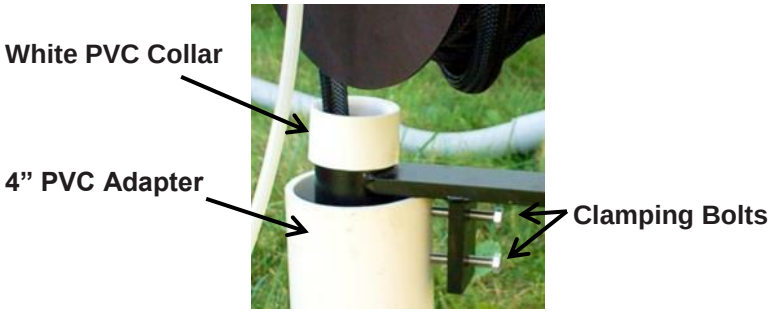
The well head adapter bracket provides a reinforced area to mount the Explosion Proof Auto Seeker unit and also locates the Auto Seeker reel and Probe directly over the well for proper operation. PVC fittings are available to accommodate well head diameters from 2” to 8”. Use PVC adhesive and install the appropriate fittings to reduce the well head to a 2” diameter.



If you did not receive the appropriate fittings for your application, please contact the factory for advice or to order preassembled fittings. These fittings can also be built up from standard PVC fittings found in most hardware and plumbing stores. The clamp incorporated into the Auto Seeker bracket can also be used for steel well heads 3” and larger, if applicable. An example of an XP Auto Seeker mounted on a 3’ metal culvert recovery well is shown to the right.

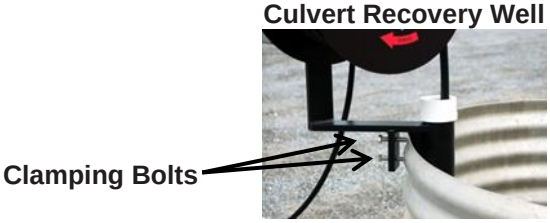
Installation

Position the Explosion Proof Auto Seeker over the well and slide the Auto Seeker mounting bracket steel tube down fully into the well head adapter. Thread the 2 clamp bolts in towards the adapter until they press against the PVC adapter and then using a wrench tighten the clamp bolts firmly until the AS is fully secured. Finally, guide the probe through the white PVC tube collar and steel mounting tube of the mounting the bracket and slide it down into the well itself. Make sure the probe slides freely in the recovery well.



Clamping Details on a PVC Well Head

Clamping Details on a Metal Culvert Recovery Well



For culvert type of recovery wells, position the Explosion Proof Auto Seeker over the well and slide the Auto Seeker mounting bracket over the culvert wall as shown above. Thread the 2 clamp bolts in towards the well until they press against the metal and then, using a wrench, tighten the clamp bolts firmly until the Auto Seeker is fully secured. Finally, guide the probe through the white PVC tube collar and steel mounting tube of the mounting the bracket and slide it down into the well itself. Make sure the probe slides freely in the recovery well.

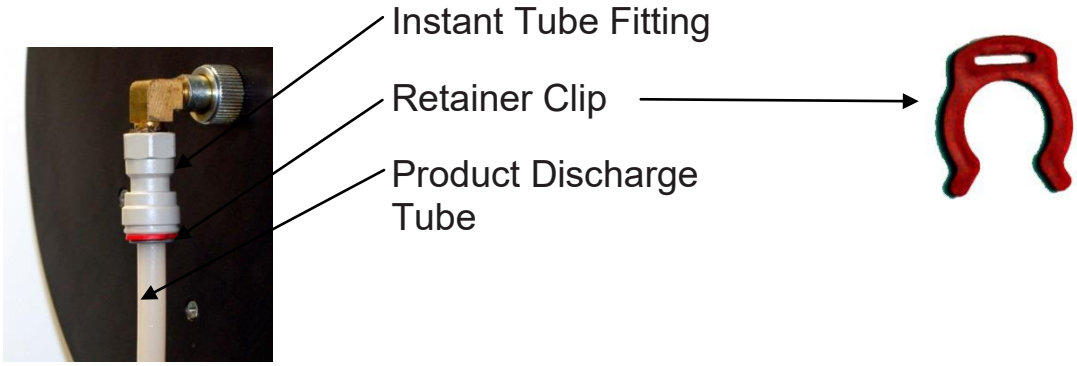
Product Seeking

After the system is fully installed and the system is turned ON, the Auto Seeker will automatically track the water table. [See 2.0 System Operation - Magnum Spill Buster System Cycle, page 36]

NOTE: Always perform the pump flooding procedure found on page 32 before lowering probe inside well.

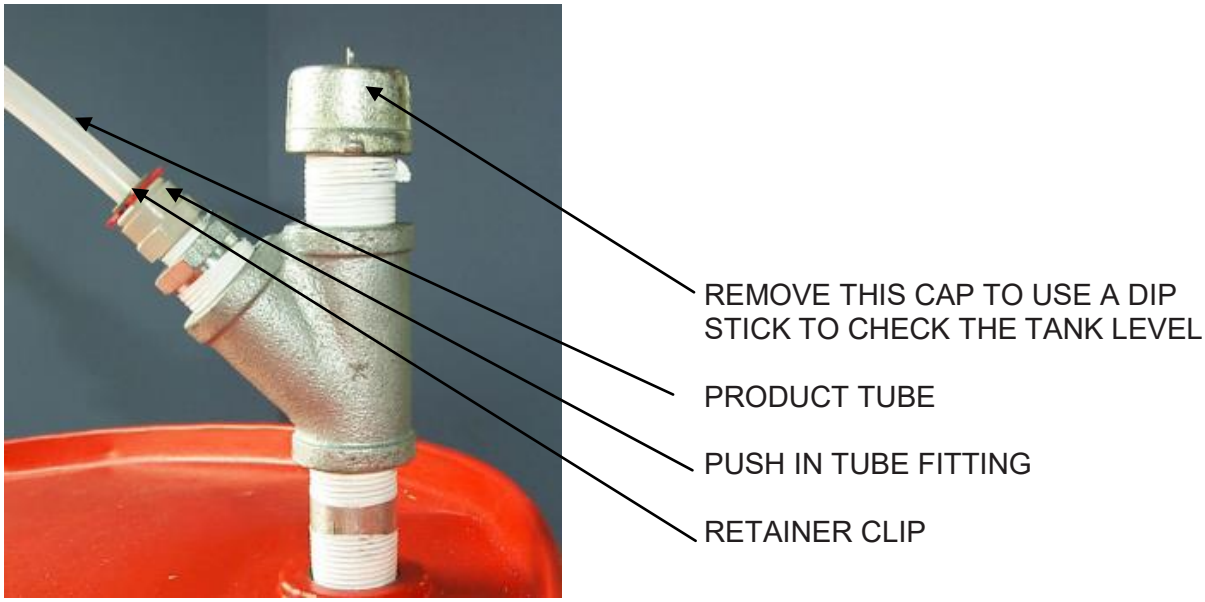
Product Discharge Tubing

Connect the Product Discharge Tubing to the Instant tube fitting on the front of the Auto Seeker reel unit by pushing the tube firmly into the fitting until it “snaps”. Secure with a retainer clip. To remove tubing, remove retainer clip and push locking sleeve of fitting squarely into the fitting while pulling on tube.] NOTE: The retainer clip is an integral part of the Instant Tube Fitting and must be in place to maintain the integrity of the fitting. Failure to install the retainer clip could cause a leaking joint.



Product Tank Inlet Fitting

The Product Tank Inlet Fitting screws into a standard 3/4” NPT fitting. Connect the product discharge tube coming from the Auto Seeker to the inlet fitting using the Instant Tube fitting supplied on the fitting assembly. First remove the red retainer clip on the fitting. Push the product discharge tube firmly into the fitting until it “snaps” into place. Re-install the retainer clip. NOTE: The retainer clip MUST be installed to insure against leaks. The product tank level can be checked manually by unscrewing the cap from the top of the fitting and inserting a dipstick into the product tank. The cap also contains a small vent. In the case of multiple recovery systems using one product tank the fittings can be stacked.



Product Tank Override Probe



The Product Tank Override Probe must be connected to the control box prior to system operation. There is an electrical interlock to prevent the product pump from operation without having the Product Tank Override Probe connected. Dip Switch S2-4 will override this interlock when turned ON. **However, on this setting a tank full condition is not detected and a secondary spill may occur.**

Install the product tank override probe in the product tank and plug the cable into the slot marked INHIBIT in the I/O Extension of the Control Box [Second slot from lower left]. The tank fitting screws into a standard 2" bung threaded hole. Other options are available, such as a "splitter" to allow use of multiple recovery systems using one product tank override probe.



The Product Tank Override Probe fitting screws into a 2" bung.

Product Tanks



Product tanks are NOT part of the Magnum Spill Buster system. Suitable receptacles for recovered product should be sized for the specific job and site, and should be monitored at regular intervals, along with the rest of the system. **Recovered product should be labeled and disposed of in an appropriate manner.**

System Grounding



A proper ground is not an option! Correct grounding is absolutely necessary for the system to work properly and safely!

WARNING

CORRECT GROUNDING IS ABSOLUTELY NECESSARY FOR THE SYSTEM TO WORK PROPERLY, AND TO ENSURE ELECTRICAL SAFETY. ONLY A QUALIFIED ELECTRICIAN SHOULD INSTALL THE SYSTEM.

The interface sensors take advantage of the RF shielding effect of ground water normally present in the well. To enable the control to properly sense this shielding effect, its logic circuits must be referenced to ground. Grounding procedures are described in the following sections for five different installations:

1. Standard utility connection.

2. Remote power installations (with a portable AC generator).

3. Bench testing where the test water is not connected to earth ground.

4. 24 VDC battery operation.

5. 24 volt solar operation.

Note: A missing ground connection is indicated when the HI and LOW LIMITS lights stay off even when the probe is immersed in water.

Warning! All power and grounding wiring should be performed by a qualified electrician. All wiring must meet the latest NEC and all applicable local codes.

Grounding a Utility Connection

When connecting to a utility power source, the green grounding wire must be connected to the power input ground terminal in the control box. This connection is marked on the overlay below the power input terminal block. A three-prong plug with a three-lead cable must be used for system power; typically a black “hot” lead, a white “neutral” lead, and a green grounding lead. However, in some cases due to site-specific conditions, it may be necessary to install a grounding rod, as described below.



A grounding rod employing a 5/8” copper rod, 8 gauge wire and copper clamp.

Installing a Grounding Rod

The metal casing of a driven well can be used as the ground. Where this is not possible, a grounding rod can be constructed as follows:

- Drive a copper rod approximately 8 feet into undisturbed soil; use a 5/8” Copperweld type rod.

- Connect a No. 8 or larger copper wire from the ground rod to the power source (a generator, battery, or control box).

- Make certain all connections are free of corrosion or oxidation.

Grounding a Portable Generator

A three-lead cable must be run from the generator to the control box; typically, a black “hot” lead, a white “neutral” lead, and a green grounding lead. In addition, the generator must be bonded to an earth ground (See “Installing a Grounding Rod” above).

Note: All connections must be clean without any oxidized layers.

Grounding for Battery Operation

Magnum Spill Buster systems operated from a pair of batteries must have the negative terminal of the series connected batteries grounded directly to a copper rod driven into the ground (See “Installing a Grounding Rod” above). In addition, a 12 gauge or larger copper wire must run from the negative lug on the battery to the grounding lug on the terminal block in the control box.

Some examples of battery locations requiring a ground rod and cable for operation are as follows:

- A pair of series connected vehicle battery, whether in or out of a vehicle.
- A pair of series connected batteries inside an Immediate Response Box (whether on the ground, in a truck, etc.)
- A pair of series connected batteries with 2 solar panels which are also series connected.

Note: For proper system operation, it is absolutely necessary to ground every battery operated system using the ground terminal lug of the 120/240/ VAC terminal block!

Grounding for Lab or Bench Testing

For temporary operation in a lab or on the bench, where the test water is not connected to earth ground, the water must be grounded. This can be accomplished by submerging at least 6 inches of bare copper wire in the water and attaching the other end to the green grounding terminal of the control box.

Installing System Extension Cables for a Standard Auto Seeker Magnum

If installing system extension cables for an Explosion Proof Auto Seeker system, skip to page 20.

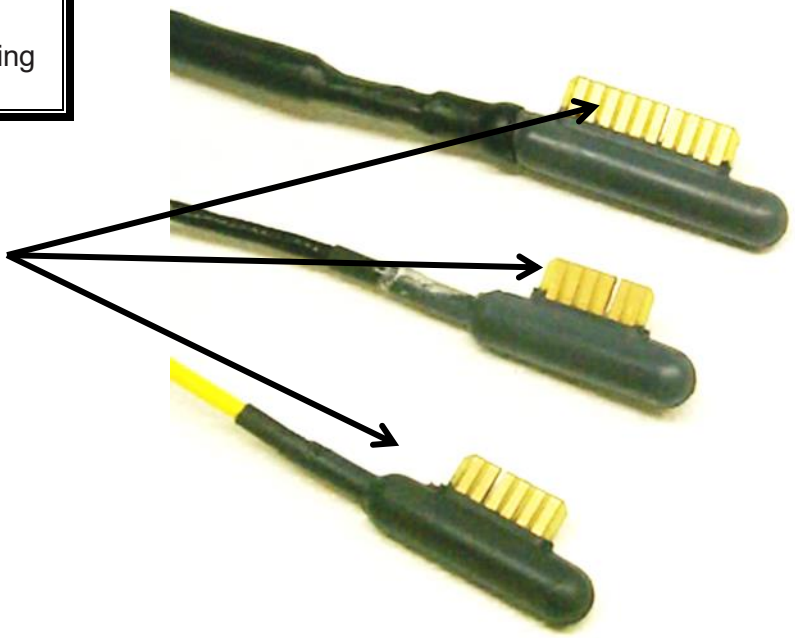
- .**Warning-** All AC Power wiring must be done by a qualified electrician who is familiar with all appropriate NEC and/or local codes. Electrical shock may result in serious injury or death.
- **Warning-** Explosive Vapors. Always disconnect AC power at its source prior to connecting/disconnecting any wires and/or cable connections located within any hazardous locations.

Make sure all cable connectors are free of dirt and debris before making connection. The standard extension cable lengths are 30 feet, but custom length cables are available up to 400 feet. If PVC conduit pipe is run between the control box and the well head, see “Pulling System Cables Through Conduit” on page 22.

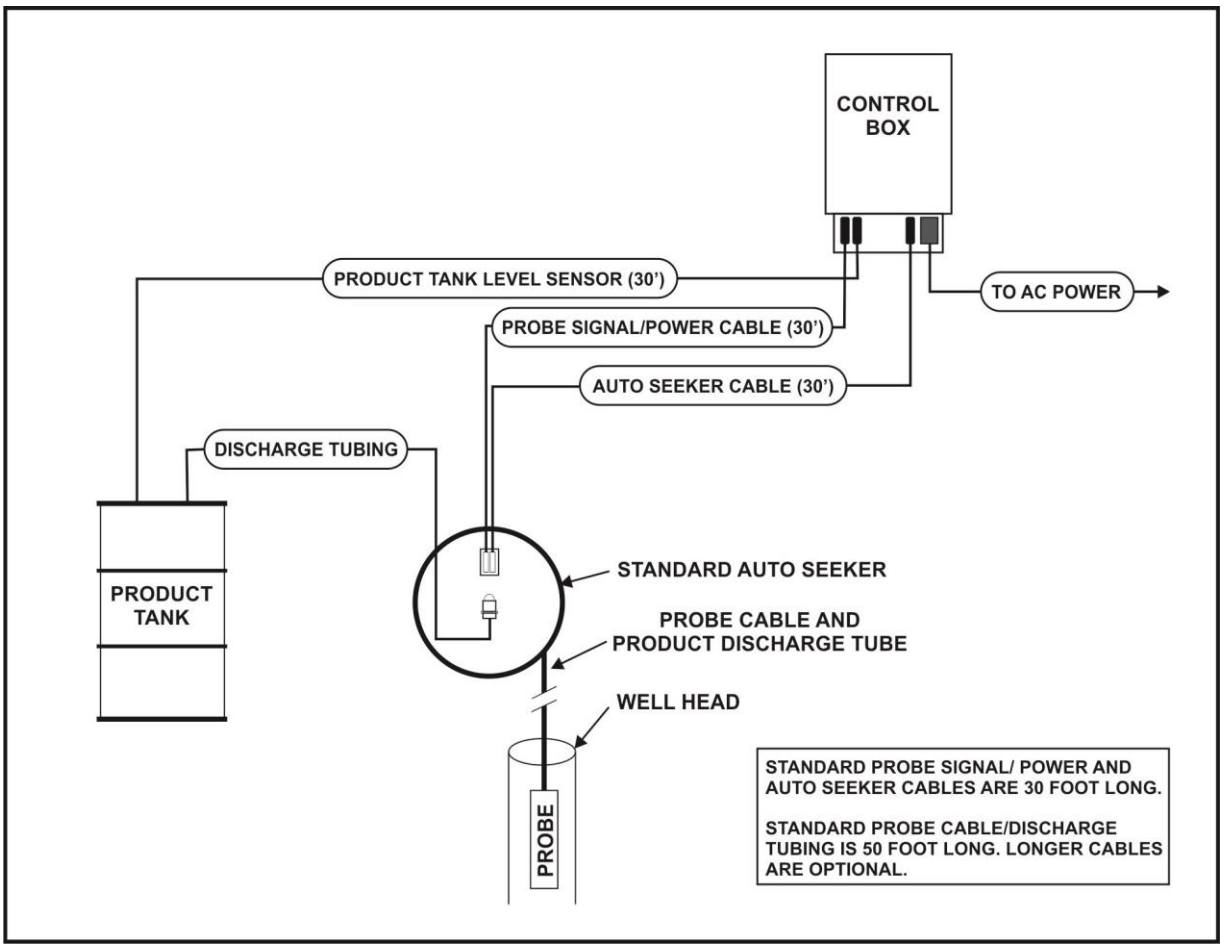
Cable Connectors

NOTE: ALWAYS turn off power before removing or connecting cables

Slim-line™ CONNECTORS



Standard System Wiring Diagram



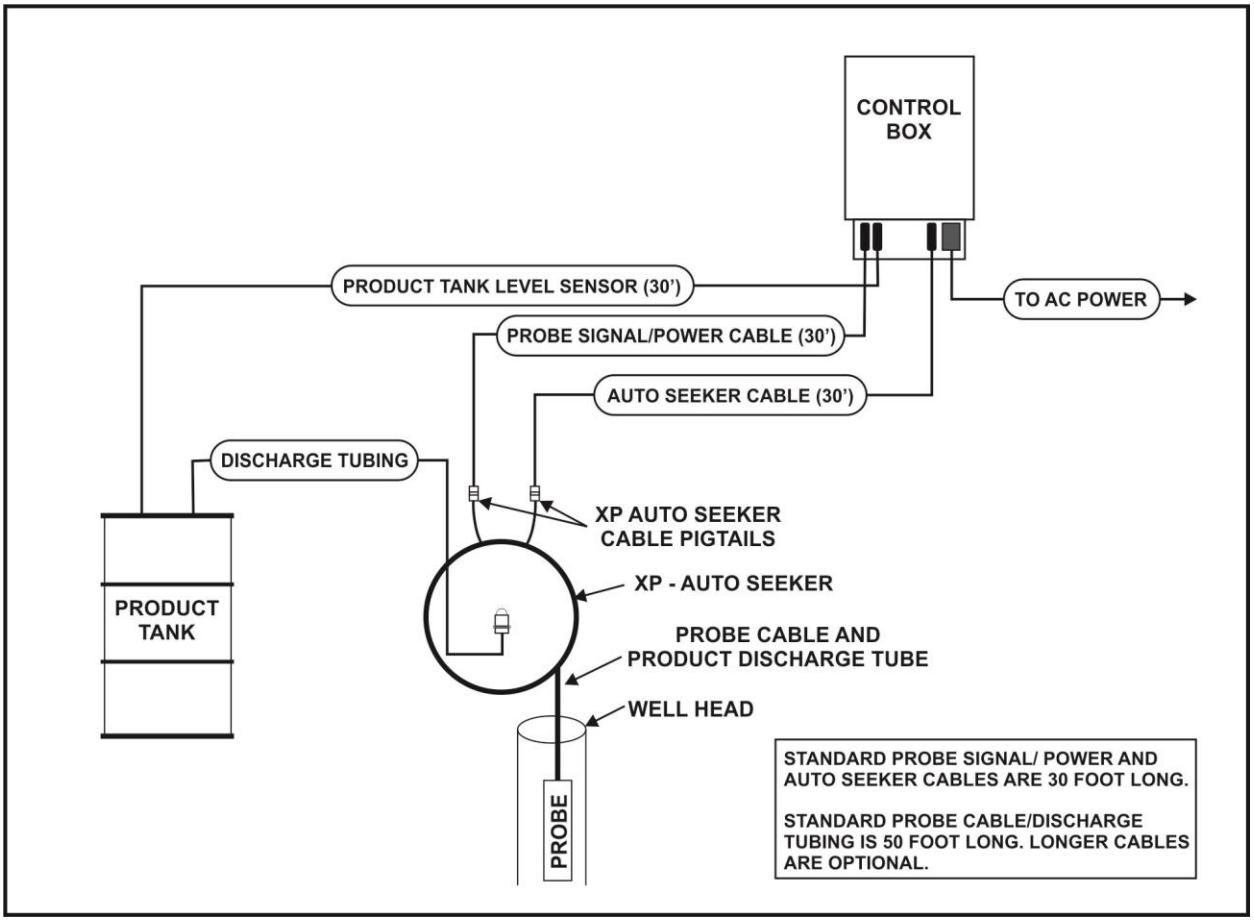
TYPICAL CABLE CONFIGURATION FOR A STANDARD MAGNUM SPILL BUSTER

Alternate cable lengths are readily available for deeper wells and control box placement further than 30 feet from the well head. The maximum allowable total cable length from the probe to the control box is 400 feet.

Installing System Extension Cables for an Explosion Proof Auto Seeker Magnum

- .**Warning-** All AC Power wiring must be done by a qualified electrician who is familiar with all appropriate NEC and/or local codes. Electrical shock may result in serious injury or death.
- **Warning-** Explosive Vapors. Always disconnect AC power at its source prior to connecting/disconnecting any wires and/or cable connections located within any hazardous locations.

Explosion Proof System Wiring Diagram



TYPICAL CABLE CONFIGURATION FOR AN EXPLOSION PROOF MAGNUM SPILL BUSTER

Installing the XP System Cables

If the extension cables pass through an unclassified area the cables must be must be sealed at each boundary in accordance with NEC & local regulations requirements to prevent migration of combustible vapors within the cable. It is the responsibility of the local installer to meet the requirements of the local area. A typical cable with coupled connectors is shown below.



Typical cable extension joined to an Auto Seeker cable pigtail.

Make sure all cable connectors are free of dirt and debris before making connection. The standard cable lengths are 30 feet, but custom length cables are available up to 400 feet. If PVC conduit pipe is used, see “Pulling System Cables through Conduit” on page 22.

Note: Cable extensions for an Explosion Proof Auto Seeker system have slim line connectors on one end. These cable ends should be pulled through any conduits to end nearest the Control Box and NOT the ends with Circular-Mil Spec connectors. This helps prevent debris or other contaminants from getting into the pins of the Mil-Spec Connector receptacles and prevent the degradation of system performance. If there is no way to pull cables from the Auto Seeker side of the conduit then a secure covering should be used over the connectors while pulling the cables through.



Cable extensions showing the female socket receptacles.

! Turn off power before removing or connecting cables.



Cable extensions for an Explosion Proof Auto Seeker will have a Slim-line™ connector on the Control Box side and a Mil- Spec circular connector one the other.

Pulling System Cables through Conduit

The minimum recommended diameter is 4” pipe. Use long “sweep” type elbows in a conduit installation. This will help prevent any damage to system cabling caused by forcing cable connections through a smaller diameter pipe. Excess cable from the installation should be coiled and stored in a protected area.

Typical Cable Segment

THE WRONG WAY TO PULL CABLES THROUGH A PIPE



Do not use smaller than 4” PVC.

Do not leave connectors exposed to contamination, especially during cable pulling operations.

THE RIGHT WAY TO DO IT!



Use 4” diameter pipe or larger. Tape the pull rope in place on the cable to prevent it from sliding up to the connectors. Tape the connectors to prevent contamination. Distribute the connectors over a few feet; don’t bunch them in one place.

Connecting Cables at a Non-XP Control Box

If connecting a Control Box mounted in an XP Enclosure, skip to page24.

- .**Warning-** All AC Power wiring must be done by a qualified electrician who is familiar with all appropriate NEC and/or local codes. Electrical shock may result in serious injury or death.
- **Warning-** Explosive Vapors. Always disconnect AC power at its source prior to connecting/disconnecting any wires and/or cable connections located within any hazardous locations.

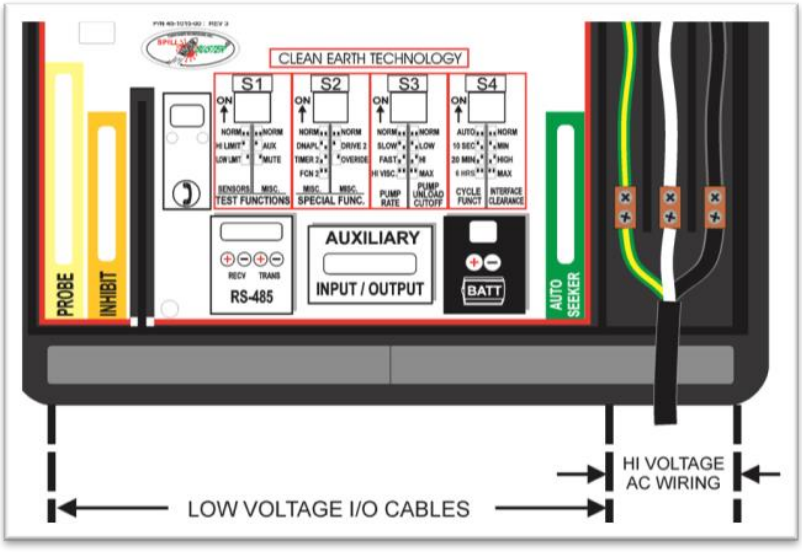
I/O Extension Pouch



Remove screws to access the I/O Extension Pouch

All cables enter the Control Box via the I/O Extension Pouch (or I/O Pouch), which makes up the bottom portion of the control box. Access into the I/O Pouch is gained by loosening the two screws on the front of the I/O Pouch and removing the lid. The Slim-line™ connector cables and power cable for the system feed through the bottom of the I/O Pouch.





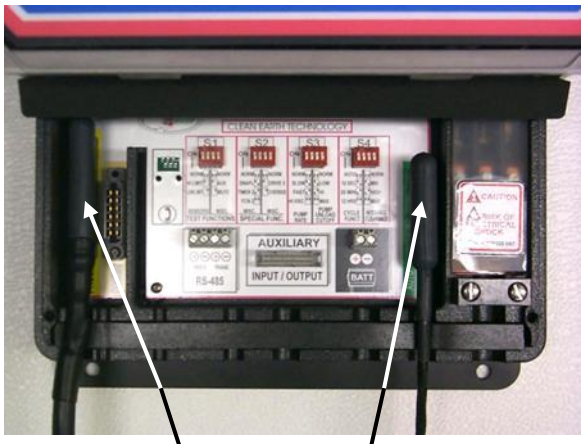
I/O Board and Terminal Block inside I/O Extension

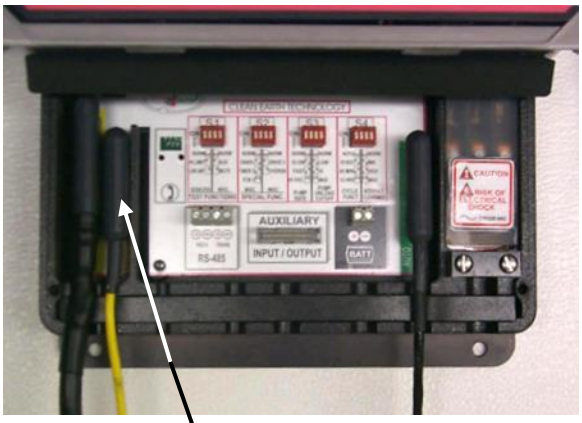
Connecting Probe, Auto Seeker, and Override Cables

Connect Slim-line™ connectors to receptacles, as labeled. Slim-line™ connector receptacles are keyed to help facilitate proper placement of plugs.

The power cable connects to the terminal block inside the I/O Pouch. See “Control Box Terminal Block” on page 25.

NOTE: The System must be properly grounded for correct operation.





Next, plug in the Override Probe connector as shown. NOTE: The Magnum Spill Buster system will not function unless the Override Probe is connected or the Override dip switch (S2-4) is ON. [See Dip Switches, page 42].

Connecting Cables at an Explosion Proof Control Box

When cabling from system components are connected to the Control Panel through an XP Housing, sealed and potted XP feed-throughs must be threaded into the threaded holes provided in the XP enclosure. These feed-through fittings will typically look like the picture shown below.



Example of a control box XP enclosure housing cable feed through.

These cable feed-throughs should be threaded tightly into the bottom of the XP enclosure. There will be three of these fittings. Two will have Slim-line connectors, and one will not have any cable potted in. This last one will need to have the power wiring fed through it by the electrician and potted per NEC or local codes for explosive atmospheres.

Once the fittings are threaded in tightly and the power cable is installed and potted, attach all of them into the I/O section of the control panel as detailed in “Connecting Probe, Auto Seeker, and Override Cables” on page 24. Upon completion of these connections install the I/O pouch cover. In these installations the control box main cover has been removed so that the front panel LED lights can be viewed during operation.

Control Box Terminal Block

- .**Warning-** All AC Power wiring must be done by a qualified electrician who is familiar with all appropriate NEC and/or local codes. Electrical shock may result in serious injury or death.
- **Warning-** Explosive Vapors. Always disconnect AC power at its source prior to connecting/disconnecting any wires and/or cable connections located within any hazardous locations.

Hardwiring AC Power

The Magnum Spill Buster is designed to run either 115 or 230 VAC Power without any modifications to the internal wiring. Attach hardwiring to the Control Box as shown on the Power Cable overlay. The incoming power cable must be able to handle a minimum of 10 Amps.



Terminal Block shown with the protective cover removed



115/230 Volt Terminal Block with the protective cover attached.

Correct Terminal Block Connections

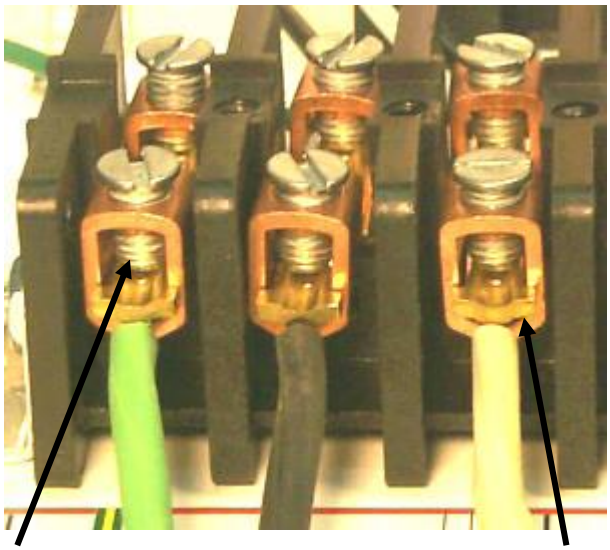
This view looking at the side of the terminal block shows the correct location to insert the AC supply wire.

PLACE WIRE IN THIS HOLE (UNDER PLATE)



CORRECT INSTALLATION

Installing the AC supply wire in the terminal block. **The wire must be installed correctly as shown.**



DO NOT PLACE WIRE DIRECTLY UNDER SCREW!

CORRECT INSTALLATION (UNDER PLATE)

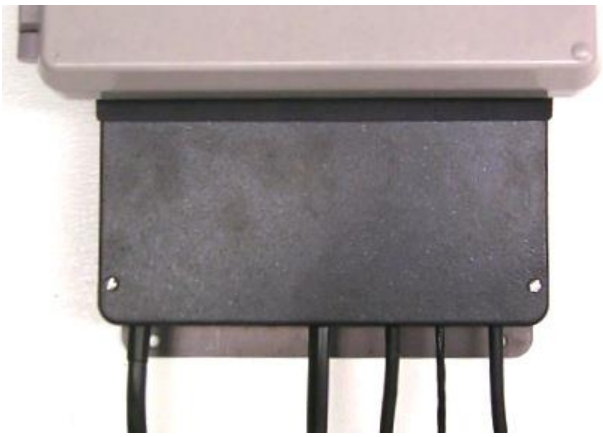
NOTE: Always replace the protective cover on the terminal block after installation or prior to providing power to the system. See page 27.

Sealed I/O Extension with Cables Installed



I/O EXTENSION RUBBER GASKET SEAL

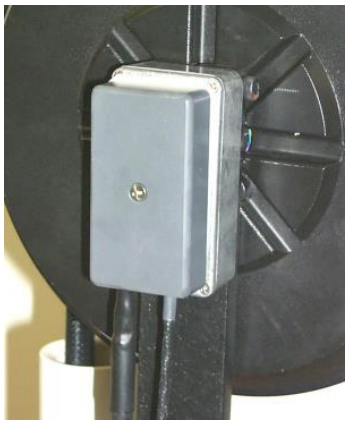
All cables must exit the I/O Extension through the appropriate sized slot in the bottom of the pouch in order to create a dust- and weather-proof seal. The perimeter of the lid and body of the I/O extension is lined with a foam rubber gasket that serves as weather stripping. The weather stripping will cause the lid to seal automatically against the cables when the lid is closed and fastened with the screws. The weather stripping will seal holes in the I/O Box, whether they contain cables or not.



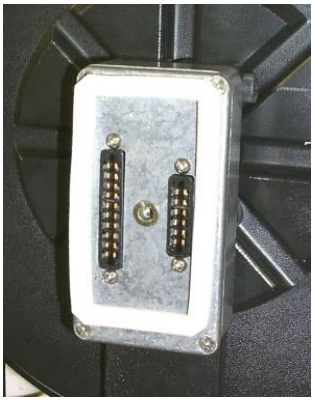
I/O extension must be closed and sealed for safety and weatherization!

Connecting the Standard Auto Seeker Cables

If connecting an Explosion Proof Auto Seeker, skip to "Connecting the XP Auto Seeker Cables" on page 29.



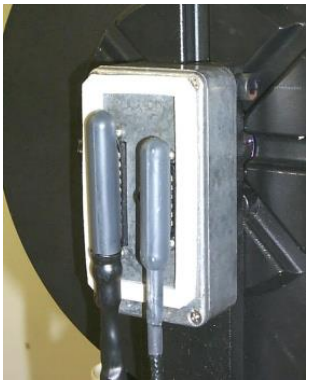
Remove safety cover from Slim-line™ connector box.



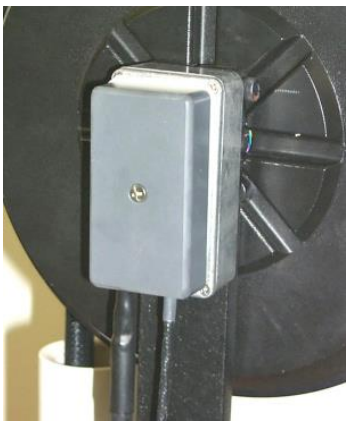
Use Probe and Auto Seeker Slim-line™ connectors with rubber gaskets affixed.



Plug in Slim-line™ connectors to size-coded receptacles.



Replace safety cover over connector box and tighten screw down snugly.



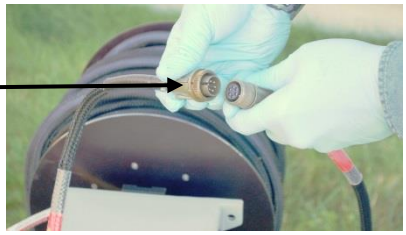
Connecting the XP Auto Seeker Cables

The XP Auto Seeker has two 5 foot long pigtail cables terminated with Circular Mil-Spec connectors (see below). The respective cable extensions are connected to the pigtails as shown and each threaded locking collar should be firmly seated to insure an environmentally tight seal.



NOTE: These connectors should not be laid directly on the ground or vault. While they are weather resistant, they are **not** rated for direct water immersion. We recommend hanging the cables such that the connectors are above any potential water flooding areas.

Threaded Locking Collar



Probe Cable Connector

Note the rotational locking key slot.





Warning:
Always de-energize system power before connecting or disconnecting cables!

Auto Seeker Power Cable Connector



Initial Pump Power Test

When all cabling and system components are connected, the system ground is installed, and power is supplied to the system, it is preferable to test the product pump for operation prior to putting the probe in the well. It is convenient to have two people for this operation; one near the Auto Seeker system to listen to the pump in the Probe, and one to operate the control box. ***NOTE: The Probe should be held outside of any classified zone around the well head while this test is being performed.*** This might be accomplished by manually unwinding enough of the Probe cable from the Auto Seeker to reach an unclassified zone if the zone is close enough. The proper procedure for doing this is as follows:

Unwinding the Probe Manually

Disconnect the Auto Seeker cable from the Auto Seeker or the Control Box, whichever is more convenient. Once disconnected, the Auto Seeker's reel may be turned by hand without disrupting the synchronization built into the Auto Seeker assembly. The probe may be rewound by turning the reel in the opposite direction. To prepare to resume normal operation, rewind the Probe up to its home position (but no farther - stop when reel becomes difficult to turn). Then reconnect the Auto Seeker cable.

Pump Power Test Procedure

(Refer to drawing below). The System Power Switch governs all power to the system when it is connected to an AC power source, including the Control Box, Probe, and Auto Seeker. A yellow lamp will light indicating that the system power is ON.

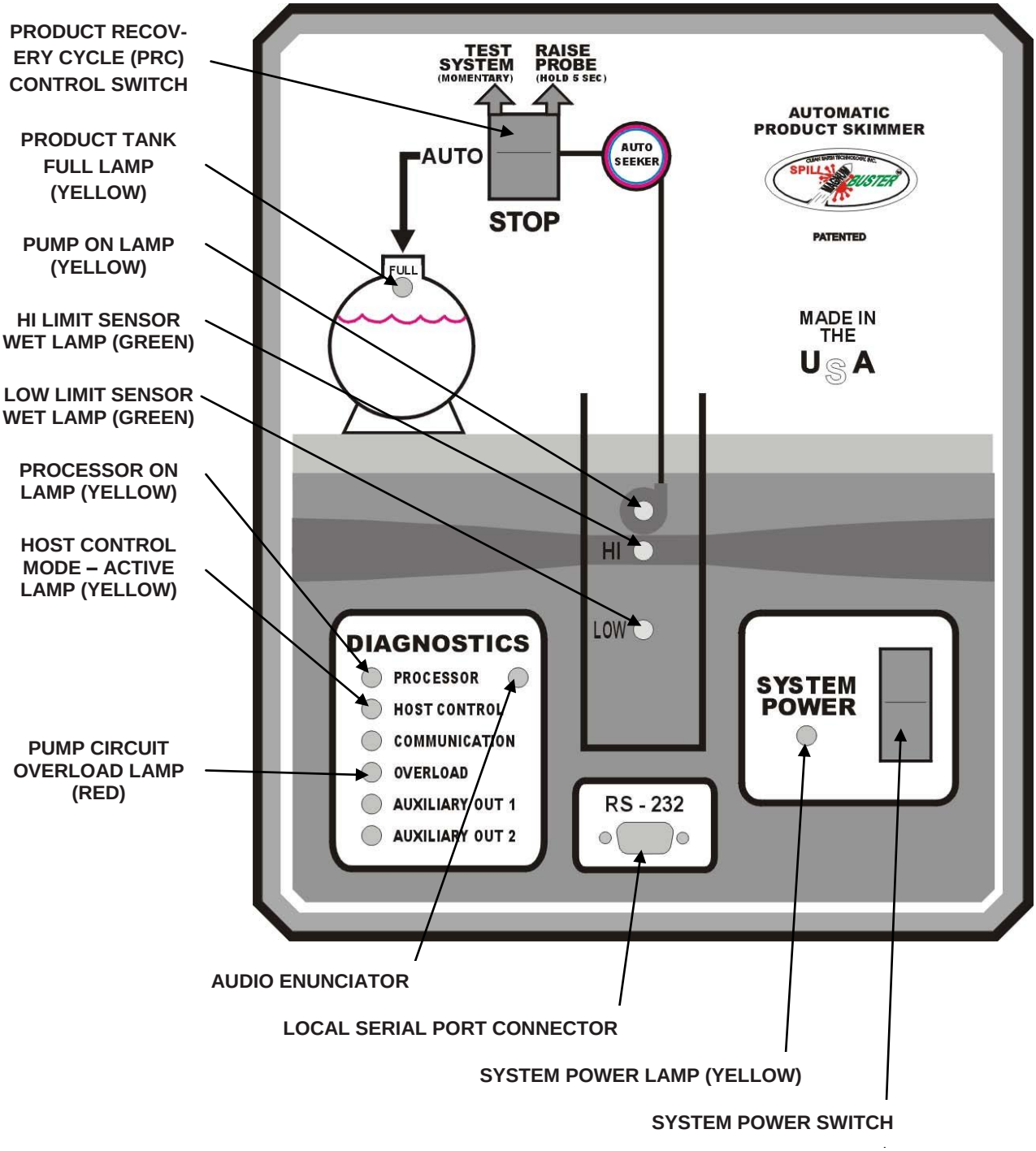
1. Turn the System Power switch ON. The System Power lamp, and Processor lamp, on the control panel will turn ON, and the audio tone in the control box will begin to beep once every 2 seconds.

2. Press and release quickly the TEST SYSTEM side of the Product Recovery Cycle (PRC) control switch. The product pump (in the probe) will operate for approximately 5 seconds and then stop. The yellow product pump lamp on the control panel will light and the audio tone in the control box will produce a warbling tone while the pump is ON. Simultaneously, along with the audible motor sound, starting the pump usually causes the entire probe and cable to visibly twist and jerk as a result of the pump torque reaction.

3. Immediately after the test, push STOP at the PRC switch. Otherwise, Auto Seeker will begin to cycle and unwind Probe cabling off the reel.

4. Turn the System Power switch to OFF.

NOTE: You must remove the pump from the Probe (See "Removing the Product Pump" on page 74) and perform the Pump Flooding Procedure (page 32) before lowering the Probe into the well.


PRODUCT RECOV-
ERY CYCLE (PRC)
CONTROL SWITCH
PRODUCT TANK
FULL LAMP
(YELLOW)
PUMP ON LAMP
(YELLOW)
HI LIMIT SENSOR
WET LAMP (GREEN)
LOW LIMIT SENSOR
WET LAMP (GREEN)
PROCESSOR ON
LAMP (YELLOW)
HOST CONTROL
MODE – ACTIVE
LAMP (YELLOW)
PUMP CIRCUIT
OVERLOAD LAMP
(RED)
TEST
SYSTEM
(MOMENTARY)
RAISE
PROBE
(HOLD 5 SEC)
AUTO
STOP
AUTO
SEEKER
AUTOMATIC
PRODUCT SKIMMER
PATENTED
MADE IN
THE
USA
FULL
HI
LOW
DIAGNOSTICS
PROCESSOR
HOST CONTROL
COMMUNICATION
OVERLOAD
AUXILIARY OUT 1
AUXILIARY OUT 2
RS - 232
SYSTEM
POWER
AUDIO ENUNCIATOR
LOCAL SERIAL PORT CONNECTOR
SYSTEM POWER LAMP (YELLOW)
SYSTEM POWER SWITCH

Pump Flooding Procedure

Before a probe can be installed down the well (or re-installed after servicing) the pump must be flooded. The purpose of this procedure is to displace oxygen and vapors from within the pump body. Once the system is installed, the added fluid will be pumped out to the recovery container during the first recovery cycle. **Note:** CET does not ship new or serviced systems with the pump pre-flooded.



Required Equipment:

- A suction device, such as syringe pictured at right. **NOTE:** If purchasing device separately, any O-ring included should be replaced with a Viton ® O-ring to prevent swelling.
- Suitable container for the fluid
- Approximately 8 fl oz of flooding fluid, such as Ultra-Pure Paraffin Lamp Oil, mineral oil, material from the subject well, or similar non combustive fluid. DO NOT USE WATER, the pump internals are NOT corrosion resistant.
- Approximately 12”of 3/8 fuel line
- A product pump, CET P/N 90-1318-019

Flood the pump

- Attach the fuel line to the discharge side of the pump.
- Attach the other end of the fuel line to the suction device.
- Place the pump inlet in the container of fluid.
- Pull the fluid into the pump until it is observed in the fuel line.
- Remove the fuel line from the pump.
- Install (or re-install) the flooded pump into the probe (reference the “Pump Installation” section of the Maintenance Operations chapter of the Operator’s Manual).
- If the pump is not immediately installed in the probe, replace the red intake and discharge caps. The pump can then be bagged for later use or storage.

Note: Always save the red caps from installed pumps for future use.

Once the flooded pump has been replaced in the Probe (See “Pump Installation” on page 73), check through all the installation steps in this chapter to confirm that all have been completed properly. You are now ready to begin system operations.

If the Control Box is mounted in an explosion proof enclosure, make sure power at the circuit breaker panel is switched OFF. Then at the Control Box, turn the System Power switch to ON and set the PRC switch on Auto. Then close the enclosure door and install the fasteners around the flange. Torque the bolts to 30 ft. lbs. When ready to begin system operation, turn the power back on at the circuit breaker panel.

2.0 Spill Buster System Operations

7 Easy Operation Steps

1. Initial Power-Up Page 34
2. Front Panel Page 35
3. Magnum System Cycle Page 36
4. System Cycle and Schematic Page 37
5. Indicator Lamps & Audible Indicators Page 38
6. Product Recovery Cycle Control Switch Page 39
7. System Cycle Operation w/o Auto Seeker Page 40

Initial Power Up

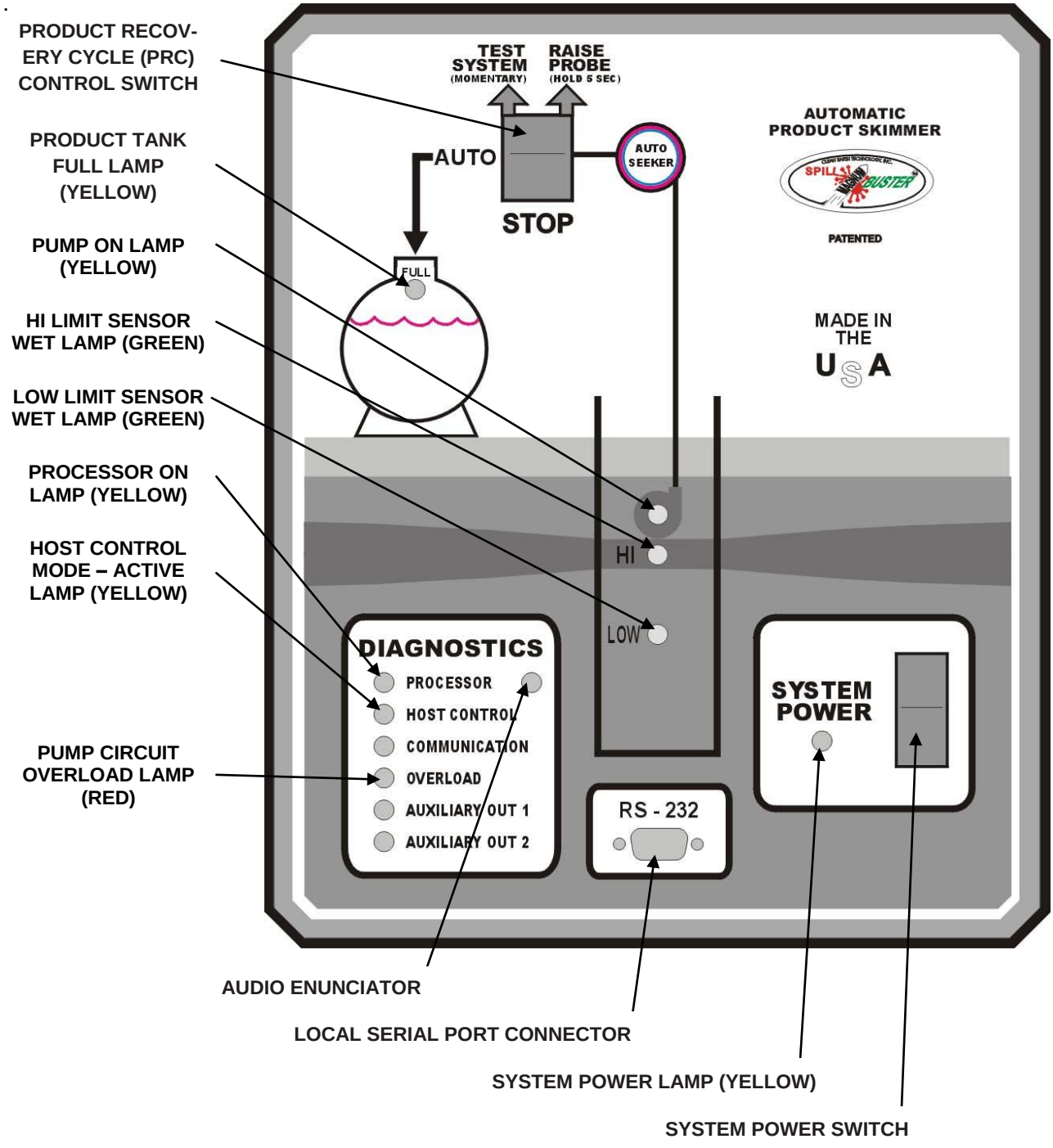


System Power Switch

The System Power Switch governs all power to the system when it is connected to an AC power source, including the Control Box, Probe, and Auto Seeker. A yellow lamp will light indicating that the system power is ON. NOTE: When the system is connected to a battery, the function of the switch is overridden. After the system is turned ON and the PRC switch is in the AUTO position, the system will begin its cycle after a 5 second delay.

NOTE: Audio tones operate for approx. 5 minutes after the system power is turned ON and when re-starting the Auto Cycle (PRC Switch). See charts for Indicator Lamps and Audio Indicators on page 32. The tones can be turned OFF altogether by altering DIP Switch S1-4 in the I/O Extension.
[See Dip Switch Settings, page 42]

Magnum Spill Buster Front Panel



Magnum Spill Buster System Cycle

Seeking the Interface

There is a 5 second delay between the time that the System Power switch is turned ON and the moment the cycle begins. The system will begin to automatically seek the water table by lowering the Probe. The Audio Enunciator in the Control Box will beep every 2 seconds. The Probe will pass through the layer of product and seek the level of water in the well. When the Low Limit sensor contacts the water, the Low Limit lamp will light, and the system will beep 2 times per second. When the HI Limit sensor contacts water, the HI Limit lamp will also light, and the Audio Enunciator will emit a continuous tone. When the HI limit sensor gets wet, the Auto Seeker will raise the Probe until the HI limit band is above the water table PLUS an additional amount as determined by the "Interface Clearance" dip switch S4-3 and S4-4. [See Dip Switch Settings, page 42] The HI limit lamp will go out when the sensor becomes dry.

Many system parameters including cycle time, pump rate, and probe interface clearance, may be altered by changing dip switches. See DIP Switch Settings, page 42

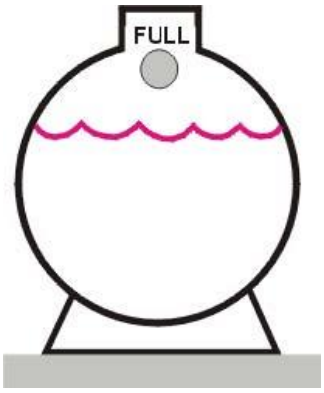
Pump Cycle

The pump will begin to pump product, the yellow Pump lamp will light, and the system will emit a warbling tone. The pump will continue to operate until it pumps air (or unloads).

Cycle Delay Time

The system cycle enters a time delay to allow more product to flow into -or recharge- the well. The Magnum Spill Buster system will automatically adjust the delay time interval from 10 seconds to up to 6 hours based on the length of the pump cycle, according to the standard factory configuration of the dip switches. The system cycle delay time is a function of the recharge rate. [See Dip Switch Settings, page 42]

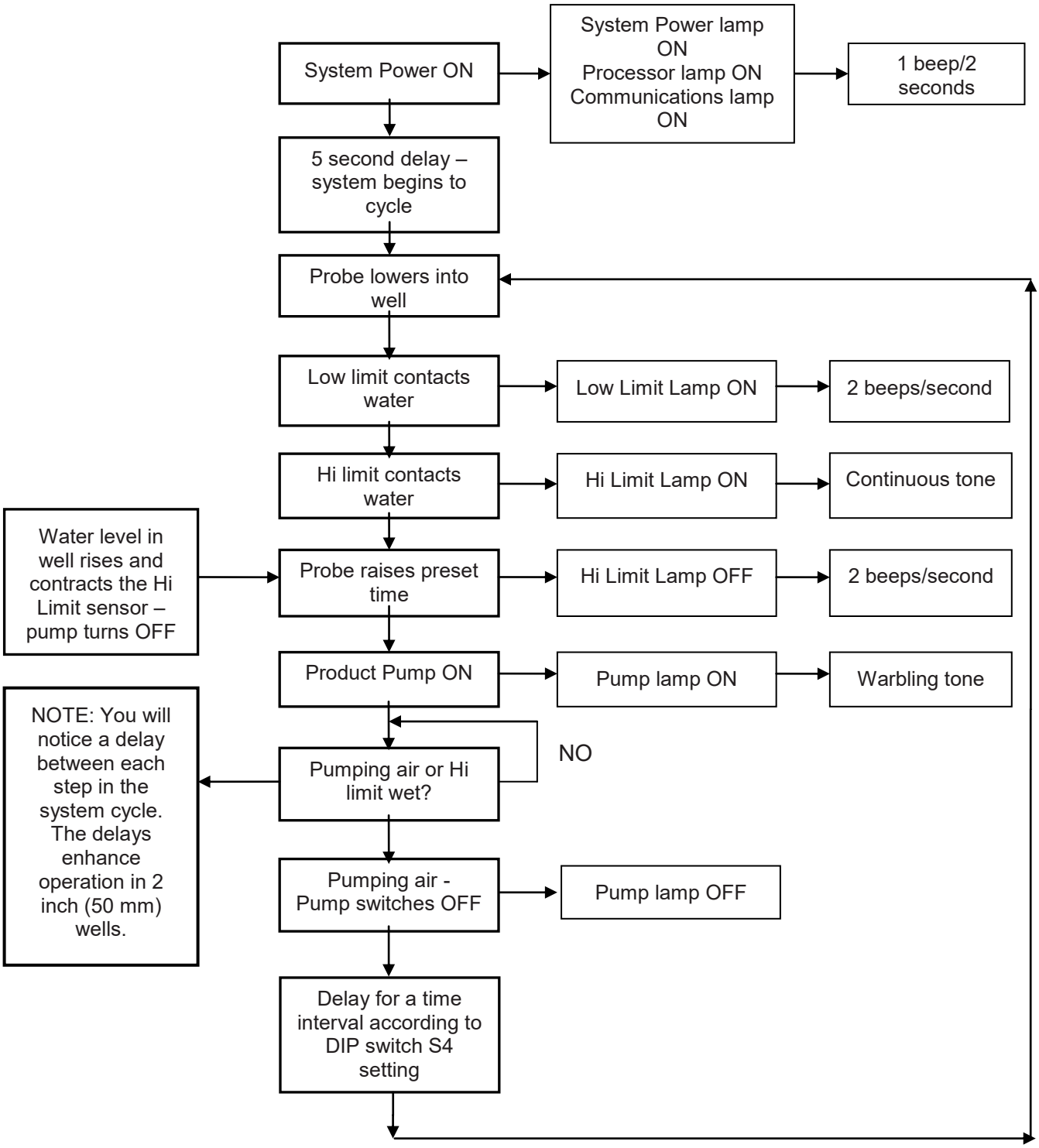
Pump Override



The Magnum Spill Buster system is configured with a Product Tank Override Probe. This Override Probe will inhibit pump operation when the product tank is full, or when the Product Tank Override Probe is missing. When one of these two conditions exists, the "full" lamp will light in the product tank on the Control Panel. A Dip Switch (S2-4) is available to override this function when a Product Tank Override Probe is not used. [See Dip Switches Settings, page 42]

NOTE: The Product Tank Lamp should not light when the system is turned on, unless the Product Tank is full, or the product tank override probe is not connected.

System Cycle Schematic with Auto Seeker



Indicator Lamps

Label	Color	Indication
System Power	yellow	ON when unit has been switched ON
Overload	yellow	ON when a pump overload condition has occurred
Full	yellow	ON when product tank is full (float switch closed) or when Product Tank Override Probe is not connected to Control Panel
Pump ON	yellow	On when product pump is energized
HI	green	On when the high limit probe sensor is contacting water
LO	green	ON when the low limit probe sensor is contacting water
Processor	yellow	ON indicates normal control function. Blinks when (a) pump circuit overloaded (e.g. failed pump) or (b) pump circuit is open

Audible Indicators

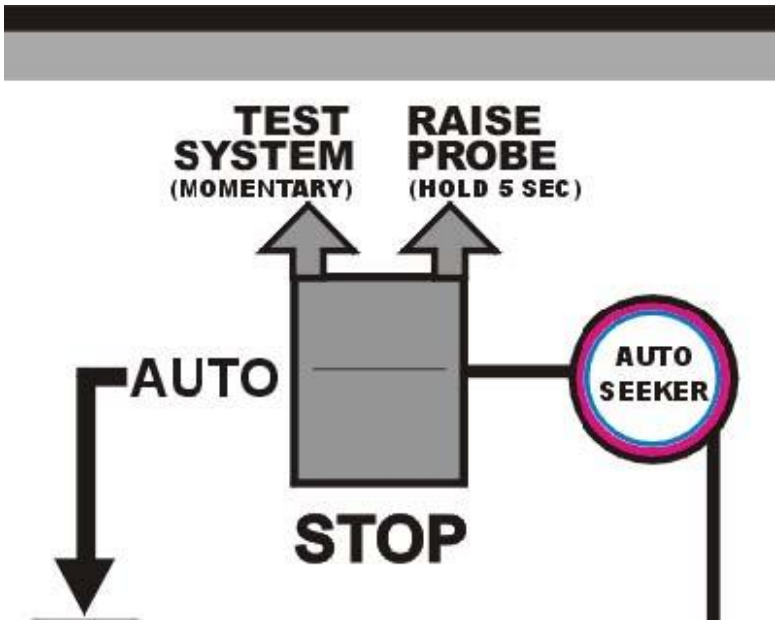
Tone Sequence	Indication	Priority
Continuous tone	Hi limit sensor is contacting water	highest
Warbling tone	Product Pump is operating	***
2 beeps/second	LO limit sensor is contacting water	***
1 beep every 2 seconds	System Power is ON	lowest

Product Recovery Cycle (PRC) Control Switch

The PRC is a 3-way rocker switch, and is located on the upper left-hand corner of the Control Panel.

Auto

At system power up, the PRC switch is in AUTO (its rest position), which allows the system to cycle automatically; that is, the Auto Seeker will lower the probe into the well after 5 seconds, etc. The system will start to lengthen its cycle time depending on the amount of product being pumped, i.e. a shorter cycle time for faster recharge rate. When depressed, this switch performs a test cycle, raises the probe, or stops the system from operating. **NOTE: System Power remains ON.**



Test System

A momentary push on the top of the PRC Control switch causes the pump to run for 5 seconds; then the system will initiate a new cycle (i.e. the probe will seek the product/water interface and start to pump the product. This Test System cycle is typically used during system installation while holding onto the probe to determine if the pump is functioning properly, prior to lowering the probe into the well. After testing, press STOP to prevent the system from beginning to cycle, or AUTO to leave system operating.

Raise Probe

If the top of the PRC Control switch is depressed and held for more than 5 seconds, the Auto Seeker will raise the probe to its upper limit for ease of Auto Seeker/probe removal. The system will not start normal operations again until the switch is moved to STOP and then to AUTO.

Stop

Depressing the Stop side of the PRC switch will stop the product pump or the Auto Seeker mid-cycle. **NOTE: System Power will remain ON**. Returning the switch to the AUTO position will initiate a new cycle after 5 seconds. Pressing STOP will also reset the Automatic Cycle Timer to 10 seconds if dip switches S4-1 and S4-2 are set for AUTO (both OFF). Refer to section 3, Dip Switches.

System Cycle Operation (no Auto Seeker)

The Auto Seeker is not used in the Magnum Spill Buster system in three modes as follows:

- In a water depression mode, where the Magnum Spill Buster is set up in tandem with a Water Depression Module,
- In a DNAPLs or “sinkers” mode, where the probe intake will be positioned as close to the bottom of the well as practicable,
- When there is no water in the well. [See OPTIONS: Magnum Spill Buster used for DNAPLS, page 44].

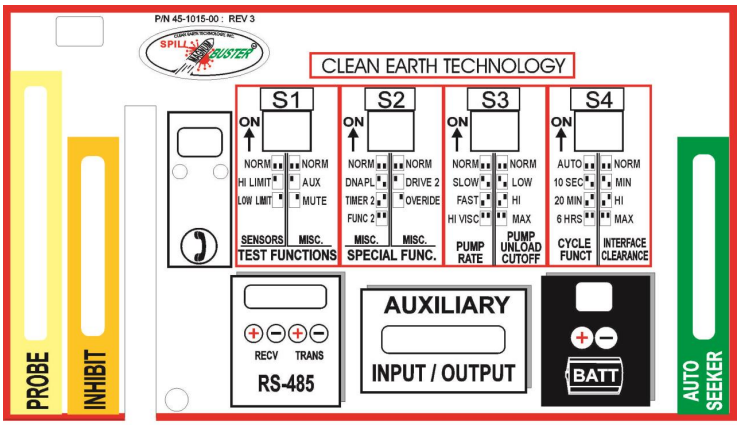
The Magnum Spill Buster system will automatically recognize that no Auto Seeker is plugged in. The pump will continuously pump product until there is no more product to pump, and it starts pumping air. The pump will cycle periodically (according to DIP Switch S4-1 and S4-2 settings, page 42) if the Hi sensor is not contacting water. The pump will also cycle whenever the Hi sensor goes through a transition from wet to dry.

When a Water Depression Interface is connected to the Magnum Spill Buster, the Auto Seeker is not moved up or down, but rather the probe is fixed at the desired water level. The depression pump will move the water/product interface past the product pump intake causing the product pump to cycle.

3.0 Spill Buster Advanced System Operations

DIP Switches page 42

DNAPLs (Sinkers) Operation page 44



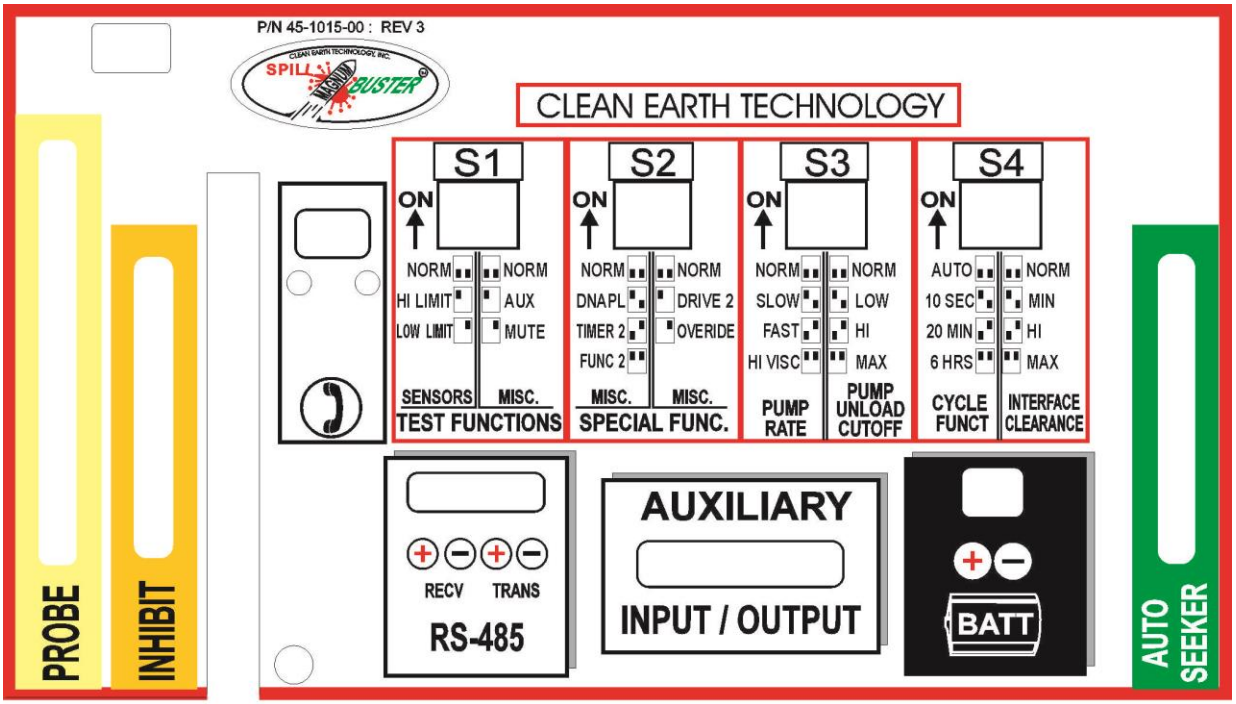
Advanced operations are defined as operating modes that are not set at the factory before shipment of the unit to customers and/or field sites. Modifying the standard operating modes is usually accomplished by changing the DIP Switch settings, which are located on the I/O panel located underneath the main Control Box enclosure.

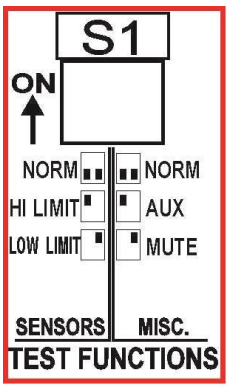
DIP Switches

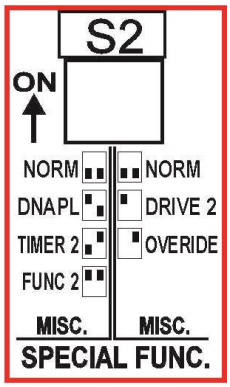
To access the DIP Switches, unscrew the two screws on the bottom corners of the I/O Extension and remove the cover.

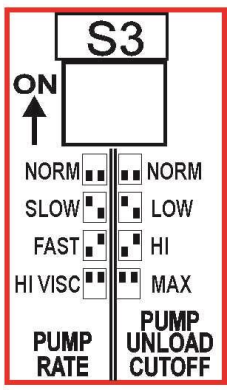
DIP Switches S3 and S4 are used to adjust and customize the Magnum Spill Buster system to individual sites and applications. The Magnum Spill Buster comes from the factory with DIP Switches preset to a standard configuration which automatically adjusts the cycle delay time interval from 10 seconds up to 6 hours [12 hours for versions previous to V.4], according to the recharge rate. This configuration will work for most sites. In some cases, changing DIP Switches from the standard configuration may increase the rate of product recovery or may increase pump life, depending upon the specific site conditions.

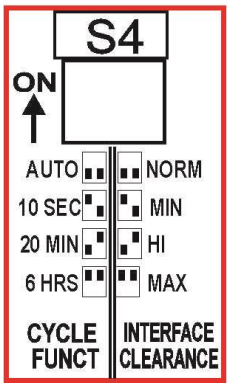
DIP Switches S1-1, S1-2, S1-3, S2-2, & S2-3 are used for factory testing and troubleshooting. These DIP Switches should **NOT** be changed unless directly requested by Clean Earth Technology personnel. DIP Switch Set Nos. 3 thru 4 control user functions of the system, and affect probe actions, including probe height above interface, pump speed, and pump cutoff. The DIP Switch functions are discussed below. For further help and instruction with the DIP Switches and the improvements they may make to your site, please call the factory.











S1 - The group of switches labeled **S1** and **TEST FUNCTIONS** are all for CET test functions, with the exception of S1-4. This switch silences all audible indicators in the Magnum Spill Buster system. Normal setting is all four switches OFF.

S2 - The group of switches labeled **S2** and **SPECIAL FUNCTIONS** contains more CET test functions with two exceptions: **S2-1**, which enables the Magnum Spill Buster system to pump DNAPLs; and **S2-4**, which allows the Magnum to operate without the product tank override probe connected. Normal setting is all four switches set to OFF. WARNING: WITHOUT OVERRIDE PROBE CONNECTED, FULL TANK IS NOT DETECTED AND SECONDARY SPILL MAY OCCUR.

S3-1 & S3-2 - The group of switches labeled **S3** and **PUMP RATE (S3-1 & S3-2)** controls the pump motor speed. Slow is the lowest speed and may be used when the product layer is thin. A thin product layer may create foam when pumped too quickly. Normal is a middle speed, and fast is for maximum speed. Fast may be used when dealing with either medium viscosity product, or greater back pressure in the product tube, or greater well depth. High viscosity products are most effectively pumped using our High Viscosity Magnum Spill Buster system.

S3-3 & S3-4 - The group of switches labeled **S3** and **PUMP UNLOAD CUTOFF** selects pump current cutoff threshold. The system should be started at normal. If the Magnum pumps air and doesn't cut off, or if the pump cuts off prematurely (i.e., product remains in the well that should be pumped out), then change switches **S3-3** and **S3-4** as follows: if cutoff is premature, decrease the setting; if the pump does not cut off while pumping air, increase the setting. Allow the Spill Buster to run through 2 or 3 cycles between changes in cutoff switch settings. Any change in PUMP RATE settings (**S3-1 and S3-2**) will affect **PUMP UNLOAD CUTOFF. Be sure the pump cuts off within 15 seconds when pumping air. Continued dry pumping will damage the pump. NOTE: MAX setting is intended for set up/demo use ONLY, and in most cases will not result in a desirable recovery rate.**

S4-1 & S4-2 - The group of switches labeled **S4** and **CYCLE FUNCTIONS** determines the time delay interval between pump cycles. Automatic is the normal setting, directing the Magnum control to vary the delay time interval according to the amount of product pumped. The other three settings are fixed time intervals: 10 sec., 20 min., & 6 hrs. **NOTES: The fixed time intervals will override the automatic delay time adjustment feature of the Magnum system, and it will continuously cycle at the time delays specified. The 10 second setting is for test, and it may be useful when setting up the Magnum system. If left in the 10 second setting, the pump will automatically switch to the 20 minute interval after 20 cycles.**

S4-3 & S4-4 - The group of switches labeled **S4 and INTERFACE CLEARANCE** determines how high the pump intake will be raised above the product/water interface. These settings are useful to avoid biological growth that accumulates at the product/water interface in some wells. The MIN setting is recommended in a well with no biological growth and will result in the maximum recovery of product and minimum product thickness (approximately 0.1" (0.25mm). NORMAL will give a greater distance from the interface, with MAX being the highest (approx. 2").

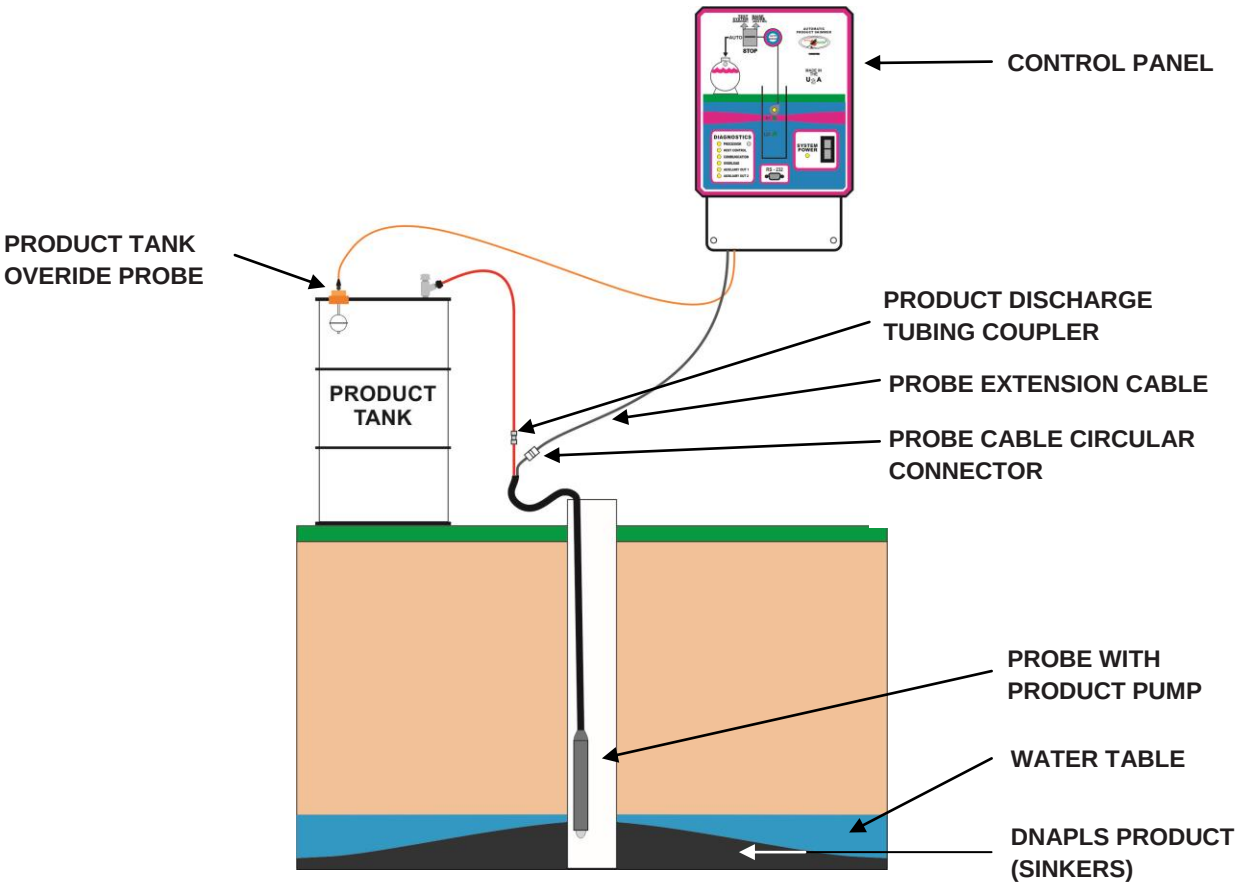
DNAPLs Operation

General Description

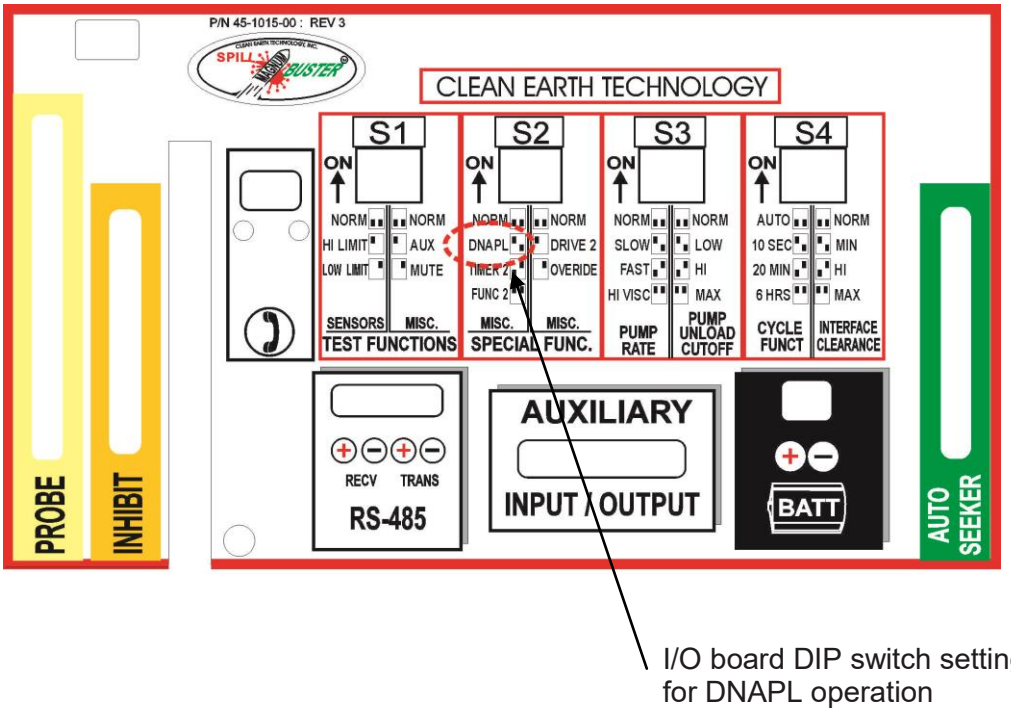
DNAPLs (or “Sinkers”) refer to those products that are heavier than the water and therefore are found below the water layer rather than above, as in the case of floating product. By following the procedure below, the Magnum Spill Buster may be adjusted to automatically pump low viscosity sinkers from a 2” well from depths of up to 150(?) feet.

DNAPLs Procedure

The system should be run with no Auto Seeker or with Auto Seeker disconnected. **Set I/O board DIP Switches S2-1 to ON and S2-2 to OFF.** Lower the probe into the well to a point 3” - 4” above the bottom. This positions the probe to avoid sediment and sludge which could clog the intake.

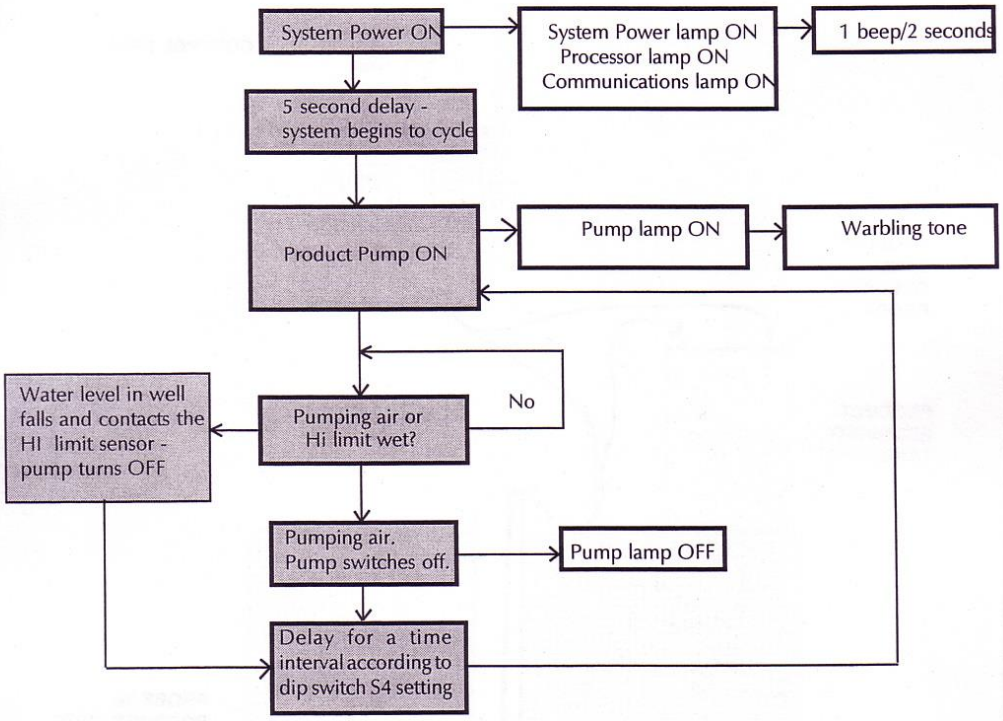


In the DNAPLs mode, the product recovery cycle differs somewhat from the standard cycle. The pump will run periodically according to the DIP switch **S4-1** and **S4-2** setting, as long as the HI limit sensor is not contacting water. As the sinker product is pumped off, the water/product interface will drop. When the HI limit sensor contacts water, the pump will stop and a delay will occur before the next cycle. If water is not present in the well, the pump will be stopped when it begins to pump air.



I/O board DIP switch setting for DNAPL operation

DNAPLs System Cycle without Auto Seeker



4.0 Other Options

1. Immediate Response Box, page 48
2. Battery Operation, page 49
3. Solar Panel Charging System, page 50
4. Water Depression Control Manual, page 57



Immediate Response Box

The Immediate Response Box (I.R. Box) is a rugged plastic box that contains a Standard Magnum Spill Buster system. The I.R. Box provides an extremely portable system to start removal of product in a 2" or larger well with minimal equipment set-up. A large forged shackle is attached on the left end of the box for security. Since the I.R. Box contains a standard control box, it can be used with any other Spill Buster options.

WARNING
Control Box and Standard Auto Seeker must be located outside of any classified hazardous areas. Refer to applicable codes



The I.R. box can easily be carried in a small pick-up truck or van. The basic setup involves mounting the Auto Seeker outside of any classified hazardous atmospheres (on many sites it is possible to move the Auto Seeker from the classified hazardous zone by raising it above the well head); then connecting the product tank discharge tube and overflow sensor to the product tank, and connecting the Auto Seeker cable and the probe signal cable.

The system is powered by 115VAC from an extension cord (see pg. 63 for extension sizing). In addition, cables can be provided to operate the system from a 24 volt deep cycle battery. See page 49 for battery operation of system.



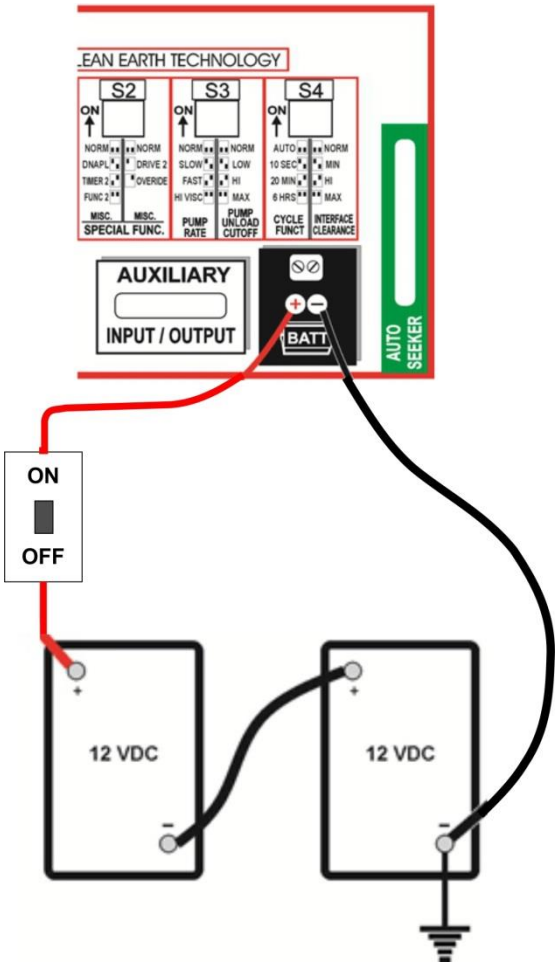
Battery Operation

For sites with no utility connection available, batteries can be used. While you certainly can build up your own battery system we do highly recommend using our turnkey Battery/ Solar power system since it provides the maximum protection from the element/vandals and surge protection. If you have a means of charging batteries, the solar panels are not needed.

It is necessary to ground EVERY battery operated system. [See page 16]. The batteries should be deep cycle type. [NOTE: use two 12 volt batteries in series for 24 volt power]. Use 12 AWG wire. One end of the cables will connect to the Control Box inside the I/O extension on the terminal block labeled “Batt”. Connect the other end to the battery, making sure that the polarity is correct. NOTE: hooking up a battery will bypass the power system switch. Therefore it is necessary to add an appropriate single pole power switch capable of carrying 10 Amps at 24 Vdc. This should be protected from the elements. When running wiring to the terminal block make sure the switch is turned off or permanent damage can occur. Using this switch the system will now activate as if the main power switch were turned on or off. No dip switch settings or board changes are necessary with battery operation. Battery life will be a function of the battery size, well depth, product viscosity and many other factors.



NOTE:
When operating the Magnum Spill Buster on battery power, remember to ground the system properly. Refer to page 16 for proper grounding procedures.



Remote Modular Battery or Solar Panel Charging Option



For sites with no utility connection available, an enclosed modular battery powered system can be supplied to power a Spill Buster system and also an extra set of batteries which will be used to swap out freshly charged batteries during periodic site visits. This system is also designed to easily have photovoltaic recharging solar panels added either on initial installation or at a later date. These systems are 24 VDC which work in conjunction with two solar panels. Larger systems with four panels can be special ordered.

The two 12vdc batteries, the 24vdc solar panel controller, 3 circuit breakers and a lightning surge arrestor are all built into a 13.5" x 19" x 16” mill finished aluminum NEMA 3R enclosure. This enclosure may be mounted on a pole, tower or a flat surface. All internal wiring comes preassembled with terminal blocks for connecting the cables between the two solar panels and a power wiring cable going out to the Spill Buster System. A bronze grounding lug is provided for a separate surge protection grounding rod.



The Solar Power Module is vented and has a pad lockable latching front door for easy access to the wiring and circuit breaker switches. The standard unit is not rated for operation in classified areas. However, the standard unit is built with a charge controller which is UL listed, and FM and CSA rated for Class 1, Div. 2, Groups C, D hazardous locations as are the solar panels. If Solar system requires full Class 1 – Div 2 rating, it can be easily and economically achieved by replacing the 3 circuit breakers with rated versions by special order.



The ASC charge controller is 100% solid state and is completely sealed against harsh environments. Independent lightning surge protection and a blocking diode are included in the controller. The number of panels needed depends both on the available sun power at the geographic location of the site, and on the amount of product present, which determines the percentage of time the Magnum will be running and thus defines the overall power requirement. Please contact Clean Earth Technology, Inc. for a solar power quotation specific to your site.

General System Specifications



- **Batteries:** Two 12v Deka 108Ah@C/Rate Deep Cycle Solar Rated. Max charging rate is16 amps @ 24vdc

- **Charge Controller:** ASC charge controller is UL listed, and FM and CSA rated for Class 1, Div. 2, Groups C, D hazardous locations. There is no minimum battery voltage required to start charging at sunrise. Please note that the controller has a Low Voltage Disconnect (LVD) which will power down the Spill Buster and prevent the batteries from being completely discharged. Please note that draining a Lead Acid battery of any kind will shorten the life of the battery.



- **Circuit Breakers:** Three Circuit Breakers (C-B) for circuit protection and manual switching. One C-B is used to turn the Spill Buster on and off (Right most C-B). The second C-B is used to disconnect the solar panels (Middle C-B) and the third C-B (Left Most) is used to disconnect the batteries from the charge controller.

- Unit comes with a 10 foot rugged duty power cable made to easily wire into the Solar Power Module and the Spill Buster. Longer power cable lengths are available on special order.

- **Weight:** 15 pounds

Solar Panel Mounting

The most typical solar method of mounting the solar panels is near the top of a 10-12 foot pole utilizing a mounting frame as shown. Other mounting brackets are available. Please note that all systems will need a minimum of two solar panels or in multiples of two panels in order to obtain the 24 volts dc required by the Spill Buster system.

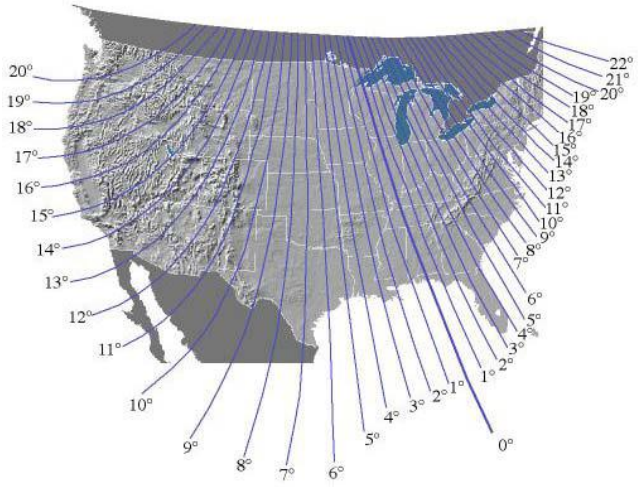
NOTE: The support post is not provided with the system. Galvanized pipe for use as the support post is readily available at most hardware stores. The pipe diameter should be a minimum of 2.5” if the panels will be mounted less than 10’ high and 3” in diameter for heights above 10’.



The picture below shows an alternative mounting method that Clean Earth Technology, Inc. can provide.

Other options include mounting on movable trailers, on the roofs of sheds so long as they are pointed in the proper direction and many other methods that a customer might come up with. Please consult Clean Earth Technology, Inc. for further options or ideas if needed.

Solar panels should be positioned with as few obstacles between them and the sun as possible. All panels should be positioned to face true south if you are in the northern hemisphere, or true north if you are in the southern hemisphere. True north or south is not the same as magnetic north or south. If you are using a compass to orient your panels, you need to correct for the magnetic difference, which varies from place to place. See diagram below to determine magnetic North.



The optimal tilt angles of the panels are variable with respect to the sun's position by season. Also, if you live where there is snow, adjusting the panels to a steeper angle in winter makes it more likely that they will shed snow. A panel covered in snow produces little or no power. Clean Earth Technology, Inc. can help you locate information on the optimal angles by season for your site if you plan to make that adjustment.

In many cases, however, it is either not convenient or not possible to alter the angle of the panels once initially mounted. If your solar panels will remain at a fixed tilt angle and you want to maximize the power generated over the entire year, the formulas below will help you determine the best angle (starting at horizontal) to tilt the panels:

If your latitude is below 25°, use the latitude times 0.87.
If your latitude is between 25° and 50°, use the latitude, times 0.76, plus 3.1 degrees.

Solar System Operation

The operation of the ASC charge controller mounted in the enclosure is completely automatic after it is initially installed. This controller will regulate the charging of batteries during conditions of heavy usage, or when left unattended for long periods of time.

WARNING!
Proper ventilation MUST be provided for the batteries and their boxes.
Most batteries produce hydrogen gas while charging or discharging. Under normal operation the hydrogen is contained within the battery enclosure but in abnormal conditions it is possible that the batteries will vent excessive gas build up through special vents. Hydrogen gas is very flammable. DO NOT expose the batteries to open flame, matches, cigarettes, or sparks.

Solar System Wiring

WARNING!

Photovoltaic Modules will be "live" upon exposure to light. There will be a voltage present on the output terminals. This voltage will vary according to the type of the photovoltaic module. The array will generate voltages substantially higher than the system nominal voltage, thereby resulting in a shock hazard.

Solar panel voltages may be minimized by completely shading the array before making any connections. Extreme care should be exercised when working with batteries. Batteries contain a high discharge current capacity and caustic compounds are present. Sparks, flames, smoking materials, etc. can ignite the gases of some batteries. Eyes, face, and hands should be protected. When working with in the enclosure that any tools should be mostly covered with an electrically insulation layer to minimize potential for accidentally dropping any tools across battery terminals. Use all tools with extreme care.

Carefully read the installation instructions before attempting to electrically connect any part of the power system. Most charge controllers and inverters are permanently damaged if the battery polarity is reversed when it is connected the controller.

The cable wiring should be hooked up per the cable schematic shown below. Note that both the Magnum Spill Buster and the solar panel(s) need to be grounded as shown on page 16. Use the provided cables to do the wiring.





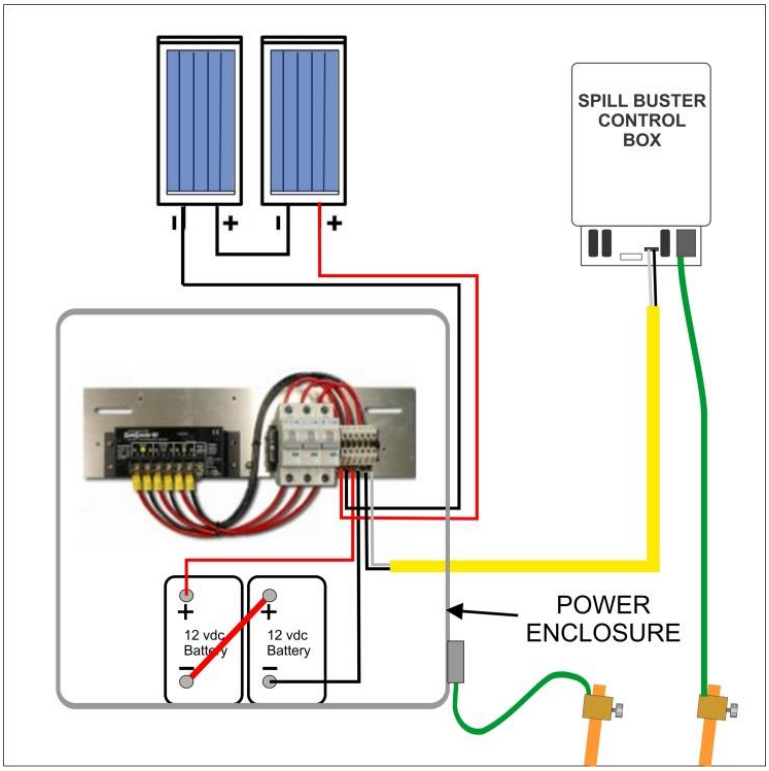
The Yellow power cable supplied is designed such that the white and the black wires go into the battery terminal block. White is the Positive Voltage and the Black wire is the Negative wire. Be absolutely certain that the positive "White" wire is not reversed on either end of the cable installation or permanent damage may occur to the Control Box.

The control Box must also have a separate green wire run from the Ground Lug in the AC Power terminal block (shown in the picture above at the right) and run to its own separate 8' copper clad grounding rod as shown in the schematic below. This wire is the necessary grounding rod to complete the sensor bands electrical path needed to be able to sense the Product/ Water interface. A second grounding wire should also be hooked to the Power Module cabinet Grounding Lug and terminated to a separate 8' grounding rod. This rod is to drain any surge voltage that may hit the solar array or battery enclosure and should be driven into the ground as far away as reasonably possible from the sensor signal grounding rod.

Follow the manufacturer's instructions for mounting and wiring the solar panels, batteries and the load. Install with the correct series configuration to insure proper system voltage and current. **Be sure all circuit breakers are turned off during set up.**

WARNING:
Make sure to correctly note the source and polarity of the wires using colored wires or tags***. Incorrect polarity may damage the ASC charge controller or the Spill Buster.***

Solar System Operation



The operation of the ASC charge controller is completely automatic after it is initially installed. This controller will regulate the charging of batteries during conditions of heavy usage, or when left unattended for long periods of time. Please note that the Spill Buster will not turn ON and Off using the normal ON/OFF Power switch located on the lower right of the from panel. The unit must be turned On and Off using the right most circuit breaker located in the Turnkey Solar Power Module.

The ASC controller provides pulses of charging current at varying durations to maintain the batteries at a full state of charge and insure the long-term health of the batteries. The “on” and “off” cycle time is wide enough to eliminate electronic noise and short enough to insure the batteries are always topped off. This method allows the batteries to reach a higher voltage with the “on” cycle and protect the batteries from gassing in the “off” cycle. This will provide the benefits of the higher voltage (reduced sulfation and stirred up electrolytes) and prevent excessive gassing and excessive water loss.

Temperature compensation is provided by a small temperature sensor on a 10 foot lead. This sensor should be mounted on one of the batteries within the battery box. This sensor monitors the battery temperature and adjusts the charging thresholds according to battery temperature.

A TYPICAL DAY: A typical daily cycle will be as follows. As the charging starts for the day when the battery capacity is low, charging will be continuous. As the battery charges up, current will pass into the battery for a while and eventually stop. Later, charging will resume and the system will continue this cycle throughout the day.

The ASC controller is provided with an auxiliary relay for Low Voltage Disconnect (LVD) which disconnects the batteries from the Magnum Spill Buster when the voltage goes below the minimum voltage required for operation, which is 17vdc. In the morning, as the solar panels recharge the battery, the power is reconnected when the batteries reach 24vdc. At that point the Magnum will automatically power up and start normal product recovery operation.

NOTE: Due to the LVD mentioned above it is possible that the batteries are disconnected upon an early arrival to the site if the batteries are below 17vdc. Thus the Spill Buster will not function at all. If you see this condition then you can measure the voltage on the batteries to insure that the battery voltage is in fact low and it is not due to a failure of the Spill Buster. In the event that the Spill Buster is off due to a LVD trip you will need to wait until the solar panels bring the voltage back up to 24 vdc.

Please note that the Spill Buster will not turn ON and Off using the normal ON/OFF Power switch located on the lower right of the from panel. The unit must be turned On and Off using the right most circuit breaker located in the Turnkey Solar Power Module.

Common Questions or Problems

THE MOST COMMON CAUSE OF PROBLEMS IS BAD CONNECTIONS.

If your system was working but develops problems, suspect a bad connection, especially if you have changed nothing. With the system operational, and current flowing, use a voltmeter to check the voltage at the terminals directly at the battery, and also on the BATTERY terminals on the ASC charge controller.

These voltages should be about the same (within a few tenths of a volt). If not, suspect a bad connection in the battery line. If these connections test properly, check the voltage at the terminals directly on the solar panels. Finally, check the ARRAY terminals on the regulator. Again, these voltages should be the same. If you find a voltage difference, inspect for corroded or loose connections, blown or loose fuses, or any other possibility for a bad connection. Even if there is no visual sign of damage, if you measure a voltage difference it confirms that you have a bad connection, and need to clean and tighten all possible connections.

If the problem appears to be a blown fuse, locate and correct the cause before replacing the fuse or the replacement will likely also be damaged. Please note that there is battery temperature compensation which will not allow the charger to operate if the sensor or wiring is compromised. Inspect the temperature sensor and sensor wire for a broken sensor or a cut or frayed sensor wire.

High voltage from nearby lightning strikes or other sources can damage the controller in spite of the built-in lightning protection, and if that does occur then it will not charge the batteries. To test the controller, first disconnect the batteries. With the panel properly connected, measure voltage at BATT(+) and BATT(–) terminals on the ASC charger. The reading should be between 28.0 and 30.0 volts.

Note: these voltages may vary slightly if the temperature sensor is hot or cold where the batteries are stored. A very high reading of 30-42 volts would indicate an open FET; a very low reading of 2-7 volts would indicate a shorted FET. Charge controllers with open or short FET's are defective and need to be replaced.

Water Depression

Dual pump product recovery operation can be accomplished with the Magnum Spill Buster System plus a Clean Earth Technology Water Depression Control Module and a Grundfos Redi-Flo 3 SQE-NE pump sized to your well. The Magnum Water Depression system is designed specifically to take advantage of all the features of the Grundfos Redi-Flo 3 SQE-NE pump. This Module obtains its water level signals and control logic from the Magnum system control box and in turn controls water flow by using the soft start feature of the Grundfos pump to turn it on and off. This line of Grundfos pumps is upgraded to safely bring the high level AC voltage through the recovery zone to the pump without the need for specialized fittings.

A set of normally open contacts are provided for use with a safety override probe, which will shut down the water pump when closed.

Typical installation of a Water Depression Control Module

alongside a Magnum Spill Buster Control Panel



Water Depression Specifications

Input Power	115 VAC or 230 VAC, 30 AMPS maximum
Operating Temperature Range	40 to +140 degrees F or -40 to +60 degrees C
Pumping Rate	0 to 33 GPM depending on water pump sizing
Standard Well Depth	50’ max
Maximum Well Depth	150’ on special order with 175’ water pump power cable.

Control Box Dimensions: 9” wide x 10.5” high x 6.5” deep. An additional 10” clearance is required below for cable exit and an additional 9” clearance is required in front and to the left for door swing.

Auxiliary Override Terminal Block: Provides wire termination for an Auxiliary set of Normally Open switch contacts. Used for emergency water depression pump shutoff if there is a water treatment failure. Switch contacts need to be rated for 1 Amp at 12 VDC minimum.

Total Water Depression System Weight (w/o pump): 8 lbs.



Pump Requirements

Due to the inherent design features of both the Magnum Water Depression System and the pump, the Grundfos Redi-Flo 3 SQE-NE Submersible Environmental Pump is the only acceptable water pump.

WARNING!
The Grundfos Redi-Flo 3 SQE-NE is the only water pump approved for use with the Magnum Water Depression System.

120 VAC or 240 VAC motors are available
Standard flow ranges are as follow:

3 to 15 GPM
7 to 33 GPM

1/2 and 3/4 horse power motors available depending on head pressure.

Options

Power Cable Lengths.
Standard length is 50’ from water pump to well head.
Other standard lengths available: 75’ and 100’.
Extra nonstandard cables available on special order. These cables may have long lead times.

Installing the Water Depression Pump

The water Depression Pump is installed using similar methods as a regular residential deep well pump would be installed but with a few critical exceptions. Since this pump is operating in a Class 1 Div 1 environment and it is pumping water with small amounts of absorbed hydrocarbon constituents there are 2 major differences. First the pump is a special Grundfos Redi Flow 3 pump with Teflon impellers and special water seals that can withstand deterioration from petroleum based chemicals mixed in with the water. Secondly, the AC power wiring is different and is made and certified specifically to meet the NEC requirements for wiring in a class 1 Div 1 atmosphere. NEVER use standard residential power leads for these installations!

Your pump should come with the motor and pump body preassembled. The power cable will come in a separate box and will look something like picture to the right. It includes the pump/ motor assembly; the pump certified power leads with integral motor end cap, sealing grease, wire cover and 2 sheet metal screws to hold the wire protector in place and 4 machine screws to bolt the end cap on the motor.



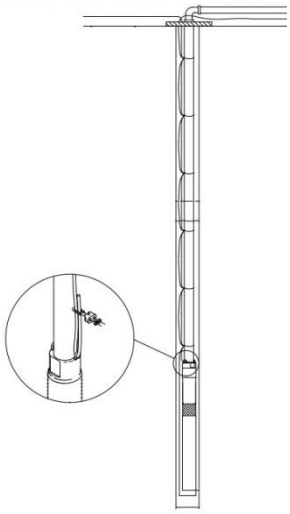
Assemble as per the provided Grundfoss assembly instructions. You will need to provide the discharge piping, the appropriate discharge piping adapter or barb, safety line of your choice with cable clamps and finally cable ties to support the power wires every foot or two as needed.

When lowering the pump be very sure that the power leads are not cut or compromised in any way. Remember that these wires are running through a Class 1 Division 1 explosive atmosphere!!



The assembled pump wiring, discharge connections, safety cabling should look approximately as shown in the picture to the left.

The whole pump assembly installed in the well should look something like the illistration to the right.



WARNING:

NEVER use standard residential deep well water pump power leads for these installations!

Water Depression Control Panel (WDCP)



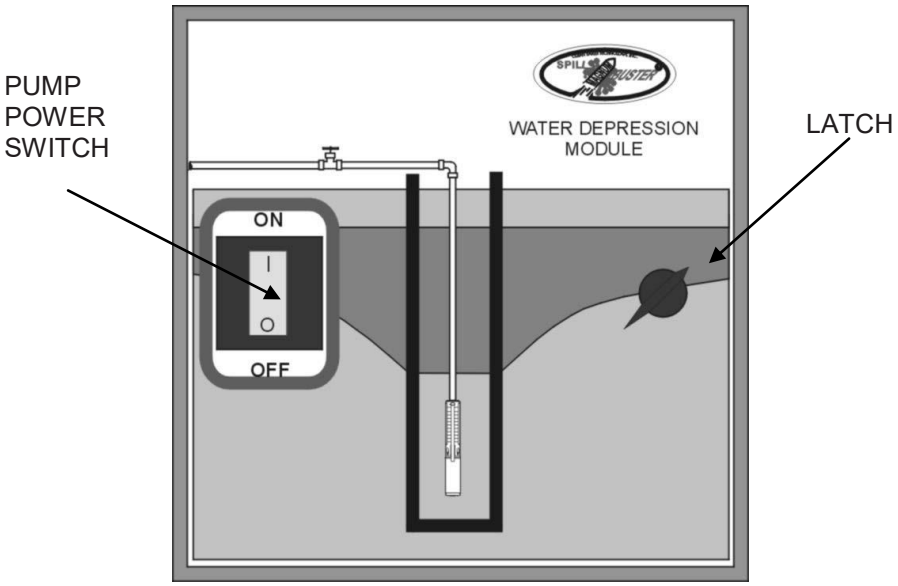
The Water Control Module is a NEMA 4 UL approved enclosure containing the water pump control solid state relay and the I/O wiring terminal blocks. The control box door should be kept latched at all times when not in use, and excessive moisture (e.g. rain) should not be allowed to enter the box. **Although there are no open contacts, this is not an explosion-proof enclosure; locate the Control Module in a non-hazardous location!**

Front Panel

The Control Panel is accessible by opening the front door of the Control Box. The Control Panel contains the main power switch for the depression pump. This switch also is a backup circuit breaker for the water pump, and is rated 25 Amps at 230 VAC.

The first (lower) position of the switch is water pump OFF. Once the switch is turned on the water system is enabled to follow orders from the Magnum Spill Buster control box, which gets its water level information from the product probe sensors. The Magnum control box will send signals to turn the water depression pump on and off as required to maintain the desired water depression level. All product skimming functions are still controlled by the Magnum Spill Buster control box as before.

WARNING!
This is not an explosion-proof enclosure; locate the Control Module in a non-hazardous location!



Installation of the Water Depression Pump

The WDP should be installed near the bottom of the screened section of the recovery well, but should not rest on the bottom of the well. Placing the WDP on the bottom of the well may result in pumping sediment that collects on the bottom of the well.

- Determine the distance from the well head to the WDP intake. Cut a length of pipe that is 0.25 m longer than the distance from the well head to the WDP intake. We recommend that 1.25" flexible plastic piping is used. Thread the WDP power cord through the pipe.
- Attach the pipe to the pump, using an appropriate fitting. At the well head end of the pipe, thread the WDP power cable through the "Y" fitting ("Y" fitting will be provided by CET). Thread the wire so that it enters the "Y" fitting at the bottom, and exits through the watertight seal. Attach the wellhead end of the pipe to the bottom of the "Y" fitting, using a 1.25" male NPT/1.25" barbed fitting. Secure the pipe to the barbed fitting, using two hose clamps.
- Secure the WDP at the desired depth, using a steel cable, nylon rope, or chain. Secure the cable, rope, or chain to the WDP, using the stainless steel loop at the top end of the pump housing. Lower the WDP into the well using the cable, rope or chain. Secure the cable, rope or chain at the wellhead to ensure that the pipe is not bearing the weight of the pump.
- Install pipe from "Y" fitting to the water treatment system. It is important to install a manual flow control valve in the water discharge line between the "Y" fitting and the water treatment system. The flow control valve is used to adjust the rate at which water is being pumped from the well. Doing so "sizes" the pump better to the actual well conditions. This will help maximize pump on/off cycle time, thereby extending the life of the pump motor. This will also tighten and smooth out depression level control.

Installation of the Water Depression Control Module (WDCM)

Mount the Control Panel in a suitable location (outside of any classified hazardous area) within a few feet of the Magnum Spill Buster Control box. Typical installations are in sheds, on the side of buildings, or on a utility type pedestal mount.

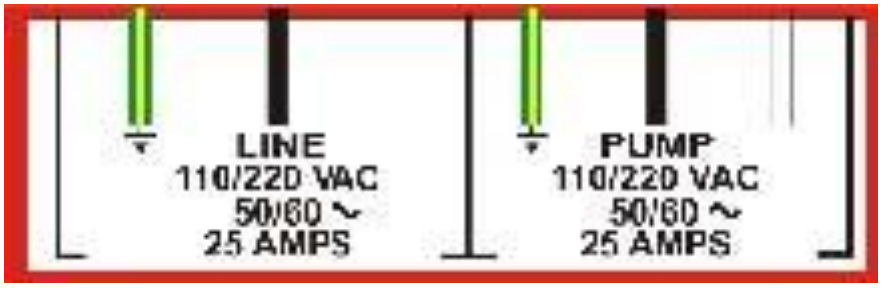
Connect the 20 pin cable from the panel to the Auxiliary I/O outlet in the MSB control box.

Hard Wiring the Water Depression Control Panel

- .**Warning-** All AC Power wiring must be done by a qualified electrician who is familiar with all appropriate NEC and/or local codes. Electrical shock may result in serious injury or death.
- **Warning-** Explosive Vapors. Always disconnect AC power at its source prior to connecting/disconnecting any wires and/or cable connections located within any hazardous locations.

The Water Depression Control (WDC) Module is designed to operate on either 115 or 220 VAC Power just by making the appropriate hook ups into the terminal block. Wiring to the module will be routed to the 120 VAC or 220 VAC portions of the terminal block depending on the voltage of the pump. It should be noted that the power into the box should be rated the same voltage and amperage as the rating for the depression pump.

The cabling coming out of the well head should be long enough that it can be run directly to the WDC Module box. Excess cable can be coiled up at the well head or control shed. Next have a certified electrician wire AC power into the control box and to the appropriate spots on the terminal box as follows:



- Feed the WDC Power Cord thru the Control Panel bulkhead strain relief.
- Connect each of the three wires in the pump power cord to the connections (green, black, white) in the control panel at the space labeled “PUMP”.
- Connect the power supply cord from the circuit breaker to the WDC panel. Starting from a 25 Amp., 110 V or 220 V circuit breaker in the distribution box, run the cord (green, black, white) to the appropriate connections labeled “LINE”.

Probe Installation for a Standard System

- The probe signal cable is hooked to the signal cable extension via the “No Auto Seeker Connector”. Insert both plugs into the connector and tightly bolt together with hardware provided. Connect the other end of the signal cable to the WDC Module control panel.



NO AUTO SEEKER CONNECTOR USED WITH A STANDARD MAGNUM SYSTEM

- Hook the product discharge tube to the probe termination module and to the recovery tank using the fittings provided.

- Lower probe into well until the HI/LO lights on the control panel just come on. This signifies that the probe is at the static product / water interface. Now lower the probe by the amount of depression desired (Example: To depress 1 foot, lower probe 1 more foot) and secure.

Probe Installation for an Explosion Proof System

- The probe signal cable is hooked to the signal cable extension via the Mil-Spec connectors. Match polarity key on the connectors, push together and tighten connection nut. Connect the other end of the signal cable to the WDC Module control panel.

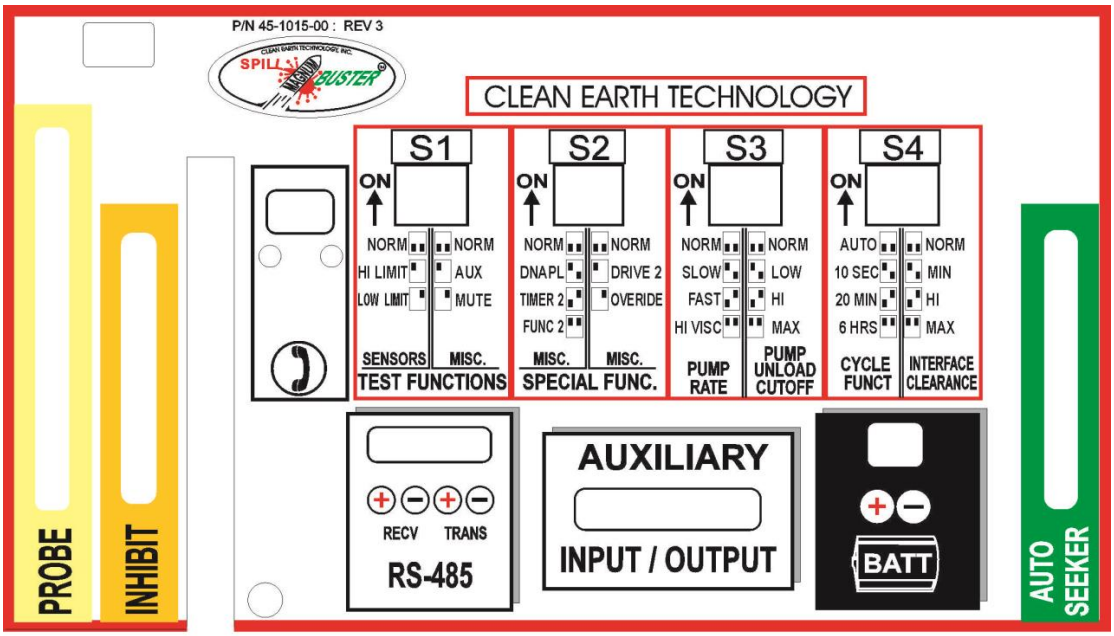


- Hook the product discharge tube to the probe termination module and to the recovery tank using the fittings provided.

- Lower probe into well until the HI/LO lights on the control panel just come on. This signifies that the probe is at the static product / water interface. Now lower the probe by the amount of depression desired (Example: To depress 1 foot, lower probe 1 more foot) and secure.

Dip Switch Settings

In order for the Water Depression Module to work in configuration with the main Magnum Control Box, it is necessary to put DIP switches 1 and 2 on S2 in the UP position and all DIP switches on S4 in the DOWN position in the Magnum Control Box.

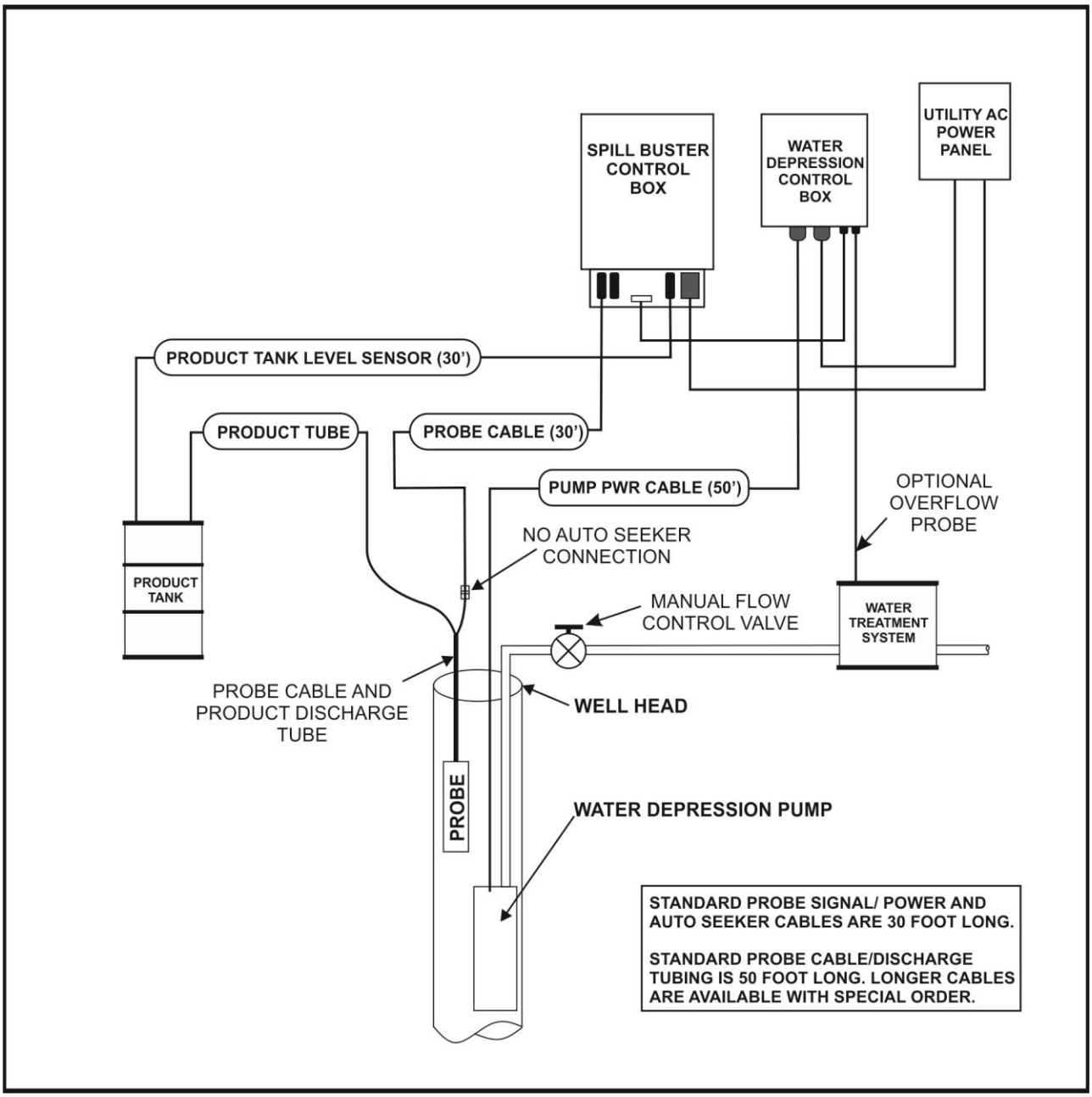


Start Up

- Turn the power on in the MSB Control Panel. Observe that the HI/LO lights on the MSB control panel are on. When used with the WTD option, it is necessary to put dip switches 1 and 2 on S2 in the UP position to enable the product pump to come on each time the HI light goes off.

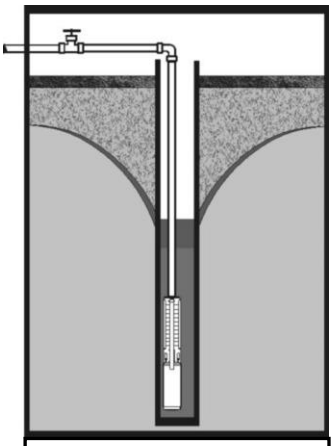
- Turn the power on in the WTD Control Panel. Watch for proper cycling to develop between the HI and LO lights. When the oil/water interface is pumped to the level of the High level sensor, the HI limit light will go out. The product pump will then start pumping product. The water pump will continue to pump until the LO level light goes out, and then the water pump shuts off. When the oil/water interface rebounds to the level of the high sensor band on the MSB probe, the water pump will automatically restart and the product pump will shut off briefly until the high level sensor goes out again. Throttle the water flow control between the pump restart and shut-off. This will help minimize pump on/off cycling, thus tightening depression level control and extending the life of the pump motor. Occasionally adjust further as the cone of depression develops or there are seasonal flow rate influences.

System Schematic



Development of a Hydraulic Cone of Depression: Tips and Good Practices

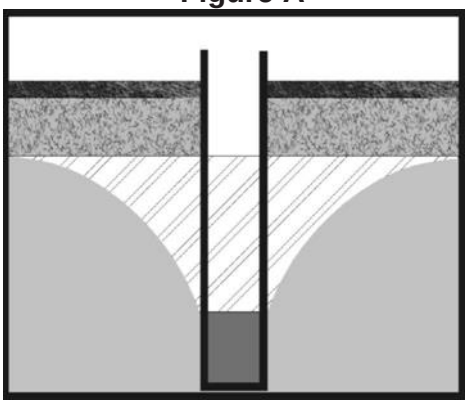
Proper development of a Hydraulic Cone of Depression is not as straight forward as it might seem. An attempt to rapidly depress to full desired depth during the initial startup can cause emulsification. The following information is offered to help you understand some of the basic principles of water depression and the development of a hydraulic cone. Be aware that no two sites are the same and all sites will behave differently from one another with respect to time and conditions.



In the event a depression level of a foot or more is required for the site, the depression should be started with a depression level of 1 foot or less. Then, over a period of several days, the depression should be increased a foot or less at a time.

INITIAL WATER REMOVAL

Figure A



When initially developing a depression cone, take into consideration that the initial flow rates required will be much greater during steady state operation. This is due to the fact that initially the water located in the depression cone (hatched area in figure A to the right) must be pumped in addition to the normal recharge of water. This would be like pumping water out of a swimming pool while more water is being pumped in at the same time. Only when the pool is empty - and only then - will the pumping rate equal the recharge rate of the water.

This water can amount to a large quantity and can take days or weeks to pump out. For instance, a five foot depression with a radius of influence of fifty feet would require the removal of roughly 150,000 gallons of water! A five G.P.M. pump would require over twenty days to pump this much water without any recharge water coming in.

If a significant depression level (say several feet) is attempted all at once, many days/weeks may be required to get the depression level down to the intake of the pump. If product starts to accumulate during the time that the product pump intake is flooded, no product recovery will be achieved even when significant product accumulations occur. For this reason alone it is a much better practice to depress the water table in stages of 1/2’ to 1 foot at a time, so that accumulated product can be pumped off sooner.

Avoiding Cascading Water

It's important to understand how a hydraulic cone of depression typically develops, and the problems that can occur if it is not done properly.

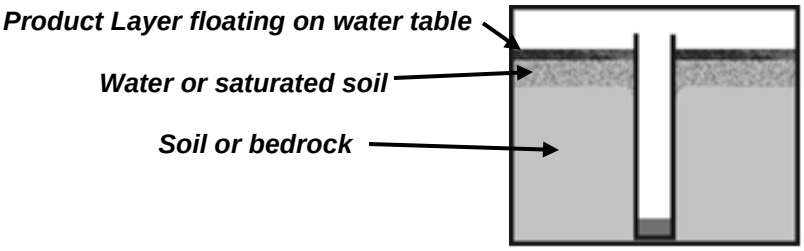
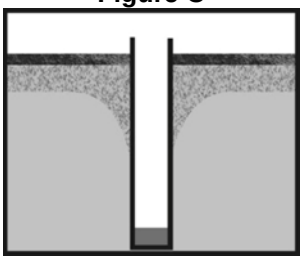


Figure B

When a deep level of depression is first initiated, the hydraulic cone should be developed in a progressive fashion similar to the one depicted in Figures B, C, and D. Figure E shows what happens if the water depression level is developed too quickly: when the water is initially up against the well screen for most of the depression height it can lead to water cascading into the well down to the product water level.

Figure C



This could be similar to putting a piece of well screen in a pool and trying to pump water out of the screened area - it would just pour in again from all levels. In the ground the effect on the flow of water into the well would be minimized by the resistance of the surrounding soil, but significant cascading water can occur none the less.

Figure E

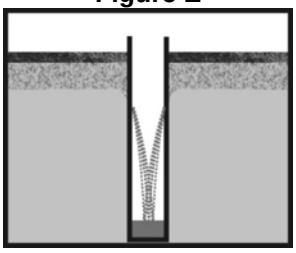
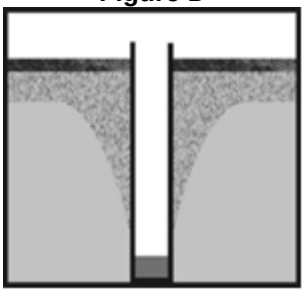
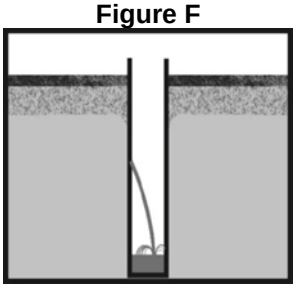


Figure D



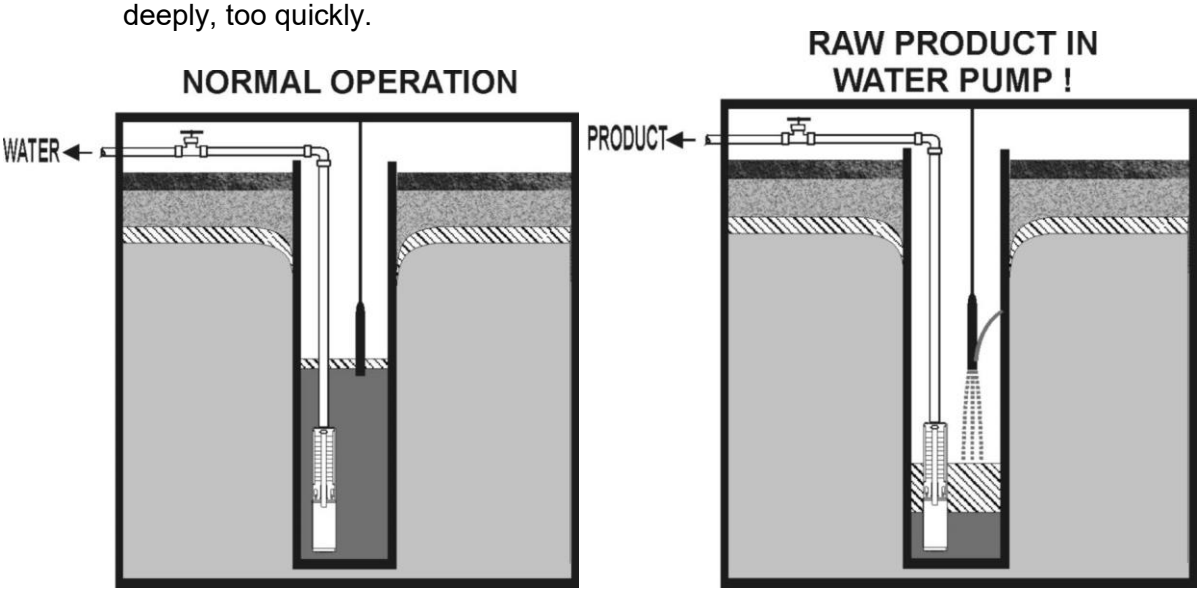
Sometimes the cascading water can come in the form of a stream from a single spot where a fissure occurs in the soil, as shown in Figure F. This can actually look similar to a water fountain. A stream of water like this may result in serious mixing of water and product creating emulsions, especially with heating and diesel oils. Since any product recovery system relies on some form of liquid level detection sensor to position a pump inlet in the accumulated product area of the recovery well, this emulsification can significantly impair product recovery.

Figure F



The Magnum Spill Buster's sensors will ignore cascading water as long as the water stream is broken up (like individual rain drops) and won't allow a conductive path back to the point of stream entry. However, if the stream becomes solid, then the sensor will falsely detect the water/product interface where the cascading water enters the well, rather than at the real interface. The resulting erratic activity of the system may lead the user to think that the system is defective when in reality **the depression level should be reduced.**

When cascading water causes the system to falsely detect that its sensors are flooded, it may signal the water depression pump to stay on longer than it should. This could result in lowering the water/product interface to the water pump intake, and pumping raw product into the water treatment system. This is usually a very bad situation since most water treatment systems are not intended to, or capable of, handling pure product and are overwhelmed. Subsequently, raw product can end up being discharged back into the environment. The moral of this story: don't depress too deeply, too quickly.



Conclusions and Warnings

A) Cascading water may cause very erratic Magnum Spill Buster system behavior. Symptoms may include the panel lights for the product and depression pumps to act out of sequence and erratically.

B) Cascading water may cause the sensor to detect a continuous false product/water interface many feet above the real interface. **This may cause large quantities of pure product to be pumped into the water treatment system and be discharged into the environment.**

C) Cascading water may cause product and water to mix creating "mayonnaise like" emulsions which will immensely complicate product recovery.

5.0 Maintenance Operations

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Product Pump	73
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Logic Board and Power Supply	79
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Removing/Installing Probe Product Tube from the Reel	81



- .**Warning-** All AC Power wiring must be done by a qualified electrician who is familiar with all appropriate NEC and/or local codes. Electrical shock may result in serious injury or death.

- **Warning-** Explosive Vapors. Always disconnect AC power at its source prior to connecting/disconnecting any wires and/or cable connections located within any hazardous locations.

Probe/Product Pump

This is the down-well component of the system. The Probe/Product Pump contains circuits for sensing the product/water interface, as well as housing the product pump. Sensors assure that water will never be pumped into the product tank. The Probe/Product Pump assembly is constructed of state of the art polymer materials for very high corrosion and deterioration resistance.

Probe Product Cable

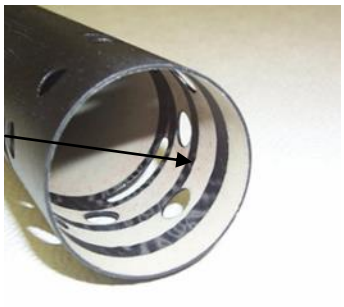


The Probe product cable is the “umbilical cord” of the down-well probe, connecting it to the above ground components. The cable carries signal and electrical power to and from the probe along with the product discharge tube. Examine the entire length of the probe product cable on a routine basis, looking for signs of unusual wear or strain. If present, these damaged areas may compromise the electrical wiring, leading an Intrinsic Safety barrier to trip which would then need replacement at the factory. Damage to the Probe product cable could also cause a leak in the product discharge tubing, potentially causing a secondary spill. Contact Clean Earth Technology if you detect damage to the Probe product cable.

Alpha Array Sensor Band Location

There is an array of sensor bands, internal to the probe, including one dispensing a low limit signal, and one dispensing a high limit signal. The sensors use a low frequency, omni-directional signal to sense the product/water interface. The sensors operate on the principle that signal transmission varies significantly due to the transmission characteristics of the type of fluid surrounding the antenna. The variation in signal transmission is used to accurately determine the interface location relative to the product inlet. The sensors are constructed of “state of the art” polymer materials for corrosion resistance and long life.

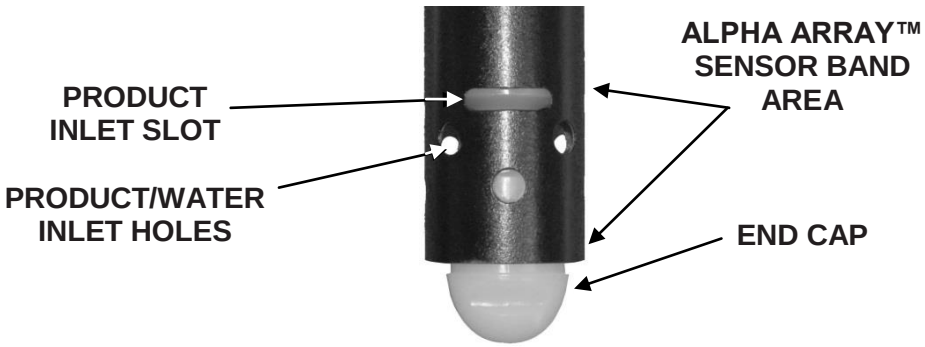
ALPHA ARRAY™ SENSOR BAND AREA



Inlet Slot

Probe Inlet slots and holes in the sensor band area of the probe body allow the product and water to freely enter into the interior of the probe. These slots must be kept clean and free of debris in order for the system to function properly. Care must be taken when cleaning the inlet slots and holes to avoid damaging the probe and sensor band area. Avoid using sharp tools such as screwdrivers, knives, etc. to clean the probe inlet slots and holes.

The product inlet slots lie toward the end of the probe, which allows the product to flow into the pump filter. There are also several round holes, which allow water and product to freely flow into the inside of the probe pump cavity where the sensor bands are located. These holes must all be kept clean.



Cleaning the Probe

If the Probe sensors become coated with a very heavy layer of biological growth, emulsions, or other materials, the Probe will not function properly. The Probe can be cleaned, as shown below, using spray cleaner or mild dish liquid in warm water and a cloth or soft bristled brush. Care must be taken to avoid damaging the Probe and sensor bands, either by brushing too hard or by using a very hard tool to perform cleaning.



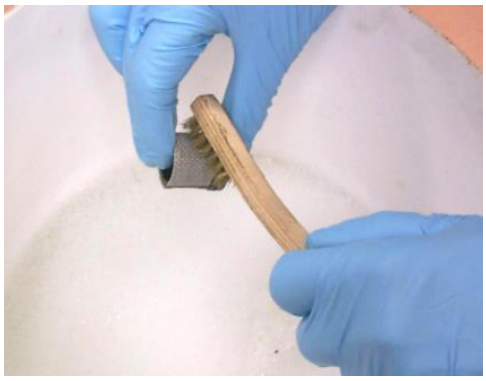


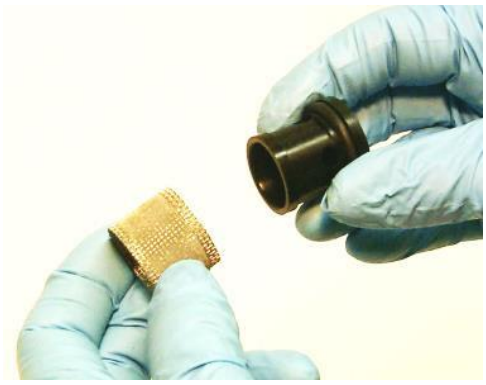
Make sure that the Product Inlet Slots and holes are clear, and the interior Alpha Array™ Sensor Band area is free of coating and debris

If persistent residue sticks inside the sensor area, a soft brush or tooth brush is recommended to fully clean sensors.



The pump inlet screen and inlet holes should be checked and cleaned also during inspection.



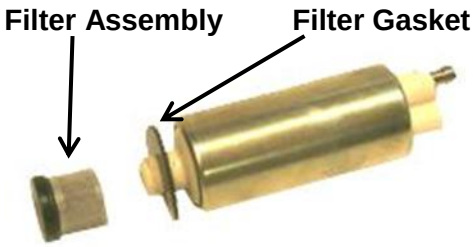


The Product Pump

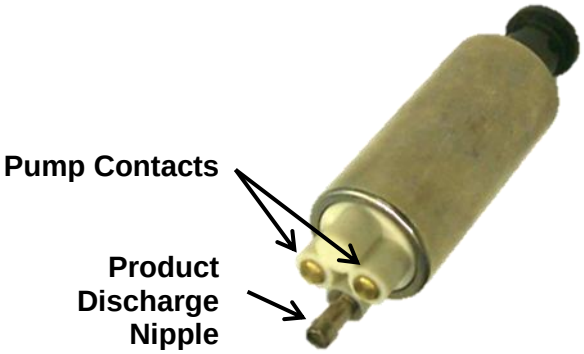
The product pump is a rugged and chemically resistant roller vane unit capable of pumping up to 46 gallons (174 liters) per hour of low viscosity liquids (up to 12 Cp) per day in shallow wells and to reliably recover product out of wells 150 feet in depth. In addition, it can withstand a certain amount of small solids such as dirt or sand passing through it. See Pump Performance Curve, page 91.



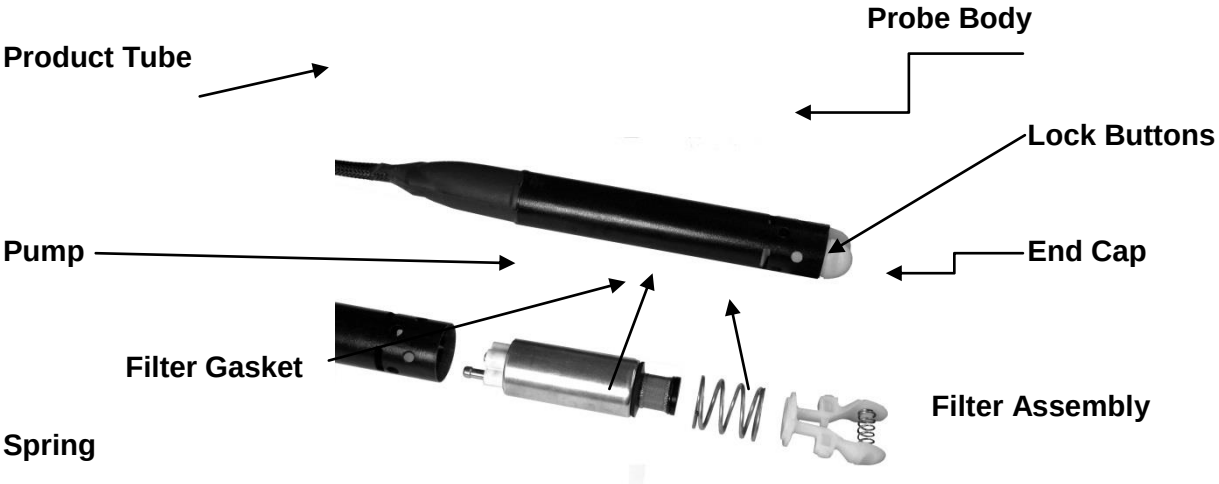
The Product Pump is located near the bottom of the probe and is easily accessible. The pump is inserted into the bottom of the probe body and is held in place by the spring and end cap.



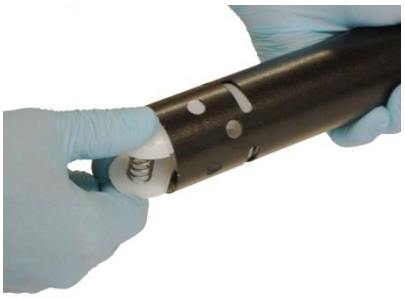
The pump product nipple and the pump electrical contacts should also be kept clean.



Removing the Product Pump



The Product Pump is located near the bottom of the probe and is easily accessible. The pump is inserted into the bottom of the probe body and is held in place by the end cap.
To remove pump, push end cap firmly into probe to loosen the locking buttons. While pushing end cap in, press locking buttons into probe.



Releasing First Lock Button



Releasing Second Lock Button



Removing End Cap

The Pump is removed from the Probe using a Pump Removal Tool supplied with the system. One end has two pins which are used to spin the filter & filter top off. The second end has a threaded hole, which is screwed onto the inlet end of the Pump. The Pump then is pushed out of the Probe.



Pump Removal/Insertion Tool



Threaded Hole



Filter Adapter Pins



Remove the Pump

Pump Maintenance

After the filter is cleaned, clean Pump contacts with brush. Make sure that the contacts are free of any corrosion. If the pump will be immediately reinstalled in the probe and the system will be turned on again, then proceed to the pump flooding procedure on page 77.

If the pump or the system as a whole is to be decommissioned and stored for a period of time, then the pump should be lubricated to prevent the pump rotor from corroding (which may lead to pump failure). In this case lubricate the pump internals with a Non-Flammable oil such as 3 In 1 Oil®. To lubricate, hold Pump upside down (intake hole up) and squirt lubricant into intake hole. This will allow lubricant to flow into working parts of Pump. Also, squirt lubricant into product discharge nipple in Pump.





Pump Flooding Procedure

Before a probe can be installed down the well (or re-installed after servicing) the pump must be flooded. The purpose of this procedure is to displace oxygen and vapors from within the pump body. Once the system is installed, the added fluid will be pumped out to the recovery container during the first recovery cycle. **Note:** CET does not ship new or serviced systems with the pump pre-flooded.



Required Equipment:

- A suction device
- Suitable container for the fluid
- Approximately 8 fl oz of flooding fluid, such as Ultra-Pure Paraffin Lamp Oil, mineral oil, material from the subject well, or similar non combustive fluid. DO NOT USE WATER, the pump internals are NOT corrosion resistant.
- Approximately 12”of 3/8 fuel line
- A product pump, CET P/N 90-1318-019

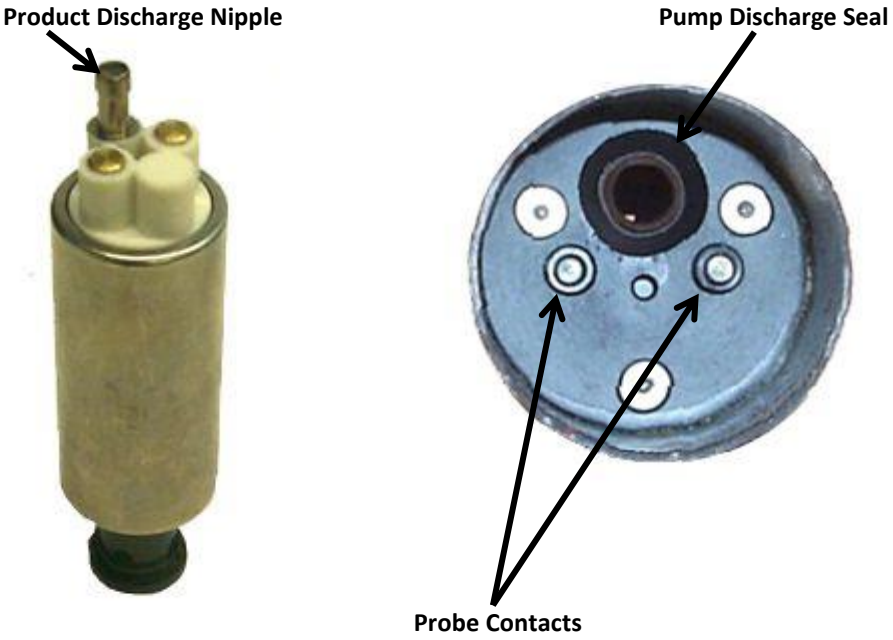
Flood the pump

- Attach the fuel line to the discharge side of the pump.
- Attach the other end of the fuel line to the suction device.
- Place the pump inlet in the container of fluid.
- Pull the fluid into the pump until it is observed in the fuel line.
- Remove the fuel line from the pump.
- Install (or re-install) the flooded pump into the probe (reference the “Pump Installation” section of the Maintenance Operations chapter of the Operator’s Manual).
- If the pump is not immediately installed in the probe, replace the red intake and discharge caps. The pump can then be bagged for later use or storage.

Note: Always save the red caps from installed pumps for future use.

Pump Installation

Reinstall pump filter assembly. Don't forget to install filter gasket between filter and Pump. Make sure that the filter assembly is tight. When installing the Pump make sure the product discharge nipple is aligned with the Pump discharge seal.



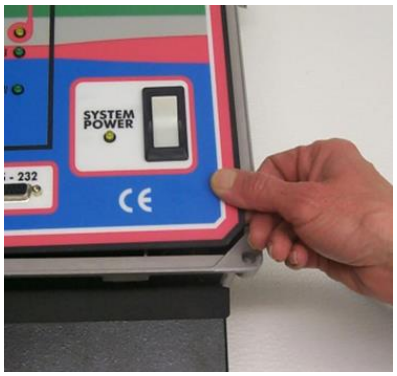
Drop Pump into Probe and push Pump until the Pump contacts are seated firmly against Probe contacts. The Pump Tool can be used to align the Product Discharge Nipple with the seal. If firm contact is not made, the Pump may not function. Finally, insert the end cap such that both lock buttons snap in place.

Logic Board and Power Supply

- .**Warning-** All AC Power wiring must be done by a qualified electrician who is familiar with all appropriate NEC and/or local codes. Electrical shock may result in serious injury or death.
- **Warning-** Explosive Vapors. Always disconnect AC power at its source prior to connecting/disconnecting any wires and/or cable connections located within any hazardous locations.

On occasion, when troubleshooting with Clean Earth Service about an issue with your system, our technician may be able to pinpoint the problem to the Control Box's logic board. Use this section to properly remove and replace the board as required for service. The Logic Board is located on the back panel inside the Control Box. The Control Panel is held in place by four spring loaded catches (see below). The Control Panel can be removed to expose the Logic Board and Power Supply by carefully prying the Control Panel with a screwdriver near one of the four corners. The control panel will then "pop" out.

"Popping" Off the Front Panel with a Screwdriver

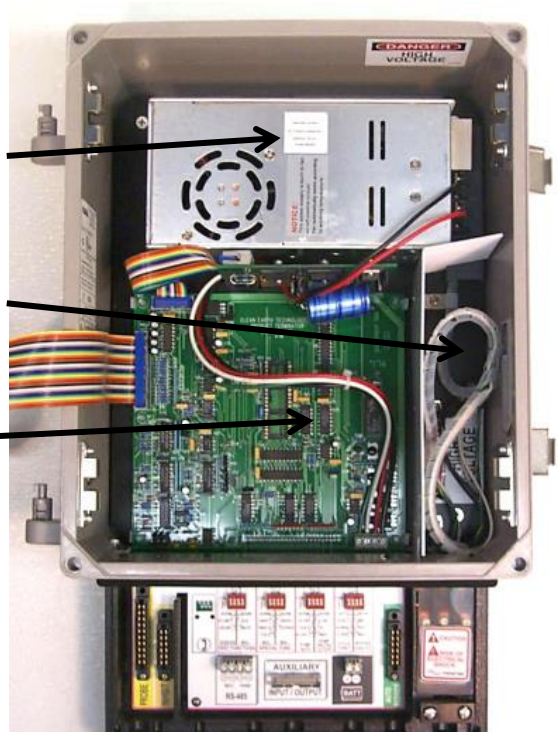


Lift off Front Panel

POWER SUPPLY

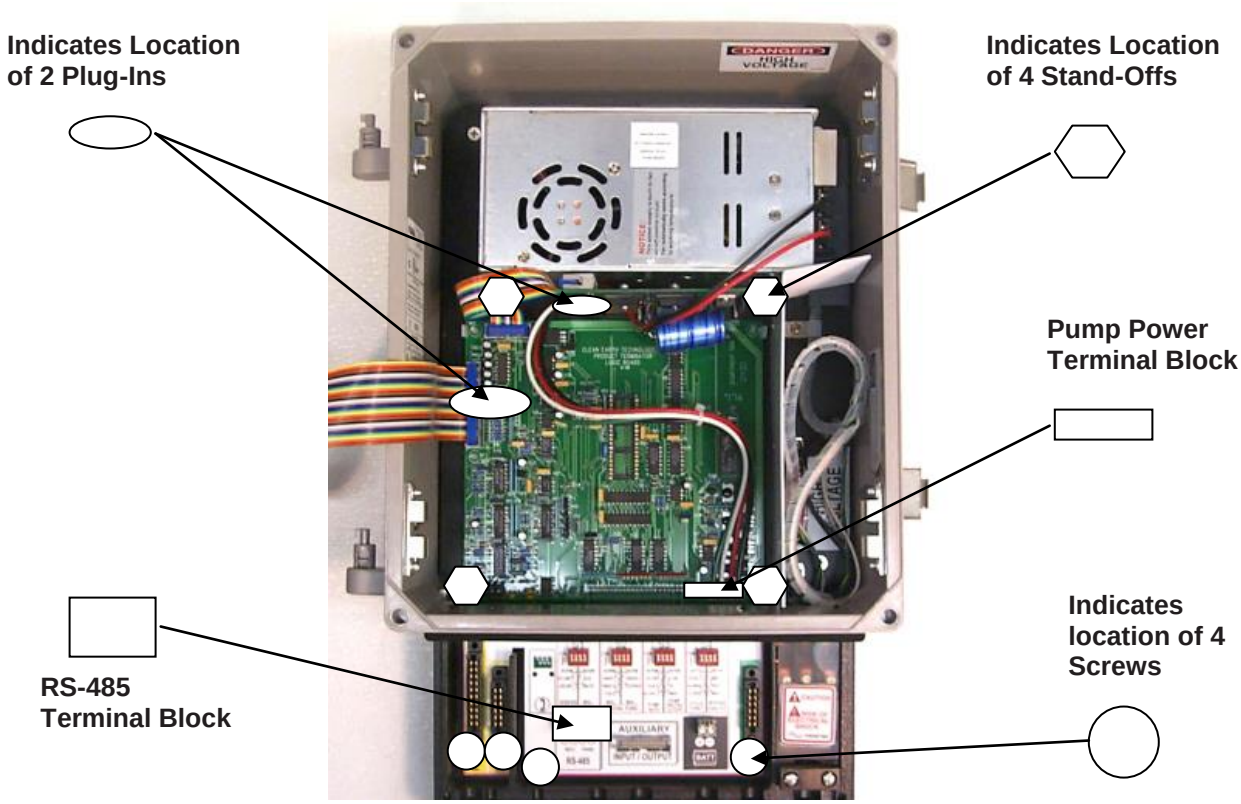
HIGH VOLTAGE SAFETY BARRIER

LOGIC BOARD



[NOT SHOWN] UL APPROVED ISOLATION BARRIER (OPTIONAL)

Removing the Logic Board



1. Disconnect Power
2. Unplug two (2) plug-ins.
3. Remove pump power wires from terminal block.
   NOTE: When replacing wires - Green, White, Red & Black
4. Remove RS-485 wires from terminal block.
   [IMPORTANT -- Note/record position of color coded wires]
5. Unscrew four (4) screws.
6. Disengage four (4) stand-offs.
7. Slide board out toward the top of the box.

Removing Probe from Auto Seeker Reel

Warning!

To prevent damage to the logic board, DISCONNECT the Auto Seeker Extension cable from the control box before rotation of the Auto Seeker by hand.

There are two cases in which it is necessary to remove the Probe Product Tubing from the reel:

1) If the Probe stops before reaching the interface; or, if the reel stops before the Probe is fully rewound when raising the Probe, then the Auto Seeker rotation is not fully synchronized with the Probe Product Tubing. The tubing must be fully unwound and removed from the reel; then reinstalled and rewound in order to correct the problem.

2) When decontaminating the Auto Seeker unit to return to the factory for service.

Resynchronizing Product Cable with the Standard Auto Seeker Rotation

Rotate the Auto Seeker in the DOWN direction until the entire length of the Probe Product Tube is off the reel. This can best be accomplished by initiating a cycle with the PRC switch (see Diagram Pg. 29), while keeping the probe away from contact with a grounded surface. The system will continue to lower the Probe in search of the interface. Press STOP on the PRC switch when all the Product tubing is off the reel.

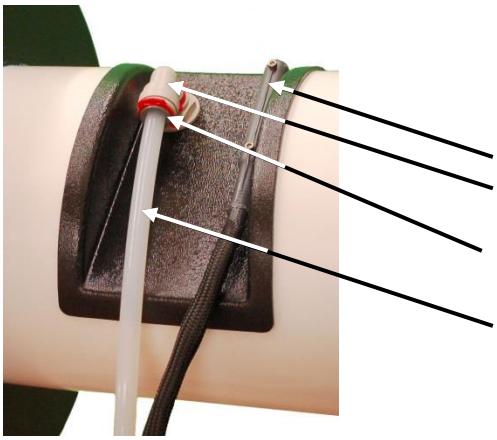
If the Auto Seeker stops before the tube is fully unwound, the unsynchronized Auto Seeker has reached its extreme DOWN position. Press STOP and remove the remaining tubing by hand without moving the reel.

If the unsynchronized Auto Seeker continues to rotate past the point at which the Product Tube is fully unwound, then press STOP and detach the Product Tubing from the Auto Seeker at the reel. [See instruction, following page.] After the Product Tubing is detached, set PRC switch back to AUTO and allow the Auto Seeker to go in the DOWN direction until it stops on its own. The Auto Seeker reel is now in the extreme DOWN position. Set PRC switch to STOP.

Now, reattach the Product Tube to the reel. Don't forget the retainer clip! Rewind the tubing onto the reel by 1) moving the HI LIMIT dip switch (S1-1) to ON [see page 37] and then 2) by placing the PRC switch in the AUTO position. This will cause the Auto Seeker to rotate in the UP direction. [If the Auto Seeker does not start going up, carefully turn the reel by hand until it starts moving. It should only take about a quarter turn before beginning to wind automatically.] Feed the cable carefully back and forth in layers. Switch the PRC to STOP once the probe is in the full UP position.

Take care that the probe head is not dragged along the ground as the Auto Seeker rewinds. [Remember to turn OFF the HI LIMIT dip switch.]

To Remove the Probe from a Standard Auto Seeker Reel



The Probe is connected to the hub of the reel by instant tube fittings and a Slim-line™ connector.

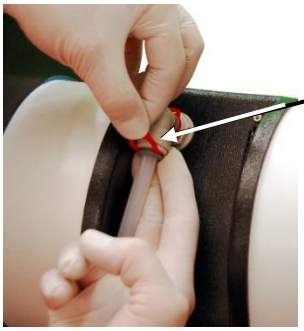
SLIM LINE CONNECTOR™
DISCHARGE TUBE FITTING

RETAINER CLIP

DISCHARGE TUBE



Unplug the Slim-line™ Connector using an Allen wrench and a pair of needle nose pliers to hold the stand-off nut in place, and remove the screws.

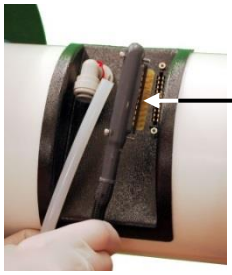


Remove the red locking clip on the discharge tube fitting by pushing the bottom of the clip up with two fingers and pulling up at the top with your other hand. Then push down on the locking sleeve of the discharge tube fitting with a screwdriver while pulling on the discharge tubing. Make sure to push the locking sleeve squarely into and against the fitting; otherwise, the tube will not be released.

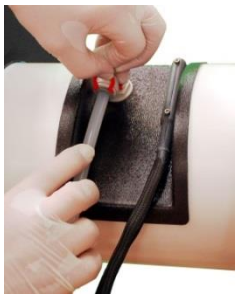
To Install the Probe on a Standard Auto Seeker Reel



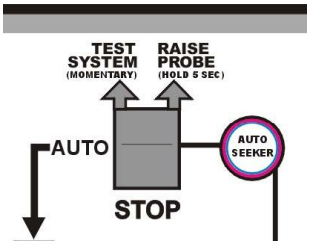
WARNING: To prevent damage to the logic board, DISCONNECT the Auto Seeker extension cable from the Control Box before rotating the Auto Seeker by hand. To wind the probe onto the reel, turn the reel a couple of turns by hand in order to reset the safety switch. This is an important step to ensure that the probe is synchronized with the Auto Seeker safety limit switches.



Check to be sure the Slim-line™ gasket is in place. Install the Slim-line™ connector using an Allen wrench to tightly install the screws.



Insert the product discharge tube into the discharge tube fitting. Install the red locking clip.

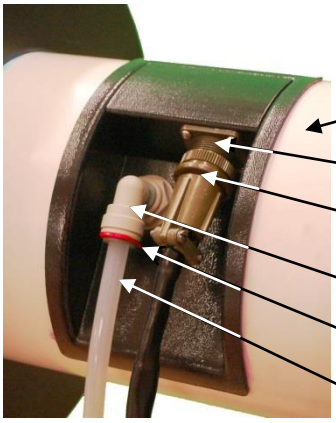


Reconnect the Auto Seeker to the Control Box I/O pouch

Power up system and press the PRC Switch to the RAISE PROBE position for 5 seconds until the Auto Seeker starts to rotate upward. [If the Auto Seeker does not start going up, carefully turn the reel by hand until it starts moving. It should only take about a quarter turn before beginning to wind automatically.] Feed the cable carefully back and forth in layers. Switch the PRC to STOP once the probe is in the full UP position.

Take care that the probe head is not dragged along the ground as the Auto Seeker rewinds.

To Remove the Probe from an Explosion Proof Auto Seeker Reel



The Probe Cable is connected to the hub of the reel by instant tube fitting and the electrical connections are via a MIL-Spec circular connector.

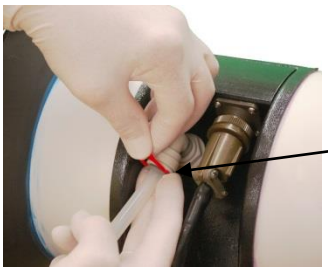
CONNECTOR RECEPTACLE

CONNECTOR PLUG

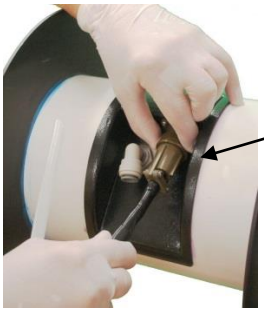
DISCHARGE TUBE FITTING

RETAINER CLIP

DISCHARGE TUBE



Remove the red locking clip on the discharge tube fitting by pushing the bottom of the clip up with two fingers and pulling up at the top with your other hand. Then push down on the locking sleeve of the discharge tube fitting with a screwdriver while pulling on the discharge tubing. Make sure to push the locking sleeve squarely into and against the fitting; otherwise, the tube will not be released.



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After removing the product discharge tubing remove the probe cable by threading the MIL-Spec plug collar off the receptacle and gently pull the connector plug out.



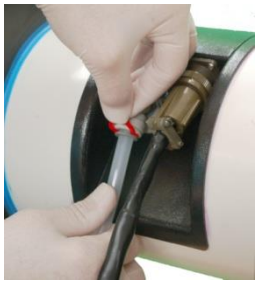
To Install the Probe on an Explosion Proof Auto Seeker Reel



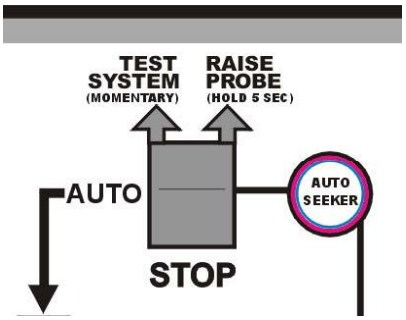
WARNING: To prevent damage to the logic board, DISCONNECT the Auto Seeker extension cable from the Control Box I/O pouch before rotating the Auto Seeker by hand. To reinstall the probe, turn the reel by hand to gain easy access as shown.



Insert the probe cable plug firmly into the MIL-Spec connector receptacle and then tread the collar down. Tighten the collar as tightly as possible in order to insure the connector gasket is fully sealed.



Install the product discharge tube: Insert the product discharge tube into the discharge tube fitting. Install the red locking clip



Reconnect the Auto Seeker to the Control Box I/O pouch.

Power up system and press the PRC Switch to the RAISE PROBE position for 10 seconds until the Auto Seeker starts to rotate upward. Feed the cable carefully back and forth in untangled layers. Switch the PRC to STOP once the probe is in the full UP position.

Take care that the probe head is not dragged along the ground as the Auto Seeker rewinds.

6.0 Troubleshooting

Problem	**System doesn't power up when System Power switch is turned ON.**
Possible Causes & Solutions	1. Make sure Control Box is connected to the power source. 2. Check for issues with the power source.
Problem	**System powers up, but pump won't run.**
Possible Causes & Solutions	1. Probe Cable is not plugged in or is broken. - Check that Probe cable connectors are properly and securely connected at both the Control Box I/O panel and at the Auto Seeker - Inspect entire length of Probe Cable for signs of damage. 2. If the Product Tank lamp is ON: - Make sure the Product Tank is not full - Make sure Product Tank sensor is connected to Control Box - Make sure the Pump contacts are seated firmly against probe contacts. (Remove end cap from probe and push pump up in probe using your thumb; then test system) - Make sure the Pump is operating correctly. (Replace pump and try TEST SYSTEM on PRC switch).
Problem	**Probe stops before reaching interface, or when raising probe, Auto Seeker stops before being fully rewound on reel**.
Possible Causes & Solutions	Auto Seeker rotation and probe product tubing are not synchronized. To correct, See Section 5 on page 81.
Problem	**High Limit sensor is not sensing water, or probe moves to the bottom of the well.**
Possible	1. Make sure there is enough water in the well for the Magnum to operate. There must be at least 3" of water in the well below the

Causes & Solutions	product. 2. Make sure the System is properly grounded. See page 16. 3. Make sure that the probe cable is not damaged or disconnected. 4. Make sure that the sensor bands in the probe head are not fouled. If needed, See page 72.
Problem	**Pump runs but no product is pumped.**
Possible Causes & Solutions	1. Make sure there is enough product in the well for the Magnum to operate. There must be at approximately ½ inch (12mm) of product present. 2. Make sure that neither the pump intake nor filter screen is clogged. See page 72. 3. Make sure that the Interface clearance has not been set too high by checking the settings on dipswitches S4-3 & S4-4. See page 42. 4. Make sure that the product discharge tubing is not clogged or frozen. Make sure the Pump is operating correctly. (Replace pump and try TEST SYSTEM on PRC switch).
Problem	**Pump runs briefly, but then cuts off prematurely.**
Possible Causes & Solutions	1. Make sure Interface Clearance is not set too high. Check dipswitches S4-3 & 4. See page 42. 2. Make sure Pump Unload Cutoff setting is not too high. Check dipswitches S3-3 & 4. See page 42.
Problem	**System was cycling, but now appears to be inactive.**
Possible Causes & Solutions	If the cycle function is set on automatic (dipswitches S4-1 & 2), Magnum Spill Buster will automatically extend the pump delay time to match the recharge rate of the well. This delay can be as long as six hours between cycles. To see if system is still functioning properly, run TEST SYSTEM on PRC switch (See page 39) to see if pump will run. After the pump runs for 10 secs, STOP the system, and then push the PRC switch to the “Auto” setting. If it is operating properly, the System should then go through a cycle.

Problem	**PROCESSOR lamp on Control Panel does not light.**
Possible Causes & Solutions	1. If the System is otherwise operating as expected, it is possible that the LED bulb is simply burned out. 2. If the System is not operating properly, the unlit Processor lamp indicates a problem with the logic board. Please call the factory to report the issue.

Problem	**AUTO SEEKER does not raise.**
Possible Causes & Solutions	1. Make sure that the Auto Seeker cable is connected to the Control Box and shows no sign of damage. 2. Make sure that the System has not been set in DNAPL mode by checking that dipswitch S2-1 is not set. See page 44.

Problem	**Processor Lamp on Control panel blinks on and off and the System is not cycling**
Possible Causes & Solutions	1. The Pump may have experienced an overload. Make sure that neither the pump intake nor filter screen is clogged. See page 72. 2. The pump circuit may be stuck open, possibly due to a failed pump. Replace pump and try TEST SYSTEM on PRC switch. 3. Make sure that the probe cable is connected to the Control Box.

7.0 System Specifications

Complete Magnum Spill Buster™ System includes: Magnum Spill Buster™ Control Box, Magnum Spill Buster™ Probe with 50' down well cable, Auto Seeker with 30' cable, and Product Tank Shutoff Probe with 30' cable, and 50 ft. Nylon Product Discharge Tubing.

Input Power: 115vac or 230vac, 100 watts max. or 24vdc, 75 watts max. with optional battery cable and deep discharge batteries. A 5 amp AC circuit breaker is built into the System Power switch.

Operating Temperature Range: Ambient air temperature of -40F to +140F (-40C to 60C).

Pumping Rate: up to 46 gal/hr (175 liter/hr) @ 0 psi (zero depth & no discharge back pressure), or up to 37 gal/hr (140 liter/hr) @ 25 psi discharge back pressure.

Product Viscosity: Products with viscosity of less than 10 Cp at 70 degrees F. Examples: gasoline, diesel fuel, #2 heating oil, JP-4, JP-5, paint thinners.

Well Diameter: 2 inch minimum for product recovery only.

Standard Well Depth: 50 ft (15.2m.) max

Maximum Well Depth: 150 ft (45.7 m) on special order with 150 ft (45.7m) down-well cable.

Probe

The Probe is certified compliant with NEC2011 specifications for use in Class 1, Div 1 locations. DC power for the pump is supplied using a conductor pair that has an over woven metal shield along with a Tefzel overcoat. The signal wires also have a separate over woven metal shield. The two cable bundles, along with the discharge tubing, are contained in a tough woven plastic protective scuff jacket.
Probe Dimensions: 1.93" (4.9cm) dia. x 15.25" (38.7cm) long [cable size including the discharge tube is 5/8" thickness x 1 1/2' width]. Standard Probe cable length is 50 ft. (15.2m)

Control Box

Certified IS barriers are wired into the Probe and Override circuits in the Control Box in order to make them compliant with NEC2011 specifications.
Dimensions & Weight: 14" (36cm) wide x 23" (59cm) high x 6" (15.4cm) deep. An additional 10" is required below for cable exit and an additional 14" is required in front and to the left for door swing. Weight: 25 lbs. (11.34 kg)

Standard Auto Seeker

The Standard Auto Seeker is not rated for use in hazardous locations.
Dimensions & Weight (with 50' probe attached)**:** 14" (36cm) wide and deep; 20" tall (15.8cm). Weight: 32 lbs. (14.51 kg)

Optional Explosion Proof Auto Seeker

The Explosion Proof Auto Seeker is certified compliant with NEC2011 specifications for use in Class 1 Div 1 locations. Connections to all cabling now have positive threaded Mil-Spec circular connectors.
Dimensions & Weight (with 50'probe attached)**:** 52 lbs. (23.59 kg)
Minimum Well Head Clearance for EXPLOSION PROOF AUTO SEEKER: 28"x24"x24" Deep (71 cm x 61 cm x 61 cm deep). **(Does not apply to Standard Auto Seeker, which must be mounted outside of any classified hazardous areas)**

Optional Explosion Proof Enclosure for the Control Box

The Explosion Proof enclosure is certified compliant with NEC2011 specifications for use in Class 1 Div 1 locations. Comes with the control box mounted in a certified XP enclosure and includes three XP cable feed through fittings with Chico® seals.
Dimensions & Weight: 29" (73.66cm) tall; 11' (27.9cm) deep; 18' (45.7cm) wide, with an additional 18" required in front and to the left for door swing and an additional 10" (25.4cm) required below for cable exit. Weight (with Control Box mounted inside): 210 lbs. (95.25 kg)

Optional Explosion Proof Enclosure AC Power Switch

This feature provides a convenient AC power switch mounted directly to the XP control box enclosure to enable the Spill Buster to be turned on and off at the box instead of back at the AC main power panel.

Standard Extension Cable length: 30 ft (9.1m) from Control Box to well head.

Override Product Tank Probe: Threads into a standard 2" barrel bung. Standard cable length is 30 ft (9.1m)

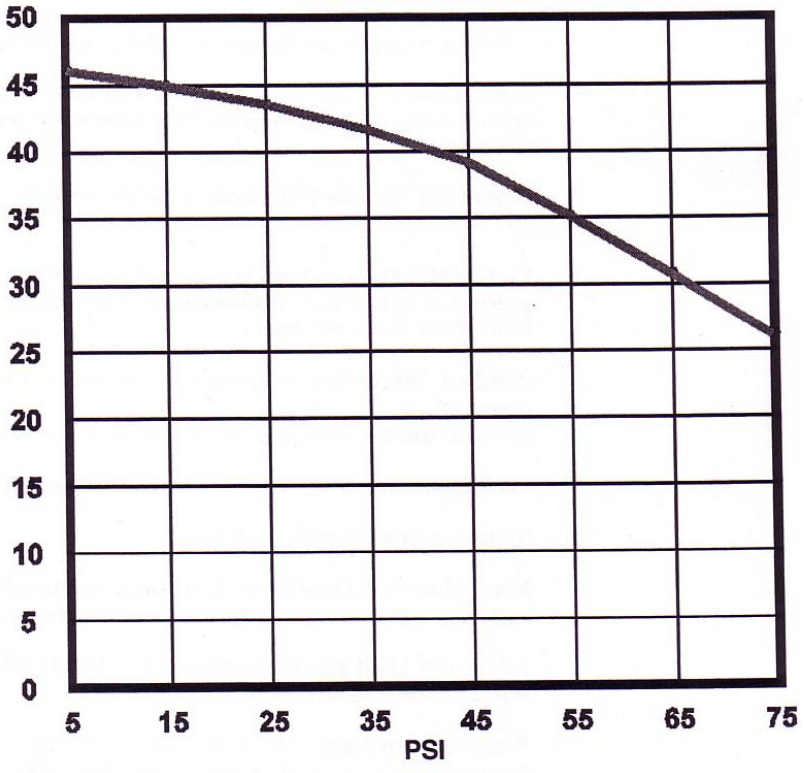
Total System Shipping Weight:

Complete Standard Magnum System – approx. 68 lbs. (30.84 kg)

Complete Magnum System with Explosion Proof Auto Seeker- approx. 92 lbs. (41.73 kg)

Complete Explosion Proof Magnum System- approx. 277 lbs. (125.65 kg) (includes Exp. Enclosure for Control Box)

Magnum Spill Buster Pump Performance



8.0 Equipment Decontamination Procedures

Prior to return to Clean Earth Technology, Inc., all equipment must be thoroughly cleaned and decontaminated. Please follow your organization's prescribed decontamination procedures, and also carefully observe each step of the following procedure. During decontamination, make sure personnel are wearing the appropriate protective clothing and observing all safety precautions.

1. REMOVE PUMP- (See page 74). Remove pump, wipe off with absorbent cloth or paper towel, clean the filter, and seal parts in a plastic bag to send with your system.
2. REMOVE PROBE FROM AUTO SEEKER- (See page 81). Unwind the probe tubing from the Auto Seeker reel and disconnect the discharge hose and Slim-line connectors.
3. Depending on the individual requirements for your site, you may need a container to catch the waste for this step. Hold the probe upright and pour several gallons of hot soapy water through it. (Alconox, Simple Green, or other similar detergents work well).
4. Place the entire probe and tubing in a large tub with enough hot soapy water to cover the entire probe assembly. Soak for several hours or overnight.
5. Remove the probe from the tub and rinse with clean fresh water. Using a garden hose with an attachment, flush several gallons of water through the probe tube and the tubing (as in step 3).
6. Remove all remaining fluid left in the tubing by gravity: starting at the probe tube end, hold the tubing over your head and pass the entire tubing through your hands, holding it high all the while.
7. Wipe off the outside of the tubing with a dry absorbent cloth or towels. Push a clean rag into the end of the probe tube and secure a plastic bag around the end of the probe to contain any possible remaining leakage.
8. Wipe down the Auto Seeker reel with a cloth and hot soapy water.
9. If you have not already done so, call CET at (802) 425-3710 to request an RMA number AND an RMA form, if needed.
10. ***Completely*** fill out the RMA form. If at all possible, fax the form to us or scan it to attach to an email so that our service department has it ahead of your equipment's arrival. Make sure to include a copy with your return- preferably in a packing slip pouch on the outside of the box, or else placed inside the box.
11. Pack the equipment with care to ship to CET. If possible, use the custom foam box set that came with the system; otherwise use sturdy boxes and a generous amount of packing material. MAKE SURE that the RMA number is clearly written on the outside of all boxes. **CET reserves the right to refuse delivery of any equipment without a CET RMA number clearly displayed on the exterior of the package(s).**

9.0 Equipment Return Policy

Any equipment return must be authorized by Clean Earth Technology (CET) prior to shipment. Call or FAX CET. A Return Material Authorization (RMA) number will be issued upon receipt of your request to return parts or equipment. An "RMA Number/ REPAIR ORDER" form must be completed by the user and the RMA number should appear on the form along with reasons for the return. Your shipment to CET must have the RMA number clearly marked on the outside of each packaged item.

This policy applies to both equipment sales and repair orders. For a Return Material Authorization, please call our Service Department at (802) 425-3710.

Clean Earth Technology, Inc.
Environmental Equipment Return Policy

This Policy refers to any equipment or parts being returned to Clean Earth Technology (CET), whether:

- Customer owned, leased or rented.
- In warranty or out of warranty.

NO equipment or parts should be shipped to CET without first contacting our service department for a **Return Materials Authorization number (RMA).** Contact our service department at (802) 425-3710 to be assigned an RMA number.

- CET reserves the right to refuse delivery of any equipment without an RMA number clearly displayed on the package(s).
- CET reserves the right to refuse delivery of any equipment improperly decontaminated.
- CET reserves the right to add a fee of $500.00 to the repair invoice of any equipment or parts not decontaminated to the satisfaction of CET.

Environmental Equipment Return Guidelines:

- All equipment must be thoroughly cleaned, purged of product and decontaminated prior to shipment to CE, as detailed in Section 8 of this manual- Equipment Decontamination Procedures. NOTE: CET recommends the use of Personal Protective Equipment, level C or D, as defined in OSHA 29 CFR 1910.120.

Any equipment or parts shipped to CET must include the following documentation:

- CET RMA/Repair Order form fully completed by customer, including description/name of product pumped, and the reason for the return.
- The CET RMA number clearly marked on the outside of ALL packages and paperwork.

Return Materials Authorization Form

RMA Number: _____

Customer Name and Address:

_____

_____

_____

_____

Phone Number:_____

Fax Number:_____

Clean Earth Technology, Inc.
445 Long Point Road
N. Ferrisburgh, VT 05473
T: (802) 425-3710 F: (802) 425-2896

Date: _____

Contact Name:_____

Contact Email:_____

Qty.	Items Being Returned (eg. Auto Seeker, Cables, etc.)	Serial Number(s)

Reason for Return:

_____

_____

_____

_____

Type of product(s) this equipment has been used to pump: _____

System Decontamination Date:_____

The undersigned confirms that the equipment or parts being returned to Clean Earth Technology have been properly and thoroughly decontaminated **using the approved procedure described on page 2 of this document.**

Name _____ *Signed: _____

(printed)

***No evaluation or repair work will be performed unless this form is signed.**

Clean Earth Technology (CET) reserves the right to add a fee of $500.00 to the repair of any equipment or parts not decontaminated to the satisfaction of CET.

Clean Earth Technology, Inc.
Environmental Equipment Return Policy

This policy refers to any equipment or parts being returned to Clean Earth Technology (CET), whether customer owned, leased, or rented; in warranty or out of warranty. NO equipment or parts should be shipped to CET without first contacting our service department for a **Return Materials Authorization Number (RMA)**. Contact our service department at **(802) 425-3710** to be assigned an RMA number.

- **CET reserves the right to refuse delivery of any equipment without a CET RMA number clearly displayed on the exterior of the package(s).**
- **CET reserves the right to refuse delivery of any equipment improperly decontaminated.**
- **CET reserves the right to add a fee of $500.00 to the repair invoice of any equipment or parts not decontaminated to the satisfaction of CET.**

Environmental Equipment Return Guidelines

- All equipment must be thoroughly cleaned, purged of product and decontaminated prior to shipment to CET. **NOTE: CET recommends the use of Personal Protective Equipment, Level C or D, as defined in OSHA 29 CFR 1910.120.**
- Any equipment or parts shipped to CET must include this RMA form, **completely** filled out by the customer; and the CET RMA number clearly marked on the outside of all packages and paperwork.

Equipment Decontamination Procedure For the Magnum Spill Buster

(Also found in Section 8 of the manual)

The following procedures are aimed at protecting people and the environment from potential contact with hazardous materials. **Please be aware that CET reserves the right to refuse delivery of any equipment improperly decontaminated. CET also reserves the right to add a fee of $500.00 to the repair invoice of any equipment or parts not decontaminated to the satisfaction of CET.**

Please follow your organization's prescribed decontamination procedures, and then carefully observe each step of the following procedure prior to shipping anything back to CET (check each step off as you go). During decontamination, make sure personnel are wearing the appropriate protective clothing and observing all safety precautions.

CALL CET AT (802) 425-3710 FOR ASSISTANCE IF YOU HAVE ANY QUESTIONS ABOUT ANY PART OF THIS PROCEDURE.

12. _____ REMOVE PUMP- (See "Removing the Product Pump"- page 74- in Chapter 5- "Maintenance Operations" in the manual). Remove pump, wipe off with absorbent cloth or paper towel, clean the filter, and seal parts in a plastic bag to send with your system.
13. _____ REMOVE PROBE FROM AUTO SEEKER- (See "Removing the Probe from the Reel" – page 81 in Chapter 5- "Maintenance Operations" in the manual). Unwind the probe tubing from the Auto Seeker reel and disconnect the discharge hose and slimline connectors.
14. _____ Depending on the individual requirements for your site, you may need a container to catch the waste for this step. Hold the probe upright and pour several gallons of hot soapy water through it. (Alconox, Simple Green, or other similar detergents work well).
15. _____ Place the entire probe and tubing in a large tub with enough hot soapy water to cover the entire probe assembly. Soak for several hours or overnight.
16. _____ Remove the probe from the tub and rinse with clean fresh water . Using a garden hose with an attachment, flush several gallons of water through the probe tube and the tubing (as in step 3).
17. _____ Remove all remaining fluid left in the tubing by gravity: starting at the probe tube end, hold the tubing over your head and pass the entire tubing through your hands, holding it high all the while.
18. _____ Wipe off the outside of the tubing with a dry absorbent cloth or towels. Push a clean rag into the end of the probe tube and secure a plastic bag around the end of the probe to contain any possible remaining leakage.

19. _____ Wipe down the Auto Seeker reel with a cloth and hot soapy water.
20. _____ If you have not already done so, call CET at (802) 425-3710 to request an RMA number AND an RMA form, if needed.
21. _____ ***Completely*** fill out the RMA form. If at all possible, fax the form to us or scan it to attach to an email so that our service department has it ahead of your equipment's arrival. Make sure to include a copy with your return- preferably in a packing slip pouch on the outside of the box, or else placed inside the box.
22. _____ Pack the equipment with care to ship to CET. If possible, use the custom foam box set that came with the system; otherwise use sturdy boxes and a generous amount of packing material. MAKE SURE that the RMA number is clearly written on the outside of all boxes. **CET reserves the right to refuse delivery of any equipment without a CET RMA number clearly displayed on the exterior of the package(s).**