TEITELBAUM DRY CLEANING, INC.

35-45 35TH STREET

QUEENS COUNTY

QUEENS, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: C241149

USEPA ID # NYD981132459

Prepared for:

S&C Properties, LLC

2 Bay Club Drive, Apt. 10G

Bayside, NY 11360

Prepared by:

Matthew M. Carroll, P.E.

&

TENEN ENVIRONMENTAL

CELEBRATING 10 YEARS OF EXCELLENCE

121 West 27th Street, Suite 702

New York, NY 10001

646-606-2332

Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

DECEMBER 2025

CERTIFICATION STATEMENT

I, Matthew M. Carroll, 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 Green Remediation (DER-31).

_____ P.E.

_____DATE

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QUEENS COUNTY

QUEENS, NEW YORK

SITE MANAGEMENT PLAN

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List of Acronyms

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BMP	Best Management Practice
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
DUSR	Data Usability Summary Report
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
GHG	Greenhouse 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
P.E. or PE	Professional Engineer
PFAS	Per- and Polyfluoroalkyl Substances
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
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

ES 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: C241149: Teitelbaum Dry Cleaning, Inc.
35-45 35th Street, Queens, NY 11106

Institutional Controls:	1. The property may be used for commercial or industrial use;
	2. All ECs must be operated and maintained as specified in this SMP;
	3. All ECs must be inspected at a frequency and in a manner defined in the SMP;
	4. The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene (NYC DOHMH) 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;
	5. Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
	6. Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
	7. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
	8. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
	9. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;

Site Identification:	C241149: Teitelbaum Dry Cleaning, Inc. 35-45 35th Street, Queens, NY 11106
	10. 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;
	11. The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 11, and any potential impacts that are identified must be monitored or mitigated;
	12. Vegetable gardens and farming on the site are prohibited; and
	13. An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.
Engineering Controls:	1. Cover system
	2. Sub-Slab Depressurization Systems (SSDSs) a. Site (35-45 35th Street) b. Offsite Property (35-01 36th Avenue)
	3. Soil Vapor Extraction (SVE) System

Inspections:	Frequency
1. Cover inspection	Annually
2. On- and Offsite SSDSs, including alarm system tests	Quarterly
3. SVE, including SVE piping to confirm operation of appropriate valves and alarm system test	Quarterly
Monitoring:	
1. Groundwater monitoring wells MW-3, MW-4, MW-5, and MW-7S	Quarterly

Site Identification: C241149: Teitelbaum Dry Cleaning, Inc.
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2. Pressure extension test for on- and offsite SSDSs and SVE system to ensure design goals are being met	Quarterly
3. Effluent sample of SVE system	Startup and 3 months after startup
4. Post-Remedial Indoor Air Sampling to assess efficacy of the on- and offsite SSDSs	3 months after SSDS startup
5. Post-Remedial Soil Vapor Sampling to assess mitigation of soil vapor migration offsite	3 months after onsite SSDS startup
Maintenance:	
1. Cover System	As needed
2. On- and offsite SSDS/SVE Blower maintenance	As needed
3. On- and offsite SSDS valves and alarms	As needed
Reporting:	
1. Groundwater Monitoring (to be provided with Periodic Review Report)	Annually with quarterly summaries
2. On- and offsite SSDS and SVE pressure monitoring (to be provided with Periodic Review Report)	Annually
3. Periodic Review Report	Annually

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

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Teitelbaum Dry Cleaning, Inc. Site located in Queens, New York (hereinafter referred to as the "Site"). See Figure 1. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. C241149, which is administered by New York State Department of Environmental Conservation (NYSDEC or Department).

S & C Properties, LLC ("S & C") entered into a Brownfield Cleanup Agreement (BCA) on January 9, 2014 with the NYSDEC to remediate the site. A figure showing the site location and 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 provided in Appendix 2.

After completion of the remedial work, some contamination was left at this site, which is hereafter referred to as "remaining contamination". 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 Queens 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 and off-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); and

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375 and the BCA (Index # C241149-12-13; Site #C241149) for the site, and thereby subject to applicable penalties.

All 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 1 of this SMP.

This SMP was prepared by Matthew M. Carroll, PE and Tenen Environmental, LLC, on behalf of S & C, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 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 and Alterations

Revisions and alterations to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to the SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. All approved alterations must conform with Article 145 Section 7209 of the Education Law regarding the application of professional seals and alterations. For example, any changes to as-built drawings must be stamped by a New York State Professional Engineer. In accordance with the Environmental Easement for the site, the NYSDEC project manager 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:

1. 60-day advance notice of any proposed changes in site use that are required under the terms of the BCA, 6 NYCRR Part 375 and/or Environmental Conservation Law.
2. 7-day advance notice of any field activity associated with the remedial program.
3. 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan. If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.
4. 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.
5. Notice within 48 hours of any non-routine maintenance activities.
6. 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.
7. 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.

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

8. 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 Brownfield Cleanup Agreement (BCA), and all approved work plans and reports, including this SMP.

9. 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 notifications. 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 1.

Table 1: Notifications*

Name	Contact Information	Required Notification**
Yildiz Palumbo, PE, NYSDEC Project Manager	(718) 482-4891, yildiz.palumbo@dec.ny.gov	All Notifications
Jane O'Connell, Regional Remediation Engineer	(718) 482-4599, jane.oconnell@dec.ny.gov	All Notifications
Kelly A. Lewandowski, P.E., Chief, Site Control Section	(518) 402-9543, kelly.lewandowski@dec.ny.gov	Notifications 1 and 8
Stephen Lawrence, NYSDOH Project Manager	(518) 402-0450, stephen.lawrence@health.ny.gov	Notifications 4, 6, and 7

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

** Note: Numbers in this column reference the numbered bullets in the notification list in this section.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The site is located in Astoria, Queens County, New York and is identified as Block 639 and Lot 4 on the New York City Tax Map (see Figure 1). The site is an approximately 0.23-acre area and is bounded by 35th Street to the northwest, 36th Avenue to the south, 36th Street to the east, and 35th Avenue to the northeast (see Figure 2 – Site Layout Map). The boundaries of the site are more fully described in Appendix 2 –Environmental Easement. The owner(s) of the site parcel(s) at the time of issuance of this SMP is/are:

S & C Properties, LLC

The operator of the site parcel at the time of issuance of this SMP is:

Teitelbaums 1, Inc. a/k/a Red Cap Valet

2.2 Physical Setting

2.2.1 Land Use

The Site consists of the following: a single-story, high-ceilinged commercial/manufacturing building (measuring approximately 100 ft x 100 ft). The ground floor of the building is currently utilized as a commercial dry cleaner, not open to the public. The building is divided into two sections (north and south). A portion of the southern section contains a second floor that is used as an office and storage space. According to the New York City Department of Buildings (NYC DOB) records, in 1998 one 1,500-gallon fuel oil underground storage tank (UST) was abandoned in place and replaced with six 275-gallon aboveground storage tanks (ASTs). No documentation was available regarding the age, condition, period of usage, proper decommissioning, or any

tightness testing associated with the abandoned UST. All six ASTs were set in secondary containment in the form of concrete enclosures and were decommissioned and removed from the Site for offsite disposal in November 2024. The ground floor of the building houses the majority of equipment and storage space. Equipment and storage on the ground floor includes numerous dry cleaning machines, fuel oil and chemical storage, dryers, washers, pressing stations, and clothing staging areas. The equipment and work areas combine to occupy much of the ground floor, leaving very little accessible space. There is a small sub-grade boiler room (measuring approximately 3 ft x 5 ft) located in the northernmost corner of the property containing a fuel oil-fired steam boiler, condensate tank, and sump. The Site is zoned M1-5, a designation that typically denotes manufacturing and light industrial use and is currently utilized for commercial use. Site occupants include a commercial dry cleaner.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include commercial and industrial properties with some residential uses northwest of the Site. The properties immediately south of the Site include a commercial property that recently finished construction; the properties immediately northwest of the Site include commercial and residential properties; the properties immediately east of the Site include commercial properties; and the properties to the northeast of the Site include industrial and manufacturing properties.

2.2.2 Geology

The Site is situated within the Atlantic Coastal Plain region of the Long Island Coastal Lowlands, characterized by glacial till and outwash sands of the Pleistocene Epoch.

The regional stratigraphy of Long Island from surface to bedrock includes: glacial and alluvial deposits of Quaternary age; the Raritan formation of Upper Cretaceous age consisting of clay, silt clay, sand, and gravel; The Monmouth Group, Matawan Group and Magothy Formation of Upper Cretaceous age consisting of silty clay, glauconitic sandy clay, sand, and gravel; Fordham Gneiss of Precambrian to Middle Proterozoic age

consisting of garnet-biotite-quartz-plagioclase gneiss, and amphibolite; Inwood Marble of Early Cambrian to Lower Ordovician age consisting of dolomite marble, calc-schist, granulite, and quartzite, overlain by calcite marble; and Harrison/Ravenswood Gneiss of Ordovician age consisting of biotite-hornblende-quartz-plagioclase gneiss with accessory garnet and sphene (USGS, 2014).

Depth to bedrock beneath the Site has not been identified. Manmade fill has been used throughout Queens County to extend and reinforce shorelines and to eliminate swampy areas. The shallow subsurface at the Site consists of fill material underlain by fine sands. Borings advanced during the Remedial Investigation (RI) describe the fill layer as mostly concrete with some brick. Fill is usually encountered from 0-2 feet below grade (ft-bg) and rarely down to five ft-bg. Material from the ground surface down to approximately 20-25 ft-bg is generally a mixture of fine to medium-grained sand with some silt. There is a minor clayey sand lens present within the first six ft-bg in the southern portion of the property.

A geologic cross section is shown in Figure 3. Site specific boring logs are provided in Appendix 3.

2.2.3 Hydrogeology

Groundwater has been measured at depths ranging from approximately 17-23 ft-bg at the Site. The topography of the Site is relatively flat. No wetlands or surface water bodies are present at the Site. Based on an elevation survey performed as part of the RI, local groundwater flow direction has been determined to be south towards Newtown Creek (approximately 1.87 miles south of the Site).

A groundwater contour map is shown in Figure 4. Groundwater elevation data is provided in Table 13. Groundwater monitoring well construction logs are provided in Appendix 3.

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.

Prior to the Site's entrance into the BCP, no Phase I Environmental Site Assessment (ESA) or other environmental investigations or sampling had been performed onsite. Site operational history was obtained through interviews with the Participant (S & C), review of Sanborn Fire Insurance Maps and New York City Department of Buildings (NYC DOB) Certificates of Occupancy. Former Site uses include a commercial wagon and automobile garage, a machine shop and iron works and a dry cleaner.

On May 20, 2013, the NYSDEC designated the Site as a potential inactive hazardous waste disposal site, but did not list it on the Registry of Inactive Hazardous Waste Disposal Sites. In August 2013, NYSDEC issued a proposed Order on Consent (Order) to S & C. Rather than execute the Order, S & C entered into the BCP as a Participant. On December 18, 2023, the Site was accepted into the BCP and the BCA was executed on January 9, 2014.

Investigation and sampling efforts conducted at the Site are described in the following reports:

- *Remedial Investigation Report, Teitelbaum Dry Cleaning, Inc., 35-45 35th Street, Queens, NY*. Tenen Environmental, LLC. November 2018.
- *Remedial Action Work Plan, Teitelbaum Dry Cleaning, Inc., 35-45 35th Street, Queens, NY*. Tenen Environmental, LLC. March 2021.

Remedial Investigation Report, Teitelbaum Dry Cleaning, Inc., 35-45 35th Street, Queens, NY. Tenen Environmental, LLC, November 2018.

The Site was investigated in accordance with the scope of work presented in the NYSDEC-approved Remedial Investigation Work Plan (RIWP) dated May 2014, as well as subsequent work plans for offsite soil vapor, offsite groundwater, and onsite source delineation submitted and approved by NYSDEC between 2015 and 2017. The investigations were conducted between August 2014 and November 2017. The Remedial Investigation Report (RIR) was submitted to NYSDEC in November 2018 and approved by NYSDEC the same month.

The RI scope of work included the installation of 22 soil borings, the collection of 43 soil samples, the installation of seven permanent groundwater monitoring wells and one temporary groundwater monitoring well, the collection of 22 groundwater samples from newly installed and previously installed groundwater monitoring wells (including wells that were previously installed by others and associated with a different property and unrelated investigation), the installation of 19 soil vapor points, and the collection of 19 soil vapor samples, within and surrounding the Site (sample quantities exclude quality assurance/quality control [QA/QC] samples). In addition, soil vapor and indoor air samples were collected from within adjacent and surrounding buildings (where access was granted) in order to evaluate potential impacted soil vapor migration and intrusion from the Site.

A summary of the RI findings are as follows:

Soil

- Elevated concentrations of chlorinated VOCs (cVOCs) were found in soil collected from the northwestern portion of the Site in the vicinity of the abandoned UST. The UST grave likely created a depression in the subsurface resulting in a preferential pathway for chlorinated solvent contamination to pool. Based upon data collected during the RI, this area is considered to be the source of the chlorinated solvent contamination in groundwater and soil vapor on- and offsite. CVOC impacts in this area extend vertically from approximately five to 20 ft-bg and are limited to a radius of approximately 15 to 20 feet. CVOC concentrations drastically decrease in soil outside of this

radius and are generally not detected above Part 375 Unrestricted Use/Protection of Groundwater Soil Cleanup Objectives (UUSCOs and PGWSCOs) outside of a 30-foot radius;

- Minor petroleum-related impacts were present near the abandoned UST and are likely the result of minor historical spills associated with typical UST operations. No additional petroleum-related impacts were found in onsite soils; and
- Pesticide and metal concentrations are consistent with historic fill and can be attributed to historical marsh land filling activities that took place across Queens County.

Groundwater

- Elevated concentrations of chlorinated solvents exceeding New York State Division of Water Technical and Operational Guidance Series (TOGS) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (AWQS) are present throughout the Site and appear to be migrating offsite, primarily towards the south-southwest. Chlorinated solvent concentrations in the groundwater are consistent with current and former Site operations and suspected releases;
- Three groundwater monitoring wells were sampled and analyzed for per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. Concentrations of PFAS in exceedance of NYSDEC's April 2023 *Guidelines for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Remedial Programs* (PFAS Guidelines) were detected in all three groundwater samples. Perfluorooctanoic acid (PFOA) was detected at a maximum concentration of 49.3 nanograms per liter (ng/L) with an AWQS of 6.7 ng/L and perfluorooctanesulfonic acid (PFOS) was detected at a maximum concentration of 35.2 ng/L with an AWQS of 2.7 ng/L. 1,4-Dioxane was not detected in any of the groundwater samples analyzed.

- The groundwater hydraulic gradient was calculated to be approximately 0.0045 ft-ft oriented south-southwest;
- A soil sample was collected from the MW-5 borehole for analysis of total organic carbon (TOC), which was used to assess the sorption properties of the aquifer. Analysis indicated an average TOC content of 1.1% by weight;
- Overall, concentrations of chlorinated solvents have decreased across and downgradient of the Site by an average of about 50% from 2012 to 2014 when the wells were initially installed. Based upon this analysis, tetrachloroethene (PCE) concentrations found in TRC-SB-16 (offsite well to the southwest and un-related to the Site, and the only well with cVOC increase) in July 2016 indicate the presence of a secondary source not associated with the Site;
- The data collected in 2015 and 2016 show a considerable reduction in PCE concentrations across and downgradient of the Site versus their initial concentrations measured in 2012 and 2014. Dichloroethene (DCE), particularly cis-1,2-DCE, is observed at a number of locations, including wells TRC-SB11, TRC-SB13, TRC-SB15, TRC-SB16, TRC-MW-1, MW-2, and MW-4; and
- Considering the whole data set, the presence of cis-DCE and the traces of vinyl chloride (VC), the decline in contaminant concentrations with time, and various aquifer characteristics (e.g., redox) being within a positive range (for reductive dechlorination), all support the conclusion that reductive dechlorination is occurring at the Site.

Soil Vapor

- Elevated concentrations of chlorinated solvents exceeding New York State Department of Health (NYSDOH) Air Guidance Values (AGVs) are present in soil vapor within the Site boundaries and extend offsite to the west, north, and south; and

- The results of the indoor air investigation within the home located at 35-42 35th Street (approximately 65 feet to the northwest across 35th Street) indicate that offsite migration of impacted soil vapor has not impacted the indoor air quality or soil vapor beneath this property.

Remedial Action Work Plan, Teitelbaum Dry Cleaning, Inc., 35-45 35th Street, Queens, NY. Tenen Environmental, LLC, March 2021.

Following the RI, a Remedial Action Work Plan (RAWP) and Alternatives Analysis (AA) was prepared by Tenen to address contamination detected on- and offsite during the RI. The RAWP contemplated three remedial alternatives: one with excavation of soil to meet Unrestricted Use (Track 1) SCOs; one with excavation of soil to meet Site-Specific (Track 4) SCOs; and, one to manage soil in place with a soil vapor extraction (SVE) system to meet Site-Specific (Track 4) SCOs. All three remedial alternatives included mitigation of soil vapor intrusion onsite and offsite at a south adjoining property via the installation of active sub-slab depressurization systems (SSDSs) and remediation of groundwater via chemical injections into an injection well network. The Commercial Use (Track 4) remedy to manage soil in place with a SVE system was chosen for the Site in the approved RAWP. The Final Engineering Report (FER) documents the remedy completed at the Site and all deviations from the RAWP.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated March 2021 are as follows:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.

- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

RAOs for Environmental Protection

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

Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

Soil Vapor

RAOs for Public Health Protection

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

2.5 Remaining Contamination

2.5.1 Soil

All soil samples collected at the Site outside of the cVOC source area in the northern portion of the Site meet the Commercial Use SCOs. Commercial Use SCOs are appropriate given the intended future use of the Site. cVOC impacts above Protection of Groundwater and Commercial Use SCOs within the upper 20 feet of the cVOC source area are being treated in-situ with a soil vapor extraction (SVE) system. PCE, detected at a maximum concentration of 1,100 mg/kg with a Protection of Groundwater SCO of 1.3 mg/kg and a Commercial Use SCO of 150 mg/kg, was left in place. No other analytes were detected in exceedance of Commercial Use SCOs. The cVOCs TCE, detected at a maximum concentration of 30 mg/kg with a Protection of Groundwater SCO of 0.47 mg/kg, and cis-1,2-DCE, detected at a maximum concentration of 6.4 mg/kg with a Protection of Groundwater SCO of 0.25 mg/kg, were also left in place. No excavation was completed during implementation of the Remedial Action, with the exception of minor excavation in support of the sub-slab depressurization system (SSDS) installation and trenching to support the SVE system installation. Soil contaminant conditions were investigated during the RI. The design goal of the SVE system is to decrease cVOC concentrations of PCE and its breakdown products to below the Protection of Groundwater SCOs.

Table 10 and Figure 5 summarize the results of all soil samples collected that exceed the Protection of Groundwater SCOs and Commercial Use SCOs at the Site after completion of the remedial action.

2.5.2 Groundwater

Residual cVOC contamination, specifically PCE and its breakdown products, remain in the groundwater. A network of 19 permanent injection wells (INJ-1 through INJ-19) were installed at the Site and in the sidewalk adjoining the Site between July 17, 2023 and August 3, 2023. Groundwater injections were applied to the injection well network between February 26, 2024 and March 8, 2024 in accordance with the NYSDEC-approved Enhanced Reductive Dechlorination (ERD) and In-Situ Chemical Reduction (ISCR) Design Document, prepared by Tenen and dated April 12, 2023. The selected groundwater treatment approach utilized 3-D Microemulsion® (3DME), Sulfidated-MicroZVI® (S-

MicroZVI), and Bio-Dechlor INOCULUM Plus® (BDI Plus) based upon the results of the pilot test conducted by Tenen on October 27, 2022. The self-distributing features of the 3DME combined with its longevity (several years) allows for sufficient coverage with minimal pore volume displacement. The colloidal zero-valent iron (ZVI) product, S-MicroZVI, provides a source or iron, creating conditions for abiotic reduction via the formation of iron sulfides, oxides, and hydroxides, while also maintaining strongly reducing conditions in the treatment area for an extended timeframe. This fosters rapid abiotic reduction of chlorinated solvents while reducing the potential for daughter product formation compared to a standard in-situ bioremediation approach. BDI Plus was added to provide a live microbial culture that is known to fully degrade these compounds. The goal of the in-situ chemical treatment is to reduce cVOC concentrations below the NYSDEC Class GA Standards. In total, approximately 6,000 pounds of 3DME, 4,500 pounds of S-MicroZVI, and 48 liters of BDI Plus was applied across the injection well network.

Baseline groundwater sampling was conducted at four groundwater monitoring wells (MW-3 [offsite and upgradient], MW-4 [offsite and downgradient], MW-5 [offsite and cross/downgradient], and MW-7S [onsite source area]) on October 27, 2022, prior to application of injections. All baseline groundwater samples were analyzed for VOCs. The results of the baseline groundwater sampling indicated concentrations of PCE and cis-1,2-DCE were detected in exceedance of their respective Class GA Standards in two samples and the duplicate sample, and TCE was detected in exceedance of its Class GA Standard in one sample and the duplicate sample. All of the above-mentioned analytes have a Class GA Standard of 5 ug/L. PCE was detected at a maximum concentration of 110 ug/L in MW-4_DUP; cis-1,2-DCE was detected at a max. concentration of 13,000 ug/L in MW-7S; and, TCE was detected at a max. concentration of 58 ug/L in MW-4_DUP. No other cVOCs were detected in exceedance of Class GA Standards in any baseline groundwater samples. cVOCs were not detected in exceedance of Class GA Standards in monitoring well MW-5.

The approved RAWP indicated that offsite monitoring well MW-6, located downgradient of the Site, would be part of the post-remedial monitoring well network.

However, the southern adjoining property had been under construction and redevelopment since at least 2021 and the associated construction fencing and support infrastructure has obstructed MW-6 since the beginning of that project. Due to the obstruction of MW-6 at the time of sampling, a baseline groundwater sample was collected from adjacent monitoring well MW-5, located approximately 15-20 feet east of MW-6 along 36th Avenue.

2.5.2.1 First Quarterly Groundwater Sampling Event – May 2024

On May 16, 2024, approximately 2.5 months after the final day of chemical injection application, the first round of post-remedial groundwater sampling was performed. Groundwater samples were collected from monitoring wells MW-3, MW-4, and MW-5. As discussed in Section 2.5.2, monitoring well MW-6 was inaccessible due to the presence of construction fencing and support infrastructure and monitoring well MW-5 was sampled instead. A sample could not be collected from onsite monitoring well MW-7S during the first post-remedial groundwater sampling event due to the continued presence of injection chemicals within the water table in this area. During low-flow purging of the well, the purge water was black and viscous, indicating the presence of S-MicroZVI.

The results of the first round of post-remedial groundwater sampling indicated concentrations of PCE have decreased by one order of magnitude in MW-4 and remained consistent in MW-3 and MW-5. In addition, concentrations of TCE have decreased below the Class GA Standard in MW-4 and continue to remain below the Class GA Standard of 5 ug/L in MW-3 and MW-5. Cis-1,2-DCE concentrations also decreased by one order of magnitude in MW-4 and continue to remain non-detect in MW-3 and MW-5. PCE was detected at a maximum concentration of 31 ug/L in MW-4; cis-1,2-DCE was detected at a max. concentration of 110 ug/L in MW-4; and, TCE was detected at a max. concentration of 2.6 ug/L in MW-4.

2.5.2.2 Second Quarterly Groundwater Sampling Event – August 2024

On August 19, 2024 the second round of post-remedial groundwater sampling was performed. Groundwater samples were collected from monitoring wells MW-3, MW-4, and MW-5. As discussed in Section 2.5.2, monitoring well MW-6 was inaccessible due to

the presence of construction fencing and support infrastructure and monitoring well MW-5 was sampled instead. A sample could not be collected from onsite monitoring well MW-7S during the second post-remedial groundwater sampling event due to the continued presence of injection chemicals within the water table in this area. During low-flow purging of the well, the purge water was black and viscous, indicating the presence of S-MicroZVI.

The results of the second round of post-remedial groundwater sampling indicated concentrations of PCE have decreased slightly in MW-4 compared to the first round of post-remedial sampling and remained consistently low and below the Class GA Standard of 5 ug/L in MW-5. The concentration of PCE detected during this round of sampling in MW-3 was slightly in exceedance of the Class GA Standard, while PCE was detected below the Class GA Standard in this well during the first round of post-injection sampling. In addition, concentrations of TCE continue to remain below the Class GA Standard of 5 ug/L in MW-3, MW-4, and MW-5. Cis-1,2-DCE concentrations also decreased in MW-4 compared to the first round of post-remedial sampling and continue to remain non-detect in MW-3 and MW-5. During this round of sampling, vinyl chloride was detected slightly in exceedance of its Class GA Standard of 2 ug/L in MW-4. Decreasing concentrations of PCE and cis-1,2-DCE and increasing concentrations of vinyl chloride over time in MW-4 indicate reductive dechlorination is occurring in the shallow aquifer. PCE was detected at a max. concentration of 23 ug/L in MW-4; cis-1,2-DCE was detected at a max. concentration of 69 ug/L in MW-4; TCE was detected at a max. concentration of 2.1 ug/L in MW-4; and, vinyl chloride was detected at a concentration of 2.9 ug/L in MW-4.

2.5.2.3 Third Quarterly Groundwater Sampling Event – March 2025

On March 4, 2025 the third round of post-remedial groundwater sampling was performed. Groundwater samples were collected from monitoring wells MW-3, MW-4, MW-5, and MW-7S. The construction fencing and support infrastructure for the south adjoining property redevelopment that was previously blocking access to MW-6 during the baseline and first and second post-remedial sampling events was removed since the last sampling event in August 2024, and MW-6 was able to be located in the field. However, during gauging of MW-6, the well was found to be dry. The bottom of the well was

measured at 13.19 ft-bg. Monitoring well construction logs for MW-6 indicate the well was installed to a depth of 30 ft-bg during the RI. Therefore, it is Tenen's opinion that sediment was introduced to the well or the well was damaged in some other way during construction and redevelopment of the south adjoining property. Since MW-6 was found to be dry, a post-remedial groundwater sample was collected from MW-5 instead. MW-5 was also sampled during the baseline and first and second post-remedial sampling events due to access limitations to MW-6.

Tenen notes that during low-flow purging of onsite monitoring well MW-7S during this sampling event, the purge water was gray to black in color, indicating the presence of S-MicroZVI in the aquifer. However, after purging the well for over one hour, the groundwater eventually became clear and a sample was able to be collected from the well. This is the first post-injection groundwater sampling event that a sample was collected from MW-7S, due to the presence of S-MicroZVI in the well during the first and second post-injection sampling events.

The results of the third round of post-remedial groundwater sampling indicated concentrations of PCE have decreased to below the Class GA Standard of 5 ug/L in MW-4 compared to the second round of post-remedial sampling and remained consistently low and below the Class GA Standard in MW-5 and MW-7S compared to the most recent previous round of sampling (second round of post-remedial sampling for MW-5, and baseline sampling for MW-7S). However, the concentration of PCE detected in MW-3, located upgradient of the Site, was still slightly in exceedance of the Class GA Standard. It should be noted that while the parent sample collected from MW-3 contained PCE slightly in exceedance of its Class GA Standard, the duplicate sample collected from MW-3 contained PCE at a concentration below the Class GA Standard. However, the concentration of PCE in both the parent and duplicate samples collected from MW-3 during this round of sampling have still decreased from the concentration detected in MW-3 during the second round of post-remedial sampling. In addition, concentrations of TCE continue to remain below the Class GA Standard of 5 ug/L in MW-3, MW-4, MW-5, and MW-7S compared to the most recent round of sampling (second round of post-injection

sampling for MW-3, MW-4, and MW-5 and baseline sampling for MW-7S). Cis-1,2-DCE concentrations decreased by three orders of magnitude in onsite monitoring well MW-7S from the baseline sampling event (reduction from 13,000 ug/L during the October 2022 baseline sampling to 7.26 ug/L during this round of sampling), though still detected slightly in exceedance of the Class GA Standard of 5 ug/L. Cis-1,2-DCE concentrations also decreased in MW-4 to below the Class GA Standard compared to the second round of post-remedial sampling and continue to remain non-detect in MW-3 and MW-5. During the second round of post-injection sampling, vinyl chloride was detected slightly in exceedance of its Class GA Standard of 2 ug/L in MW-4, but was non-detect in MW-4 during this round of sampling. PCE was detected at a max. concentration of 5.05 ug/L in MW-3; cis-1,2-DCE was detected at a max. concentration of 7.26 ug/L in MW-7S; TCE was detected at a max. concentration of 1.58 ug/L in MW-4; and, vinyl chloride was detected at a concentration of 0.88 ug/L in MW-7S.

2.5.2.4 Fourth Quarterly Groundwater Sampling Event – June 2025

On June 5, 2025 the fourth round of post-remedial groundwater sampling was performed. Groundwater samples were collected from monitoring wells MW-3, MW-4, MW-5, and MW-7S. As noted in Section 2.5.2.3 above, MW-6 was found to be dry following completion of the redevelopment at the south-adjoining property and a post-remedial groundwater sample was collected from MW-5 instead.

The results of the fourth round of post-remedial groundwater sampling indicated concentrations of PCE have increased to slightly above the Class GA Standard of 5 ug/L in MW-4 compared to the third round of post-remedial sampling and remained slightly above the Class GA Standard in MW-3. PCE concentrations in MW-5 and MW-7S remained consistently below the Class GA Standard, with PCE non-detect in MW-7S, the onsite source area well. In addition, concentrations of TCE continue to remain below the Class GA Standard of 5 ug/L in MW-3, MW-4, MW-5, and MW-7S compared to the third round of post-injection sampling. Cis-1,2-DCE concentrations remained consistent in all four post-remedial monitoring wells compared to the third round of post-remedial sampling, with cis-1,2-DCE concentrations continued to be slightly in exceedance of the

Class GA Standard of 5 ug/L in MW-7S. Cis-1,2-DCE continues to remain non-detect in MW-3 and MW-5. Vinyl chloride was detected slightly in exceedance of its Class GA Standard of 2 ug/L in MW-7S during this round of sampling, and was detected below its Class GA Standard during the third round of post-remedial sampling. Vinyl chloride was not detected in any other post-remedial monitoring wells. Vinyl chloride is the final cVOC breakdown product of PCE. PCE was detected at a max. concentration of 10.9 ug/L in MW-3; cis-1,2-DCE was detected at a max. concentration of 7.81 ug/L in MW-7S; TCE was detected at a max. concentration of 1.65 ug/L in MW-4; and, vinyl chloride was detected at a concentration of 2.02 ug/L in MW-7S.

As of the most recent round of post-remedial groundwater sampling (6/5/2025), PCE was detected below the Class GA Standard in monitoring wells MW-5 (offsite and downgradient) and MW-7S (onsite source area); cis-1,2-DCE was detected below the Class GA Standard in monitoring wells MW-3 (offsite and upgradient), MW-4 (offsite and downgradient) and MW-5 (offsite and downgradient); vinyl chloride was detected below the Class GA Standard in MW-3 (offsite and upgradient), MW-4 (offsite and downgradient) and MW-5 (offsite and downgradient); and, TCE was detected below the Class GA Standard in all four post-remedial monitoring wells. Comparison of post-injection sampling event results with RI and baseline groundwater sample results indicate reductive dechlorination of PCE in the shallow aquifer is occurring. Groundwater will continue to be monitored on a quarterly basis. Monitoring will continue until permission to discontinue is granted in writing by NYSDEC and NYSDOH.

Table 11 and Figure 6 summarize the results of all samples of groundwater that exceed the SCGs after completion of the remedial action.

2.5.3 Soil Vapor

Contamination remains in the soil vapor; however, the concentrations of contaminants in the soil source area will decrease over time with the operation of a SVE system, which should result in a decrease of contaminants in soil vapor over time as well.

Remaining soil vapor contamination onsite will be addressed by the operation of an active SSDS. The active SSDS will also mitigate the potential for migration of impacted soil vapor offsite. Soil vapor sampling was completed at the Site during the Remedial Investigation phase of this project; sample locations are shown on Figure 7 and results are included in Table 12. Post-remedial indoor air sampling will be conducted onsite to assess the efficacy of the active SSDS and post-remedial soil vapor sampling will be conducted offsite to demonstrate the mitigation of soil vapor migration offsite after the decommissioning of the SVE System. While the SSDS is currently operating, once the SVE System is fully installed (estimated August 2025), the SSDS will be shut off and the SVE will operate until post remedial sampling indicates that the SVE remedy was effective and the system is decommissioned. Once the SVE system is decommissioned, the SSDS will begin operating and the required sampling will be conducted. The results of all post remedial sampling will be detailed in quarterly and/or annual reports to NYSDEC.

Table 12 and Figure 7 summarize the results of all samples of soil vapor that exceed the SCGs after completion of the remedial action.

3.0 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 project manager.

This plan provides:

- A description of all 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, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix 4) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the site remedy, as determined by the NYSDEC project manager.

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 commercial and industrial uses only. 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 11. These ICs are:

- The property may be used for: commercial and industrial use;
- All ECs must be operated and maintained as specified in this SMP;
- All 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 NYSDOH or the New York City Department of Health and Mental Hygiene (NYC DOHMH) 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 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;
- All 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 remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any 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;
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 11, and any potential impacts that are identified must be monitored or mitigated;
- Vegetable gardens and farming on the site are prohibited; and
- An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.

3.3 Engineering Controls

3.3.1 Cover (or Cap)

Exposure to remaining contamination at the site is prevented by a cover system placed over the site. This cover system is comprised of a minimum of two- to six-inch thick concrete building slab that covers the entirety of the Site. Figure 11 presents the location of the cover system and applicable demarcation layers. The Excavation Work Plan (EWP) provided in Appendix 4 outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed. 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) and associated Community Air Monitoring Plan (CAMP) prepared for the site and provided in Appendices 7 and 8, respectively. Any breach of the site's cover system must be overseen by a Professional Engineer (PE) who is licensed and registered in New York State or a qualified person who directly reports to a PE who is licensed and registered in New York State.

3.3.2 Onsite Sub-Slab Depressurization System

To mitigate the potential for vapor intrusion, an active SSDS was installed onsite. The SSDS design for the onsite SSDS was approved in the RAWP dated March 2021. A pressure field extension test was conducted at the Site on May 10, 2021 to confirm the design presented in the RAWP would be appropriate for the remedy.

The SSDS consists of six suction pits installed beneath the building slab, each connected via manifold to a fan on the roof via galvanized steel piping. Galvanized steel was utilized due to fire department requirements for exterior piping. To create the suction pits, the existing slab was saw cut and the underlying soil was removed to a depth of at

least 18 inches. The void space was then lined with geotextile fabric and a layer of ¾-inch clean stone aggregate.

The overall goal of the system is to create a pressure differential of -0.02 inches of water column (in-wc) between the at-grade building and sub-slab environment; however, differential pressure readings above -0.004 in-wc are considered acceptable. An alarm system was installed that will notify building management if a drop in pressure occurs, which indicates that the system is not operating as designed. The system has been designed in general conformance with the NYSDOH Soil Vapor Guidance, including Section 4.2.2, *System-specific Recommendations*. The exhaust location meets the requirements of the NYSDOH Soil Vapor Guidance, and is located above the access roof level and at least 25 feet away from adjoining buildings and HVAC intakes.

A blower test was performed for the onsite SSDS on April 12, 2022. Based on the sizing test, a fan was chosen by the Remedial Engineer and installed in order to meet design goals. The installed fan was manufactured by Obar Systems, Inc. (Obar), Model No. GBR 89HA and was equipped with a weather-proof enclosure.

Following installation of the blower, the system was started up and six pressure monitoring points (PM-1 through PM-6) were installed. Following SSDS start up, a pressure field extension test was completed to ensure design goals were being met. The pressure field extension test results are shown below in Table 2. As noted above, the performance goal of the onsite SSDS was to depressurize below the slab to at least -0.02 in-wc; however, differential pressure readings above -0.004 in-wc are considered acceptable. Results of the pressure field extension test indicate that all soil vapor monitoring points pass the performance criteria as included in the approved RAWP. The SSDS vacuum was balanced to incorporate the SVE wellpoints; once the SVE system is no longer required, the SSDS will be rebalanced to increase the pressure of the SSDS. Locations of the monitoring points are shown on Figure 8.

Table 2: Onsite SSDS Monitoring Point Pressure Field Extension Test Results

Monitoring Point	Pressure (in-wc)
VMP-1	-2.43
VMP-2	-0.191
VMP-3	-0.014
VMP-4	-0.042
VMP-5	-1.159
VMP-6	-0.031

Procedures for operating and maintaining the onsite SSDS are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). As-built drawings, signed and sealed by a PE who is licensed and registered in New York State, are included in Appendix 10 – Operations and Maintenance Manual. Figure 11 shows the location of the ECs for the site.

3.3.3 Soil Vapor Extraction System

The objective of the SVE system is to remove PCE from soil above the water table; the system will also address PCE in soil vapor and prevent off-site migration of soil vapor in coordination with the on- and offsite SSDSs. This was accomplished by installing three sets of coupled soil vapor extraction wells in the PCE source area and applying a vacuum. At each of the three locations, one shallow, four-inch vertical SVE well and one deep, four-inch vertical SVE well was constructed of five feet of slotted (0.020 inch) schedule 40 PVC screen. All shallow extraction wells were installed to a depth of 13 ft-bg; one deep extraction well was installed to a depth of 17 ft-bg; and, two deep extraction wells were installed to a depth of 18 ft-bg. All extraction wells were installed using a Geoprobe® direct-push drill rig with auger attachment. The extraction wells were each connected below grade to two-inch PVC piping extending to the location of the SVE system equipment in the northwestern corner of the Site. Trenching was completed to accommodate the connections. The trenching was completed by saw cutting and jackhammering to remove the existing concrete slab and removing the underlying soil to a depth of approximately one to two ft-bg. Upon completion of the subgrade SVE piping

network, clean sand was backfilled around the piping and the concrete slab was repaired to seal the trench. The excavated soil was containerized and disposed of offsite in accordance with appropriate local, state, and federal regulations. A Contained-In Determination (CID) was obtained from NYSDEC on June 16, 2025 to permit all soil generated during the SVE system piping installation to be disposed of offsite as non-hazardous waste. The CID is included as an appendix to the Final Engineering Report (FER). The extraction wells were plumbed to a six-inch galvanized steel manifold for connection to the SVE system blower in the northwestern corner of the Site building, independent from the onsite SSDS riser. The discharge location for the blower is located on the building roof consistent with the NYSDEC DAR-1 guidance.

A pilot test for the SVE system was performed on April 11, 2022 and the results of the pilot test were detailed in a SVE Pilot Test Report dated July 2024 and prepared by EnviroTrac Engineering (EnviroTrac). The SVE Pilot Test Report was approved by NYSDEC on September 3, 2024. Based upon the results of the pilot test, the SVE system design was detailed in a SVE Remedial Design Document dated March 26, 2025 and prepared by Matthew M. Carroll, PE and Tenen. The SVE Remedial Design Document was approved by NYSDEC on March 26, 2025.

SVE performance testing included the screening of newly installed coupled shallow and deep pressure monitoring locations in the soil along the outer periphery of the known areas of contamination exceeding the Protection of Groundwater SCO for PCE and its breakdown products, to be treated by the extraction wells. These coupled pressure monitoring locations are shown as MP-1 through MP-7 in Figure 10. Vacuum readings ranged from -1.453 in-wc to -6.712 in-wc and were considered an acceptable value in accordance with the Environmental Protection Agency's (EPA) "*Soil Vapor Extraction Technology Reference Handbook, February 1991.*"

A blower test was performed for the on-Site SVE system on April 11, 2022 to size the blower. Based on the sizing test, a SVE system with a full enclosure and a regenerative vacuum blower was installed in order to meet design goals. The blower is Model No. K09-

MS as manufactured by FPZ with maximum flow of 471 cubic feet per meter (cfm). The SVE system shed and blower were installed on July 14, 2025 in the northwestern corner of the grade level of the onsite building.

Table 3: SVE Monitoring Point Communication Test Results

Monitoring Location	Shallow or Deep Point	Pressure (in-wc)
MP-1	Shallow	-2.040
	Deep	-1.453
MP-2	Shallow	-4.032
	Deep	-3.876
MP-4	Shallow	-3.889
	Deep	-3.780
MP-5	Shallow	-6.712
	Deep	-1.948
MP-6	Shallow	-6.090
	Deep	-5.670
MP-7	Shallow	-5.459
	Deep	-5.398

Procedures for operating and maintaining the SVE system are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). As-built drawings, signed and sealed by a PE who is licensed and registered in New York State, are included in Appendix

10 – Operations and Maintenance Manual. Figure 11 shows the location of the ECs for the site.

3.3.4 Offsite Sub-Slab Depressurization System

To mitigate the potential for vapor intrusion, an active SSDS was installed at the south adjoining property located at 35-01 36th Avenue (Block 639, Lot 1), herein referenced as "adjacent development". The SSDS was installed beneath the new building foundation slab and installation was conducted concurrently with the construction of the new building. The SSDS design for the offsite SSDS was prepared by Vertex Engineering, PC and was approved by NYSDEC in the RAWP dated March 2021.

The offsite SSDS consists of a sub-grade network of perforated PVC pipes set horizontally within sub-grade trenches consisting of a minimum of six-inches of clean stone aggregate overlying gas-permeable geotextile fabric. The SSDS underlies the concrete foundation slab of the adjacent development. One six-inch diameter cast iron riser pipe connects to the sub-grade network and extends vertically through the building to the roof, where the pipe is connected to a blower fan for exhaust. Six pressure monitoring points were installed throughout the foundation slab to confirm the system is achieving its design goals.

The overall goal of the system is to create a pressure differential of -0.02 in-wc between the at-grade building and sub-slab environment; however, differential pressure readings above -0.004 in-wc are considered acceptable. An alarm system was installed that will notify building management if a drop in pressure occurs, which indicates that the system is not operating as designed. The system has been designed in general conformance with the NYSDOH Soil Vapor Guidance, including Section 4.2.2, *System-specific Recommendations*. The exhaust location meets the requirements of the NYSDOH Soil Vapor Guidance, and is located above the access roof level and at least 25 feet away from adjoining buildings and HVAC intakes.

One fan manufactured by [insert manufacturer] was installed in order to meet design goals (Model No. [insert model #]). The fan was equipped with a weather-proof enclosure.

Following installation of the blower, the system was started up and six pressure monitoring points (PM-1 through PM-6) were installed. Following SSDS start up, a pressure field extension test was completed to ensure design goals were being met. The pressure field extension test results are shown below in Table 4. As noted above, the performance goal of the onsite SSDS was to depressurize below the slab to at least -0.02 in-wc; however, differential pressure readings above -0.004 in-wc are considered acceptable. Results of the pressure field extension test indicate that all soil vapor monitoring points pass the performance criteria as included in the approved RAWP. Locations of the monitoring points are shown on Figure 9.

Table 4: Offsite SSDS Monitoring Point Pressure Field Extension Test Results

Monitoring Point	Pressure (in-wc)
PM-1	
PM-2	
PM-3	
PM-4	
PM-5	
PM-6	

Procedures for operating and maintaining the offsite SSDS are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). As-built drawings, signed and sealed by a PE who is licensed and registered in New York State, are included in Appendix 10 – Operations and Maintenance Manual. Figure 11 shows the location of the ECs for the site.

3.3.5 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10. Unless waived by the NYSDEC, confirmation samples of applicable environmental media are required before terminating any remedial actions at the site. Confirmation samples require Category B deliverables and a Data Usability Summary Report (DUSR).

As discussed below, the NYSDEC may approve termination of a groundwater monitoring program. When a remedial party receives this approval, the remedial party will decommission all site-related monitoring, injection and recovery wells as per the NYSDEC CP-43 policy.

The remedial party will also conduct any needed site restoration activities, such as asphalt patching and decommissioning treatment system equipment. In addition, the remedial party will conduct any necessary restoration of vegetation coverage, trees and wetlands, and will comply with NYSDEC and United States Army Corps of Engineers regulations and guidance. Also, the remedial party will ensure that no ongoing erosion is occurring on the site.

3.3.5.1 – Cover (or Cap)

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.

3.3.5.2 – Onsite Sub-Slab Depressurization System (SSDS)

The onsite SSDS will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH project managers. If monitoring data indicates that the

onsite SSDS may no longer be required, a work plan to discontinue the onsite SSDS will be submitted by the remedial party to the NYSDEC and NYSDOH project managers. The work plan must include soil vapor intrusion sampling to verify that the onsite SSDS is no longer needed and must comply with the NYSDOH Soil Vapor Intrusion Guidance.

If the NYSDEC project manager approves termination of operation and maintenance of an onsite SSDS, the remedial party will notify the property owner and ask whether the property owner wants to keep the SSD system. If the property owner elects to keep the system, the property owner will be responsible for the operation and maintenance of the system going forward. If the property owner wants the system removed, the remedial party will remove and dispose of the system and repair any parts of the structure that were altered or modified by the onsite SSDS, such as holes in the basement floor or walls.

3.3.5.3 – Soil Vapor Extraction System (SVE) System

The AS/SVE system will not be discontinued unless prior written approval is granted by the NYSDEC project manager. In the event that monitoring data indicates that the AS/SVE system may no longer be required, a proposal to discontinue the system will be submitted by the remedial party to the NYSDEC project manager. Conditions that may warrant discontinuing the AS/SVE system include contaminant concentrations in groundwater and/or soil that: (1) reach levels that are consistently below ambient water quality standards or the site SCGs, as appropriate; (2) have become asymptotic to a low level over an extended period of time, as accepted by the NYSDEC; or (3) the NYSDEC has determined that the AS/SVE system has reached the limit of its effectiveness. This assessment will be based in part on post-remediation contaminant levels in groundwater collected from monitoring wells located throughout the site. Systems will remain in place and operational until permission to discontinue their use is granted in writing by the NYSDEC project manager.

3.3.5.4 – Enhanced Reductive Dechlorination (ERD) and In-Situ Chemical Reduction (ISCR) Groundwater Treatment Technology

Groundwater monitoring activities to assess ERD and ISCR treatment will continue, as determined by the NYSDEC project manager in consultation with NYSDOH project manager, until residual groundwater concentrations are found to be consistently below ambient water quality standards, the site SCGs, or have become asymptotic at an acceptable level over an extended period. In the event that monitoring data indicates that monitoring may no longer be required, a proposal to discontinue the monitoring will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC project manager. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, a additional injections, source removal, treatment and/or control measures will be evaluated.

3.3.5.5 – Offsite Sub-Slab Depressurization System (SSDS)

The offsite SSDS will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH project managers. If monitoring data indicates that the offsite SSDS may no longer be required, a proposal to discontinue the offsite SSDS will be submitted by the remedial party to the NYSDEC and NYSDOH project managers. The work plan must include soil vapor intrusion sampling to verify that the offsite SSDS is no longer needed and must comply with the NYSDOH Soil Vapor Intrusion Guidance.

If the NYSDEC project manager approves termination of operation and maintenance of an offsite SSDS, the remedial party will notify the property owner and ask whether the property owner wants to keep the SSD system. If the property owner elects to keep the system, the property owner will be responsible for the operation and maintenance of the system going forward. If the property owner wants the system removed, the remedial party will remove and dispose of the system and repair any parts of the structure that were altered or modified by the offsite SSDS, such as holes in the basement floor or walls.

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 project manager. 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 6.

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

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards and Part 375 SCOs for soil; and
- 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 monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site – wide Inspection

Site-wide inspections will be performed at a minimum of once per year. These periodic inspections must be conducted when the ground surface is visible (i.e. no snow cover). Site-wide inspections will be performed by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. 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 9 – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- Whether stormwater management systems, such as basins and outfalls, are working as designed;
- 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 all remedial components installed at the site will be conducted. 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.

Reporting requirements are outlined in Section 7.0 of this plan.

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 project manager 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 defined in 6 NYCCR Part 375. Written confirmation must be provided to the NYSDEC project manager 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. The remedial party will submit follow-up status reports to the NYSDEC within 45 days of the event on actions taken to respond to any emergency event requiring ongoing responsive action, describing and documenting actions taken to restore the effectiveness of the ECs.

The remedial party will conduct exterior inspections of all sub-slab depressurization (SSD) systems annually and perform comprehensive inspections annually. Exterior inspections will include: confirming that the fan is running correctly, determining whether there is damage to the stack or other exterior system components, and determining whether there have been structural changes, such as an addition to the structure. Comprehensive inspections include all of the activities required in the exterior inspection and an interior inspection, which includes: confirming a pressure differential on the manometer, inspecting the interior components for damage, recording vacuum readings from sub-slab vacuum monitoring points (if installed), and inspecting the basement area

for cracks in the basement floors and walls that may have developed since the SSD system was installed. The remedial party will notify the DEC project manager about any problems within three days of inspections. Inspection reports will be emailed to the DEC Project Manager and included in the next PRR. Any needed repairs will be made promptly according to the procedures in the Operation and Maintenance Plan (Section 5.3).

4.3 Treatment System Monitoring and Sampling

4.3.1 Remedial System Monitoring

Monitoring of the composite cover system, on- and offsite SSDSs, and SVE system will be performed on a routine basis, as identified in Table 5 – Remedial System Monitoring Requirements and Schedule (see below). The monitoring of remedial systems must be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager. 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 composite cover, on- and offsite SSDSs, or SVE system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. Composite cover, on- and offsite SSDSs, and SVE system components to be monitored include, but are not limited to, the components included in Table 5 below.

Table 5 – Remedial System Monitoring Requirements and Schedule

Remedial System Component	Monitoring Parameter	Operating Range	Monitoring Schedule
On- and Offsite SSDS Vacuum Blowers	Pressure readings at six onsite monitoring points and six offsite monitoring points	Design goal of ≤ -0.02 in-wc; ≤ -0.004 in-wc acceptable	Annually
	Alarm system test	Pass/Fail	Quarterly
SVE Vacuum Blower	Pressure readings at six coupled monitoring points	Design goal of ≤ -0.1 in-wc	Annually
	Alarm system test	Pass/Fail	Quarterly
On- and Offsite SSDS Piping	Visual inspection of on- and offsite SSDS mechanical and above-grade piping components	N/A	Quarterly
SVE Piping	Visual inspection of the SVE mechanical and above-grade piping components	N/A	Quarterly
Composite Cover System	Visual inspection of concrete floors and slabs for penetrations, cracking, or degradation	N/A	Annually

A complete list of components to be inspected is provided in the Inspection Checklist, provided in Appendix 9 – Site Management Forms. If any equipment 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, as per the Operation and Maintenance Plan, is required immediately.

4.3.2 Remedial System Sampling

Sampling locations, required analytical parameters and schedule are provided in Table 6 – Remedial System Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Table 6 – Remedial System Sampling Requirements and Schedule

Sampling Location	Analytical Parameters	Schedule
	VOC (EPA Method TO-15)	
SVE Blower Effluent Sample	X	At start up, 3 months following start up, and restart of the SVE system

In the event that the SVE system required a system restart, an effluent sample will be collected.

Detailed sample collection and analytical procedures and protocols are provided in Appendix 5 – Field Sampling Plan and Appendix 6 – Quality Assurance Project Plan.

The remedial party will properly dispose of all wastes generated by the remedial system at off-site disposal facilities according to local, state and federal laws and regulations. Wastes will be tested before disposal to comply with the permit conditions of the disposal facility. Wastes generated at this site include: spent activated carbon.

4.4 Post-Remediation Media Monitoring and Sampling

Groundwater samples shall be collected from the post-remedial groundwater monitoring network on a quarterly basis. Sampling locations, required analytical parameters and schedule are provided in Table 7 – Remedial System Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Table 7 – Post Remediation Sampling Requirements and Schedule

Sampling Location	Analytical Parameters	Schedule
Monitoring Wells MW-3, MW-4, MW-5*, and MW-7S	VOCs (EPA Method 8260C)	Quarterly
Subsurface Soil Location	VOCs (EPA Method 8260C)	Prior to petition shut down of SVE system
Indoor Air (onsite) and Exterior Soil Vapor	VOCs (EPA TO-15)	3 months following onsite SSDS start up
Indoor Air (offsite)	VOCs (EPA TO-15)	3 months following offsite SSDS start up
Sub-slab soil vapor and co-located indoor air	VOCs (EPA TO-15)	Prior to petition shut down of SVE system or the on- or offsite SSDSs

*Monitoring well MW-6 was inaccessible due to the presence of construction fencing and supports from the south adjoining redevelopment project covering the well until circa 2025. While MW-6 was inaccessible, monitoring well MW-5 was sampled in its place for baseline sampling and the first two rounds of post-injection sampling. During the third round of post-injection sampling conducted in March 2025, the construction fencing and supports had been removed and MW-6 was able to be located in the field. However, during gauging of MW-6, the well was found to be dry. The bottom of the well was measured at 13.19 feet below grade (ft-bg). Monitoring well construction logs for MW-6 indicate the well was installed to a depth of 30 ft-bg during the Remedial Investigation (RI). Therefore, it is Tenen's opinion that sediment was introduced into the well or the well was damaged in some other way during construction and redevelopment of the south adjoining property. Since MW-6 was found to be dry, post-remedial groundwater samples were collected from

MW-5 during the third and fourth rounds of post-injection sampling. MW-5 will replace MW-6 in the post-remedial groundwater monitoring well network and will continue to be sampled during future quarterly sampling events.

Detailed sample collection and analytical procedures and protocols are provided in Appendix 5 – Field Sampling Plan and Appendix 6 – Quality Assurance Project Plan.

4.4.1 Soil Sampling

The design goal of the SVE system is to decrease PCE and its associated degradation compound concentrations below the Protection of Groundwater SCO. Soil sampling will be performed once, at a minimum, to assess the quality of the soil, specifically the presence of remaining cVOC contamination, prior to petitioning shut down of the SVE system.

Onsite soil sampling will be completed within the cVOC source area in the northern corner of the Site to determine the efficacy of the SVE system. Proposed soil sample locations and soil boring depths will be provided in a written work plan to the Department for approval prior to completion of any work. Modification to the frequency or sampling requirements will be as determined by the NYSDEC project manager.

The soil samples will be analyzed for VOCs by an ELAP-certified laboratory. Results will be compared to the Protection of Groundwater SCOs, as determined by 6 NYCRR Part 375-6.8(b). The SVE system will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH. In the event that soil sampling data indicates that the SVE system may no longer be required, a proposal to discontinue the SVE system will be submitted by the remedial party to the NYSDEC and the NYSDOH.

The sampling frequency may only be modified with the approval of the NYSDEC project manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC project manager.

Deliverables for the soil sampling program are specified in Section 7.0 – Reporting Requirements.

4.4.2 Groundwater Sampling

Groundwater monitoring will be performed quarterly to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

The network of monitoring wells has been installed to monitor upgradient, on-site and downgradient groundwater conditions at the site. The network of on-site and off-site wells has been designed based on the following criteria:

- Post-remedial monitoring wells are located upgradient, in the source area, and downgradient of the Site;
- Wells are located for appropriate triangulation of the groundwater flow; and,
- Wells are screened into the groundwater across the water table in order to maximize yield.

Table 8 summarizes the wells' identification numbers, as well as the purpose, location, depths, diameter and screened intervals of the wells. As part of the groundwater monitoring, one upgradient well, one on-site well and two downgradient wells are sampled to evaluate the effectiveness of the remedial system. The remedial party will measure depth to the water table for each monitoring well in the network before sampling.

Table 8 – Monitoring Well Construction Details

Monitoring Well ID	Well Location	Coordinates (longitude/ latitude)	Well Diameter (inches)	Elevation (NAVD88)			
				Top of Outer Casing at Surface	Top of PVC	Screen Top	Screen Bottom
MW-3	Offsite Upgradient	-73.926146, 40.755479	2	37.46	36.47	20.47	10.47
MW-4	Offsite Downgradient	-73.926357, 40.755253	2	37.11	36.29	20.29	10.29
MW-5	Offsite Downgradient	-73.926118, 40.754962	2	35.10	34.82	18.82	8.82
MW-7S	Onsite Source Area	-73.926124, 40.755426	2	37.20	36.88	18.88	7.22

Monitoring well construction logs are included in Appendix 3 of this document.

Post-remedial monitoring well locations are depicted on Figure 6 and were installed and documented in Tenen's Remedial Investigation Report; no new groundwater wells are proposed for installation. Groundwater gauging data indicates the groundwater generally flows to the south.

Groundwater samples will be collected on a quarterly basis from monitoring wells MW-3, MW-4, MW-5, and MW-7S. All post-remedial groundwater samples will be analyzed by VOCs via EPA Method 8260 by an ELAP-certified laboratory.

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC project manager will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC project manager. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC project manager.

The sampling frequency may only be modified with the approval of the NYSDEC project manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC project manager.

Deliverables for the groundwater monitoring program are specified in Section 7.0 – Reporting Requirements.

4.4.3 Soil Vapor Sampling

Exterior and offsite soil vapor sampling will be performed approximately three months following SSDS start up to assess the performance of the remedy in regards to the ability of the SSDS to mitigate the potential for offsite soil vapor migration. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

The network of off-site soil vapor sample locations has been designed based on the following criteria:

- Four exterior and offsite soil vapor samples will be collected from sidewalks surrounding the Site and one outdoor (ambient) air sample will be collected; and,
- Samples will be sent to an ELAP-certified laboratory for analysis of TO-15 VOCs.

The sampling frequency may only be modified with the approval of the NYSDEC project manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC project manager.

Deliverables for the soil vapor sampling program are specified in Section 7.0 – Reporting Requirements.

4.4.4 Soil Vapor Intrusion Sampling

Soil vapor intrusion sampling will be performed prior to any petition to shutdown the SVE system, onsite SSDS, or offsite SSDS. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

The network of on-site and off-site soil vapor intrusion sample locations has been designed based on the following criteria:

- Two onsite sub-slab soil vapor samples, two co-located indoor air samples, and one outdoor (ambient) air sample will be collected during the heating season;
- Three offsite sub-slab soil vapor samples, three co-located indoor air samples, and one outdoor (ambient) air sample will be collected from the adjacent development during the heating season; and,
- Samples will be sent to an ELAP-certified laboratory for analysis of TO-15 VOCs.

The sampling frequency may only be modified with the approval of the NYSDEC project manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC project manager.

Deliverables for the soil vapor intrusion sampling program are specified in Section 7.0 – Reporting Requirements.

4.4.5 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling log as provided in Appendix 9 – Site Management Forms. Other observations (e.g., groundwater monitoring well integrity) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the site-specific Field Sampling Plan provided as Appendix 5 of this document.

5.0 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 remedy selected for the site. This Operation and Maintenance Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the site to operate and maintain the composite cover, on- and offsite SSDSs, and SVE systems;
- Will be updated periodically to reflect changes in site conditions or the manner in which the composite cover, on- and offsite SSDSs, and SVE systems are operated and maintained.

Further detail regarding the Operation and Maintenance of the on- and offsite SSDSs and SVE system is provided in Appendix 10 – Operation and Maintenance Manual. 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 Remedial System (or other Engineering Control) Performance Criteria

The Site composite cover, on- and offsite SSDSs, and SVE system performance criteria are specified in Table 5 (Section 4.3.1) of this SMP.

5.3 Operation and Maintenance of On- and Offsite Sub-slab Depressurization Systems

The following sections provide a description of the operations and maintenance of the on- and offsite SSDSs. Cut-sheets and as-built drawings for the on- and offsite SSDSs are provided in Appendix 10 – Operations and Maintenance Manual.

5.3.1 System Start-Up and Testing

After the on- and offsite SSDSs were installed, the following was completed:

1. Visual inspection of building slabs for any cracks or holes. If any were identified, they were sealed using caulk.
2. The blower was turned on.
3. After allowing appropriate time for the blower and system to equilibrate, sub-slab pressure was measured at six monitoring points to ensure that the goal of -0.02 in-wc has been achieved.
4. Verification that the system alarms are functioning was completed by disconnecting pressure tubing hookup and noting that all alarms are operational.

Start up communication testing results for the on- and offsite SSDSs are shown in Tables 2 and 4 of this SMP, respectively.

The system testing described above will be conducted if, in the course of the SSDS lifetime, the system goes down or significant changes are made to the system and the system must be restarted.

5.3.2 Routine System Operation and Maintenance

The long-term operation and maintenance program described below shall continue throughout the life cycle of the on- and offsite SSDSs to ensure a proper working order. The long-term operation and maintenance program for the major on- and offsite SSDS components includes manufacturer's recommendations for the replacement of on- and offsite SSDS components if any of the components fail, inspection procedures, an operation schedule, typical routine maintenance activities and schedules, and troubleshooting.

5.3.3 Non-Routine Operation and Maintenance

Common troubleshooting tips that can be followed if the vacuum switch/alarm will not indicate a vacuum or is sluggish include the following:

- The pressure ports (high or low) are not hooked up correctly;
- The fittings or sensing lines are blocked, pinched, or leaking;
- The cover is loose;
- The pressure sensor is improperly located; and,
- The ambient temperature is too low (below 20°C)

Table 5 provides a summary and schedule of routine maintenance.

5.3.4 System Monitoring Devices and Alarms

The on- and offsite SSDSs have a warning device to indicate that the system is not operating properly. In the event that warning device is activated, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SSDS will be restarted. Operational problems will be noted in the Periodic Review Report to be prepared for that reporting period.

The alarm system, described below, shall run continuously and only be disconnected for routine maintenance and inspection activities or replacement. The onsite riser pipe is equipped with the following:

- Obar Differential Pressure Gauge and Alarm (Model: GBR25-R)

The offsite riser pipe is equipped with the following:

- [Add manufacturer and model of offsite SSDS alarm]

The Obar Differential Pressure Gauge and Alarm (Model: GBR25-R) includes a scaled adjustment knob to allow changes to the switching pressure to be made without a pressure gauge; the product is a single pole double throw (SPDT) pressure switch and alarm combination. The alarm is wired to send a signal remotely to the building management system. In case there is a need to relocate the switch/alarm, the new location shall ensure that the switch/alarm remains in close proximity to the riser pipe and is installed under the supervision of the Remedial Engineer. If the device is not indicating a vacuum while the SSDS is on, staff trained to perform inspections will make sure that the tubing connected to

the riser pipe is connected to the low-pressure port. High-pressure ports on the vacuum/switch alarm are vented to the atmosphere.

The vacuum switch/alarm does not require lubrication or periodic servicing. The vacuum switch/alarm is connected to a low voltage transformer for power, and barring a power outage, routine checkups will not be required. Repairs or alterations made to the vacuum switch by others will void the unit's warranty. The vacuum switch is factory calibrated and cannot be recalibrated in the field. The installation and operating instructions for the vacuum alarm/monitor have been included in Appendix 10.

When testing the vacuum alarms, the tubing that connects the vacuum alarms to the riser pipe shall be disconnected and the low set point raised above the current reading. If the vacuum alarm is powered at the time of disconnecting the tubing from the riser pipe, the alarm will go off. The alarm should go back on-line when the tubing is reconnected to the riser pipe. If the system is in alarm when there is a vacuum present in the riser pipe, inspect the tubing and riser pipe tap to ensure that there are no blockages. If there is a blockage in either the tubing or the riser pipe tap, remove the blockage and retest the vacuum alarm/monitor.

The on- and offsite SSDS fans shall operate continuously and only be turned off for routine maintenance and inspection activities or replacement. The on- and offsite SSDS fans shall not be left on the system piping without electrical power for more than 48 hours due to possible fan failure that could result from this non-operational storage. The on- and offsite SSDS fan units do not require periodic servicing and should be returned to the manufacturer or supplier for service. Repairs or alterations made to the on- and offsite SSDS fan units by others will void the units' warranties. The installation and operating instructions for the on- and offsite SSDS fan units have been included in Appendix 10.

Inspections of the on- and offsite SSDS components shall include the following:

- Observe visible components (fan, vacuum switch/alarm, tubing, riser pipe, etc.) for physical wear, damage, and operational issues, and replace as necessary;
- Remove any blockages in vacuum switch/alarm tubing and riser pipe taps;
- Verify operation of vacuum switch/alarm by disconnecting tubing from riser pipe and noting if the system goes into alarm more;
- Inspect riser pipe penetrations in concrete slab for proper seal;
- Inspect riser pipe connections at fan for leaks and tightness; and,
- Inspect power to fan by operating dedicated switch.

A cope of an Operations and Maintenance (O&M) Plan specific to the on- and offsite system components is provided in Appendix 10, which will provide further detail on the above.

5.3.5 Fire Safety

All electrical components of the on- and offsite SSDSs were installed in accordance with NYC Department of Buildings (DOB) electrical code. The SSDS control boxes containing the electrical panels meet the local NY State and national electric codes and a fire extinguisher is located in the vicinity of the control boxes. All above ground piping inside of the on- and offsite buildings is stainless steel or cast iron, in accordance with the NYC fire code.

The remedial party will conduct an annual facility walk with the local fire chief and/or fire suppression team. The site walk will allow for the addition of the facility to any local preplanning efforts. The NYSDEC project manager will be provided with the local fire chief's/fire suppression team's recommendations as soon as they become available. Following review, the NYSDEC project manager may direct the remedial party to implement the recommendations and/or revise the SMP.

5.4 Operation and Maintenance of Soil Vapor Extraction System

The following sections provide a description of the operations and maintenance of the SVE system. As-built drawings for the SVE system are provided in Appendix 10 - Operations and Maintenance Manual.

5.4.1 System Start-Up and Testing

After the SVE system was installed, the following was completed:

1. Visual inspection of building slabs for any cracks or holes. If any were identified, they were sealed using caulk.
2. The blower was turned on.
3. Allow 15 minutes for blower and system to equilibrate.
4. Measurement of the pressure within the outer periphery at coupled monitoring points around the coupled extraction wells. A vacuum reading of -0.07 and -0.04 in-wc induced in the monitoring points are considered acceptable values.

Start up communication testing results are shown in Table 3 of this SMP.

The system testing described above will be conducted if, in the course of the SVE system lifetime, the system goes down or significant changes are made to the system and the system must be restarted.

5.4.2 Routine System Operation and Maintenance

The long-term operation and maintenance program described below shall continue throughout the life cycle of the SVE system to ensure a proper working order. The long-term operation and maintenance program for the major SVE system components includes manufacturer's recommendations for the replacement of SVE system components if any of the components fail, inspection procedures, an operation schedule, typical routine maintenance activities and schedules, and troubleshooting.

5.4.3 Non-Routine Operation and Maintenance

Common troubleshooting tips that can be followed if the vacuum switch/alarm will not indicate a vacuum or is sluggish include the following:

- The pressure ports (high or low) are not hooked up correctly;
- The fittings or sensing lines are blocked, pinched, or leaking;
- The cover is loose;
- The pressure sensor is improperly located; and,
- The ambient temperature is too low (below 20°C)

Table 5 provides a summary and schedule of routine maintenance.

5.4.4 System Monitoring Devices and Alarms

The SVE system has a warning device to indicate that the system is not operating properly. In the event that warning device is activated, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SVE system will be restarted. Operational problems will be noted in the Periodic Review Report to be prepared for that reporting period.

The alarm system, described below, shall run continuously and only be disconnected for routine maintenance and inspection activities or replacement. The riser pipe is equipped with the following:

- Dwyer Series 1800 Low Differential Pressure Switch (Model: 1823-80)

The Dwyer Series 1800 Low Differential Pressure Switch (Model: 1823-80) includes a scaled adjustment knob to allow changes to the switching pressure to be made without a pressure gauge; the product is a single pole double throw (SPDT) pressure switch and alarm combination. The alarm is wired to send a signal remotely to the building management system. In case there is a need to relocate the switch/alarm, the new location shall ensure that the switch/alarm remains in close proximity to the riser pipe and is installed under the supervision of the Remedial Engineer. If the device is not indicating a vacuum while the SVE

system is on, staff trained to perform inspections will make sure that the tubing connected to the riser pipe is connected to the low-pressure port. High-pressure ports on the vacuum/switch alarm are vented to the atmosphere.

The vacuum switch/alarm does not require lubrication or periodic servicing. The vacuum switch/alarm is connected to a low voltage transformer for power, and barring a power outage, routine checkups will not be required. Repairs or alterations made to the vacuum switch by others will void the unit's warranty. The vacuum switch is factory calibrated and cannot be recalibrated in the field. The installation and operating instructions for the vacuum alarm/monitor have been included in Appendix 10.

When testing the vacuum alarms, the tubing that connects the vacuum alarms to the riser pipe shall be disconnected and the low set point raised above the current reading. If the vacuum alarm is powered at the time of disconnecting the tubing from the riser pipe, the alarm will go off. The alarm should go back on-line when the tubing is reconnected to the riser pipe. If the system is in alarm when there is a vacuum present in the riser pipe, inspect the tubing and riser pipe tap to ensure that there are no blockages. If there is a blockage in either the tubing or the riser pipe tap, remove the blockage and retest the vacuum alarm/monitor.

The SVE system fan shall operate continuously and only be turned off for routine maintenance and inspection activities or replacement. The SVE system fan shall not be left on the system piping without electrical power for more than 48 hours due to possible fan failure that could result from this non-operational storage. The SVE system fan unit does not require periodic servicing and should be returned to the manufacturer or supplier for service. Repairs or alterations made to the SVE system fan unit by others will void the unit's warranty. The installation and operating instructions for the SVE system fan unit have been included in Appendix 10.

Inspections of the SVE system components shall include the following:

- Observe visible components (fan, vacuum switch/alarm, tubing, riser pipe, etc.) for physical wear, damage, and operational issues, and replace as necessary;
- Remove any blockages in vacuum switch/alarm tubing and riser pipe taps;
- Verify operation of vacuum switch/alarm by disconnecting tubing from riser pipe and noting if the system goes into alarm more;
- Inspect riser pipe penetrations in concrete slab for proper seal;
- Inspect riser pipe connections at fan for leaks and tightness; and,
- Inspect power to fan by operating dedicated switch.

A cope of an Operations and Maintenance (O&M) Plan specific to the system components is provided in Appendix 10, which will provide further detail on the above.

5.4.5 Fire Safety

All electrical components of the SVE system were installed in accordance with NYC DOB electrical code. The SVE system control box containing the electrical panels meet the local NY State and national electric codes and a fire extinguisher is located in the vicinity of the control box. All above ground piping inside of the building is stainless steel, in accordance with the NYC fire code.

The remedial party will conduct an annual facility walk with the local fire chief and/or fire suppression team. The site walk will allow for the addition of the facility to any local preplanning efforts. The NYSDEC project manager will be provided with the local fire chief's/fire suppression team's recommendations as soon as they become available. Following review, the NYSDEC project manager may direct the remedial party to implement the recommendations and/or revise the SMP.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a current vulnerability assessment that evaluates the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding. This section also identifies vulnerability assessment updates that will be conducted for the site in Periodic Review Reports.

Flood Plain: The Federal Emergency Management Agency (FEMA) flood insurance rate map for the Site (Map Number 3604970093G) indicates that the Site and surrounding area is not located within the 0.2% annual chance floodplain (500-year flood).

Sea Level Rise: The Site is situated at an elevation of approximately 37 feet above mean sea level (ft-msl) and the closest surface water body to the Site is approximately 1.87 miles away. Sea level rise is not likely to have an impact on the Site cover, SSDS, or SVE system.

Site Drainage and Storm Water Management: The Site occupies less than one acre of land and a permit for storm water discharges is not required.

Erosion: No evidence of erosion has been observed at the Site and the Site cover, SSDS, and SVE systems will not be affected by stormwater.

High Wind: Two blowers with weather enclosures, one for the SSDS and one for the SVE system, are located on the roof of the Site building and could become susceptible to damage due to high winds.

Drought: Drought is not likely to occur at the Site and the Site cover, SSDS, and SVE system would not be susceptible to damage due to drought.

Electricity: The SSDS and SVE system would be susceptible to power loss and/or dips/surges in voltage during severe weather events, including lightning strikes, and the associated impact on Site equipment and operations.

Spill/Contaminant Release: The SSDS and SVE system are not susceptible to a spill or other contaminant release due to storm-related damage caused by flooding, erosion, high winds, loss of power etc.

Wildfires: The risk of wildfires in the surrounding area is low and unlikely to impact the Site cover, SSDS, and SVE system.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section provides an environmental footprint analysis of the remedy, as implemented at the time of this SMP. This section of the SMP also provides a summary of green remediation evaluations to be completed for the site during site management and reported in Periodic Review Reports (PRRs).

Green remediation principals and techniques will be implemented to the extent feasible in the site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long-term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste; and
- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings shall be constructed, at a minimum, to meet the 2020 Energy Conservation Construction Code of New York (or most recent edition) to improve energy efficiency as an element of construction.

To evaluate the remedy with respect to green and sustainable remediation principles, an environmental footprint analysis was completed and included in Appendix 11. The environmental footprint analysis was completed using SEFA (Spreadsheets for Environmental Footprint Analysis, USEPA), which is a NYSDEC accepted tool. Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction and material were estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, will be established for the site management activities, as appropriate. Further, progress with respect to green and sustainable remediation metrics will be tracked and reported in periodic review reports and remedial system optimization reports as part of the site management program, and opportunities to further reduce the environmental footprint of the project will be identified as appropriate. The following is a summary of the green remediation evaluation with regards to the above-mentioned metrics:

Waste Generation: F-002 listed hazardous waste (PCE-contaminated soil) and concrete debris was disposed of offsite as part of this Remedial Action. Hazardous soil and concrete debris was containerized in 55-gallon drums onsite to await offsite

disposal. Soil reuse onsite was not implemented as part of this Remedial Action, as hazardous F-002 listed soil is not appropriate for backfill at the Site.

Energy Usage: The onsite SVE system and on- and offsite SSDSs utilize electricity for operation of their respective blowers.

Emissions: The onsite SVE system and on- and offsite SSDSs release vapor-phase emissions from their respective blowers on the roof of the on- and offsite buildings. The emissions from the blowers are diluted with ambient air above the roof and the exhaust locations are in compliance with all local, State, and Federal laws and regulations. An effluent sample will be collected from the SVE system at start up and three months following start up. The results will be assessed to determine if emissions need to be treated any further prior to release into the atmosphere. SVE effluent is currently being treated with two 55-gallon drums of granular activated carbon (GAC) prior to release into the atmosphere. Whenever possible, site visits for inspections, Remedial Action implementation, or sampling were conducted by staff utilizing public transit to reduce fuel usage for transportation.

Water Usage: All water utilized onsite for the purposes of mixing cement, installing wells, mixing with chemicals for groundwater injections, etc. was obtained from the onsite building, which obtains its water from upstate watersheds provided by NYC DEP.

Land and/or Ecosystems: There were no disturbances or restoration of land and/or ecosystems as part of this Remedial Action.

Best management practices (BMPs) were implemented at the Site at all stages of the Remedial Action to reduce the environmental footprint and included the following:

- Utilized nearby sources for backfill import and soil/fill disposal to reduce fuel consumption and associated air emissions from trucks;

- Utilized machinery and equipment that was suitably sized for the Site and were capable of performing multiple tasks whenever possible to avoid field deployment of multiple machines;
- Shut down of machinery and equipment during extended periods of downtime instead of idling the engines to avoid fuel consumption when the machinery is not actively engaged;
- Performed routine, on-time maintenance to all machinery and equipment to ensure fuel efficiency;
- Utilized direct-push technology (DPT) instead of rotary drilling rigs for the installation of injection wells and soil vapor extraction wells during the remedial action. DPT can reduce drilling duration by as much as 50-60% while eliminating generation of drill cuttings or the need to dispose of drilling fluids;
- All soil generated for disposal was contained in 55-gallon drums onsite to await offsite disposal. Drums were closed at the end of each work day to promote dust suppression;
- Coupled shallow/deep SVE extraction wells and monitoring points were installed within the same borehole whenever possible to minimize the time it takes to construct new wells;
- Utilized piping of sufficient diameter for the SVE system and on- and offsite SSDSs to minimize pressure drops and resulting need for additional energy to operate blowers; and,
- Utilized blowers for the SVE system and on- and offsite SSDSs that can accommodate changes in operating requirements as treatment progresses.

6.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the NYSDEC project manager feels appropriate,

(e.g. during significant maintenance events or in conjunction with storm recovery activities).

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities after approval from the DER project manager. Reporting of these modifications will be presented in the PRR.

6.2.2 Remedial Systems

Remedial systems will be operated properly considering the current site conditions to conserve materials and resources to the greatest extent possible. Consideration will be given to operating rates and use of reagents and consumables. Spent materials will be sent for recycling, as appropriate.

6.2.3 Building Operations

Structures including buildings and sheds will be operated and maintained to provide for the most efficient operation of the remedy, while minimizing energy, waste generation and water consumption.

6.2.4 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the Site, use of consumables in relation to visiting the Site in order to conduct system checks and/or collect samples, and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources.

6.2.5 Metrics and Reporting

As discussed in Section 7.0 and as shown in Appendix 9 – Site Management Forms, information on energy usage, solid waste generation, transportation and shipping, water usage and land use and ecosystems will be recorded to facilitate and document consistent implementation of green remediation during site management and to identify corresponding benefits. A set of metrics has been developed and will be evaluated over time to ensure that green remediation actions are achieving the desired results.

6.3 Remedial System Optimization

A Remedial System Optimization (RSO) study will be conducted any time that the NYSDEC project manager or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;
- The management and operation of the remedial system is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the site's cleanup goals, gather additional performance or media specific data and

information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

7.0. REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in Appendix 9. These forms are subject to NYSDEC revision. All site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

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 9 and summarized in the Periodic Review Report.

Table 9: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Groundwater Monitoring (to be provided with Periodic Review Report)	Annually; Quarterly Summaries by Tenen Environmental, LLC
SSDS and SVE system pressure monitoring (to be provided with Periodic Review Report)	Annually
Periodic Review Report	Annually, or as otherwise determined by the NYSDEC

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

All interim monitoring/inspections reports 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);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any 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;
- Any 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.

7.2 Periodic Review Report

A Periodic Review Report (PRR) will be submitted to the NYSDEC project manager beginning sixteen (16) 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 NYSDEC project manager or at another frequency as may be required by the NYSDEC project manager. In the event that 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 2 - 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 all ECs/ICs required by the remedy for the site.
- Results of the required annual site inspections, fire inspections and severe condition inspections, if applicable.

- Description of any change of use, import of materials, or excavation that occurred during the certifying period.

- 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.

- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.

- 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 tables and figures will include a presentation of past data as part of an evaluation of contaminant concentration trends, including but not limited to:
  - Trend monitoring graphs that present groundwater contaminant levels from before the start of the remedy implementation to the most current sampling data;
  - Trend monitoring graphs depicting system influent analytical data on a per event and cumulative basis;
  - O&M data summary tables;
  - A current plume map for sites with remaining groundwater contamination; and
  - A groundwater elevation contour map for each gauging event.
- 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.

- A site evaluation, which includes the following:
  - The compliance of the remedy with the requirements of the site-specific Remedial Action Work Plan (RAWP), ROD or Decision Document;
  - The operation and the effectiveness of all treatment 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;
- An update to the climate change vulnerability assessment if site or external conditions have changed since the previous assessment, and recommendations to address vulnerabilities.
- A summary of the Green Remediation evaluation, including a quantitative and qualitative overview of a site's environmental impacts and recommendations to improve the remedy's environmental footprint. The PRR will include the completed Summary of Green Remediation Metrics form provided in Appendix [x].
- An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving remedial goals as specified by the RAWP, ROD or Decision Document; and
- The overall performance and effectiveness of the remedy.

- A performance summary for all treatment systems at the site during the calendar year, including information such as:
  - The number of days the system operated for the reporting period;
  - The average, high, and low flows per day;
  - The contaminant mass removed and the cost per pound of mass removed during the certification period and during the life of the treatment system;
  - 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. Recommendations must address how receptors would be impacted. Recommendations can include:
    - Proposals to address efficiency and costs such as: instituting remote operation, system changes to decrease maintenance costs and downtime, and system changes to decrease energy use; and
    - Proposals to modify or shut down a treatment system due to remediation completion, system performance or changed conditions. System shutdowns are addressed in Section 6.4 of DER-10.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a Professional Engineer licensed to practice and registered 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, Matthew M. Carroll, of 1085 Sackett Avenue, Bronx, NY 10461, am certifying as Owner's Designated Site Representative for the site."

"I certify that the New York State Education Department has granted a Certificate of Authorization to provide Professional Engineering services to the firm that prepared this Periodic Review Report."

For BCP projects, every five years the following certification will be added:

- *The assumptions made in the qualitative exposure assessment remain valid.*

The signed certification will be included in the Periodic Review Report.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager. The Periodic Review Report may also need to be submitted in hard-copy format if requested by the NYSDEC project manager.

7.3 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 or failure to conduct site management activities, a Corrective Measures Work Plan will be submitted to the NYSDEC project manager 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 project manager.

7.4 Remedial System Optimization Report

If an RSO is to be performed (see Section 6.3), upon completion of an RSO, an RSO report must be submitted to the NYSDEC project manager for approval. A general outline for the RSO report is provided in Appendix 12. 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. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager.

8.0 REFERENCES

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

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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).

New York State Department of Environmental Conservation (NYSDEC). Guidelines for Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs. April 2023. NYSDEC 2023.

New York State Department of Health (NYSDOH). Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH, October 2006 with May 2017 and February 2024 addendums).

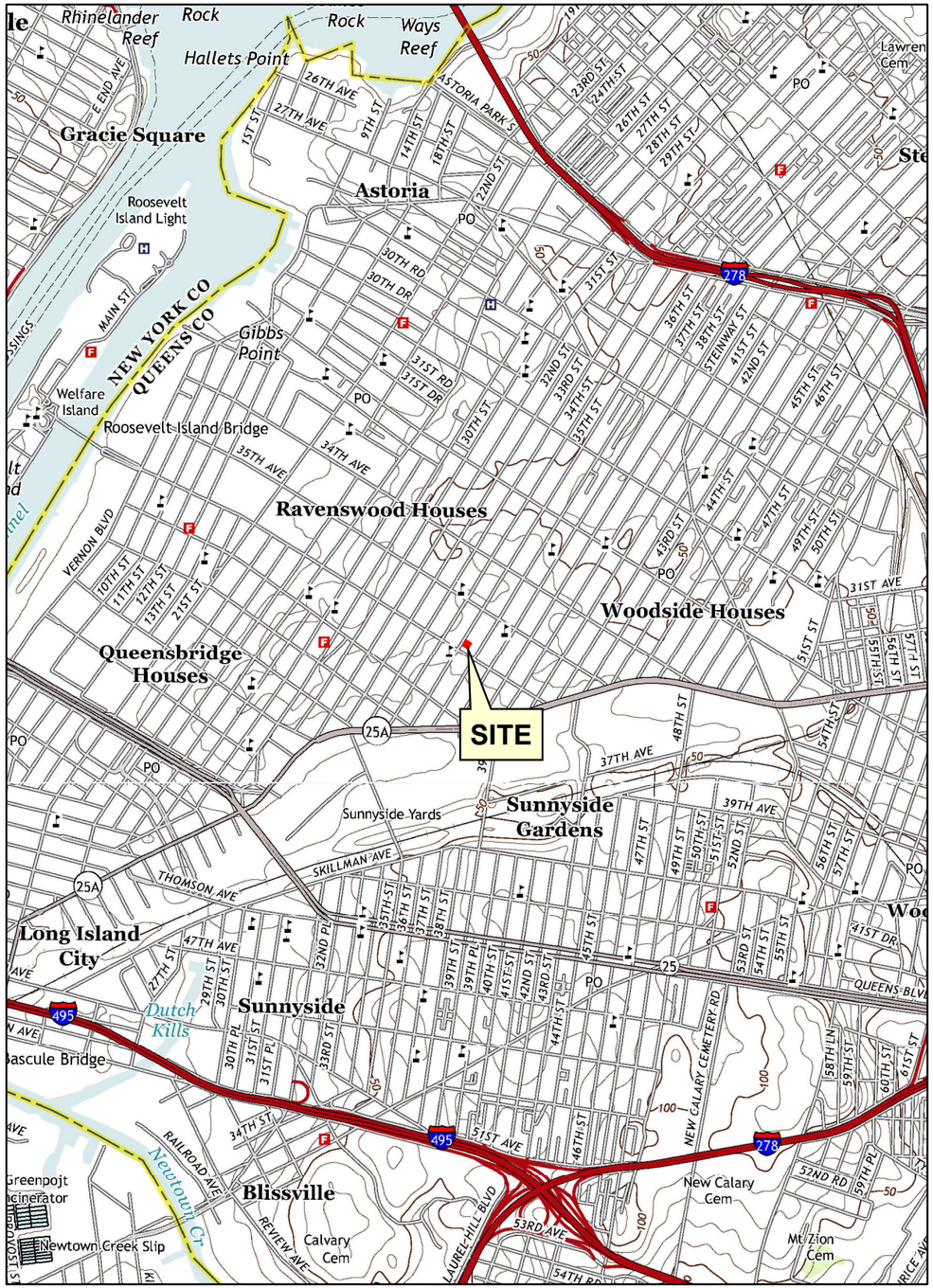
Remedial Action Work Plan, Teitelbaum Dry Cleaning Inc., 35-45 35th Street, Queens, NY 11106, Tenen Environmental, LLC, March 2021.

Remedial Investigation Report, Teitelbaum Dry Cleaning Inc., 35-45 35th Street, Queens, NY 11106, Tenen Environmental, LLC, November 2018.

Soil Vapor Extraction (SVE) Pilot Test Report Final, 35-45 35th Street, Astoria, NY 11106, EnviroTrac Engineering PE PC, July 2024.

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FIGURES



Basemap: USGS Central Park - NY & Brooklyn - NY Quadrangles, 2013
http://www.usgs.gov

Site Location

0 1,000 2,000 4,000 Feet



http://gis.nyc.gov/taxmap/map.htm

Department of Finance Digital Tax Map

0 100 200 400 Feet



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community
NYC Department of City Planning, Information Technology Division

Department of City Planning MapPLUTO - 2017 v1

0 100 200 400 Feet

Site

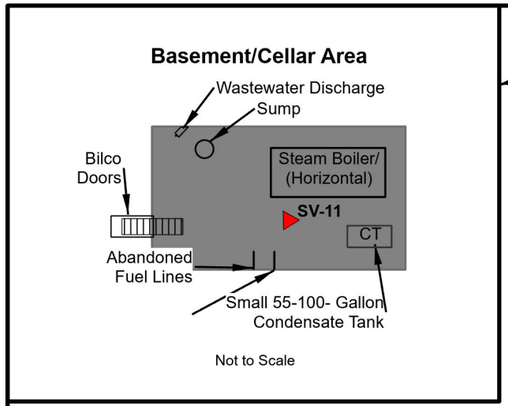
Site Management Plan
Teitelbaum Dry Cleaning, Inc.
35-45 35th Street
Astoria, New York
BCP No. C241149

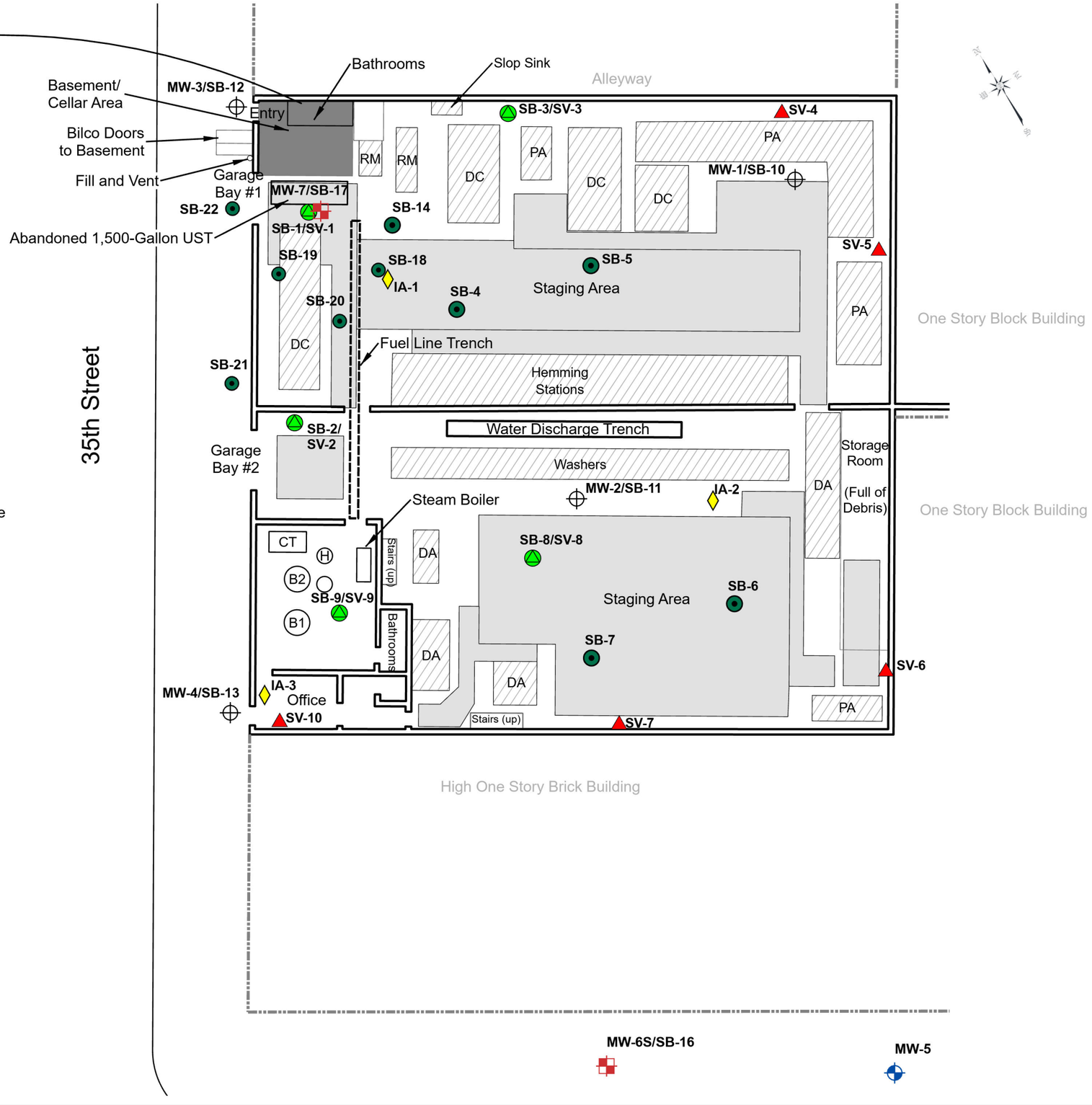
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121 West 27th Street
Suite 702
New York, NY 10001
O: (646) 606-2332
F: (646) 606-2379

Drawn By	Checked By	Date	Scale
LM	AP	May 2018	As Noted

Drawing Title: **Site Location Map**

Drawing No: **Figure 1**





Legend

- Indoor Air
- Soil Boring
- Soil Vapor
- Soil Boring/Soil Vapor
- Soil Boring/Monitoring Well
- Soil Boring/Temp Monitoring Well
- Monitoring Well
- Tax Lots
- Partially Accessible
- Inaccessible

- DC Dry Cleaning Machine
- PA Pressing Area
- DA Dryer Area
- RM PCE Recycling
- (B) Boiler
- (H) Hot Water Heater
- CT Condensate Tank

Notes:
1. Sample locations are approximate.
2. Placement and size of equipment and staging areas is approximate.

0 17 34 Feet

Source: Integral Engineering, P.C., 34-45 35th St., Astoria, NY, RIR, Fig.7

Site

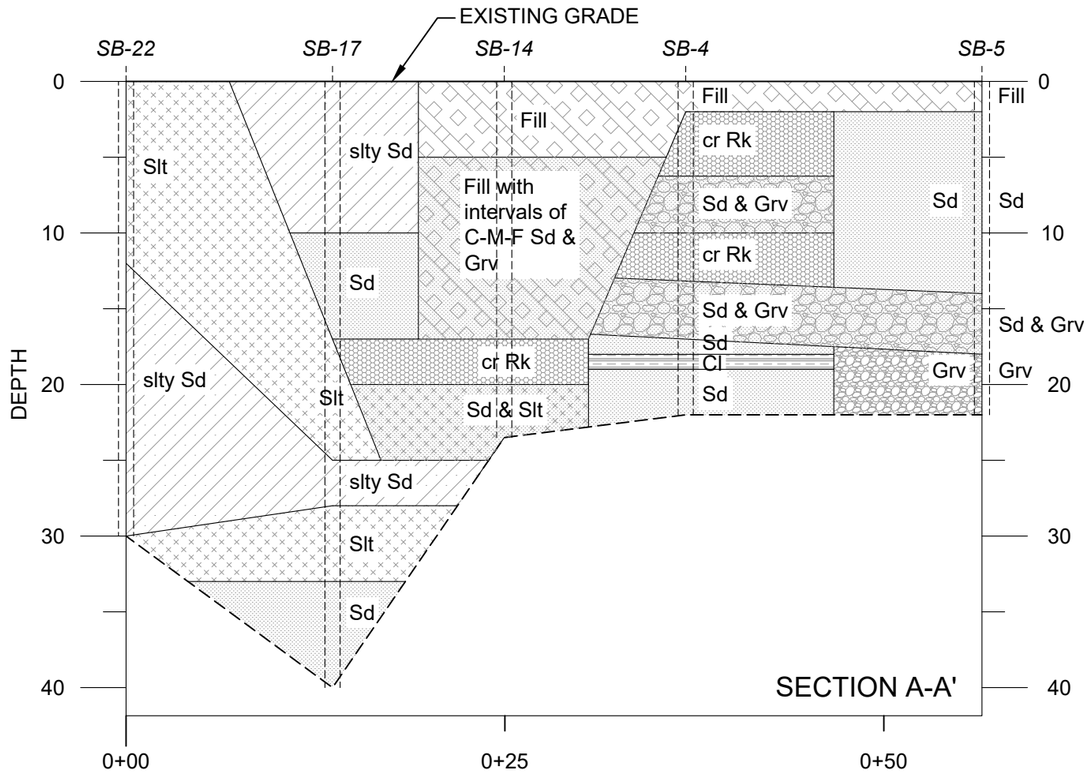
Site Management Plan
Teitelbaum Dry Cleaning, Inc.
35-45 35th Street
Astoria, New York
BCP Site No. C241149

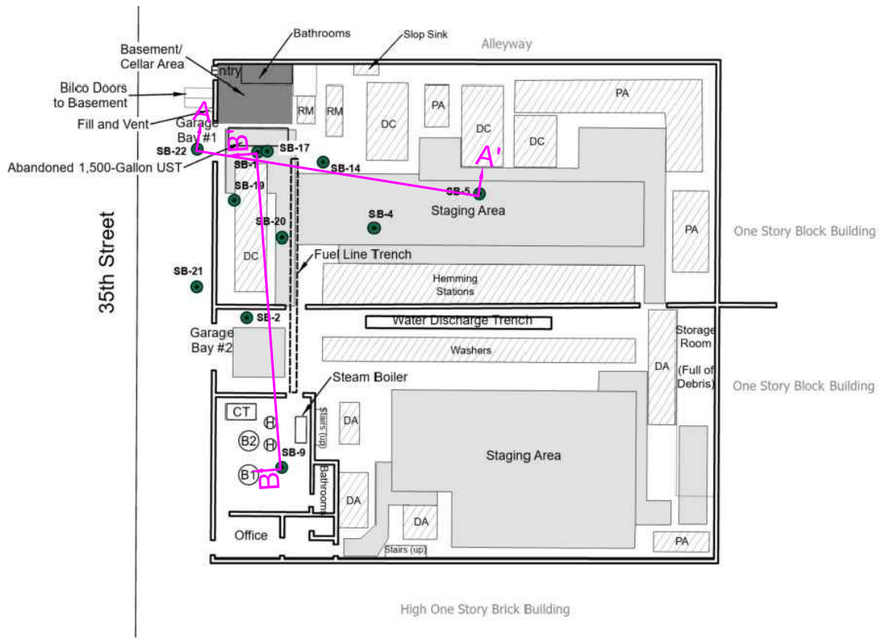
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Drawn By	Checked By	Date	Scale
LM	AP	July 2025	As Noted

Drawing Title: **Site Layout**

Drawing No: **Figure 2**

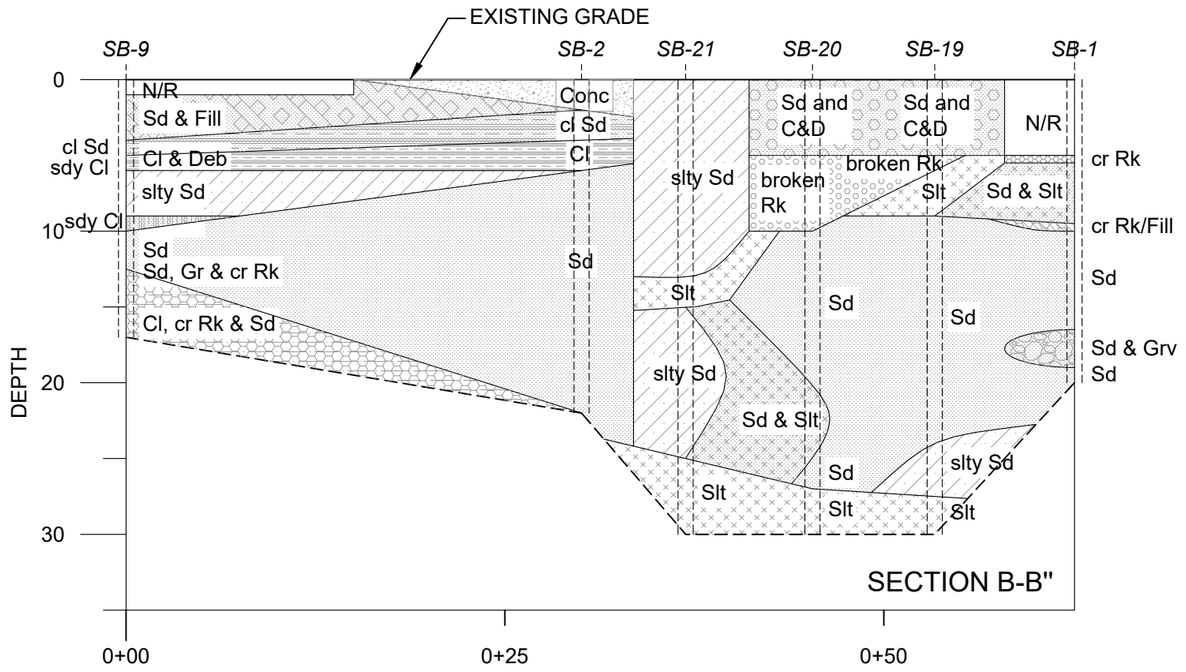




CROSS-SECTION KEY MAP

0 15' 30' 60'

Key Map Scale



Legend

- Sand
- Silt
- Gravel
- Silty Sand
- Sand & Silt
- Sand & Gravel
- Sand & C&D
- Sand & Fill
- Fill
- Clay
- Clayey Sand
- Sandy Clay
- Concrete
- Crushed Rock
- Crushed Rock & Fill
- Broken Rock
- Clay, Crushed Rock & Sand

0 5 10' 20'

Cross-section Scale

Site Management Plan
Teitelbaum Dry Cleaning, Inc.
34-45 35th Street
Astoria, New York
BCP Site No. C241149

SITE

TENEN ENVIRONMENTAL

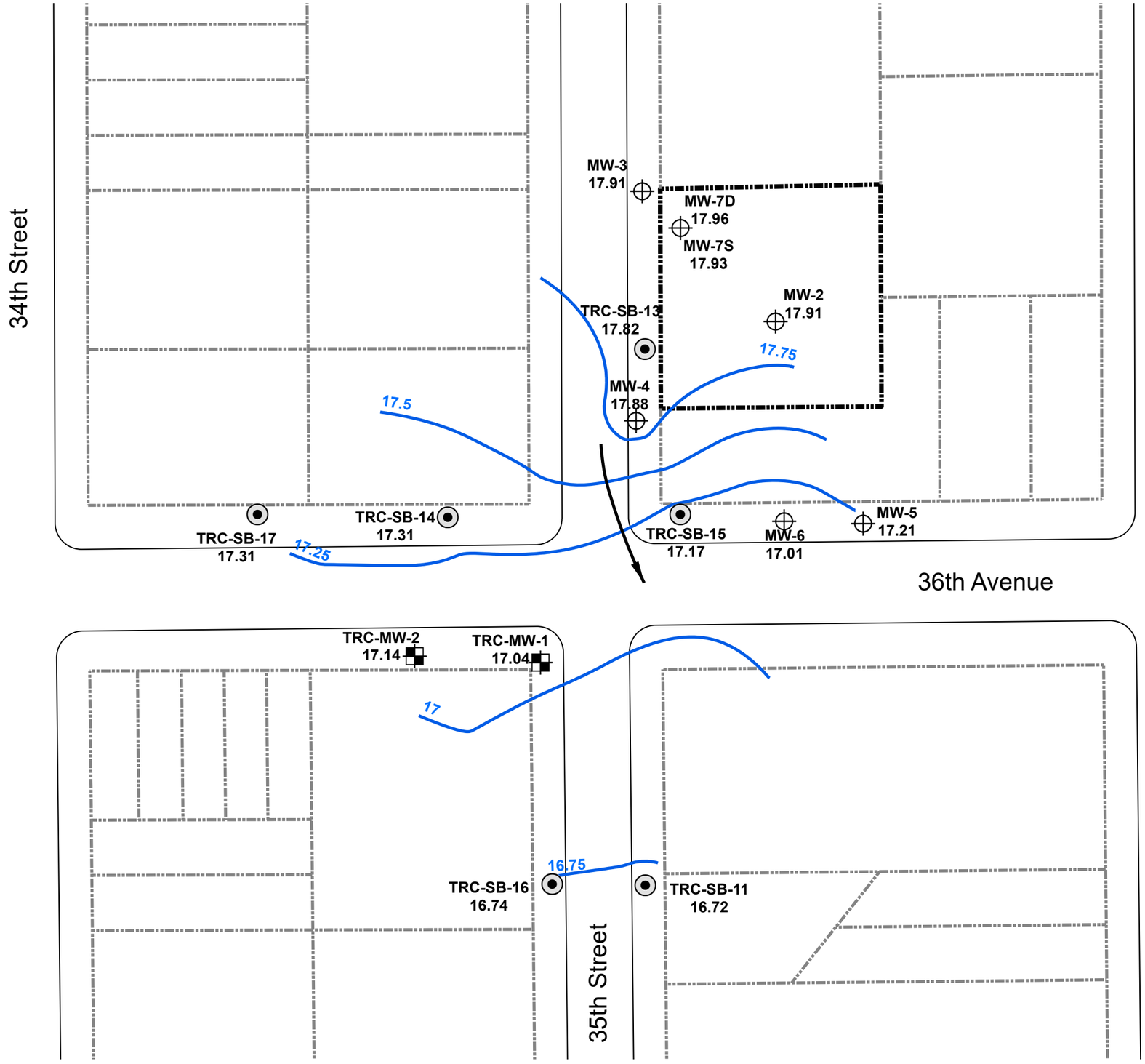
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New York, NY 10001
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F: 646-606-2379

CONSULTANT

DRAWN BY	CHECKED BY	DATE	SCALE:
LM	AP	July 2025	As Noted

DRAWING TITLE: Geologic Cross-Sections

DRAWING NO.: Figure 3



Legend

- Existing Groundwater Monitoring Well
- Permanent Monitoring Well Installed by Others, 2012
- Temporary 1" Well Installed by Others, 2012
- Groundwater Contours (0.25 feet)
- Groundwater Flow Direction
- Parcels
- Site Boundary

Sources:
gis.nyc..gov/taxmap/map.htm
integral, New York, NY, Remedial Invesitgation Report, Fig. 5

Notes:
Elevations are in feet
Vertical Datum is NAVD 88
Groundwater Elevations recorded on July 27 and 28, 2016

0 25 50 100 Feet

Site

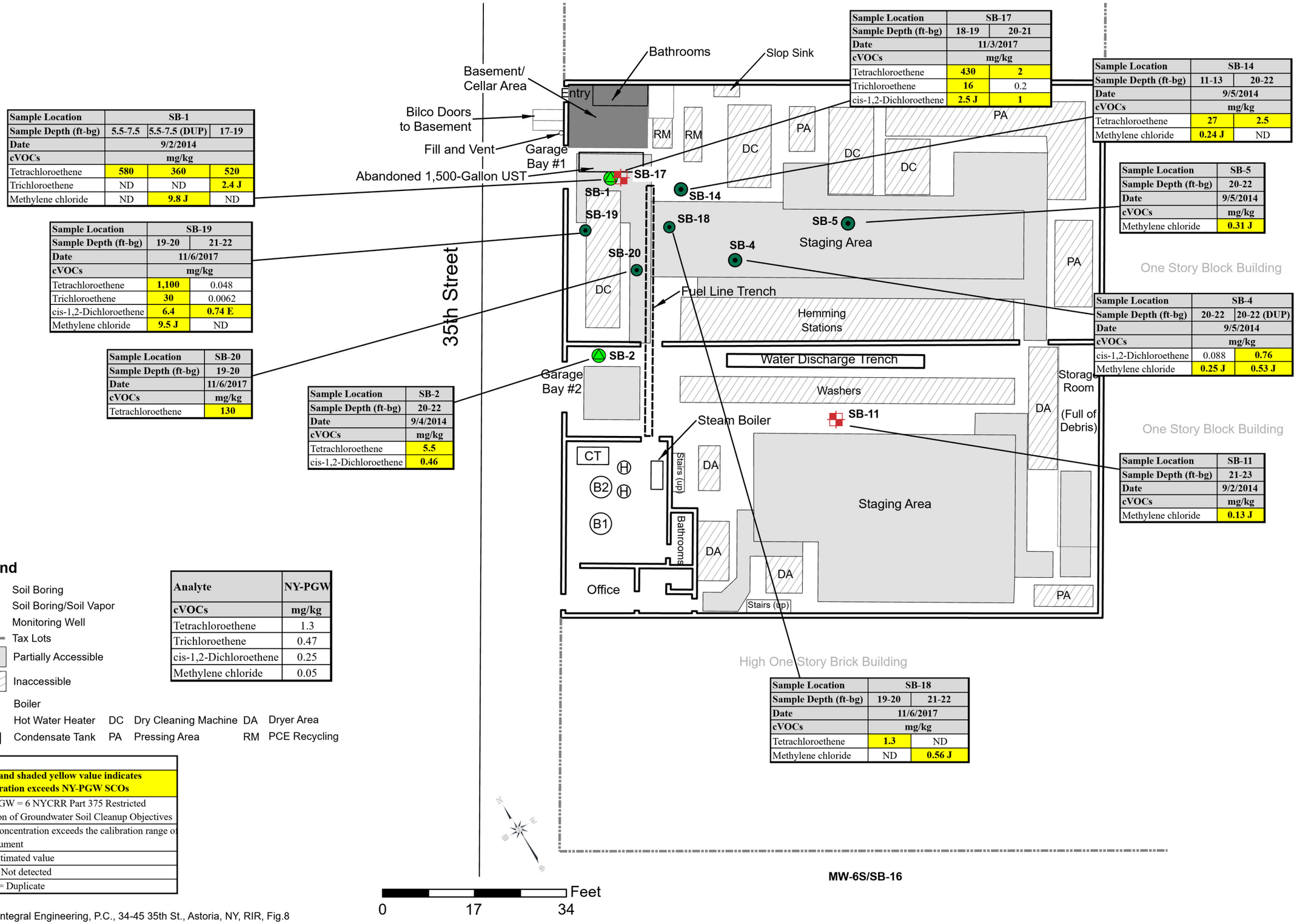
Site Management Plan
Teitelbaum Dry Cleaning, Inc.
35-45 35th Street
Astoria, New York
BCP No. C241149

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Drawn By	Checked By	Date	Scale
LM	AP	October 2019	As Noted

Drawing Title: **Groundwater Contours**

Drawing No: **Figure 4**



Sample Location	SB-1		
Sample Depth (ft-bg)	5.5-7.5	5.5-7.5 (DUP)	17-19
Date	9/2/2014		
cVOCs	mg/kg		
Tetrachloroethene	**580**	**360**	**520**
Trichloroethene	ND	ND	**2.4 J**
Methylene chloride	ND	**9.8 J**	ND

Sample Location	SB-19	
Sample Depth (ft-bg)	19-20	21-22
Date	11/6/2017	
cVOCs	mg/kg	
Tetrachloroethene	**1,100**	0.048
Trichloroethene	**30**	0.0062
cis-1,2-Dichloroethene	**6.4**	**0.74 E**
Methylene chloride	**9.5 J**	ND

Sample Location	SB-20
Sample Depth (ft-bg)	19-20
Date	11/6/2017
cVOCs	mg/kg
Tetrachloroethene	**130**

Sample Location	SB-2
Sample Depth (ft-bg)	20-22
Date	9/4/2014
cVOCs	mg/kg
Tetrachloroethene	**5.5**
cis-1,2-Dichloroethene	**0.46**

Sample Location	SB-17	
Sample Depth (ft-bg)	18-19	20-21
Date	11/3/2017	
cVOCs	mg/kg	
Tetrachloroethene	**430**	**2**
Trichloroethene	**16**	0.2
cis-1,2-Dichloroethene	**2.5 J**	**1**

Sample Location	SB-14	
Sample Depth (ft-bg)	11-13	20-22
Date	9/5/2014	
cVOCs	mg/kg	
Tetrachloroethene	**27**	**2.5**
Methylene chloride	**0.24 J**	ND

Sample Location	SB-5
Sample Depth (ft-bg)	20-22
Date	9/5/2014
cVOCs	mg/kg
Methylene chloride	**0.31 J**

Sample Location	SB-4	
Sample Depth (ft-bg)	20-22	20-22 (DUP)
Date	9/5/2014	
cVOCs	mg/kg	
cis-1,2-Dichloroethene	0.088	**0.76**
Methylene chloride	**0.25 J**	**0.53 J**

Sample Location	SB-11
Sample Depth (ft-bg)	21-23
Date	9/2/2014
cVOCs	mg/kg
Methylene chloride	**0.13 J**

Sample Location	SB-18	
Sample Depth (ft-bg)	19-20	21-22
Date	11/6/2017	
cVOCs	mg/kg	
Tetrachloroethene	**1.3**	ND
Methylene chloride	ND	**0.56 J**

Legend

- Soil Boring
- Soil Boring/Soil Vapor
- Monitoring Well
- Tax Lots
- Partially Accessible
- Inaccessible
- (B) Boiler
- (H) Hot Water Heater — DC Dry Cleaning Machine — DA Dryer Area
- CT Condensate Tank — PA Pressing Area — RM PCE Recycling

Analyte	NY-PGW
cVOCs	mg/kg
Tetrachloroethene	1.3
Trichloroethene	0.47
cis-1,2-Dichloroethene	0.25
Methylene chloride	0.05

Notes:
1. Bold and shaded yellow value indicates concentration exceeds NY-PGW SCOs
2. NY-PGW = 6 NYCRR Part 375 Restricted Protection of Groundwater Soil Cleanup Objectives
3. E = Concentration exceeds the calibration range o the instrument
4. J = Estimated value
5. ND = Not detected
6. DUP = Duplicate

Source: Integral Engineering, P.C., 34-45 35th St., Astoria, NY, RIR, Fig.8

Site Management Plan
Teitelbaum Dry Cleaning, Inc.
35-45 35th Street
Astoria, New York
BCP Site No. C241149

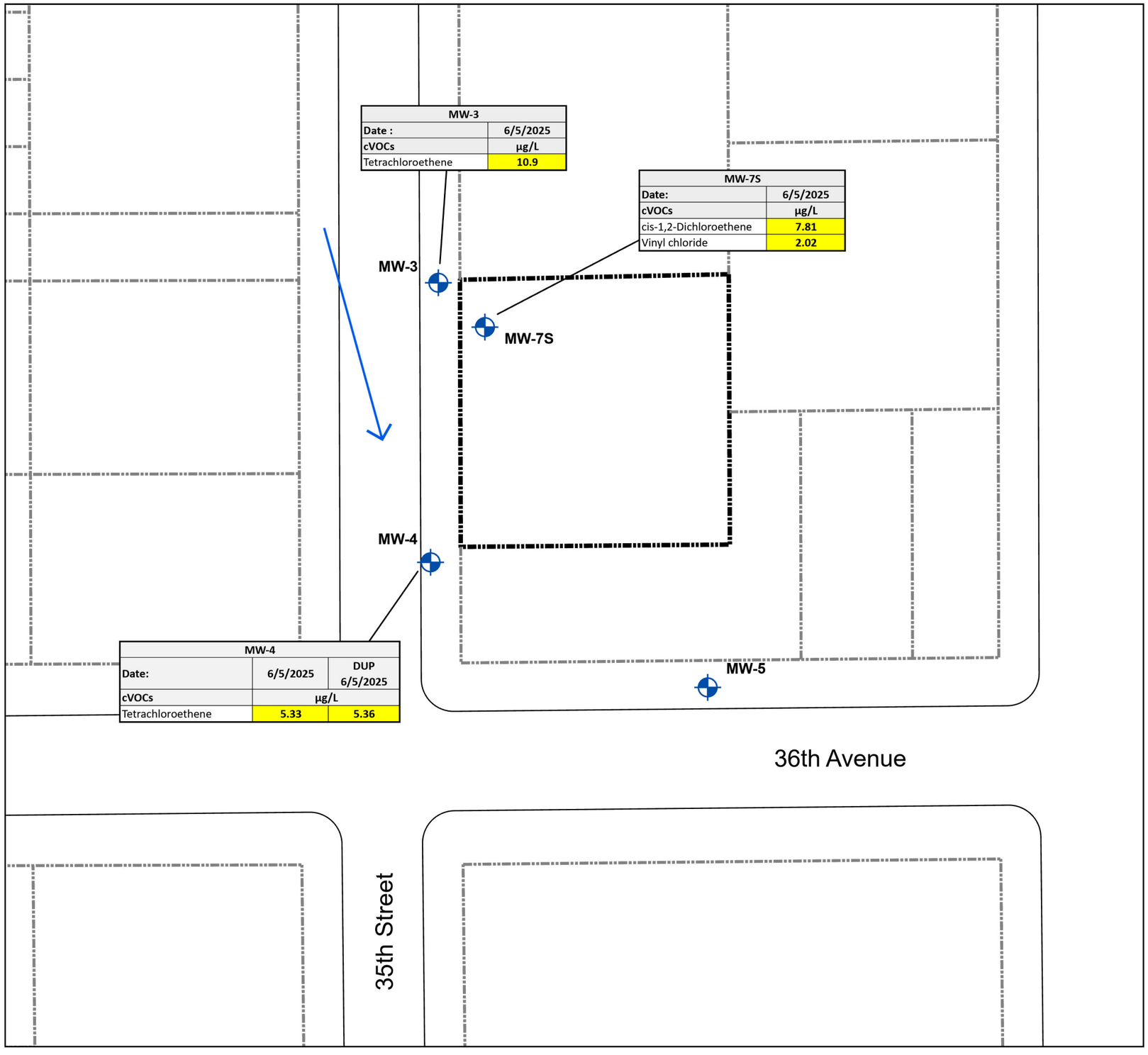
Site

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Drawn By: LM
Checked By: AP
Date: July 2025
Scale: As Noted

Drawing Title: Remaining Contamination in Soil

Drawing No: Figure 5



Analyte	TOGS AWQS
cVOCs	µg/L
Tetrachloroethene	5
cis-1,2-Dichloroethene	5
Vinyl Chloride	2

NOTES:

1. **Bold and shaded yellow value indicates concentration exceeds TOGS AWQS**
2. TOGS AWQS = NYSDEC Division of Technical Operational Guidance Series (TOGS) 1.1.1, Class GA Water Quality Standards (AWQS) and Guidance Values
3. DUP = Duplicate
4. All cVOCs were detected at concentrations below TOGS AWQS in the post-remedial groundwater sample collected from MW-5 on 6/5/2025.

Legend

- Post-Remedial Groundwater Sampling Locations
- Groundwater Flow Direction
- Adjacent and Surrounding Tax Parcels
- Site Boundary

Sources:
gis.nyc..gov/taxmap/map.htm
integral, New York, NY, Remedial Invesitgation Report, Fig. 5

Notes:
Elevations are in feet
Vertical Datum is NAVD 88
Groundwater Elevations recorded on July 27 and 28, 2016

0 20 40 80 Feet

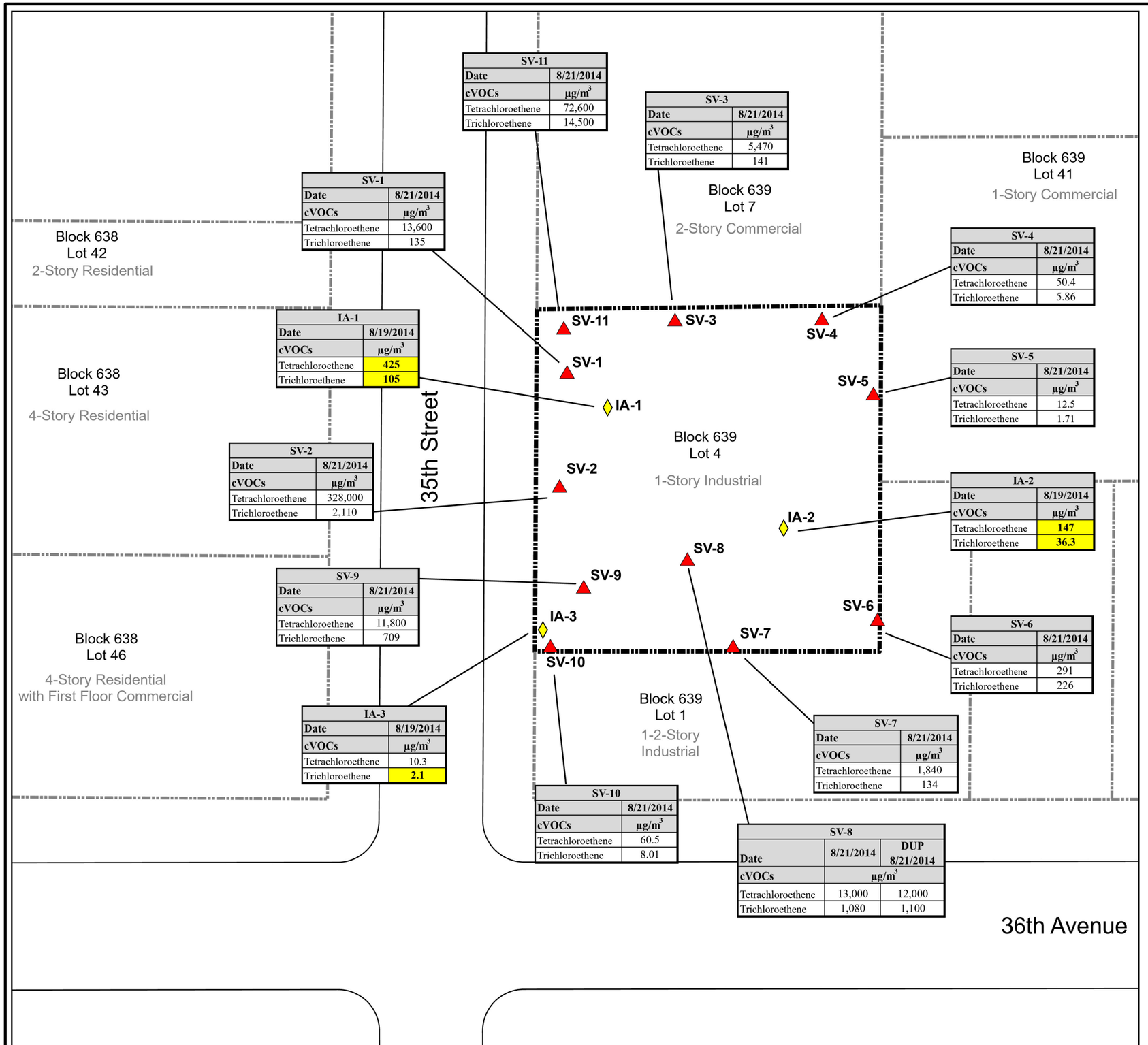
Site
Site Management Plan
Teitelbaum Dry Cleaning, Inc.
35-45 35th Street
Astoria, New York
BCP Site No. C241149

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Drawn By: LM
Checked By: AP
Date: July 2025
Scale: As Noted

Drawing Title: **Remaining Contamination in Groundwater and Post-Remedial Groundwater Sampling Locations**

Drawing No: **Figure 6**



Analyte	NYSDOH AGVs
cVOCs	µg/m³
Tetrachloroethene	30
Trichloroethene	2

NOTES:

1. NYSDOH AGV = New York State Department of Health Air Guideline Value
2. **Bold and shaded yellow value indicates indoo air concentration exceeds NYSDOH AGV***
3. Only indoor air concentrations are compared to NYSDOH AGVs
4. DUP = Duplicate

Legend

- Indoor/Ambient Air Sample Location
- Soil Vapor Sample Location
- NYC Tax Lots Parcels
- ProjectSite Site Boundary

Sources:
gis.nyc..gov/taxmap/map.htm
integral, New York, NY, Remedial Invesitgation Report, Fig. 11

0 15 30 60 Feet

Site Management Plan
Teitelbaum Dry Cleaning, Inc.
35-45 35th Street
Astoria, New York
BCP Site No. C241149

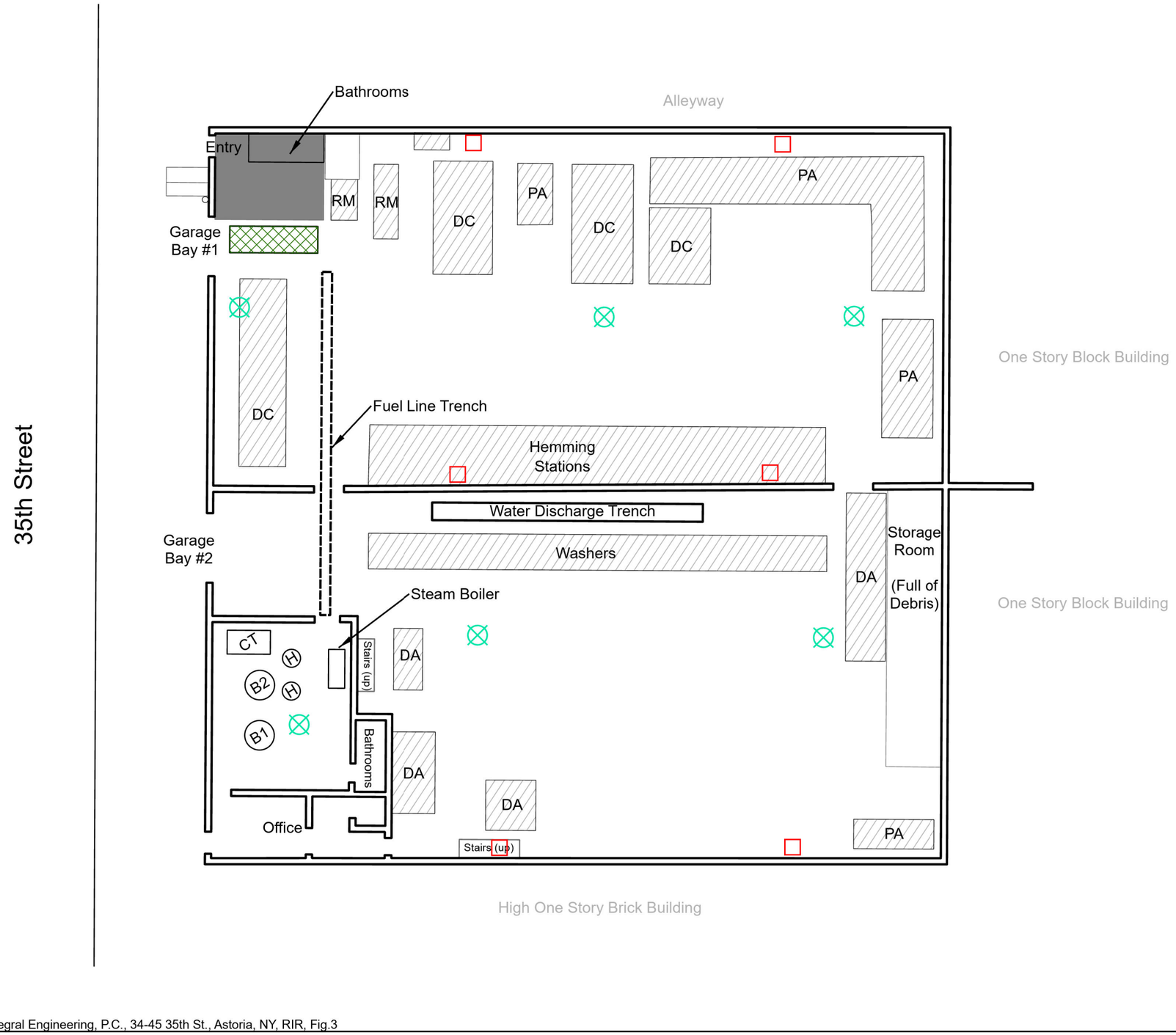
Site

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Drawn By: LM
Checked By: AP
Date: July 2024
Scale: As Noted

Drawing Title: **Remaining Contamination in Soil Vapor and Indoor Air**

Drawing No: **Figure 7**



Legend

- Pressure Monitoring Point
- Suction Pit
- Concrete Block Enclosed 275-Gallon Fuel Oil ASTs
- Inaccessible
- Partial Cellar
- Abandoned 1,500 Gallon UST
- DC Dry Cleaning Machine
- PA Pressing Area
- DA Dryer Area
- RM PCE Recycling
- (B) Boiler
- (H) Hot Water Heater
- CT Condensate Tank

Notes:

1. Placement and size of equipment is approximate.

0 7.5 15 22.5 30 Feet

Source: Integral Engineering, P.C., 34-45 35th St., Astoria, NY, RIR, Fig.3

Site

Site Management Plan
Teitelbaum Dry Cleaning, Inc.
35-45 35th Street
Astoria, New York
BCP Site No. C241149

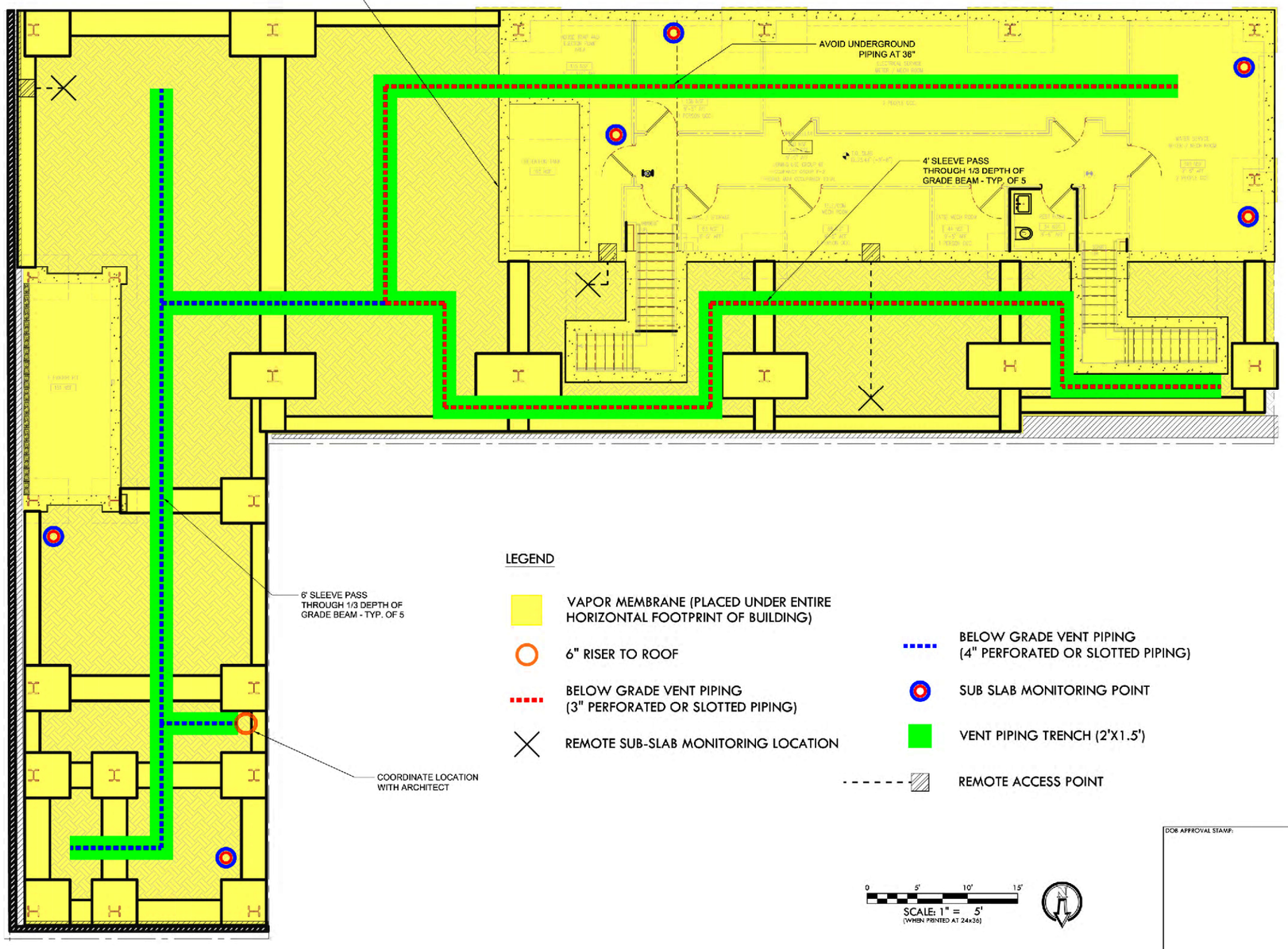
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Drawn By	Checked By	Date	Scale
LM	AP	July 2025	As Noted

Drawing Title: **Onsite Sub-Slab Depressurization System Layout**

Drawing No: **Figure 8**

VAPOR MITIGATION SYSTEM SHEETS
ENV-1 THROUGH ENV-5



LEGEND

- VAPOR MEMBRANE (PLACED UNDER ENTIRE HORIZONTAL FOOTPRINT OF BUILDING)
- 6" RISER TO ROOF
- BELOW GRADE VENT PIPING (3" PERFORATED OR SLOTTED PIPING)
- REMOTE SUB-SLAB MONITORING LOCATION
- BELOW GRADE VENT PIPING (4" PERFORATED OR SLOTTED PIPING)
- SUB SLAB MONITORING POINT
- VENT PIPING TRENCH (2'X1.5')
- REMOTE ACCESS POINT

SCALE: 1" = 5'
(WHEN PRINTED AT 24x36)

DOB APPROVAL STAMP:

VERTEX
Engineering, PC
Main: 646.553.3500 | Fax: 646.553.3499
147 West 35th St., 19th FL | New York, NY 10001
CONTACT: Richard J. Tobia, PE

NUMBER	DATE	DESCRIPTION
01	2020-08-14	FOR BID PURPOSES ONLY
02	2020-09-08	FOR CONSTRUCTION
03	2020-09-18	VERTICAL BARRIER REVISIONS
04	2020-10-21	ACTIVE SSDS REVISION
05	2020-11-05	WATERPROOFING REVISION
06	2021-02-16	NYSDOH REVISIONS
07		
08		
09		
10		
11		
12		

NOTE

- IT IS A VIOLATION OF NY STATE LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT IN ANY WAY.

PROJECT:
35-01 36TH AVENUE, QUEENS, NEW YORK 11106

DRAWING TITLE:
BELOW GRADE VMS VENT PIPING PLAN

SEAL & SIGNATURE:
STATE OF NEW YORK · RICHARD J. TOBIA · 095039 · LICENSED PROFESSIONAL ENGINEER
Richard J. Tobia, PE
PE License No.: 095039-1

FILE NAME: 65164
PLOT DATE: 08/07/2020
DATE: 08/07/2020
DRAWN BY: JJA
CHECKED BY: MK
JOB #: 65164
DRAWING NUMBER:
ENV-1
SHEET SIZE: 24 X 36 | 1 of 5

Site
Remedial Action Work Plan
Teitelbaum Dry Cleaning, Inc.
34-45 35th Street
Astoria, New York

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Tenen Environmental, LLC
121 West 27th Street
Suite 702
New York, NY 10001
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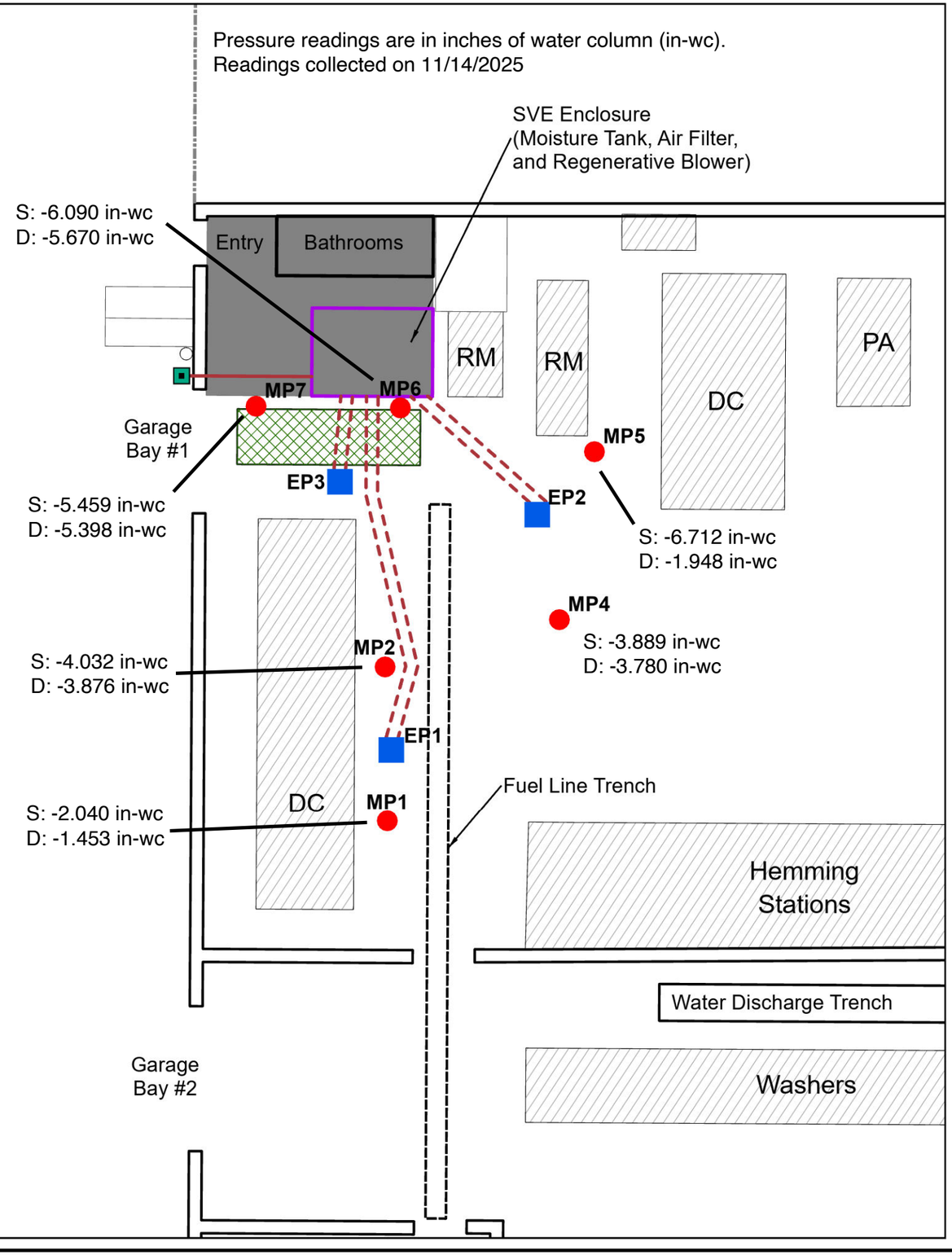
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Checked By: AC
Date: February 2021
Scale: As Noted

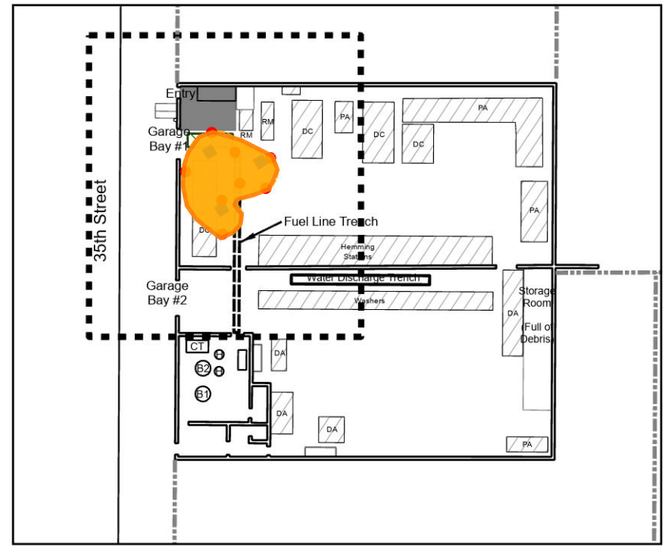
Drawing Title
Offsite Sub-Slab Depressurization System Layout

Drawing No
Figure 9

Source: Vertex Engineering, PC, Below Grade VMS Vent Piping Plan, 35-01 36th Avenue, Queens, NY

Pressure readings are in inches of water column (in-wc).
Readings collected on 11/14/2025





Inset Map

Legend

- Coupled Soil Vapor Extraction Wells (deep and shallow)
- Soil Vapor Extraction Monitoring Points
- Riser to Roof
- Subsurface System Piping
- Above Grade System Piping
- SVE Enclosure
- Inaccessible
- Partial Cellar
- Abandoned 1,500 Gallon UST

- DC Dry Cleaning Machine
- PA Pressing Area
- DA Dryer Area
- RM PCE Recycling
- (B) Boiler
- (H) Hot Water Heater
- CT Condensate Tank

Notes:

1. Placement and size of equipment is approximate.
2. Shallow SVE Wells are screened 8-13 feet below grade.
3. Deep SVE Wells EP1 and EP2 are screened 13-18 feet below grade. Deep SVE Well EP3 is screened 12-17 feet below grade.
4. Riser to Roof Connects to Effluent Release on Roof

0 4 8 12 16 Feet

Source:
gis.nyc.gov/taxmap.htm
Integral Engineering, P.C., 34-45 35th St., Astoria, NY, RIR, Fig.3
EnviroTrac Environmental Services, Proposed SVE System Layout, Fig 3, Teitelbaum Dry Cleaning Inc., 7/21/23

Site

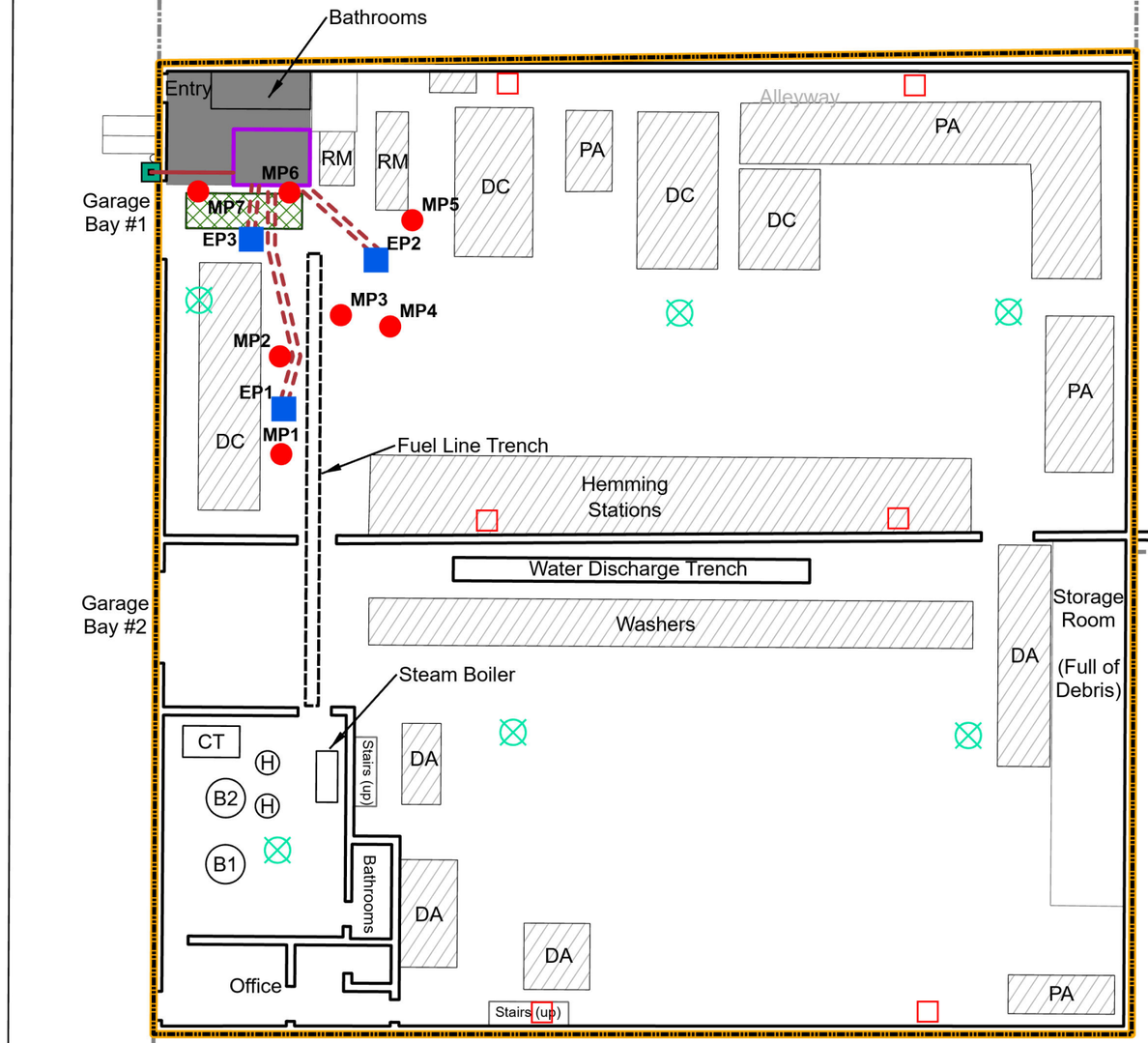
Final Engineering Report
Teitelbaum Dry Cleaning, Inc.
35-45 35th Street
Astoria, New York
BCP Site No. C241149

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Drawn By	Checked By	Date	Scale
LM	AP	September 2025	As Noted

Drawing Title: **Soil Vapor Extraction System Layout**

Drawing No: **Figure 10**



Legend

- Pressure Monitoring Point
- Suction Pit
- Inaccessible
- Partial Cellar
- Abandoned 1,500 Gallon UST
- DC Dry Cleaning Machine
- PA Pressing Area
- DA Dryer Area
- RM PCE Recycling
- (B) Boiler
- (H) Hot Water Heater
- CT Condensate Tank
- Coupled Soil Vapor Extraction Wells
- Soil Vapor Extraction Monitoring Point
- Riser to Roof
- Subsurface System Piping
- Above Grade System Piping
- SVE Enclosure
- Institutional Control Boundaries

Notes:

1. Placement and size of equipment is approximate.

0 7.5 15 22.5 30 Feet

Source:
gis.nyc.gov/taxmap.htm
Integral Engineering, P.C., 34-45 35th St., Astoria, NY, RIR, Fig.3
EnviroTrac Environmental Services, Proposed SVE System Layout, Fig 3, Teitelbaum Dry Cleaning Inc., 7/21/23

Site

Site Management Plan
Teitelbaum Dry Cleaning, Inc.
35-45 35th Street
Astoria, New York
BCP Site No. C241149

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Drawn By	Checked By	Date	Scale
LM	AP	July 2025	As Noted

Drawing Title
Institutional Control Boundaries and Engineering Control Locations

Drawing No
Figure 11

TABLES

Table 10. Summary of Remaining Soil Sample Exceedances
Teitelbaum Dry Cleaning, Inc.
Site Management Plan
BCP Site No. C241149

LOCATION	NY-PGW	Units	SB-1	SB-1	SB-1	SB-2	SB-4	SB-4
DEPTH (FT-BG)			5.5-7.5	5.5-7.5 (DUP)	17-19	20-22	20-22	20-22 (DUP)
SAMPLING DATE			9/2/2014	9/2/2014	9/2/2014	9/4/2014	9/5/2014	9/5/2014
LAB SAMPLE ID			L1420136-03	L1420136-04	L1420136-05	L1420412-03	L1420412-11	L1420412-13
			Qual	Qual	Qual	Qual	Qual	Qual
Volatile Organic Compounds								
Tetrachloroethene	1.3	mg/kg	**580**	**360**	**520**	**5.5**	0.036 J	0.053 J
Trichloroethene	0.47	mg/kg	ND	ND	**2.4 J**	0.22	ND	ND
cis-1,2-Dichloroethene	0.25	mg/kg	ND	ND	ND	**0.46**	0.088	**0.76**
Methylene chloride	0.05	mg/kg	ND	**9.8 J**	ND	ND	**0.25 J**	**0.53 J**

Notes:

Bold and shaded yellow value indicates concentration exceeds NY-PGW SCOs

NY-PGW = 6 NYCRR Part 375 Restricted Protection of Groundwater Soil Cleanup Objectives

E = Concentration exceeds the calibration range of the instrument

J = Estimated value

ND = Not detected

DUP = Duplicate

Table 10. Summary of Remaining Soil Sample Exceedances
Teitelbaum Dry Cleaning, Inc.
Site Management Plan
BCP Site No. C241149

LOCATION	NY-PGW	Units	SB-5		SB-11		SB-14		SB-14		SB-17		SB-17	
DEPTH (FT-BG)			20-22		21-23		11-13		20-22		18-19		20-21	
SAMPLING DATE			9/5/2014		9/2/2014		9/5/2014		9/5/2014		11/3/2017		11/3/2017	
LAB SAMPLE ID			L1420412-15		L1420136-10		L1420136-01		L1420136-02		L1740444-01		L1740444-02	
				Qual		Qual		Qual		Qual		Qual		Qual
Volatile Organic Compounds														
Tetrachloroethene	1.3	mg/kg	ND		0.12		**27**		**2.5**		**430**		**2**	
Trichloroethene	0.47	mg/kg	ND		ND		ND		0.017	J	**16**		0.2	
cis-1,2-Dichloroethene	0.25	mg/kg	0.024	J	ND		ND		0.062	J	**2.5**	**J**	**1**	
Methylene chloride	0.05	mg/kg	**0.31**	**J**	**0.13**	**J**	**0.24**	**J**	ND		ND		ND	

Notes:

Bold and shaded yellow value indicates concentration exceeds NY-PGW SCOs

NY-PGW = 6 NYCRR Part 375 Restricted Protection of Groundwater Soil Cleanup Objectives

E = Concentration exceeds the calibration range of the instrument

J = Estimated value

ND = Not detected

DUP = Duplicate

Table 10. Summary of Remaining Soil Sample Exceedances
Teitelbaum Dry Cleaning, Inc.
Site Management Plan
BCP Site No. C241149

LOCATION	NY-PGW	Units	SB-18	SB-18	SB-19	SB-19	SB-20
DEPTH (FT-BG)			19-20	21-22	19-20	21-22	19-20
SAMPLING DATE			11/6/2017	11/6/2017	11/6/2017	11/6/2017	11/6/2017
LAB SAMPLE ID			L1740631-01	L1740631-02	L1740631-03	L1740631-04	L1740631-05
			Qual	Qual	Qual	Qual	Qual
Volatile Organic Compounds							
Tetrachloroethene	1.3	mg/kg	**1.3**	ND	**1100**	0.048	**130**
Trichloroethene	0.47	mg/kg	ND	ND	**30**	0.0062	0.44 J
cis-1,2-Dichloroethene	0.25	mg/kg	ND	ND	**6.4**	**0.74 E**	ND
Methylene chloride	0.05	mg/kg	ND	**0.56 J**	**9.5 J**	ND	ND

Notes:

Bold and shaded yellow value indicates concentration exceeds NY-PGW SCOs

NY-PGW = 6 NYCRR Part 375 Restricted Protection of Groundwater Soil Cleanup Objectives

E = Concentration exceeds the calibration range of the instrument

J = Estimated value

ND = Not detected

DUP = Duplicate

Table 11. Summary of Baseline and Post-Remedial Groundwater Sample Exceedances
Teitelbaum Dry Cleaning, Inc.
Site Management Plan
BCP Site No. C241149

CLIENT SAMPLE ID:	NY-AWQS	Units	MW-3	MW-3	MW-3	MW-3	MW-3_DUP
SAMPLING DATE:			10/27/2022	5/16/2024	8/19/2024	3/4/2025	3/4/2025
SAMPLING EVENT:			BASELINE	POST-REMEDIAL	POST-REMEDIAL	POST-REMEDIAL	POST-REMEDIAL
LAB SAMPLE ID:			L2260163-01	L2427398-01	L2447136-01	25C0118-01	25C0118-05
			Qual	Qual	Qual	Qual	Qual
Chlorinated Volatile Organic Compounds							
cis-1,2-Dichloroethene	5	ug/l	ND	ND	ND	ND	ND
Tetrachloroethene	5	ug/l	**7.6**	**8.3**	**13**	**5.05**	4.88
Trichloroethene	5	ug/l	1	1	1.2	0.92	0.9
Vinyl Chloride	2	ug/l	ND	ND	ND	ND	ND

Notes:

Bold and shaded yellow value indicates concentration exceeds NY-AWQS

NY-AWQS = NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Class GA Ambient Water Quality Standards

J = Estimated value

ND = Not detected

Table 11. Summary of Baseline and Post-Remedial Groundwater Sample Exceedances
Teitelbaum Dry Cleaning, Inc.
Site Management Plan
BCP Site No. C241149

CLIENT SAMPLE ID:	NY-AWQS	Units	MW-3	MW-4	MW-4_DUP	MW-4		MW-4_DUP
SAMPLING DATE:			6/5/2025	10/27/2022	10/27/2022	5/16/2024		5/16/2024
SAMPLING EVENT:			POST-REMEDIAL	BASELINE	BASELINE	POST-REMEDIAL		POST-REMEDIAL
LAB SAMPLE ID:			25F0353-01	L2260163-02	L2260163-03	L2427398-02		L2427398-03
			Qual	Qual	Qual	Qual		Qual
Chlorinated Volatile Organic Compounds								
cis-1,2-Dichloroethene	5	ug/l	ND	**1200**	**1200**	**110**		**110**
Tetrachloroethene	5	ug/l	**10.9**	**100**	**110**	**31**		**31**
Trichloroethene	5	ug/l	1.1	**55**	**58**	2.5		2.6
Vinyl Chloride	2	ug/l	ND	ND	ND	0.08	J	ND

Notes:

Bold and shaded yellow value indicates concentration exceeds NY-AWQS

NY-AWQS = NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Class GA Ambient Water Quality Standards

J = Estimated value

ND = Not detected

Table 11. Summary of Baseline and Post-Remedial Groundwater Sample Exceedances
Teitelbaum Dry Cleaning, Inc.
Site Management Plan
BCP Site No. C241149

CLIENT SAMPLE ID:	NY-AWQS	Units	MW-4		MW-4		MW-4	MW-4_DUP	MW-5
SAMPLING DATE:			8/19/2024		3/4/2025		6/5/2025	6/5/2025	10/27/2022
SAMPLING EVENT:			POST-REMEDIAL		POST-REMEDIAL		POST-REMEDIAL	POST-REMEDIAL	BASELINE
LAB SAMPLE ID:			L2447136-02		25C0118-02		25F0353-02	25F0353-03	L2260163-04
				Qual		Qual	Qual	Qual	Qual
Chlorinated Volatile Organic Compounds									
cis-1,2-Dichloroethene	5	ug/l	**69**		0.38	J	0.6	0.63	ND
Tetrachloroethene	5	ug/l	**23**		2.53		**5.33**	**5.36**	0.82
Trichloroethene	5	ug/l	2.1		1.58		1.65	1.73	ND
Vinyl Chloride	2	ug/l	**2.9**		ND		ND	ND	ND

Notes:

Bold and shaded yellow value indicates concentration exceeds NY-AWQS

NY-AWQS = NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Class GA Ambient Water Quality Standards

J = Estimated value

ND = Not detected

Table 11. Summary of Baseline and Post-Remedial Groundwater Sample Exceedances
Teitelbaum Dry Cleaning, Inc.
Site Management Plan
BCP Site No. C241149

CLIENT SAMPLE ID:	NY-AWQS	Units	MW-5		MW-5		MW-5_DUP		MW-5		MW-5	
SAMPLING DATE:			5/16/2024		8/19/2024		8/19/2024		3/4/2025		6/5/2025	
SAMPLING EVENT:			POST-REMEDIAL		POST-REMEDIAL		POST-REMEDIAL		POST-REMEDIAL		POST-REMEDIAL	
LAB SAMPLE ID:			L2427398-04		L2447136-03		L2447136-04		25C0118-03		25F0353-04	
				Qual		Qual		Qual		Qual		Qual
Chlorinated Volatile Organic Compounds												
cis-1,2-Dichloroethene	5	ug/l	ND		ND		ND		ND		ND	
Tetrachloroethene	5	ug/l	1.5		1.5		1.4		0.83		0.79	
Trichloroethene	5	ug/l	0.21	J	0.29	J	0.27	J	ND		ND	
Vinyl Chloride	2	ug/l	ND		ND		ND		ND		ND	

Notes:

Bold and shaded yellow value indicates concentration exceeds NY-AWQS

NY-AWQS = NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Class GA Ambient Water Quality Standards

J = Estimated value

ND = Not detected

Table 11. Summary of Baseline and Post-Remedial Groundwater Sample Exceedances
Teitelbaum Dry Cleaning, Inc.
Site Management Plan
BCP Site No. C241149

CLIENT SAMPLE ID:	NY-AWQS	Units	MW-7S	MW-7S	MW-7S
SAMPLING DATE:			10/27/2022	3/4/2025	6/5/2025
SAMPLING EVENT:			BASELINE	POST-REMEDIAL	POST-REMEDIAL
LAB SAMPLE ID:			L2260163-05	25C0118-04	25F0353-04
			Qual	Qual	Qual
Chlorinated Volatile Organic Compounds					
cis-1,2-Dichloroethene	5	ug/l	**13000**	**7.26**	**7.81**
Tetrachloroethene	5	ug/l	ND	ND	ND
Trichloroethene	5	ug/l	ND	ND	ND
Vinyl Chloride	2	ug/l	ND	0.88	**2.02**

Notes:

Bold and shaded yellow value indicates concentration exceeds NY-AWQS

NY-AWQS = NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Class GA Ambient Water Quality Standards

J = Estimated value

ND = Not detected

Table 12. Summary of Soil Vapor and Indoor Air Sample Exceedances
Teitelbaum Dry Cleaning, Inc.
Site Management Plan
BCP Site No. C241149

LOCATION	NYSDOH AGV	Units	AA	IA-1	IA-2	IA-3	SV-11	SV-1
SAMPLING DATE			8/19/2014	8/19/2014	8/19/2014	8/19/2014	8/21/2014	8/21/2014
LAB SAMPLE ID			L1419084-01	L1419084-02	L1419084-03	L1419084-04	L1419279-01	L1419279-02
			Qual	Qual	Qual	Qual	Qual	Qual
Volatile Organic Compounds								
Tetrachloroethene	30	ug/m3	8.14	**425**	**147**	10.3	72600	13600
Trichloroethene	2	ug/m3	1.17	**105**	**36.3**	**2.1**	14500	135

Notes:

Bold and shaded yellow value indicates concentration exceeds NYSDOH AGV

NYSDOH AGV = New York State Department of Health Air Guideline Value

Only indoor air concentrations are compared to NYSDOH AGVs

Table 12. Summary of Soil Vapor and Indoor Air Sample Exceedances
Teitelbaum Dry Cleaning, Inc.
Site Management Plan
BCP Site No. C241149

LOCATION	NYSDOH AGV	Units	SV-2	SV-3	SV-4	SV-5	SV-6	SV-7
SAMPLING DATE			8/21/2014	8/21/2014	8/21/2014	8/21/2014	8/21/2014	8/21/2014
LAB SAMPLE ID			L1419279-03	L1419279-04	L1419279-05	L1419279-06	L1419279-07	L1419279-08
			Qual	Qual	Qual	Qual	Qual	Qual
Volatile Organic Compounds								
Tetrachloroethene	30	ug/m3	328000	5470	50.4	12.5	291	1840
Trichloroethene	2	ug/m3	2110	141	5.86	1.71	226	134

Notes:

Bold and shaded yellow value indicates concentration exceeds NYSDOH AGV

NYSDOH AGV = New York State Department of Health Air Guideline Value

Only indoor air concentrations are compared to NYSDOH AGVs

Table 12. Summary of Soil Vapor and Indoor Air Sample Exceedances
Teitelbaum Dry Cleaning, Inc.
Site Management Plan
BCP Site No. C241149

LOCATION	NYSDOH AGV	Units	SV-8	SV-8_DUP	SV-9	SV-10
SAMPLING DATE			8/21/2014	8/21/2014	8/21/2014	8/21/2014
LAB SAMPLE ID			L1419279-09	L1419279-10	L1419279-11	L1419279-12
			Qual	Qual	Qual	Qual
Volatile Organic Compounds						
Tetrachloroethene	30	ug/m3	13000	12000	11800	60.5
Trichloroethene	2	ug/m3	1080	1100	709	8.01

Notes:

Bold and shaded yellow value indicates concentration exceeds NYSDOH AGV

NYSDOH AGV = New York State Department of Health Air Guideline Value

Only indoor air concentrations are compared to NYSDOH AGVs

Table 13.
Groundwater Elevation Measurements
Teitelbaum Dry Cleaning, Inc.
Site Management Plan
BCP #C241149

Location	Measuring Point Elevation - feet (NAVD)	Depth to Water (ft)	Water Elevation - feet (NAVD)
MW-2	37.06	19.15	17.91
MW-3	36.47	18.56	17.91
MW-4	36.29	18.41	17.88
MW-5	34.82	17.61	17.21
MW-6	35.56	18.55	17.01
MW-7S	36.88	18.95	17.93
TRC-MW-1	36.76	19.72	17.04
TRC-MW-2	37.86	20.72	17.14
TRC-SB-11	34.2	17.48	16.72
TRC-SB-13	36.83	19.01	17.82
TRC-SB-14	37.92	20.61	17.31
TRC-SB-15	36.48	19.31	17.17
TRC-SB-16	34.49	17.75	16.74
TRC-SB-17	39.47	22.16	17.31

Notes:

1. Data collected as part of Tenen's Remedial Investigation.
2. All elevations shown are in NAVD 1988 (NAVD) vertical datum.
3. Depth to water measurements are in feet below measuring point (top of casing).

APPENDIX 1 – LIST OF SITE CONTACTS

Name	Phone/Email Address
Andrea Pampillonio, S & C Properties, LLC	(917) 543-8513, apapap13@yahoo.com
Alana Carroll, P.G.; QEP	(646) 606-2332, acarroll@tenen-env.com
Matthew Carroll, P.E.; Remedial Engineer	(646) 606-2332, mcarroll@tenen-env.com
Yildiz Palumbo, P.E.; NYSDEC DER Project Manager	(718) 482-4891, yildiz.palumbo@dec.ny.gov
Andre Obligado, P.G., NYSDEC DER Project Manager's Supervisor	(718) 482-6412, andre.obligado@dec.ny.gov
Jane O'Connell, P.G.; NYSDEC Regional Remediation Engineer	(718) 482-4599, jane.oconnell@dec.ny.gov
Kelly A. Lewandowski, P.E.; NYSDEC Chief Site Control Section	(518) 402-9543, kelly.lewandowski@dec.ny.gov
Stephen Lawrence, NYSDOH Project Manager	(518) 402-0450, stephen.lawrence@health.ny.gov
James Periconi; Periconi, LLC	(212) 213-5500, jpericoni@periconi.com

APPENDIX 2 – 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.

2024090500540001001E8942

RECORDING AND ENDORSEMENT COVER PAGE

Document ID: 2024090500540001 Document Date: 06-10-2024 Preparation Date: 09-05-2024
Document Type: EASEMENT
Document Page Count: 8

PRESENTER:
NEWMARK TITLE SERVICES LLC
ONE PENN PLAZA
SUITE 3406
NEW YORK, NY 10119
212-239-1000
RECORDINGS@NMRK.COM

RETURN TO:
CONNELL FOLEY LLP
875 THIRD AVENUE 21ST FLOOR
NEW YORK, NY 10022

PROPERTY DATA

Borough	Block	Lot	Unit	Address
QUEENS	639	4	Entire Lot	35-45 35TH STREET

Property Type: INDUSTRIAL BUILDING Easement

CROSS REFERENCE DATA

CRFN_____ *or* DocumentID_____ *or* _____ Year____ Reel____ Page____ *or* File Number_____

PARTIES

GRANTOR/SELLER:
S & C PROPERTIES, LLC
2 BAY CLUB DRIVE APT 10G
BAYSIDE, NY 11360

GRANTEE/BUYER:
N.Y.S. DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 BROADWAY
ALBANY, NY 12233

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:	$	77.00
Affidavit Fee:	$	0.00

Filing Fee: $ 100.00
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 09-06-2024 15:24
City Register File No.(CRFN): **2024000232513**

City Register Official Signature

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

THIS INDENTURE made this 10th day of June, 2024, between Owner, S&C Properties, LLC, having an office at 2 Bay Club Drive, Bayside, County of Queens, State of New York (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 35-45 35th Street in the City of New York, County of Queens 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 639 Lot 4, being the same as that property conveyed to Grantor by deed dated November 20, 2002 and recorded in the City Register of the City of New York in City Register File No. 2003000106601. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.229 +/- acres, and is hereinafter more fully described in the Land Title Survey dated May 24, 2023 prepared by Donald R. Stedge, 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 Number: C241149-12-13, 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) The Controlled Property may be used for:

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

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

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene 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;

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

(6) 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;

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

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

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

(10) 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.

B. The Controlled Property shall not be used for Residential or Restricted Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i) and (ii), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. 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

D. 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.

E. 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.

F. 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.

G. 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: C241149
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.

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WELL ELEVATION TABLE

WELL I.D.	ELEVATIONS TOP OF CASING	TOP OF PVC RISER
MW-2	37.26	37.06
MW-3	37.46	36.47
MW-4	37.11	36.29
TRC-MW-1	36.76	36.56
TRC-SB-11	34.58	34.20
TRC-SB-13	37.18	36.83
TRC-SB-15	36.78	36.48
TRC-SB-16	34.80	34.49
JULY 28, 2016 WELLS		
MW-5	35.10	34.82
TRC-MW-2	38.12	37.86
TRC-SB-14	38.15	37.92
TRC-SB-17	39.83	39.47
NOVEMBER 7, 2017		
MW-6	35.92	35.56
MW-7	37.20	36.94 D 36.88 S

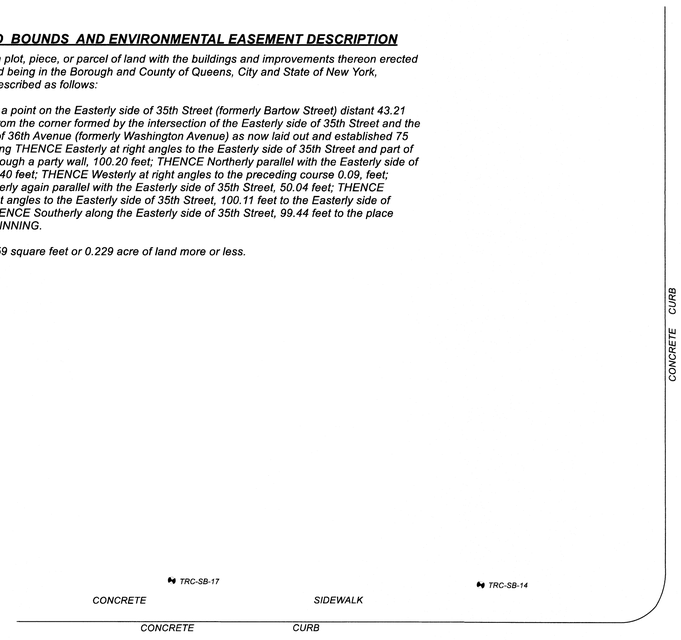
ALL WELLS ARE FLUSH MOUNT
TOP OF CASING ELEVATION = GROUND ELEVATION

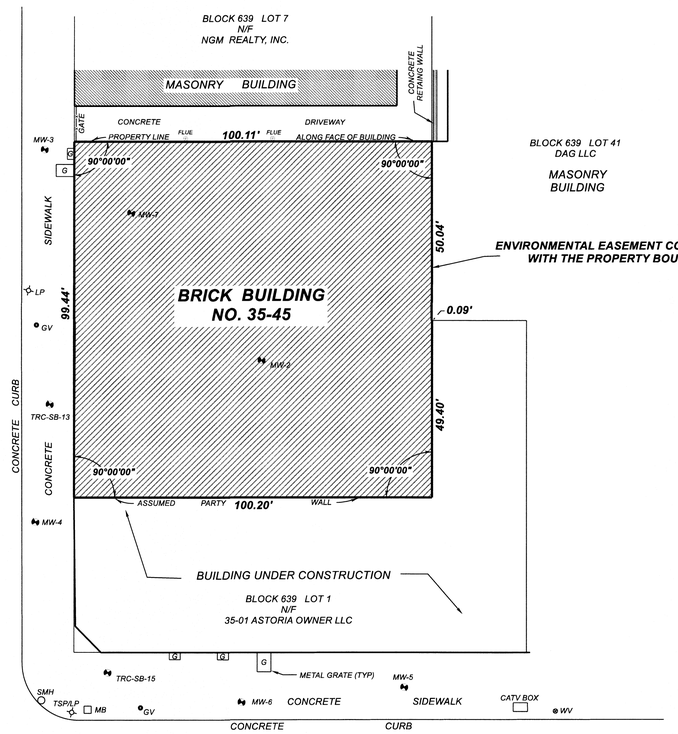
METES AND BOUNDS AND ENVIRONMENTAL EASEMENT DESCRIPTION

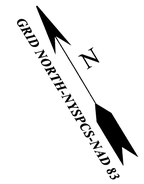
ALL that certain plot, piece, or parcel of land with the buildings and improvements thereon erected situate lying and being in the Borough and County of Queens, City and State of New York, bounded and described as follows:

BEGINNING at a point on the Easterly side of 35th Street (formerly Bartow Street) distant 43.21 feet Northerly from the corner formed by the intersection of the Easterly side of 35th Street and the Northerly side of 36th Avenue (formerly Washington Avenue) as now laid out and established 75 feet wide; running THENCE Easterly at right angles to the Easterly side of 35th Street and part of the distance through a party wall, 100.20 feet; THENCE Northerly parallel with the Easterly side of 35th Street, 49.40 feet; THENCE Westerly at right angles to the preceding course 0.09, feet; THENCE Northerly again parallel with the Easterly side of 35th Street, 50.04 feet; THENCE Westerly at right angles to the Easterly side of 35th Street, 100.11 feet to the Easterly side of 35th Street; THENCE Southerly along the Easterly side of 35th Street, 99.44 feet to the place or point of BEGINNING.

Containing 9,959 square feet or 0.229 acre of land more or less.







NOTES:

-DATES OF ORIGINAL WELL FIELD SURVEY: OCTOBER 7, 2015 AND OCTOBER 26, 2015

-HORIZONTAL DATUM: NAD 83- NY EAST ZONE- FROM GPS OBSERVATIONS

-VERTICAL DATUM: NAVD 88 FROM GPS OBSERVATIONS

-WELLS MW-5, TRC-MW-2, TRC-SB-14 AND TRC-SB-17 SURVEYED ON JULY 28, 2016

-WELLS MW-6 AND MW-7 SURVEYED ON NOVEMBER 7, 2017

-TAX LOT: BLOCK 639 LOT 4

-RECORD DEED: DOCUMENT I.D. 2003011302243001

-AREA: 9,959 S.F. = 0.229 ACRE

-SUBJECT TO THE FINDINGS OF AN UP TO DATE ABSTRACT OF TITLE

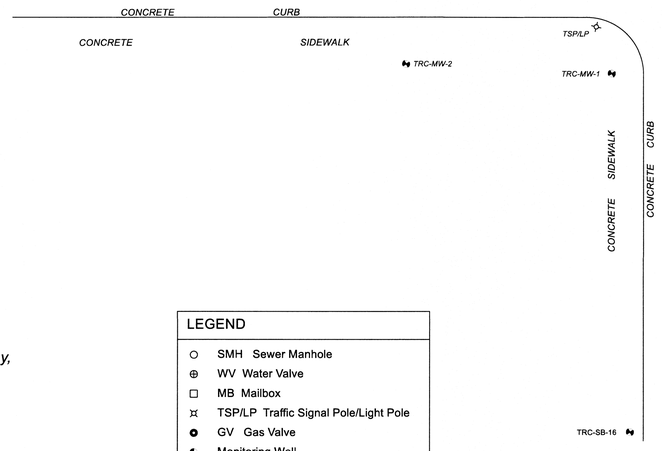
-UNAUTHORIZED ALTERATION OR ADDITION TO A SURVEY MAP BEARING A LICENSED LAND SURVEYOR'S EMBOSSED SEAL IS A VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW

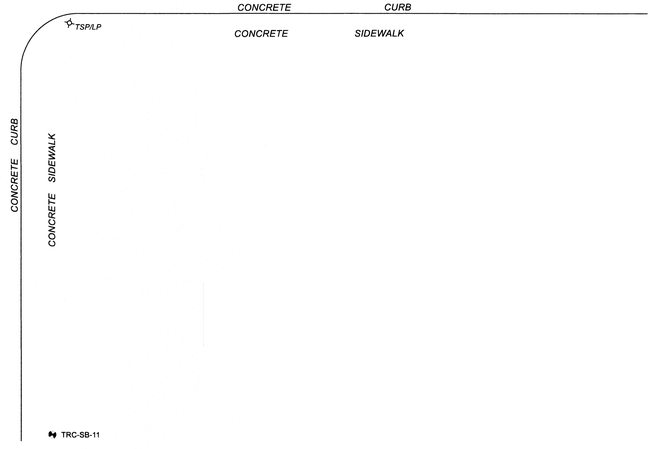
-ONLY COPIES OF THIS MAP BEARING THE LICENSED LAND SURVEYOR'S EMBOSSED SEAL SHALL BE CONSIDERED TO BE VALID, TRUE COPIES

-UNDERGROUND UTILITIES SUCH AS SEWERAGE DISPOSAL SYSTEMS, DRAINAGE, WATER, GAS, AND/OR ELECTRIC LINES, ETC..., ARE NOT SHOWN AND ARE NOT CERTIFIED TO

-THERE ARE NO PONDS, LAKES, SPRINGS, RIVERS OR NATURAL WATER BOUNDARY BORDERING ON OR RUNNING THROUGH THE SURVEYED PROPERTY

-PARTY WALLS NOT VISIBLE AT THE TIME OF THE SURVEY, LOCATIONS ARE ASSUMED AND NOT CERTIFIED TO

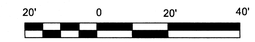


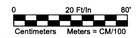


"This property is subject to an environmental easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the New York Environmental Conservation Law. The engineering and institutional controls for this Easement are set forth in more detail in the 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".

LEGEND

- SMH Sewer Manhole
- WV Water Valve
- MB Mailbox
- TSP/LP Traffic Signal Pole/Light Pole
- GV Gas Valve
- Monitoring Well
- Flue Pipe





I HEREBY CERTIFY TO THE PARTIES LISTED BELOW THAT THIS MAP IS BASED ON AN ACTUAL FIELD SURVEY COMPLETED ON MAY 24, 2023 AND WAS PREPARED IN ACCORDANCE WITH THE CURRENT EXISTING CODE OF PRACTICE FOR LAND SURVEYS ADOPTED BY THE NEW YORK STATE ASSOCIATION OF PROFESSIONAL LAND SURVEYORS, INC.

-NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION



DONALD R. STEDGE, L.S., NYS LIC. NO. 49759

ENVIRONMENTAL EASEMENT PREPARED FOR

S & C PROPERTIES, LLC

35-45 35th STREET
BLOCK 639 LOT 4

QUEENS COUNTY — NEW YORK
SCALE: 1" = 20' — MAY 24, 2023

DONALD R. STEDGE, P.L.S.
112 MURRAY AVENUE
GOSHEN, NY 10924
(845) 325-9734

JOB NO. 1477

Traverse PC

APPENDIX 3 – SOIL BORING AND MONITORING WELL CONSTRUCTION LOGS

TENEN ENVIRONMENTAL

		Boring No.	**SB-1**
		Sheet 1	**of 1**
Site:	**S&C Tietelbaum**	**Drilling Method:**	Geoprobe
Date:	**9/2/2014**	**Soil Sampling Method:**	4' Macro-core
Weather:	**Cloudy, mid 80 deg-F**		
Observer:	**Alana Carroll**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
5		0%		**0-5:** No recovery (Fill)
10	309.0 509.0 257.0	80%	SB-1 and Duplicate (5.5-7.5)	**5-5.5:** Crushed CONCRETE. **5.5-9.5:** Brown SAND and SILT, some mica, trace gravel, heavy odor (possibly petroleum). **9.5-10:** Crushed ROCK/FILL with sand and gravel.
15	296.0 209.0 193.0	60%		**10-15:** Light to dark brown, medium to fine SAND with gravel and silt, trace crushed rock and cobbles.
20	214.0 378.0 70.0	100%	SB-1 (17-19)	**15-16.5:** Dark brown, coarse SAND and medium gravel with cobbles. **16.5-19:** Gray, medium coarse to fine SAND and medium to fine GRAVEL, some silt and cobbles, intervals of fine sand. **19-20:** Gray, fine clayey SAND, moist.
25				**EOB @ 20 ft-bg**

Notes:

N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**SB-2**
		Sheet 1	**of 1**
Site:	**S&C Tietelbaum**	**Drilling Method:**	Geoprobe
Date:	**9/4/2014**	**Soil Sampling Method:**	4' Macro-core
Weather:	**Cloudy, mid 70 deg-F**		
Observer:	**Alana Carroll**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
6	0	63%		**0-2:** Concrete **2-4:** Brown, medium to fine clayey SAND, wet. **4-6:** Brown CLAY, wet.
10	0	75%		**6-10:** Brown, medium to fine SAND, some medium to fine gravel with large cobbles. Bottom 8" contains crushed rock (schist).
14	0	50%		**10-14:** Brown coarse to fine SAND, some crushed rock and coarse to fine gravel.
18	0	33%		**14-18:** Coarse SAND with large cobbles, some medium to fine sand (micaceous) and silt.
22	60	25%	SB-2 (18-20) SB-2 (20-22)	**18-20:** Coarse SAND with large cobbles, some medium to fine sand (micaceous) and silt. **20-22:** Brown, medium to fine SAND (micaceous), some silt and medium to fine gravel. **EOB @ 22 ft-bg**

Notes:

N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**SB-3**
		Sheet 1	**of 1**
Site:	**S&C Tietelbaum**	**Drilling Method:**	Geoprobe
Date:	**9/6/2014**	**Soil Sampling Method:**	4' Macro-core
Weather:	**Cloudy, mid 80 deg-F**		
Observer:	**Alana Carroll**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
6	0	50%	SB-3 (4-6)	**0-2:** FILL **2-6:** Coarse to fine SAND and coarse to fine GRAVEL, some coarse cobbles and silt, brick/textile fill in top 6".
10	0	88%		**6-10:** Tan, fine silty SAND, some mica, some clay in top 6".
14	0	100%		**10-14:** Brown, fine silty SAND, some mica and clay.
18	0	100%	SB-3 (15-17)	**14-18:** Brown to tan, fine silty SAND,some clay and mica, trace medium to fine gravel.
22	0	75%		**18-22:** Brown, coarse to medium SAND and coarse to medium GRAVEL, some silt, clay, and mica, wet. **EOB @ 22 ft-bg**

Notes:

N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**SB-4**
		Sheet 1	**of 1**
Site:	**S&C Tietelbaum**	**Drilling Method:**	Geoprobe
Date:	**9/4/2014**	**Soil Sampling Method:**	4' Macro-core
Weather:	**Cloudy, mid 70 deg-F**		
Observer:	**Alana Carroll**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
6	0.6 3.8	75%		**0-2:** FILL **2-6:** Crushed ROCK (schist) with fine sand and coarse to medium gravel, some silt, clay, and mica.
10	2.6	50%		**6-6.25:** Crushed ROCK (schist) with fine sand and coarse to medium gravel, some silt, clay, and mica. **6.25-10:** Red to tan, coarse to fine SAND and coarse to fine GRAVEL with large cobbles (micaceous).
14	9.4 3.2	38%		**10-14:** Top 10" is brown, crushed ROCK (schist) with coarse to fine sand, some silt and coarse to fine gravel. Bottom 8" is coarse to fine SAND and coarse to medium GRAVEL with large cobbles.
18	9.9 12.5	100%		**14-17:** Brown, coarse to medium SAND and medium to fine GRAVEL, some fine sand, coarse gravel (micaceous), and silt. **17-18:** Brown, coarse to medium SAND with coarse to medium gravel, some silt and mica, trace cobbles.
22	9.1 182.0	100%	SB-4 (18-20) SB-4 and Duplicate (20-22)	**18-19:** Brown, medium to fine sandy CLAY, moist. **19-22:** Brown to green, coarse to fine SAND, some medium to fine gravel, cobbles, silt, and clay. **EOB @ 22 ft-bg**

Notes:
N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**SB-5**
		Sheet 1	**of 1**
Site:	**S&C Tietelbaum**	**Drilling Method:**	Geoprobe
Date:	**9/4/2014**	**Soil Sampling Method:**	4' Macro-core
Weather:	**Cloudy, mid 70 deg-F**		
Observer:	**Alana Carroll**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
6	10.2 3.0 13.6	100%	SB-5 (4-6)	**0-2:** FILL **2-6:** Brown to tan, silty SAND, some cobbles and clay, trace gravel.
10	5.0	100%		**6-10:** Tan silty SAND, lenses of clayey sand.
14	0.8 1.1	100%		**10-14:** Brown to tan, fine silty SAND, some mica, grading to coarse to fine sand, coarse to fine gravel, and crushed rock (schist).
18	3.4 0.7	75%		**14-18:** Brown, coarse to fine SAND and coarse to medium GRAVEL, some cobbles (micaceous).
22	68	50%	SB-5 (20-22)	**18-22:** Black, coarse GRAVEL. **EOB @ 22 ft-bg**

Notes:

N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL		Boring No.	SB-6
		Sheet 1	of 1
Site:	S&C Tietelbaum	Drilling Method:	Geoprobe
Date:	9/3/2014	Soil Sampling Method:	2' Macro-core
Weather:	Cloudy, mid 80 deg-F		
Observer:	Alana Carroll	Driller :	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
2	0.0	17%		**0-2:** Brown, coarse to fine SAND and coarse GRAVEL with crushed rock (schist) and debris (concrete).
4	0.0	42%		**2-4:** Brown, medium to fine sandy CLAY, trace gravel.
6	0.0	58%		**4-4.33:** Brown, medium to fine sandy CLAY, trace gravel. **4.33-6:** Coarse to fine SAND, some medium to fine gravel, large cobbles, and mica.
8	0.0	75%	SB-6 (6-8)	**6-6.25:** Brown CLAY, some fine sand. **6.25-8:** Brown to tan, coarse to fine SAND and GRAVEL, some crushed rock (quartz and schist) grading to fine sand and silt.
10	0.0	63%	SB-6 (8-10)	**8-8.25:** Brown to black CLAY. **8.25-9.25:** Fine SAND. **9.25-10:** Medium to coarse SAND, some crushed gravel (micaceous). **EOB @ 10 ft-bg due to refusal.**

Notes:

N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**SB-7**
		Sheet 1	**of 1**
Site:	**S&C Tietelbaum**	**Drilling Method:**	Geoprobe
Date:	**9/2/2014**	**Soil Sampling Method:**	4' Macro-core
Weather:	**Cloudy, mid 80 deg-F**		
Observer:	**Alana Carroll**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
5	0	20%		**0-5:** Top 4" consists of brown, clayey SILT, some sand and mica; Next 5" consists of brown, silty CLAY, some fine sand; Next 3" consists of brown, medium to fine SAND, few medium to fine gravel, trace cobbles.
10	0	20%		**5-10:** Brown, medium to fine SAND and medium to fine GRAVEL (micaceous).
15	0	16%		**10-15:** Brown, medium to fine SAND and coarse to fine GRAVEL, some large cobbles (micaceous) and silt.
20	0	30%	SB-7 (18-20)	**15-19.75:** Brown, medium to fine SAND, some fine gravel and cobbles. **19.75-20:** COBBLES (micaceous), some silt, no water.
22	0	80%	SB-7 (20-22)	**20-22:** Brown, fine SAND and SILT, grading to medium to fine SAND with some silt, graded to fine SAND and CLAY, wet/saturated.
25				**EOB @ 22 ft-bg**

Notes:

N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**SB-8**
		Sheet 1	**of 1**
Site:	**S&C Tietelbaum**	**Drilling Method:**	Geoprobe
Date:	**9/2/2014**	**Soil Sampling Method:**	4' Macro-core
Weather:	**Cloudy, mid 80 deg-F**		
Observer:	**Alana Carroll**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
5	0	60%	SB-8 (0-2)	**0-0.5:** Crushed DEBRIS (concrete). **0.5-2:** Black to brown, coarse to fine SAND (micaceous), some medium to fine gravel. **2-4:** Dark brown CLAY, some silt and mica, moist. **4-5:** Brown, fine clayey SAND, some medium to fine gravel, crushed rock in last 1".
10	0	40%		**5-6:** Crushed ROCK (schist) and medium to fine SAND. **6-10:** Brown, coarse to fine SAND and medium to fine GRAVEL (micaceous), some cobbles and silt, crushed rock at bottom.
15	0	40%		**10-12.5:** Brown, crushed ROCK and medium to fine SAND, some mica and silt. **12.5-15:** Brown, medium to fine SAND and MICA, some silt.
20	0	50%	SB-8 (17-19)	**15-20:** Brown to gray, medium to fine SAND, some cobbles, fine sand, and silt, grading to wet.
25				**EOB @ 20 ft-bg**

Notes:

N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**SB-9**
		Sheet 1	**of 1**
Site:	**S&C Tietelbaum**	**Drilling Method:**	Geoprobe
Date:	**9/4/2014**	**Soil Sampling Method:**	4' Macro-core
Weather:	**Cloudy, mid 70 deg-F**		
Observer:	**Alana Carroll**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
5	0	8%		**0-1:** No recovery. **1-4:** Brown, coarse to medium SAND and FILL, some fine sand, silt, and debris (brick, concrete) **4-5:** Brown, fine clayey SAND, some large cobbles.
9	0	88%		**5-5.5:** Brown CLAY and DEBRIS (brick, concrete). **5.5-6:** Brown, fine sandy CLAY. **6-9:** Brown, fine silty SAND, some coarse gravel, lenses of fine silty sand and clayey sand, wet.
13	0	100%	SB-9 (9-11)	**9-10:** Brown, medium to fine sandy CLAY. **11-12.5:** Brown, medium to fine SAND, some silt, top 1" fill. **12.5-13:** Brown, coarse to fine SAND, coarse to fine GRAVEL, and crushed ROCK (quartz and schist), micaceous.
17	0	38%	SB-9 (13-15)	**13-17:** Brown CLAY grading to crushed ROCK and poorly graded SAND.
22				**EOB @ 17 ft-bg due to refusal**

Notes:

N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**MW-1/SB-10**
		Sheet 1	**of 1**
Site:	**S&C Tietelbaum**	**Drilling Method:**	Geoprobe
Date:	**9/4/2014**	**Soil Sampling Method:**	4' Macro-core
Weather:	**Cloudy, mid 70 deg-F**		
Observer:	**Alana Carroll**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	GW Monitoring Well Interval	Soil Description
6	0	75%		1" PVC Casing (0-12)	**0-2:** FILL. **2-4.5:** Brown, coarse to fine SAND, some silt, trace coarse to medium gravel, some lenses of fine sand. **4.5-6:** Brown, medium to fine clayey SAND.
10	0	100%	SB-10 (7-9)		**6-10:** Brown, medium to fine clayey SAND.
14	0	100%			**10-10.5:** Brown, medium to fine clayey SAND. **10.5-14:** Tan, fine silty SAND (micaceous), grading to coarse to fine SAND intermixed with coarse to fine gravel and crushed rock (schist and quartz).
18	0	63%		Screen (12-22)	**14-18:** Tan, fine silty SAND with silt (micaceous) intermixed with coarse to fine gravel and crushed rock (schist and quartz).
22	0	38%	SB-10 (20-22)		**18-21:** Coarse to fine silty SAND (micaceous), some coarse to fine gravel. **21-22:** Coarse to fine SAND and large GRAVEL (2"), some coarse to fine gravel (micaceous), saturated.
27					**EOB @ 22 ft-bg**

Notes:
N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**MW-2/SB-11**
		Sheet 1	**of 1**
Site:	**S&C Tietelbaum**	**Drilling Method:**	Geoprobe
Date:	**9/3/2014**	**Soil Sampling Method:**	4' Macro-core
Weather:	**Cloudy, mid 80 deg-F**		
Observer:	**Alana Carroll**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	GW Monitoring Well Intervals	Soil Description
5	0	20%		1" PVC Casing (0-16)	**0-5:** Brown, medium to fine silty SAND, some gravel (micaceous), trace cobbles, grades to brown, medium to fine clayey SAND to CLAY, some sand.
10	0	70%			**5-6:** Brown CLAY, some sand. **6-10:** Brown, coarse to fine SAND and coarse to fine GRAVEL, some silt (micaceous), some large gravel (3") and crushed rock.
15	0	60%			**10-15:** Brown, coarse to fine SAND and coarse to fine GRAVEL, some rock (native), cobbles, and small gravel.
20	0	70%	SB-11 (18-20)	Screen (16-26)	**15-17:** Brown, coarse to fine SAND, some clay, mica, and fine gravel. **17-20:** Brown to tan, coarse well graded SAND, some mica and medium to fine gravel, trace silt.
25	63.0	60%	SB-11 (21-23)		**20-22:** Brown to tan, coarse well graded SAND, some mica and medium to fine gravel, trace silt. **22-25:** Fine silty SAND (micaceous), some coarse sand, silt, and mica, saturated grading to wet.
30					**EOB @ 25 ft-bg**

Notes:
N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**MW-3/SB-12**
		Sheet 1	**of 1**
Site:	**S&C Tietelbaum**	**Drilling Method:**	Geoprobe
Date:	**9/3/2014**	**Soil Sampling Method:**	4' Macro-core
Weather:	**Cloudy, mid 80 deg-F**		
Observer:	**Alana Carroll**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	GW Monitoring Well Intervals	Soil Description
5	0	60%		2" PVC Casing (0-16)	**0-0.5:** CONCRETE. **0.5-5:** Brown, fine SAND (micaceous), some silt.
10	0	80%			**5-6:** Brown to tan, fine SAND, some clay, trace gravel. **6-8:** Brown, fine silty SAND, some mica. **8-10:** Brown to tan, fine silty SAND, some clay, trace gravel.
15	0	80%			**10-11:** Brown, medium to fine SAND, some clay, trace gravel. **11-13:** Brown, fine silty SAND, some mica. **13-15:** Brown to tan, fine silty SAND, some clay, trace gravel.
20	1.5	100%	SB-12 (16-18) SB-12 (18-20)	Screen (16-26)	**15-16:** Brown, fine sandy SILT (micaceous). **16-16.5:** Weathered ROCK (schist) intermixed with cobbles and coarse to medium sand. **16.5-20:** Brown to green silty SAND, moist grading to wet, some mica.
25					**EOB @ 20 ft-bg**
30					

Notes:
N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**MW-4/SB-13**
		Sheet 1	**of 1**
Site:	**S&C Tietelbaum**	**Drilling Method:**	Geoprobe
Date:	**9/3/2014**	**Soil Sampling Method:**	4' Macro-core
Weather:	**Cloudy, mid 80 deg-F**		
Observer:	**Alana Carroll**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	GW Monitoring Well Intervals	Soil Description
5	0	60%		2" PVC Casing (0-16)	**0-3:** Brown, medium to fine SAND, some gravel, 4" interval of crushed rock. **3-5:** Fine clayey SAND with intermixed medium to coarse sand.
10	0	50%			**5-10:** Brown, coarse, well graded SAND, trace fine sand, occassional interbedded fine sand lenses (micaceous).
15	0	60%	SB-13 (13-15)		**10-15:** Brown, coarse, well graded SAND with large cobbles and coarse to medium gravel, trace fine sand, occassional interbedded fine sand lenses (micaceous).
20	N/A	0%		Screen (16-26)	**15-20:** No recovery.
25	3.6	20%	SB-13 (24-25)		**20-25:** Sand collapsed from above. Bottom is brown, fine SAND and SILT, micaceous, wet.
30					**EOB @ 25 ft-bg**

Notes:
N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**SB-14**
		Sheet 1	**of 1**
Site:	**S&C Tietelbaum**	**Drilling Method:**	Geoprobe
Date:	**9/2/2014**	**Soil Sampling Method:**	4' Macro-core
Weather:	**Cloudy, mid 80 deg-F**		
Observer:	**Alana Carroll**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
5	35.0	27%		**0-5:** FILL (concrete, brick).
10	3.2 0	100%		**5-10:** FILL, grades to brown, fine SAND, some coarse to medium sand.
15	60.0 0.7 0	80%	SB-14 (11-13)	**10-10.5:** Crushed ROCK and FILL. **10.5-12:** Brown, medium to fine SAND, some gravel and mica. **12-13.5:** Brown, coarse to fine SAND and medium to fine GRAVEL. **13.5-15:** Dark brown, coarse to fine SAND (micaceous) and COBBLES, some gravel and silt.
20	33.0 37.0 0	42%		**15-16:** Dark brown, coarse to fine SAND, grades to brown, fine SAND, some coarse gravel and fill. **16-17:** FILL (crushed rock and brick). **17-20:** Crushed ROCK (quartzite at top, schist at bottom) with intemixed cobbles, some silt.
23.5	55.0 12.0	100%	SB-14 (20-23)	**20-23.5:** Brown, fine SAND and SILT (micaceous), wet/saturated, bottom 6" contains trace clay.
25				**EOB @ 23.5 ft-bg**

Notes:

N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**SB-15/MW-5**
		Sheet 1	**of 1**
Site:	**S&C Tietelbaum**	**Drilling Method:**	Geoprobe
Date:	**7/19/2016**	**Soil Sampling Method:**	2" Macro-core
Weather:	**Sunny, mid 80 deg-F**		
Observer:	**Jordan Junion**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	GW Monitoring Well Intervals	GW Sample	Soil Description
5	0 0 0 0 0	100%		2" PVC Casing (0-16)		**0-0.2:** Concrete. **0.2-5:** Brown, medium to fine SAND, loose, moist, nonplastic, noncohesive, some large to small gravel.
10	0 0 0 0 0	80%				**5-7.5:** Light brown, fine SAND, loose, moist, nonplastic, noncohesive, some silt, trace gravel and roots. **7.5-10:** Brown, fine silty SAND, dense, moist, nonplastic, noncohesive, some small gravel.
15	0 0 0 0 0	60%				**10-10.2:** Brown, fine silty SAND, dense, moist, nonplastic, noncohesive, some small gravel. **10.2-13.5:** Brown, medium to fine SAND, loose, moist, nonplastic, noncohesive, trace small to large gravel. **13.5-15:** Brown silty SAND, dense, moist, nonplastic, noncohesive, some silt.
20	0 0 0 0 0	63%	MW-5 (19-26)	Screen (16-26)	MW-5	**15-18.5:** Brown, fine SAND, medium dense, moist, nonplastic, noncohesive, some medium sand and silt. **18.5-18.75:** Medium brown SILT with fine sand, wet, nonplastic, noncohesive, few fine sand. **18.75-19.25:** Brown, fine SAND, medium dense, wet, nonplastic, noncohesive, some silt. **19.25-20:** Brown SILT, stiff, wet, nonplastic, noncohesive, some sand.
25	0 0 0 0 0	100%				**20-21.8:** Brown, fine silty SAND, dense, wet, nonplastic, noncohesive. **21.8-22.2:** Brown SILT, stiff, wet, nonplastic, noncohesive, some fine sand. **22.2-23:** Fine SAND, medium dense, wet, nonplastic, noncohesive. **23-25:** Brown to gray, fine SAND, dense, wet, nonplastic, noncohesive, some silt and clay, trace iron concentrations at 24-25 ft-bg.
30	0 0 0 0 0	47%				**25-30:** Brown to gray, medium to fine SAND, medium dense, wet, nonplastic, noncohesive, some silt. **EOB @ 30 ft-bg**

Notes:
N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**SB-16/MW-6**
		Sheet 1	**of 1**
Site:	**34-45 35th Street, Queens, NY**	**Drilling Method:**	Geoprobe
Date:	**11/2/2017**	**Soil Sampling Method:**	Acetate Liners
Weather:	**Cloudy, mid 60 deg-F**		
Observer:	**Michael Briscoe**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	GW Monitoring Well Intervals	GW Sample	Soil Description
5	0 0 0 0 0	100%		2" PVC Casing (0-19.17)		**0-5:** Medium to light brown, coarse to fine SAND, trace gravel, dry, loose.
10	0 0 0 0 0	50%				**5-10:** Light gray, coarse to fine SAND, medium dense.
15	0 0 0 0 0	60%				**10-15:** Medium gray to medium brown silty SAND, transitions to SILT with coarse sand at 11'.
20	0 0 0 0 0	75%			MW-6	**15-20:** Light brown to medium gray, fine SAND, trace silt, moist to wet. DTW = 17 ft-bg
25	0 0 0 0 0	80%		Screen (19.17-30.17)		**20-25:** Light brown to medium gray, fine SAND, trace silt, wet.
30	0 0 0 0 0.2	60%	MW-6S (29-30)			**25-30:** Coarse GRAVEL, trace coarse to fine sand, wet.
32	0.1 0.1	40%	MW-6S (31-32)			**30-32:** Coarse SAND with gravel, trace silt, wet, loose.
35						**EOB @ 32 ft-bg due to refusal, likely from bedrock**

Notes:
N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**SB-17/MW-7**
		Sheet 1	**of** 1
Site:	**34-45 35th Street, Queens, NY**	**Drilling Method:**	Geoprobe
Date:	**11/2/2017**	**Soil Sampling Method:**	Acetate Liners
Weather:	**Cloudy, mid 60 deg-F**		
Observer:	**Michael Briscoe**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	GW Monitoring Well Intervals (Shallow Well)	GW Monitoring Well Intervals (Deep Well)	GW Sample	Soil Description
5	0 1.5 1.9 1.0 3.9	100%		2" PVC Casing (0-18)	2" PVC Casing (0-29)		**0-5:** Medium brown, fine to coarse silty SAND, dry, loose.
10	0 2.7 70.1 117.6 113.0	60%					**5-10:** Medium brown, fine to coarse silty SAND, dry, loose.
15	36.4 28.5 96.6 61.1 156.6	60%					**10-15:** Fine to coarse SAND, trace silt and broken schist, dry, loose.
20	42.7 65.9 274.5 363.5 292.0	60%	MW-7 SB-17 18-19	Screen (18-29.66)		MW-7S	**15-17:** Fine to coarse SAND, trace silt and broken schist, dry, loose. **17-20:** Light to medium gray SILT with fine sand, trace coarse gravel, strong odor, visible impacts. DTW = 19 ft-bg
25	141.0 206.0 35.2 19.6 117.2	80%	MW-7 SB-17 20-21			MW-7D	20-25: Medium gray SILT, trace coarse to fine sand, saturated, strong odor. Transitions to fine to coarse silty SAND at 24 ft-bg.
30	92.3 109.5 26.2 28.6 32.4	40%					**25-28:** Medium gray, coarse to fine silty SAND, saturated, strong odor. **28-30:** Dark gray SILT, trace coarse sand and coarse gravel, broken rock, moist, strong odor.
35	52.5 30.5 26.8 6.3 4.5	60%			Screen (29-39.83)		**30-33:** Dark gray SILT, trace coarse sand and coarse gravel, broken rock, moist, no odor. **33-35:** Varying colors, coarse SAND, trace silt, moist, strong odor.
40	12.1 2.5 1.7 7.7 1.2	90%					**35-40:** Fine to coarse SAND, trace silt and gravel, saturated, dense.
45							**EOB @ 40 ft-bg**

Notes:
N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**SB-18**
		Sheet 1	**of 1**
Site:	**34-45 35th Street, Queens, NY**	**Drilling Method:**	Geoprobe
Date:	**11/6/2017**	**Soil Sampling Method:**	Acetate liners
Weather:	**Overcast, mid 50 deg-F**		
Observer:	**Michael Briscoe**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
5	0 0 0 0 0.3	100%		**0-5:** Black to medium brown, coarse SAND and GRAVEL.
10	1.8 2.4 3.7 3.1 5.0	50%		**5-10:** Medium brown, coarse SAND, trace silt, broken C&D material throughout, dry.
15	12.1 9.8 15.6 14.4 14.5	40%		**10-15:** Medium brown, coarse to fine SAND, trace silt and broken rock, dry, mild odor.
20	11.1 12.1 32.5 56.8 212.3	40%	SB-18 (19-20)	**15-18:** Medium brown, coarse to fine SAND, trace silt and broken rock, dry, mild odor. **18-20:** Dark gray, coarse SAND, dry, strong odor, visible impacts.
25	5.5	10%	SB-18 (21-22)	**20-25:** Medium brown, coarse SAND, dry, loose.
30	4.8 0.7 0.9 0.4 0.1	60%		**25-30:** Dark gray to brown, SILT with fine to coarse sand, saturated.
35				**EOB @ 30 ft-bg**

Notes:

N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL					
				Boring No.	**SB-19**
				Sheet 1	**of 1**
Site:	**34-45 35th Street, Queens, NY**			**Drilling Method:**	Geoprobe
Date:	**11/6/2017**			**Soil Sampling Method:**	Acetate liners
Weather:	**Overcast, mid 50 deg-F**				
Observer:	**Michael Briscoe**			**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
	0			**0-5:** Medium brown/gray, coarse SAND, broken rock and C&D throughout.
	0.8			
	0.6	100%		
	0.9			
5	3.5			
	1.5			**5-6:** Broken rock.
	15.7			
	62.3	50%		**6-9:** Medium to light brown, SILT with coarse to fine sand, dry, medium dense.
	36.2			
10	40.8			**9-10:** Dark brown, coarse to fine SAND.
	26.5			**10-14:** Dark to light brown, coarse to fine SAND, trace silt and broken rock.
	14.4			
	130.8	70%		
	172.5			
15	369.9			**14-15:** Dark Gray, coarse SAND with broken rock.
	118.5			**15-20:** Light brown to gray, coarse to fine SAND with silt, trace gravel, loose.
	129.4			
	152.0	50%		
	1472.0			
20	1855.0			DTW = 20 ft-bg
	90.8			**20-24:** Medium gray to dark brown, fine to coarse SAND, trace silt and gravel, loose.
	172.0		SB-19 (21-22)	
	237.0	60%		
	19.8			
25	19.3			**24-25:** Medium brown, coarse to fine silty SAND, moist.
	0.6			**25-30:** Medium brown, coarse to fine silty SAND, moist. Transitions to SILT, trace fine sand, wet, dense.
	0.9			
	1.8	60%		
	3.7			
30	0.4			
				EOB @ 30 ft-bg
35				

Notes:

N/A - Not Applicable
SAA - Same as above

EOB - End of Boring
ft-bg - Feet Below Grade

PID - Photoionization Detector

DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL

		Boring No.	**SB-20**
		Sheet 1	**of 1**
Site:	**34-45 35th Street, Queens, NY**	**Drilling Method:**	Geoprobe
Date:	**11/6/2017**	**Soil Sampling Method:**	Acetate liners
Weather:	**Overcast, mid 50 deg-F**		
Observer:	**Michael Briscoe**	**Driller :**	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
	0			**0-5:** Coarse SAND with broken rock and C&D
	0			
	0	100%		
	0.3			
5	0.1			
	0.4			**5-10:** Dark to light brown to gray, broken ROCK with silty coarse sand, dry to moist.
	0.3			
	0.6	40%		
	0.4			
10	0.5			
	0.8			**10-15:** Medium to light brown to orange, coarse to fine SAND, trace coarse gravel.
	1.2			
	1.1	50%		
	3.5			
15	1.1			
	5.2			**15-18:** Medium brown, coarse to fine SAND, trace silt.
	12.9			
	4.3	50%		
	1784.0			**18-20:** Medium brown coarse to fine SAND with silt, trace broken rock, moist, strong odor, visual impacts.
20	1073.0		SB-20 (19-20)	
	70.5			**20-25:** Gray, coarse SAND, trace gravel and silt, saturated. Transitions to dark to medium gray SILT, stiff.
	1648.0		SB-20 (21-22)	
	35.0	75%		
	7.6			
25	0.2			
	9.2			**25-27:** Gray, coarse to fine SAND, trace gravel, moist, medium dense.
	5.7			
	1.9	70%		**27-30:** Medium brown SILT, trace fine sand, moist, stiff
	0.6			
30	4.4			
				EOB @ 30 ft-bg
35				

Notes:
N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL				Boring No.	SB-21
				Sheet 1	of 1
Site:	34-45 35th Street, Queens, NY			Drilling Method:	Geoprobe
Date:	11/6/2017			Soil Sampling Method:	Acetate liners
Weather:	Overcast, mid 50 deg-F				
Observer:	Michael Briscoe			Driller :	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
5	0 0 0 0 0	100%		**0-5:** Varying colors, silty SAND with coarse gravel.
10	0 0 0 0 0	60%		**5-10:** Varying colors, silty SAND with coarse gravel.
15	0 0 0 0 0	60%		**10-13:** Varying colors, silty SAND with coarse gravel. **13-15:** SILT, trace coarse sand and coarse gravel, moist to saturated.
20	0.4 0.9 3.5 6.8 1.1	60%	SB-21 (18-19)	**15-18:** SILT, trace coarse sand and coarse gravel, moist to saturated. **18-20:** Fine to coarse silty SAND, saturated. DTW = 19 ft-bg
25	0.6 0.5 0.1 0 0	20%	SB-21 (20-21)	**20-25:** Medium brown, silty SAND with coarse gravel, medium dense.
30	0 0 0 0 0	80%		**25-30:** Dark to medium gray SILT, trace fine sand, wet, medium stiff.
35				**EOB @ 30 ft-bg**

Notes:
N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

TENEN ENVIRONMENTAL					Boring No.	SB-22
					Sheet 1	of 1
Site:	34-45 35th Street, Queens, NY				Drilling Method:	Geoprobe
Date:	11/6/2017				Soil Sampling Method:	Acetate liners
Weather:	Overcast, mid 50 deg-F					
Observer:	Michael Briscoe				Driller :	AARCO Environmental

Depth (feet)	PID Reading (ppm)	Soil Recovery	Soil Samples	Soil Description
5	0 0 0 0 0	100%		**0-5:** Varying colors, SILT with sand, trace C&D, dry
10	0 0 0 0 0	50%		**5-10:** Varying colors, SILT with fine to coarse sand, trace C&D, dry.
15	0 0 0 0.2 0.1	50%		**10-12:** Varying colors, SILT with fine to coarse sand, trace C&D, dry. **12-15:** Gray, fine to coarse silty SAND, moist, medium dense.
20	0 0 0.8 0 0.4	60%	SB-22 (17-18) SB-22 (19-20)	**15-20:** Gray, fine to coarse silty SAND, moist, medium dense. DTW = 18-19 ft-bg
25	1.0 0 0 0 0	20%		**20-25:** Silty SAND, trace coarse gravel, wet, dense.
30	0 0 0 0 0	80%		**25-30:** Silty SAND, trave coarse gravel, wet, dense.
35				**EOB @ 30 ft-bg**

Notes:

N/A - Not Applicable
SAA - Same as above
EOB - End of Boring
ft-bg - Feet Below Grade
PID - Photoionization Detector
DTW = Depth to Water
GW = Groundwater

APPENDIX 4 – EXCAVATION WORK PLAN (EWP)

4-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the site's cover system, the site owner or their representative will notify the NYSDEC contacts listed in the table below. Table 4-1 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 1.

Table 4-1: Notifications*

Yildiz Palumbo, PE, NYSDEC Project Manager	(718) 482-4891, yildiz.palumbo@dec.ny.gov
Jane O'Connell, Regional Remediation Engineer	(718) 482-4599, jane.oconnell@dec.ny.gov
Kelly A. Lewandowski, P.E., Chief, Site Control Section	(518) 402-9543, kelly.lewandowski@dec.ny.gov
Stephen Lawrence, NYSDOH Project Manager	(518) 402-0450, stephen.lawrence@health.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, any modifications of truck routes, 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, and submittals (e.g., reports) to the NYSDEC documenting the completed intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP, 29 CFR 1910.120 and 29 CFR 1926 Subpart P;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix 7 of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with the required request to import form and all supporting documentation including, but not limited to, chemical testing results.

The NYSDEC project manager will review the notification and may impose additional requirements for the excavation that are not listed in this EWP. The alteration, restoration and modification of engineering controls must conform with Article 145 Section 7209 of the Education Law regarding the application professional seals and alterations.

4-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination) or a breach of the cover system. A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will perform the screening. 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 Sections 4-6 and 4-7 of this Appendix, respectively.

4-3 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.

4-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State 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. A site utility stakeout will be completed for all utilities prior to any ground intrusive activities at 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). Trucks transporting contaminated soil must have either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides.

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. Material accumulated from the street cleaning and egress cleaning activities will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

4-5 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 either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides. 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 are as follows: all trucks will exit the Site on 35th Street, which is a one-way street running south to north. Trucks will continue north on 35th Street for approximately one mile, then turn left onto Astoria Boulevard. From Astoria Boulevard, trucks will merge onto I-278 East, which is a truck through route. 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.

4-6 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 off-site in a permitted facility in accordance with all local, State 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 project manager. Unregulated off-site management of materials from this site will not occur without formal NYSDEC project manager 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, (e.g. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D debris recovery facility). Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include, but will not be limited to: 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 consistent with 6 NYCRR Parts 360, 361, 362, 363, 364 and 365. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6 NYCRR Subpart 361-5 registered or permitted facility).

4-7 MATERIALS REUSE ON-SITE

The qualified environmental professional, as defined in 6 NYCRR Part 375, will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material (i.e. contaminated) 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 the cover system or within landscaping berms. Contaminated on-site material may only be used beneath the site cover as backfill for subsurface utility lines with prior approval from the DEC project manager.

Proposed materials for reuse on-site must be sampled for full suite analytical parameters including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. The sampling frequency will be in accordance with DER-10 Table 5.4(e)10 unless prior approval is obtained from the NYSDEC project manager for modification of the sampling frequency. The analytical results of soil/fill material testing must meet the site use criteria presented in NYSDEC DER-10 Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil for all constituents listed, and the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances April 2023 guidance values. Approvals for modifications to the analytical parameters must be obtained from the NYSDEC project manager prior to the sampling event.

Soil/fill material for reuse on-site will be segregated and staged as described in Sections 4-2 and 4-3 of this EWP. The anticipated size and location of stockpiles will be provided in the 15-day notification to the NYSDEC project manager. Stockpile locations will be based on the location of site excavation activities and proximity to nearby site features. Material reuse on-site will comply with requirements of NYSDEC DER-10 Section 5.4(e)4. Any modifications to the requirements of DER-10 Section 5.4(e)4 must be approved by the NYSDEC project manager.

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 may only be reused on-site with written approval from the NYSDEC project manager.

4-8 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 off-site at a permitted facility 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.

4-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the RAWP. The existing cover system is comprised of a minimum of two- to six-inch thick concrete building slab that covers the entirety of the Site. All soil below the building slab is part of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP; therefore, a demarcation layer is not required. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP. The alteration, restoration and modification of engineering controls must conform with Article 145 Section 7209 of the Education Law regarding the application professional seals and alterations.

4-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional, as defined in 6 NYCRR Part 375, and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review. A copy of the form is presented in Appendix 13.

Material from industrial sites, spill sites, 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 6 NYCRR 375-6.7(d) and DER-10 Appendix 5 for commercial use. Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in Table 6.8(b). Soils that meet 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC project manager. Soil material will be sampled for the full suite of analytical parameters, including PFAS and 1, 4-dioxane. 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.

4-11 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.

4-12 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. The NYSDEC project manager will be promptly notified of the discovery.

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 (including 1,4-dioxane), TCL pesticides and PCBs, and PFAS], unless the site history and previous sampling results provide sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC project manager for approval prior to sampling. Any tanks will be closed as per NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone within two hours 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.

4-13 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan (CAMP) will comply with the NYSDOH Generic CAMP and OSHA standards for construction (29 CFR 1926). Continuous monitoring on the perimeter of the work zones for odor, VOCs, and dust will be required for all ground intrusive activities within the Site. Locations of air monitoring stations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least one downwind monitoring station. Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers. Appendix 8 includes the NYSDOH Generic CAMP.

4-13A: Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 part-per-million, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be pre-determined). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 micrograms per cubic meter, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 micrograms per cubic meter or less at the monitoring point.

- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

4-13B: Special Requirements for Indoor Work with Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under "Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures" except that in this instance "nearby/occupied structures" would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.

4-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site and on-site. Specific odor control methods to be used on a routine basis will include

monitoring open excavations with a photoionization detector. 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 remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

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.

4-15 DUST CONTROL PLAN

Particulate monitoring must be conducted according to the Community Air Monitoring Plan (CAMP) provided in Section [X]-13. If particulate levels at the site exceed the thresholds listed in the CAMP or if airborne dust is observed on the site or leaving the site, the dust suppression techniques listed below will be employed. The remedial party will also take measures listed below to prevent dust production on the site.

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 using 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.

4-16 OTHER NUISANCES

If necessary, 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.

APPENDIX 5 – FIELD SAMPLING PLAN

APPENDIX 5 – FIELD SAMPLING PLAN

The soil sampling methodology described below will be utilized prior to any petition to shut down the soil vapor extraction (SVE) system. The groundwater sampling methodology described below will be utilized during all quarterly post-remedial groundwater sampling events. The effluent sampling methodology described below will be utilized during the collection of effluent samples from the SVE system. The exterior soil vapor sampling methodology described below will be utilized during the collection of post-remedial soil vapor samples. The sub-slab soil vapor sampling methodology described below will be utilized prior to any petition to shut down the SVE system or active on- or offsite sub-slab depressurization systems (SSDSs). The indoor air sampling methodology described below will be utilized during the collection of on- and offsite post-remedial indoor air samples and prior to any petition to shut down the SVE system or active on- or offsite SSDSs. Separate work plans will also be submitted to NYSDEC and NYSDOH for review and approval prior to any sampling events to shut down the SVE system and on- or offsite SSDSs.

Soil

Soil samples will be collected prior to any petition to shut down the SVE system. Soil borings will be advanced by a direct push Geoprobe©. In general, select soil intervals will be screened between grade and the terminal depth of the boring. All non-disposable sampling equipment will be decontaminated between borings.

Soil from grade to the terminal depth of the boring will be screened for volatile organic compounds (VOCs) using a photoionization detector (PID) and geologically described using the Unified Soil Classification System, including documentation of observations regarding potential contamination such as odors, staining, etc. All descriptions and observations will be documented in a field notebook.

It is anticipated that one soil boring will be advanced within the soil source area in the northwestern portion of the Site to assess if the remedial goals of the SVE system have been met (i.e., chlorinated VOCs [cVOCs] in soil are reduced to below Protection of Groundwater Soil Cleanup Objectives). One sample will be collected from the boring at the interval of highest contamination detected during the Remedial Investigation within the vadose (unsaturated) zone

(5.5-7.5 feet below grade). Soil from the vadose zone will be sampled because this is the zone that was targeted for treatment by the SVE system.

All collected soil samples will be placed in pre-cleaned, pre-preserved laboratory provided sample bottles or En Core samplers (En Novative Technologies, Inc.), cooled to 4°C in the field, and transported under chain-of-custody command to the designated laboratory for analysis. All soil samples will be analyzed for cVOCs with a Category B deliverable package and sent to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory.

Groundwater

Prior to sample collection, static water levels will be measured and recorded from all monitoring wells in the post-remedial monitoring well network. Monitoring wells will also be gauged for the presence of light non-aqueous phase liquid (LNAPL). In the event that LNAPL is detected, Tenen will record the thickness and will not collect a groundwater sample. If LNAPL is not detected, Tenen will purge and sample monitoring wells using low-flow/minimal drawdown purge and sample collection procedures utilizing a peristaltic pump. Prior to sample collection, groundwater will be evacuated from each well at a low-flow rate (typically less than 0.1 liter/min [L/min]). Field measurements for pH, temperature, turbidity, dissolved oxygen, specific conductance, oxidation-reduction potential, and water level, as well as visual and olfactory field observations, will be periodically recorded and monitored for stabilization. Purging will be considered complete when pH, specific conductivity, dissolved oxygen, and temperature stabilize and when turbidity measurements fall below 50 Nephelometric Turbidity Units (NTU) or become stable above 50 NTU. If stabilization does not occur or the well has been purged and recovery cannot maintain the pace of low-flow purging, a sample will be collected and a notation will be made in the field book.

Stability is defined as variation between field measurements of ten percent of less and no overall upward or downward trend in the measurements. Upon stabilization of field parameters, groundwater samples will be collected and analyzed as discussed below.

Wells will be purged and sampled using dedicated pump tubing following low-flow/minimal drawdown purge and sample collection procedures, as described above. The pump will be decontaminated between samples and the tubing will be replaced.

Groundwater samples will be collected for laboratory analysis through dedicated tubing. Prior to, and immediately following collection of groundwater samples, field measurements for pH, specific conductance, temperature, dissolved oxygen, turbidity, and water level, as well as visual and olfactory field observations, will be recorded. All collected groundwater samples will be placed in pre-cleaned, pre-preserved laboratory provided sample bottles, cooled to 4°C in the field, and transported under chain-of-custody command to the designated laboratory for analysis.

Post-remedial groundwater sampling will be completed in accordance with the Site Management Plan (SMP). Post-remedial groundwater samples will be collected from four existing monitoring wells quarterly for a minimum of eight quarters. Post-remedial groundwater sample locations are shown on Figure 6 of the SMP. All post-remedial groundwater samples will be analyzed for cVOCs with a Category B deliverable package and sent to an ELAP-certified laboratory.

Exterior and Sub-Slab Soil Vapor

Post-remedial exterior soil vapor samples will be collected from sidewalks surrounding the Site. Sub-slab soil vapor samples will be collected prior to any petition to shut down the SVE system or on- or offsite SSDSs in accordance with the New York State Department of Health (NYSDOH) *Guidance for Evaluating Soil Vapor Intrusion In the State of New York*, dated October 2006. All sub-slab soil vapor samples will be co-located with an indoor air sample. An effluent sample will be collected from the SVE system blower at system start up, three months following system start up, and at any restart of the system.

Exterior soil vapor samples will be collected from four newly installed soil vapor sampling points in sidewalks surrounding the Site. Sub-slab soil vapor samples will be collected from two newly installed pressure monitoring points in the foundation slab of the onsite building and from three newly installed pressure monitoring points in the foundation slab of the adjacent development. Prior to sampling, ambient air will be purged from the points by attaching ¼-inch diameter Teflon® tube to the VMP and attaching the surface end of the tube to an air valve and then to a vacuum pump. The vacuum pump will remove three volumes of air (volume of the sample probe and tube) prior to sample collection. The flow rate for both purging and sample collection will not exceed 0.2 liter per minute (L/min).

The exterior and sub-slab soil vapor samples will first be screened for organic vapors using

a PID. A tracer gas will be used in accordance with NYSDOH protocols to verify the integrity of the soil vapor probe seal. Helium will be used as the tracer gas and a bucket will serve to keep it in contact with the probe during testing. A portable monitoring device will be used to analyze a sample of soil vapor for the tracer prior to sampling. If the tracer sample results show a significant presence of the tracer, the probe seals will be adjusted to prevent infiltration.

A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, purge volumes, volume of the soil vapor extracted, vacuum of canisters before and after the samples are collected, apparent moisture content of the sampling zone, and chain of custody.

Exterior soil vapor samples will be collected in laboratory-supplied 2.7-liter Summa canisters using two-hour regulators. Sub-slab soil vapor samples and the effluent sample from the SVE system will be collected in laboratory-supplied 6-liter Summa canisters using eight-hour regulators. All exterior and sub-slab soil vapor sample containers and effluent sample containers will be appropriately labeled and closed. Chain-of-custody documents will be completed before shipment. All exterior and sub-slab soil vapor samples and effluent samples will be analyzed for volatile organic compounds (VOCs) using EPA Method TO-15 with a Category B deliverable package and sent to an ELAP certified laboratory.

Indoor Air

Post-remedial indoor air samples will be collected approximately three months following SSDS start up. Indoor air samples will be collected prior to any petition to shut down the SVE system and on- or offsite SSDSs in accordance with the NYSDOH *Guidance for Evaluating Soil Vapor Intrusion In the State of New York*, dated October 2006. All indoor air samples collected prior to any petition to shut down the SVE system or on- or offsite SSDSs will be co-located with a sub-slab soil vapor sample.

The indoor air samples will be collected from breathing height (three to five feet above the floor) from within the on- or offsite building. The sampling flow rate will not exceed 0.2 L/min. Sampling will occur for eight-hours in commercial structures. A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, identity of samplers, sampling methods and devices, vacuum of canisters before and after the samples are collected, apparent moisture content of the sampling zone, and chain-of-custody protocols.

Indoor air samples will be collected in laboratory-supplied 6-liter Summa canisters using eight-hour regulators. All indoor air sample containers will be appropriately labeled and closed. Chain-of-custody documents will be completed before shipment. All indoor air samples will be analyzed for VOCs by EPA Method TO-15 with a Category B deliverable package and sent to an ELAP certified laboratory.

APPENDIX 6 – QUALITY ASSURANCE PROJECT PLAN

Quality Assurance Project Plan

for
Teitelbaum Dry Cleaning, Inc.
Site Management Plan

35-45 35th Street
Queens, NY
Block 639, Lot 4
BCP Site # C241149

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B
625 Broadway, 12th Floor
Albany, NY 12233-7016

Prepared for:
S & C Properties, LLC
2 Bay Club Drive, Apt. 10G
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Prepared by:
TENEN ENVIRONMENTAL
121 West 27th Street, Suite 303
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December 2025

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1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been developed for the Site Management Plan (SMP) prepared for the Teitelbaum Dry Cleaning, Inc. property (the Site).

The Site, located at 35-45 35th Street in the Astoria section of Queens, New York is a rectangular-shaped parcel of land located on the eastern side of 35th Street, between 35th Avenue and 36th Avenue. The Site is bounded by 35th Street to the northwest, 36th Avenue to the south, 36th Street to the east, and 35th Avenue to the northeast.

The Site is currently occupied by a single-story, high-ceilinged commercial/manufacturing building (measuring approximately 100 ft x 100 ft). The ground floor of the building is currently utilized as a commercial dry cleaner not open to the public. The building is divided into two sections (north and south). A portion of the southern section contains a second floor that is used as an office and storage space. According to the New York City Department of Buildings (NYC DOB) records, in 1998 one 1,500-gallon fuel oil underground storage tank (UST) was abandoned in place and replaced with six 275-gallon aboveground storage tanks (ASTs). No documentation was available regarding the age, condition, period of usage, proper decommissioning, or any tightness testing associated with the abandoned UST. All six ASTs were set in secondary containment in the form of concrete enclosures. The ground floor of the building houses the majority of equipment and storage space. Equipment and storage on the ground floor includes numerous dry cleaning machines, fuel oil and chemical storage, dryers, washers, pressing stations, and clothing staging areas. The equipment and work areas combine to occupy much of the ground floor, leaving very little accessible space. There is a small sub-grade boiler room (measuring approximately 3 ft x 5 ft) located in the northernmost corner of the property containing a fuel oil-fired steam boiler, condensate tank, and sump.

1.1 Project Scope and QAPP Objective

The proposed scope of work includes the following:

- Collection of post-remedial groundwater samples from permanent groundwater monitoring wells;
- Collection of post-remedial indoor air samples;
- Collection of post-remedial soil vapor samples;
- Collection of soil vapor extraction (SVE) system blower effluent samples;
- Collection of subsurface soil samples prior to any petition to shut down the SVE system; and,
- Collection of sub-slab soil vapor and co-located indoor air samples prior to any petition to shut down the active sub-slab depressurization system (SSDS) or SVE system.

The objective of the QAPP is to detail the policies, organization, objectives, functional activities and specific quality assurance/quality control activities designed to achieve the data quality goals or objectives of the Site Management Plan. This QAPP addresses how the acquisition and handling of samples and the review and reporting of data will be documented for quality control (QC)

purposes. Specifically, this QAPP addresses the following:

- The procedures to be used to collect, preserve, package, and transport samples;
- Field data collection and record keeping;
- Data management;
- Chain-of-custody procedures; and,
- Determination of precision, accuracy, completeness, representativeness, decision rules, comparability and level of quality control effort.

2.0 PROJECT ORGANIZATION

The personnel detailed are responsible for the implementation of the QAPP. Tenen Environmental, LLC (Tenen) will implement the sampling outlined in the SMP on behalf of S & C Properties, LLC (the Participant).

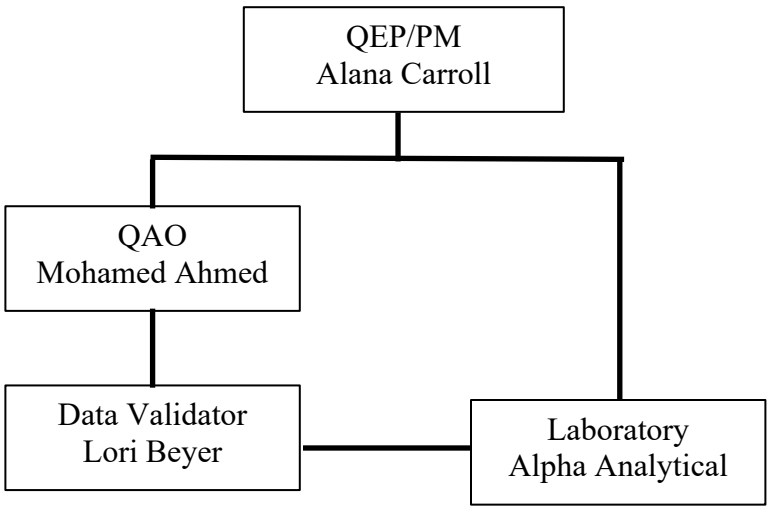
The Project Manager and Qualified Environmental Professional (QEP) will be Mrs. Alana Carroll, CPG, managing scientist at Tenen. Mrs. Carroll is a certified professional geologist with experience in all aspects of site assessment, development and implementation of remedial strategies. Her experience involves projects from inception through investigation, remediation and closure. Her expertise includes soil, soil vapor and groundwater remediation; remedial selection and design; field/health and safety oversight and preparation of work plans and reports to satisfy the requirements of various regulatory agencies. Mrs. Carroll received her BS in Geology from Hofstra University; her resume is included in Appendix A.

The Quality Assurance Officer will be Mohamed Ahmed, Ph.D., CPG, principal at Tenen. Dr. Ahmed is a certified professional geologist with over 20 years of experience in the New York City metropolitan area. He has designed and implemented subsurface investigations and is proficient in groundwater modeling, design of groundwater treatment systems, and soil remediation. He has managed numerous projects focused on compliance with the requirements of the New York State Brownfield Cleanup Program and spills programs and the New York City E-designation program. Dr. Ahmed also has extensive experience in conducting regulatory negotiations with the New York State Department of Environmental Conservation, the New York City Department of Environmental Protection, the NYC Office of Housing Preservation and Development, and the Mayor's Office of Environmental Remediation. Dr. Ahmed holds advanced degrees in geology and Earth and Environmental Sciences from Brooklyn College and the Graduate Center of the City University of New York; his resume is included in Appendix A.

In addition, Tenen will utilize subcontractors for laboratory services (Alpha Analytical of Westborough, MA) and data validation (L.A.B. Validation Corp. of East Northport, NY). The resume for the DUSR preparer, Ms. Lori Beyer, is included in Appendix A.

Contact Information
Remedial Party (S & C Properties, LLC), Andrea Pampillonio, 917.543.8513
Tenen Environmental, Alana Carroll or Mohamed Ahmed, 646.606.2332

An organization chart for the implementation of the Remedial Action Work Plan and QAPP is below.



3.0 SAMPLING AND DECONTAMINATION PROCEDURES

A detailed description of the procedures to be used during this program for collection of the soil, groundwater, soil vapor and indoor air samples is provided below. An Analytical Methods/Quality Assurance Summary is provided in Table 1, included in Section 3.11.

3.1 Level of Effort for QC Samples

Field blank, trip blank, field duplicate and matrix spike (MS) / matrix spike duplicate (MSD) samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs. Each type of QC sample is discussed below.

- Field and trip blanks consisting of distilled water will be submitted to the analytical laboratories to provide the means to assess the quality of the data resulting from the field-sampling program. Field (equipment) blank samples are analyzed to check for procedural chemical constituents that may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage.

- Duplicate samples are analyzed to check for sampling and analytical reproducibility.

- MS/MSD samples provide information about the effect of the sample matrix on the digestion and measurement methodology.

The general level of QC effort will be one field duplicate and one field blank for every 20 or fewer investigative samples of a given matrix. Additional sample volume will also be provided to the laboratory to allow one site-specific MS/MSD for every 20 or fewer investigative samples of a given matrix. One trip blank will be included along with each sample delivery group of volatile organic compound (VOC) samples. One equipment blank will be collected at a frequency of one per day that PFAS samples are collected for a given matrix.

The analytical laboratory, Alpha Analytical, is certified under the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) as Lab IDs 11148 and 11627. NYSDEC Analytical Services Protocol (ASP) Category B deliverables will be prepared by the laboratory.

QC samples (e.g., field blank, trip blank, field duplicate, and MS/MSD samples) will not be collected with soil vapor, indoor air, or ambient air samples.

3.2 Sample Handling

Samples will either be picked up by the laboratory, delivered to the laboratory in person by the sampler, or transported to the laboratory by overnight courier. All samples will be shipped to the laboratory to arrive within 48 hours after collection, and the laboratory will adhere to the analytical holding times for these analyses, as listed in the current version of the New York State ASP.

3.3 Custody Procedures

Sample custody will be controlled and maintained through the chain-of-custody procedures. The chain of custody is the means by which the possession and handling of samples is tracked from the site to the laboratory. Sample containers will be cleaned and preserved at the laboratory before shipment to the Site. The following sections (Sections 3.4 and 3.5) describe procedures for maintaining sample custody from the time samples are collected to the time they are received by the analytical laboratory.

3.4 Sample Storage

Samples will be stored in secure limited-access areas. Walk-in coolers or refrigerators will be maintained at 4°C, +/- 2°C, or as required by the applicable regulatory program. The temperatures of all refrigerated storage areas are monitored and recorded a minimum of once per day. Deviations of temperature from the applicable range require corrective action, including moving samples to another storage location, if necessary.

3.5 Sample Custody

Sample custody is defined by this QAPP as the following:

- The sample is in someone's actual possession;
- The sample is in someone's view after being in his or her physical possession;
- The sample was in someone's possession and then locked, sealed, or secured in a manner that prevents unsuspected tampering; or,
- The sample is placed in a designated and secured area.

Samples will be removed from storage areas by the sample custodian or laboratory personnel and transported to secure laboratory areas for analysis. Access to the laboratory and sample storage areas is restricted to laboratory personnel and escorted visitors only; all areas of the laboratory are therefore considered secure.

Laboratory documentation used to establish chain of custody and sample identification may include the following:

- Field chains of custody or other paperwork that arrives with the sample;
- Laboratory chain of custody;
- Sample labels or tags attached to each sample container;
- Sample custody seals;
- Sample preparation logs (i.e., extraction and digestion information) recorded in hardbound laboratory books, filled out in legible handwriting, and signed and dated by the chemist;
- Sample analysis logs (e.g., metals, GC/MS, etc.) information recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist;
- Sample storage log (same as the laboratory chain of custody); and,

- Sample disposition log, which documents sample disposal by a contracted waste disposal company.

3.6 Sample Tracking

All samples will be maintained in the appropriate coolers prior to and after analysis. Laboratory analysts will remove and return their samples, as needed. Samples that require internal chain of custody procedures will be relinquished to the analysts by the sample custodians. The analyst and sample custodian will sign the original chain of custody relinquishing custody of the samples from the sample custodian to the analyst. When the samples are returned, the analyst will sign the original chain of custody returning sample custody to the sample custodian. Sample extracts will be relinquished to the instrumentation analysts by the preparatory analysts. Each preparation department will track internal chain of custody through their logbooks/spreadsheets.

Any change in the sample during the time of custody will be noted on the chain of custody (e.g., sample breakage or depletion).

3.7 Soil Sampling

Soil samples will be collected prior to any petition to shut down the soil vapor extraction (SVE) system. Soil borings will be advanced by a direct push Geoprobe©. In general, select soil intervals will be screened between grade and the terminal depth of the boring. All non-disposable sampling equipment will be decontaminated between borings, as described in Section 3.12.

Soil from grade to terminal depth of the boring will be scanned for volatile organic compounds (VOCs) using a photoionization detector (PID) and geologically described using the Unified Soil Classification System, including documentation of observations regarding potential contamination such as odors, staining, etc. All descriptions and observations will be documented in a field notebook.

It is anticipated that one soil boring will be advanced within the soil source area in the northwestern portion of the Site to assess if the remedial goals of the SVE system have been met (i.e., chlorinated VOCs [cVOCs] in soil are reduced to below Protection of Groundwater Soil Cleanup Objectives). One sample will be collected from the boring at the interval of highest contamination detected during the Remedial Investigation within the vadose (unsaturated) zone (5.5-7.5 feet below grade).

All collected soil samples will be placed in pre-cleaned, pre-preserved laboratory provided sample bottles or En Core samplers (En Novative Technologies, Inc.), cooled to 4°C in the field, and transported under chain-of-custody command to the designated laboratory for analysis.

All soil samples will be analyzed for cVOCs with a Category B deliverable package.

3.8 Quarterly Groundwater Sampling

Prior to sample collection, static water levels will be measured and recorded from all monitoring wells in the post-remedial monitoring well network. Monitoring wells will also be gauged for the presence of light non-aqueous phase liquid (LNAPL). In the event that LNAPL is detected, Tenen will record the thickness and will not collect a sample. If LNAPL is not detected, Tenen will purge and sample monitoring wells using low-flow/minimal drawdown purge and sample collection procedures (peristaltic pump). Prior to sample collection, groundwater will be evacuated from each well at a low-flow rate (typically less than 0.1 L/min). Field measurements for pH, temperature, turbidity, dissolved oxygen, specific conductance, oxidation-reduction potential and water level, as well as visual and olfactory field observations, will be periodically recorded and monitored for stabilization. Purging will be considered complete when pH, specific conductivity, dissolved oxygen and temperature stabilize and when turbidity measurements fall below 50 Nephelometric Turbidity Units (NTU) or become stable above 50 NTU. If stabilization does not occur or the well has been purged and recovery cannot maintain the pace of low flow purging, a sample will be collected and a notation will be made in the field book.

Stability is defined as variation between field measurements of 10 percent or less and no overall upward or downward trend in the measurements. Upon stabilization of field parameters, groundwater samples will be collected and analyzed as discussed below.

Wells will be purged and sampled using dedicated pump tubing following low-flow/minimal drawdown purge and sample collection procedures, as described above. The pump will be decontaminated between samples and the tubing will be replaced.

Groundwater samples will be collected for laboratory analysis through dedicated tubing. Prior to, and immediately following collection of groundwater samples, field measurements for pH, specific conductance, temperature, dissolved oxygen, turbidity and depth-to-water, as well as visual and olfactory field observations will be recorded. All collected groundwater samples will be placed in pre-cleaned, pre-preserved laboratory provided sample bottles, cooled to 4°C in the field, and transported under chain-of-custody command to the designated laboratory for analysis.

Post-remedial groundwater sampling will be completed in accordance with the Site Management Plan (SMP). Post-remedial groundwater samples will be collected from four existing monitoring wells quarterly for a minimum of eight quarters. Post-remedial groundwater sample locations are shown on Figure 6 of the SMP.

All post-remedial groundwater samples will be analyzed for cVOCs with a Category B deliverable package.

3.9 Sub-slab and Exterior Soil Vapor Sampling Methodology

All sub-slab and exterior soil vapor samples will be collected in accordance with the NYSDOH Soil Vapor Guidance prior to any petition to shut down the SSDS. All sub-slab soil vapor samples will be co-located with an indoor air sample. All exterior soil vapor samples will be collected without a co-located indoor air sample. An effluent sample will be collected from the soil vapor

extraction (SVE) system blower at system start up, three months following system start up, and at any restart of the system.

Sub-slab soil vapor samples will be collected from two newly installed pressure monitoring points in the foundation slab of the onsite building and from three newly installed pressure monitoring points in the foundation slab of the adjacent development. Exterior soil vapor samples will be collected from four newly installed soil vapor sampling points in sidewalks surrounding the Site. Prior to sampling, ambient air will be purged from the sampling points by attaching ¼-inch diameter Teflon® tube to the point and attaching the surface end of the tube to an air valve and then to a vacuum pump. The vacuum pump will remove three volumes of air (volume of the sample probe and tube) prior to sample collection. The flow rate for both purging and sample collection will not exceed 0.2 liter per minute (L/min).

The sub-slab and exterior soil vapor samples will first be screened for organic vapors using a photoionization detector (PID). A tracer gas will be used in accordance with NYSDOH protocols to verify the integrity of the soil vapor probe seal. Helium will be used as the tracer gas and a bucket will serve to keep it in contact with the probe during testing. A portable monitoring device will be used to analyze a sample of soil vapor for the tracer prior to sampling. If the tracer sample results show a significant presence of the tracer, the probe seals will be adjusted to prevent infiltration.

A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, purge volumes, volume of the soil vapor extracted, vacuum of canisters before and after the samples are collected, apparent moisture content of the sampling zone, and chain of custody.

Sub-slab soil vapor samples and the effluent sample from the SVE system will be collected in laboratory-supplied 6-liter Summa canisters using eight-hour regulators. Exterior soil vapor samples will be collected in laboratory-supplied 2.7-liter Summa canisters using two-hour regulators. All sub-slab exterior soil vapor sample containers and effluent sample containers will be appropriately labeled and closed. Chain-of-custody documents will be completed before shipment. All sub-slab soil vapor, exterior soil vapor, and effluent samples will be analyzed for volatile organic compounds (VOCs) using EPA Method TO-15 with a Category B deliverable package and sent to an ELAP certified laboratory.

3.10 Indoor Air Sampling Methodology

All indoor air samples will be collected in accordance with the NYSDOH Soil Vapor Guidance. Post-remedial indoor air samples collected approximately three months following SSDS startup at the onsite building and adjacent development will not be co-located with sub-slab soil vapor samples. All indoor air samples collected prior to petition shutdown of the SVE system or on- or offsite SSDSs will be co-located with a sub-slab soil vapor sample.

The indoor air samples will be collected from breathing height (three to five feet above the floor) from within the Site building. The sampling flow rate will not exceed 0.2 L/min. Sampling will

occur for eight hours in commercial structures. A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, identity of samplers, sampling methods and devices, vacuum of canisters before and after the samples are collected, apparent moisture content of the sampling zone, and chain-of-custody protocols.

Indoor air samples will be collected during the heating season in laboratory-supplied 6-liter Summa canisters using eight-hour regulators in commercial structures. Indoor air samples will be analyzed for VOCs using EPA Method TO-15 and sent to an ELAP certified laboratory.

3.11 Analytical Methods/Quality Assurance Summary Table

A summary of the analytical methods and quality assurance methods are included in Table 1, below.

Table 1
Analytical Methods/Quality Assurance Summary

Matrix	Proposed Samples	QA/QC Samples					Total # Samples	Analytical Parameter	Method	Preservative	Holding Times	Container
		TB	FB	DUP	MS/MSD	EB						
Soil	1 (per sampling event)	1	1	1	1 / 1	0	6	cVOCs	8260C	Cool to 4°C, No Headspace	14 days to analysis	(3) Encore samplers, and; (1) 2-oz plastic bottle
Groundwater	4 (per quarterly sampling event)	1	1	1	1 / 1	0	9	cVOCs	8260C	Cool to 4°C, pH<2 with HCl	14 days to analysis	(3) 40 mL amber glass vials
Exterior Soil Vapor	4	0	0	0	0	0	4	VOCs	TO-15	None	30 days	(1) 2.7-L Summa
SVE System Effluent	1 (per sampling event)	0	0	0	0	0	1	VOCs	TO-15	None	30 days	(1) 6-L Summa
Sub-Slab Soil Vapor (Onsite)	2 (per sampling event)	0	0	0	0	0	2	VOCs	TO-15	None	30 days	(1) 6-L Summa
Sub-Slab Soil Vapor (Offsite)	3 (per sampling event)	0	0	0	0	0	3	VOCs	TO-15	None	30 days	(1) 6-L Summa
Indoor Air (Onsite)	2 (per sampling event)	0	0	0	0	0	2	VOCs	TO-15	None	30 days	(1) 6-L Summa
Indoor Air (Offsite)	3 (per sampling event)	0	0	0	0	0	3	VOCs	TO-15	None	30 days	(1) 6-L Summa
Ambient Air	1 (per sampling event)	0	0	0	0	0	1	VOCs	TO-15	None	30 days	(1) 6-L Summa

TB – Trip Blank
FB – Field Blank
DUP – Duplicate
EB – Equipment Blank
°C – degrees Celsius
mL – milliliter
L – liter

3.12 Decontamination

Where possible, samples will be collected using new, dedicated sampling equipment so that decontamination is not required. All non-dedicated drilling tools and equipment will be decontaminated between boring locations using potable tap water and a phosphate-free detergent (e.g., Alconox) and/or a steam cleaner. All non-dedicated sampling equipment will also have a final rinse with deionized water. Decontamination water will be collected and disposed as investigation-derived waste (IDW).

3.13 Data Review and Reporting

The NYSDEC ASP Category B data package will be validated by an independent data validation subconsultant and a DUSR summarizing the results of the data validation process will be prepared. All reported analytical results will be qualified as necessary by the data validation and will be reviewed and compared against background concentrations and/or applicable New York State criteria:

Soil – Protection of Groundwater Soil Cleanup Objectives (SCOs) as listed in 6NYCRR Part 375;
Groundwater – Class GA groundwater standards and guidance values for groundwater as listed in NYSDEC Technical and Operations Guidance Series (TOGS) 1.1.1;
Exterior Soil Vapor – Ambient air concentrations; and,
Sub-Slab Soil Vapor and Co-Located Indoor Air – NYSDOH Matrices and Air Guideline Values (AGVs) (AGVs will be compared to indoor air samples only).

All end-point and indoor air analytical results will be documented in the Periodic Review Report (PRR) for that reporting period, and will describe Site conditions and document applicable observations made during the sample collection. In addition, the PRR will include a description of the sampling procedures, tabulated sample results and an assessment of the data and conclusions. The laboratory data packages, DUSR, and field notes will be included in the PRR as appendices. All data will also be submitted electronically to NYSDEC via the Environmental Information Management System (EIMS) in EqUIS format.

Appendix A

Resumes

Matthew Carroll, P.E.
Environmental Engineer/Principal

Experience Summary

Matthew Carroll is an environmental engineer experienced in all aspects of site assessment and development and implementation of remedial strategies. He has managed projects from inception through investigation, remediation and closure. His expertise includes soil, soil gas, and groundwater remediation, preparation of cost estimates, remedial alternative selection and design, soil characterization for disposal, field safety oversight, and preparation of work plans and reports to satisfy New York and New Jersey state requirements, and New York City "e" designation and restrictive declarations. Mr. Carroll's project management experience includes past management of a New York City School Construction Authority hazardous materials contract. He is responsible for all engineering work performed by Tenen and is currently the project manager and remedial engineer for several New York State Brownfield Cleanup Program sites.

Selected Project Experience

470 Kent Avenue, Brooklyn
As project manager, supported the client in due diligence and transactional activities, including a Phase I ESA, preliminary site investigation, and remedial cost estimate; preparation of BCP application and remedial investigation work plan. The former manufactured gas plant, sugar refinery and lumberyard will be developed as a mixed-use project with market rate and affordable housing and public waterfront access. As remedial engineer, will be responsible for development of remedial alternatives and oversight and certification of all remedial activities.

500 Exterior Street, Bronx
Designed and implemented the investigation of this former lumberyard and auto repair shop that will be redeveloped as mixed use development with an affordable housing component; prepared BCP application and subsequent work plans and reports. Designed a remedial strategy incorporating both interim remedial measures (IRMs) and remediation during the development phase.

Gateway Elton I and II, Brooklyn
Conducted soil disposal characterization, prepared Remedial Action Work Plans and designed methane mitigation systems for two phases of a nine-building residential development and commercial space; prepared and oversaw implementation of a Stormwater Pollution Prevention Plan during construction and prepared and certified the remedial closure reports for the project.

Affordable Housing Development, Rye, NY
Consultant to the City of Rye on environmental issues pertaining to a county-owned development site slated for an afford senior housing; reviewed environmental documentation for the project and prepared summary memorandum for City Council review; recommended engineering controls to address potential exposure to petroleum constituents, presented report findings at public meetings and currently providing ongoing environmental support during project implementation.

Queens West Development BCP Site, Long Island City, New York
Assistant Project Manager for two developers involved in the site.

- Responsible for oversight of remediation under the New York State Brownfield Cleanup Program
- Technical review of work plans and reports and coordination of the Applicant's investigation and oversight efforts
- Provided input for mass calculations and well placement for an in-situ oxidation remedy implemented on a proposed development parcel and within a City street
- Conducted technical review of work pertaining to a former refinery. Documents reviewed included work plans for characterization and contaminant delineation; pilot test (chemical oxidation); remediation (excavation and groundwater treatment). Managed field personnel conducting full time oversight and prepared progress summaries for distribution to project team
- Following implementation of remedial action, implemented the Site Management Plan and installation/design of engineering controls (SSDS, vapor barrier/concrete slab, NAPL recovery). Also responsible for coordination with NYSDEC

Brownfield Cleanup Program Redevelopment Sites – West Side, New York City
Managed remediation of a development consisting of four parcels being addressed under one or more State and city regulatory programs (NYS Brownfield Cleanup Program, NYS Spills, and NYC "e" designation program). Remediation includes soil removal, screening and disposal; treatment of groundwater during construction dewatering and implementation of a worker health and safety plan and community air monitoring plan (HASP/CAMP)

Managed an additional BCP site, supported the Applicant in coordination with MTA to create station access for the planned No. 7 subway extension; also provided support the client in coordination with Amtrak to obtain access for remedial activities on the portion of the site that is within an Amtrak easement. The site will eventually be used for construction of a mixed-use high-rise building.

BCP Site, Downtown Brooklyn, New York
Performed investigation on off-site properties and designed an SSDS for an adjacent building, retrofitting the system within the constraints of the existing structure; coordinated the installation of the indoor HVAC controls and vapor barrier; provided input to the design of a SVE system to address soil vapor issues on the site.

West Chelsea Brownfield Cleanup Program Site
Designed an in-situ remediation program and sub-slab depressurization system to address contamination remaining under the High Line Viaduct; SSDS design included specification of sub-grade components, fan modeling and selection, identifying exhaust location within building constraints and performance modeling; prepared the Operations Maintenance and Monitoring Plan and Site Management Plan sections pertaining to the SSDS.

Historic Creosote Spill Remediation – Queens, New York – New York State Voluntary Cleanup Program
Modeled contamination volume and extent and prepared mass estimates of historic fill constituents and creosote-related contamination; designed a soil vapor extraction (SVE) and dewatering system to address historic creosote release both above and below static

water table; coordinated with the Metropolitan Transit Authority and prepared drawings to secure approval to drill in the area of MTA subway tunnels.

NYSDEC Spill Site– Far West Side, Manhattan
Provided support to client during negotiations with a major oil company regarding allocation of remedial costs. Worked with client's attorney to develop a regulatory strategy to address the client's obligations under the NYSDEC Spills Program and the New York City "e" designation requirements.

Affordable Housing Site, Brooklyn, New York
Modified prior work plans for soil, soil vapor and groundwater investigation to address requirements for site entry into the New York City Brownfield Cleanup Program. Prepared technical basis for use of prior data previously disallowed by OER. Currently conducting site investigation.

New York City School Construction Authority Hazardous Materials Contract
Provided work scopes and cost estimates, managed and implemented concurrent projects, including Phase I site assessments, Phase II soil, groundwater and soil gas investigations, review of contractor bid documents, preparation of SEQR documents, specifications and field oversight for above- and underground storage tank removal, and emergency response and spill control.

Former Manufacturing Facility, Hoboken, New Jersey
Evaluated site investigation data to support a revision of the current property use to unrestricted; modified the John & Ettinger vapor intrusion model to apply the model to a site-specific, mixed use commercial/residential development; implemented a Remedial Action Work Plan that included the characterization, removal and separation of 9,500 cubic yards of historic fill; designed and implemented a groundwater characterization/delineation program using a real-time Triad approach; designed and implemented an innovative chemical oxidation technology for the property.

F**ormer Varnish Manufacturer – Newark, New Jersey**
Prepared a Phase I environmental site assessment; implemented soil and groundwater sampling to assess presence of petroleum and chlorinated compounds; prepared alternate cost remediation scenarios for settlement purposes and implemented a groundwater investigation plan, including pump tests and piezometer installation to assess the effect of subsurface utilities and unique drainage pathways upon contaminant transport.

Education and Certifications

Professional Engineer, New York
Bachelor of Engineering, Environmental; Stevens Institute of Technology, 2002
Bachelor of Science, Chemistry, New York University, 2002
Technical and Regulatory Training in Underground Storage Tanks, Cook College, Rutgers University, 2006

Mohamed Ahmed, Ph.D., C.P.G.
Sr. Geologist/Principal

Experience Summary

Mohamed Ahmed is a certified professional geologist with nearly 23 years of experience in the New York City metropolitan area. He has designed and implemented subsurface investigations and is proficient in groundwater modeling, design of groundwater treatment systems and soil remediation. He has managed numerous projects focused on compliance with the New York State Brownfield Cleanup and Spills programs and the New York City "e" designation program. Dr. Ahmed also has extensive experience in conducting regulatory negotiations with the New York State Department of Environmental Conservation, the NYC Office of Housing Preservation and Development, and the Mayor's Office of Environmental Remediation.

Selected Project Experience

Willoughby Square, Downtown Brooklyn
As Project Manager, directs all regulatory interaction and investigation on this joint public-private sector redevelopment that will include a public park and four-level underground parking garage. Prepared the remedial investigation work plan and remedial action work plan, conducted investigation activities and waste characterization, and negotiated with the NYC Department of Environmental Protection and the Mayor's Office of Environmental Remediation to transition the site into the NYC Voluntary Cleanup Program.

School Facility, Borough Park, Brooklyn
Managed all regulatory agency coordination, work plan and report preparation and remedial oversight; worked with OER to determine measures to retroactively address the hazardous materials and air quality E-designations on a previously constructed school building and prepared supporting documentation to justify the use of electrical units rather than natural gas.

LGA Hotel Site, East Elmhurst, Queens
Project manager for all work conducted at this former gasoline service station which is being remediated under the NYS Brownfield Cleanup Program; technical oversight of work plans, reports, and design and implementation of field and soil disposal characterization.

436 10th Avenue, Manhattan
As project manager and technical lead, assisted client in developing remedial cost estimates used for property transaction, developed regulatory strategy to address NYS Spills and NYC E-designation requirements, and currently overseeing remedial activities which include removal and disposal of petroleum-contaminated bedrock and dewatering and disposal of impacted groundwater.

Brownfield Cleanup Program Site, Downtown Brooklyn
Managed investigation and remediation under the BCP program for a proposed mixed-use development; designed the remedial investigation and prepared the remedial action work plan which includes an SVE system monitored natural attenuation. Prepared remedial cost

estimates for several scenarios. The project will include a 53-story mixed-use structure and parking garage.

Queens West Development, Long Island City
Directed project team and subcontractors for soil investigation/remediation studies on multiple properties; provided technical support for negotiations with NYSDEC during investigation and remediation.

Former Creosote Site, Long Island City
Designed and implemented a complex investigation to assess the nature and extent of historic creosote contamination at this former industrial site; conducted studies to optimize recovery of LNAPL and DNAPL and developed strategies using bioremediation and natural attenuation in conjunction with conventional remedial approaches. Performed pilot tests for soil vapor extraction system design and coordinated with NYSDEC and NYSDOH to implement sub-slab soil vapor sampling.

NYSDEC Spill Site – Far West Side, Manhattan
Developed a detailed remedial cost estimate for to support client negotiations with a major oil company. The estimate included costs pertaining to: chipping, removal and disposal of petroleum-impacted bedrock; removal/disposal of recycled concrete; costs for dewatering and disposal of impacted groundwater during construction; and design and installation of a vapor barrier below the redevelopment.

Active Industrial Facility, Newburgh, New York
Designed remedial investigation of soil and groundwater contaminated with trichloroethane; performed soil vapor pilot test and pump test to aid in design of soil and groundwater remediation alternatives; conducted sub-slab vapor sampling in accordance with NYSDOH guidance.

Former Dry Cleaning Facility, New York City
Conducted soil and groundwater investigations, designed and installed a soil vapor extraction system and performed extensive testing of indoor air. Negotiated the scope of the RI and IRM with NYSDEC.

Waterfront Redevelopment, Yonkers, NY
Designed and performed geophysics survey of six parcels to determine locations of subsurface features; supervised test pit excavation to confirm geophysics results and evaluate and classify soil conditions prior to development activities.

Prince's Point, Staten Island, New York
Performed soil, groundwater and sediment sampling to delineate the extent of contamination; used field-screening techniques to control analytical costs and supervised soil excavation and disposal.

Apartment Complex, New York City, New York
Coordinated with Con Edison, the owner of the adjacent property and NYSDEC to determine oil recovery protocol; assessed hydrogeological conditions and conducted pilot tests to design cost-effective recovery system; designed and supervised installation of recovery system.

Publications

"Impact of Toxic Waste Dumping on the Submarine Environment: A Case Study from the New York Bight". Northeastern Geology and Environmental Sciences, V. 21, No. 12, p. 102-120. (With G. Friedman)

Metals Fluxes Across the Water/Sediment Interface and the Influence of pH. Northeastern Geology and Environmental Sciences, in press. (With G. Friedman)

"Water and Organic Waste Near Dumping Ground in the New York Bight". International Journal of Coal Geology, volume 43. (With G. Friedman)

Education and Certifications

Ph.D., Earth and Environmental Sciences, Graduate Center of the City of New York (2001)
M.Ph., Earth and Environmental Sciences, City University of New York (1998)
M.A. Geology, Brooklyn College (1993)
B.S. Geology, Alexandria University, Egypt (1982)

American Institute of Professional Geologists, Certified Professional Geologist, 1997-2015

L.A.B. Validation Corp., 14 West Point Drive, East Northport, New York 11731

Lori A. Beyer

SUMMARY: General Manager/Laboratory Director with a solid technical background combined with Management experience in environmental testing industry. Outstanding organizational, leadership, communication and technical skills. Customer focused, quality oriented professional with consistently high marks in customer/employee satisfaction.

EXPERIENCE:

1998-Present L.A.B. Validation Corporation, 14 West Point Drive, East Northport, NY
President
- Perform Data Validation activities relating to laboratory generated Organic and Inorganic Environmental Data.

1998-Present American Analytical Laboratories, LLC. 56 Toledo Street, Farmingdale, NY
Laboratory Director/Technical Director
- Plan, direct and control the operation, development and implementation of programs for the entire laboratory in order to meet AAL's financial and operational performance standards.
- Ensures that all operations are in compliance with AAL's QA manual and other appropriate regulatory requirements.
- Actively maintains a safe and healthy working environmental that is demanded by local laws/regulations.
- Monitors and manages group's performance with respect to data quality, on time delivery, safety, analyst development/goal achievement and any other key performance indices.
- Reviews work for accuracy and completeness prior to release of results to customers.

1996-1998 Nytest Environmental, Inc. (NEI) Port Washington, New York
General Manager
- Responsible for controlling the operation of an 18,000 square foot facility to meet NEI's financial and operational performance standards.
- Management of 65 FTEs including Sales and Operations
- Ensure that all operations are in compliance with NEI's QA procedures
- Ensures that productivity indicators, staffing levels and other cost factors are held within established guidelines
- Maintains a quantified model of laboratory's capacity and uses this model as the basis for controlling the flow of work into and through the lab so as to ensure that customer requirements and lab's revenue and contribution targets are achieved.

1994-1996 Nytest Environmental, Inc. (NEI) Port Washington, New York
Technical Project Manager
- Responsible for the coordination and implementation of environmental testing programs requirements between NEI and their customers
- Supervise Customer Service Department
- Assist in the development of major proposals
- Complete management of all Federal and State Contracts and assigned commercial contracts
- Provide technical assistance to the customer, including data validation and interpretation
- Review and Implement Project specific QAPP's.

1995-1996 Nytest Environmental, Inc. (NEI) Port Washington, New York
Corporate QA/QC Officer
- Responsible for the implementation of QA practices as required in the NJDEP and EPA Contracts
- Primary contact for NJDEP QA/QC issues including SOP preparation, review and approval
- Responsible for review, verification and adherence to the Contract requirements and NEI QA Plan

1992-1994 Nytest Environmental, Inc. (NEI) Port Washington, New York
Data Review Manager
- Responsible for the accurate compilation, review and delivery of analytical data to the company's customers. Directly and effectively supervised a department of 22 personnel.
- Managed activities of the data processing software including method development, form creation, and production
- Implement new protocol requirements for report and data management formats
- Maintained control of data storage/archival areas as EPA/CLP document control officer

1987-1991 Nytest Environmental, Inc. (NEI) Port Washington, New York
Data Review Specialist
- Responsible for the review of GC, GC/MS, Metals and Wet Chemistry data in accordance with regulatory requirements
- Proficient with USEPA, NYSDEC, NJDEP and NEESA requirements
- Review data generated in accordance with SW846, NYSDEC ASP, EPA/CLP and 40 CFR Methodologies

1986-1987 Nytest Environmental, Inc (NEI) Port Washington, New York
GC/MS VOA Analyst

EDUCATION:

1982-1985 State University of New York at Stony Brook, New York; BS Biology/Biochemistry
1981-1982 University of Delaware; Biology/Chemistry
5/91 Rutgers University; Mass Spectral Data Interpretation Course, GC/MS Training
8/92 Westchester Community College; Organic Data Validation Course
9/93 Westchester Community College; Inorganic Data Validation Course

Westchester Community College

Professional Development Center

Awards this Certificate of Achievement To

LORI BEYER

for Successfully Completing

ORGANIC DATA VALIDATION COURSE (35 HOURS)

Dr. John Samuelian

Date AUGUST 1992

Assistant Dean
Professional Development Center

President

The Professional Development Center

SUNY
WESTCHESTER COMMUNITY COLLEGE
Valhalla, New York 10595

Westchester Community College
Professional Development Center

Awards this Certificate of Achievement To

LORI BEYER

for Successfully Completing

INORGANIC DATA VALIDATION

Instructor: Dale Boshart

Date MARCH 1993

Assistant Dean
Professional Development Center

President

The Professional Development Center

SUNY
WESTCHESTER COMMUNITY COLLEGE
Valhalla, New York 10595

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

Thomas C. Jorling
Commissioner

July 8, 1992

Ms. Elaine Sall
Program Coordinator
Westchester Community College
Valhalla, NY 10595-1698

Dear Elaine,

Thank you for your letter of June 29, 1992. I have reviewed the course outline for organic data validation, qualifications for teachers and qualifications for students. The course that you propose to offer would be deemed equivalent to that which is offered by EPA. The individuals who successfully complete the course and pass the final written exam would be acceptable to perform the task of organic data validation for the Department of Environmental Conservation, Division of Hazardous Waste Remediation.

As we have discussed in our conversation of July 7, 1992, you will forward to me prior to the August course deadline, the differences between the EPA SOW/90 and the NYSDEC ASP 12/91. You stated these differences will be compiled by Mr. John Samulian.

I strongly encourage you to offer an inorganic data validation course. I anticipate the same list of candidates would be interested in an inorganic validation course as well, since most of the data to be validated consists of both organic and inorganic data.

Thank you for you efforts and please contact me if I can be of any further assistance.

Sincerely,

Maureen P. Serafini

Maureen P. Serafini
Environmental Chemist II
Division of Hazardous Waste
Remediation

The Professional
Development Center
AT
WESTCHESTER COMMUNITY COLLEGE

914 285-6619

October 2, 1992

Ms. Lori Beyer
3 sparkill Drive
East Northport, NY 11731

Dear Ms. Beyer:

Congratulations upon successful completion of the Organic Data Validation course held August 17 - 21, 1992, through Westchester Community College, Professional Development Center. This course has been deemed by New York State Department of Environmental Conservation as equivalent to EPA's Organic Data Validation Course.

Enclosed is your Certificate. Holders of this Certificate are deemed competent to perform organic data validation for the New York State DEC Division of Hazardous Waste Remediation.

The Professional Development Center at Westchester Community College plans to continue to offer courses and seminars which will be valuable to environmental engineers, chemists and related personnel. Current plans include a TCLP seminar on November 17th and a conference on Environmental Monitoring Regulations on November 18th.

We look forward to seeing you again soon at another environmental program or event. Again, congratulations.

Very truly yours,

Passing Grade is 70%
Your Grade is 99%

Elaine Sall
Program Coordinator

ES/bf

SUNY
WESTCHESTER COMMUNITY COLLEGE
Valhalla, New York 10595

The Professional
Development Center
AT
WESTCHESTER COMMUNITY COLLEGE

914 285-6619

June 21, 1993

Dear Ms. Beyer:

Enclosed is your graded final examination in the Inorganic Data Validation course you completed this past March. A score of 70% was required in order to receive a certificate of satisfactory completion. Persons holding this certificate are deemed acceptable to perform Inorganic Data Validation for the New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation.

I am also enclosing a course evaluation for you to complete if you have not already done so. The information you provide will greatly aid us in structuring further courses. We wish to make these course offerings as relevant, targeted and comprehensive as possible. Your evaluation is vital to that end.

Congratulations on your achievement. I look forward to seeing you again at another professional conference or course. We will be co-sponsoring an environmental monitoring conference on October 21, 1993 with the New York Water Pollution Control Association, Lower Hudson Chapter, at IBM's Yorktown Heights, NY site. Information regarding this event will be going out in August.

Very truly yours,

Elaine Sall

Elaine Sall
Program Coordinator

ES/bf

Enclosures

SUNY
WESTCHESTER COMMUNITY COLLEGE
Valhalla, New York 10595

APPENDIX 7 – HEALTH AND SAFETY PLAN

Health and Safety Plan

for
Teitelbaum Dry Cleaning Inc.
Site Management Plan

34-45 35th Street
Queens, NY 11106
Queens County
Block 639, Lot 4
Site No. C241149

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 2
Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101

Prepared for:
S&C Properties, LLC
2 Bay Club Drive, Apt. 10G
Bayside, New York 11360

Prepared by:
TENEN ENVIRONMENTAL
121 West 27th Street, Suite 303
New York, NY 10001

December 2025

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1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been prepared in conformance with the Occupational Safety and Health Administration (OSHA) standards and guidance that govern site investigation activities, other applicable regulations, and Tenen Environmental LLC (Tenen) health and safety policies and procedures. The purpose of this HASP is the protection of Tenen field personnel and others during the implementation of a Site Management Plan.

The Site, located at 34-45 35th Street, Queens, New York, is a rectangular-shaped parcel consisting of 9,950 square feet (0.23 acres) situated on the southeast side of 35th Street, between 35th Avenue and 36th Avenue. The Site is in Queens Community District 1 and the tax map designation of the property is Block 639, Lot 4.

The Site is currently occupied by a single-story, high-ceilinged commercial/manufacturing building (measuring approximately 100 ft x 100 ft). The ground floor of the building is currently utilized as a commercial dry cleaner not open to the public. The building is divided into two sections (north and south). A portion of the southern section contains a second floor that is used as an office and storage space. According to the New York City Department of Buildings (NYC DOB) records, in 1998 one 1,500-gallon fuel oil underground storage tank (UST) was abandoned in place and replaced with six 275-gallon aboveground storage tanks (ASTs). No documentation was available regarding the age, condition, period of usage, proper decommissioning, or any tightness testing associated with the abandoned UST. All six ASTs were set in secondary containment in the form of concrete enclosures. The ground floor of the building houses the majority of equipment and storage space. Equipment and storage on the ground floor includes numerous dry cleaning machines, fuel oil and chemical storage, dryers, washers, pressing stations, and clothing staging areas. The equipment and work areas combine to occupy much of the ground floor, leaving very little accessible space. There is a small sub-grade boiler room (measuring approximately 3 ft x 5 ft) located in the northernmost corner of the property containing a fuel oil-fired steam boiler, condensate tank, and sump.

1.1 Scope of HASP

This HASP includes safety procedures to be used by Tenen staff during the following activities:

- Annual inspections of Engineering Controls (ECs);
- Collection of post-remedial groundwater samples from permanent groundwater monitoring wells;
- Collection of post-remedial indoor air samples;
- Collection of post-remedial soil vapor samples;
- Collection of soil vapor extraction (SVE) system blower effluent samples;
- Collection of subsurface soil samples prior to any petition to shut down the SVE system; and,
- Collection of sub-slab soil vapor and co-located indoor air samples prior to any petition to shut down the active sub-slab depressurization system (SSDS) or SVE system.

Subcontractors will ensure that performance of the work is in compliance with this HASP and applicable laws and regulations.

2.0 PROJECT SAFETY AUTHORITY

The following personnel are responsible for project health and safety under this HASP.

- Project Manager, Alana Carroll
- Health and Safety Officer (HSO), Ashley Platt

In addition, each individual working at the Site will be responsible for compliance with this HASP and general safe working practices. All Site workers will have the authority to stop work if a potentially hazardous situation or event is observed.

2.1 Designated Personnel

The Project Manager is responsible for the overall operation of the project, including compliance with the HASP and general safe work practices. The Project Manager may also act as the Health and Safety Officer (HSO) for this project.

Tenen will appoint one of its on-site personnel as the on-site HSO. This individual will be responsible for the implementation of the HASP. The HSO will have a 4-year college degree in occupational safety or a related science/engineering field, and at least two (2) years of experience in implementation of air monitoring and hazardous materials sampling programs. The HSO will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards.

The HSO will be present on-site during all field operations involving drilling or other subsurface disturbance, and will be responsible for all health and safety activities and the delegation of duties to the field crew. The HSO has stop-work authorization, which he/she will execute on his/her determination of an imminent safety hazard, emergency situation, or other potentially dangerous situation. If the HSO must be absent from the field, a replacement who is familiar with the Construction Health and Safety Plan, air monitoring and personnel protective equipment (PPE) will be designated.

3.0 HAZARD ASSESSMENT AND CONTROL MEASURES

Known previous uses of the site include historic operations as a commercial wagon and automobile garage. Operations at this time included the use of a cleaning pit and automobile painting. Dry cleaning operations began on Site in the 1950s and continue to be in operation to date, likely using chlorinated solvents containing volatile organic contaminants (VOCs).

Previous investigations offsite conducted in 2008 and 2012 resulted in NYSDEC's identification of the Site as a potential source of downgradient chlorinated solvent contamination. Subsurface investigations of a neighboring property at 34-12 36th Avenue (Luft Co. Property) confirmed the presence of chlorinated solvents and their breakdown components at concentrations above regulatory levels in soil vapor and groundwater. The detection of chlorinated solvent concentrations in groundwater and sub-slab vapor, without detection in soil, indicated an offsite source. The highest concentrations of PCE and associated degradation products were detected in the groundwater monitoring wells upgradient of the Luft Co. Property, adjacent to and directly downgradient of the dry cleaner located at 35-45 35th Street (the Site).

A remedial investigation (RI) was conducted at the Site between 2014 and 2017. The RI included the collection and analysis of soil, soil vapor, and groundwater samples on- and offsite. The results of the RI indicate that there are highly elevated concentrations of chlorinated VOCs (cVOCs) in groundwater and soil vapor on- and offsite as well as soil in the northwestern portion of the Site, in the proximity of an abandoned underground storage tank (UST). This area is considered to be the source of the chlorinated solvent contamination in groundwater and soil vapor on- and offsite. The source area extends vertically from 5 to 20 ft-bg and is limited to a radius of approximately 15 to 20 feet. In addition, petroleum-related VOCs were detected in soil in the vicinity of the abandoned UST and pesticide and metal concentrations, consistent with historic fill, were also detected in Site soils.

3.1 Human Exposure Pathways

The media of concern at the Site include potentially-impacted soil, groundwater, and soil vapor. Potential exposure pathways include dermal contact, incidental ingestion and inhalation of vapors. The risk of dermal contact and incidental ingestion will be minimized through general safe work practices, a personal hygiene program and the use of PPE.

3.2 Chemical Hazards

Based on historic uses and previously-completed investigations, the following contaminants of concern may be present at the Site:

Chlorinated Solvents

- 1,1-Dichloroethylene
- Cis-1,2-Dichloroethylene
- Tetrachloroethylene (PCE)
- Trans-1,2-Dichloroethylene
- Trichloroethylene (TCE)
- Methylene Chloride

Material Safety Data Sheets (MSDSs) for each contaminant of concern are included in Appendix C. All personnel are required to review the MSDSs included in this HASP.

3.3 Physical Hazards

The physical hazards associated with the field activities likely present a greater risk of injury than the chemical constituents at the Site. Activities within the scope of this project shall comply with New York State and Federal OSHA construction safety standards.

Head Trauma
To minimize the potential for head injuries, field personnel will be required to wear National Institutes of Occupational Safety and Health (NIOSH)-approved hard hats during field activities. Hats must be worn properly and not altered in any way that would decrease the degree of protection provided.

Foot Trauma
To avoid foot injuries, field personnel will be required to wear steel-toed safety shoes while field activities are being performed. To afford maximum protection, all safety shoes must meet American National Standards Institute (ANSI) standards.

Eye Trauma
Field personnel will be required to wear eye protection (safety glasses with side shields) while field activities are being performed to prevent eye injuries caused by contact with chemical or physical agents.

Noise Exposure
Field personnel will be required to wear hearing protection (ear plugs or muffs) in high noise areas (noise from heavy equipment) while field activities are being performed.

Buried Utilities and Overhead Power Lines
Boring locations will be cleared by an underground utility locator service. In addition, prior to intrusive activities, the drilling subcontractor will contact the One Call Center to arrange for a utility mark-out, in accordance with New York State requirements. Protection from overhead power lines will be accomplished by maintaining safe distances of at least 15 feet at all times.

Thermal Stress
The effects of ambient temperature can cause physical discomfort, personal injury, and increase the probability of accidents. In addition, heat stress due to lack of body ventilation caused by protective clothing is an important consideration. Heat-related illnesses commonly consist of heat stroke and heat exhaustion.

The symptoms of heat stroke include: sudden onset; change in behavior; confusion; dry, hot and flushed skin; dilated pupils; fast pulse rate; body temperature reaching 105° or more; and/or, deep breathing later followed by shallow breathing.

The symptoms of heat exhaustion include: weak pulse; general weakness and fatigue; rapid

shallow breathing; cold, pale and clammy skin; nausea or headache; profuse perspiration; unconsciousness; and/or, appearance of having fainted.

Heat-stress monitoring will be conducted if air temperatures exceed 70 degrees Fahrenheit. The initial work period will be set at 2 hours. Each worker will check his/her pulse at the wrist for 30 seconds early in each rest period. If the pulse rate exceeds 110 beats per minute, the next work period will be shortened by one-third.

One or more of the following precautions will reduce the risk of heat stress on the Site:

- Provide plenty of liquids to replace lost body fluids; water, electrolytic drinks, or both will be made available to minimize the risk of dehydration and heat stress
- Establish a work schedule that will provide appropriate rest periods
- Establish work regimens consistent with the American Conference of Governmental Industrial Hygienists (ACGIH) guidelines
- Provide adequate employee training on the causes of heat stress and preventive measures

In the highly unlikely event of extreme low temperatures, reasonable precautions will be made to avoid risks associated with low temperature exposure.

Traffic

Field activities will occur near public roadways. As a result, vehicular traffic will be a potential hazard during these activities and control of these areas will be established using barricades or traffic cones. Additional staff will be assigned, as warranted, for the sole purpose of coordinating traffic. Personnel will also be required to wear high-visibility traffic vests while working in the vicinity of the public roadways and local requirements for lane closure will be observed as needed. All work in public rights-of-way will be coordinated with local authorities and will adhere to their requirements for working in traffic zones.

Hazardous Weather Conditions

All Site workers will be made aware of hazardous weather conditions, specifically including extreme heat, and will be requested to take the precautions described herein to avoid adverse health risks. All workers are encouraged to take reasonable, common sense precautions to avoid potential injury associated with possible rain or high wind, sleet, snow or freezing.

Slip, Trip and Fall

Areas at the Site may be slippery from mud or water. Care should be taken by all Site workers to avoid slip, trip, and fall hazards. Workers shall not enter areas that do not have adequate lighting. Additional portable lighting will be provided at the discretion of the HSO.

Biological Hazards

Drugs and alcohol are prohibited from the Site. Any on-site personnel violating this requirement will be immediately expelled from the site.

Any worker or oversight personnel with a medical condition that may require attention must inform the HSO of such condition. The HSO will describe appropriate measures to be taken if the individual should become symptomatic.

Due to the Site location in an urban area, it is highly unlikely that poisonous snakes, spiders, plants and insects will be encountered. However, other animals (dogs, cats, etc.) may be encountered and care should be taken to avoid contact.

4.0 COVID-19 HEALTH AND SAFETY

The following requirements apply to all Tenen employees working on project sites for the duration of the COVID-19 pandemic. These guidelines are based on information provided by the Centers for Disease Control, the Occupational Safety and Health Administration and the New York State "New York Forward" Covid-19 management plans. Information regarding the health status of Tenen employees will be kept confidential, with the exception of required notifications to health authorities. The following are guidelines. **As with any potential workplace hazard, employees should report any concerns related to potential Covid-19 exposure to the Project Manager.**

Communication/Reporting:

Employees should not report to work and should notify the Project Manager immediately in the event of the following:

- You are exhibiting flu-like symptoms (fever, body aches, cough, difficulty breathing). Contact your health care provider and follow their instructions.
- You do not exhibit symptoms but have a sick (i.e., diagnosed with Covid-19 or exhibiting flu-like symptoms) family member at home. Remember that the virus can be spread by asymptomatic individuals.
- You have been exposed to someone who has been diagnosed with Covid-19.

In each of the above cases, inform your Project Manager regarding others who may have been exposed in order to facilitate any necessary notification or contact tracing efforts.

Hygiene

- Wash hands frequently with soap and water for at least 20 seconds or use hand sanitizer with at least 60% alcohol if soap and water are not available. Key times for employees to clean their hands include:
    - Before and after work shifts
    - Before and after work breaks
    - After blowing the nose, coughing, or sneezing
    - After using the restroom
    - Before eating or preparing food
    - After putting on, touching, or removing face coverings
- Avoid touching the eyes, nose, and mouth with unwashed hands.
- Practice good respiratory etiquette, including covering coughs and sneezes.
- To the extent possible, avoid sharing tools and sampling equipment. Shared tools and equipment should be regularly disinfected.

Physical Distancing

- Minimize contact with others, maintaining a distance of at least six feet to the extent possible
- Employees should wear masks over their nose and mouth to prevent spread of the virus; this is especially important when a minimum 6-foot distance cannot be maintained.
- Maintain the 6-foot distance to the extent possible during sampling efforts and pickup and delivery of sampling equipment and containers.
- Keep job site meetings to a minimum and of short duration; limit the number of people involved and maintain social distance.

5.0 AIR MONITORING

The New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP), included as Appendix 1A of DER-10, will be implemented during all ground-intrusive, soil sampling, and remedial activities associated with cVOC-impacted soil or groundwater. Continuous monitoring will be implemented during all soil handling activities and will be recorded at a 15-minute basis.

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 15-minute 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 should be performed using equipment appropriate for 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 shut down.
4. All 15-minute readings must be recorded and be available for New York City Department of Environmental Protection (NYCDEP) 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 at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a 15-minute 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 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/m3) 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/m3 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/m3 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/m3 of the upwind level and in preventing visible dust migration.
3. All readings must be recorded and be available for NYCDEP personnel to review.

6.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protection equipment required for various kinds of site investigation tasks is based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, "General Description and Discussion of the Levels of Protection and Protective Gear" and the Centers for CDC COVID-19 "Guidelines on How to Protect Yourselves and Others."

Tenen field personnel and other site personnel will wear Modified Level D-1 personal protective equipment. During activities such as drilling, well installation, or sampling, where there is a chance of contact with contaminated materials, Modified Level D-2 equipment will be worn. The protection will be upgraded to Level C if warranted by the results of the air monitoring. A six-foot minimum distance between individuals (both workers and non-workers) will be maintained at all times. A description of the personnel protective equipment for Levels D and C is provided below.

Modified Level D-1
Respiratory Protection: Cloth face covering
Protective Clothing: Hard hat, steel-toed shoes, long pants, nitrile gloves

Modified Level D-2
Respiratory Protection: Cloth face covering
Protective Clothing: Hard hat, steel-toed shoes, coveralls/tyvek, nitrile gloves

Level C
Respiratory Protection: Air purifying respirator with organic vapor cartridges and filters.
Protective Clothing: Same as Modified Level D-2

7.0 EXPOSURE MONITORING

7.1 Hazardous Materials

Selective monitoring of workers in the exclusion area may be conducted, as determined by the HSO, if sources of hazardous materials are identified. Personal monitoring may be conducted in the breathing zone at the discretion of the Project Manager or HSO. All monitoring will comply with the CDCs Guidance on Social Distancing.

7.2 COVID-19

For any employee that may have come into contact with a person who has COVID-19, a 14-day quarantine will be imposed for that individual and any employee that individual was in contact with.

8.0 SITE ACCESS

The Site is currently used as an industrial space. Access to the Site during the remedial action will be controlled by the Project Manager or HSO. Access to the off-site work areas will be cordoned off. Unauthorized personnel will not be allowed access to the Site or off-site work areas during the investigation.

9.0 WORK AREAS

During any activities involving drilling or other subsurface disturbance, the work area must be divided into various zones to prevent the spread of contamination, clarify the type of protective equipment needed, and provide an area for decontamination.

The Exclusion Zone is defined as the area where potentially contaminated materials are generated as the result of drilling, sampling, or similar activities. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located adjacent to the Exclusion Zone. The Support Zone is the area where support facilities such as vehicles, a field phone, fire extinguisher and/or first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all Site workers will assemble in the event of an emergency. These zones shall be designated daily, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

Control measures such as "Caution" tape and traffic cones will be placed around the perimeter of the work area when work is being done in the areas of concern (i.e., areas with exposed soil) to prevent unnecessary access.

10.0 DECONTAMINATION PROCEDURES

Personnel Decontamination
Personnel decontamination (decon), if deemed necessary by the HSO, will take place in the designated decontamination area delineated for each sampling location. Personnel decontamination will consist of the following steps:

- Soap and potable water wash and potable water rinse of gloves;
- Tyvek removal;
- Glove removal;
- Disposable clothing removal; and
- Field wash of hands and face.

Equipment Decontamination
Sampling equipment, such as split-spoons and bailers, will be decontaminated in accordance with U.S. Environmental Protection Agency methodologies, as described in the work plan. Because site soil is considered essentially non-hazardous, there is no need to decontaminate vehicles used for transporting equipment and personnel over the Site.

Disposal of Materials
Purged well water, water used to decontaminate any equipment and well cuttings will be containerized and disposed off-site in accordance with federal, state and local regulations.

11.0 GENERAL SAFE WORK PRACTICES

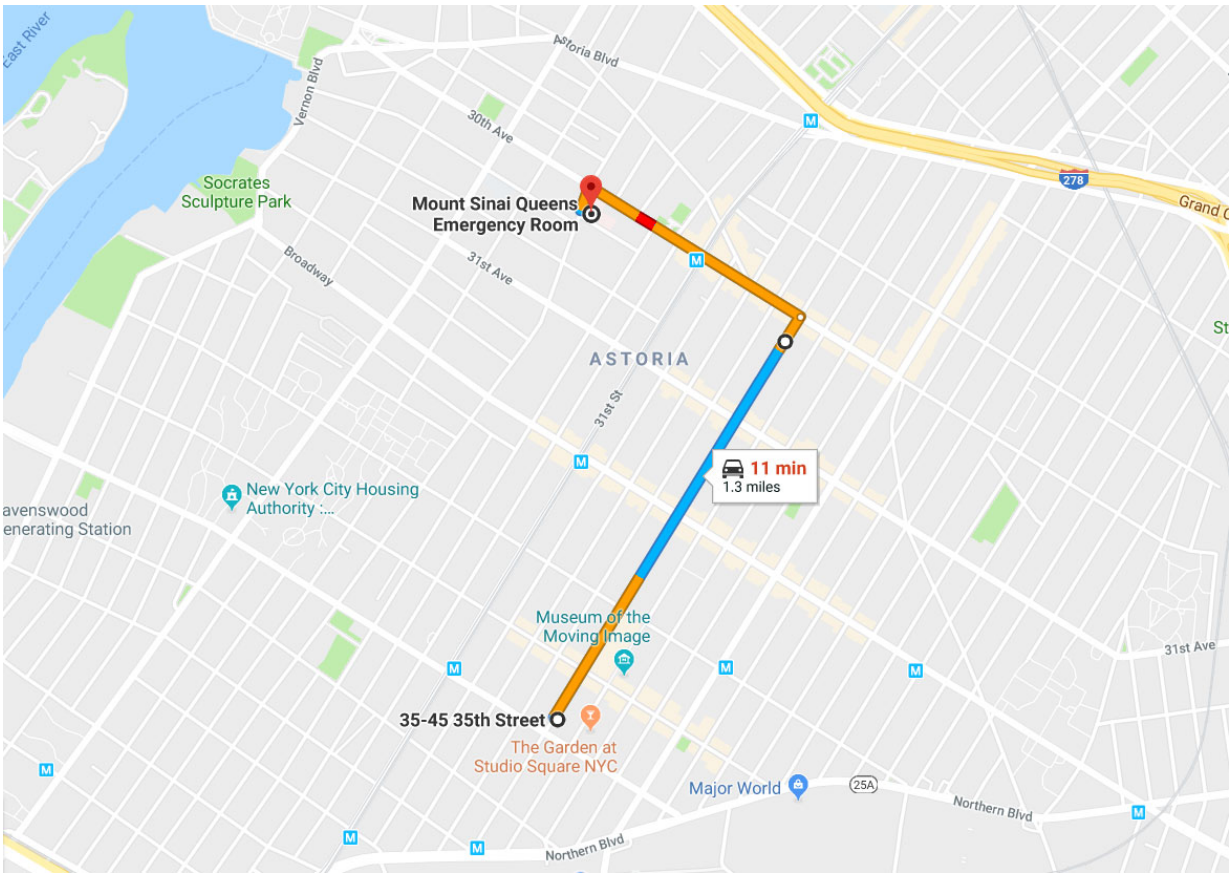
To protect the health and safety of the field personnel, all field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance.

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the site. These areas will be designated by the HSO.
- Workers must wash their hands and face thoroughly on leaving the work area and before eating, drinking, or any other such activity. The workers should shower as soon as possible after leaving the site.
- Removal of potential contamination from PPE and equipment by blowing, shaking or any means that may disperse materials into the air is prohibited.
- Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat stress.
- Personnel will be cautioned to inform each other of symptoms of chemical exposure such as headache, dizziness, nausea, and irritation of the respiratory tract and heat stress.
- No excessive facial hair that interferes with a satisfactory fit of the face-piece of the respirator to the face will be allowed on personnel required to wear respiratory protective equipment.
- On-site personnel will be thoroughly briefed about the anticipated hazards, equipment requirements, safety practices, emergency procedures, and communications methods.

12.0 EMERGENCY PROCEDURES

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the HSO will determine the nature of the emergency and will have someone call for an ambulance, if needed. If the nature of the injury is not serious—i.e., the person can be moved without expert emergency medical personnel—onsite personnel should drive him to a hospital. The nearest emergency room is at **Mount Sinai Queens Emergency Room – 25-10 30th Avenue, Queens, NY (718) 932-1000.** The route to the hospital is shown and detailed on the next page.

12.1 Route to Hospital



Driving directions to **Mount Sinai Queens Emergency Room** from **35-45 35th Street— Queens, NY 11102**

1. Head northwest on 35th Street towards 34th Avenue (0.8 mi)
2. Turn left onto 30th Ave (0.4 mi)
3. Turn left onto Crescent Street (240 ft)
4. Destination will be on the left.

12.2 Emergency Contacts

There will be an on-site field phone. Emergency and contact telephone numbers are listed below:

Table 1 – Emergency Contacts

Ambulance	911
Emergency Room	(718) 963-8000
NYSDEC Spill Hotline	(800) 457-7362
Tenen PM, Alana Carroll	(917) 428-2094
On-site Field Phone, Ashley Platt	(908) 892-1354
Andrea Pampillonio, S&C Properties, LLC	(917) 543-8513

13.0 TRAINING

All personnel performing the field activities described in this HASP will have received the initial safety training required by 29 CFR, 1910.120. Current refresher training status also will be required for all personnel engaged in field activities.

All those who enter the work area while intrusive activities are being performed must recognize and understand the potential hazards to health and safety. All field personnel must attend a training program covering the following areas:

- potential hazards that may be encountered;
- the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- the purpose and limitations of safety equipment; and
- protocols to enable field personnel to safely avoid or escape from emergencies.

Each member of the field crew will be instructed in the above objectives before he/she goes onto the site. The HSO will be responsible for conducting the training program.

14.0 MEDICAL SURVEILLANCE

All Tenen and subcontractor personnel performing field work involving drilling or other subsurface disturbance at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). The medical examination for Tenen employees will, at a minimum, be provided annually and upon termination of hazardous waste site work.

Appendix A

Acknowledgement of HASP

ACKNOWLEDGMENT OF HASP

Below is an affidavit that must be signed by all Tenen Environmental employees who enter the site. A copy of the HASP must be on-site at all times and will be kept by the HSO.

AFFIDAVIT

I have read the Construction Health and Safety Plan (HASP) for the Teitelbaum Dry Cleaning, Inc. Site in Queens, NY. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the site.

Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____

Appendix B

Injury Reporting Form (OSHA Form 300)

How to Fill Out the Log

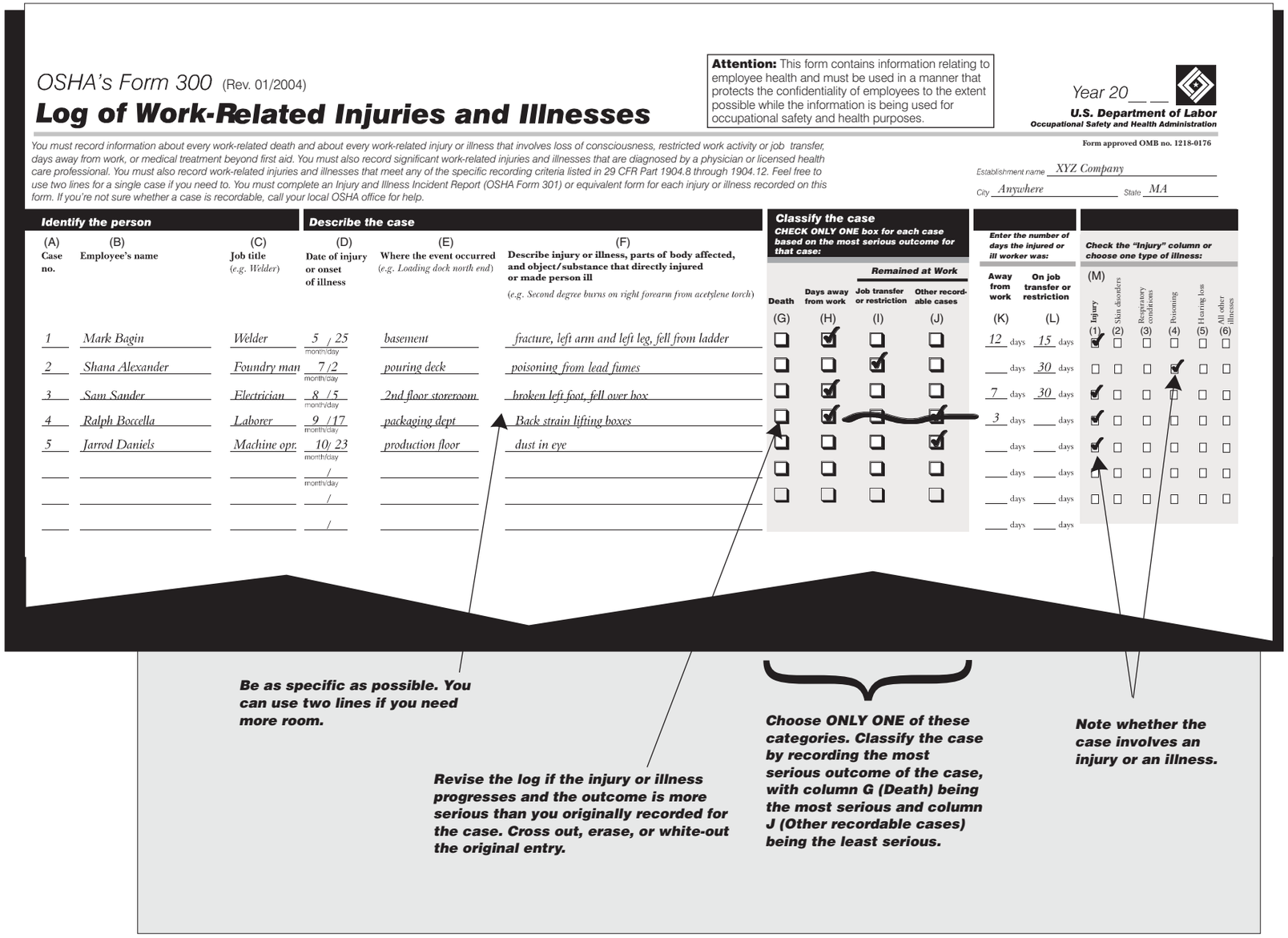
The *Log of Work-Related Injuries and Illnesses* is used to classify work-related injuries and illnesses and to note the extent and severity of each case. When an incident occurs, use the *Log* to record specific details about what happened and how it happened.

If your company has more than one establishment or site, you must keep separate records for each physical location that is expected to remain in operation for one year or longer.

We have given you several copies of the *Log* in this package. If you need more than we provided, you may photocopy and use as many as you need.

The *Summary* — a separate form — shows the work-related injury and illness totals for the year in each category. At the end of the year, count the number of incidents in each category and transfer the totals from the *Log* to the *Summary*. Then post the *Summary* in a visible location so that your employees are aware of injuries and illnesses occurring in their workplace.

You don't post the Log. You post only the Summary at the end of the year.



OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name: XYZ Company
City: Anywhere State: MA

Identify the person			Describe the case			Classify the case (CHECK ONLY ONE box for each case based on the most serious outcome for that case:)				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness:					
							Remained at Work										
(A) Case no.	(B) Employee's name	(C) Job title (e.g. Welder)	(D) Date of injury or onset of illness	(E) Where the event occurred (e.g. Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from acetylene torch)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other recordable cases (J)	Away from work (K)	On job transfer or restriction (L)	(M) Injury (1)	Skin disorders (2)	Respiratory conditions (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
1	Mark Bagin	Welder	5/25	basement	fracture, left arm and left leg, fell from ladder	☐	☑	☐	☐	12 days	15 days	☑	☐	☐	☐	☐	☐
2	Shana Alexander	Foundry man	7/2	pouring deck	poisoning from lead fumes	☐	☐	☑	☐	___ days	30 days	☐	☐	☐	☑	☐	☐
3	Sam Sander	Electrician	8/5	2nd floor storeroom	broken left foot, fell over box	☐	☑	☐	☐	7 days	30 days	☑	☐	☐	☐	☐	☐
4	Ralph Boccella	Laborer	9/17	packaging dept	Back strain lifting boxes	☐	☑	☐	☐	3 days	___ days	☑	☐	☐	☐	☐	☐
5	Jarrod Daniels	Machine opr.	10/23	production floor	dust in eye	☐	☐	☐	☑	___ days	___ days	☑	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	___ days	___ days						

Be as specific as possible. You can use two lines if you need more room.

Revise the log if the injury or illness progresses and the outcome is more serious than you originally recorded for the case. Cross out, erase, or white-out the original entry.

Choose ONLY ONE of these categories. Classify the case by recording the most serious outcome of the case, with column G (Death) being the most serious and column J (Other recordable cases) being the least serious.

Note whether the case involves an injury or an illness.

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name _____

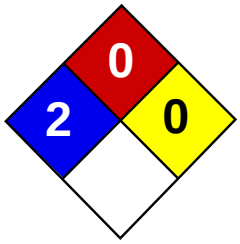
City _____ State _____

Identify the person			Describe the case			Classify the case (CHECK ONLY ONE box for each case based on the most serious outcome for that case:)				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness:					
								Remained at Work				(M)					
(A) Case no.	(B) Employee's name	(C) Job title (*e.g., Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g., Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g., Second degree burns on right forearm from acetylene torch*)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other record-able cases (J)	Away from work (K)	On job transfer or restriction (L)	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
			/ month/day			☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐

Appendix C

Material Safety Data Sheets (MSDS)
(on cd)





Health	2
Fire	0
Reactivity	0
Personal Protection	G

Material Safety Data Sheet
Tetrachloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Tetrachloroethylene

Catalog Codes: SLT3220

CAS#: 127-18-4

RTECS: KX3850000

TSCA: TSCA 8(b) inventory: Tetrachloroethylene

CI#: Not available.

Synonym: Perchloroethylene; 1,1,2,2-Tetrachloroethylene; Carbon bichloride; Carbon dichloride; Ankilostin; Didakene; Dilatin PT; Ethene, tetrachloro-; Ethylene tetrachloride; Perawin; Perchlor; Perclene; Perclene D; Percosolvel; Tetrachloroethene; Tetraleno; Tetralex; Tetravec; Tetroguer; Tetropil

Chemical Name: Ethylene, tetrachloro-

Chemical Formula: C2-Cl4

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Tetrachloroethylene	127-18-4	100

Toxicological Data on Ingredients: Tetrachloroethylene: ORAL (LD50): Acute: 2629 mg/kg [Rat]. DERMAL (LD): Acute: >3228 mg/kg [Rabbit]. MIST(LC50): Acute: 34200 mg/m 8 hours [Rat]. VAPOR (LC50): Acute: 5200 ppm 4 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (anticipated carcinogen) by NTP. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, peripheral nervous system, respiratory tract, skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with skin. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, metals, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection:
Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 25 (ppm) from OSHA (PEL) [United States] TWA: 25 STEL: 100 (ppm) from ACGIH (TLV) [United States] TWA: 170 (mg/m3) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Ethereal.

Taste: Not available.

Molecular Weight: 165.83 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 121.3°C (250.3°F)

Melting Point: -22.3°C (-8.1°F)

Critical Temperature: 347.1°C (656.8°F)

Specific Gravity: 1.6227 (Water = 1)

Vapor Pressure: 1.7 kPa (@ 20°C)

Vapor Density: 5.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 5 - 50 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.4

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Miscible with alcohol, ether, chloroform, benzene, hexane. It dissolves in most of the fixed and volatile oils. Solubility in water: 0.015 g/100 ml @ 25 deg. C It slowly decomposes in water to yield Trichloroacetic and Hydrochloric acids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals, acids, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Oxidized by strong oxidizing agents. Incompatible with sodium hydroxide, finely divided or powdered metals such as zinc, aluminum, magnesium, potassium, chemically active metals such as lithium, beryllium , barium. Protect from light.

Special Remarks on Corrosivity: Slowly corrodes aluminum, iron, and zinc.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2629 mg/kg [Rat]. Acute dermal toxicity (LD50): >3228 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5200 4 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of ingestion.

Special Remarks on Toxicity to Animals:
Lowest Publishe Lethal Dose/Conc: LDL [Rabbit] - Route: Oral; Dose: 5000 mg/kg LDL [Dog] - Route: Oral; Dose: 4000 mg/kg LDL [Cat] - Route: Oral; Dose: 4000 mg/kg

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects(teratogenic). May affect genetic material (mutagenic). May cause cancer.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation with possible dermal blistering or burns. Symtoms may include redness, itching, pain, and possible dermal blistering or burns. It may be absorbed through the skin with possible systemic effects. A single prolonged skin exposure is not likely to result in the material being absorbed in harmful amounts. Eyes: Contact causes transient eye irritation, lacrimation. Vapors cause eye/conjunctival irritation. Symptoms may include redness and pain. Inhalation: The main route to occupational exposure is by inhalation since it is readily absorbed through the lungs. It causes respiratory tract irritation, . It can affect behavior/central nervous system (CNS depressant and anesthesia ranging from slight inebriation to death, vertigo, somnolence, anxiety, headache, excitement, hallucinations, muscle incoordination, dizziness, lightheadness, disorentiation, seizures, enotional instability, stupor, coma). It may cause pulmonary edema Ingestion: It can cause nausea, vomiting, anorexia, diarrhea, bloody stool. It may affect the liver, urinary system (proteinuria, hematuria, renal failure, renal tubular disorder), heart (arrhythmias). It may affect behavior/central nervous system with symptoms similar to that of inhalation. Chronic Potential Health Effects: Skin: Prolonged or repeated skin contact may result in excessive drying of the skin, and irritation. Ingestion/Inhalation: Chronic exposure can affect the liver(hepatitis,fatty liver degeneration), kidneys, spleen, and heart (irregular heartbeat/arrhythmias, cardiomyopathy, abnormal EEG), brain, behavior/ central nervous system/peripheral nervous system (impaired memory, numbness of extremeties, peripheral neuropathy and other

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 18.4 mg/l 96 hours [Fish (Fatthead Minnow)]. 18 mg/l 48 hours [Daphnia (daphnia)]. 5 mg/l 96 hours [Fish (Rainbow Trout)]. 13 mg/l 96 hours [Fish (Bluegill sunfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Tetrachloroethylene UNNA: 1897 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Tetrachloroethylene California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Tetrachloroethylene Connecticut hazardous material survey.: Tetrachloroethylene Illinois toxic substances disclosure to employee act: Tetrachloroethylene Illinois chemical safety act: Tetrachloroethylene New York release reporting list: Tetrachloroethylene Rhode Island RTK hazardous substances: Tetrachloroethylene Pennsylvania RTK: Tetrachloroethylene Minnesota: Tetrachloroethylene Michigan critical material: Tetrachloroethylene Massachusetts RTK: Tetrachloroethylene Massachusetts spill list: Tetrachloroethylene New Jersey: Tetrachloroethylene New Jersey spill list: Tetrachloroethylene Louisiana spill reporting: Tetrachloroethylene California Director's List of Hazardous Substances: Tetrachloroethylene TSCA 8(b) inventory: Tetrachloroethylene TSCA 8(d) H and S data reporting: Tetrachloroethylene: Effective date: 6/1/87; Sunset date: 6/1/97 SARA 313 toxic chemical notification and release reporting: Tetrachloroethylene CERCLA: Hazardous substances.: Tetrachloroethylene: 100 lbs. (45.36 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R40- Possible risks of irreversible effects. R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S23- Do not breathe gas/fumes/vapour/spray S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S37- Wear suitable gloves. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: g

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

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

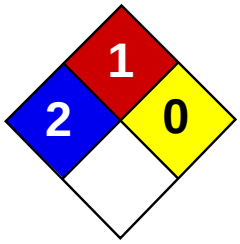
Other Special Considerations: Not available.

Created: 10/10/2005 08:29 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.







Material Safety Data Sheet
Trichloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Trichloroethylene

Catalog Codes: SLT3310, SLT2590

CAS#: 79-01-6

RTECS: KX4560000

TSCA: TSCA 8(b) inventory: Trichloroethylene

CI#: Not available.

Synonym:

Chemical Formula: C2HCl3

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Trichloroethylene	79-01-6	100

Toxicological Data on Ingredients: Trichloroethylene: ORAL (LD50): Acute: 5650 mg/kg [Rat]. 2402 mg/kg [Mouse]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 420°C (788°F)

Flash Points: Not available.

Flammable Limits: LOWER: 8% UPPER: 10.5%

Products of Combustion: These products are carbon oxides (CO, CO2), halogenated compounds.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/

spray. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Carcinogenic, teratogenic or mutagenic materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 50 STEL: 200 (ppm) from ACGIH (TLV) TWA: 269 STEL: 1070 (mg/m3) from ACGIH Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 131.39 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 86.7°C (188.1°F)

Melting Point: -87.1°C (-124.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.4649 (Water = 1)

Vapor Pressure: 58 mm of Hg (@ 20°C)

Vapor Density: 4.53 (Air = 1)

Volatility: Not available.

Odor Threshold: 20 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether, acetone.

Solubility:
Easily soluble in methanol, diethyl ether, acetone. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity:
Extremely corrosive in presence of aluminum. Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
Acute oral toxicity (LD50): 2402 mg/kg [Mouse]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in human. Detected in maternal milk in human.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Trichloroethylene : UN1710 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Trichloroethylene California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Trichloroethylene Pennsylvania RTK: Trichloroethylene Florida: Trichloroethylene Minnesota: Trichloroethylene Massachusetts RTK: Trichloroethylene New Jersey: Trichloroethylene TSCA 8(b) inventory: Trichloroethylene CERCLA: Hazardous substances.: Trichloroethylene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R36/38- Irritating to eyes and skin. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:54 PM

Last Updated: 05/21/2013 12:00 PM

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SAFETY DATA SHEET

Version 4.4
Revision Date 12/01/2015
Print Date 04/22/2018

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : cis-Dichloroethylene

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

CAS-No. : 156-59-2

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

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

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

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

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

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

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

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

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

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

P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312	Call a POISON CENTER or doctor/ physician if you feel unwell.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

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

Hazardous components

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

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

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

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

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

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

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

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

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

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

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

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

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

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

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

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

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

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

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

Recommended storage temperature 2 - 8 °C

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

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

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

8.2 Exposure controls

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

Personal protective equipment

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

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

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

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

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

p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

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

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

10.5 Incompatible materials
Oxidizing agents

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

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

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

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

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

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: KV9420000

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

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

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

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

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

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

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

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

Poison Inhalation Hazard: No

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

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

15. REGULATORY INFORMATION

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

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

SARA 311/312 Hazards
Fire Hazard

Massachusetts Right To Know Components

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

Pennsylvania Right To Know Components

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

New Jersey Right To Know Components

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

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

16. OTHER INFORMATION

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

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

HMIS Rating

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

NFPA Rating

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

Further information
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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.

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

Version: 4.4 Revision Date: 12/01/2015 Print Date: 04/22/2018

SAFETY DATA SHEET

Version 4.6
Revision Date 02/28/2015
Print Date 05/04/2015

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : *trans*-1,2-Dichloroethylene

Product Number : D62209
Brand : Aldrich
Index-No. : 602-026-00-3

CAS-No. : 156-60-5

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

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

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

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

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

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

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

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

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

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

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

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	trans-1,2-Dichloroethene trans-Acetylene dichloride
Formula	:	$C_2H_2Cl_2$
Molecular weight	:	96.94 g/mol
CAS-No.	:	156-60-5
EC-No.	:	205-860-2
Index-No.	:	602-026-00-3

Hazardous components

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

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

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

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

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

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

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

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

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

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

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

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

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

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

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

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

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

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

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

Light sensitive. Air and moisture sensitive.

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
trans-Dichloroethylene	156-60-5	TWA	200.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Eye irritation		

		TWA	200.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Eye irritation		

8.2 Exposure controls

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

Personal protective equipment

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

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

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

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: light yellow
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -50 °C (-58 °F) - lit.
f)	Initial boiling point and boiling range	48 °C (118 °F) - lit.
g)	Flash point	6.0 °C (42.8 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 12.8 %(V) Lower explosion limit: 9.7 %(V)
k)	Vapour pressure	No data available
l)	Vapour density	No data available

m)	Relative density	1.257 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

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

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

10.5 Incompatible materials
Oxidizing agents, Bases

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

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 1,235 mg/kg

LD50 Oral - Mouse - 2,122 mg/kg
Remarks: Behavioral:Altered sleep time (including change in righting reflex). Behavioral:Somnolence (general depressed activity). Behavioral:Ataxia.

LC50 Inhalation - Rat - 24100 ppm
Remarks: Behavioral:Somnolence (general depressed activity).

LD50 Dermal - Rabbit - > 5,000 mg/kg
Remarks: Prolonged skin contact may cause skin irritation and/or dermatitis. Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

No data available

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

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

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

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

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: KV9400000

prolonged or repeated exposure can cause:, narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Kidney -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 220.00 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

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

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

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

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

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

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

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

15. REGULATORY INFORMATION

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

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

SARA 311/312 Hazards
Fire Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
trans-Dichloroethylene	156-60-5	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
trans-Dichloroethylene	156-60-5	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
trans-Dichloroethylene	156-60-5	1993-04-24

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

16. OTHER INFORMATION

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

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity

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

HMIS Rating

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

NFPA Rating

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

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.

Preparation Information

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

Version: 4.6 Revision Date: 02/28/2015 Print Date: 05/04/2015

SAFETY DATA SHEET

Creation Date 27-Jan-2010 **Revision Date** 17-Jan-2018 **Revision Number** 6

1. Identification

Product Name **Methylene chloride**

Cat No. : **D37-1; D37-4; D37-20; D37-200; D37-200LC; D37-500; D37FB-19; D37FB-50; D37FB-115; D37FB-200; D37POP-19; D37POPB-50; D37POPB-200; D37RB-19; D37RB-50; D37RB-115; D37RB-200; D37RS-19; D37RS-28; D37RS-50; D37RS-115; D37RS-200; D37SK-4; D37SK-4LC; D37SS-28; D37SS-50; D37SS-115; D37SS-200; D37SS-1350; D37RS1000ASME; NC1485726; D37RE200ASME; NC1568702**

CAS-No 75-09-2
Synonyms Dichloromethane; DCM

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
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)

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 - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Liver, Kidney, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye 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
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
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
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash 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
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 %
Methylene chloride	75-09-2	>99.5

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.

Inhalation Move to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.

Ingestion Clean mouth with water and drink afterwards plenty of water.

Most important symptoms and effects None reasonably foreseeable. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature 556 °C / 1032.8 °F

Explosion Limits
Upper 23 vol %
Lower 13 vol %
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Carbon monoxide (CO) Carbon dioxide (CO_2) Hydrogen chloride gas Phosgene
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.

NFPA

Health	Flammability	Instability	Physical hazards
2	1	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation.
Environmental Precautions Should not be released into the environment.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Ensure adequate ventilation.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Methylene chloride	TWA: 50 ppm	(Vacated) TWA: 500 ppm (Vacated) STEL: 2000 ppm (Vacated) Ceiling: 1000 ppm TWA: 25 ppm STEL: 125 ppm	IDLH: 2300 ppm	TWA: 100 ppm TWA: 330 mg/m³ STEL: 500 ppm STEL: 1740 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location.

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.

Skin and body protection Long sleeved clothing.

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	No information available
pH	No information available
Melting Point/Range	-97 °C / -142.6 °F
Boiling Point/Range	39 °C / 102.2 °F
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	23 vol %
Lower	13 vol %
Vapor Pressure	350 mbar @ 20°C
Vapor Density	2.93 (Air = 1.0)
Specific Gravity	1.33
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	556 °C / 1032.8 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C H2 Cl2
Molecular Weight	84.93

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat.

Incompatible Materials Strong oxidizing agents, Strong acids, Amines

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2), Hydrogen chloride gas, Phosgene

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
Methylene chloride	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rat)	53 mg/L (Rat) 6 h 76000 mg/m³ (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes 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
Methylene chloride	75-09-2	Group 2A	Reasonably Anticipated	A3	X	A3

IARC: (International Agency for Research on Cancer)

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)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects Mutagenic effects have occured in microorganisms.

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)
STOT - repeated exposure Liver Kidney Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.

12. Ecological information

Ecotoxicity

.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Methylene chloride	EC50:>660 mg/L/96h	Pimephales promelas: LC50:193 mg/L/96h	EC50: 1 mg/L/24 h EC50: 2.88 mg/L/15 min	EC50: 140 mg/L/48h

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
Methylene chloride	1.25

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
Methylene chloride - 75-09-2	U080	-

14. Transport information

DOT

UN-No UN1593
Proper Shipping Name DICHLOROMETHANE
Hazard Class 6.1
Packing Group III

TDG

UN-No UN1593
Proper Shipping Name DICHLOROMETHANE
Hazard Class 6.1
Packing Group III

IATA

UN-No UN1593
Proper Shipping Name Dichloromethane
Hazard Class 6.1
Packing Group III

IMDG/IMO

UN-No UN1593
Proper Shipping Name Dichloromethane
Hazard Class 6.1
Packing Group III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Methylene chloride	X	X	-	200-838-9	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b)

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Methylene chloride	75-09-2	>99.5	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
Methylene chloride	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Methylene chloride	X		-

OSHA Occupational Safety and Health Administration

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Methylene chloride	125 ppm STEL 12.5 ppm Action Level 25 ppm TWA	-

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
Methylene chloride	1000 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Methylene chloride	75-09-2	Carcinogen	200 µg/day 50 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Methylene chloride	X	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 No information available

16. Other information

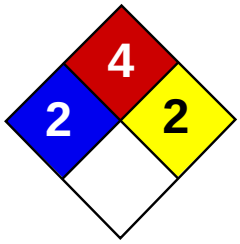
Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date	27-Jan-2010
Revision Date	17-Jan-2018
Print Date	17-Jan-2018
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







Material Safety Data Sheet
Vinylidene Chloride MSDS

Section 1: Chemical Product and Company Identification

Product Name: Vinylidene Chloride

Catalog Codes: SLV1063

CAS#: 75-35-4

RTECS: KV9275000

TSCA: TSCA 8(b) inventory: Vinylidene Chloride

CI#: Not available.

Synonym: 1,1-Dichloroethylene

Chemical Name: Vinylidene Chloride

Chemical Formula: C2-H2-Cl2

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Vinylidene Chloride	75-35-4	100

Toxicological Data on Ingredients: Vinylidene Chloride: ORAL (LD50): Acute: 194 mg/kg [Mouse]. 200 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant). Slightly hazardous in case of eye contact (irritant), of inhalation (lung irritant). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified 4 (No evidence.) by NTP. A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. The substance may be toxic to kidneys, liver, bladder, gastrointestinal tract, skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 520°C (968°F)

Flash Points: CLOSED CUP: -28°C (-18.4°F).

Flammable Limits: LOWER: 8.4% UPPER: 16.5%

Products of Combustion: These products are carbon oxides (CO, CO2), halogenated compounds.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid. Poisonous liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call

for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with skin. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, moisture.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Do not store above 25°C (77°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
STEL: 20 (ppm) from ACGIH (TLV) [United States] TWA: 1 from OSHA (PEL) [United States] TWA: 2 (ppm) [Austria] TWA: 5 (ppm) [Belgium] TWA: 5 (ppm) [Denmark] TWA: 2 (ppm) [Germany] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Chloroform-like (Slight.)

Taste: Not available.

Molecular Weight: 96.94 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 31°C (87.8°F)

Melting Point: -122.5°C (-188.5°F)

Critical Temperature: Not available.

Specific Gravity: 1.213 (Water = 1)

Vapor Pressure: 78.8 kPa (@ 20°C)

Vapor Density: 3.25 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Very slightly dispersed in cold water, hot water, diethyl ether, acetone.

Solubility: Very slightly soluble in cold water, hot water, diethyl ether, acetone.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents, moisture.

Corrosivity: Corrosive in presence of steel.

Special Remarks on Reactivity:
Do not mix with Aluminum or Copper. May cause polymerization when exposed to Nitric Acid, Chlorosulfonic Acid, Oleum

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 194 mg/kg [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 4 (No evidence.) by NTP. A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. May cause damage to the following organs: kidneys, liver, bladder, gastrointestinal tract, skin, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant). Slightly hazardous in case of inhalation (lung irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Vinylidene chloride, Inhibited UNNA: 1303 PG: I

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Vinylidene Chloride Florida: Vinylidene Chloride Minnesota: Vinylidene Chloride Michigan critical material: Vinylidene Chloride Massachusetts RTK: Vinylidene Chloride New Jersey: Vinylidene Chloride TSCA 8(b) inventory: Vinylidene Chloride TSCA 8(a) PAIR: Vinylidene Chloride TSCA 8(d) H and S data reporting: Vinylidene Chloride: 8/4/95 CERCLA: Hazardous substances.: Vinylidene Chloride: 100 lbs. (45.36 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).

DSCL (EEC):
R12- Extremely flammable. R20- Harmful by inhalation. R40- Possible risks of irreversible effects.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 4

Reactivity: 0

Personal Protection: g

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

Health: 2

Flammability: 4

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 12:15 AM

Last Updated: 05/21/2013 12:00 PM

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APPENDIX 8 – COMMUNITY AIR MONITORING PLAN

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

Overview

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

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

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

Community Air Monitoring Plan

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

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

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

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

VOC Monitoring, Response Levels, and Actions

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

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

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

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

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

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

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

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

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

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

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

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

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

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

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

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

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

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

APPENDIX 9 – SITE MANAGEMENT FORMS

Teitelbaum Dry Cleaning, Inc.
Site Management - Monthly Inspection Checklist
BCP Site No. C241149

Engineering Controls	Condition	No	Yes	Deficiencies (if any):
Onsite Sub-slab Depressurization System (SSDS)	Has piping been inspected to confirm operation of appropriate valves?			
Soil Vapor Extraction (SVE) System	Has piping been inspected to confirm operation of appropriate valves?			
SVE and Onsite SSDS	Have alarms been tested to ensure proper operation?			
Offsite SSDS	Has piping been inspected to confirm operation of appropriate valves?			
	Has alarm been tested to ensure proper operation?			

Comments/Notes: _____

Name of inspector: _____

Signature of inspector: _____

Date of inspection: _____

Teitelbaum Dry Cleaning, Inc.
Site Management - Annual Inspection Form
BCP Site No. C241149

Engineering Controls	Condition	Field Notes/Observations:
On- and Offsite Sub-Slab Depressurization (SSD) and Soil Vapor Extraction (SVE) Systems	Observe visible components (fan, vacuum alarm/monitor, vacuum gauge, tubing, riser pipe, etc.) for physical wear, damage and operational issues, and replace as necessary	
	Remove any blockages in vacuum monitor and gauge tubing and riser pipe taps	
	Verify operation of vacuum monitor by disconnecting tubing from riser pipe and noting if the building notification system goes into alarm mode	
	Verify operation of vacuum gauge by disconnecting tubing from riser pipe and noting if the indicator moves to zero (check high and low pressure ports to see if they are plugged correctly)	
	Inspect riser pipe penetrations in concrete slab for proper seal	
	Inspect riser pipe connections at fan for leaks and tightness	
	Inspect power to fan by operating dedicated switch	
Site Cover (annual)	Visual inspection of concrete floors and perforations through floor for cracking or degradation	

Name of inspector: _____

Signature of inspector: _____

Date of inspection: _____

Teitelbaum Dry Cleaning, Inc.
Site Management - Pressure Monitoring Inspection Form
BCP Site No. C241149

Onsite SSDS Pressure Field Extension Testing		
PM-1		in-wc
PM-2		in-wc
PM-3		in-wc
PM-4		in-wc
PM-5		in-wc
PM-6		in-wc

Name of inspector: _____

Signature of inspector: _____

Date of inspection: _____

SVE System Pressure Field Extension Testing		
MP-1	Shallow	in-wc
	Deep	in-wc
MP-2	Shallow	in-wc
	Deep	in-wc
MP-3	Shallow	in-wc
	Deep	in-wc
MP-4	Shallow	in-wc
	Deep	in-wc
MP-5	Shallow	in-wc
	Deep	in-wc
MP-6	Shallow	in-wc
	Deep	in-wc
MP-7	Shallow	in-wc
	Deep	in-wc

Name of inspector: _____

Signature of inspector: _____

Date of inspection: _____

Offsite SSDS Pressure Field Extension Testing		
PM-1		in-wc
PM-2		in-wc
PM-3		in-wc
PM-4		in-wc
PM-5		in-wc
PM-6		in-wc

Name of inspector: _____

Signature of inspector: _____

Date of inspection: _____

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 and lab-supplied bottles, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service (bottle and sample delivery)		
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 (not including treated water)		
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:
Recommendations/Other:

CONTRACTOR CERTIFICATION
I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of _____ (**Contractor Name**), which is responsible for the work documented on this form. According to my knowledge and belief, all of the information provided in this form is accurate and the site management program complies with the DER-10, DER-31, and CP-49 policies. _____ **Date** **Contractor**

APPENDIX 10 – O&M MANUAL (FOR EACH ACTIVE EC)

Soil Vapor Extraction (SVE) System and On- and Offsite Sub-Slab Depressurization Systems (SSDSs) Operations, Maintenance and Monitoring (OM&M) Plan

For

Teitelbaum Dry Cleaning, Inc.

35-45 35th Street, Queens, NY

NYSDEC Site Number: C241149

Prepared for:

S&C Properties, LLC

2 Bay Club Drive, Apt. 10G

Bayside, NY 11360

Prepared by:

TENEN ENVIRONMENTAL

121 West 27th Street, Suite 303

New York, NY 10001

mcarroll@tenen-env.com

DECEMBER 2025

OPERATIONS, MAINTENANCE AND MONITORING (OM&M) PLAN

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OPERATIONS, MAINTENANCE AND MONITORING (OM&M) PLAN

1.0 INTRODUCTION

This Operations, Maintenance and Monitoring (OM&M) Plan has been developed to detail the engineering controls (ECs) implemented at the property located at 35-45 35th Street in the Astoria neighborhood of Queens, NY (Site). The ECs were incorporated as part of the New York State Department of Environmental Conservation (NYSDEC) requirements for soil remediation and soil vapor mitigation.

The Site is located at 35-45 35th Street, in the Astoria neighborhood of Queens, NY and is identified as Block 639, Lot 4 on the New York City Tax Map. The Site is occupied by a single-story, high-ceilinged commercial/manufacturing building (measuring approximately 100 ft x 100 ft). The ground floor of the building is currently utilized as a commercial dry cleaner not open to the public. The building is divided into two sections (north and south). A portion of the southern section contains a second floor that is used as an office and storage space. According to the New York City Department of Buildings (NYC DOB) records, in 1998 one 1,500-gallon fuel oil underground storage tank (UST) was abandoned in place and replaced with six 275-gallon aboveground storage tanks (ASTs). No documentation was available regarding the age, condition, period of usage, proper decommissioning, or any tightness testing associated with the abandoned UST. All six ASTs were set in secondary containment in the form of concrete enclosures. The ground floor of the building houses the majority of equipment and storage space. Equipment and storage on the ground floor includes numerous dry cleaning machines, fuel oil and chemical storage, dryers, washers, pressing stations, and clothing staging areas. The equipment and work areas combine to occupy much of the ground floor, leaving very little accessible space. There is a small sub-grade boiler room (measuring approximately 3 ft x 5 ft) located in the northernmost corner of the property containing a fuel oil-fired steam boiler, condensate tank, and sump.

The Site is an approximately 0.23-acre area and is bounded by 35th Street to the northwest, 36th Avenue to the south, 36th Street to the east, and 35th Avenue to the northeast.

1.1 Background

Environmental investigations at the Site have documented elevated concentrations of chlorinated solvents in the soil, groundwater, soil vapor, and indoor air. There is the potential for an indoor air intrusion condition.

In order to address the potential for indoor air quality impacts from the sub-slab soil and soil vapor, a soil vapor extraction (SVE) system and an active sub-slab depressurization system (SSDS) have been designed and were incorporated into the current building plan.

The goals of the SVE system for the Site are to reduce concentrations of chlorinated volatile organic compounds (cVOCs) in soil to below Protection of Groundwater Soil Cleanup Objectives (SCOs). The goals of the active SSDS for the Site are to mitigate soil vapor intrusion into the existing onsite building, and to prevent off-Site migration of soil vapors.

1.2 Summary of Engineering Controls (ECs)

Four Engineering Controls (ECs) to address remaining contamination through physical protective measures at the Site have been incorporated to ensure that the Site remains protective of public health and the environment. Additionally, one EC has been installed at an offsite, adjoining property.

A soil vapor extraction (SVE) system has been installed to treat impacts in the soil below the onsite building. The principal components of the SVE system include three sets of coupled soil vapor extraction wells installed in the PCE source area. At each of the three locations, one shallow, four-inch vertical SVE well and one deep, four-inch vertical SVE wells was constructed of five feet of slotted (0.020 inch) schedule 40 PVC screen. All shallow extraction wells were installed to a depth of 13 feet below grade (ft-bg); one deep extraction well was installed to a depth of 17 ft-bg; and, two deep extraction wells were installed to a depth of 18 ft-bg. The extraction wells were each connected below grade to two-inch PVC piping extending to the location of the SVE system equipment in the northwestern corner of the Site. Trenching was completed to accommodate the connections. The trenching was completed by saw cutting and jackhammering to remove the existing concrete slab and removing the underlying soil to a depth of approximately one to two ft-bg. Upon completion of the subgrade SVE piping network, clean sand was backfilled around the

piping and the concrete slab was repaired to seal the trench. The excavated soil was containerized and disposed of offsite in accordance with local, state, and federal regulations. A Contained-In Determination (CID) was obtained from NYSDEC on June 16, 2025 to permit all soil generated during the SVE system piping installation to be disposed of offsite as non-hazardous waste. The extraction wells were plumbed to a six-inch galvanized steel manifold for connection to the SVE system blower in the northwestern corner of the Site building, independent from the onsite SSDS riser. The discharge location for the blower is located on the building roof consistent with the NYSDEC DAR-1 guidance.

Active sub-slab depressurization systems (SSDSs) were installed within the existing onsite building and an offsite and adjoining property. The principal components of the onsite SSDS include six suction pits installed beneath the building slab, each connected via manifold to a fan on the roof via galvanized steel piping. Galvanized steel was utilized due to fire department requirements for exterior piping. To create the suction pits, the existing slab was saw cut and the underlying soil was removed to a depth of at least 18 inches. The void space was then lined with geotextile fabric and a layer of ¾-inch clean stone aggregate. The principal components of the offsite SSDS include a sub-grade network of perforated PVC pipes set horizontally within sub-grade trenches consisting of a minimum of six-inches of clean stone aggregate overlying gas-permeable geotextile fabric. The offsite SSDS underlies the concrete foundation slab of the adjacent development. One six-inch diameter cast iron riser pipe connects to the sub-grade network and extends vertically through the building to the roof, where the pipe is connected to a blower fan for exhaust. The goal of the systems was to create a pressure differential of at least -0.02 inches of water column (in-wc) between the foundation slabs and the sub-slab environments; however, differential pressure readings above -0.004 in-wc are considered acceptable. An alarm system was installed with each SSDS to notify the respective building management if a drop in pressure occurs, which indicates that the system is not operating as designed. The systems were designed in general accordance with NYSDOH's Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006 (NYSDOH Soil Vapor Guidance).

2.0 Engineering Control Operations

Four permanent ECs were incorporated into the existing onsite building to address potential remaining contamination at the Site. The ECs are:

- A soil vapor extraction (SVE) system;
- An active sub-slab depressurization system (SSDS);
- A composite cover system; and,
- Post-remedial groundwater monitoring.

In addition, the following EC was installed within an offsite and adjoining property to address potential remaining soil vapor contamination emanating from the Site. This EC is:

- An active SSDS

General design drawings and specifications are included in the Appendices.

2.1 Soil Vapor Extraction (SVE) System

The SVE system will reduce the remaining chlorinated solvent impacts in soil at the Site. The SVE system will be inspected at specific intervals as defined in this OM&M.

2.2 Sub-Slab Depressurization Systems (SSDSs)

The on- and offsite SSDSs will reduce the potential for soil vapor migration into the existing onsite building and offsite and adjoining building. The SSDSs will be inspected at specific intervals as defined in this OM&M.

2.3 Composite Cover System

Exposure to soil, groundwater, and soil vapor will be prevented by a composite cover system that will be maintained at the Site. The composite cover system consists of the existing four- to six-inch thick concrete building slab, which covers the entirety of the Site.

2.4 Groundwater Monitoring

Long-term monitoring (eight quarterly events) of the groundwater will be conducted to confirm the efficacy of the groundwater remedy. All quarterly groundwater monitoring samples will be analyzed for cVOCs.

While post-remedial groundwater monitoring is part of the selected remedy, it is presented as an EC because it will continue after the Final Engineering Report (FER) and SMP are submitted.

3.0 Routine Maintenance and Monitoring

EC inspections will be performed by a person knowledgeable with the mechanical systems present in the building and familiar with the property and may include a building or property superintendent.

3.1 EC Inspection Frequency

Site inspection and certification for performance of the SVE system and active SSDS will be performed on a schedule detailed in the SMP and reported in an annual Periodic Review Report (PRR).

3.2 EC Inspection Components

The EC inspections will evaluate the following:

- continued performance of ECs as designed;
- compliance with this SMP;
- continued achievement of remedial performance criteria;
- accuracy and completeness of Site records;
- necessity for any changes to the remedial systems; and
- general Site conditions at the time of inspection.

In the event of an emergency, such as a natural disaster or an unforeseen failure of any of the ECs, an inspection of the ECs will be conducted by a Qualified Environmental Professional (QEP), as defined by NYSDEC.

3.3 Engineering Control (EC) Inspections

3.3.1 Soil Vapor Extraction (SVE) System

EC inspections of the SVE system components shall include the following:

- Observe visible components (fan, vacuum switch/alarm, tubing, riser pipe, air cleaning filters [if required], etc.) for physical wear, damage and operational issues, and replace as necessary;
- Remove any blockages in vacuum switch/alarm tubing and riser pipe taps;

- Verify operation of vacuum switch/alarm by disconnecting tubing from riser pipe and noting if the system goes into alarm mode;
- Inspect riser pipe penetrations in concrete slab for proper seal;
- Inspect riser pipe connections at fan for leaks and tightness;
- Inspect air cleaning (if required) for operational issues;
- Inspect condition of muffler (if installed) at end of outlet pipe; and,
- Inspect power to fan by operating dedicated switch.

3.3.2 On- and Offsite Sub-Slab Depressurization Systems (SSDSs)

EC inspections of the SSDS components shall include the following:

- Observe visible components (fan, vacuum switch/alarm, tubing, riser pipe, etc.) for physical wear, damage and operational issues, and replace as necessary;
- Remove any blockages in vacuum switch/alarm tubing and riser pipe taps;
- Verify operation of vacuum switch/alarm by disconnecting tubing from riser pipe and noting if the system goes into alarm mode;
- Inspect riser pipe penetrations in concrete slab for proper seal;
- Inspect riser pipe connections at fan for leaks and tightness;
- Inspect condition of muffler (if installed) at end of outlet pipe; and,
- Inspect power to fan by operating dedicated switch.

3.3.3 Composite Cover System

EC inspections of the composite cover shall include observations of the concrete building slab. The composite cover will be inspected for cracks, holes or other openings that will provide access to the soil/fill below the cover. If any cracks, holes or other openings are observed in the composite cover during the EC inspection, the inspector will make a recommendation that such cracks, holes or openings be immediately filled and/or sealed as necessary.

3.4 Inspection Reporting

EC inspections will be performed by a person with knowledge of the mechanical systems present in the building and familiar with the property. Such person may include a building or

property superintendent. Inspections will be completed and reported to NYSDEC at the frequency detailed in Section 3.1. The PRR will include, at a minimum:

- Date of inspection;
- Personnel conducting inspection;
- Description of the inspection activities performed;
- Observations for each EC inspected, noting any deficiencies, conclusions and recommendations;
- Copies of inspection forms;
- Indoor air sampling results if applicable; and
- Certification of ECs, as discussed below.

PRR's containing the findings from inspections and associated certifications will be submitted to NYSDEC on an annual basis. PRR's will be submitted in digital format to NYSDEC. The Department will send a reminder notice indicating the date in which the PRR is due.

3.5 Certifications

The results of the EC inspections will be certified at the time of the inspection and the signed certifications included with the PRR.

The Inspection Certification will certify whether:

- on-site ECs are unchanged from the previous certification;
- on-site ECs remain in-place and effective;
- on-site ECs are performing as designed; and
- anything has occurred that would impair the ability of the controls to protect public health and the environment.

4.0 EMERGENCY CONTACT NUMBERS

In the event of any emergency condition pertaining to any EC, the current Owner's representative(s) should contact the appropriate parties from the contact list below. Prompt contact should also be made to a Qualified Environmental Professional (QEP), as defined by NYSDEC. These emergency contact lists must be maintained in an easily accessible location at the Site.

Emergency Contact Numbers

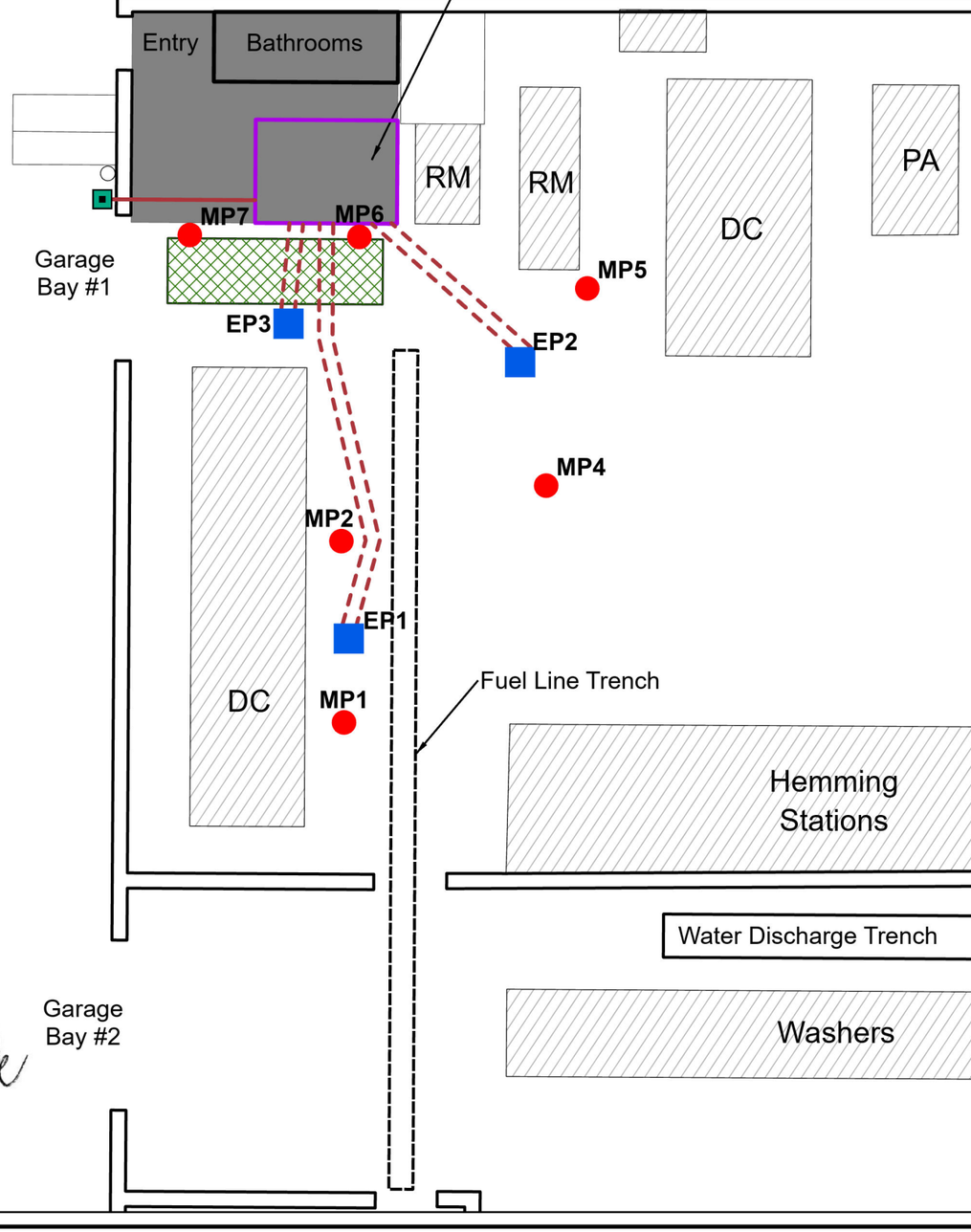
Contact	Number
Medical, Fire and Police:	911
One Call Center:	(800) 272-4480 (3 day notice required for utility markout)
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline	(800) 457-7362

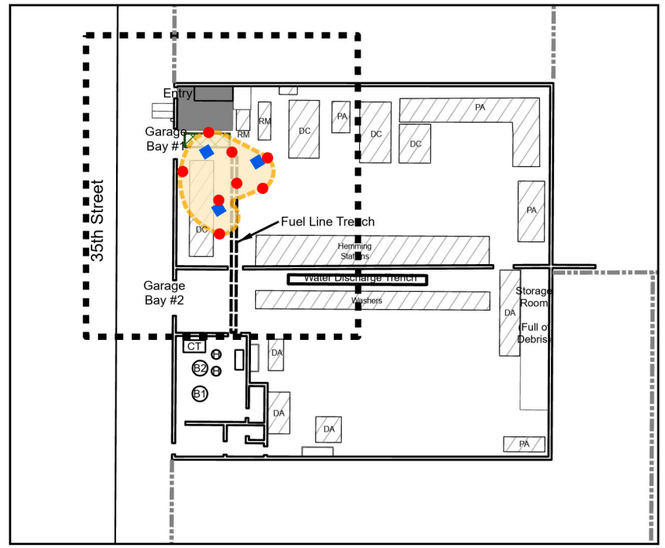
Project Contact Numbers

Contact	Number
Matthew Carroll Tenen Environmental	(646) 606-2332

Appendix A

SVE System and SSDS Designs – As-Built





Legend

- Coupled Soil Vapor Extraction Wells (deep and shallow)
- Soil Vapor Extraction Monitoring Points
- Riser to Roof
- Subsurface System Piping
- Above Grade System Piping
- SVE Enclosure
- Inaccessible
- Partial Cellar
- Abandoned 1,500 Gallon UST

DC Dry Cleaning Machine
PA Pressing Area
DA Dryer Area
RM PCE Recycling
(B) Boiler
(H) Hot Water Heater
CT Condensate Tank

Notes:

1. Placement and size of equipment is approximate.
2. Shallow SVE Wells are screened 8-13 feet below grade.
3. Deep SVE Wells EP1 and EP2 are screened 13-18 feet below grade. Deep SVE Well EP3 is screened 12-17 feet below grade.
4. Riser to Roof Connects to Effluent Release on Roof

0 4 8 12 16 Feet

Source:
gis.nyc.gov/taxmap.htm
Integral Engineering, P.C., 34-45 35th St., Astoria, NY, RIR, Fig.3
EnviroTrac Environmental Services, Proposed SVE System Layout, Fig 3, Teitelbaum Dry Cleaning Inc., 7/21/23

STATE OF NEW YORK
MATTHEW M. CARROLL
LICENSED PROFESSIONAL ENGINEER
091629

Site

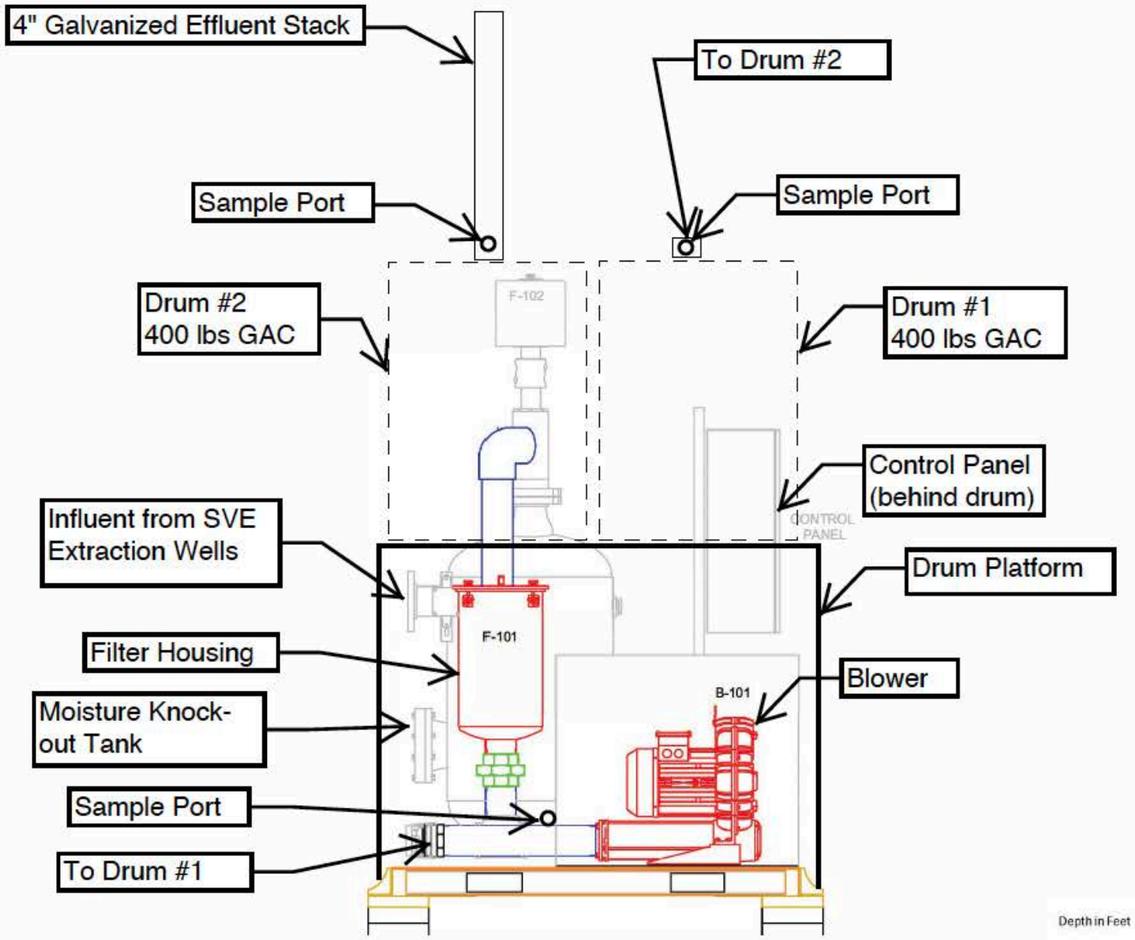
Final Engineering Report
Teitelbaum Dry Cleaning, Inc.
35-45 35th Street
Astoria, New York
BCP Site No. C241149

TENEN ENVIRONMENTAL
Tenen Environmental, LLC
121 West 27th Street, Suite 303
New York, NY 10001
O: (646) 606-2332; F: (646) 606-2379

Drawn By	Checked By	Date	Scale
LM	AP	September 2025	As Noted

Drawing Title: **Soil Vapor Extraction System Layout**

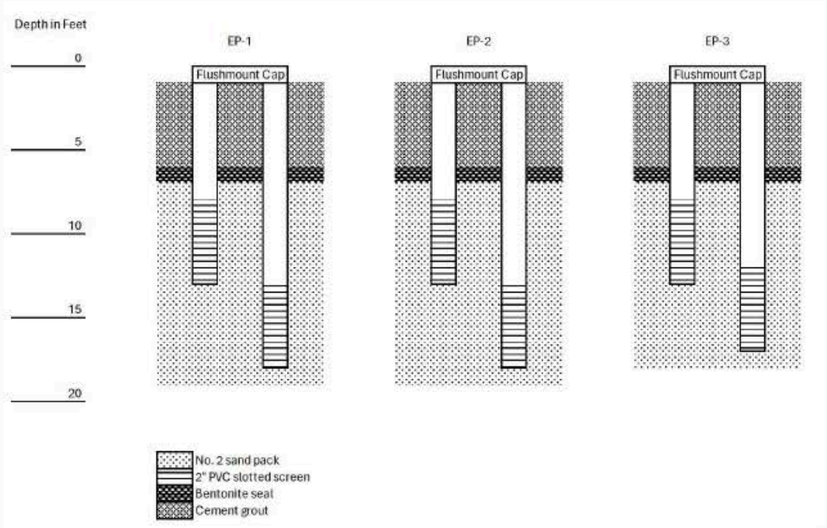
Drawing No: **Y-100**



SVE System As-Built

STATE OF NEW YORK
MATTHEW M. CARROLL
091629
LICENSED PROFESSIONAL ENGINEER

SVE Extraction Well As-Built



Site
Final Engineering Report
Teitelbaum Dry Cleaning, Inc.
35-45 35th Street
Astoria, New York
BCP Site No. C241149

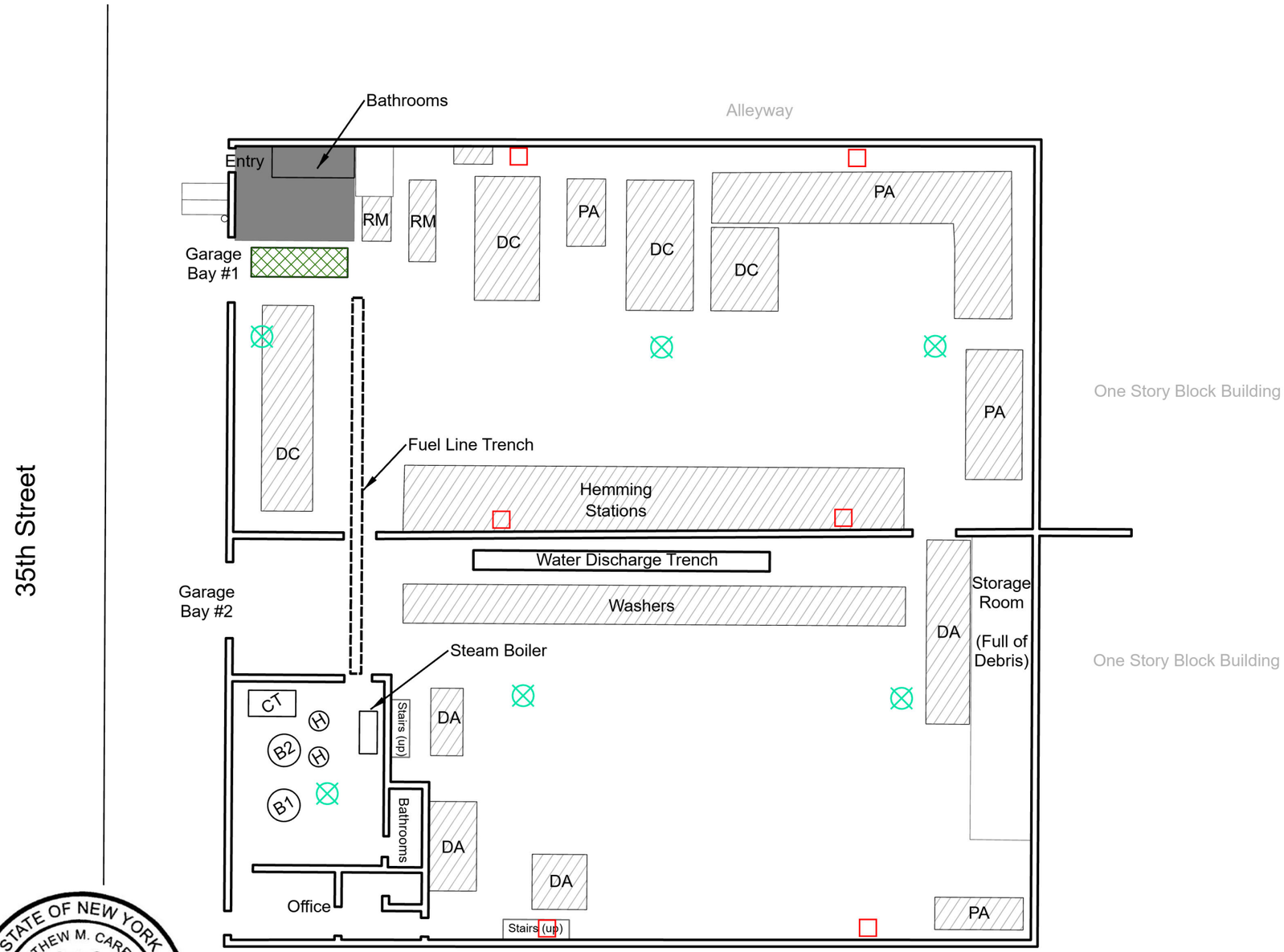
TENEN ENVIRONMENTAL

Tenen Environmental, LLC
121 West 27th Street, Suite 303
New York, NY 10001
O: (646) 606-2332; F: (646) 606-2379

Drawn By	Checked By	Date	Scale
LM	AP	September 2025	As Noted

Drawing Title: Soil Vapor Extraction System Sections

Drawing No: Figure Y-102



Legend

- Pressure Monitoring Point
- Suction Pit
- Concrete Block Enclosed 275-Gallon Fuel Oil ASTs
- Inaccessible
- Partial Cellar
- Abandoned 1,500 Gallon UST
- DC Dry Cleaning Machine
- PA Pressing Area
- DA Dryer Area
- RM PCE Recycling
- (B) Boiler
- (H) Hot Water Heater
- CT Condensate Tank

Notes:

1. Placement and size of equipment is approximate.

0 7.5 15 22.5 30 Feet

STATE OF NEW YORK
MATTHEW M. CARROLL
091629
LICENSED PROFESSIONAL ENGINEER

Source: Integral Engineering, P.C., 34-45 35th St., Astoria, NY, RIR, Fig.3

Site

Final Engineering Report
Teitelbaum Dry Cleaning, Inc.
35-45 35th Street
Astoria, New York
BCP Site No. C241149

TENEN ENVIRONMENTAL
Tenen Environmental, LLC
121 West 27th Street, Suite 303
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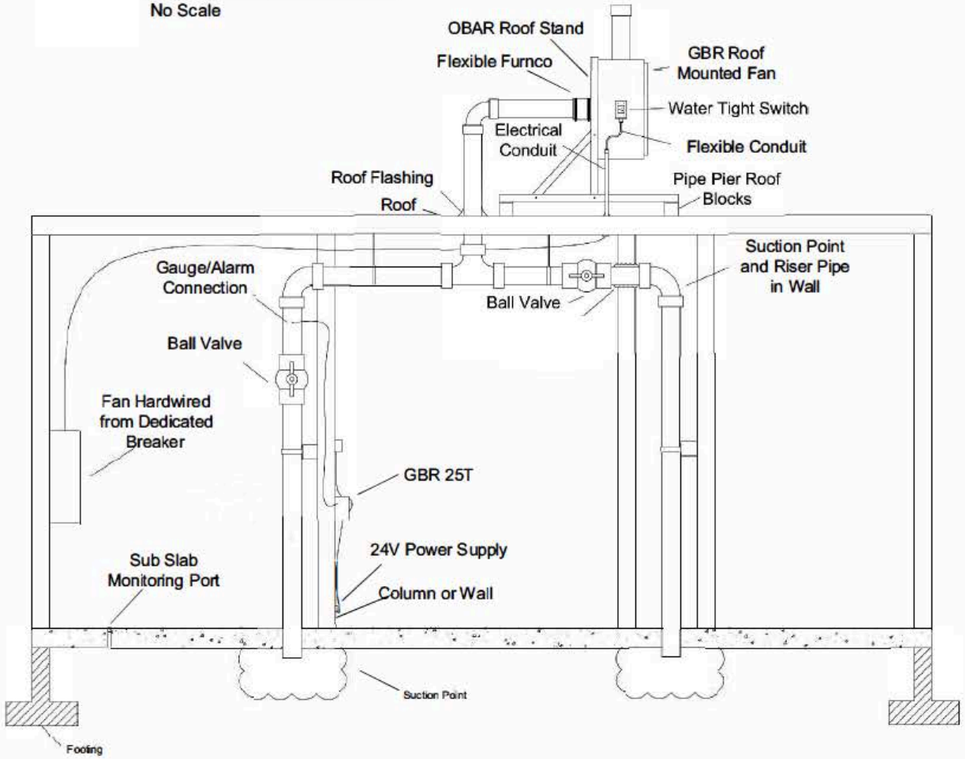
Drawn By	Checked By	Date	Scale
LM	AP	September 2025	As Noted

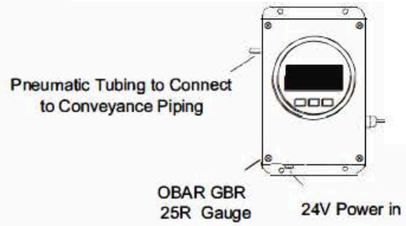
Drawing Title: **Onsite Sub-Slab Depressurization System Layout**

Drawing No: **Z-100**

System Section View

No Scale





STATE OF NEW YORK
MATTHEW M. CARROLL
091629
LICENSED PROFESSIONAL ENGINEER

Site

Final Engineering Report
Teitelbaum Dry Cleaning, Inc.
35-45 35th Street
Astoria, New York
BCP Site No. C241149

TENEN ENVIRONMENTAL
Tenen Environmental, LLC
121 West 27th Street, Suite 303
New York, NY 10001
O: (646) 606-2332; F: (646) 606-2379

Drawn By: LM
Checked By: AP
Date: September 2025
Scale: As Noted

Drawing Title: Sub-Slab Depressurization System As-built Section

Drawing No: Z-101

Appendix B

Soil Vapor Extraction (SVE) System and Sub-Slab Depressurization Systems (SSDSs)

Routine Operating Procedures

The long-term operation and maintenance program described below shall continue throughout the life cycle of the SVE system and on- and offsite SSDSs to ensure a proper working order. The long-term operation and maintenance program for the major SVE system and on- and offsite SSDS components includes manufacturer's recommendations for the reinstallation of SVE system and SSDS components if modifications to the existing systems need to be made, inspection procedures, an operation schedule, typical routine maintenance activities and schedules, and troubleshooting.

The alarm systems, described below, shall run continuously and only be disconnected for routine maintenance and inspection activities or replacement. The SVE system riser pipe is equipped with the following:

- Dwyer Series 1800 Low Differential Pressure Switch (Model: 1823-80)

The onsite SSDS riser pipe is equipped with the following:

- Obar Systems, Inc. Digital Pressure Gauge and Alarm (Model: GBR25-R)

The pressure switches references above include scaled adjustment knobs to allow changes to the switching pressure to be made without a pressure gauge; the products are SPDT pressure switch and alarm combinations. The alarm is wired to send a signal remotely to the building's management system. In case there is a need to relocate a switch/alarm, the new location shall ensure that the switch/alarm remains in close proximity to the riser pipes and is installed correctly. If the device is not indicating a vacuum while the SVE system or SSDS is on, staff will make sure that the tubing connected to the riser pipe is connected to the low pressure port. High pressure ports on the vacuum switch/alarm should be vented to atmosphere.

The vacuum switch/alarm does not require lubrication or periodic servicing. Repairs or alterations made to the vacuum switches by others will void the unit's warranty. The vacuum switches are factory calibrated and cannot be recalibrated in the field. The installation and

operating instructions for the vacuum alarm/monitor have been included in Appendix C for the SSDSs and Appendix D for the SVE system.

When testing the vacuum alarms, the tubing that connects the vacuum alarms to the riser pipe shall be disconnected and the low set point raised above the current reading. If the vacuum alarms are powered at the time of disconnecting the tubing from the riser pipe, the alarms will go off. The alarms should go back on-line when the tubing is reconnected to the riser pipe. If the system is in alarm when there is a vacuum present in the riser pipe, inspect the tubing and riser pipe tap to ensure that there are no blockages. If there is a blockage in either the tubing or the riser pipe tap, remove the blockage and retest the vacuum alarm/monitor.

The SVE system and SSDS fans shall operate continuously and only be turned off for routine maintenance and inspection activities or replacement. The SVE system and SSDS fans shall not be left on the system piping without electrical power for more than 48 hours due to possible fan failure that could result from this non-operational storage. The SVE system and SSDS fan units do not require periodic servicing and should be returned to the manufacturer or supplier for service. Repairs or alterations made to the SVE system or SSDS fan units by others will void the unit's warranty. The installation and operating instructions for the SVE system and SSDS fan units have been included in Appendices D and C, respectively.

Inspections of the SVE system components shall include the following:

- Observe visible components (fan, vacuum switch/alarm, tubing, riser pipe, air cleaning filters [if required], etc.) for physical wear, damage and operational issues, and replace as necessary;
- Remove any blockages in vacuum switch/alarm tubing and riser pipe taps;
- Verify operation of vacuum switch/alarm by disconnecting tubing from riser pipe and noting if the system goes into alarm mode;
- Inspect riser pipe penetrations in concrete slab for proper seal;
- Inspect riser pipe connections at fan for leaks and tightness;
- Inspect air cleaning (if required) for operational issues;
- Inspect condition of muffler (if installed) at end of outlet pipe; and,
- Inspect power to fan by operating dedicated switch.

Inspections of the on- and offsite SSDS components shall include the following:

- Observe visible components (fan, vacuum switch/alarm, tubing, riser pipe, etc.) for physical wear, damage and operational issues, and replace as necessary;
- Remove any blockages in vacuum switch/alarm tubing and riser pipe taps;
- Verify operation of vacuum switch/alarm by disconnecting tubing from riser pipe and noting if the system goes into alarm mode;
- Inspect riser pipe penetrations in concrete slab for proper seal;
- Inspect riser pipe connections at fan for leaks and tightness;
- Inspect condition of muffler (if installed) at end of outlet pipe; and,
- Inspect power to fan by operating dedicated switch.

Common troubleshooting tips that can be followed if the vacuum switch/alarm will not indicate a vacuum or is sluggish include the following:

- The pressure ports (high or low) are not hooked up correctly;
- The fittings or sensing lines are blocked, pinched or leaking;
- The cover is loose;
- The pressure sensor is improperly located;
- The ambient temperature is too low (below 20-deg C)

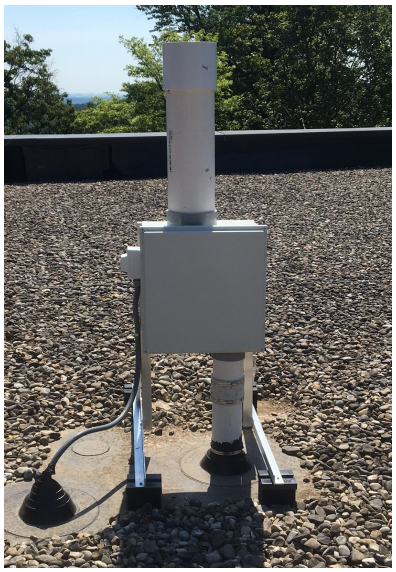
The installation and operating instructions for the SSDS equipment have been included in Appendix C. The installation and operating instructions for the SVE equipment have been included in Appendix D.

Appendix C

SSDS Equipment Specifications

THE OBAR GBR89
COMPACT RADIAL BLOWER

Based on 25 years of experience and 2 years of research and development, the patent pending GBR series of compact radial blowers provide the perfect combination of performance and design.



GBR89 WITH ROOF MOUNT

PERFORMANCE

- GBR89 HA 14” WC at 100CFM max flow 500 CFM.
- Built in speed control to customize performance.
- Condensate bypass built in.
- 12 month warranty 40,000 hr sealed bearings.

DESIGN

- Our modular design means the blower and manifold assembly can be removed and replaced as a unit. This makes repairs cost effective and easy and allows contractors to upgrade systems simply by swapping assemblies.
- The GBR series is based on a bypass blower designed to handle combustible materials.
- The housing is not required to be air tight so you can add gauges and alarms without compromising the system.
- Built in condensate bypass.
- Built in speed control.
- Quick disconnect electrical harness.
- All UL listed components including UL listed enclosure for outside use.
- Wall fastening lugs included.
- GBR series roof and wall mounts available to quickly configure the blowers for your installation while providing a custom built look.
- Compact design 18”x 16”x 10” weighing only 26 lbs.
- 4” schedule 40 inlet and 6” schedule 40 exhaust.

Enclosure Specifications

Rating:

Ingress Protection (EN 60529): 66/67

Electrical insulation: Totally insulated

Halogen free (DIN/VDE 0472, Part 815): yes

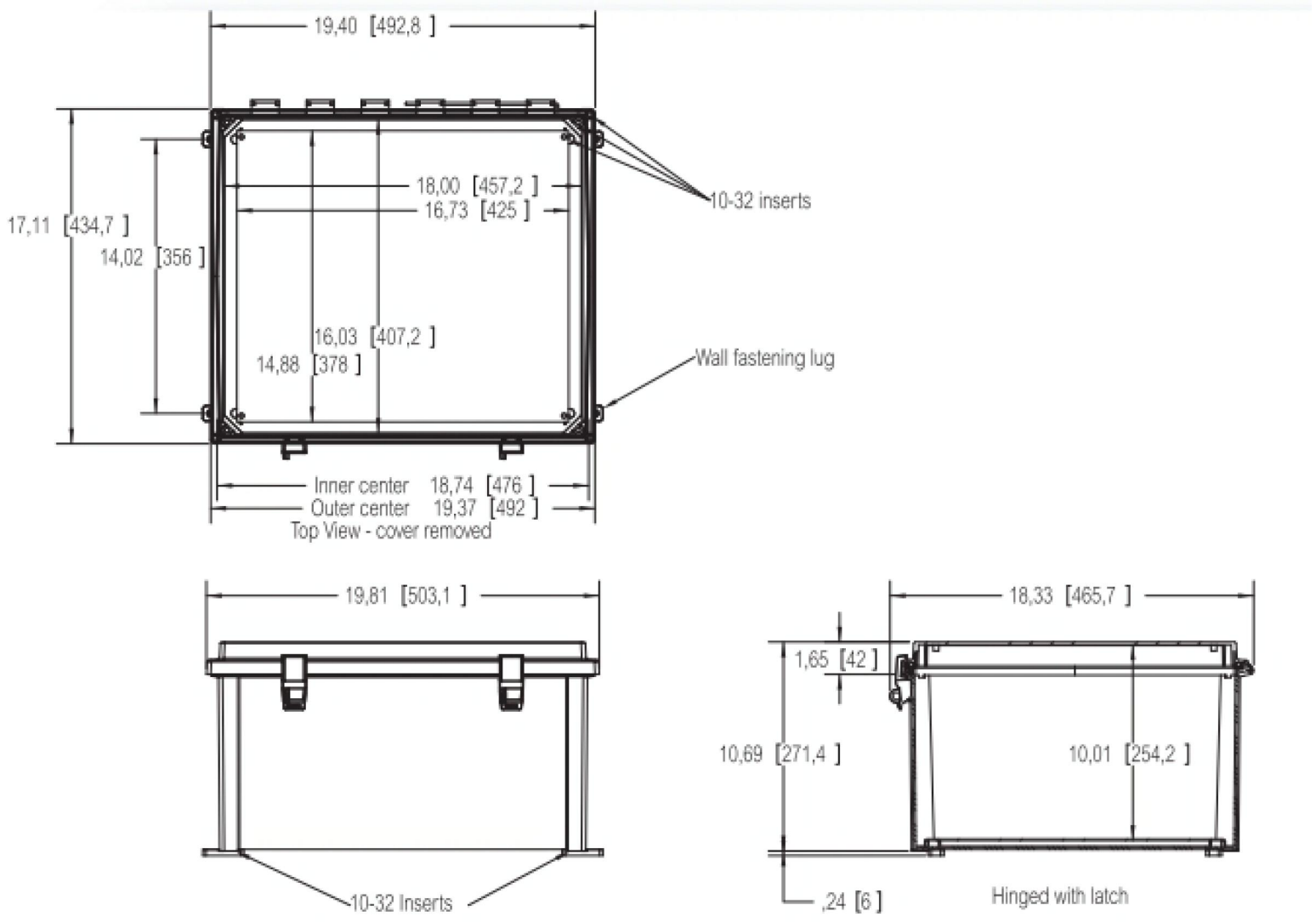
UV resistance: UL 508

Flammability Rating (UL 746 C 5): complies with UL 508

Glow Wire Test (IEC 695-2-1) °C: 960

NEMA Class: UL Type 4, 4X, 6, 6P, 12 and 13

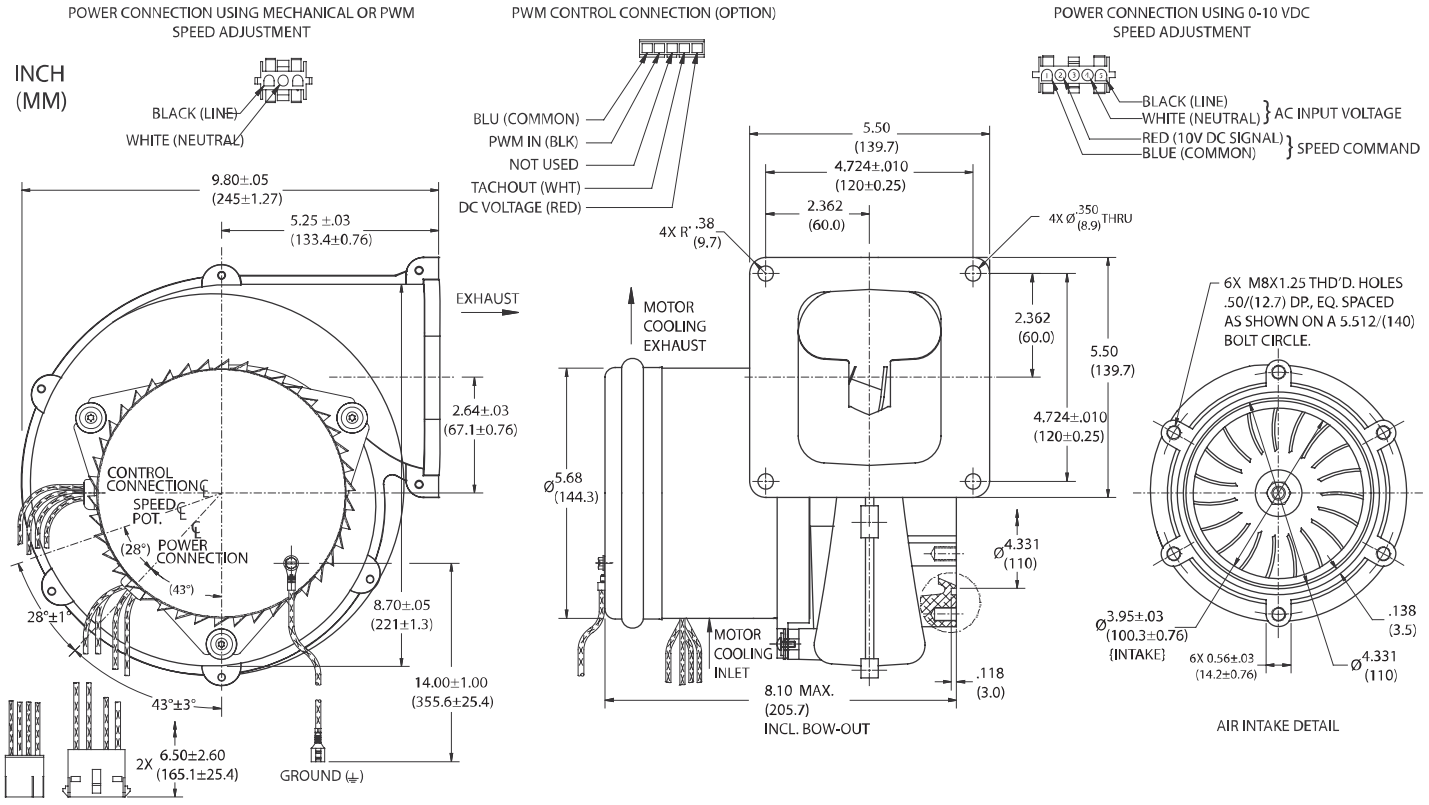
Certificates: Underwriters Laboratories



High Voltage Brushless DC Blowers

Nautilair (TM) 8.9" (226mm) Variable Speed Blower

240 Volt AC Input, Single Phase, High Output



		Part/ Model Number		
Specification	Units	150240	150241	150242
Speed Control	-	Mechanical	0-10 VDC	PWM

Notes:

- **Input Voltage Range:** 216 - 264 Volts AC RMS, 50/60 Hz, single phase.
- **Input Current:** 10 amps AC RMS
- **Operating Temperature (Ambient Air and Working Air):** 0°C to 50°C
- **Storage Temperature:** -40°C to 85°C
- **Dielectric Testing:** 1800 Volts AC RMS 60 Hz applied for one second between input pins and ground, 3mA leakage maximum.
- **Speed Control Methods:** PWM (Pulse Width Modulation). Speed control input signal of 15 - 45 VDC @ 500 Hz - 10 kHz, and tachometer output (2 Pulses / Revolution).
  Optional tachometer output (3 Pulses / Revolution).
  0 to 10 VDC with a speed control input current of 5 mA to 20 mA at 10 VDC Input with multi-turn potentiometer set to minimum resistance (fully clockwise).
  Mechanical: A potentiometer is available for speed control of the blower. The potentiometer can be preset for a specific speed. Access for speed adjustment located in motor housing.
  4-20mA speed control available.
- **Approximate Weight:** 9.3 Lbs. / 4.2 Kg.
- **Option Card available for Customization**
- **Regulatory Agency Certification:** Underwriters Laboratories Inc. UL507 Recognized under File E94403 and CSA C22.2#133 under File LR43448
- **Design Features:** Designed to provide variable airflow for low NOx & CO emission in high efficiency gas fired combustion systems. Built with non-sparking materials. Blower housing assembly constructed of die cast aluminum. Impeller constructed from hardened aluminum. Rubber isolation mounts built into blower construction to dampen vibration within the motor. Two piece blower housing assembly sealed with O-ring gasket for combustion applications. Customer is responsible to check for any leakage once the blower is installed into the final application.
- **Miscellaneous:** Blower inlet, discharge, and all motor cooling inlet and discharge vents must not be obstructed. Motor ventilation air to be free of oils and other foreign particles, (i.e. breathing quality air). Blower is to be mounted so ventilation air cannot be re-circulated.
  POWER CONNECTION (3 CAVITY): Blower connector, AMP Universal MATE-N-LOK, part no. 1-480701-0.
  POWER CONNECTION (5 CAVITY): Blower connector, AMP Universal MATE-N-LOK, part no. 350810-1.
  SPEED CONNECTION (5 CAVITY): Blower connector, Molex Mini-Fit Jr., part no. 39-01-4057.
  Mating harnesses available upon request.

This document is for informational purposes only and should not be considered as a binding description of the products or their performance in all applications. The performance data on this page depicts typical performance under controlled laboratory conditions. AMETEK is not responsible for blowers driven beyond factory specified speed, temperature, pressure, flow or without proper alignment. Actual performance will vary depending on the operating environment and application. AMETEK products are not designed for and should not be used in medical life support applications. AMETEK reserves the right to revise its products without notification. The above characteristics represent standard products. For product designed to meet specific applications, contact AMETEK Technical & Industrial Products Sales department.

AMETEK TECHNICAL & INDUSTRIAL PRODUCTS
627 Lake Street, Kent OH 44240
USA: +1 215-256-6601 - Europe: +44 (0) 845 366 9664 - Asia: +86 21 5763 1258
www.ametektip.com

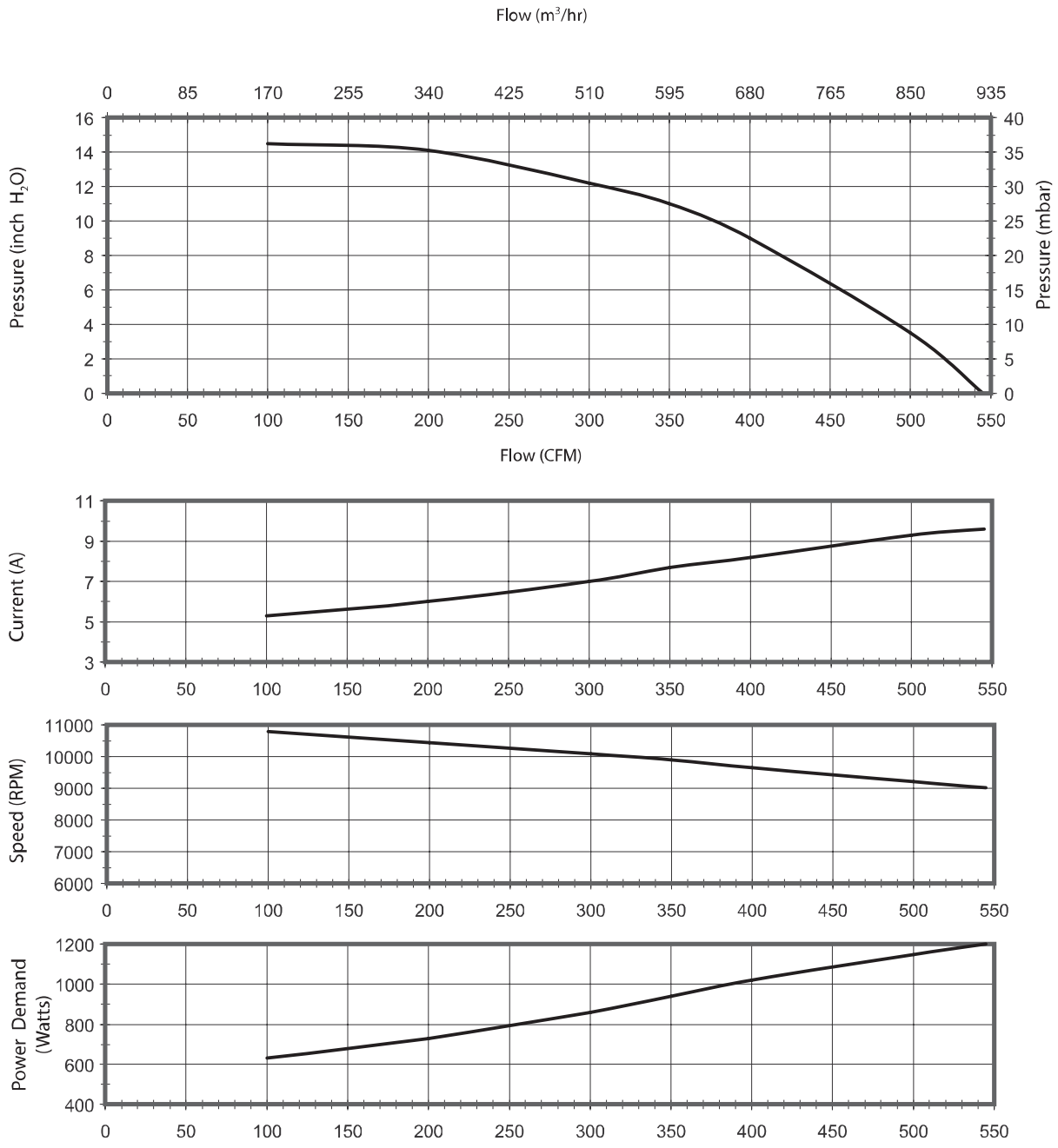
AMETEK
PRECISION MOTION CONTROL

Nautilair (TM) 8.9" (226mm) Variable Speed Blower

Nautilair

240 Volt AC Input, Single Phase, High Output

Typical Performance



Data presented represents blower performance at STANDARD AIR DENSITY, .075 lb/ft³ (29.92" Hg, Sea Level, 68° F)
Vacuum performance available upon request.

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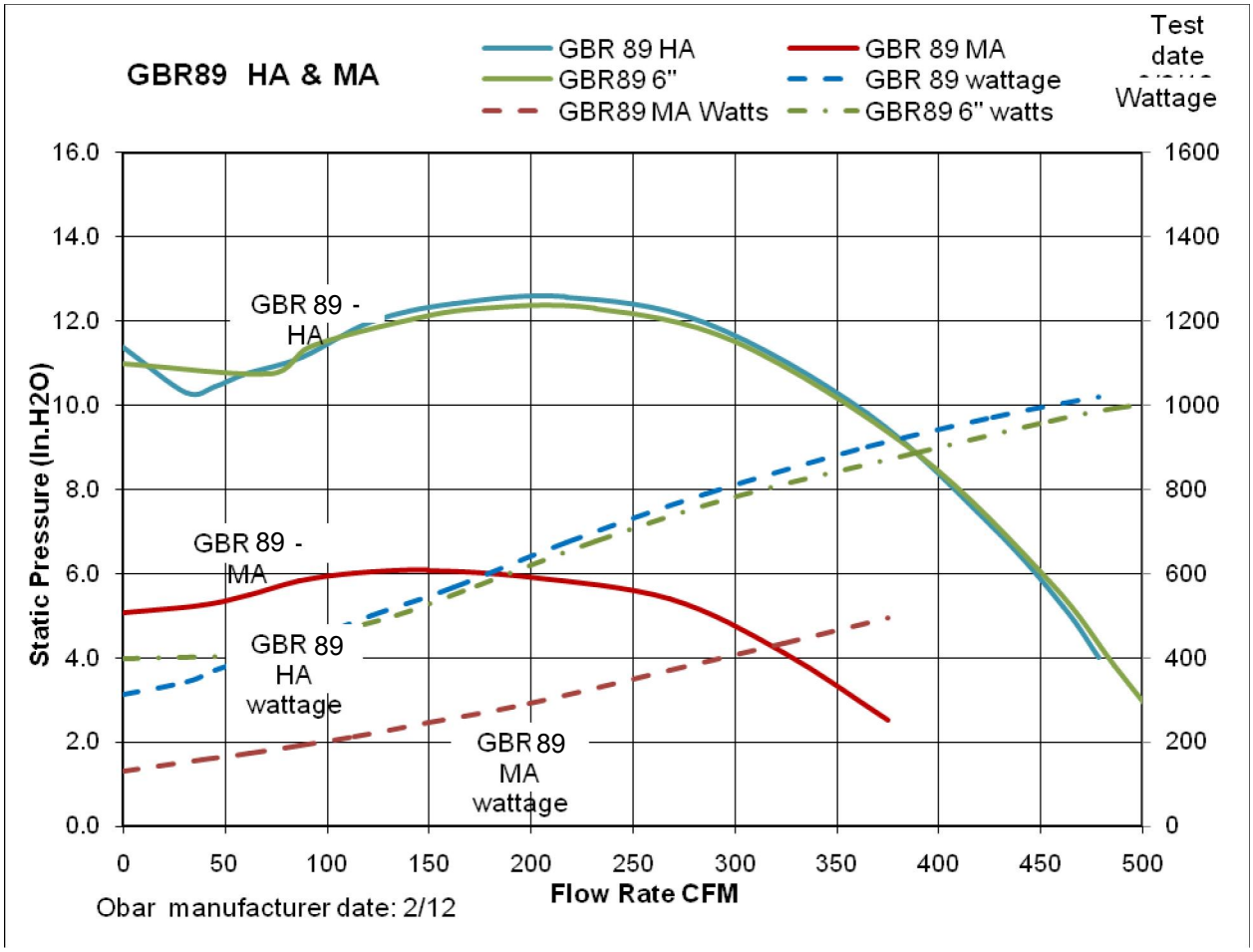
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627 Lake Street, Kent OH 44240
USA: +1 215-256-6601 - Europe: +44 (0) 845 366 9664 - Asia: +86 21 5763 1258
www.ametektip.com

AMETEK
PRECISION MOTION CONTROL

GBR89 HA tested at full voltage with 8 feet of 4" inlet (Blue Lines) and 6" Inlet (Green lines)

Maximum airflow with no exhaust piping and 8' of 6" piping is 529 CFM

GBR89 MA tested with speed control set to half the wattage consumption (Red Line)



GBR 25 Mini Digital Differential Pressure Gauge With Alarm

System alarms and monitoring made simple and affordable.

Finally a product that has what you need and can be easily installed.
The GBR 25 is a compact stand alone system gauge with an audible and visual alarm that works for VOC and Radon systems operating at system pressures greater than 2" wc. Included is a second relay that can be used to trigger additional alarms.
Includes Power supply
Optional 4-20 MA or 0-10 outputs can be used to monitor system pressure.

Contact OBAR for a quote to build custom alarm panels for your needs.

Applications and features

- Scale 0-40 inches WC eliminates need for multiple gauges.
- Visual and audible alarm included and factory set at 1" WC
  The alarm set point can be changed in the field.
- Second adjustable relay for triggering additional alarms.
- Optional 4-20 MA or 0-10 output for data.
- Accuracy is up to ±1% FS, with large LCD display.
- Function keys: zero reset, units select, display update time, automatic sleep time, alarm, etc.



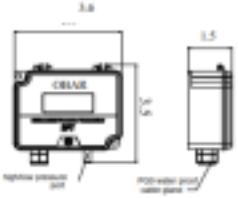
Specifications

Medium: Non-combustible, non-corrosive air, insensitive to moisture, dust, condensation and oil
Working Temp.: 20~70°C
Medium Temp.: 0~60°C
Temp. Compensation: 0~50°C
Working Pressure: overload 10xFS, burst 15xFS
Display: 5 bits LCD, with engineering unit & backlight
Output: 0-10V / 4-20mA (3 wires)
Output load: ≤500Ω (current), ≥2KΩ (voltage)
Relay Output: 2×SPST, 3A/30VDC, 3A/250VAC or 1xBuzzer
Accuracy: up to ±1.0%FS(±2.0%FS@25Pa range)
Long term stability: ±0.5%FS /Year
Thermal effect: <0.05%FS/°C (zero), <0.08%FS/°C(FS)
Power type 16~28VDC/AC
24V Power Supply included
Process Connection: 5mm ID tubing, two pairs (left/back)
Keys: 3 touch buttons
Protection: IP54
Approval: CE
Display update time: selectable for 0.5/1/5/10s (default 1s)

Other OBAR products you may be interested in.

DPT(DPT-F Flush Mount) Differential Pressure Transmitter





Pricing: $125 per unit

Add $20 for 4-20 mA / 0-10V version

Custom options and bulk order pricing available. Call or email for details.

OBAR Systems, Inc. **800-949-OBAR** **wholesale@obarsystems.com**

Low Profile Custom Alarm Panel



Features

Pre-wired solution for SSDS systems.

Vacuum tube connections pre-labeled to corresponding gauge.

Hinge orientation can be customized.

Secondary relay can be used for secondary alarm/MarCell Pro monitor or upgrade to a 4-20 mA/0-10v output for remote monitoring capability.

Low profile, wall mountable design.

Power supply included.

Custom labeling available.



Appendix D

SVE System Equipment Specifications

AIR ENERGY GROUP LLC

Documentation Package

NES PROJECT NUMBER: 25-103, May 2025
PROJECT NAME: SVE System Skid
S & C Properties, LLC Site
35-45 35th Street
Astoria-Queens, NY 11106

Prepared for:

S & Properties c/o Tenen Environmental, LLC
121 West 27th Street, Suite 702
New York, NY 10001

Sales & Technical Support: (508)230-9445

SECTION 1 - SUMMARY OF EQUIPMENT

COMPONENT SUMMARY

WARRANTY STATEMENT

AE-NES MAJOR COMPONENT SUMMARY **REV A** MAY 23, 2025

PROJECT NO.: **25-103N** **TENEN / S&C PROPERTIES - SVE SYSTEM 35-45 35th ST ASTORIA-QUEENS, NY**

COMPONENT	TAG	QTY	MANUFACTURER	MODEL	SERIAL NUMBER
SECTION 1 - SUMMARY OF EQUIPMENT					
COMPONENT SUMMARY					
WARRANTY STATEMENT					
SECTION 2 - MECHANICAL DRAWINGS & TABLE(S)					
M-1, PROCESS & INSTRUMENTATION DIAGRAM (P&ID)	M-1				
T-1, INSTRUMENTATION TABLE	T-1				
M-2, SKID LAYOUT DRAWING	M-2				
M-3, MOISTURE SEPARATOR (MS) DRAWING	M-3				
SECTION 3 - PROCESS EQUIPMENT					
MOISTURE SEPARATOR (MS), 80 GALLONS, 4 IN TANGENTIAL 64 FPS	T-101	1	AE-NES	80 GAL	N/A
MS HEAT TRACE, SELF-REGULATING, 5 WATTS/FT [125 W MAX], W/ TERMINATION KIT	HT-101	25 FT	THERMON	5-FLX-1 BC / PETK-10	N/A
INLINE FILTER, 4 IN, RATED 520 CFM, L-STYLE	F-101	1	SOLBERG	CSL-235P-400	N/A
DILUTION GATE VALVE, 2 IN BRASS, THREADED		1	RED WHITE VALVE	RWV2672 - 2 IN	N/A
DILUTION FILTER, 2 IN, RATED 135 SCFM	F-102	1	SOLBERG	FS-231P-200	N/A
VACUUM RELIEF VALVE, 3 IN FNPT, ADJUSTABLE	VRV-101	1	FPZ	VRL8	N/A
REGENERATIVE BLOWER: 275 SCFM [335 ACFM] @ ~70" w.c.(V) DELTA P / ~45ft AMSL	B-101	1	FPZ	SCL K09-MS-10-3	L27883 2025
BLOWER MOTOR, 10 HP 208 VAC, 3-PHASE, TEFC	B-101	1	BONORA	CP132MG/2	57834
BLOWER ASSEMBLY WEATHER ENCLOSURE		1	FPZ	WE 0712	N/A
VGAC VESSEL, 400 LB MEDIA, 4" INLET / OUTLET, SV ~45 FPM	VGAC-101 / 102	2	CFS	VS-110	N/A
VAPOR PHASE CARBON MEDIA, REACT COAL BASED CARBON, 4 X 10 MESH SIZE	VGAC-101 / 102	2x400lbs	CFS	4x10 REACT	N/A
VGAC VESSEL HOSES, 4" [D] x ~8FT [L] WITH C/E CAM-LOCKS		3	KURIYAMA	W400-8-CE	N/A
SECTION 4 - PROCESS INSTRUMENTATION					
VACUUM INDICATOR(S), (-)100 TO 0 IN W.C.-V	VI-101 / 103	3	PIC	LP1-254-60V	N/A
PRESSURE INDICATOR(S), 0 TO 30 IN W.C.	PI-101 / 103	3	PIC	LP1-254-30	N/A
TEMPERATURE INDICATOR(S), 0 TO 250 F	TI-101 / 102	2	PROSENSE	T30-0250-25C	N/A
BLOWER LOW VACUUM SWITCH, RANGE 9 - 85 IN W.C	VSL-101	1	DWYER	1823-80	T13AK
BLOWER DISCHARGE HIGH TEMPERATURE SWITCH, ADJ. (-)4 TO 284°F	TSH-101	1	PROSENSE	TSDA25N-AP-0284-H	N/A
MS LEVEL SWITCH, 3-POSITION, PUMP ON / PUMP OFF / E-HIGH	LSHH-101	1	MADISON	M5920	W05035
SECTION 5 - ELECTRICAL DRAWINGS & TABLE(S)					
SENTINEL TELEMETRY INFORMATION					
T-2, CONTROL INTERLOCK TABLE	T-2				
I-1, CONTROL PANEL LAYOUT DRAWING	I-1				
T-3, CONTROL PANEL BILL OF MATERIAL (BOM)	T-3				
I-2, WIRING DIAGRAM & TERMINAL DETAILS	I-2				
T-4, NEC LOAD LIST	T-4				
E-1, LINE DIAGRAM	E-1				
SECTION 6 - POWER & CONTROL PANEL EQUIPMENT					
SENTINEL TELEMETRY SYSTEM w/ 4G VERIZON MODEM	TELEMETRY	1	SENSAPHONE	SCD-1200-4GVZ	00:07:F9:01:29:68
WIRELESS MODEM ANTENNA, 3G / 4G / LTE, 16 FT CABLE	TELEMETRY	1	SENSAPHONE / PANORAMA	B4BE-6-60-5SP	N/A
ENCLOSURE NEMA 3R, 30 X 30 X 10 - MILD STEEL / GRAY	ENCL	1	SAGINAW	SCE-30EL3010LP	UL: E-54168739
BACK-PANEL 30 X 30 MILD STEEL/WHT	ENCL	1	SAGINAW	SCE-30P30	N/A
SWING-PANEL 30 X 30 - MILD STEEL / GRAY	ENCL	1	SAGINAW	SCE-DF30EL30LP	N/A
MOUNTING FEET SET OF 4 - ZINC PLATED	ENCL	1	SAGINAW	SCE-ELMFK4	N/A

AE-NES MAJOR COMPONENT SUMMARY **REV A** MAY 23, 2025

PROJECT NO.: **25-103N** **TENEN / S&C PROPERTIES - SVE SYSTEM 35-45 35th ST ASTORIA-QUEENS, NY**

COMPONENT	TAG	QTY	MANUFACTURER	MODEL	SERIAL NUMBER
PANEL WING-KNOB PAD-LOCKING HANDLE BLACK	ENCL	2	SAGINAW	SCE-PLWKB	N/A
60 AMP FUSIBLE ROTARY DISCONNECT SWITCH, CLASS J, 3-POLE, 600 VAC, 200KA SCCR	MDS	1	SOCOMEC	38613005	N/A
CLASS J T/D FUSES 60 AMPS, 600V	F	3	LITTELFUSE	JTD060	N/A
MDS SHAFT, 320MM LENGTH, 10 X 10MM	MDS	1	SOCOMEC	14001032	N/A
MDS HANDLE, ROUND S0 TYPE, RED/YELLOW, 2-POS., LOCKABLE IN OFF, DEFEATABLE	MDS	1	SOCOMEC	141E2111	N/A
POWER DISTRIBUTION BLOCK 175 AMP 3-POLE	DB	1	ADI - EDISON	PB1043	N/A
POWER DISTRIBUTION BLOCK COVER, 3-POLE	DB	1	ADI - EDISON	PBC23	N/A
POWER DISTRIBUTION BLOCK 175 AMP 1-POLE 600 VAC	DB	1	ADI - EDISON	PB1041	N/A
DISTRIBUTION BLOCK COVER 1-POLE	DB	1	ADI - EDISON	PBC21	N/A
MOTOR CONTROL PROTECTOR, 28-40 AMP, ADJUSTABLE	MCP	1	ADI	HMMP-63HR-40	N/A
HMMP-63H ALARM CONTACT - LEFT	MCP	1	ADI	HPX2-ALM11-S	N/A
AUXILIARY CONTACT, [1] N.O. / [1] N.C. CONTACT, 6A @ 120 VAC/0.55A @ 120 VDC	MCP	1	ADI	HPX1-AUX11-F	N/A
HMMP-63H MOUNTING PLATE	M	1	ADI	HPX2-MBPT	N/A
CONTACTOR,50 AMP, 120 VAC COIL	M	1	ADI	HMC-50A30-22-AL	N/A
LINK MODULE HMMP-32H MANUAL MOTOR PROTECTOR TO HMC-9 - 22 CONTACTOR	M	1	ADI	HMX3-LM63-AC	N/A
HEAT TRACE 15 AMP CIRCUIT BREAKER, 1-POLE, 277VAC	CB	1	EATON	FAZ-D15-1-NA-SP	N/A
CONTROL POWER 6 AMP CIRCUIT BREAKER, 1-POLE, 240VAC	CB	1	EATON	FAZ-B6-1-NA-L-SP	N/A
POWER SUPPLY, 24VDC, 3.8A, 91W DIN MOUNT, CLASS 2	PS	1	ADI RHINO	PSV24-100S	N/A
P1000 PLC, CPU 50MB MEMORY WITH MICRO SD CARD SLOT	PLC	1	ADI	P1-540	24828F0841G2
P1000 PLC, 16PT 12-24VDC INPUT SINK/SOURCE	PLC	1	ADI	P1-16ND3	4324FC
P1000 PLC, 16PT RELAY OUTPUT SPST 6-27VDC / 6-240VAC	PLC	1	ADI	P1-16TR	5324FA4
P1000 PLC, TERMINAL BLOCK FOR ALL 8 & 16 POINT I/O MODULES	PLC	2	ADI	P2-RTB	N/A
RELAY DPDT 120VAC W/INDICATOR LIGHT	CR	1	IDEC	RH2B-UL-AC120V	N/A
SOCKET DIN RAIL/SURFACE 8-BLADE FOR RH2B FINGER SAFE	CR	1	IDEC	SH2B-05C	N/A
CONTROL POWER 2 POS SELECTOR SWITCH ILLUM. GREEN MAINTAINED	SW	1	ADI-FUJI	AR22-PL-210L3GZA	N/A
H/O/A 3 POS SELECTOR SWITCH ILLUM. GREEN SPRING RETURN	SW	1	ADI-FUJI	AR22-PL-611L3GZA	N/A
RESET PUSH BUTTON OPERATOR NON-ILLUM BLACK	PB	1	ADI	GCX1100	N/A
E-STOP MUSHROOM PUSHBUTTON, RED TRIGGER ACTION - TURN TO RELEASE	ESTOP	1	ADI	GCX1131	N/A
E-STOP LEGEND PLATE	ESTOP	1	ADI	ECX1651	N/A
ALARM PILOT LIGHT HEAD RED LED	LT	6	ADI	GCX1231-120L	N/A
TERMINAL BLOCK END ANCHORS	TB	9	ADI	DN-EB35	N/A
TERMINAL BLOCK END BARRIERS GRAY	TB	5	ADI	DN-EC1210	N/A
TERMINAL BLOCK SCREW CLAMP 30 AMP 600 V GRAY	TB	31	ADI	DN-T10-A	N/A
TERMINAL BLOCK GROUND SCREW CLAMP 600 V GREEN	TB	2	ADI	DN-G8	N/A
LOAD CENTER GROUND BAR 17 OPENINGS 15 CIRCUITS	GB	1	ADI - PENN UNION	NA-413-1	N/A
GROUNDING LUG TERMINAL, ALUMINUM, 2-HOLE, 6AWG	GL	1	NSI	2-0T	N/A

WARRANTY

All products not manufactured by National Environmental Systems, carry the original manufacturer's warranty. Copies are available on request.

National Environmental Systems, warrants its packaged and manufactured equipment against any defect in material or workmanship, under normal use and storage for a period of twelve (12) months from date of manufacture and invoice, regardless of system start-up date. In the event that products are found to be defective within the warranty period, National Environmental Systems, sole obligation and remedy shall be the furnishing of replacements for any defective parts, and such replacement parts shall be furnished but not installed by National Environmental Systems NATIONAL ENVIRONMENTAL SYSTEMS, WILL NOT BE LIABLE FOR SPECIAL OR CONSEQUENTIAL DAMAGES IN ANY CLAIM SUIT OR PROCEEDINGS ARISING UNDER WARRANTY, NOR WILL NATIONAL ENVIRONMENTAL SYSTEMS, ACCEPT ANY LIABILITY FOR CLAIMS FOR LABOR, LOSS OR PROFIT, REPAIRS OR OTHER EXPENSES INCIDENTAL TO REPLACEMENT.

The warranty requires that the purchaser complete all operations and maintenance as detailed in each section of the Documentation Package supplied with the purchased system. In addition installation must comply with nationally recognized electrical and mechanical standards as well as best engineering practices in effect at the time of purchase.

The product warranty expressed above is our only warranty and may not be verbally changed or modified by any representative of National Environmental Systems All freight costs incurred in shipping parts to or from National Environmental Systems, or to the manufacturer if necessary are at the expense of the customer.

National Environmental Systems, will invoice the cost of any replacement parts. These parts will be credited upon certification the original part was defective and the defective part was returned within one week of notifying National Environmental Systems, of the malfunction. If the part is found to have been misused no credit will be issued. In order for National Environmental Systems, to ship a replacement part on account, all outstanding invoices must be current.

National Environmental Systems, expressly disclaims any warranties, expressed or implied, including any warranty of merchantability or fit for particular purpose or any warranty arising from a course of dealing or usage of trade. Except to the extent required by applicable law. National Environmental Systems, shall not be liable, in tort, contract or otherwise, for any loss or damage, whether direct, consequential or incidental, of any person or entity arising in connections with the equipment.

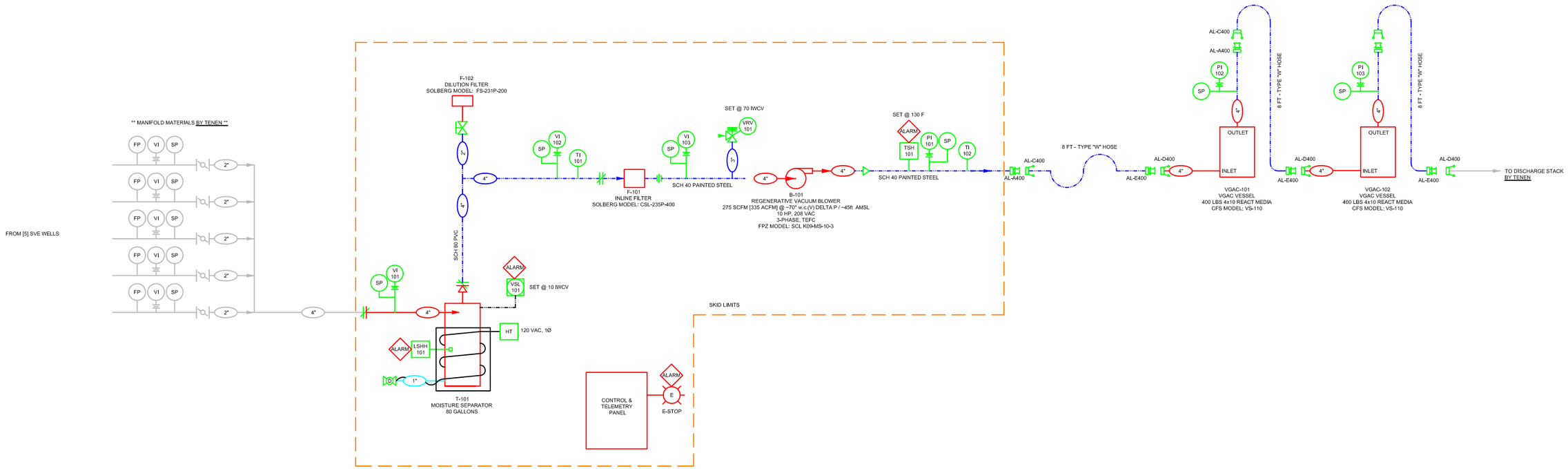
SECTION 2 - MECHANICAL DRAWINGS & TABLE(S)

M-1, PROCESS & INSTRUMENTATION DIAGRAM (P&ID)

T-1, INSTRUMENTATION TABLE

M-2, SKID LAYOUT DRAWING

M-3, MOISTURE SEPARATOR (MS) DRAWING



GENERAL NOTES:

1. PROCESS & INSTRUMENTATION DIAGRAM IS A REPRESENTATIVE DRAWING SHOWING EQUIPMENT SPECIFICATIONS, PROCESS PIPING, VALVES AND INSTRUMENTATION NOT TO BE INTERPRETED AS A LAYOUT DRAWING DEPICTING PLUMBING LOCATION, CONNECTIONS, OR FITTING
2. REFER TO TABLE 1 FOR INSTRUMENTATION LIST
3. REFER TO TABLE 2 FOR CONTROL INTERLOCKS
4. NEC ELECTRICAL CLASSIFICATION - NON-CLASSIFIED LOCATION
5. VGAC VESSELS SHIPPED LOOSE FOR SITE MECHANICAL

REV	DESCRIPTION	DATE	APPROVED
A	AS-BUILT	05-23-25	CJJ

REVISIONS

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NATIONAL ENVIRONMENTAL SYSTEMS
AIR ENERGY GROUP LLC
105 INDUSTRIAL BLVD / BROCKTON, MA 02311
508-227-1100 (Phone) / INFO@NES-INC.COM

TITLE: PROCESS & INSTRUMENTATION DIAGRAM

DRWN BY	KWB
DATE	03-11-25
CHK BY	
DATE	
APPR BY	
DATE	
TENEN - S&C PROPERTIES / SVE SYSTEM	35-45 35th ST ASTORIA-QUEENS, NY
JOB NO.	25-103N
SCALE	NTS
SIZE	D
DWG NO.	M-1
SHEET	1 OF 2
REV	A

INSTRUMENT IDENTIFICATION

INSTRUMENT TYPE / INSTRUMENT DESIGNATION (XX / XXX) — LOCALLY MOUNTED INSTRUMENT W / REMOTE DISPLAY

INSTRUMENT TYPE / INSTRUMENT DESIGNATION (XX / XXX) — LOCALLY MOUNTED INSTRUMENT W / DISPLAY

INSTRUMENT TYPE / INSTRUMENT DESIGNATION (XX / XXX) — LOCALLY MOUNTED SWITCH

INSTRUMENTATION ABBREVIATIONS

ADV	AUTOMATIC DRAIN VALVE
CC	CYCLE COUNTER
CF	COALESCING FILTER
D	DRAIN
DB	DISTRIBUTION BOX
DPI	DIFFERENTIAL PRESSURE INDICATOR
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
FE	FLOW ELEMENT
FI	FLOW INDICATOR
FIT	FLOW INDICATING TRANSMITTER
FIQ	FLOW TOTALIZER
FM	FLOW METER
FP	FLOW PORT
FPIT	FLOW PRESSURE INDICATING TRANSMITTER
FPT	FLOW PRESSURE TRANSMITTER
FPTH	FLOW PRESSURE TRANSMITTER HIGH
FPTL	FLOW PRESSURE TRANSMITTER LOW
FS	FLOW SWITCH
FSL	FLOW SWITCH LOW
FT	FLOW TOTALIZER
LI	LEVEL INDICATOR
LIT	LEVEL INDICATING TRANSMITTER
LS	LEVEL SWITCH
LSHH	LEVEL SWITCH HIGH-HIGH
LSH	LEVEL SWITCH HIGH
LSL	LEVEL SWITCH LOW
LSLL	LEVEL SWITCH LOW-LOW
LT	LEVEL TRANSMITTER
MOV	MOTOR OPERATED VALVE
M/OL	MOTOR OVERLOAD
OLH	OIL LEVEL HIGH
OLL	OIL LEVEL LOW
PF	PARTICULATE FILTER
PI	PRESSURE INDICATOR
PIT	PRESSURE INDICATING TRANSMITTER
PRV	PRESSURE REGULATING/RELIEF VALVE
PS	PRESSURE SWITCH
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
PS	PRESSURE SAFETY VALVE
PT	PRESSURE TRANSMITTER
SP	SAMPLE PORT
SP/V	SAMPLE PORT / VENT
S	SOLENOID VALVE
TE	TEMPERATURE ELEMENT
TI	TEMPERATURE INDICATOR
TIT	TEMPERATURE INDICATING TRANSMITTER
TS	TEMPERATURE SWITCH
TSH	TEMPERATURE SWITCH HIGH
TSL	TEMPERATURE SWITCH LOW
V	VENT
VFD	VARIABLE FREQUENCY DRIVE
VI	VACUUM INDICATOR
VIT	VACUUM INDICATING TRANSMITTER
VRV	VACUUM RELIEF VALVE
VS	VACUUM SWITCH
VSH	VACUUM SWITCH HIGH
VSL	VACUUM SWITCH LOW
VS	VACUUM SAFETY VALVE
VT	VACUUM TRANSMITTER
VTL	VACUUM TRANSMITTER LOW SETPOINT

PIPING ABBREVIATIONS

BI	BLACK IRON
BRS	BRASS
CPVC	CHLORINATED POLYVINYL CHLORIDE
COP	COPPER PIPE
GS	GALVANIZED STEEL
HDPE	HIGH DENSITY POLYETHYLENE TUBING
LLDPE	LOW LINEAR DENSITY POLYETHYLENE TUBING
MGA	MARINE GRADE ALUMINUM (COMPRESSED AIR PIPING)
PVC	POLYVINYL CHLORIDE

PIPE DESIGNATION

- AIR LINE
- WATER LINE
- CONTROL AIR
- HEAT TRACED
- WATER LINE HEAT TRACED AND INSULATED
- CHEMICAL LINE
- PRODUCT LINE
- VENT LINE
- CONTROL LINE
- INTRINSICALLY SAFE LINE
- ANALOG LINE
- FIELD PIPING (SITE CONTRACTOR)
- PIPING BREAK (FIELD TO SYSTEM CONNECTION)
- FLOW DIRECTION
- PIPE SIZE (X")

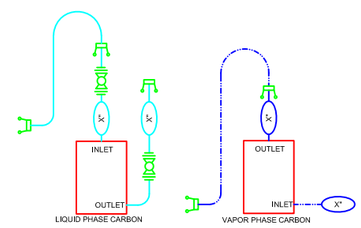
SYMBOLS

- ROTAMETER
- FLOW METER (FM XXX)
- FLOW METER / TRANSMITTER (FIT/FT XXX, FE XXX)
- TIMER (T)
- MOTOR (M)
- VARIABLE FREQUENCY DRIVE (VFD)
- ALARM DESGINATION (ALARM)
- WARNING INDICATION (WARN)
- PUMP CONTROL (PUMP XXX)
- E-STOP (E)
- DISCHARGE SILENCER
- EXHAUST SILENCER (S)
- INLET AIR FILTER
- INLINE FILTER
- SITE GAUGE
- HOSE LENGTH

SYMBOLS CONTINUED

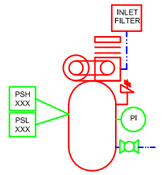
- FILTER REGULATOR (FR)
- COALESCING FILTER (CF)
- PARTICULATE FILTER (PF)
- AUTOMATIC CONDENSATE DRAIN (CD)
- PRESSURE REGULATOR
- GLOBE VALVE
- GATE VALVE
- TRUE UNION BALL VALVE
- BALL VALVE
- DRAIN VALVE
- CHECH VALVE
- BUTTERFLY VALVE
- RELIEF VALVE
- NEEDLE VALVE
- SOLENOID VALVE - NORMALLY CLOSED (S XXX)
- SOLENOID VALVE - NORMALLY OPEN (S XXX)
- MOTOR OPERATED BUTTERFLY VALVE (MOV XXX)
- MOTOR OPERATED VALVE (MOV XXX)
- 3-WAY MOTOR OPERATED BALL VALVE (MOV XXX)
- SAMPLE PORT (SP)
- ATMOSPHERIC VENT LINE (V)
- SIPHON BREAK
- MECHANICAL FLOAT
- UNION
- PULSE-DAMPING SNUBBER
- FEMALE CAMLOCK
- MALE CAMLOCK
- MULTIFUNCTION VALVE
- INJECT NOZZLE
- METERING PUMP INLET CHECH VALVE
- COPPER COIL
- PLUG
- DIAPHRAGM VALVE
- FLANGED CONNECTION
- FLEX CONNECTOR
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER

SYMBOLS CONTINUED

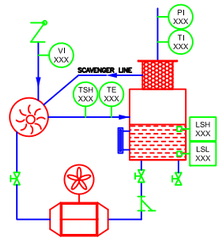


LIQUID PHASE CARBON

VAPOR PHASE CARBON

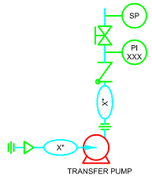


AC-XXX
AIR COMPRESSOR
XX HP / XXX VAC
X PHASE / TEFC
XXX ACFM @ XX PSI
MODEL:

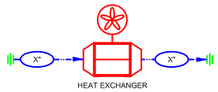


LRP-XXX
LIQUID RING PUMP
XX HP / XXX VAC
X PHASE / TEFC
XXX ACFM @ XX INCHES HGA
MODEL:

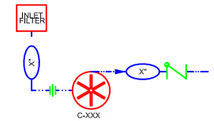

CF-XXX
FILTER
MAX FLOW:
MICRON SIZE:
MODEL:



TRANSFER PUMP



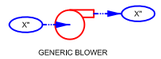
HEAT EXCHANGER



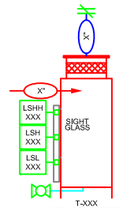
C-XXX
SPARGE COMPRESSOR
XX HP / XXX VAC
X PHASE / TEFC
XXX CFM @ XX PSI
MODEL:



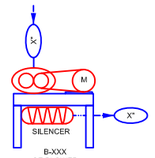
ROTARY CLAW BLOWER



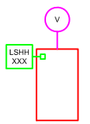
GENERIC BLOWER



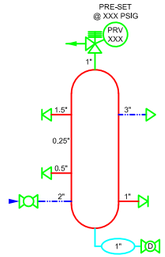
T-XXX
MOISTURE SEPARATOR
XXX GALLONS



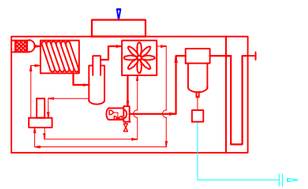
B-XXX
SE BLOWER
XX HP / XXX VAC
X PHASE / TEFC
XXX ACFM @ XX INCHES HGA
BLOWER MODEL:
MOTOR MODEL:



T-XXX
PRODUCT TANK
XXX GALLONS



TK-XXX
XXX GLN RECEIVER TANK
XXX PSI RATED
MODEL

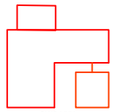

C-XXX
ROTARY SCREW AIR COMPRESSOR
XXX HP / 460 VAC / 3-PH / TEFC
XXX MAX PRESSURE
MODEL NO:
CFM COOLING FAN FLOW



EF-XXX
EXHAUST FAN
XX HP / XXX VAC / XX PH
XXX CFM @ XX INCHES SP
MODEL:



HE-XXX
HEATER
XX kW / XXX VAC / XX PH
XXXX BTU
MODEL:


OWS-XXX
OIL WATER SEPARATOR
MODEL: XXX

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AIR ENERGY GROUP LLC
105 INDUSTRIAL BLVD / BROCKTON, MA 02311
508-227-1100 (Phone) / INFO@NES-INC.COM

REV	DESCRIPTION	DATE	APPROVED
A	AS-BUILT	05-23-25	CJJ

REVISIONS

DRWN BY / DATE	KWB 03-11-25
CHK BY / DATE	
APPR BY / DATE	

TITLE: P&ID MASTER LEGEND

TENEN - S&C PROPERTIES / SVE SYSTEM
35-45 35th ST ASTORIA-QUEENS, NY

JOB NO. 25-103N

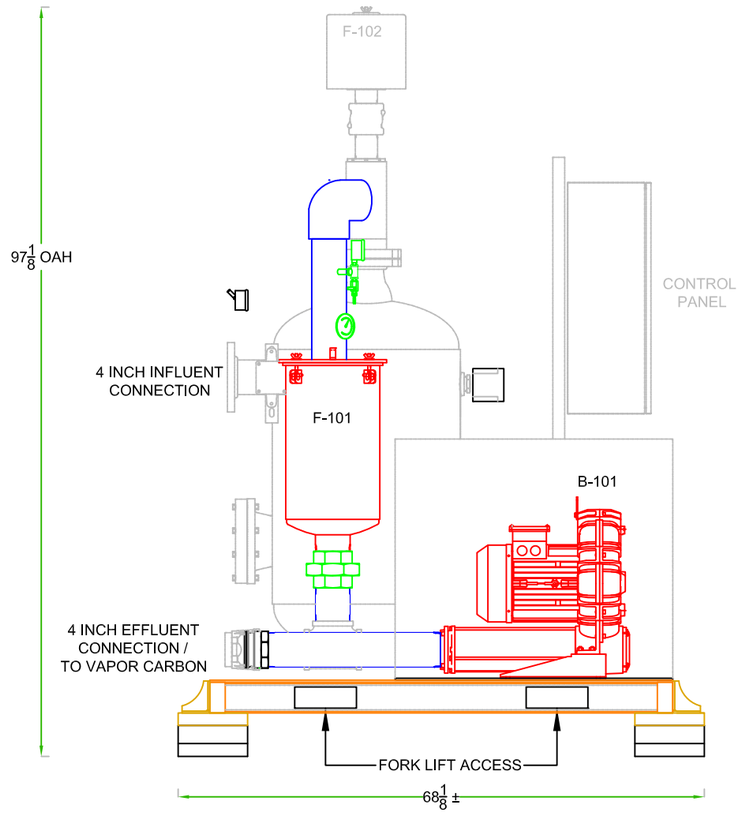
SCALE	SIZE	DWG NO.	SHEET	REV
NTS	D	M-1	2 OF 2	A

TABLE 1
PROCESS INSTRUMENTATION DIAGRAM INSTRUMENT LIST

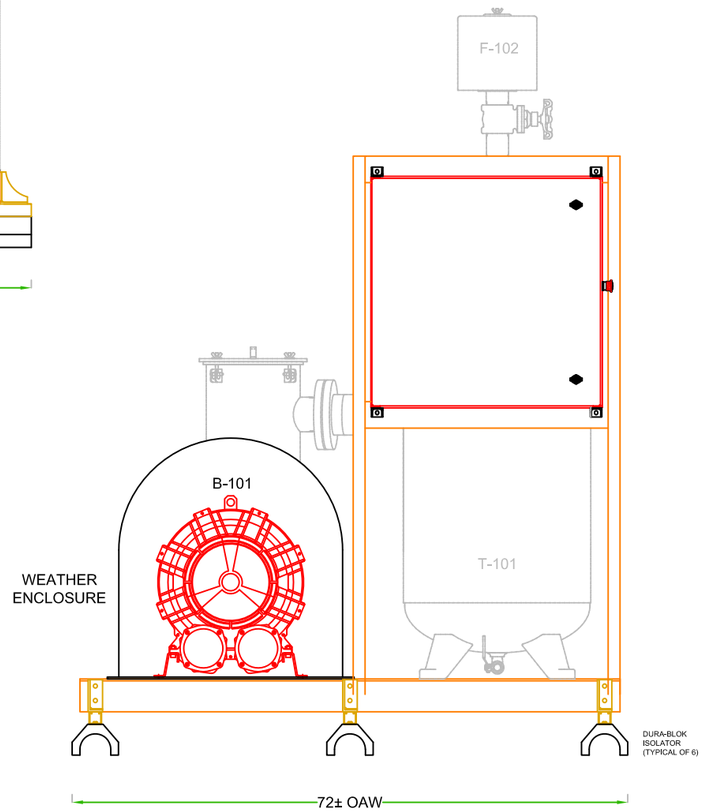
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25-103N TENEN / S&C PROPERTIES - SVE SYSTEM 35-45 35th ST ASTORIA-QUEENS, NY

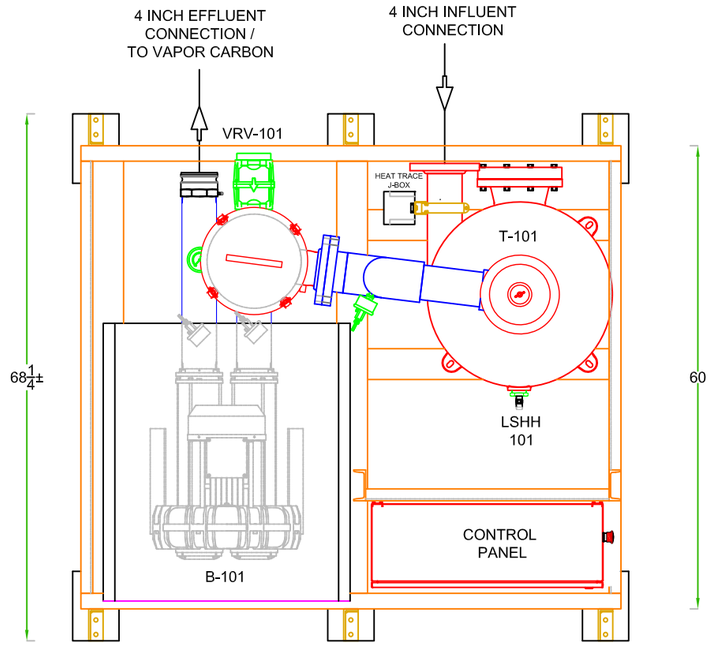
TAG	ITEM	MODEL	MANUFACTURER	SPECIFICATION
VI-101 / 103	VACUUM INDICATOR(S), (-)100 TO 0 IN W.C.-V	LP1-254-60V	PIC	[-]100 TO 0 IWC-V / 2.5 INCH STEEL CASE / BRASS WETTED PARTS / 0.25 INCH BOTTOM MOUNT CONNECTION
PI-101 / 103	PRESSURE INDICATOR(S), 0 TO 30 IN W.C.	LP1-254-30	PIC	0 - 30 IWC / 2.5 INCH STEEL CASE / BRASS WETTED PARTS / 0.25 INCH BOTTOM MOUNT CONNECTION
TI-101 / 102	TEMPERATURE INDICATOR(S), 0 TO 250 F	T30-0250-25C	PROSENSE	BIMETAL THERMOMETER, 0 TO 250 F +/- 1% / 2.5 IN [D], 2.5 IN STEM, 1/2 IN MNPT BACK MOUNT / 304SS CASE, GLASS LENS / MAX PRESSURE 125 F / IP68
VSL-101	BLOWER LOW VACUUM SWITCH, RANGE 9 - 85 IN W.C	1823-80	DWYER	DIFFERENTIAL PRESSURE SWITCH, RANGE 9 - 85 IN W.C., APPROX. DEADBAND @ MIN. SET POINT 1.3, APPROX. DEADBAND @ MAX. SET POINT 3
TSH-101	BLOWER DISCHARGE HIGH TEMPERATURE SWITCH, ADJ. (-)4 TO 284°F	TSDA25N-AP-0284-H	PROSENSE	TEMPERATURE SWITCH, INTEGRAL PT1000 RTD, -4 TO 284 DEG F, 50MM INSERTION LENGTH, 6MM PROBE DIAMETER, 1/4IN MALE NPT PROCESS CONNECTION, OUTPUT: SWITCH PNP, N.O., OUTPUT 2: SWITCH PNP, N.O.
LSHH-101	MS LEVEL SWITCH, 3-POSITION, PUMP ON / PUMP OFF / E-HIGH	M5920	MADISON	316 SS HORIZONTAL-MOUNT LIQUID-LEVEL SWITCH LOW-AMP, 1/2 IN X 1/2 IN NPT MALE, 300 MAX PSI, XP



LEFT SIDE ELEVATIONAL VIEW



FRONT ELEVATIONAL VIEW



PLAN VIEW

REV	DESCRIPTION	DATE	APPROVED
A	AS-BUILT	05-23-25	CJJ

REVISIONS

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AN AIR ENERGY GROUP LLC COMPANY
105 INDUSTRIAL BLVD / BROCKTON, MA 02311
508-227-1100 (Phone) / INFO@NES-INC.COM

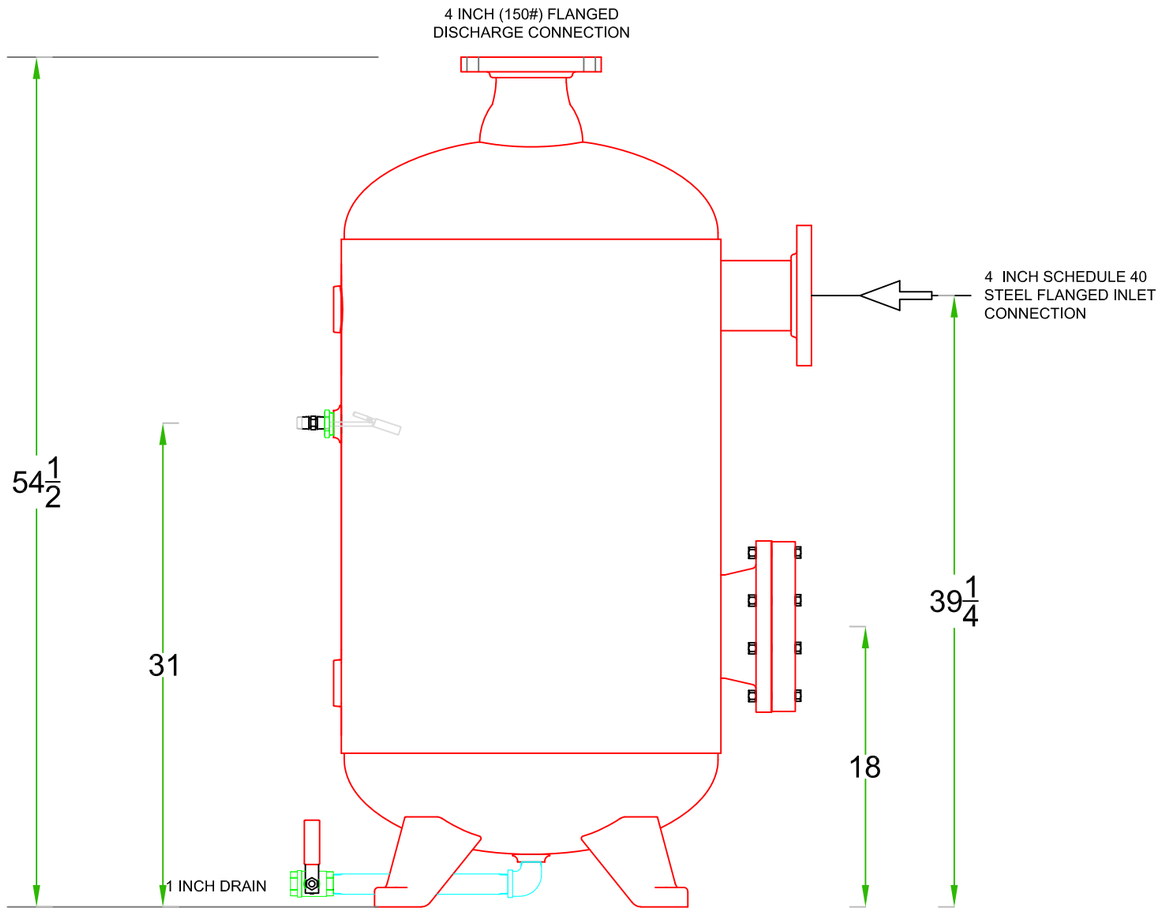
DRWN BY	CJJ
DATE	03-18-25
CHK BY	
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APPR BY	
DATE	

TITLE: SVE SYSTEM SKID LAYOUT

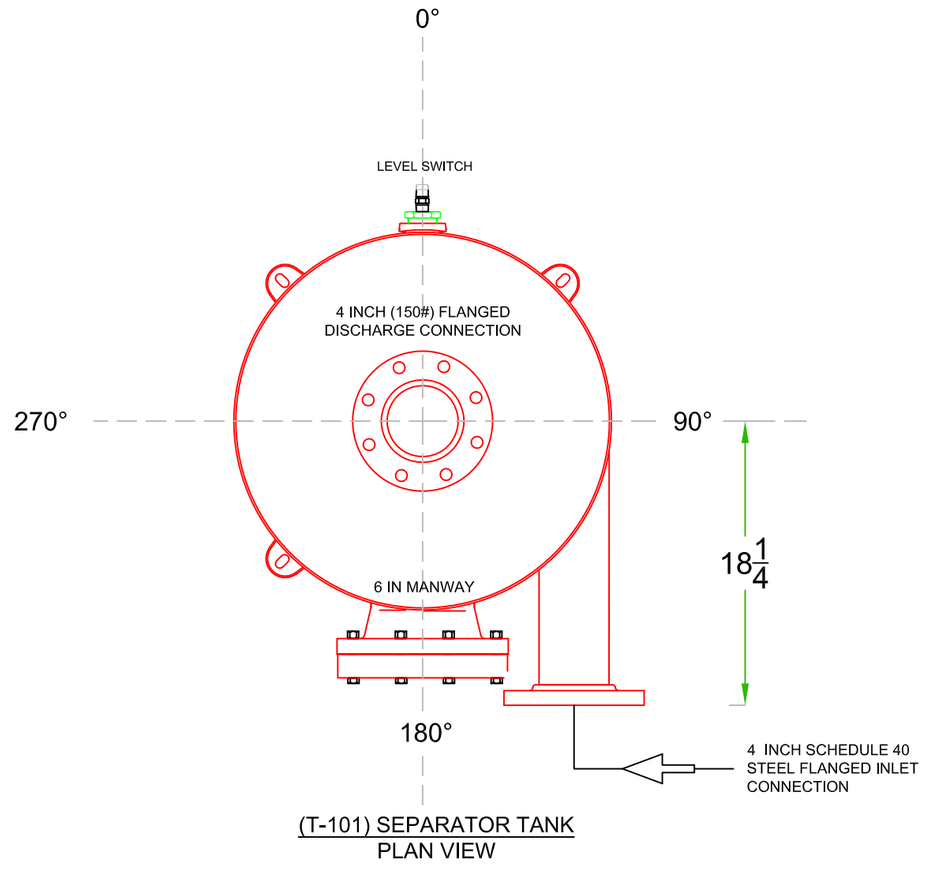
TENEN - S&C PROPERTIES / SVE SYSTEM
35-45 35th ST ASTORIA-QUEENS, NY

JOB NO. 25-103N

SCALE	SIZE	DWG NO.	SHEET	REV
NTS	D	M-2	1 OF 1	A



(T-101) SEPARATOR TANK
270° ELEVATIONAL VIEW



(T-101) SEPARATOR TANK
PLAN VIEW

-ESTIMATED WEIGHT: 195 LBS
-E-HIGH LIQUID LEVEL: 49 GALLONS
-PUMP-OUT CAPACITY : XX GALLONS
-ESTIMATED OPERATING WEIGHT: 604 LBS
2:1 ELLIPTICAL HEAD: 7.9 GLNS± (INCLUDED IN OVERALL CAPACITY)

REV	DESCRIPTION	DATE	APPROVED
A	AS-BUILT	05-23-25	CJJ

REVISIONS

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DRWN BY	CJJ	DATE 03-20-25
CHK BY	---	DATE ---
APPR BY	---	DATE ---

AIR ENERGY GROUP LLC
105 INDUSTRIAL BLVD / BROCKTON, MA 02301
508-226-1100 (Phone) / INFO@NES-INC.COM

TITLE
80 GALLON MOISTURE SEPARATOR

TENEN - S&C PROPERTIES / SVE SYSTEM
35-45 35th ST ASTORIA-QUEENS, NY

JOB NO.	SCALE	SIZE	DWG NO.	SHEET	REV
25-103N	NTS	B	M-3	1 OF 1	A

SECTION 3 - PROCESS EQUIPMENT

MOISTURE SEPARATOR (MS), 80 GALLONS, 4 IN TANGENTIAL 64 FPS - AE-NES 80 GAL

MS HEAT TRACE, SELF-REGULATING, 5 WATTS/FT, W/ TERMINATION KIT - THERMON 5-FLX-1 BC / PETK-10

INLINE FILTER, 4 IN, RATED 520 CFM, L-STYLE - SOLBERG CSL-235P-400

DILUTION FILTER, 2 IN, RATED 135 SCFM - SOLBERG FS-231P-200

VACUUM RELIEF VALVE, 3 IN FNPT, ADJUSTABLE - FPZ VRL8

REGENERATIVE BLOWER: 275 SCFM [335 ACFM] @ ~70" w.c.(V) DELTA P / ~45ft AMSL - FPZ SCL K09-MS-10-3

BLOWER MOTOR, 10 HP 208 VAC, 3-PHASE, TEFC - BONORA CP132MG/2

BLOWER ASSEMBLY WEATHER ENCLOSURE - FPZ WE 0712

VGAC VESSEL, 400 LB MEDIA, 4" INLET / OUTLET, SV ~45 FPM - CFS VS-110

VGAC VESSEL HOSES, 4" [D] x ~8FT [L] WITH C/E CAM-LOCKS - KURIYAMA W400-8-CE

TANK STYLE MOISTURE SEPARATOR

GENERAL THEORY

The moisture separator removes liquids from the process stream in soil venting applications to help protect the blower from corrosion and mineral deposits caused by water.

DESIGN INFORMATION

NES moisture separators operate on the principles of cyclonic section aided by velocity reduction. The moisture separator inlet pipe is set tangential to the tank wall, a stinger pipe extends down past the separator inlet is placed in the center of the tank. The moisture laden air stream is forced into a cyclonic rotation. The centrifugal force produced throws the water droplets to the outer wall of the separator where they fall and collect at the bottom. Additional efficiency is produced when the velocity is reduced to values between 1500 fpm and 6000 fpm. For a separator of this type, moisture separation efficiency is typically 95% or greater for moisture droplets greater than 10 micron.

CONSTRUCTION

Tank style separators are DTM painted carbon steel construction and include a brass drain valve, flanged clean-out port, sight glass, and an emergency high level switch. Pump-out ports & switch assemblies as well as demister assemblies are optional.



TANK STYLE SEPARATOR

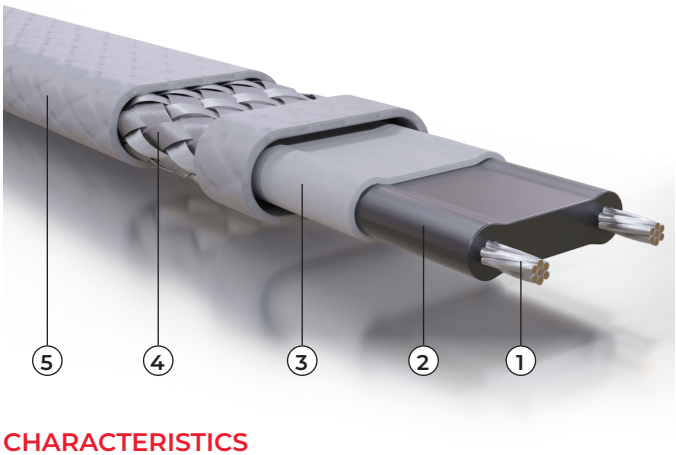
NORMAL OPERATION FOR MOISTURE SEPARATOR LEVEL SWITCHES

1. Water level rises and actuates low level switch (wired normally open).
2. Switch closes and sends signal to controller.
3. Water level continues to rise and actuates high level switch (wired normally open).
4. Switch closes and sends signal to controller to activate moisture separator transfer pump.
5. Water level drops when pump activates.
6. De-energizes high switch.
7. Continues to drop.
8. De-energizes low switch.
9. Controller calls off pump.
10. Series repeats.

ACTIVATION OF EMERGENCY HIGH LEVEL SWITCH

1. Water level rises and actuates low level switch (wired normally open).
2. Switch closes and sends signal to controller.
3. Water level continues to rise and actuates high level switch (wired normally open).
4. Switch closes and sends signal to controller to activate moisture separator transfer pump.
5. Problem with pump, level switch or downstream process, water level does not drop.
6. Water level rises until emergency high switch (wired normally closed) is actuated.
7. Appropriate process equipment is de-energized (i.e. Vacuum pump, SVE blower)

PRODUCT DATASHEET
FLX™
SELF-REGULATING HEAT TRACING



APPLICATION
FLX self-regulating trace heaters are designed to provide freeze protection and temperature maintenance to metallic and nonmetallic pipes, tanks and equipment. FLX is rated for heat outputs of 10, 16, 26 and 33 W/m at 10°C (3, 5, 8 and 10 W/ft at 50°F) when powered at 110 to 120 Vac or 208 to 277 Vac. FLX is a proven, simple, practical solution for both metal and plastic pipes.

RUGGED AND RELIABLE
FLX is protected by a tinned copper braid and a polyolefin outer jacket to provide grounding and additional mechanical protection. An optional fluoropolymer outer jacket is available if additional environmental protection is required.

Built with proven and proprietary compounding, extrusion, and cross-linking technology, FLX allows for continuous operation and extended life expectancy.

EASY TO DESIGN
Whether the application is a small project or a complex network of piping and equipment, designing an electric heat traced freeze protection system is easy with FLX. The step-by-step design guide leads the reader through determining the heating requirements and number of circuits required to establish a bill of materials.

With parallel circuitry, FLX does not require exact piping lengths to be known in advance and can be cut to length in the field. Heat tracing circuits for field-routed piping can be quickly and easily designed on site.

EASY TO INSTALL
FLX is installed directly on metallic or nonmetallic piping under conventional thermal insulation with ordinary hand tools. Kits for power connection, end termination and splicing, plus other accessories, are designed for quick and easy installation.

Simply pull FLX from the supply reel, install directly on the pipe and complete circuit fabrication. Tee splices may be installed anywhere along the circuit to match the layout of the piping.

CHARACTERISTICS
1. 1.3 mm^2 (16 AWG) Nickel-Plated Copper Bus Wire
2. E-Beam Cross-Linked Polyolefin Semiconductive Heating Matrix
3. E-Beam Cross-Linked Polyolefin Primary Dielectric Insulation
4. Tinned Copper Metallic Braid
5. Polyolefin Outer Jacket (Fluoropolymer optional)

RATINGS
Supply voltages ..... 110-120 or 208-277 Vac
Max. continuous exposure temperature
- Power on ..... 65°C (150°F)
- Power off ..... 85°C (185°F)

Minimum bend radius
- @ -15°C (5°F) ..... 10 mm (0.38”)
- @ -60°C (-76°F) ..... 32 mm (1.25”)

30 mA Ground-Fault Protection Required [1]

BASIC ACCESSORIES
Thermon offers system accessories designed specifically for rapid, trouble-free installation of Thermon heat tracing. All trace heaters require a connection kit to comply with approval requirements. Information on accessories to complete a heater circuit installation can be found in the “Freeze Protection Systems Accessories” product specification sheet (Form CPD1017).

CERTIFICATIONS/APPROVALS
LISTED

UL listed for use with Fire Sprinkler Freeze Protection Systems (UL515A)

Notes

1. The National Electrical Code and the Canadian Electrical Code require ground-fault protection of equipment for each branch circuit supplying electric heating equipment.

Thermon • 100 Thermon Dr • PO Box 609 San Marcos, TX 78667-0609 • Phone: 512-396-5801 • 1-800-820-4328
For the Thermon office nearest you visit us at www.thermon.com

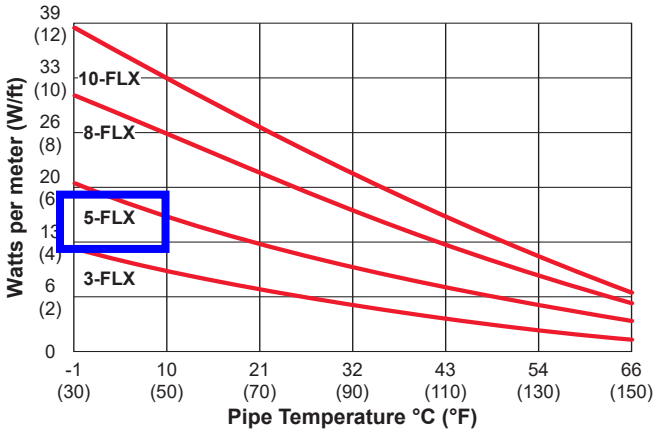
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PRODUCT DATASHEET

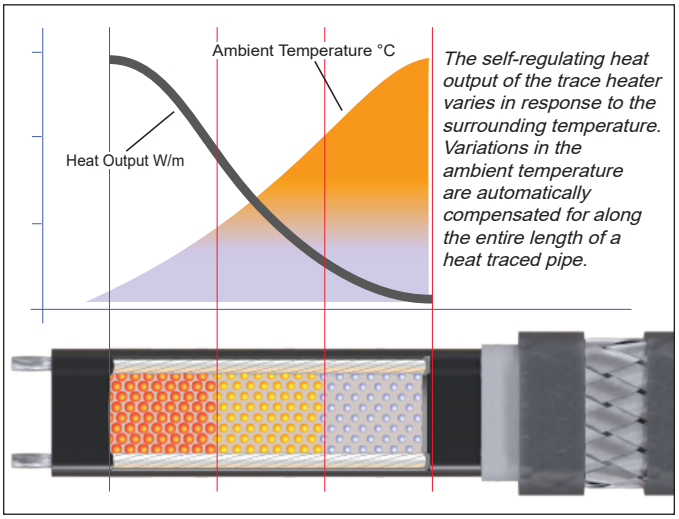
FLX™

SELF-REGULATING HEAT TRACING

POWER OUTPUT CURVES[1]



SELF-REGULATING HEAT OUTPUT



The self-regulating heat output of the trace heater varies in response to the surrounding temperature. Variations in the ambient temperature are automatically compensated for along the entire length of a heat traced pipe.

CIRCUIT BREAKER SIZING [2]

Maximum circuit lengths for various circuit breaker amperages are shown below. Circuit breaker sizing and ground-fault protection should be based on applicable local codes. For information on design and performance on other voltages, contact Thermon. Ground-fault protection of equipment should be provided for each branch circuit supplying electric heating equipment.

120 Vac Service Voltage		Max. Circuit Length[3] vs. Breaker Size m (ft)		
Catalog Number	Start-Up Temperature °C (°F)	20 A	30 A	40 A
3-FLX-1	10 (50)	108 (354)	108 (354)	108 (354)
	0 (32)	108 (354)	108 (354)	108 (354)
	-20 (-4)	96 (315)	108 (354)	108 (354)
	-40 (-40)	79 (259)	108 (354)	108 (354)
5-FLX-1	10 (50)	73 (240)	88 (289)	88 (289)
	0 (32)	73 (240)	88 (289)	88 (289)
	-20 (-4)	61 (200)	88 (289)	88 (289)
	-40 (-40)	50 (164)	76 (249)	81 (266)
8-FLX-1	10 (50)	58 (190)	81 (266)	81 (266)
	0 (32)	57 (187)	81 (266)	81 (266)
	-20 (-4)	44 (144)	67 (220)	79 (259)
	-40 (-40)	37 (121)	55 (180)	65 (213)
10-FLX-1	10 (50)	48 (157)	66 (217)	66 (217)
	0 (32)	42 (138)	63 (207)	66 (217)
	-20 (-4)	33 (108)	50 (164)	66 (217)
	-40 (-40)	27 (89)	41 (135)	55 (180)

240 Vac Service Voltage		Max. Circuit Length[3] vs. Breaker Size m (ft)		
Catalog Number	Start-Up Temperature °C (°F)	20 A	30 A	40 A
3-FLX-2	10 (50)	214 (702)	214 (702)	214 (702)
	0 (32)	214 (702)	214 (702)	214 (702)
	-20 (-4)	192 (630)	214 (702)	214 (702)
	-40 (-40)	158 (518)	214 (702)	214 (702)
5-FLX-2	10 (50)	146 (479)	178 (584)	178 (584)
	0 (32)	146 (479)	178 (584)	178 (584)
	-20 (-4)	117 (384)	175 (574)	178 (584)
	-40 (-40)	96 (315)	145 (476)	163 (535)
8-FLX-2	10 (50)	117 (384)	154 (505)	154 (505)
	0 (32)	108 (354)	154 (505)	154 (505)
	-20 (-4)	84 (276)	127 (417)	154 (505)
	-40 (-40)	69 (226)	104 (341)	131 (430)
10-FLX-2	10 (50)	96 (315)	133 (436)	133 (436)
	0 (32)	85 (279)	127 (417)	133 (436)
	-20 (-4)	67 (220)	101 (331)	133 (436)
	-40 (-40)	55 (180)	83 (272)	111 (364)

Notes

1. For more precise power output values as a function of pipe temperature, refer to CompuTrace®.
2. Based on the trip current characteristic of Type QOB or Type QO equipment protection devices. For devices with other trip current characteristics, contact Thermon.
3. The maximum circuit length is for one continuous length of trace heater, not the sum of segments of cable. Refer to CompuTrace® design software or contact Thermon for current loading of segments.

SOLBERG Solutions

NES NATIONAL ENVIRONMENTAL SYSTEMS

Pressure Drop vs. Flow for Inlet and Vacuum Filters

Choose Filter or Element Number:	**CSL-235P-400**			
Enter Flow Rate in SCFM:	**275.0**	**SCFM**		
Tested SCFM Range:	**Min.**	**173.0**	**Max.**	**693.0**
Pressure Drop =	**2.24**	**Inches of Water/WC**		
Estimated Pressure Drop =		**Inches of Water/WC**		

NOTES:

1. *Please select filter from the drop down list and enter the flow values in the blue boxes.*
2. *Filter/Element numbering are in standard convention: i.e. CSL-235P-300 etc.*
3. *Calculated values will appear in Green boxes when all values are entered.*
4. *Flow ratings are based on outside to in flow at standard conditions.*
5. *Ocassionally, negative values will appear for estimated Pressure Drop. When this occurs, pressure drop will be minimal. Adjust flow rate to within tested range to obtain actual pressure drop.*



All information contained within and derived is considered ***Solberg Confidential*** .
Worksheet prepared exclusively for use by National Environmental Systems.

Worksheet updated 6/24/08

SOLBERG®
Filtration • Separation• Silencing

Inline Right Angle Vacuum Filters

CSL Series 3” - 12”

Overview

Solberg’s CSL Series is designed to protect equipment from contaminants carried over from a variety of industrial processes. Ideal for rough-medium vacuum service, the CSL can be utilized in systems where standard duty flanges and threaded connections are acceptable. Multiple filter element media options offer superior protection and longevity for the vacuum system.

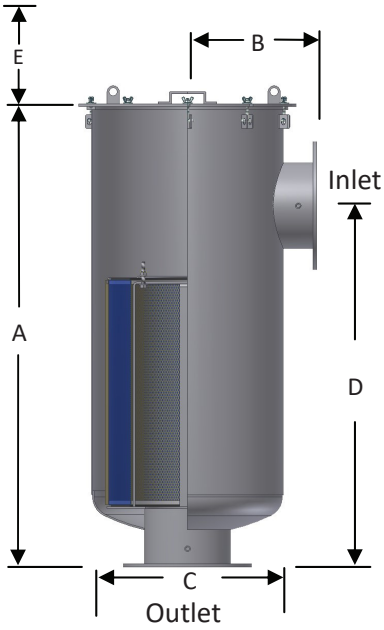


Benefits

- Reduce piping costs with multiple mounting configurations (mount horizontal or inverted)
- Minimize equipment pressure-drop change with low pressure-drop filter design

Features

- Heavy duty T-bolts for easy maintenance
- Corrosive resistant black powder coat carbon steel
- O-ring stays in place with unique U-channel groove
- Inlet & outlet ¼” gauge taps
- Lifting lugs
- Brackets for optional support legs
- Nameplate bracket



Technical Specifications

- Vacuum Rating: medium vacuum service*
- Filter change out differential: 15-20” H_2O over initial ΔP
- Polyester: 99%+ removal efficiency standard to 5 micron
- Paper: 99%+ removal efficiency standard to 2 micron

Options

ATEX Available

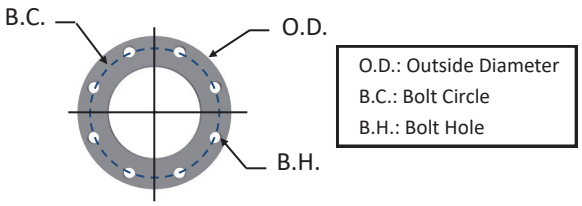
- Straight-through configurations
- Specialty filter media
- Stainless steel
- Various nonstandard finishes and connection styles
- ISO flange
- PN6, PN16 flange patterns
- Flange faces and internal surfaces free of paint
- Mounting housing bands

Flanged Assemblies

Flange Inlet & Outlet	Assembly SCFM Rating	Assembly Part Number		Dimensions - inches				Suggested Service ht. E	Approx. Weight lbs	Replacement Element Part No.		Element SCFM Rating
		Polyester	Paper	A	B	C	D			Polyester	Paper	
4”	520	**CSL-235P-400F**	**CSL-234P-400F**	25.50	9.00	12.00	18.50	10”	62	235P™	234P™	570
4”	520	**CSL-335P-400F**	**CSL-334P-400F**	25.50	9.00	12.00	18.50	15”	64	335P™	334P™	800
5”	800	**CSL-245P-500F**	**CSL-244P-500F**	26.50	11.00	16.00	19.50	10”	88	245P™	244P™	880
5”	800	**CSL-345P-500F**	**CSL-344P-500F**	26.50	11.00	16.00	19.50	15”	90	345P™	344P™	1100
6”	1100	**CSL-275P-600F**	**CSL-274P-600F**	27.50	12.00	16.00	20.50	10”	110	275P™	274P™	1100
6”	1100	**CSL-375P-600F**	**CSL-374P-600F**	27.50	12.00	16.00	20.50	15”	113	375P™	374P™	1500
8”	1800	**CSL-377P-800F**	**CSL-376P-800F**	37.25	14.00	20.00	25.50	20”	185	377P™	376P™	1825
10”	2900	**CSL-685P-1000F**	**CSL-384P(2)-1000F**$^{+}$	56.00	16.00	24.00	45.00	20”	380	685P™	384P™(2)$^{+}$	6600
12”	4950	**CSL-485P(2)-1200F**$^{+}$	**CSL-484P(2)-1200F**$^{+}$	67.63	16.00	24.00	57.00	25”	465	485P™(2)$^{+}$	484P™(2)$^{+}$	9410

$^{+}$Denotes 2 elements stacked in housing.

125/150# Pattern Flange	Dimensions - inches			No. of Holes	Flange Thickness inches
	O.D.	B.C.	B.H.		
4”	9.00	7.50	0.75	8	0.50
5”	10.00	8.50	0.88	8	0.50
6”	11.00	9.50	0.88	8	0.50
8”	13.50	11.75	0.88	8	0.50
10”	16.00	14.25	1.00	12	0.50
12”	19.00	17.00	1.00	12	0.50



All flanges are oriented “split center”.

MPT Assemblies

MPT Inlet & Outlet	Assembly SCFM Rating	Assembly Part Number		Dimensions - inches				Suggested Service ht. E	Approx. Weight lbs	Replacement Element Part No.		Element SCFM Rating
		Polyester	Paper	A	B	C	D			Polyester	Paper	
3”	300	**CSL-235P-300**	**CSL-234P-300**	25.50	9.00	12.00	18.50	10”	47	235P™	234P™	570
3”	300	**CSL-335P-300**	**CSL-334P-300**	25.50	9.00	12.00	18.50	15”	50	335P™	334P™	800
4”	520	**CSL-235P-400**	**CSL-234P-400**	25.50	9.00	12.00	18.50	10”	52	235P™	234P™	570
4”	520	**CSL-335P-400**	**CSL-334P-400**	25.50	9.00	12.00	18.50	15”	55	335P™	334P™	800
5”	800	**CSL-245P-500**	**CSL-244P-500**	26.50	11.00	16.00	19.50	10”	82	245P™	244P™	880
5”	800	**CSL-345P-500**	**CSL-344P-500**	26.50	11.00	16.00	19.50	15”	88	345P™	344P™	1100
6”	1100	**CSL-275P-600**	**CSL-274P-600**	27.50	12.00	16.00	20.50	10”	95	275P™	274P™	1100
6”	1100	**CSL-375P-600**	**CSL-374P-600**	27.50	12.00	16.00	20.50	15”	97	375P™	374P™	1500

*See Vacuum Filter Technical Data for vacuum service data and sizing guidelines.

Rev: US2411D

All model offerings and design parameters are subject to change without prior notice.
Contact your representative or visit www.solbergmfg.com for the most current information.









Inlet Vacuum Filters

www.solbergmfg.com

Note: Please read the maintenance instructions given by the OEM for the machinery first. The OEM's manual should be adhered to in order to protect the equipment. Solberg Manufacturing, Inc has made every effort to make sure that these instructions are accurate but is not responsible for any typos, slight variations or for human errors that may occur.

Solberg Manufacturing, Inc., 1151 Ardmore Itasca, IL 60143 USA
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Maintenance Manual

Inlet Vacuum Filters

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Section D

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2. CT Series ..... pg. 21
4. ST Series ..... pg. 29

**For Further Information Please Call: 630-773-1363*

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SOLBERG®

Section A

INTRODUCTION

The purpose of this manual is instruction on the proper assembly and care of Solberg inlet vacuum filters.

WARNING

This manual must be read and thoroughly understood before using and caring for this vacuum filter. Failure to comply could result in explosion, product/system contamination or personal injury.

This manual should be used as a supplement to the user's understanding of the proper care needed to maintain a safe and dependable vacuum filter. It is the responsibility of the user to interpret and explain all instructions to persons who do not read or understand English BEFORE they are allowed to maintain and use this filter.

This manual should be readily available to all operators responsible for operation and maintenance of the inlet vacuum filters.

We thank you for selecting products from Solberg Manufacturing, Inc. We are confident that our superior filter designs will meet your application requirements.

Section B

GENERAL INFORMATION

1. Identification of Solberg Inlet Vacuum Filters

All Solberg inlet vacuum filters should have an identification label/nameplate that gives the following information:

Assembly Model #
Replacement Element #

(The exception is OEM supplied units. In this case, please enter the OEM part numbers in Table 1.)

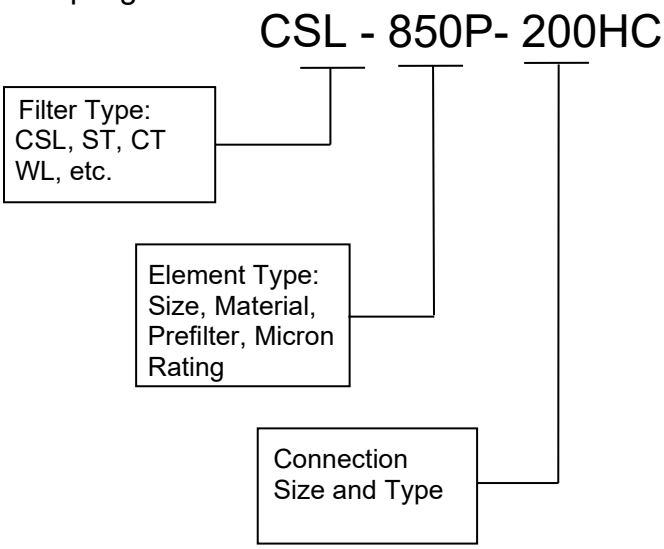
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Fill in the actual nameplate data from your new Solberg inlet vacuum filter(s):

No.	Filter Model Number	Replacement Element	Initial Delta P Readings
1			
2			
3			
4			
5			

Table 1

The model number designates the filter type, the original element configuration and housing connection size. For example, the following part number identifies the filter as being a 'CSL' design filter with an 850 element with prefilter and 2" NPSC half coupling connection:



2. Filtration Rules of Thumb

General: For peak output performance from a compressor, blower, vacuum pump, engine, or any other machine that consumes air, one must have clean, unrestricted air. Proper filtration can help stabilize the working environment within rotating equipment even when the external conditions may be quite severe. A critical component in creating the right working conditions is filter sizing. With the properly sized filter, equipment will run smoothly over its entire expected operating life.

A major factor in filtration and filter sizing is air velocity through the filter media. Generally, the slower the velocity of air through a media the higher the filter efficiency and, conversely, the lower the pressure drop. Therefore, the primary goal in filter sizing is to optimize the velocity of air through the media (sometimes called face velocity).

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Rule of Thumb #1: Always begin with the filter cartridge requirements when sizing a filter. Once the appropriate element has been selected then move on to the housing requirements.

Rule of Thumb #2: Always ask or specify a filter based on a micron rating ***with filtration efficiencies***. As an example, stating a requirement for a 1-micron filter is misleading because no efficiency rating has been specified. A 1-micron filter at 95% efficiency may be less efficient than a 5-micron filter at 99% efficiency. For proper air system performance in light and industrial duty environments, a filter with a minimum of 99% filtration efficiency at 5 microns is required.

Rule of Thumb #3: Size your filter correctly by understanding the impact air velocity through a media has on efficiency and pressure drop. Maintain the suggested Air-to-Media ratios listed below based on the external environment listings and Filtration efficiency needs.

Filtration Efficiency Requirements (99%+ efficiency)	**Environmental Conditions**	**Air to Media Ratio**	
Industrial Grade 2-micron **Paper**	Industrial Duty (clean, office/warehouse-like)	30 CFM/ft^2	(549m^3/h)/m^2
	Severe Duty (workshop, factory-like)	15 CFM/ft^2	(274.5m^3/h)/m^2
	Extreme Duty (Foundry, Construction-like)	10 CFM/ft^2	(183m^3/h)/m^2
Industrial Grade 5-micron **Polyester**	Industrial Duty (clean, office/warehouse-like)	65 CFM/ft^2	(1189.5m^3/h)/m^2
	Severe Duty (workshop, factory-like)	40 CFM/ft^2	(732m^3/h)/m^2
	Extreme Duty (Foundry, Construction-like)	25 CFM/ft^2	(457.5m^3/h)/m^2
Industrial Grade 1-micron **Polyester**	Severe Duty (Foundry, Construction-like)	25 CFM/ft^2	(457.5m^3/h)/m^2
Industrial Grade 0.3-micron **HEPA** Glass @ 99.97% Efficiency	Industrial Duty (Pre-filtered Applications)	9 CFM/ft^2	(164.7m^3/h)/m^2
	Severe Duty (workshop, factory-like)	7 CFM/ft^2	(128m^3/h)/m^2
	Extreme Duty (Foundry, Construction-like)	5 CFM/ft^2	(91.5m^3/h)/m^2

Table 2

Solberg Manufacturing, Inc., 1151 Ardmore Itasca, IL 60143 USA
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Rule of Thumb #4: Pressure drop is also caused by the dirt holding capacity of the element. As the element fills up with dirt, the pressure drop increases. It is important to document the pressure drop across a given filter when it is new and then clean or replace it when the pressure drop increases by 10” to 15” / 250-280mm H_2O over the original reading.

Rule of Thumb #5: The inlet connection greatly influences the overall pressure drop of the filter system. To minimize the restriction contributed by an inlet filter, a velocity of 6,000 ft/min (10200m^3/h) or less is suggested through the outlet pipe. The table below lists the suggested flows based on pipe size:

Pipe Size (inches)	Max Airflow		Pipe Size (inches)	Max Airflow	
1/2"	10 CFM	17m^3/h	2 ½"	195 CFM	332m^3/h
3/4"	20 CFM	34m^3/h	3"	300 CFM	510m^3/h
1"	35 CFM	60m^3/h	4"	520 CFM	884m^3/h
1 ¼"	60 CFM	102m^3/h	5"	800 CFM	1360m^3/h
1 ½"	80 CFM	136m^3/h	6"	1,100 CFM	1870m^3/h
2"	135 CFM	230m^3/h			

Table 3 **Note: This information is for general use only. A qualified engineer must properly design each system.*

3. Element Specifications

Temperature Range: -15° to 220°F / -26° to 105°C
Filter Change-Out Differential: 10” to 15” / 250-380mm H_2O Over Initial Delta P

Media	Micron Rating
Standard Paper	99+% @ 2 micron
Standard Polyester	99+% @ 5 micron
“S” Series Wire Mesh	Epoxy Coated Wire Mesh
“Z” Series Polyester	99+% @ 1 micron
“HE” Series HEPA	99.97% @ 0.3 microns
“U” Series Polyester	99+% @ 25 micron
“W” Series Polyester	99+% @ 100 micron
“S2” Series	Stainless Steel Wire Mesh
“AC” & “ACP” Series	N/A
“Y” Series Polypropylene	99+% @ 10 micron

Table 4

Temperature Range: -15° to 385°F / -26° to 196°C
Filter Change-Out Differential**:** 10” to 15”/ 250-380mm H_2O Over Initial Delta P

Media	Micron Rating
“MX” & “MXD” Series – Nomex Cloth	99+% @ 10 micron

Table 5

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4. Element Cleaning - Inlet Filtration

Solberg elements should be cleaned or replaced, once the pressure drop reaches 10 to 15-inches water column (250 - 380mm WC) above the initial pressure drop of the installation.

The decision to clean the element rather than replace it is left to the discretion of the operator. Any damage which results from by-pass or additional pressure drop created by element cleaning is the sole responsibility of the operator.

WARNING

The overall performance of a filter element is altered once cleaned.

The initial pressure drop after cleaning will be greater than the original, clean pressure drop of the element.

After each subsequent cleaning, the initial pressure drop will continue to increase.

Under all circumstances, the initial pressure drop of the element needs to be maintained at less than 15-inches water column (380mm WC).

Cleaned elements that exceed 15-inches water column (380mm WC) at start-up should be replaced with new elements.

With many types of equipment, the maximum pressure drop allowed will be dictated by the ability of the equipment to perform to its rated capacity. Under all circumstances, the operator should avoid exceeding the manufacturer's recommended maximum pressure drop for their specific equipment.

A. ***Polyester Element***: The polyester element may be washed in warm soapy water, vacuumed, gently blown out or replaced. The element should be dry before reinstallation. The element should be replaced after a maximum of three cleanings.
B. ***Paper Element***: The paper element may be lightly blown with low pressure air. It is disposable and in most cases should be replaced with a new element.

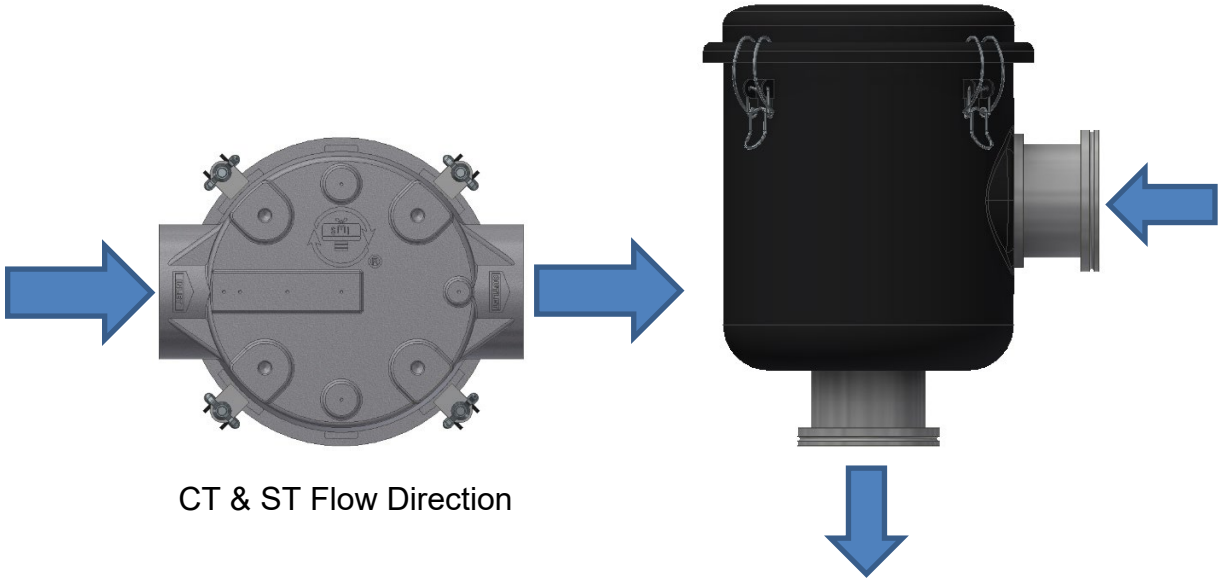
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C. ***Polyurethane Prefilter***: The prefilter may be washed as a sponge or replaced to give the element a longer service life.
D. ***Epoxy Coated Wire Mesh and Stainless Steel Wire Mesh Elements***: Cleaning instructions similar to polyester, except mild solvents may be used.
E. ***Activated Carbon Element***: Not cleanable
F. ***Polypropylene Element***: Cleaning instructions similar to polyester
G. ***Nomex Cloth Element***: Cleaning instructions similar to polyester

If you are not confident that the integrity of the element was maintained during cleaning, it is recommended that a new element be installed. Also, spare parts such as gaskets, wing nuts and washers can be supplied upon request.

5. Installation.

The drawing of the filter should be referenced before installation in order to ensure the unit is installed properly. The inlet and outlet should be identified on the unit as a label or as a physical design feature of the unit.



CT & ST Flow Direction

CSL & WL Flow Direction

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Section C

MAINTENANCE RECOMMENDATIONS

1. Pressure drop readings are recommended to have an effective vacuum filter. Always document initial pressure drop during start-up when element is clean. Replacement cartridge is needed when system experiences 10” to 15” / 250-380mm H_2O higher pressure drop above the initial reading.
2. Always check replacement cartridge gaskets to ensure they are adhered uniformly along the end caps during handling. If not, contact Solberg Manufacturing, Inc. immediately. Do not modify or change from Solberg specified parts!
3. Always check inlets/outlets, element base and its components when replacing element to ensure cleanliness. Wipe clean if necessary.
4. Operate only when a proper seal exists.

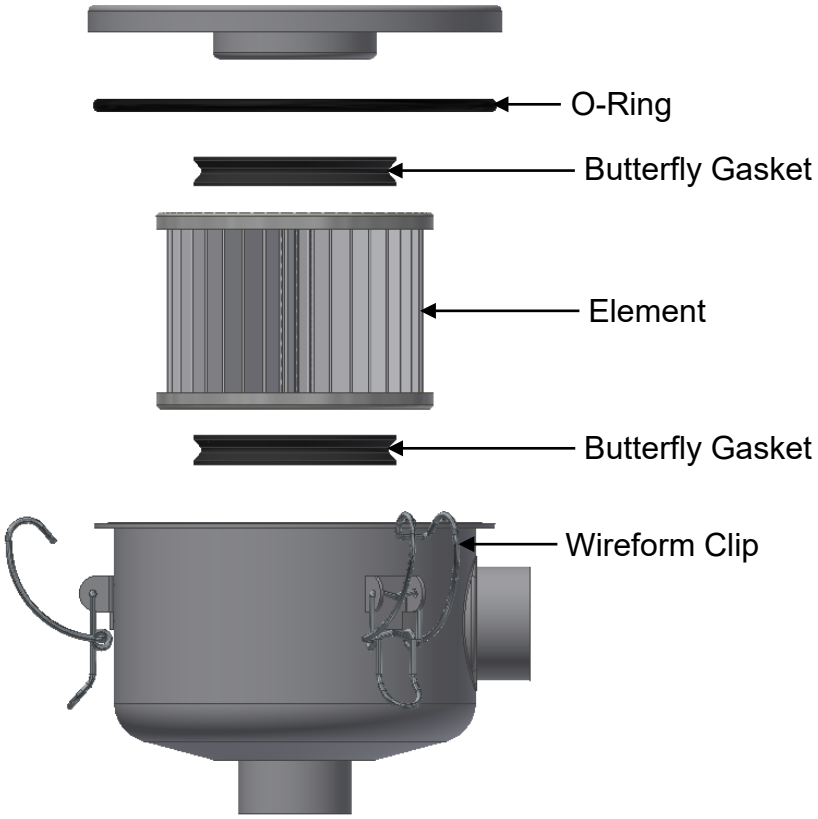
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Section D

REPLACEMENT PARTS LIST

1. CSL Series



CSL Series 3/8" – 1 1/2" Compact "L" Style Vacuum Filter
Available Replacement Parts

Available Replacement Part by Product Number					
Product #	**Element****	**Prefilter**	**O-Ring**	**Butterfly Gasket**	**Wire-form Clip**
CSL-824-XXX	824	N/A	9240825	9110810	5080110+36
CSL-825-XXX	825	N/A	9240825	9110810	5080110+36
CSL-842-XXX	842	PF842	9241050	9110900	5080110+36
CSL-843-XXX	843	PF842	9241050	9110900	5080110+36
CSL-848-XXX	848	PF848	9241250	9111000	5080110+36
CSL-849-XXX	849	PF848	9241250	9111000	5080110+36

**Note: *Even element numbers are Paper elements and odd element numbers are Polyester elements.*

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SOLBERG®
Filtration • Separation• Silencing

Stamped Steel Filter Silencers

FS Series ½" - 6"

Features

- Fully drawn weatherhood
- Tubular silencing design - tubes are positioned to maximize attenuation and air flow while minimizing pressure drop
- Corrosive resistant gray powder coat carbon steel

Technical Specifications

- Temp (continuous): min -15°F (-26°C) max 220°F (104°C)
- Filter change out differential: 15-20" H_2O over initial ΔP
- Pressure drop graphs available upon request
- Polyester: 99%+ removal efficiency standard to 5 micron
- Paper: 99%+ removal efficiency standard to 2 micron

Options

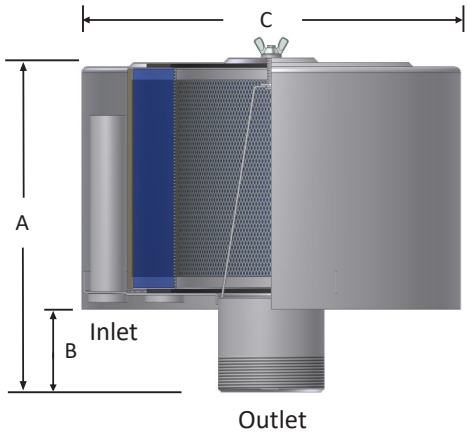
ATEX Available

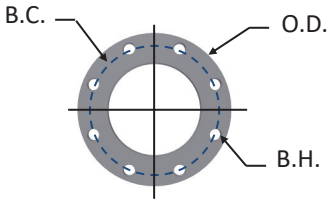
- Tap holes available
- Pressure drop indicator
- Various media for different environments
- Stainless steel construction
- Various nonstandard finishes and connection styles
- Side Access Silencer Filters (LQB Series) for space restricted enclosures (select models)



Rev: US0621K

All model offerings and design parameters are subject to change without prior notice.
Contact your representative or visit www.solbergmfg.com for the most current information.





O.D.: Outside Diameter
B.C.: Bolt Circle
B.H.: Bolt Hole

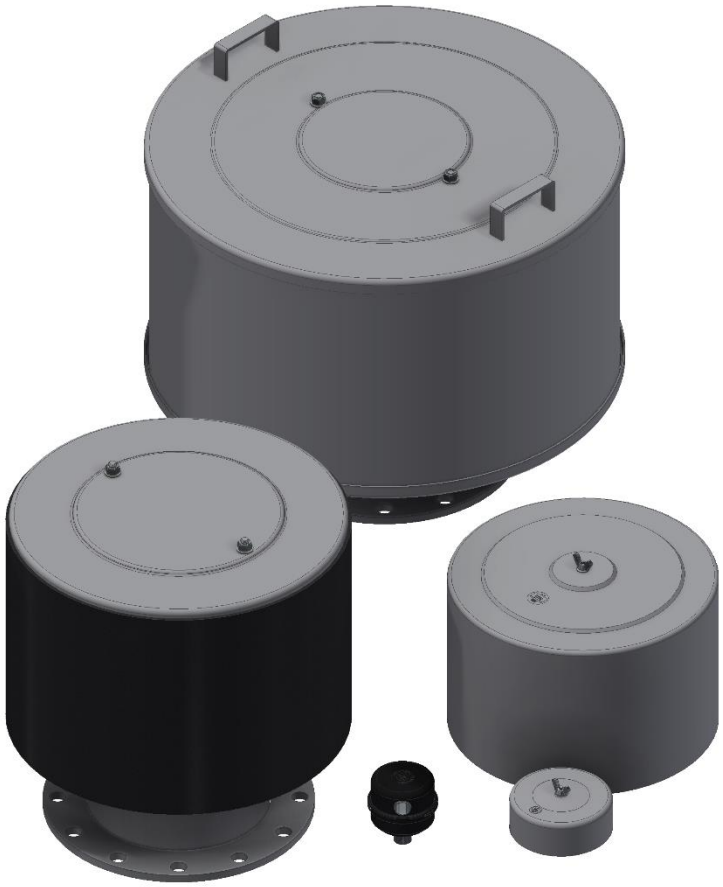
125/150# Pattern Flange	Dimensions - inches			No. of Holes	Flange Thickness inches
	O.D.	B.C.	B.H.		
4"	9	7 ½	¾	8	0.5
5"	10	8 ½	⅞	8	0.5
6"	11	9 ½	⅞	8	0.5

MPT Outlet	Assembly SCFM Rating	Assembly Part Number		Dimensions - inches			Suggested Service ht. inches	No. of Silencing Tubes	Approx. Weight lbs.	Replacement Element Part No.		Element SCFM Rating
		Polyester	Paper	A	B	C				Polyester	Paper	
½"	10	FS-15-050	FS-14-050	3 7/16	1	6	3	1	2	15™	14™	35
¾"	25	FS-15-075	FS-14-075	4	1 ¼	6	3	2	2	15™	14™	35
1"	35	FS-15-100	FS-14-100	3 ¾	1 5/16	6	3	3	2	15™	14™	35
1"	55	FS-19P-100	FS-18P-100	6 ⅜	1 ¼	6	5	3	3	19P®	18P™	100
1 ¼"	70	FS-19P-125	FS-18P-125	6 ¾	1 ⅝	6	5	5	3	19P®	18P™	100
1 ½"	85	FS-19P-150	FS-18P-150	6 ¾	1 ⅝	6	5	5	4	19P®	18P™	100
2"	135	FS-31P-200	FS-30P-200	7 ½	2 ¼	10	5	5	8	31P™	30P™	195
2"	135	FS-231P-200	FS-230P-200	12	2 ⅜	10	10	5	14	231P™	230P™	300
2 ½"	195	FS-31P-250	FS-30P-250	7 ½	2 ½	10	5	5	8	31P™	30P™	195
2 ½"	195	FS-231P-250	FS-230P-250	12 ⅜	2 ⅝	10	10	9	15	231P™	230P™	300
3"	300	FS-231P-300	FS-230P-300	12 ¾	3 ⅛	10 ¼	10	9	15	231P™	230P™	300
3"	300	FS(12)-235P-300	FS(12)-234P-300	12 ⅞	2 11/16	12 ¼	10	3	29	235P™	234P™	570
3"	300	FS-275P-300	FS-274P-300	13	3	16	10	9	33	275P™	274P™	1100
4"	520	FS(12)-235P-400	FS(12)-234P-400	13 ⅞	3 11/16	12 ¼	10	6	29	235P™	234P™	570
4"	520	FS-275P-400	FS-274P-400	14	4	16	10	9	34	275P™	274P™	1100
5"	800	FS-245P-500	FS-244P-500	14	4	16	10	14	33	245P™	244P™	880
5"	800	FS-275P-500	FS-274P-500	14	4	16	10	14	36	275P™	274P™	1100
6"	1100	FS-275P-600	FS-274P-600	15	5 ⅛	16	10	18	38	275P™	274P™	1100

Flange Outlet	Assembly SCFM Rating	Assembly Part Number		Dimensions - inches			Suggested Service ht. inches	No. of Silencing Tubes	Approx. Weight lbs.	Replacement Element Part No.		Element SCFM Rating
		Polyester	Paper	A	B	C				Polyester	Paper	
4"	520	FS(12)-235P-400F	FS(12)-234P-400F	13 ⅞	3 11/16	12 ¼	10	6	32	235P™	234P™	570
4"	520	FS-275P-400F	FS-274P-400F	14	4	16	10	9	39	275P™	274P™	1100
5"	800	FS-245P-500F	FS-244P-500F	14	4	16	10	14	38	245P™	244P™	880
5"	800	FS-275P-500F	FS-274P-500F	14	4	16	10	14	41	275P™	274P™	1100
6"	1100	FS-275P-600F	FS-274P-600F	15	5 ⅛	16	10	18	42	275P™	274P™	1100

See Filter Silencer Technical Data for sizing guidelines.

Rev: US0621K



Intake Filters

www.solbergmfg.com

Note: Please read the maintenance instructions given by the OEM for the machinery first. The OEM's manual should be adhered to in order to protect the equipment. Solberg Manufacturing, Inc has made every effort to make sure that these instructions are accurate but is not responsible for any typos, slight variations or for human errors that may occur.

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Maintenance Manual

Intake Filters

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Section B

General Information

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2. Filtration Rules of Thumb ..... pg. 4
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4. Element Cleaning ..... pg. 7
5. Installation ..... pg. 8

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Maintenance Recommendations ..... pg. 8

Section D

Replacement Parts List

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2. F Series ..... pg. 13
3. FS Series. ..... pg. 17
4. QB Series ..... pg. 22
5. 2G Series ..... pg. 25

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Section A

INTRODUCTION

The purpose of this manual is instruction on the proper assembly and care of Solberg intake filters.

WARNING

This manual must be read and thoroughly understood before using and caring for this air filter. Failure to comply could result in explosion, product/system contamination or personal injury.

This manual should be used as a supplement to the user's understanding of the proper care needed to maintain a safe and dependable intake filter. It is the responsibility of the user to interpret and explain all instructions to persons who do not read or understand English BEFORE they are allowed to maintain and use this filter.

This manual should be readily available to all operators responsible for operation and maintenance of the intake filters.

We thank you for selecting products from Solberg Manufacturing, Inc. We are confident that our superior filter designs will meet your application requirements.

Section B

GENERAL INFORMATION

1. Identification of Solberg Intake Filters

All Solberg intake filters should have an identification label/nameplate that gives the following information:

Assembly Model #
Replacement Element #

(The exception is OEM supplied units. In this case, please enter the OEM part numbers in Table 1.)

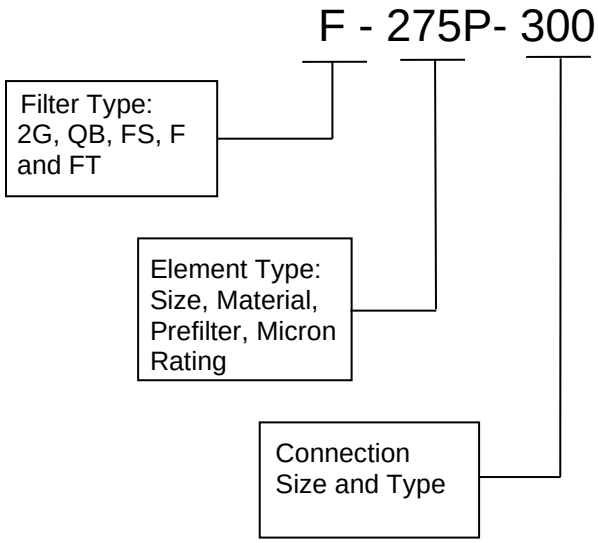
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Ph: 630.773.1363 Fax: 630.773.0727 Email: sales@solbergmfg.com Web: www.solbergmfg.com

Fill in the actual nameplate data from your new Solberg intake filter(s):

No.	Filter Model Number	Replacement Element	Initial Delta P Readings
1			
2			
3			
4			
5			

Table 1

The model number designates the filter type, the original element configuration and housing connection size. For example, the following part number identifies the filter as being a 'F' design filter with a 275 element with prefilter and 3" MPT connection size:



2. Filtration Rules of Thumb

General: For peak output performance from a compressor, blower, vacuum pump, engine, or any other machine that consumes air, one must have clean, unrestricted air. Proper filtration can help stabilize the working environment within rotating equipment even when the external conditions may be quite severe. A critical component in creating the right working conditions is filter sizing. With the properly sized filter, equipment will run smoothly over its entire expected operating life.

A major factor in filtration and filter sizing is air velocity through the filter media. Generally, the slower the velocity of air through a media the higher the filter efficiency and, conversely, the lower the pressure drop. Therefore, the primary goal in filter sizing is to optimize the velocity of air through the media (sometimes called face velocity).

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Rule of Thumb #2: Always ask or specify a filter based on a micron rating ***with filtration efficiencies***. As an example, stating a requirement for a 1-micron filter is misleading because no efficiency rating has been specified. A 1-micron filter at 95% efficiency may be less efficient than a 5-micron filter at 99% efficiency. For proper air system performance in light and industrial duty environments, a filter with a minimum of 99% filtration efficiency at 5 microns is required.

Rule of Thumb #3: Size your filter correctly by understanding the impact air velocity through a media has on efficiency and pressure drop. Maintain the suggested Air-to-Media ratios listed below based on the external environment listings and Filtration efficiency needs.

Filtration Efficiency Requirements (99%+ efficiency)	**Environmental Conditions**	**Air to Media Ratio**	
Industrial Grade 2-micron **Paper**	Industrial Duty (clean, office/warehouse-like)	30 CFM/ft^2	(549m^3/h)/m^2
	Severe Duty (workshop, factory-like)	15 CFM/ft^2	(274.5m^3/h)/m^2
	Extreme Duty (Foundry, Construction-like)	10 CFM/ft^2	(183m^3/h)/m^2
Industrial Grade 5-micron **Polyester**	Industrial Duty (clean, office/warehouse-like)	65 CFM/ft^2	(1189.5m^3/h)/m^2
	Severe Duty (workshop, factory-like)	40 CFM/ft^2	(732m^3/h)/m^2
	Extreme Duty (Foundry, Construction-like)	25 CFM/ft^2	(457.5m^3/h)/m^2
Industrial Grade 1-micron **Polyester**	Severe Duty (Foundry, Construction-like)	25 CFM/ft^2	(457.5m^3/h)/m^2
Industrial Grade 0.3-micron **HEPA** Glass @ 99.97% Efficiency	Industrial Duty (Pre-filtered Applications)	9 CFM/ft^2	(164.7m^3/h)/m^2
	Severe Duty (workshop, factory-like)	7 CFM/ft^2	(128m^3/h)/m^2
	Extreme Duty (Foundry, Construction-like)	5 CFM/ft^2	(91.5m^3/h)/m^2

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Rule of Thumb #4: Pressure drop is also caused by the dirt holding capacity of the element. As the element fills up with dirt, the pressure drop increases. It is important to document the pressure drop across a given filter when it is new and then clean or replace it when the pressure drop increases by 10” to 15” / 250-280mm H_2O over the original reading.

Rule of Thumb #5: The inlet connection greatly influences the overall pressure drop of the filter system. To minimize the restriction contributed by an inlet filter, a velocity of 6,000 ft/min (10200m^3/h) or less is suggested through the outlet pipe. The table below lists the suggested flows based on pipe size:

Pipe Size (inches)	Max Airflow		Pipe Size (inches)	Max Airflow	
1/2"	10 CFM	17m^3/h	4"	520 CFM	884m^3/h
3/4"	20 CFM	34m^3/h	5"	800 CFM	1360m^3/h
1"	35 CFM	60m^3/h	6"	1,100 CFM	1870m^3/h
1 ¼"	60 CFM	102m^3/h	8"	1,800 CFM	3060m^3/h
1 ½"	80 CFM	136m^3/h	10"	3,300 CFM	5610m^3/h
2"	135 CFM	230m^3/h	12"	4,700 CFM	7990m^3/h
2 ½"	195 CFM	332m^3/h	14"	6,000 CFM	10200m^3/h
3"	300 CFM	510m^3/h			

Table 3 **Note: This information is for general use only. A qualified engineer must properly design each system.*

3. Element Specifications

Temperature Range: -15° to 220°F / -26° to 105°C
Filter Change-Out Differential: 10” to 15” / 250-380mm H_2O Over Initial Delta P

Media	Micron Rating
Standard Paper	99+% @ 2 micron
Standard Polyester	99+% @ 5 micron
“S” Series Wire Mesh	Epoxy Coated Wire Mesh
“Z” Series Polyester	99+% @ 1 micron
“HE” Series HEPA	99.97% @ 0.3 microns
“U” Series Polyester	99+% @ 25 micron
“W” Series Polyester	99+% @ 100 micron
“S2” Series	Stainless Steel Wire Mesh
“AC” & “ACP” Series	N/A
“Y” Series Polypropylene	99+% @ 10 micron

Table 4

Temperature Range: -15° to 385°F / -26° to 196°C
Filter Change-Out Differential**:** 10” to 15”/ 250-380mm H_2O Over Initial Delta P

Media	Micron Rating
“MX” & “MXD” Series – Nomex Cloth	99+% @ 10 micron

Table 5

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4. Element Cleaning - Inlet Filtration

Solberg elements should be cleaned or replaced, once the pressure drop reaches 10 to 15-inches water column (250 - 380mm WC) above the initial pressure drop of the installation.

The decision to clean the element rather than replace it is left to the discretion of the operator. Any damage which results from by-pass or additional pressure drop created by element cleaning is the sole responsibility of the operator.

WARNING

The overall performance of a filter element is altered once cleaned.

The initial pressure drop after cleaning will be greater than the original, clean pressure drop of the element.

After each subsequent cleaning, the initial pressure drop will continue to increase.

Under all circumstances, the initial pressure drop of the element needs to be maintained at less than 15-inches water column (380mm WC).

Cleaned elements that exceed 15-inches water column (380mm WC) at start-up should be replaced with new elements.

With many types of equipment, the maximum pressure drop allowed will be dictated by the ability of the equipment to perform to its rated capacity. Under all circumstances, the operator should avoid exceeding the manufacturer's recommended maximum pressure drop for their specific equipment.

A. ***Polyester Element***: The polyester element may be washed in warm soapy water, vacuumed, gently blown out or replaced. The element should be dry before reinstallation. The element should be replaced after a maximum of three cleanings.
B. ***Paper Element***: The paper element may be lightly blown with low pressure air. It is disposable and in most cases should be replaced with a new element.

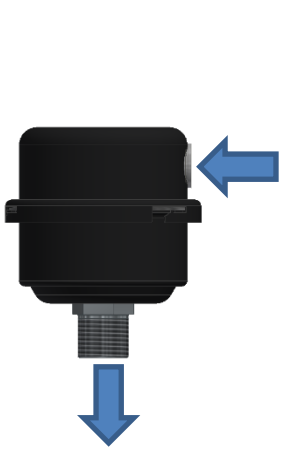
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C. ***Polyurethane Prefilter***: The prefilter may be washed as a sponge or replaced to give the element a longer service life.
D. ***Epoxy Coated Wire Mesh and Stainless Steel Wire Mesh Elements***: Cleaning instructions similar to polyester, except mild solvents may be used.
E. ***Activated Carbon Element***: Not cleanable
F. ***Polypropylene Element***: Cleaning instructions similar to polyester
G. ***Nomex Cloth Element***: Cleaning instructions similar to polyester

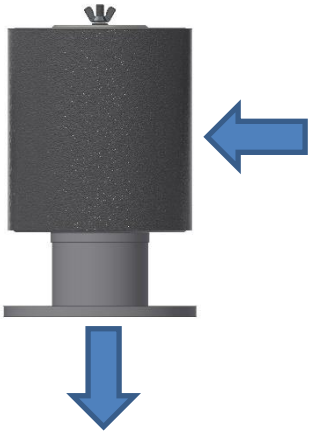
If you are not confident that the integrity of the element was maintained during cleaning, it is recommended that a new element be installed. Also, spare parts such as gaskets, wing nuts and washers can be supplied upon request.

5. Installation.

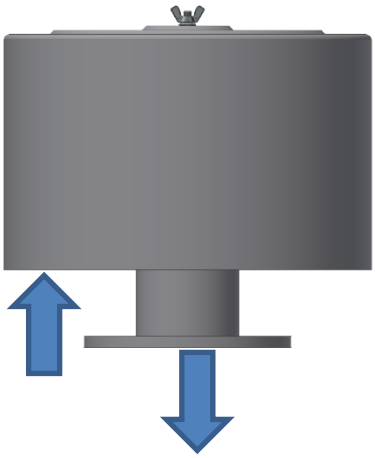
The drawing of the filter should be referenced before installation in order to ensure the unit is installed properly. The inlet and outlet should be identified on the unit as a label or as a physical design feature of the unit.



Mini FS Flow Direction



FT Flow Direction



F, FS, QB, & 2G Flow Direction

Section C

MAINTENANCE RECOMMENDATIONS

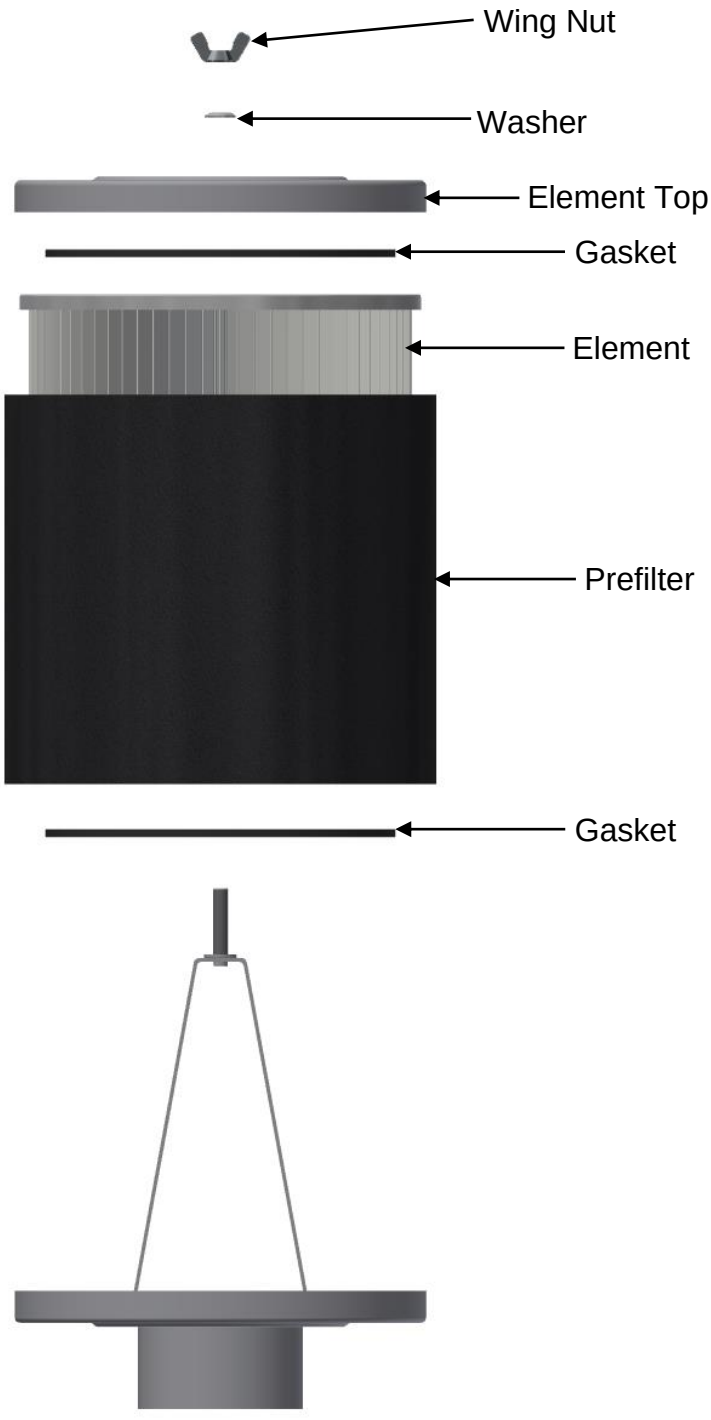
1. Pressure drop readings are recommended to have an effective air filter. Always document initial pressure drop during start-up when element is clean. Replacement cartridge is needed when system experiences 10” to 15” / 250-380mm H_2O above drop above the initial reading. Refer to page 4 for initial values.
2. Always check inlets/outlets, element base and its components when replacing element to ensure cleanliness. Wipe clean if necessary.
3. Operate only when a proper seal exists.

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Section D

REPLACEMENT PARTS LIST

1. FT SERIES



FT Series Compact Exposed Inlet Filter
Available Replacement Parts

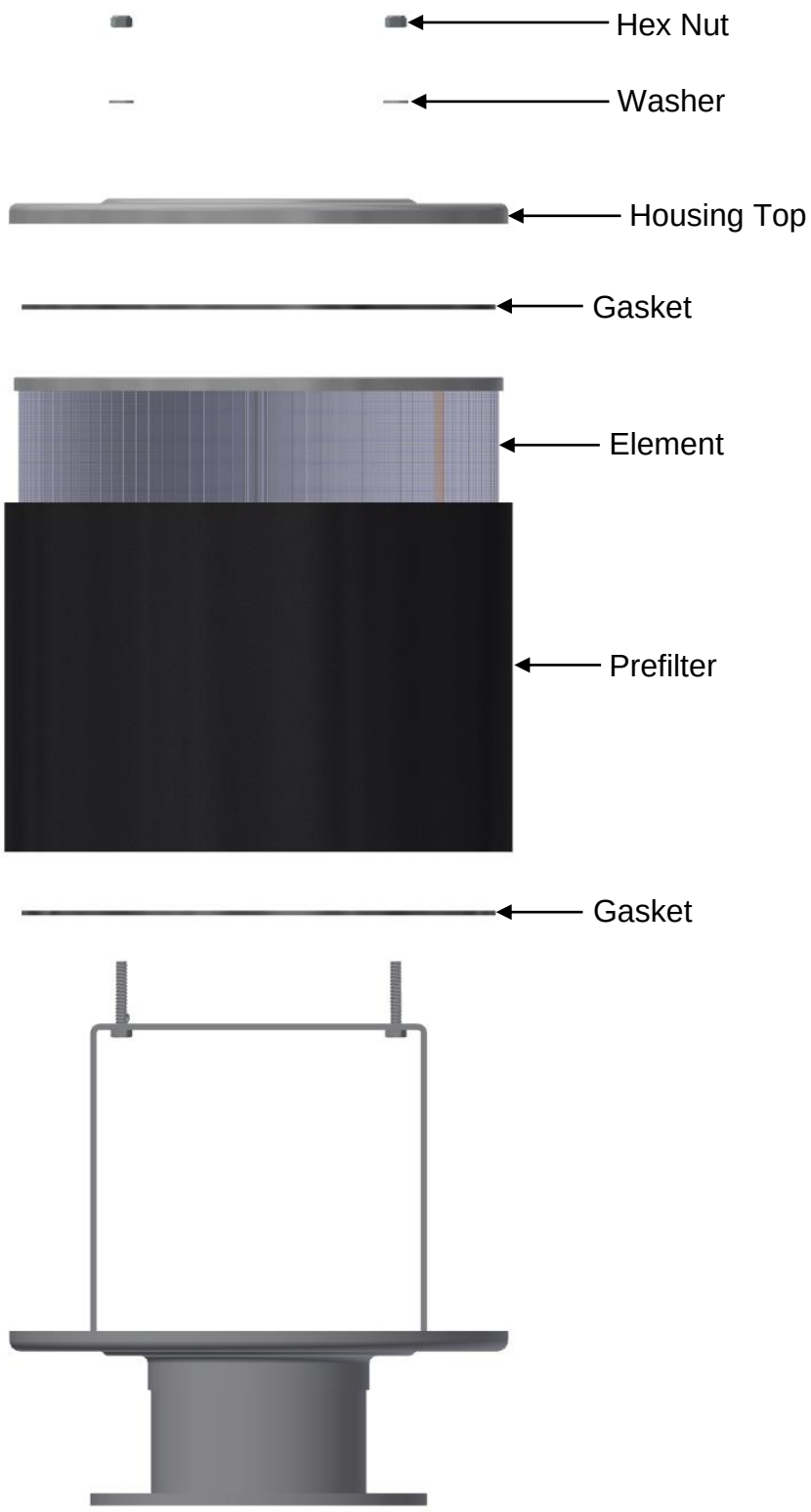
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Available Replacement Part by Product Number						
Product #	**Element****	**Prefilter**	**Gasket**	**Housing top**	**Washer**	**Wing Nut**
FT-14P-XXX	14	9010200	N/A	1030400+01	5040200	5030500
FT-15P-XXX	15	9010200	N/A	1030400+01	5040200	5030500
FT-18P-XXX	18	9010400	N/A	1030400+01	5040200	5030500
FT-19P-XXX	19	9010400	N/A	1030400+01	5040200	5030500
FT-30P-XXX	30	9010500	N/A	1030500+01	5040200	5030500
FT-31P-XXX	31	9010500	N/A	1030500+01	5040200	5030500
FT-230P-XXX	230	9010700	N/A	1030500+01	5020150	5030600
FT-231P-XXX	231	9010700	N/A	1030500+01	5020150	5030600
FT-234P-XXX	234	9010800	N/A	1030700+01	5020150	5030600
FT-235P-XXX	235	9010800	N/A	1030700+01	5020150	5030600
FT-244P-XXX	244	9010900	N/A	1030900+01	5020150	5030600
FT-245P-XXX	245	9010900	9110100	1030900+01	5020150	5030600
FT-274P-XXX	274	9011000	9110200	1031000+01	5020150	5030600
FT-275P-XXX	275	9011000	9110200	1031000+01	5020150	5030600

**Note: *Even element numbers are Paper elements and odd element numbers are Polyester elements.*

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FT Series Big Boy Exposed Inlet Filter
Available Replacement Part

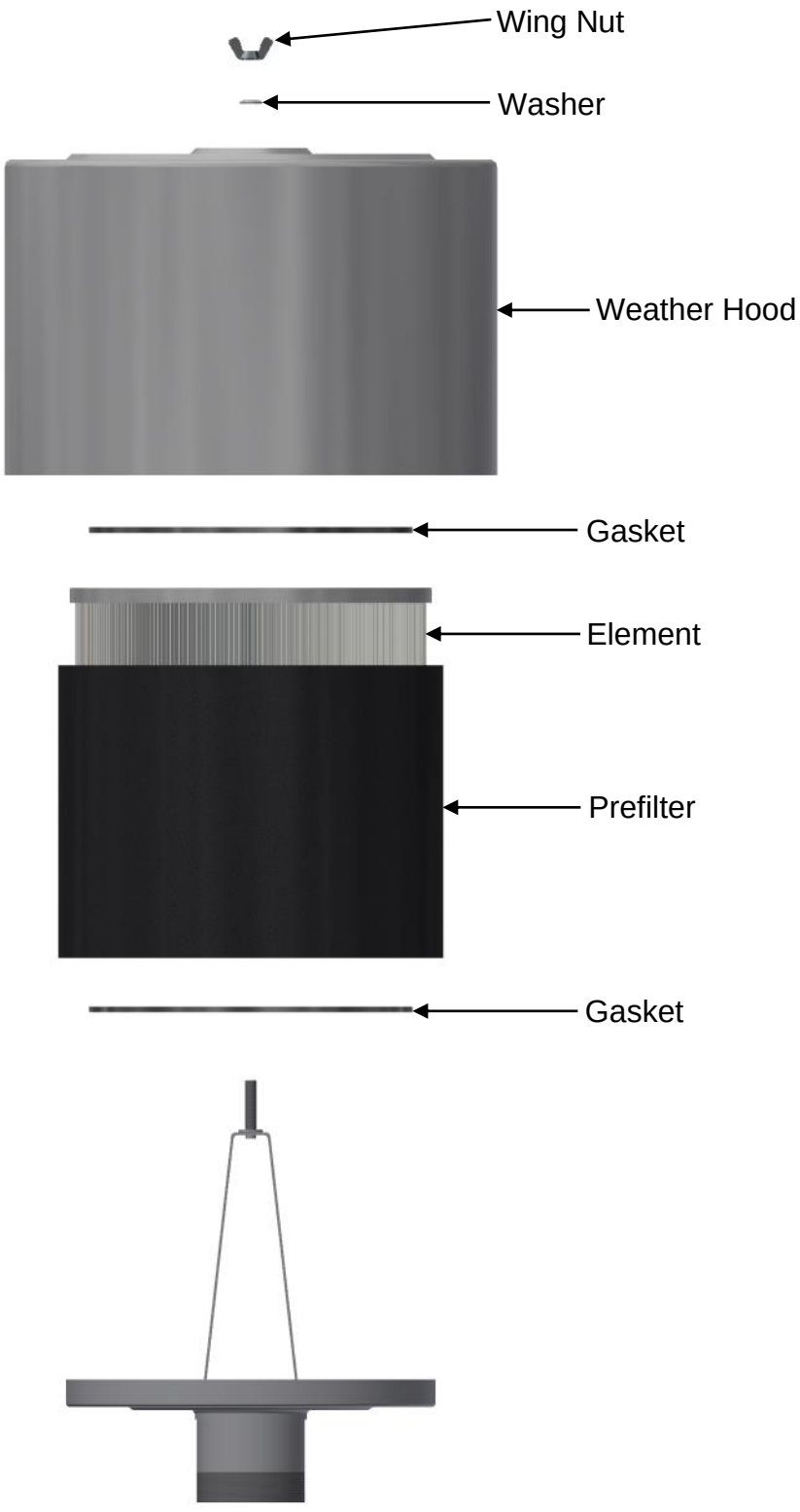
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Available Replacement Part by Product Number						
Product #	**Element****	**Prefilter**	**Gasket**	**Element Top**	**Washer**	**Hex Nut**
FT-376P-XXX	376	9011200	9110400	1031100+01	5020200	5011401
FT-377P-XXX	377	9011200	9110400	1031100+01	5020200	5011401
FT-384P-XXX	384	9011300	9110500	1031300+01	5020200	5011401
FT-385P-XXX	385	9011300	9110500	1031300+01	5020200	5011401
FT-484P-XXX	484	9011400	9110500	1031300+01	5020200	5011401
FT-485P-XXX	485	9011400	9110500	1031300+01	5020200	5011401
FT-384P(2)-XXX	384(2)	9011300	9110500	1031300+01	5020200	5011401
FT-685P-XXX	685	9011500	9110500	1031300+01	5020200	5011401

**Note: *Even element numbers are Paper elements and odd element numbers are Polyester elements.*

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2. F SERIES



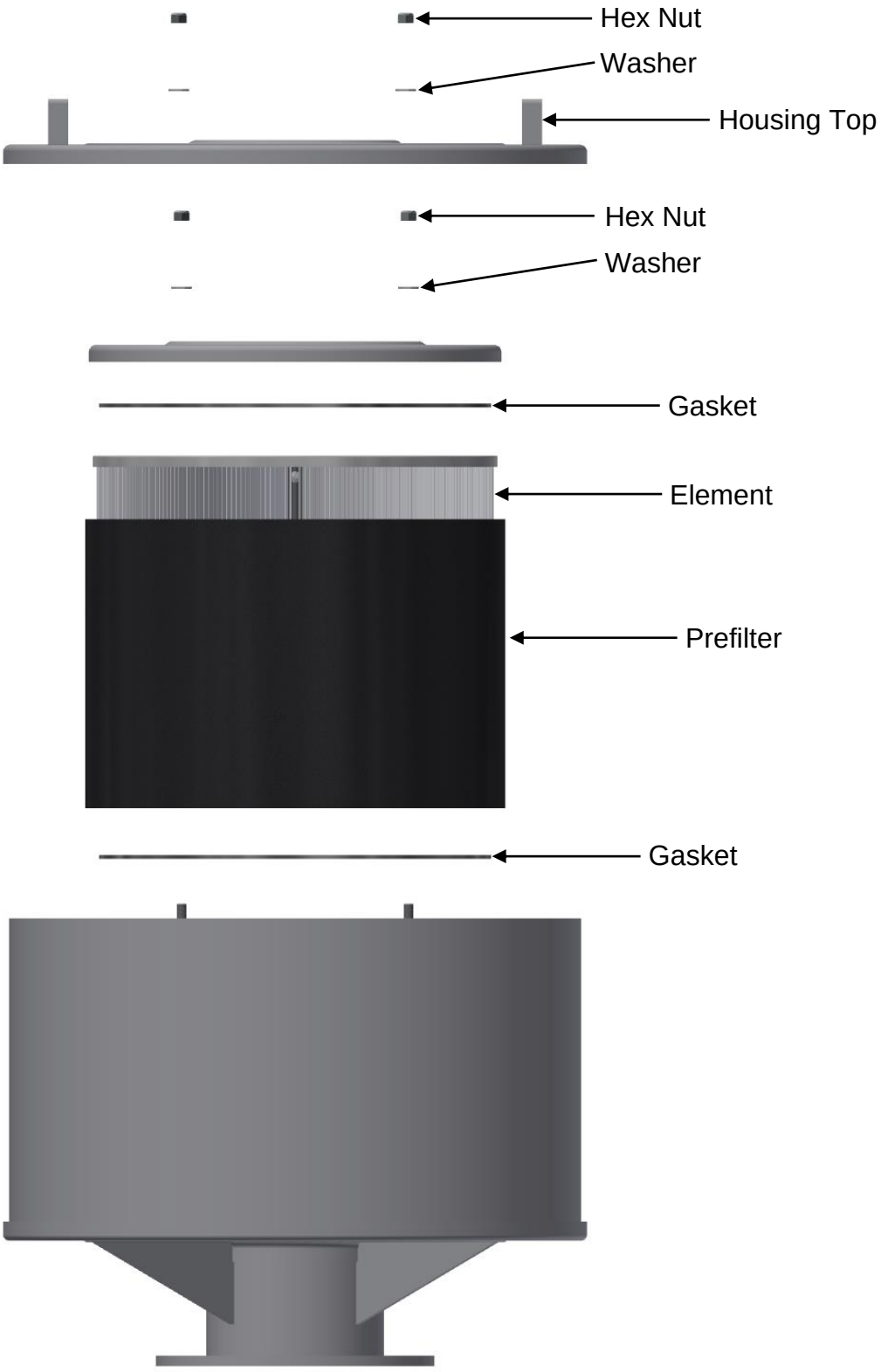
F Series Compact Inlet Filter
Available Replacement Parts

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Available Replacement Part by Product Number						
Product #	**Element****	**Prefilter**	**Gasket**	**Weather Hood**	**Washer**	**Wing Nut**
F-14P-XXX	14	9010200	N/A	1050300+01	5040200	5030500
F-15P-XXX	15	9010200	N/A	1050300+01	5040200	5030500
F-18P-XXX	18	9010400	N/A	1050500+01	5040200	5030500
F-19P-XXX	19	9010400	N/A	1050500+01	5040200	5030500
F-30P-XXX	30	9010500	N/A	1050700+01	5040200	5030500
F-31P-XXX	31	9010500	N/A	1050700+01	5040200	5030500
F-230P-XXX	230	9010700	N/A	1051000+01	5020150	5030600
F-231P-XXX	231	9010700	N/A	1051000+01	5020150	5030600
F-234P-XXX	234	9010800	N/A	1051000+01	5020150	5030600
F-235P-XXX	235	9010800	N/A	1051000+01	5020150	5030600
F-244P-XXX	244	9010900	N/A	0004822+01	5020150	5030600
F-245P-XXX	245	9010900	9110100	0004822+01	5020150	5030600
F-274P-XXX	274	9011000	9110200	1051200+01	5020150	5030600
F-275P-XXX	275	9011000	9110200	1051200+01	5020150	5030600

**Note: *Even element numbers are Paper elements and odd element numbers are Polyester elements.*

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F Series Big Boy Inlet Filter
Available Replacement Parts

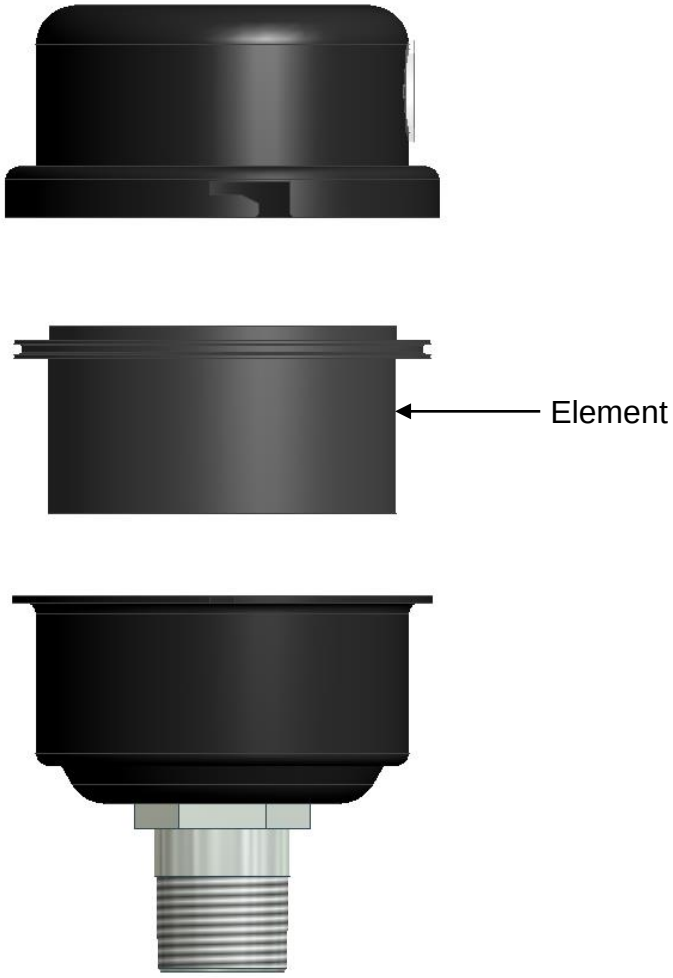
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Available Replacement Part by Product Number						
Product #	**Element****	**Prefilter**	**Gasket**	**Housing Top**	**Washer**	**Hex Nut**
F-376P-XXX	376	9011200	9110400	200-1031500+01	5020200	5011401
F-377P-XXX	377	9011200	9110400	200-1031500+01	5020200	5011401
F-384P-XXX	384	9011300	9110500	205-1031600+01	5020200	5011401
F-385P-XXX	385	9011300	9110500	205-1031600+01	5020200	5011401
F-484P-XXX	484	9011400	9110500	203-1031600+01	5020200	5011401
F-485P-XXX	485	9011400	9110500	203-1031600+01	5020200	5011401
F-384P(2)-XXX	384(2)	9011300	9110500	200-1031600+01	5020200	5011401
F-685P-XXX	685	9011500	9110500	200-1031600+01	5020200	5011401
F-484P(2)-XXX	484(2)	9011400	9110500	200-1031600+01	5020200	5011401
F-485P(2)-XXX	485(2)	9011400	9110500	200-1031600+01	5020200	5011401

**Note: *Even element numbers are Paper elements and odd element numbers are Polyester elements.*

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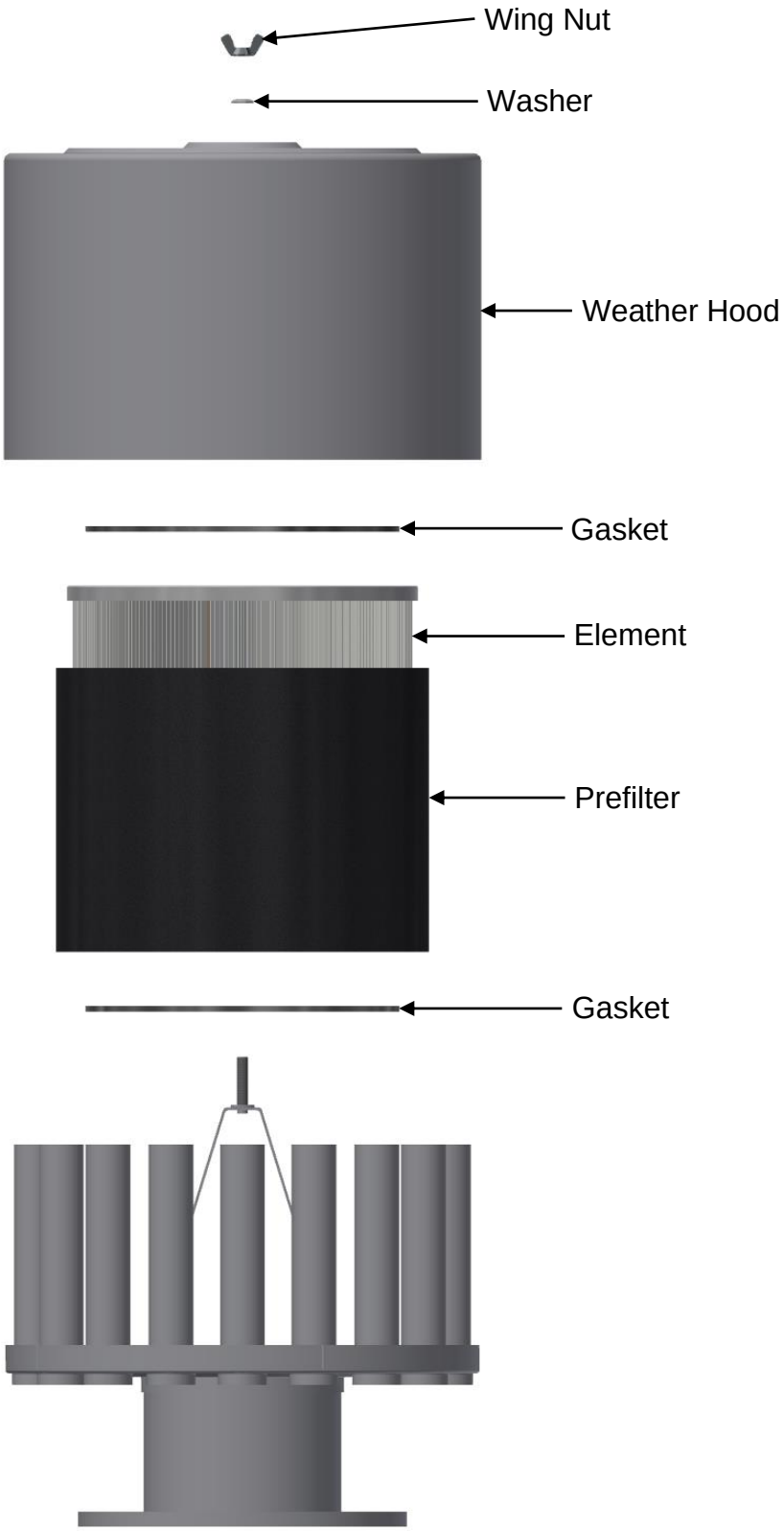
3. FS SERIES



FS Series Miniature Filter Silencer
Available Replacement Parts

Available Replacement Part by Product Number		
Product Number	**Element Type**	**Replacement Part Number**
FS-04-XXX	Paper	04
FS-05-XXX	Polyester	05
FS-06-XXX	Paper	06
FS-07-XXX	Polyester	07
FS-10-XXX	Paper	10
FS-11-XXX	Polyester	11

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FS Series Compact Filter Silencer
Available Replacement Parts

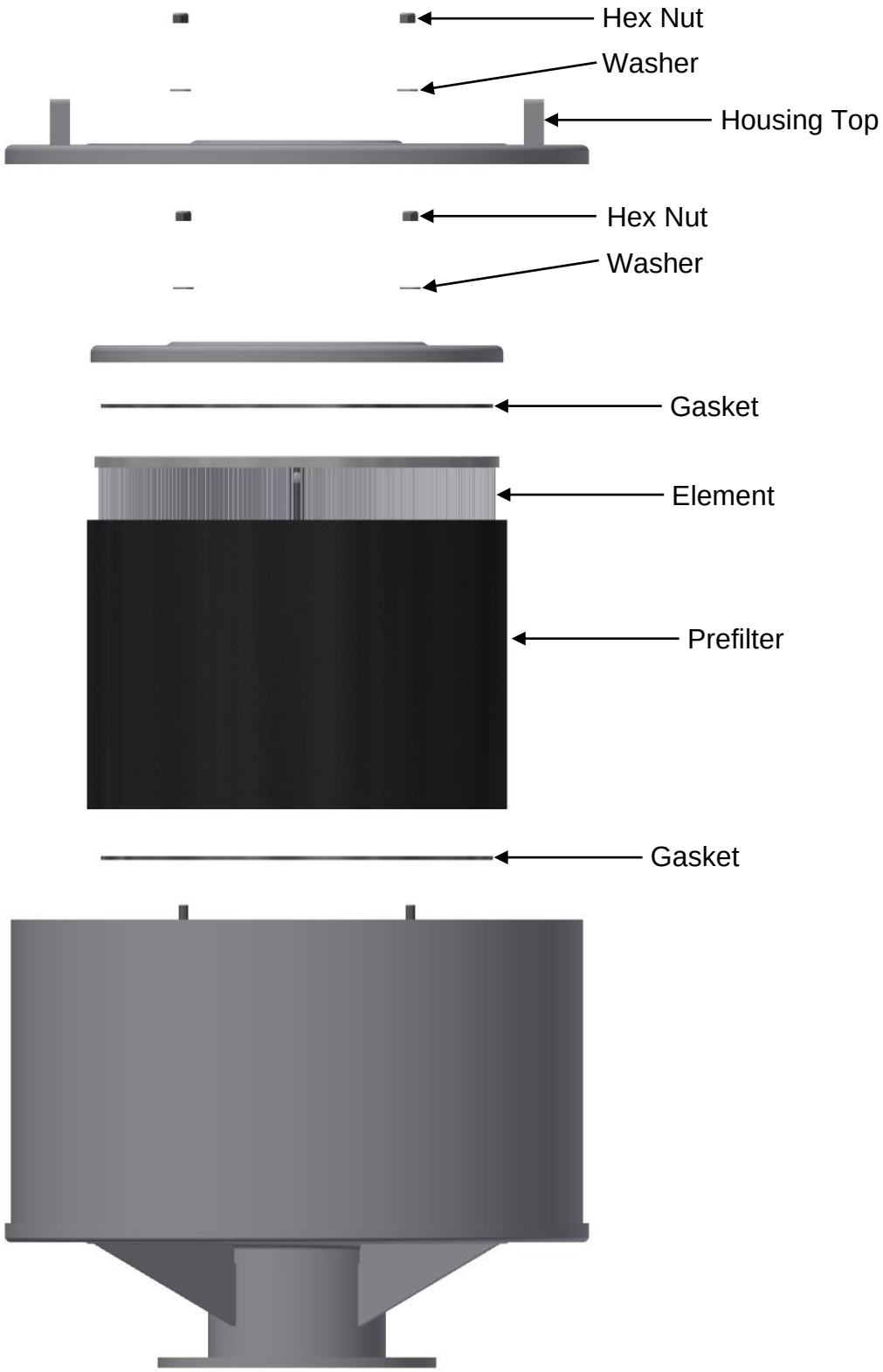
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Available Replacement Part by Product Number						
Product #	**Element****	**Prefilter**	**Gasket**	**Weather Hood**	**Washer**	**Wing Nut**
FS-14P-XXX	14	9010200	N/A	1050300+01	5040200	5030500
FS-15P-XXX	15	9010200	N/A	1050300+01	5040200	5030500
FS-18P-XXX	18	9010400	N/A	1050500+01	5040200	5030500
FS-19P-XXX	19	9010400	N/A	1050500+01	5040200	5030500
FS-30P-XXX	30	9010500	N/A	1050900+01	5040200	5030500
FS-31P-XXX	31	9010500	N/A	1050900+01	5040200	5030500
FS-230P-XXX	230	9010700	N/A	1051000+01	5020150	5030600
FS-231P-XXX	231	9010700	N/A	1051000+01	5020150	5030600
FS-234P-XXX	234	9010800	N/A	1051200+01	5020150	5030600
FS-235P-XXX	235	9010800	N/A	1051200+01	5020150	5030600
FS-244P-XXX	244	9010900	N/A	1051200+01	5020150	5030600
FS-245P-XXX	245	9010900	9110100	1051200+01	5020150	5030600
FS-274P-XXX	274	9011000	9110200	1051200+01	5020150	5030600
FS-275P-XXX	275	9011000	9110200	1051200+01	5020150	5030600

**Note: *Even element numbers are Paper elements and odd element numbers are Polyester elements.*

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FS Series Big Boy Filter Silencer
Available Replacement Parts

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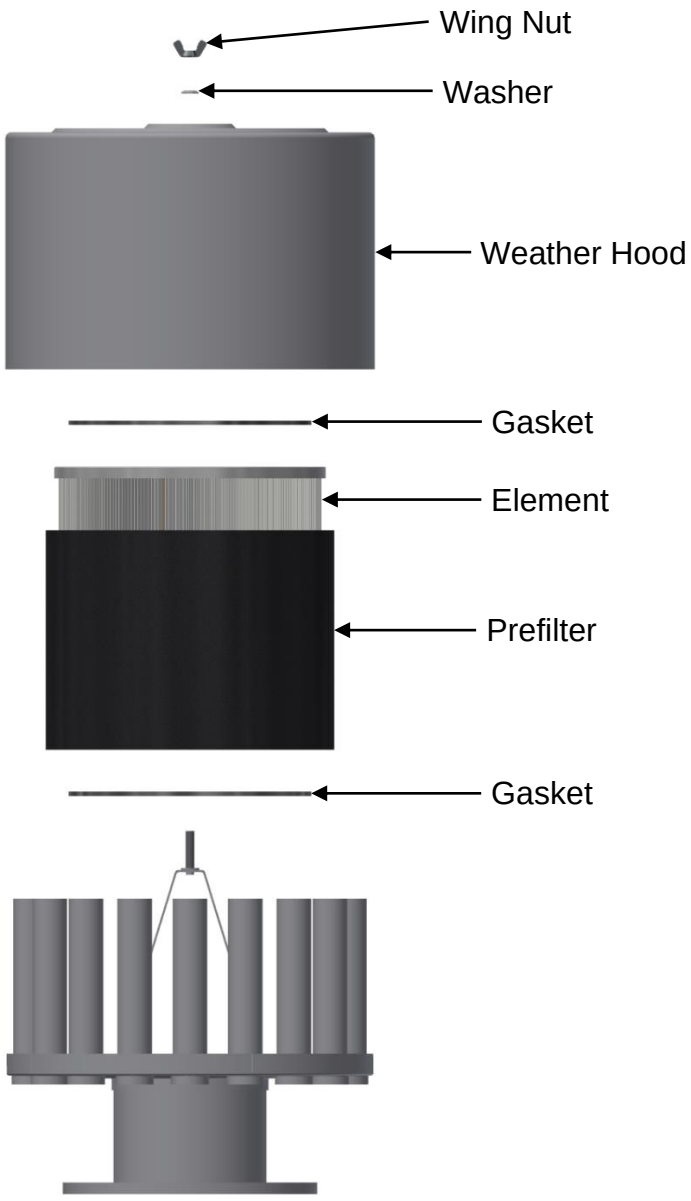
Available Replacement Part by Product Number							
Product #	**Element****	**Prefilter**	**Gasket**	**Housing Top**	**Washer**	**Hex Nut**	**Element Top**
FS-376P-XXX	376	9011200	9110400	201-1031500+01	5020200	5011401	1031100+01
FS-377P-XXX	377	9011200	9110400	201-1031500+01	5020200	5011401	1031100+01
FS-384P-XXX	384	9011300	9110500	200-1031600+01	5020200	5011401	1031300+01
FS-385P-XXX	385	9011300	9110500	200-1031600+01	5020200	5011401	1031300+01
FS-484P-XXX	484	9011400	9110500	200-1031600+01	5020200	5011401	1031300+01
FS-485P-XXX	485	9011400	9110500	200-1031600+01	5020200	5011401	1031300+01
FS-384P(2)-XXX	384(2)	9011300	9110500	200-1031600+01	5020200	5011401	1031300+01
FS-685P-XXX	685	9011500	9110500	200-1031600+01	5020200	5011401	1031300+01
FS-484P(2)-XXX	484(2)	9011400	9110500	200-1031600+01	5020200	5011401	1031300+01
FS-485P(2)-XXX	485 (2)	9011400	9110500	200-1031600+01	5020200	5011401	1031300+01

**Note: *Even element numbers are Paper elements and odd element numbers are Polyester elements.*

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4. QB SERIES

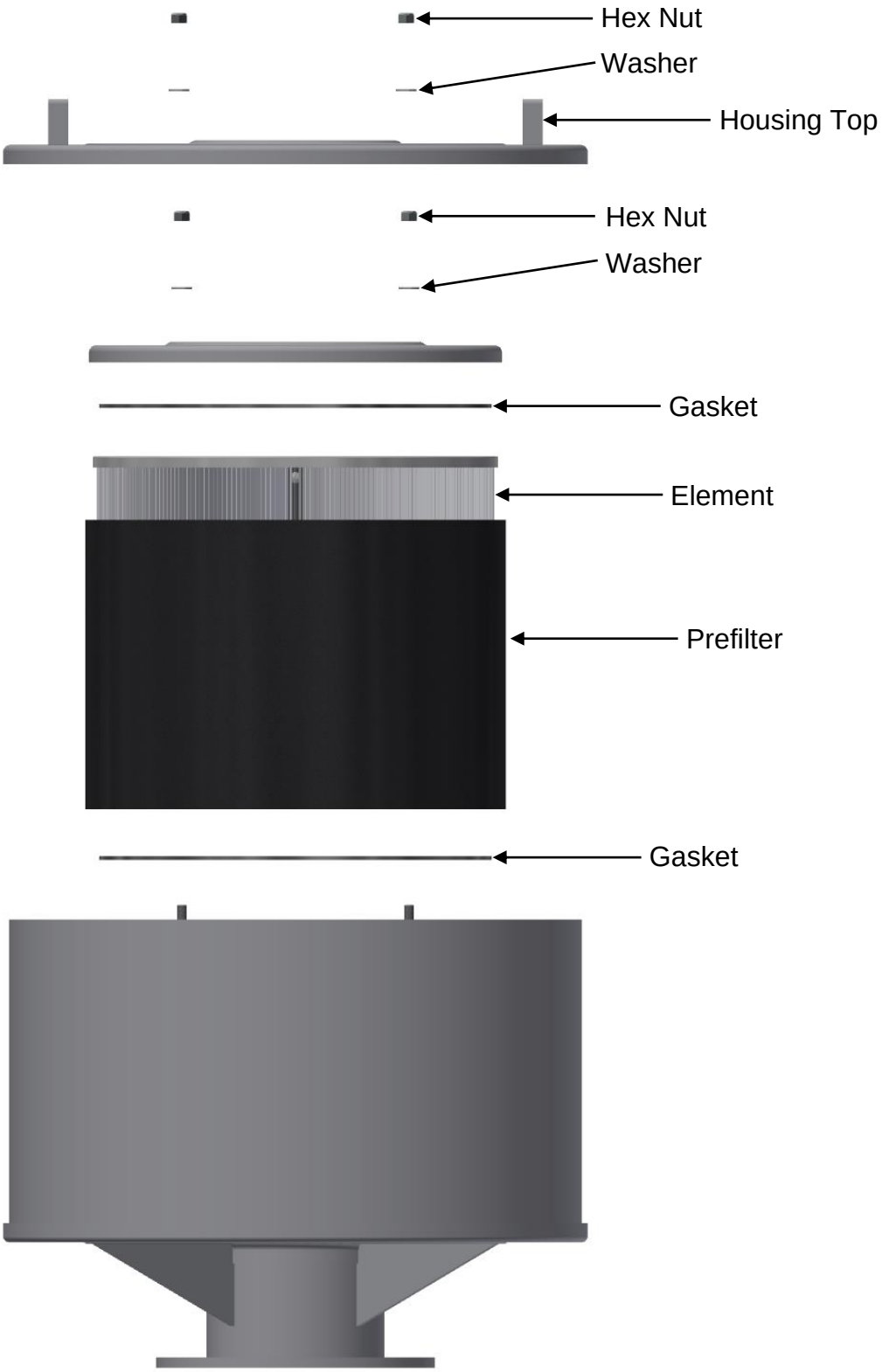


QB Series Compact Filter Silencer
Available Replacement Parts

Available Replacement Part by Product Number						
Product #	**Element****	**Prefilter**	**Gasket**	**Weather Hood**	**Washer**	**Wing Nut**
QB-230P-XXX	230	9010700	N/A	1051000-1+01	5020150	5030600
QB-231P-XXX	231	9010700	N/A	1051000-1+01	5020150	5030600

**Note: *Even element numbers are Paper elements and odd element numbers are Polyester elements.*

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QB Series Big Boy Filter Silencer
Available Replacement Parts

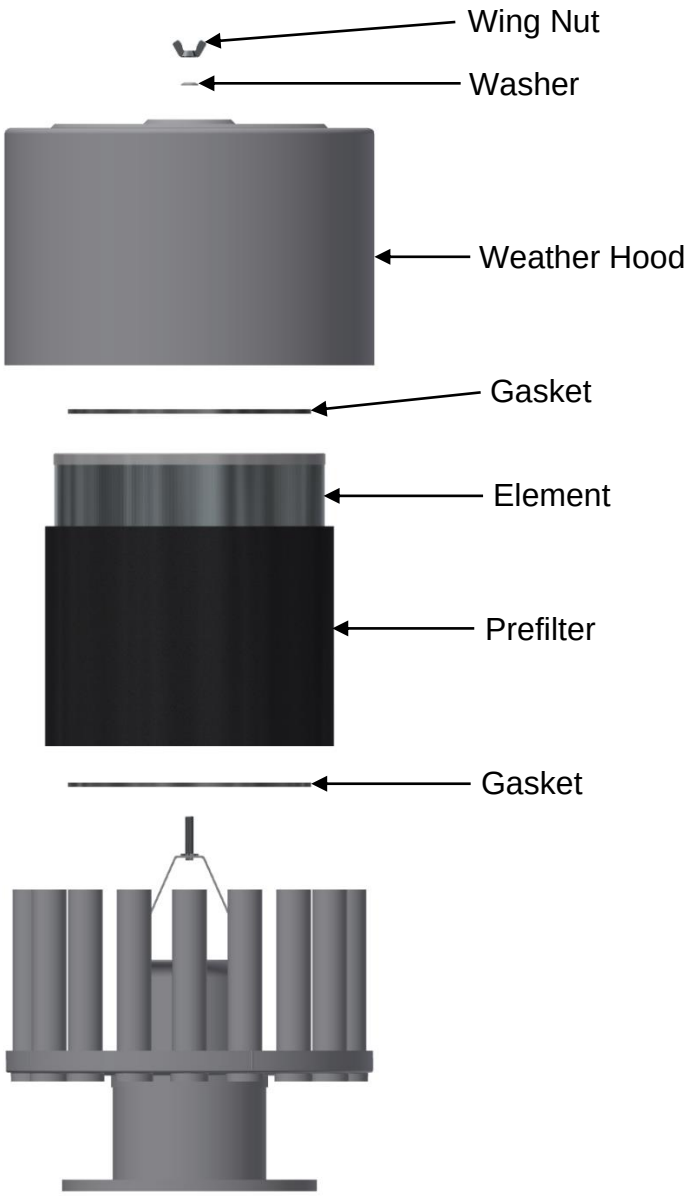
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Available Replacement Part by Product Number							
Product #	**Element****	**Prefilter**	**Gasket**	**Housing Top**	**Washer**	**Hex Nut**	**Element Top**
QB-376P-XXX	376	9011200	9110400	201-1031500+01	5020200	5011401	1031100+01
QB-377P-XXX	377	9011200	9110400	201-1031500+01	5020200	5011401	1031100+01
QB-384P-XXX	384	9011300	9110500	200-1031600+01	5020200	5011401	1031300+01
QB-385P-XXX	385	9011300	9110500	200-1031600+01	5020200	5011401	1031300+01
QB-484P-XXX	484	9011400	9110500	200-1031600+01	5020200	5011401	1031300+01
QB-485P-XXX	485	9011400	9110500	200-1031600+01	5020200	5011401	1031300+01
QB-685P-XXX	685	9011500	9110500	200-1031600+01	5020200	5011401	1031300+01
QB-384P(2)-XXX	384(2)	9011300	9110500	200-1031600+01	5020200	5011401	1031300+01
QB-484P(2)-XXX	484(2)	9011400	9110500	200-1031600+01	5020200	5011401	1031300+01
QB-485P(2)-XXX	485(2)	9011400	9110500	200-1031600+01	5020200	5011401	1031300+01

**Note: *Even element numbers are Paper elements and odd element numbers are Polyester elements.*

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5. 2G SERIES

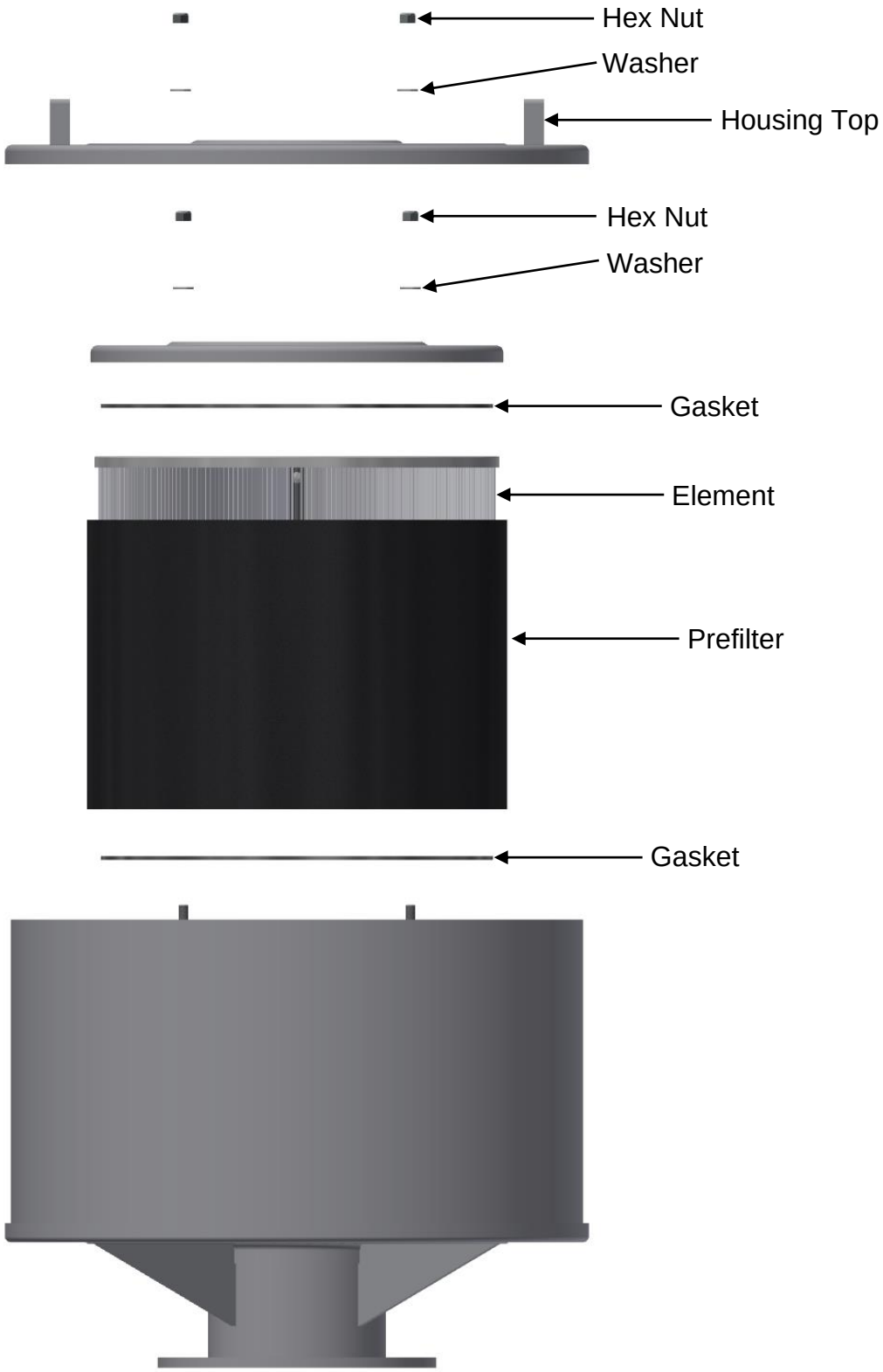


2G Series Compact Filter Silencer
Available Replacement Parts

Available Replacement Part by Product Number						
Product #	**Element****	**Prefilter**	**Gasket**	**Weather Hood**	**Washer**	**Wing Nut**
2G-274P-XXX	274	9011000	9110200	1051200-1+01	5020150	5030600
2G-275P-XXX	275	9011000	9110200	1051200-1+01	5020150	5030600

**Note: *Even element numbers are Paper elements and odd element numbers are Polyester elements.*

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2G Series Big Boy Filter Silencer
Available Replacement Parts

Solberg Manufacturing, Inc., 1151 Ardmore Itasca, IL 60143 USA
Ph: 630.773.1363 Fax: 630.773.0727 Email: sales@solbergmfg.com Web: www.solbergmfg.com

Available Replacement Part by Product Number							
Product #	**Element****	**Prefilter**	**Gasket**	**Housing Top**	**Washer**	**Hex Nut**	**Element Top**
2G-376P-XXX	376	9011200	9110400	201-1031500+01	5020200	5011401	1031100+01
2G-377P-XXX	377	9011200	9110400	201-1031500+01	5020200	5011401	1031100+01
2G-384P-XXX	384	9011300	9110500	200-1031600+01	5020200	5011401	1031300+01
2G-385P-XXX	385	9011300	9110500	200-1031600+01	5020200	5011401	1031300+01
2G-484P-XXX	484	9011400	9110500	200-1031600+01	5020200	5011401	1031300+01
2G-485P-XXX	485	9011400	9110500	200-1031600+01	5020200	5011401	1031300+01
2G-685P-XXX	685	9011500	9110500	200-1031600+01	5020200	5011401	1031300+01
2G-384P(2)-XXX	384(2)	9011300	9110500	200-1031600+01	5020200	5011401	1031300+01

**Note: *Even element numbers are Paper elements and odd element numbers are Polyester elements.*

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SOLBERG®

FPZ BLOWER TECHNOLOGY

ACCESSORIES

Safety Valves

SS1401

The following table is a guide to select the appropriate safety valve. The selections in the table are based on blowers operating at 60 Hz - for 50 hz applications refer to the safety valve data sheets. To select the appropriate safety valve, determine the blower model, horsepower, and whether it is to be used for vacuum or pressure service. If it is desirable to have the valve activate at lower pressures than the maximum rated pressure or vacuum of the blower, a different safety valve might be required (refer to safety valve data sheets). In some cases, two valves are required. FPZ valves are supplied uncalibrated. All safety valves include detailed instructions on how to calibrate and install the valve.

Single Stage Blowers			
Model	HP	Safety Valve Vacuum	Safety Valve Pressure
K03-MS	3/4	VRL6	VRL6
K04-MS	ALL	VRL6	VRL6
K05-MS	ALL	VRL6	VRL6
K06-MS	3	VRL6	VRL8
K06-MS	4	VRL6	VRL6
K06-MS	5 1/2	VRL6	VRL6
K06-MS	6 1/5	VRL6	VRL6
K07-MS	4	VRL8	VRL8
K07-MS	5 1/2	VRL6	VRL8
K07-MS	7 1/2	VRL6	VRL6
K07-MS	10	VRL6	VRL6
K08-MS	5.5	VRL8	VRL9
K08-MS	7 1/2	VRL8	VRL8
K08-MS	10	VRL6	VRL8
K08-MS	15	VRL6	VRL6
K09-MS	7 1/2	VRL9	VRL9
K09-MS	10	VRL8	VRL8
K09-MS	15	VRL6	VRL8
K09-MS	20	VRL6	VRL6
K10-MS	7 1/2	VRL9	VRL9
K10-MS	10	VRL9	VRL9
K10-MS	15	VRL8	VRL8
K10-MS	20	VRL6	VRL8
K10-MS	25	-	VRL6
K11-MS	10	VRL9	VRL9
K11-MS	15	VRL9	VRL9
K11-MS	20	VRL8	VRL8
K11-MS	25	VRL8	VRL8
K12-MS	15	VRL9	VRL9
K12-MS	20	VRL9	VRL9
K12-MS	25	VRL8	VRL8
K05-TS	ALL	VRL8	VRL8
K06-TS	5 1/2	VRL9	VRL9
K06-TS	7 1/2	VRL8	VRL8
K06-TS	10	VRL6	VRL8
K07-TS	7 1/2	VRL9	VRL9
K07-TS	10	VRL9	VRL9
K07-TS	15	VRL8	VRL8
K08-TS	7 1/2	N.A	N.A.
K08-TS	10	VRL9	(2) VRL9
K08-TS	15	VRL9	VRL9
K09-TS	15	(2) VRL9	(2) VRL9
K09-TS	20	VRL9	VRL9
K09-TS	25	VRL8	VRL9
K10-TS	15	(2) VRL9	(2) VRL9
K10-TS	20	(2) VRL9	(2) VRL9
K10-TS	25	VRL9	VRL9
K11-TS	25	(2) VRL9	(2) VRL9
K11-TS	30	(2) VRL9	(2) VRL9
K12-TS	30	(3) VRL9	(3) VRL9

Two Stage Blowers			
Model	HP	Safety Valve Vacuum	Safety Valve Pressure
15DH	ALL	VRL6	VRL6
R20-MD	ALL	VRL6	VRL6
30DH	ALL	VRL6	VRL6
40DH	ALL	VRL6	VRL6
K07-MD	3	VRL6	VRL6
K07-MD	4	VRL6	VRL6
K07-MD	5 1/2	VRL6	VRL6
K07-MD	7 1/2	VRL6	VRL6-HP
K08-MD	5 1/2	VRL6	VRL6
K08-MD	7 1/2	VRL6	VRL6
K08-MD	10	VRL6	VRL6
K08-MD	15	-	VRL6-HP
K09-MD	5 1/2	VRL8	VRL8
K09-MD	7 1/2	VRL6	VRL6
K09-MD	10	VRL6	VRL6
K09-MD	15	-	VRL6-HP
K10 -MD	7 1/2	VRL8	VRL8
K10-MD	10	VRL6	VRL6
K10-MD	15	VRL6	VRL6
K10-MD	20	-	VRL6-HP
K11-MD	10	VRL8	VRL8
K11-MD	15	VRL6	VRL8
K11-MD	20	VRL6	VRL6-HP
K11-MD	25	-	VRL6-HP
K12-MD	15	VRL8	VRL8
K12-MD	20	VRL6	VRL6
K12-MD	25	-	VRL6-HP
K04-TD	2	VRL6	VRL6
K04-TD	3	VRL6	VRL6
K05-TD	3	VRL6	VRL6
K05-TD	4	VRL6	VRL6
K05-TD	5 1/2	VRL6	VRL6
K06-TD	5 1/2	VRL6	VRL8
K06-TD	7 1/2	VRL6	VRL6
K06-TD	10	VRL6	VRL6
K07-TD	7 1/2	VRL8	VRL8
K07-TD	10	VRL6	VRL6
K07-TD	15	VRL6	VRL6
K08-TD	7 1/2	VRL8	VRL8
K08-TD	10	VRL8	VRL8
K08-TD	15	VRL6	VRL6
K09-TD	20	VRL6	VRL8
K09-TD	25	VRL6	VRL6
K10-TD	15	VRL9	VRL9
K10-TD	20	VRL8	VRL8
K10-TD	25	VRL6	VRL8
K11-TD	20	VRL9	VRL9
K11-TD	25	VRL8	VRL8
K12-TD	25	VRL9	VRL9
K12-TD	30	VRL8	VRL8

Valve selections are based on 60 Hz operation and refer to air having a density equal to 0.075 lbs / cu. Ft and inlet temperarture of 68 deg F. Data is subject to change without notice.

Safety Valves

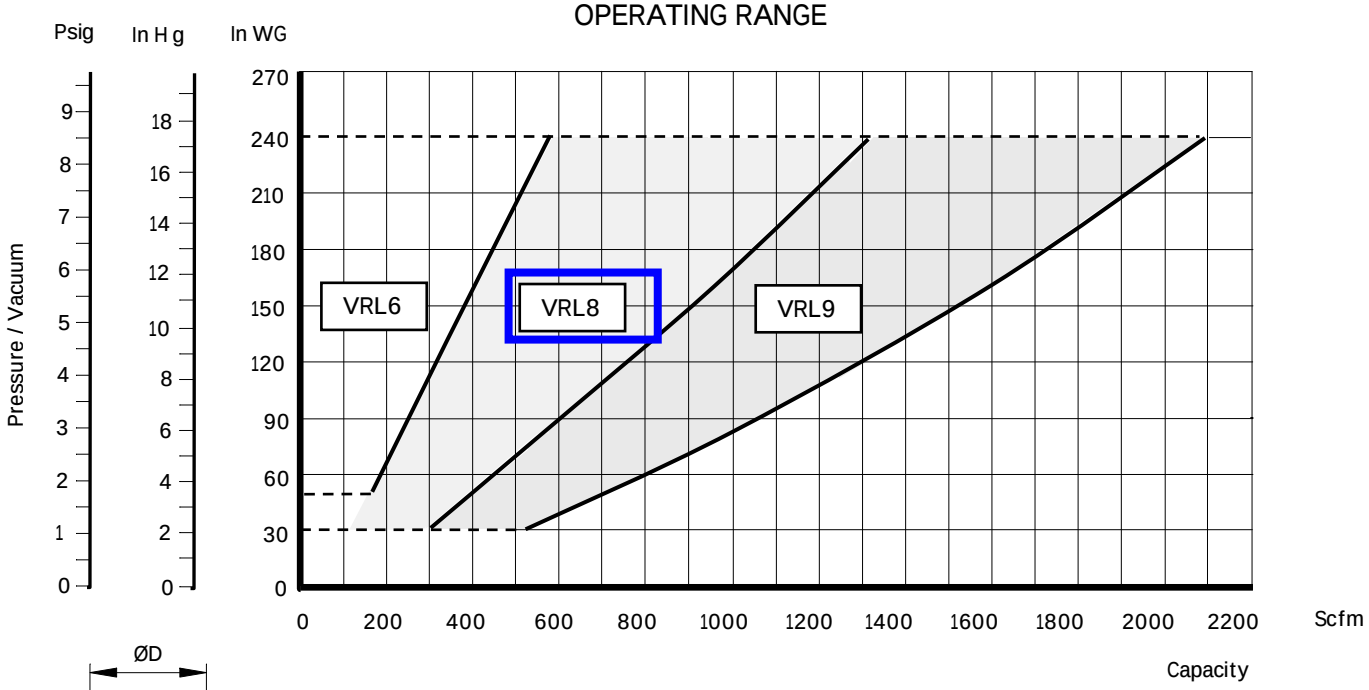
SN 1733 -5 1/1

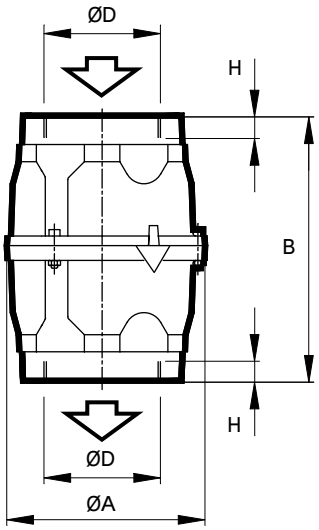
The VRL valves are designed to protect blowers and / or motors from over pressurization or excess vacuum. When there is over pressurization, the valve opens and discharges to the outside. When there is excess in vacuum, the valve opens and takes flow from outside.
The valves have been designed for low pressure / low vacuum, with minimal difference between the initial value at which the valve begins to open and its fully opened position. The valves are supplied with 2 different springs to maximize their efficiency.
These compact valves, made of aluminum alloy, are both easy to install and calibrate. The valves are designed to operate in a wide range of capacities. The VRL can be plumbed to divert excess primary flow through a secondary external outlet when working in pressure conditions or to pipe in a secondary flow when working in vacuum.
Maximum efficiency is achieved by keeping operating values (flow versus pressure or vacuum) within the operating range (shaded area on graph). Capacity refers to air having a density equal to 0.075 lbs./cu.ft .



VRL6 VRL8 VRL9

OPERATING RANGE





OVERALL DIMENSIONS

TYPE	ND	D	A	B	H	WEIGHT (Lbs)
VRL6	2”	2” NPT	4.02	6.90	0.47	1.9
VRL8	3”	3” NPT	5.31	7.48	0.59	4.2
VRL9	4”	4” NPT	6.30	8.11	0.71	5.7

- Dimensions in inches.
- Specifications subject to change without prior notice.

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I – GB – F – D – E **SN 1701-9**

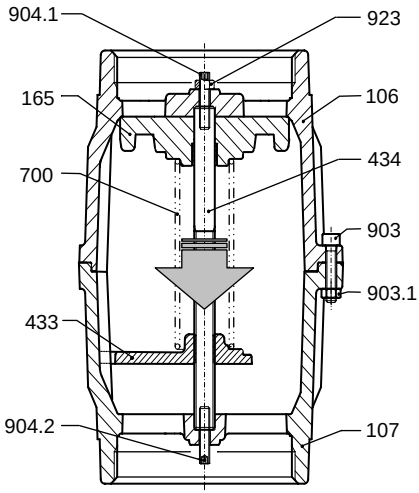
VALVOLA DI SICUREZZA VRL
SAFETY VALVE VRL
SOUPAPE DE SECURITE VRL
SICHERHEITSVENTIL VRL
VALVULA DE SEGURIDAD VRL

ISTRUZIONI D'USO
USE INSTRUCTIONS
INSTRUCTIONS D'UTILISATION
ANWENDUNGSHINWEISE
INSTRUCCIONES PARA EL USO

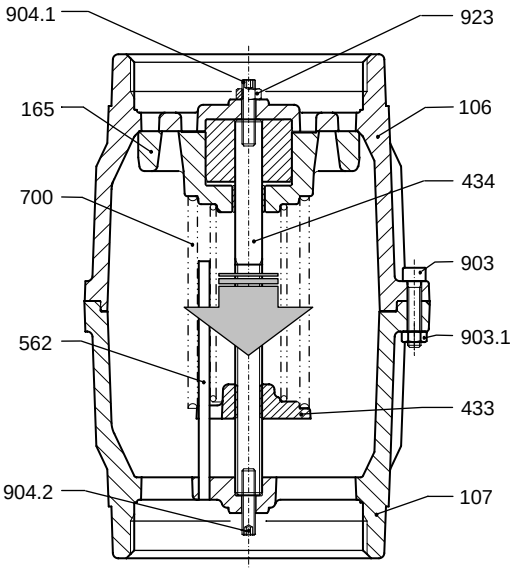
ATTENZIONE! LA VALVOLA E' FORNITA NON TARATA
CAUTION! THE VALVE IS SUPPLIED NOT CALIBRATED
ATTENTION ! LA SOUPAPE EST FOURNIE NON TAREE
ACHTUNG ! DAS VENTIL IST WERKSEITIG NICHT GEEICHT
ATENCION ! LA VALVULA NO ESTA GRADUADA



LEGGERE ATTENTAMENTE TUTTE LE ISTRUZIONI E CONSERVARLE
PLEASE READ CAREFULLY ALL INSTRUCTIONS AND KEEP THEM FOR FUTURE REFERENCE
LIRE ATTENTIVEMENT TOUTES LES INSTRUCTIONS ET LES CONSERVER
ALLE ANLEITUNGEN SIND SORGFÄLTIG ZU LESEN UND AUFZUBEWAHREN!
LEER ATENTAMENTE LAS INSTRUCCIONES Y CONSERVARLAS



VRL6
Fig. 1a



VRL8 - VRL9
Fig. 1b

ITEM	Denominazione - *Description* - Désignation - *Description* - Descripciòn
106	Corpo - *Housing* - Corps supérieur - *Gehäuse* - Cuerpo
107	Coperchio - *Cover* - Couvercle - *Abdeckung* - Cubierta
165	Otturatore - *Shutter* - Obturateur - *Verschluss* - Obturador
433	Piattello guida molla - *Spring guide disc* - Guide ressort - *Federführungsscheibe* - Disco guìa muelle
434	Asta - *Shutter guide* - Tige - *Schließführung* - Vastago
562	Spina cilindrica - Dowel pin -Goupille cylindrique - *Führungsstift* - Pin
700	Molla - *Spring* - Ressort - *Feder* - Muelle
903	Vite - *Screw* - Vis - *Schraube* - Tornillo
903.1	Dado - *Nut* - Ecrou - *Schraubenmutter* - Tuerca
904.1	Grano superiore - *Upper grub screw* - Tige de réglage supérieure – *Obere Einstellschraube* - Espàrrago superior
904.2	Grano inferiore - *Lower grub screw* - Tige de réglage inférieure - *Untere Einstellschraube* - Espàrrago inferior
923	Dado di fermo - *Nut* - Ecrou de blocage -*Schraubenmutter* - Contratuerca

I CONDIZIONI D'UTILIZZO

- **LE VALVOLE VRL SONO ADATTE AL CONVOGLIAMENTO DI ARIA E GAS NON ESPLOSIVI, NON INFIAMMABILI, NON AGGRESSIVI, IN ATMOSFERA NON ESPLOSIVA. LA TEMPERATURA DEL FLUIDO CONVOGLIATO È AMMESSA NEL CAMPO DI -15 A +160 °C.**
- **VALVOLE PROGETTATE E FABBRICATE PER LA LIMITAZIONE NEL CAMPO DELLE BASSE PRESSIONI / DEPRESSIONI, PER UN UTILIZZO SPECIFICO SU SOFFIANTI, ASPIRATORI E COMPRESSORI A BASSE PRESSIONI;**
- **NON SOPPORTANO PRESSIONI INTERNE ELEVATE, COMUNQUE NON SUPERIORI A 2.8 bar A;**
- **SONO SOGGETTE A PICCOLE PERDITE DEL FLUIDO CONVOGLIATO;**
- **CORPI SOLIDI ANCHE DI PICCOLE DIMENSIONI E SPORCIZIA POSSONO PROVOCARE GRAVI DANNI, VANNO QUINDI SEPARATI DAL FLUSSO MEDIANTE ADEGUATI FILTRI IN ASPIRAZIONE.**

GB *CONDITIONS OF USE*

- ***THE VRL VALVES ARE DESIGNED FOR THE HANDLING OF AIR OR NON-EXPLOSIVE, NON-HAZARDOUS AND NON-FLAMMABLE GASES IN NON-EXPLOSIVE ENVIRONMENTS. THE GAS INLET TEMPERATURE MUST BE IN THE RANGE OF -15 TO +160 °C.***
- ***RELIEF VALVES ARE DESIGNED AND MANUFACTURED TO LIMIT THE OPERATING PRESSURE IN LOW PRESSURE/VACUUM APPLICATIONS. THEY ARE FOR USE SPECIFICALLY ON LOW PRESSURE BLOWERS AND VACUUM PUMPS ONLY;***
- ***THE VALVE CANNOT WITHSTAND HIGH INTERNAL PRESSURE, DESIGN MAXIMUM OF 2.8 bar A;***
- ***THERE IS SMALL LOSS OF THE AIR/GAS BEING HANDLED;***
- ***SOLID PARTICULES, HOWEVER SMALL, INCLUDING DIRT CAN CAUSE SERIOUS DAMAGE; THEREFORE IT IS ESSENTIAL THAT SUCH SUBSTANCES SHOULD BE REMOVED FROM THE GAS BY SUITABLE FILTERS UPSTREAM OF THE INLET.***

F CONDITIONS D'UTILISATION

- **LES SOUPAPES VRL SONT ADAPTÉS À L'ACHEMINEMENT D'AIR ET DE GAZ NON EXPLOSIFS, ININFLAMMABLES, NON AGRESSIFS, DANS UNE ATMOSPHÈRE NON EXPLOSIVE. LA TEMPÉRATURE DU FLUIDE ACHEMINÉ EST ADMISE DANS UN ÉVENTAIL DE -15 À +160 °C.**
- **CES SOUPAPES ONT ETÉ DÉVELOPPÉES ET CONSTRUITES AFIN DE LIMITER LES VALEURS MAXIMALES VIDE/PRESSION ET LEUR UTILISATION EST SPÉCIFIQUEMENT RESERVÉE AUX ASPIRATEURS ET COMPRESSEURS BASSES PRESSION;**
- **NE SUPPORTENT PAS DES PRESSIONS INTERNES ÉLEVÉES, C'EST-À-DIRE DES PRESSIONS SUPÉRIEURES À 2.8 bar A;**
- **SONT SUJETTES À DE PETITES PERTES DU FLUIDE ACHEMINÉ;**
- **DES CORPS SOLIDES MÊME DE PETITES DIMENSIONS ET LÉGÈREMENT SALES PEUVENT PROVOQUER DE GRAVES DOMMAGES, ILS SONT PAR CONSÉQUENT SÉPARÉS DU FLUX PAR DES FILTRES ADÉQUANTS EN ASPIRATION.**

D *EINSATZBEDINGUNGEN*

- ***DIE VENTILE DER SERIE VRL SIND FÜR DEN DAUERBETRIEB IN NICHT-EXPLOSIVER UMGEBUNG ZUM ANSAUGEN UND VERDICHTEN VON LUFT ODER NICHT-EXPLOSIVEN, NICHT-BRENNBAREN UND NICHT-AGGRESSIVEN GASEN GEEIGNET. DIE ZULÄSSIGE ANSAUGTEMPERATUREN LIEGT ZWISCHEN -15 BIS +160 °C.***
- ***DIE SPEZIELL FÜR DEN NIEDERDRUCK- BZW. NIEDERVAKUUMBEREICH ENTWICKELTEN VENTILE SIND FÜR DIE SPEZIFISCHE ANWENDUNG IN VAKUUMPUMPEN UND KOMPRESSOREN GEEIGNET;***
- ***DIE GEHÄUSE WIDERSTEHEN KEINEN HOHEN INNENDRÜCKEN. UNTER KEINEN UMSTÄNDEN DARF DER MAX. BETRIEBSDRUCK VON 2.8 bar A ÜBERSCHRITTEN WERDEN;***
- ***DIE VENTILE SIND NICHT VOLLSTÄNDIG GASDICHT;***
- ***FREMDKÖRPER, AUCH GERINGER GRÖßE, UND VERUNREINIGUNGER KÖNNEN SCHWERE SCHÄDEN VERURSACHEN. SIE MÜSSEN DAHER AUS DEM FÖRDERMEDIUM MIT GEEIGNETEN ANSAUGFILTERN ENTFERNT WERDEN.***

E CONDICONES DE USO

- **LAS VALVULAS VRL SON ADAPTAS PARA EL MOVIMIENO DE AIRE O GASES NO EXPLOSIVOS, NO PELIGROSOS Y NO INFLAMABLES Y PARA SERVICIO EN AMBIENTES NO EXPLOSIVOS. LA TEMPERATURA DE ENTRADA DEL GAS DEBE ESTAR ENTRE LOS –15 Y +160 °C.**
- **VALVULAS PROYECTADAS Y FABRICADAS PARA LA LIMITACION EN EL SECTOR DE LAS BAJAS PRESIONES / VACIOS, PARA UN UTILIZO SOBRE ASPIRADORES, COMPRESORES A BAJAS PRESIONES.**
- **LA VALVULA NO PUEDE CONTENER PRESIONES INTERNAS ALTAS, NO MAYORES QUE 2.8 bar A;**
- **HAY UNA PECHEÑA PERDIDA DE FLUIDO MANEJADO;**
- **LAS PARTICULAS SOLIDAS, AUNQUE PEQUEÑAS, INCLUIDO EL POLVO, PUEDEN CAUSAR SERIOS DAÑOS. POR LO TANTO ES ESENCIAL QUE DICHAS SUSTANCIAS SEAN ELIMINADAS DEL GAS MEDIANTE FILTROS APROPIADOS ANTES DE LA ENTRADA.**

DIAGRAMMA DI SELEZIONE - ***SELECTION DIAGRAM***
SCHÉMA DE SÉLECTION – AUSWAHLDIAGRAMM
DIAGRAMA DE SELECCION

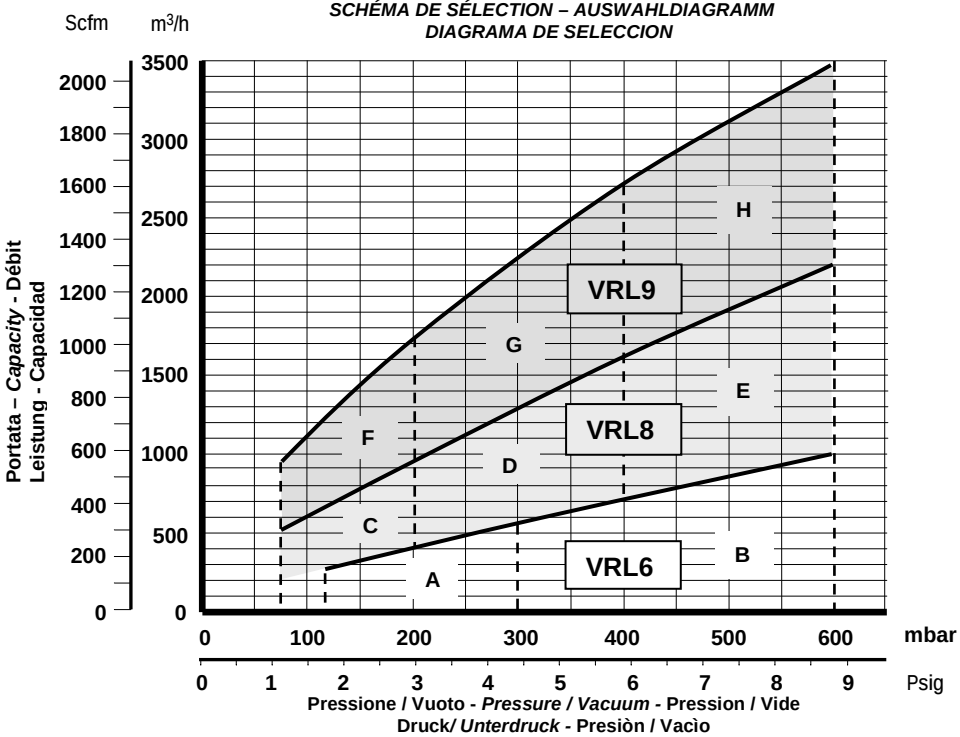


TABELLA DI SELEZIONE MOLLA - ***SPRING SELECTION CHART*** **- TABLEAU DE SÉLECTION RESSORT**
UEBERSICHTSTABELLE FEDERN **- TABLA DE SELECCION MUELLE**

RANGE	MOLLA *SPRING* RESSORT *FEDER* MUELLE N°	Pressione / Vuoto *Pressure / Vacuum* Pression / Vide *Druck / Underdruck* Presiòn / Vacìo MIN [mbar]	[psig]	Pressione / Vuoto *Pressure / Vacuum* Pression / Vide *Druck / Underdruck* Presiòn / Vacìo MAX [mbar]	[psig]	Colore di identificazione *Colour of identification* Couleur d' identification *Farbidentifizierung* Color de identificaciòn
VRL6						
A	I	120	1.763	300	4.408	-
B	II	300	4.408	600	8,820	VERDE - *GREEN* - VERT - *GRÜN* - VERDE
VRL8						
C	I	75	1.102	200	2.940	-
D	II	200	2.940	400	5.880	VERDE – *GREEN* VERT - *GRÜN* - VERDE
E	I + II	400	5.880	600	8,820	-
VRL9						
F	I	75	1.102	200	2.940	VERDE - *GREEN* - VERT - *GRÜN* - VERDE
G	II	200	2.940	400	5.880	-
H	I + II	400	5.880	600	8,820	-

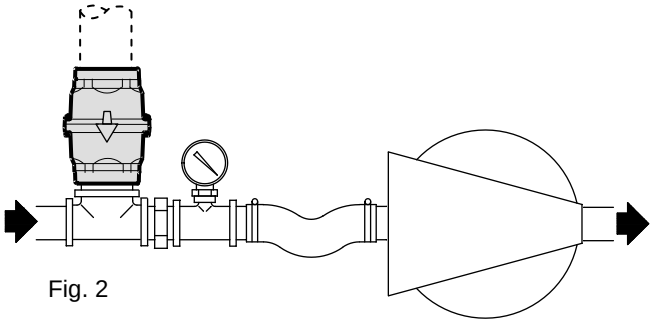


Fig. 2

SCHEMA DI INSTALLAZIONE – VALVOLA LIMITATRICE DI VUOTO
INSTALLATION SKETCH – VACUUM RELIEF VALVE
INSTALLATIONSSCHEMA – VAKUUMVENTIL
SCHÉMA DE INSTALLATION – SOUPAPE CASSE VIDE
ESQUEMA DE INSTALATIÒN – VALVULA LIMITADORA DE VACIO

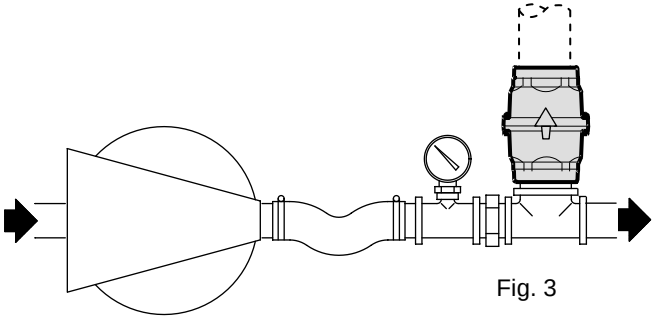


Fig. 3

SCHEMA DI INSTALLAZIONE – VALVOLA LIMITATRICE DI PRESSIONE
INSTALLATION SKETCH – PRESSURE RELIEF VALVE
INSTALLATIONSSCHEMA – DRUCKVENTIL
SCHÉMA DE INSTALLATION – SOUPAPE DE SÉCURITÉ
ESQUEMA DE INSTALATIÒN – VALVULA LIMITADORA DE PRESION

1. CHOICE OF SPRING

The valve is supplied with 2 different springs; each spring is to be used within a specific pressure-vacuum operating range. For the VRL8 and VRL9 there is the possibility to use both springs working in parallel.
Referring to the SELECTION DIAGRAM, check that the valve is correctly sized and depending where the operating point (area A, B,…H) is located, choose one or two springs according to SPRING SELECTION CHART.
The valve is supplied with spring # I installed. If spring needs to be replaced or a supplementary spring is needed to be added (for VRL8 / VRL9), proceed to point # 2 otherwise, adjust valve as per point #3.

2. INSTRUCTIONS FOR SPRING REPLACEMENT (OR MOUNTING ADITIONAL SPRING FOR VRL8 / VRL9)

- Remove the two plastic caps on valve.
- **Ensure stop-nut 923 is locked on the upper housing 106.**
- Unscrew screw 903 from nut 903.1.
- Remove cover 107 from housing 106.
- Unscrew spring guide disc 433 taking it out from shutter guide 434.
- Remove spring 700 (only in case of replacement).
- Install the appropriate spring into shutter 165.
- Compress spring and screw spring guide disc 433 on shutter guide 434 for at least 20 full thread terms.
- Check that both ends of the spring are properly positioned within their seats.
- Install the cover 107 on the housing 106 inserting:
  - for VRL6: the sliding guide on the slot in spring guide disc 433.
  - for VRL8 and VRL9: dowel pin 562 on the slot in spring guide disc 433.
- Tighten screw 903 on nut 903.1.

3. VALVE SETTING

A) Setting-up at allowed vacuum level

- Remove the two plastic caps on valve, if any.
- Position valve on the suction by-pass and connect a vacuum gage as close as possible to the exhauster inlet (Fig. 2).
- Unscrew nut 923.
- Relieve spring tension by backing off upper grub screw 904.1 with the fit key.
- Turn on exhauster. Induce highest attainable vacuum by throttling air intake upstream relief valve (normally reducing throttle to fully-closed).
- Adjust upper grub screw 904.1 until maximum allowable vacuum level is reached.
- Tighten nut 923 keeping blocked upper grub screw 904.1.
- Open suction line.

Double-check vacuum gauge to ensure no additional losses are induced by pipes or filters installed upstream relief valve.

B) Setting-up at allowed pressure level

- Remove the two plastic caps on valve, if any.
- Remove nut 923 from upper grub screw 904.1 and place it on to the lower grub screw 904.2. Do not tighten.
- Position valve on the discharge by-pass and connect a pressure gage as close as possible to the blower outlet (Fig. 3).
- Relieve spring tension by backing on lower grub screw 904.2 with the fit key.
- Turn on blower. Induce highest attainable pressure by throttling air discharge downstream of the valve (normally reducing throttle to fully-closed).
- Unscrew lower grub screw 904.2 until maximum allowable pressure level is reached.
- Tighten nut 923 keeping blocked lower grub screw 904.2.
- Open discharge line.

Double-check pressure gauge to ensure no additional losses are induced by pipes or filters installed downstream the valve

SCL K07/ K08 / K09 / K10

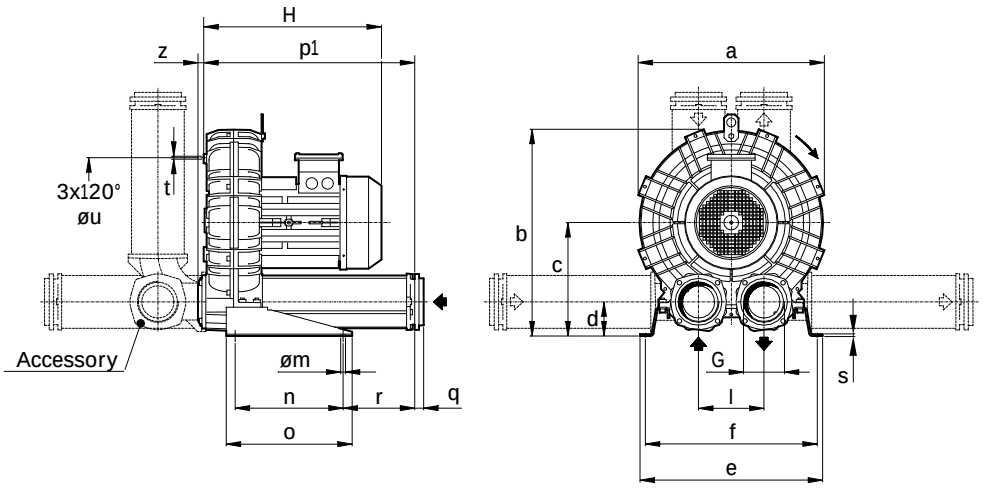
MS - SERIES

SN 1810-20B 1/2

TECHNICAL CHARACTERISTICS
- Aluminium alloy construction
- Smooth operation
- High efficiency impeller
- Maintenance free
- Mountable in any position
- Recognized TEFC - cURus motor

OPTIONS
- Special voltages (IEC 38)
- Surface treatments

ACCESSORIES
- Inlet and/or inline filters
- Additional inlet/outlet silencers
- Safety valves
- Flow converting device
- Optional connectors



Dimensions in inches.
Dimension for reference only.

Model	a	b	c	d	e	f	G	l	m	n	o	p1	q	r	s	t	u	z
K07-MS	16.69	18.84	10.59	3.23	18.43	17.24	3" NPT	6.10	0.51	11.81	13.78	20.16	0.98	5.39	0.20	M8	11.61	0.63
K08-MS	17.99	19.61	10.59	3.23	18.82	17.64	3" NPT	6.10	0.51	11.81	13.78	20.16	0.98	5.39	0.20	M8	12.2	0.63
K09-MS	19.37	22.09	12.40	3.78	20.00	18.82	4" NPT	7.17	0.51	11.81	13.78	23.07	0.98	7.83	0.20	M8	14.17	0.63
K10-MS	20.31	22.56	12.40	3.78	20.00	18.82	4" NPT	7.17	0.51	11.81	13.78	23.07	0.98	7.83	0.20	M8	14.17	0.63

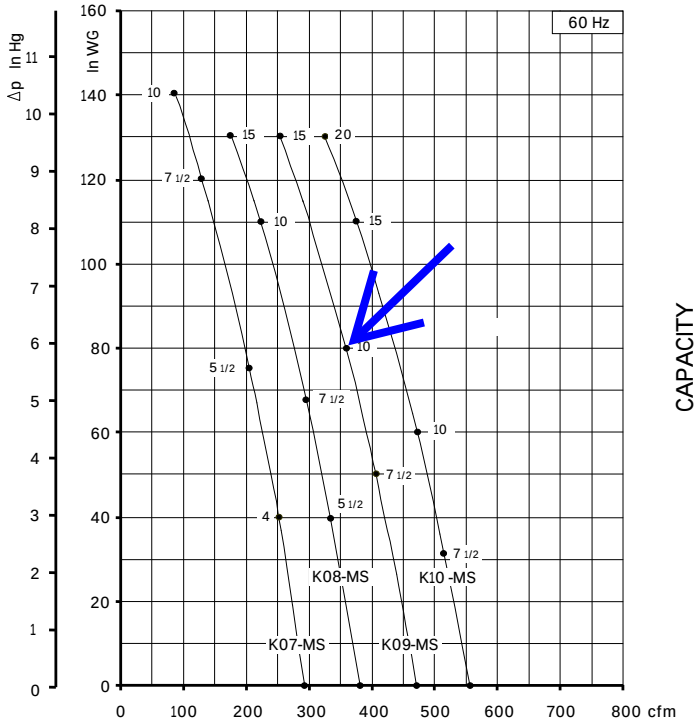
Model	Maximum flow cfm		Installed power Hp		Maximum differential pressure △p (In Hg)		Noise level Lp dB (A) (1)		Overall dimensions H	Weight
	60 Hz 3500 rpm	50 Hz 2900 rpm	60 Hz 3500 rpm	50 Hz 2900 rpm	60 Hz 3500 rpm	50 Hz 2900 rpm	60 Hz 3500 rpm	50 Hz 2900 rpm	Inches	Lbs
K07-MS	294	243	4	4	3.0	4.6	77.7	75.7	15.6	116.2
			5 ½	5 ½	5.6	6.3	78.0	76.0	16.3	119.0
			7 ½	7 ½	8.9	8.9	78.3	76.3	18.4	160.5
			10	-	10.3	-	78.6	-	19.1	172.6
K08-MS	381	316	5 ½	5 ½	3.0	3.8	78.8	76.8	16.3	124.8
			7 ½	7 ½	5.2	6.6	79.1	77.1	18.4	166.5
			10	10	8.1	9.2	79.4	77.4	19.1	179.0
			15	-	9.6	-	79.7	-	19.1	192.0
K09-MS	471	390	7 ½	7 ½	3.7	4.6	79.3	77.3	18.8	186.3
			10	10	5.9	7.0	79.6	77.6	19.5	245.0
			15	15	9.6	10.4	80.1	78.1	22.0	212.0
K10 -MS	556	460	7 ½	7 ½	2.4	3.8	79.4	77.4	18.8	189.6
			10	10	4.4	5.9	79.7	77.7	19.5	202.0
			15	15	8.1	9.9	80.2	78.2	19.6	215.0
			20	-	9.6	-	80.5	-	22.0	248.0

(1) Noise measured at 1 m distance with inlet and outlet ports piped, in accordance to ISO 3744.

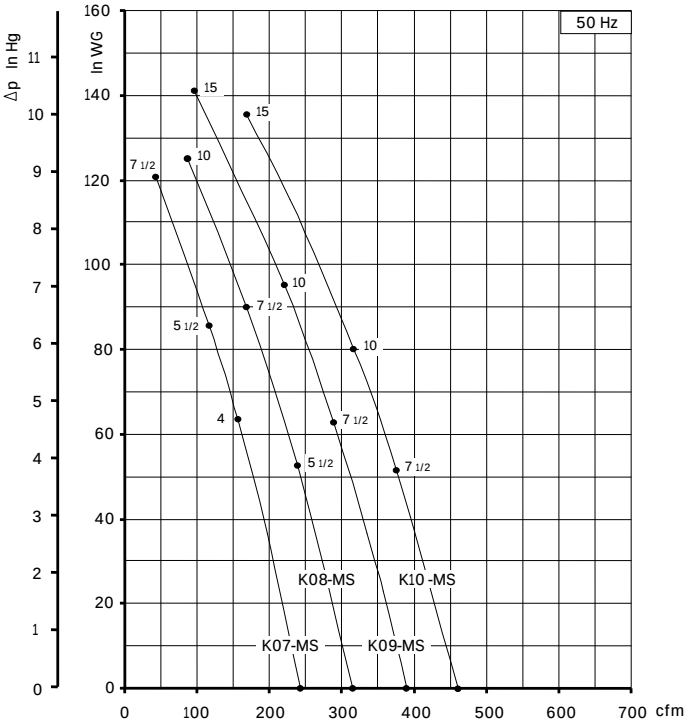
- For proper use, the blower should be equipped with inlet filter and safety valve; other accessories available on request.
- Ambient temperature from +5° to +104°F.
- Specifications subject to change without notice.

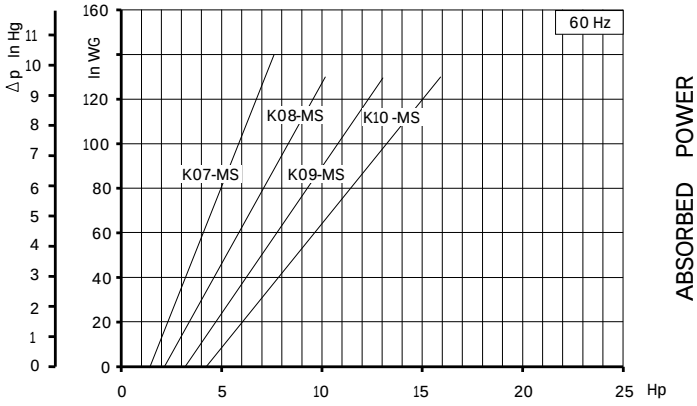
SCL K07 / K08 / K09 / K10 MS SERIES

SN 1810-20B 2/2

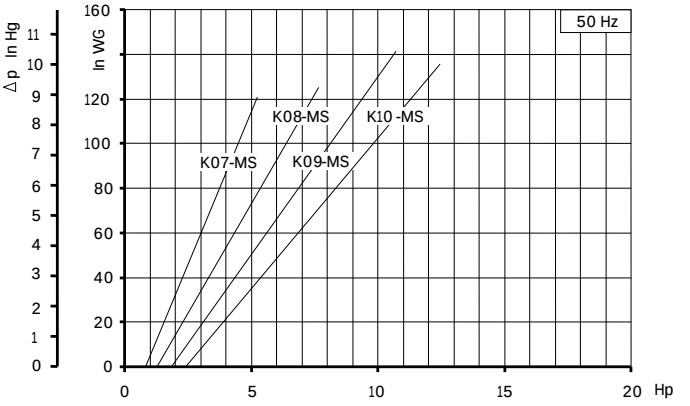


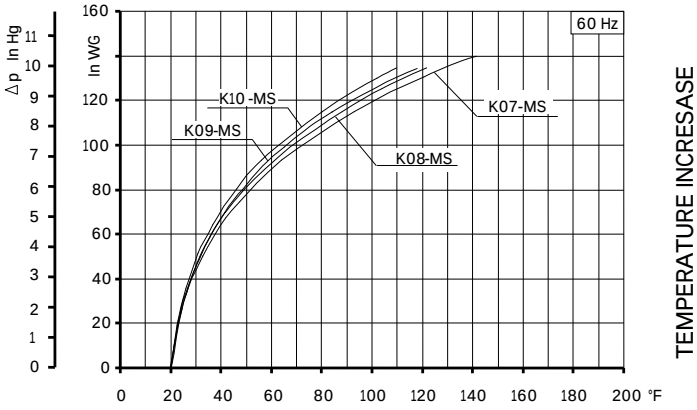
CAPACITY



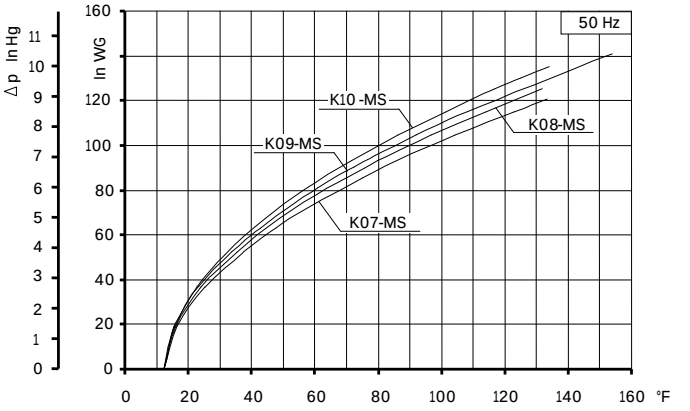


ABSORBED POWER





TEMPERATURE INCRESASE



Curves refer to air at 68° F temperature, measured at inlet port and 29.92 In Hg atmospheric backpressure (abs).
Values for flow, power consumption and temperature rise: +/-10% tolerance.
Data subject to change without notice.

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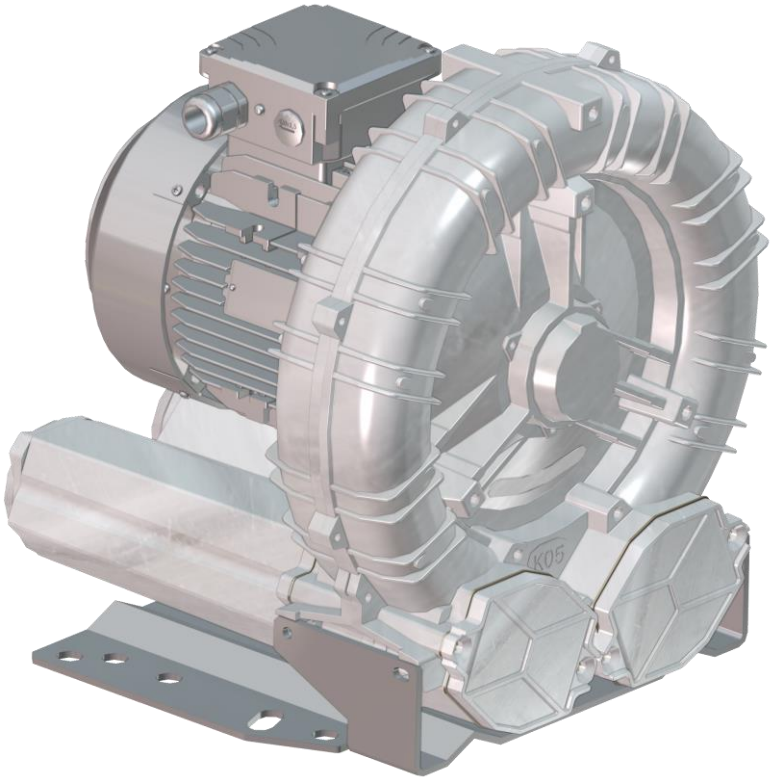
COMPRESSORI-ASPIRATORI A CANALE LATERALE — ISTRUZIONI — I
LATERAL CHANNEL BLOWERS-EXHAUSTERS — INSTRUCTIONS — GB



WARNING

Leggere e seguire le istruzioni prima dell'uso e conservare il manuale come riferimento per il futuro. Il mancato rispetto di tutte le istruzioni del produttore, inclusa l'installazione impropria o l'uso improprio del prodotto, le alterazioni del prodotto e/o il mancato utilizzo del prodotto in conformità al presente manuale, possono causare danni, lesioni gravi o morte. I

Read and follow all instructions before use and keep manual for future reference. Failure to comply with all manufacturer's instructions, including improper installation or use of the product, alterations to the product, and/or failure to use the product in accordance with this manual can result in property damage, serious injury or death. *GB*



Per ulteriori informazioni o assistenza all'installazione, prego contattare:
For further information or assistance with installation, please contact:

@ service@fpz.com +39 039 690981

COMPANY WITH QUALITY SYSTEM CERTIFIED BY DNV GL = ISO 9001 =

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1 GENERAL INFORMATION

Read the manual for safety information on correct installation, operation and maintenance.

1.1 PURPOSE OF MANUAL

- The purpose of the manual is to complete the information contained in the *operative instructions* (Figure 1*)* supplied with the blower in order to give "instructions for use" to the skilled operator to prevent and minimize risks during the interaction between man and machine.
- For safe installation, carefully read this manual before installing the product and follow all instructions exactly as shown.
- The information was prepared by the manufacturer in the original language (ITALIAN) considering the content communication effectiveness for the interested parties also depending on the operator's qualifications and perspicacity.
- Keep the *operative instructions* (Figure 1*)* for the entire service life of the unit in a known and easy to access place to make it always at hand for reference.
- Any observations made by recipients can be an important contribution to improve the after-sales services provided by the manufacturer.
- The information contained in this manual is intended for use by specialized operators whose definition is contained in the document MAN_PIC (Figure 2).

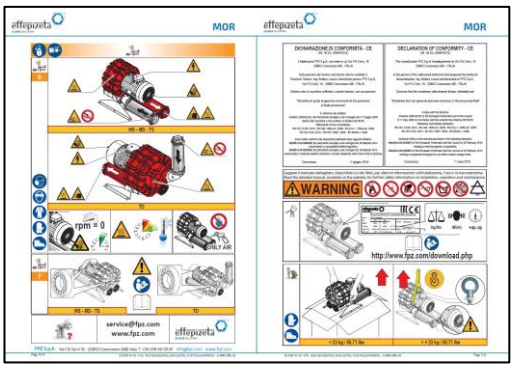


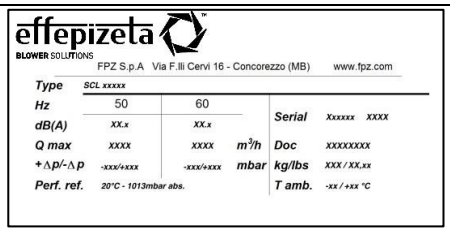
Figure 1 – *Operating Instruction*



Figure 2 - Document MAN_PIC

1.1 TECHNICAL DATA – NAMEPLATE

On the product nameplate are stated:

• Unit description • Performance (Noise [dB], Flow [m^3/h] and Pressure [mbar]) at 50 Hz and 60 Hz frequency referring to 20°C and 1013 mbar abs. • Serial number and year of manufacture • Reference Doc. (*Operating Instruction)* • Weight [kg/lbs] • Reference temperature for the working blower (T. amb)	

It is strictly forbidden to remove or tamper with the product label.

1.1 TESTING, WARRANTY AND LIABILITY

Testing and inspection

- The entire unit is sent to the customer ready for installation, after passing the tests and inspections required by the manufacturer, in conformity with the applicable laws and the mandatory technical standards.

Warranty

- Warranties are defined in the general terms and conditions of sale.

Liability

- See document MAN_PIC.

2 SAFETY RULES

2.1 IMPORTANT SAFETY INFORMATION

⚠WARNING	**The instructions listed below must be read carefully and become a fundamental part of daily procedures in the normal use and maintenance of all the equipment, in order to prevent any kind of personal or domestic animals (even serious) injury (or death) or damage to equipment.**

- Do not start the unit until its operation is clearly understood.
- All installation, commissioning and maintenance operations must be carried out by specialized operators only (see doc MAN_PIC).
- Keep the area around the unit constantly free of obstructions.
- Use appropriate PPE (Personal Protective Equipment) such as boots, gloves, goggles and work clothes.
- Pay attention to all danger and caution signs placed on the unit.
- Do not wear clothes, jewelry or accessories that can get caught in the cooling fan of the electric motor or that can be sucked into the blower.
- Do not modify the electrical connections on the unit.
- Observe all local, state and national electrical codes.
- Before starting the unit and/or with weekly frequency, the operator must check the efficiency of the devices that ensure the operation of the unit and any other unit defects. In case of any defects, immediately notify FPZ S.p.A.
- Devices that ensure the operation of the unit must never be removed or rendered useless.
- During maintenance or repair work, it may be necessary to exclude some mentioned devices from the service. This operation must be carried out by specialized operators only (see doc MAN_PIC).
- Always apply and enforce the safety rules; in case of any doubts, always consult this manual before acting.

⚠WARNING	**Non-compliant installation with the unit's intended use can cause personal (even serious) injury (or death) or damage to equipment.**

The unit must only be started:

- in conformity with the purposes of use, transport and handling specified in "FORESEEN USE";
- respecting the values given in the nameplate data.

2.2 PROHIBITIONS

⚠WARNING	**Failure to comply the following PROHIBITIONS can cause personal (even serious) injury (or death) or damage to equipment.**

- NEVER suck up and convey aggressive, corrosive, and/or harmful fluids.
- NEVER use the unit under conditions that differ from those indicated on the nameplate.
- NEVER use the unit without having installed a suction filter.
- NEVER operate with the suction and/or delivery openings closed.
- NEVER make conversions or changes to the unit, maintenance or repair work on one's own initiative or not envisaged in the manual. Maintenance work can be carried out only in compliance with what is described in this user manual, exclusively by specialized operators (see document MAN_PIC).
- NEVER use the unit in places where ATEX classification does not comply with Annex II of Directive 1999/92/EC.
- NEVER use the unit without having first installed and connected the sensors and/or regulators required to the plant and correctly installed and checked the seal system of the machine.
- NEVER use the unit with ambient temperatures below -15°C (+5°F) and above +40°C (+104°F).
- NEVER use the unit before ensuring correspondence between grid voltage and motor label voltage.

3 PROPER AND IMPROPER USE

3.1 OPERATING CONDITIONS

WARNING **Failure to observe the temperature, altitude, differential pressure and filtering modes for design and operation specifications there can be an impeller break which can cause personal (even serious) injury (or death) or damage to equipment .**

- The maximum permissible differential pressure indicated on the product nameplate must never be exceeded.
- It is important to install the unit at a maximum altitude of 1000 m (3300 ft.) above sea level, for higher altitudes contact FPZ.
- The unit is designed to operate at ambient temperature between -15°C (+5°F) and +40°C (+104°F).
- In case of suction in the environment or on the plant, protect the suction pipe using a suitable filter with a maximum degree of filtration of 25µm. Contact FPZ for filters with a different filtration degree. Check the compliance with the data of maximum pressure/vacuum listed on the nameplate. For ATEX blower we recommend an ATEX filter with a filtration degree of 20 µm / 25 µm.
- Installation, operation and maintenance of the blower must be carried out by specialized operators (see document MAN_PIC). Due to incorrect maintenance or an unauthorized modification, a non-compliant condition of use is determined, so the responsibility lies with the customer or end user.

NOTICE If installed outdoors, protect the unit against exposure to sunlight and to atmospheric agents.
If the flow rate has to be reduced, use a draw-off valve rather than throttling back the suction or delivery lines.

3.2 STANDARD SIDE CHANNEL BLOWER

FPZ side channel blowers / exhausters are designed to generate vacuum and overpressure for conveying non-explosive, non-flammable, non-dangerous gases and air in continuous use in a non-explosive environment. Side channel blowers are not designed to transport dusts of any grain size.

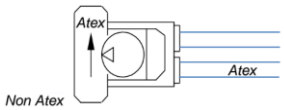
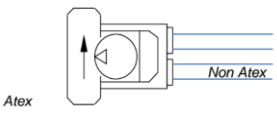
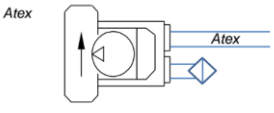
FPZ side channel blowers / exhausters are designed and built for use in industrial plants and are equipped with three-phase or single-phase asynchronous bipolar electric motors in compliance with IEC 60034-1.

3.3 ATEX BLOWERS (Category 3GD – Category 2G)

Atex blowers are designed and built in accordance with 2014/34/UE Directive and European standards EN 1127-1, EN 13463, EN 14986, considering the compatibility of unit components with treated fluids (contact FPZ for components compatibility details). Accessories and monitoring systems linked to the unit have to be compliant with 2014/34/UE Directive.
It is recommended that the connections and suction and delivery pipes are in metal or antistatic material.

Units are group II devices for use in environments classified as explosive for the presence of Gas (G) zone 1/2 and/or Dust (D) zone 22.

- If not specifically indicated, the ATEX label refers to the equipment “indoor” and “outdoor” area.
- In the case of a double indication separated by the “/” symbol, the first number indicates the “indoor” category (internal surface of the blower), the second number the “outdoor” category (outside of the blower, including the electric motor).
- The blower protection mode is constructive (“EX **c**”).
- Electric motors have different protection modes depending on the category and the environment they are designed for.
- All “2G” e “3/2G” configurations have explosion-proof motors (EX d protection).
- Classification of work zones:

1	Use of blower for conveying flammable gas	**Equipment with internal potentially explosive atmospheres, intended for use in areas that are not classified**	
2	Use of blower for conveying non-hazardous fluids in ATEX classified environment	**Equipment with internal non-explosive atmospheres and intended for use in areas that are classified**	
3	Use of blower with suction of ambient air and operating in a classified zone	**Equipment with internal explosive atmospheres, interfaced with process atmospheres and intended for use in areas that are classified**	

3.4 IMPROPER USE AND ASSOCIATED RISKS

⚠WARNING	**Non-compliance with the unit's intended use or with prohibitions/obligations can cause personal (also serious) injury (or death) or equipment damage.**

- Listed below are some improper uses, identified through risk assessment and experiences. Improper uses are subdivided according to the conditions that they may generate.
- The list is a non-exhaustive and representative example of improper use and associated risks.

IMPROPER USE	POSSIBLE CONSEQUENCES	RISKS
IMPROPER USE LINKED TO NORMAL OPERATION		
Absence of cyclic monitoring and control.	Anomalous operation not detected / hidden.	Risk of damage to the unit, with possible injury (or death) for the operator if present nearby.
Different installation with respect to manufacturer's suggestion.	Yielding / break of fastening points.	Risk of damage to the unit, with possible injury (or death) for the operator if present nearby. The unit may fall or be subject to damage due to incorrect load at support.
Operation outside the performance indicated on the blower and electric nameplate.	Seizure of the impeller.	Risk of damage to the unit, with possible injury (or death) for the operator if present nearby. The unit may break.
Proceeding at all stages without consulting the *operating instructions* and this manual.	Using the unit for unforeseen purposes and without considering the associated risk factors.	Risk of damage to the unit, with possible injury (or death) for the operator if present nearby.
IMPROPER USE LINKED TO METHODS OF USE		
Use of a fluid different from that indicated / forbidden.	Incorrect workload.	Risk of damage to the unit, with possible injury (or death) for the operator if present nearby. The unit may break.
Physical load applied to the machine (no element excluded).	Breakage and/or presence of leakage of fluid collected.	Risk of damage to the unit, with possible injury (or death) for the operator if present nearby due to inhalation of harmful substances.
IMPROPER USE LINKED TO THE STOPPAGE OF A BLOWER		
Manipulation of the machine still rotating / moving.	Direct contact of the operator with moving parts and with the surface unit still hot.	Risk of possible injury for the operator such as burns and entanglement.
Disconnecting the unit from the electricity with the voltage inserted.	Direct contact of the operator with the live parts.	Risk of possible injuries for the operator through electrocution.
IMPROPER USE LINKED TO MAINTENANCE WORK		
Handling the machine differently from instructions for use.	Falling or sudden movement of the unit.	Risk of damage to the unit, with possible injury for the operator if present nearby.
Use of liquid during unit cleaning operations.	In case of stagnation, characteristics of the material may be compromised.	Risk of damage to the unit, with possible injury for the operator if present nearby.
Use of types of spare parts different to those supplied by FPZ.	Different performance from design (pressure, noise, vibration, sealing).	Risk of damage to the unit, with possible injury for the operator if present nearby.
BREAKDOWN AND EMERGENCY CONDITIONS		
Not stopping the machine when it is making an unusual noise.	Seizure of the impeller and overheating of the unit and of the electric motor.	Risk of damage for the unit, with possible injury (or death) for the operator if present nearby. The unit may break down.

4 STORAGE AND TRANSPORT

4.1 RECEIPT AND CHECK OF THE PACKAGE

- When receiving the unit, it is necessary to check that the packaging is intact and free from signs of damage due to transport or storage conditions.
- In the case of damage to the packaging, immediately inform the shipping agent and the manufacturer.

4.2 HANDLING AND TRANSPORT



Danger of crushing and / or impacting various parts of the body

During the transport and handling phases due to the sudden drop or displacement of the packaging, there may be a risk of crushing and / or impacting various parts of the body. During the activities around the unit, the operator may fall due to stumbling or slipping.
Use equipment compliant with the laws and follow the handling and manual handling procedures described in the operating manual, based on the weight indications on the packaging and in accordance with applicable regulations in the state in which this activity takes place. Use safety shoes during this phase.

4.3 STORAGE

- Store in a dry place, possibly keeping the machine in the packaging.
- Do not remove the protective covers of the openings.
- In the event of long-term storage, remove dust deposits on external surfaces and, before commissioning, check the unit's functional status with a startup test.

5 INSTALLATION

5.1 INSTALLATION CONDITIONS



Commissioning and operation must only take place under the following installation conditions:

- The unit must be completely assembled and intact (not damaged or tampered).
- Silencers must be connected to the pipe system (see *operating instructions*); if silencers are not present, make sure that the connection is made by flexible sleeve.
- The machine must be securely fastened to the predetermined site and in the recommended modes (see *operating instructions*).
- The motor must be connected to a suitable control panel.
- Ensure the visibility of the unit installed from the position of the control elements.



Danger of ejection of objects

The entry of foreign bodies into the unit, even if very small, can cause personal serious injury (or death) and/or equipment damage with probable breakage of the impeller blades, including the danger of debris can be thrown out of the machine violently.
Remove the closure caps from the silencers and connect the pipes of the system, making sure to carry out the operation in a non-dusty area to prevent the entry of foreign bodies.



Danger of crushing and / or impacting various parts of the body

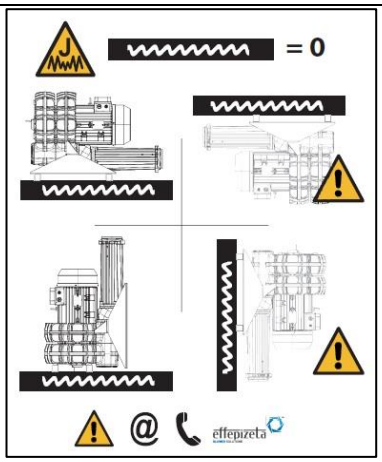
During the installation phase due to the sudden drop or displacement of the packaging, there may be a risk of crushing and / or impacting various parts of the body. During work around the unit, the operator may fall due to stumbling or slipping. Use the appropriate device (eg. toe) to hook and lift the unit properly.



Danger of injury to upper limbs

The risk of injury to upper limbs may arise due to a combination of hazards during the mechanical assembly phase and the connection of the machine to the piping. Observe the operating manual to install the unit safely.

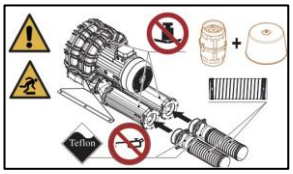
- The support surface of the unit must be flat, robust, stable and absolutely levelled.
- It is important that the unit is installed on supports that do not transmit vibration for example structures or antivibration

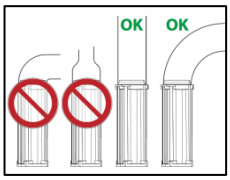


- Connect the pipes with flexible sleeves and avoid the unit bears pipes weight; except for the filter in the case of suction in the environment.

Size the pipes and choose accessories that minimize the load losses, therefore:

- do not fit pipes with diameters smaller than those of the machine's outlets and inlets;
- install multiple machines in parallel, sizing the manifold and main line proportionally;
- do not use angle-pipe, but bends with a large radius of curvature;
- do not install valves with passages smaller than the nominal value and check valves with a stopper pushed by a spring (the check valve with the lowest load loss is the type with a light disc);
- in the case of use for oxygenation, choose low-resistance diffusers (low load loss).





⚠WARNING	To avoid overloads caused by pressure variations, it's recommended that you install a relief valve on aspiration in the case of operation as suction, and on discharge in the case of operation as a compressor.



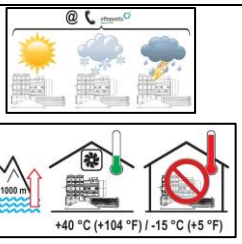
⚠WARNING	If you need to reduce the flow rate, use a branch valve instead of throttling the suction or discharge.



⚠WARNING	Protect the intake duct with a suitable filter with a filtration degree of 25 µm. Foreign bodies are: dust, sand, calcite, impurities in the pipes, cutting blades and shavings, drops and waste from welding, metal burrs, and residues of sealants produced during connection of pipes. Replace the filters regularly.



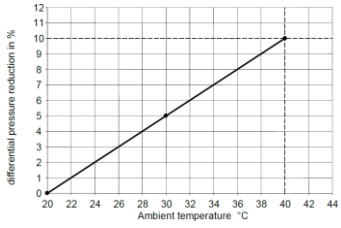
- When installing outdoors, protect the unit against direct exposure to the sun and atmospheric agents. For outdoor installations without the use of protections contact FPZ S.p.A..
- Ventilation of the motor must not be hampered by obstacles placed in the immediate vicinity. For this purpose, the electric motor air intake must remain free and a minimum distance between the electric motor fan cover and any other structure as defined by the manufacturer of electric motor.
- The unit must be installed at a maximum height of 1000 m a.s.l., for different conditions contact FPZ S.p.A..



The ambient temperature, and the conveyed gas intake temperature, is permissible inside the range -15°C (+5°F) ÷ +40°C (+104°F) with the following provisions:

- For ambient temperature +30°C (+86°F) **reduce** the maximum pressure differential given in the Data Sheet by 5%;
- For ambient temperature +40°C (+104°F) **reduce** the maximum pressure differential given in the Data Sheet 10%.

The graph on the right has to be used to reduce the maximum pressure differential in case of ambient temperature between +21°C and +40°C (+70°F and +104°F)



- Check dimensions to allow adequate space for installing the unit with its accessories and ensure sufficient ventilation of the electric motor.

⚠WARNING	In the case of ATEX side channel blower intended for classified areas, the unit must be installed outdoors or in an air conditioned environment.

5.2 BLOWER WITHOUT ELECTRIC MOTOR (GOR – GVR EXECUTION)

NOTICE

Units supplied without an electric motor, GOR execution (with horizontal coupling) or GVR (with vertical coupling) are considered as partly completed machinery, so the designer has to check the compatibility of the electric motor chosen with the data in the data sheets downloadable from the website.
During installation and maintenance, to install or dismantle the elastomeric coupling; it is recommended not to use a hammer, but pushers or extractors, to fit or remove the coupling flanges from the shaft. . Percussion can damage the slope of the bearings by reducing their durability. Coupling requires axial and angular alignment accuracy. Also refer to the coupling instruction manual.

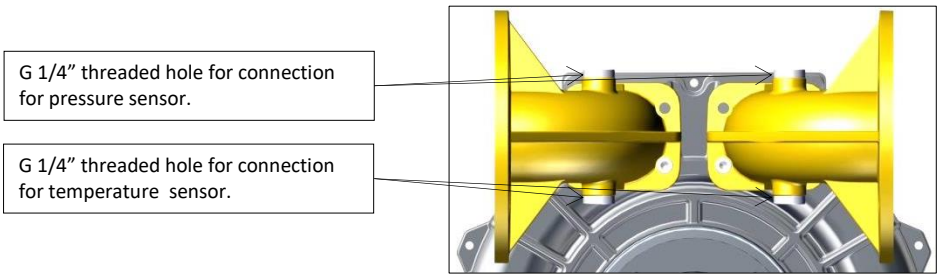
5.3 ATEX 2G BLOWER (EXCLUDED TMD VERSION)

The blower is arranged for the installation of measurement/control systems in order to prevent machine faults that can produce potential sources of triggering:

- pressure sensor
- temperature sensor.



Danger of explosion. The unit is designed to convey flammable gas and is sealed. Do not start the machine before connecting and activating the unit and surveillance system



Pressure sensor



ALWAYS use a pressure sensor

Given the likelihood of an explosive atmosphere, the use of pressure measuring instruments is compulsory in order to check that the difference between the delivery and suction pressures respects the levels given in the "specifications" and on the machine's rating plate.

NOTICE

The use of an alarm and stop device (non-automatic reset) that automatically shuts off the power to the machine is advisable.

Temperature sensor

A possible temperature sensor is deemed functional for the customer's measurement needs, but can in any way replace the pressure sensor for monitoring any dangerous machine conditions.

WARNING

All the sensors must be protected against possible impacts, damage and atmospheric agents.

5.4 GOR TMD ATEX 2G BLOWER

The blower is designed for the installation of control systems which must be set up by the installer for the purpose of monitoring machine breakdowns which could produce possible sources of combustion:

- vibration sensor;
- pressure switch / vacuum switch;
- thermostat.

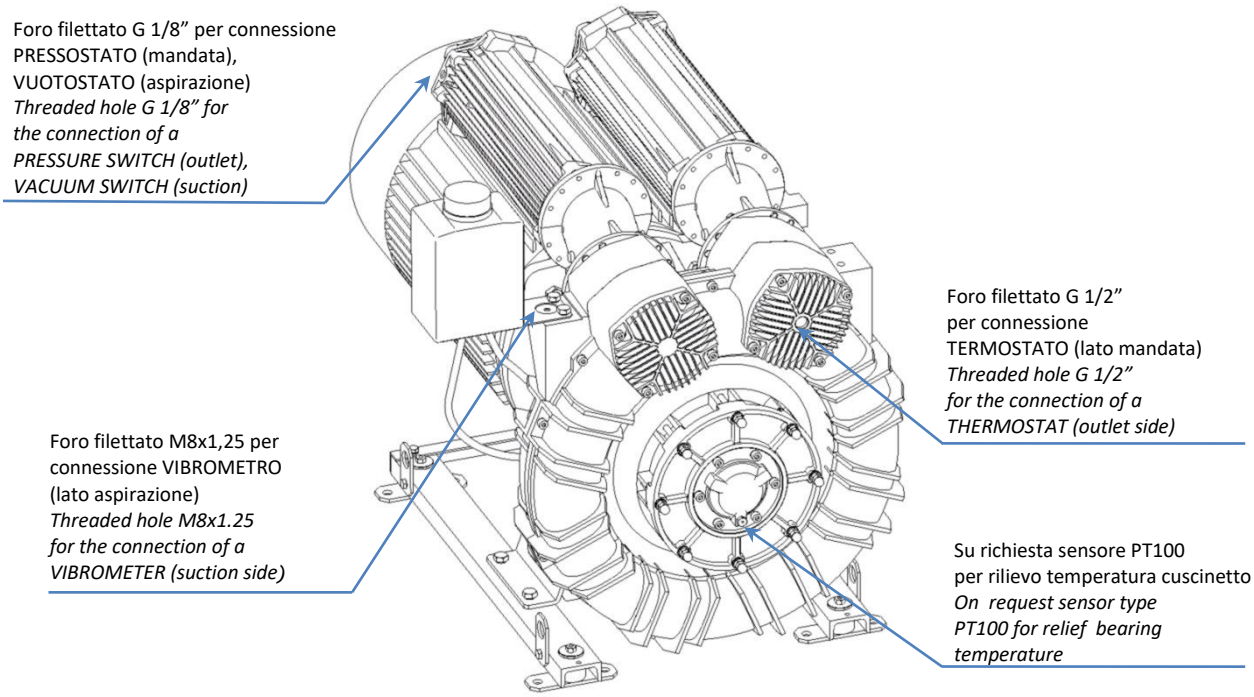
The mechanical seal installed also requires the following operations:

- refilling of the oil tray, as indicated below;
- connection of the oil level sensor.

If necessary, in order to avoid overloads caused by pressure variations, provide a vent device in conformity with EN 1127-1 branching off from the suction pipe, in the case of operation as a suction pump, and on the delivery pipe, in the case of operation as a compressor.

5.4.1 INSTALLATION OF SENSOR GOR TMD ATEX 2G BLOWERS

Install the machine on the plant. Fit the sensors (suitable for the purpose and especially for the Atex environment in question) in their places and connect them to the control system as specified in the instructions provided with the sensors and as required in the plant diagram:



- Vibration sensor

The signal from the sensor must monitor the vibrations of the machine constantly. This signal must be connected to an alarm and block device with manual reset, which automatically interrupts the power supply to the compressor/suction pump at the moment the level of the vibration signal exceeds the predetermined limits.

Effective vibration velocity value [mm/s]	***Class I*** (≤ 15kW)
a<**2.2**	***A***

Effective vibration velocity value [mm/s]	***Class II*** (> 15kW)
a<**3.5**	***A***

- Pressure switch and vacuum switch

The pressure or vacuum switch installed must be calibrated to the maximum pressure or vacuum level specified on the plate of the machine or in accordance with the operating limits of the plant.
The signal must be connected to an alarm and block device, with manual reset, that automatically interrupts the power supply to the machine.

- Thermostat

The thermostat must be set to come on at a temperature not exceeding 125°C to interrupt the power supply to the machine automatically.
The signal must be connected to an alarm and block device, with manual reset, that automatically interrupts the power supply to the machine.

WARNING **All sensors installed must be protected against impact, damage and weathering**. FPZ can supply a protective casing, on request and after receiving the dimensions of the sensors installed.

5.4.2 CONNECTION OF THE MECHANICAL SEAL FOR GOR TMD ATEX 2G BLOWER



Danger of slipping

Oil spills can make the floor slippery. Clean the floor with absorbent and /or degreasing products.



Danger of electrostatic charges

Do not clean or rub the oil reservoir with dry clothes.

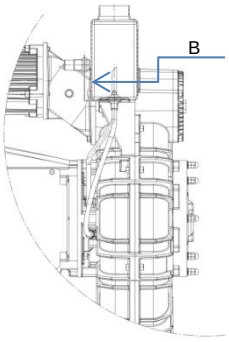
- Refilling the cooling oil tray

Refill the cooling circuit of the mechanical seal. For good circulation of the cooling liquid, it is important not to have air bubbles inside the circuit. To achieve this, refill by pouring the liquid into the vessel repeatedly in small amounts without exceeding level (B) of the return line. Top up completely only when the level at the return line has covered the bottom of the vessel.

The cooling liquid must be kept at least 10 mm above the level of the return line (B); top up as necessary.

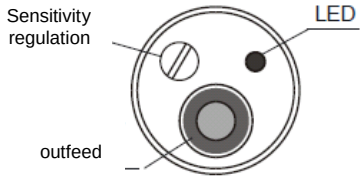
Recommended cooling liquid:	SAE 10W-40 oil Or SAE 5W-40 oil
First filling quantity:	Approx. 1,5 kg

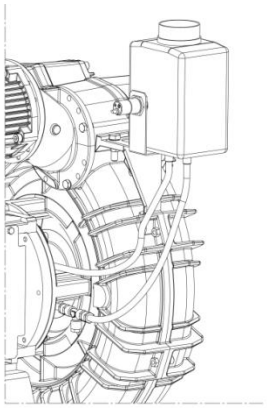
A small leak of fluxing liquid is normal, especially when the seals are settling down.



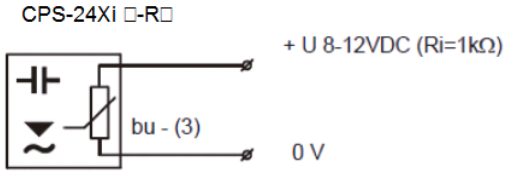
- Connection of the cooling oil level sensor

The capacitive oil level sensor consists of a stainless steel cylindrical body and is suitable for use in explosion risk zones. It is fitted with a potentiometer to regulate sensitivity and a LED display on the back end, which is normally on.





This sensor must be connected to an alarm and block system with manual reset which automatically interrupts the power supply to the machine. Connect the sensor to the control system following the specific instructions enclosed with this manual.



Note: the connection cable must not be cut or tampered with.

5.5 ELECTRIC MOTOR

WARNING **Comply with safety measures and instructions indicated in the instruction manual for the electric motor.**

Before starting working on the unit or system, the following precautions must be taken:
- make sure that the unit is NOT connected to electrical power mains;
- take precautions to prevent electricity from being reconnected;
- open the terminal box only after making sure that there is absolutely no live current.

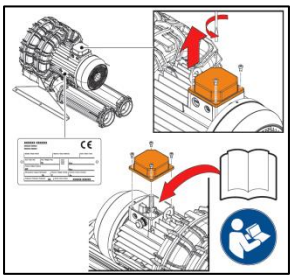
Danger due to electricity

- If connecting operations are carried out without removing the voltage from the electrical system or without setting up a system to avoid reinsertion, direct contact between the operator and the live parts can occur. This can also cause personal serious injury (or death).
- Work on electrical equipment (installation and maintenance) has to be done only by specialized operators (see document MAN_PIC), wearing PPE.
- In the event of contact with a defective unit there is a risk of electrocution. Always have seals and electrics checked regularly by a specialized operator (see document MAN_PIC).
- The terminal box must not contain foreign bodies, impurities or humidity. Close the terminal box with the cover, and seal the cable gland openings to prevent dust, water and humidity from getting inside.

NOTICE In the case of several motor starts during an hour, there is a limitation of 6 start-ups per hour, evenly distributed; failure to respect this can severely damage the unit.

5.5.1 ELECTRIC CONNECTION

Incorrect motor connection may seriously damage the unit.



- Check that the details on the data plate are compatible with the line voltage and frequency.
- Always connect the motor's earth cable to the relevant terminal marked with this symbol before connecting to the mains supply and check the dispersion capacity. The earth cable can be recognized by its color (yellow/green).
- Connect the machine to the earth system too, using the specific hole (marked with the relative symbol) located on the base of the unit. Connection to the power grid must be carried out in compliance with what is shown in the diagram inside the terminal box.
- Use the cable gland openings to allow power supply cables to pass into the terminal box.
- Proceed to tighten the power supply cables, taking the section of the electrical cables into account each time.
- The terminal boards for the electrical connections must be tightened properly to avoid high contact resistances and resulting overheating.
- Check that the insulation gaps between the various conductors are kept in the air and between surfaces, as indicated in the standards.
- All the screws used to close the terminal board must be tightened properly. Damaged screws must be replaced immediately, using screws of the same or better quality.

The connection must guarantee:
- long-lasting safety;
- that no wire ends are sticking out;
- protection with a (thermal or amperometric) trip switch is essential for dealing with risks of overloading, a loss of one phase in the mains supply, excessive voltage fluctuations, or the rotor getting stuck;
- that the motor trip switch have to be set using the current level shown on the nameplate as a maximum.

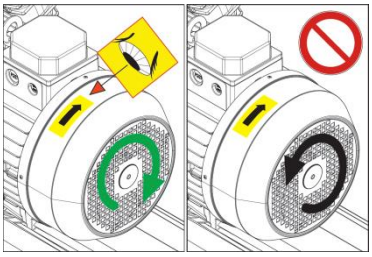
5.5.2 ELECTRIC MOTOR POWERED BY FREQUENCY CONVERTER

The unit's nominal pressure or vacuum characteristics for service at mains frequency cannot be maintained if the unit is powered via a frequency converter. Contact FPZ S.p.A. for information about unit powered by a frequency converter performance.

When power is supplied with a frequency converter, the installer is responsible for:
- respecting the laws;
- checking with FPZ assistance if the motor can be powered by a frequency converter, if it doesn't appear on data sheet;
- checking and making any measures necessary to comply with the immunity and emission limits set by the standards;
- checking the suitability of the plant and the frequency converter for operation with standard motors (class F), or the need to use specific motors for these types of operation.

5.5.3 ROTATION DIRECTION

The machines must be used respecting the rotation direction indicated by the arrow on the electric motor fan cover.



- To check the rotation direction, switch the motor on briefly and observe the fan.
- To change the rotation direction, invert the power cable connections, leaving the earth connection unchanged.

Refer to the connection diagram located inside the terminal box and to this section.

6 START UP AND NORMAL OPERATION

6.1 PRELIMINARY CHECKS

WARNING! Before starting the machine for use, carry out the following preliminary checks:

- if the unit has not been started up for some time, check its condition and, if necessary, remove any dust from the external surfaces, to avoid compromising the heat dissipation during the unit work;
- deactivate/open any pipe closing devices (shut-off valves, solenoid valves, etc.) before starting the unit;
- never start and operate the unit with the inlet and/or outlet ports closed;
- make sure the ambient and conveyed gas suction temperatures come within the levels: -15°C (+5 °F)÷ +40°C (+104 °F);
- check the operation of any flow control/limiting devices (not supplied).

6.2 OPERATION

- If the side channel blower is put into operation without being fixed to a surface, a sudden displacement of the starting torque on ignition of the electric motor may occur.
- The information on the product nameplate must always be considered when commissioning and operating.

The unit can be started for use after carrying out the preliminary checks

- Start the unit by switching on the power to the electric motor.
- Respect the values given in the "specifications" and the electric motor rating data. Pressure losses in the pipes are often underestimated but are decisive factors for the operating differential pressure.
- Measure the motor absorption and check compliance with the rated value

	**Non-compliance with the unit's use or with prohibitions/obligations can cause personal (also serious) injury (or death) or equipment damage**



Danger of burns

Danger of burns caused by contact with hot surfaces of the unit, which at startup and operation may reach high surface temperatures, as specified on the product nameplate.
Apply adequate PPE against the risk of burns.



Danger of suction

Danger of injury due to depression, which can cause a sudden suction of objects, hair and clothes.
Start the machine only if it is properly connected to the system.



Danger of vibration

Regularly check that the unit is firmly fixed to the support frame.
Excessive vibration of the unit can cause serious damage to the machine, such as the seizure of the impeller.



Danger due to noise

Some machines can produce loud noise, even over 80 dB (A).
Reference levels are shown on the table of characteristic data that does not consider environmental reverb.
Warning to be taken:
Measure the acoustic pressure of the machine in the installation environment.
In the case of levels above the threshold defined by local standards:

- report the noise hazard
- prepare the use of PPE
- isolate the environment



Danger of ejection of objects

- Danger due to exceeding performance levels that may cause seizure of the impeller.
  Check that operating conditions are in accordance with values declared on the nameplate.
  Avoid operating with the inlet and/or outlet ports closed even temporarily.
  Install a limit valve or equivalent circuit that can avoid excessive vacuum and / or overpressure and allow the compliance with levels shown on the product plate
- Danger of injury due to objects and fluids aspirated and thrown at high speed (injury to the skin or eyes).
  Only start the unit (first start) if it is properly connected and check it accurately.
  In the case of unusual noise from the impeller, switch off the unit immediately and check it accurately.



Danger of injury to upper limbs

During the start-up (first start) phase due to a combination of hazards, the risk of injury to upper limbs may arise.



Danger of sudden leakage and/or aspiration of fluids (even harmful ones)

They could cause damage to the respiratory system due to the leakage of gas while the unit is in use and/or the slowing down of connection to the gas flow circuit.



Danger due to a limited view of the place in which the unit is installed.

Make sure you always have the unit installed in your sight while carrying out any activities close to it.

6.3 STOPPING

- The unit must be stopped by switching off the power supply to the motor.
- On shutdown, make sure to operate the unit with open outlet (suction / delivery) for about 20 minutes. This operation allows the removal of any condensation inside.

7 MAINTENANCE

In order to prevent faults and damage it is important to check periodically the units in operation; therefore it is advisable to adopt a maintenance plan in line with this manual, providing for:

- periodical checks;
- periodical maintenance.

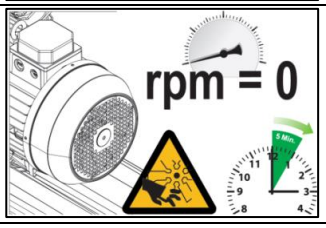
7.1 MAINTENANCE AND FAILURE CONDITIONS

WARNING **Before starting any maintenance, either periodical or due to malfunction, take the following safety measures in order to prevent personal (also serious) injury (or death) or equipment damage:**

- unplug the unit from the power supply by unplugging the main switch;
- apply a sign to the system and to the control unit **"DANGER! Maintenance work in progress";**
- cool the unit for at least 15 minutes;



- wait until the unit has completely stopped, checking through the motor fan that the impeller is not rotating;



- make sure that there is no depression or overpressure in the unit through a pressure gauge and make sure that no fluid can escape from the unit (through its stopping) and / or the system (through its insulation).

Danger due to electricity

- If connecting operations are carried out without removing the voltage from the electrical system or without setting up a system to avoid reinsertion, a direct contact of the operator with live parts can occur. This can also cause personal serious injury (or death).
- Work on electrical equipment (installation and maintenance) must be done only by specialized operators (see document MAN_PIC), wearing PPE.
- In the event of contact with a defective unit there is a risk of electrocution.

Danger of moving parts

High risk of cuts caused by rotating impellers. By removing the manifolds or blind flanges, it is possible to access the rotating impeller through the openings of the body and the cover of the side channel blower.
Never put your hands or objects through the openings.

Danger of burns

Danger of burns caused by contact with hot surfaces of the unit, which at startup and in operation may reach high surface temperatures, as specified on the product nameplate.
Apply adequate PPE against the risk of burns.

Danger of injury to upper limbs

During the maintenance phase due to use of improper tools, lack of PPE, bad illumination of the workplace or unauthorized startup, the operator fails to perform the required procedures, the machine can be put into unmanaged operation, and the risk of injury to upper limbs may arise.

Danger due to noise

Some machines can produce loud noise, even over 80 dB (A) therefore the operator may be subject to acoustic pressure which may cause buzzing in the headset and reduced attention.

WARNING **Danger of sudden spillage of gas (also harmful) suction**

Respiratory damage could occur due to gas leakage during operation and / or loosening of the connections to the gas flow circuits.

7.2 PERIODICAL CHECKS

In order to avoid any defects that may directly or indirectly cause damage, it is important that the unit is inspected by specialized operators (see document MAN_PIC).

A) When the unit is running, routinely carry out the following checks:

- delivery temperature;
- operating pressure and/or vacuum;
- electric motor current absorption;
- vibrations;
- state of the filter and related load loss.

WARNING

Danger of seizure of the impeller due to excess vibration. Vibrations above the threshold (see table below) are considered NOT eligible and can cause damage to the machine and consequently personal injury even serious (or death) and / or damage to things.
In the event of unusual noise and / or vibration over parameters, that may indicate the possibility the impeller is seizing up, turn off the unit immediately.

Class I (Blower with electric motor of power ≤15kW)	Class II (Blower with electric motor of power >15kW)
a > 2,2	a > 3,5
a = effective vibration speed level [mm/s]	

Changes to normal working conditions (power ups, abnormal noise, vibrations, excessive overheating of the service fluid) are indications that the units is not working properly.

B) With the unit stopped and cooled, periodically carry out the following checks:

- dust: check and remove deposits from the external surfaces of the unit;
- suction filter (if fitted): every 10-15 days, check and clean or replace the filter cartridge. The dirty cartridge creates strong suction resistance and consequently a higher pressure differential, power absorption and operating temperature;
- for unit supplied with elastic joint, check the condition of the elastic joint as indicated in its operating manual;
- condensation discharge (if present): every 8-10 days, turn the yellow valve counterclockwise 90° to allow draining of the condensation that has built up inside the blower;
- check for oil leaks (TMD version) near the joint; if leaks are found, maintenance work must be scheduled to replace the seals.

7.3 ROUTINE MAINTENANCE REPAIR OF BREAKDOWNS

See the following chapter “TROUBLESHOOTING” for identifying possible critical situations and types of breakdowns.
Always disconnect the unit and remove it from the plant to do routine maintenance, cleaning and replacing components and in the event of a breakdown.

WARNING

Danger due to residual overpressure or drop in pressure:

- with residual overpressure, process fluids can leak, with the risk of injury to the skin and eyes;
- with a drop in pressure there is the risk that hair and clothes can be trapped;
- disconnect the unit only after closing and bleeding the system connected to it.

7.4 LIFESPAN OF BEARINGS

Under normal operating conditions, the bearings of the unit must be replaced by a specialized operator (see document MAN_PIC), after a time fixed by the manufacturer (see details in the table below).

Non Atex Blower	25000 hours or 3 years	**Atex Blower**	18000 hours or 3 years

NOTICE

Replace the bearings of the unit only if you have all the instructions, the parts list and the section/explosion of the unit

7.5 DISMANTLING AND DEMOLITION



Danger of crushing and / or impacting various parts of the body

During the dismantling and demolition phases due to the sudden drop or displacement of the packaging, there may be a risk of crushing and / or impacting various parts of the body. During work around the unit, the operator may fall due to stumbling or slipping.

8 RESIDUAL RISKS

During the design of the machines or system on which the blower will be installed, the following residual risks should be considered.



Danger during the transport phase

Danger of crushing or slipping during the unit transport steps. The *operating instructions* (attached to the unit) and this manual describe how to carry out safe transport operations according to tested procedures.



Danger during the installation phase

Danger of crushing or slipping during the installation phases of the unit. The *operating instructions* (attached to the unit) and this manual describes how to carry out safe installation operations and according to tested procedures.



Danger during the startup and operating phase

Danger of electrocution, burns, noise, unauthorized startup of the unit, and ejection of objects or fluids during the start-up and operation phases of the unit. The *operating instructions* (attached to the unit) and this manual describe how to perform the operations mentioned safely and according to tested procedures.



Danger during maintenance and dismantling phases

Danger of electrocution, burns, noise, unauthorized startup of the unit, and ejection of objects or fluids during the maintenance and dismantling phases of the unit. The *operating instructions* (attached to the unit) and this manual describe how to perform the operations mentioned safely and according to tested procedures.

9 TROUBLESHOOTING

Problem	Serious	Cause	Solution	Precaution
The unit does not start	F	Electrical wiring incorrect	The electrical connection has to be checked by a technician referring to the wiring diagram contained in the terminal board box	Turn off the power to the electrical system or set up a system that avoids reinsertion
	F	Power supply voltage unsuitable	Check that the power supply voltage, measured at the motor terminals, is within +/- 10% of the rated voltage	Use PPE against the electrical hazards
	G	The impeller is stuck	Call FPZ assistance to repair the unit	
No or insufficient air flow	G	The suction filter is clogged	A specialized operator (see MAN_PIC) has to clean or replace the cartridge	Avoid entering foreign bodies into the unit
	G	Wrong frequency (for units powered through an inverter)	Correct the frequency	Check the rating plate
	G	Profile of the impeller blades modified (due to deposits on the profile)	Call FPZ assistance personnel to check the impeller	
No or insufficient pressure differential	F	Incorrect direction of rotation	The direction of rotation has to be inverted by a specialized operator (see MAN_PIC) switching two of the electrical power supply wires.	Turn off the power to the electrical system or set up a system that avoids reinsertion
	G	Leaks in the plant	Locate the leak and seal	Use proper sealants
Current absorption exceeding the admissible level	F	Electrical wiring incorrect	The electrical connection has to be checked by a technician referring to the wiring diagram contained in the terminal board box	Take off the power to the electrical system or set up a system that avoids reinsertion
	F	Drop in mains supply voltage	The power supply voltage has to be restored by a specialized operator (see MAN_PIC) at the terminals and at the established values.	
	G	The suction filter is clogged	The cartridge has to be cleaned or replaced by a specialized operator (see MAN_PIC)	Avoid entering foreign bodies into the unit.
	G	The unit has accumulated deposits inside	Call FPZ assistance personnel to clean the inside of the unit	Avoid entering foreign bodies into the unit.
	G	The unit is operating at a pressure and/or vacuum that exceeds the admissible level	Adjust the system and/or the regulating valve to lower pressure differentials.	Use appropriate PPE to operate near the unit
High delivery air temperature	G	The suction filter is clogged	Adjust the system and/or the regulating valve to lower pressure differentials.	Use appropriate PPE (surge protectors, gloves) to operate near the unit
	G	The suction filter is clogged	The cartridge has to be cleaned or replaced by a specialized operator (see MAN_PIC)	Avoid entering foreign bodies into the unit.
	G	The unit has accumulated deposits inside	The unit has to be cleaned inside by a specialized operator (see MAN_PIC).	Avoid entering foreign bodies into the unit.
	G	Suction and/or delivery piping obstructed.	Obstructions have to be removed by a specialized operator (see MAN_PIC).	Avoid entering foreign bodies into the unit.
	G	Suction air temperature exceeds 40°C (+104°F)	Use heat exchangers to reduce the suction air temperature	
Abnormal noise	F	The soundproofing material is damaged	Soundproofing cloth has to be replaced by a technician.	Avoid entering foreign bodies into the unit.
	G	The impeller scrapes against the casing. - The unit is operating at a pressure and/or vacuum that exceeds the admissible level	Reduce the pressure differentials in the plant	Use appropriate PPE (surge protectors, gloves) to operate near the unit
	G	- Reduction of assembly tolerances due to internal deposits (dust, impurities in the pipes, process residues, etc.)	The unit has to be cleaned inside by a specialized operator (see MAN_PIC).	Avoid entering foreign bodies into the unit.
	G	Worn bearing	Bearings have to be replaced by a specialized operator (see MAN_PIC).	
	F	Unit's installation position unsuitable	The unit has to be installed by a technician on structures that cannot transmit or amplify noise (tanks, steel plating, etc.)	Use proper anti-vibration and move the units according to local regulations

Abnormal vibrations	G	The impeller is damaged	The impeller has to be replaced by a specialized operator (see MAN_PIC).	
	G	The impeller has accumulated deposits	The unit has to be cleaned inside by a specialized operator (see MAN_PIC).	Avoid entering foreign bodies into the unit
	G	Unit anchored without anti-vibration insulators	The unit has to be anchored with anti-vibration insulators by specialized operator (see MAN_PIC).	Use proper anti-vibration and move the units according to local regulations
	F	Rigid connection to the plant	Flexible hoses between the unit and the piping have to be fitted by a specialized operator (see MAN_PIC).	Carry out the activity only if the unit is disconnected to the power supply.
	G	Bearing on the blower or motor side defective	Bearings have to be replaced by a specialized operator (see MAN_PIC).	

Leaks	G	Defective silencer gaskets	Gaskets have to be checked by a specialized operator (see MAN_PIC), and if necessary have to be replaced.	Avoid entering foreign bodies into the unit.
	G	Defective casing gaskets	Gaskets have to be cleaned by a specialized operator (see MAN_PIC), and if necessary have to be replaced.	Avoid entering foreign bodies into the unit.

Seriousness: F for functional fault and G for serious fault.

10 REFERENCES

Documents quoted:

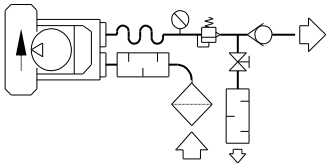
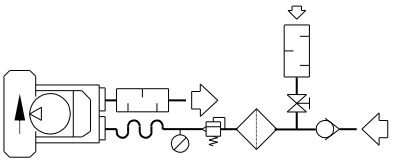
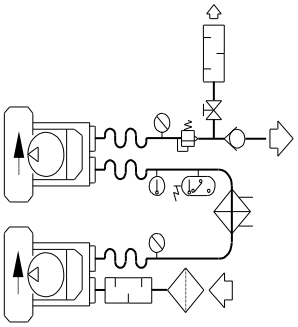
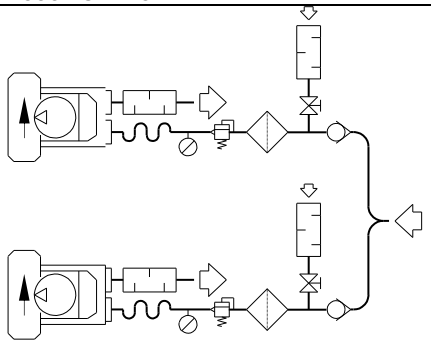
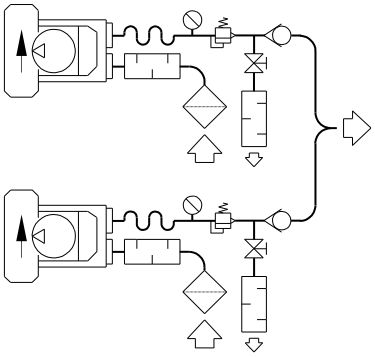
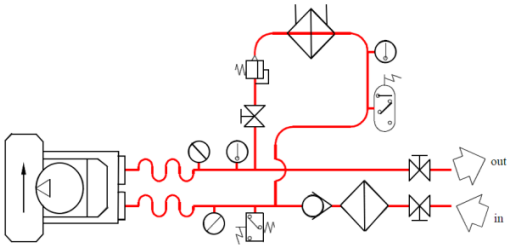
- Operating Instruction: supplied with the blower
- MAN_PIC: document with pictogram definitions
- Instruction manual of elastic joint
- Instruction manual of electric motor

Standards and directives:

- Directive 2006/42/CE
- Directive 2014/34/UE, (Valid only for Atex Version)
- EN 1127-1:2011
- EN 1127-2:2014
- EN 13237:2012
- EN ISO 80079-36:2016
- EN ISO 80079-37:2016
- EN 14986:2017,
- IEC 60034-1:2017

11 INSTALLATION DIAGRAMS

SCHEMI DI INSALLAZIONE I
INSTALLATION DIAGRAM GB

COMPRESSORE PRESSURE SERVICE	ASPIRATORE VACUUM SERVICE
	
COMPRESSORE IN SERIE SERIAL PRESSURE SERVICE	ASPIRATORE IN PARALLELO PARALLEL VACUUM SERVICE
	
COMPRESSORE IN PARALLELO PARALLEL PRESSURE SERVICE	ATEX BLOWERS SCHEMA D'INSTALLAZIONE INSTALLATION DIAGRAM
	

LEGENDA, KEY – ACCESSORIES

Item Item		Denominazione Name	Item Item		Denominazione Name
1		Filtro - Filtro in linea Filter - Inline filter	7		Valvola di ritegno Check valve
(2)		Silenziatore Silencer	8		Valvola Valve
3		Manicotto flessibile Flexible sleeve	(9)		Scambiatore Cooler
4		Manometro – Vuotometro Pressure gauge - Vacuum gauge	(10)		Termometro Thermometer
5		Pressostato – Vuotostato Pressure switch – Vacuum switch	(11)		Termostato Thermostat
6		Valvola limitatrice Pressure relief valve	(x) (x)	SE NECESSARIO IF NECESSARY	

Motori BONORA

Via Reno Vecchio, 62 Cento (FE) - IT **S.P.A**

CERTIFICATO DI TIPO
TYPE TEST CERTIFICATE

TDS0114

Revisione / *Revision* : 0

Data / *Date* : 07/12/2015

Rilasciato da / *Released by* : Roger Tchinda

Approvato da / *Approved by* : M. Diegoli

Cliente / Customer : FPZ

Motore Asincrono Trifase Con Rotore A Gabbia Di Scoiattolo
Asynchronous Three Phase Electric Motor With Squirrel Cage Rotor

Tipo motore / *Motor type:* **CP132MG/2** **Pn** [HP] / [kW]**: 10 / 7,5** **Poli / *Poles:* 2**

Classe Isol. *Insul.Class* (ΔT)	Servizio *Duty*	Service ¹ factor	Temp.amb. *Amb.Temp.* [℃]	Altitudine *Altitude* [m]	Test rigidità *Dielectric test* [Vac]	Resist. Isolamento *Insulation resist.* [Mohm]	Sistema Raffr. *Cooling system*	Inertia j [Kgm²]	Protezione *Protection*	Norme *Standards*
F (B)	Cont (S1)	1,15	40	1000	1920	>100	IC411	0,01876	IP55	IEC 60034-1, UL 1004-1-2, C22.2 No. 100-04, C390-10.

Dati a 60Hz / *Data at 60Hz*

Pn [HP] / [kW]	Vn [V]	In [A]	n [rpm]	Mn [Nm]	Ma / Mn	Mm / Mn	Ia / In	Prova a carico variabile ² *Variable load test ²*	%Pn	25%Pn	50%Pn	75%Pn	100%Pn	125%Pn	Livello efficienza *Efficiency level* (Nema MG-1 Tab 12-12)
10 / 7,5	460 Y	12,5	3555	20,1	5,0	5,8	13	η %	79,6	87,6	90,1	91,0	91,3		**PREMIUM EFF.- IE3 Nema Nom.Eff. 90.2%**
								Cosφ	0,44	0,65	0,76	0,83	0,86		
10 / 7,5	230 YY	25	3555	20,1	5,0	5,8	13	η %	79,6	87,6	90,1	91,0	91,3		
								Cosφ	0,44	0,65	0,76	0,83	0,86		
10 / 7,5	208 YY	26,1	3540	20,2	4,1	4,6	11,2	η %	82,0	88,7	90,6	91,0	90,9		
								Cosφ	0,55	0,75	0,84	0,88	0,90		

Prova equilibrio termico ***Temperature rise test***

Tensioni / *Voltage* [V]	Freq. [Hz]	Pn [HP] / [kW	ΔT Avvolg. Motore *ΔT Motor winding.* [K]	Temp. carcassa motore *Motor case temp.* [℃]	Tamb. [℃]
480 Y	60	11,5 / 8,63 (S.F 1,15)	< 46.2	< 35.8	23,1
460 Y	60	10 / 7,5	35	33,6	23
200 YY	60	11,5 / 8,63 (S.F 1,15)	46,2	35,8	23,1
208 YY	60	10 / 7,5	35,2	32,1	22

Prova a vuoto ***No-load test***

Vn [V]	Io [A]	Cosφ0	Temp.avvolgimento *Winding temp.* [℃]
460 Y	6,17	0,09	39,1
230 YY	12,3	0,09	39,1
208 YY	9,9	0,11	35,4
---	---	---	---

Dati a 50Hz / *Data at 50Hz*

Pn [HP] / [kW]	Vn [V]	In [A]	n [rpm]	Mn [Nm]	Ma / Mn	Mm / Mn	Ia / In	Prova a carico variabile ² *Variable load test ²*	%Pn	25%Pn	50%Pn	75%Pn	100%Pn	125%Pn	Livello efficienza *Efficiency level* (Nema MG-1 Tab 12-14)
10 / 7,5	200YY/400 Y	28,6/14,3	2950	24,3	4,6	5,0	11,8	η %	82,4	88,9	90,7	91,1	90,8		**PREMIUM EFF.- IE3 Nema Nom.Eff. 90.1%**
								Cosφ	0,43	0,65	0,77	0,83	0,87		

Prova equilibrio termico ***Temperature rise test***

Tensioni / *Voltage* [V]	Freq. [Hz]	Pn [HP] / [kW	ΔT Avvolg. motore *ΔT Motor winding.* [K]	Temp. carcassa motore *Motor case temp.* [℃]	Tamb. [℃]
210 YY/420 Y	50	10 / 7,5	≤ 45	< 40	23
200 YY/400 Y	50	10 / 7,5	41	35,2	23
190 YY/380 Y	50	10 / 7,5	≤ 45	< 40	23

Prova a vuoto ***No-load test***

Vn [V]	Io [A]	Cosφ0	Temp.avvolgimento *Winding temp.* [℃]
----	----	----	---
200 YY 400 Y	14,1 7,07	0,08	42,4
---	---	---	---

Legenda / Legend:

Pn: Potenza Nominale / *Nominal power*

In: Corrente nominale / *Nominal current*

Vn: Tensione nominale / *Nominal voltage*

Mn: Coppia nominale / *Nominal torque*

Io: Corrente a vuoto / *No load current*

J: Momento d'inertia / Moment of inertia

Ia: Corrente Avviamento / Starting current

Ma: Coppia avviamento / Starting torque

Mm: Coppia massima / *Maximum torque*

Note: *¹ Service factor 1.15 only at 60Hz*

² Determinazione dell'efficienza secondo CSA-C390-10 / Efficiency determination according to CSA-C390-10

Motori Bonora S.p.A.

Roger Tchinda

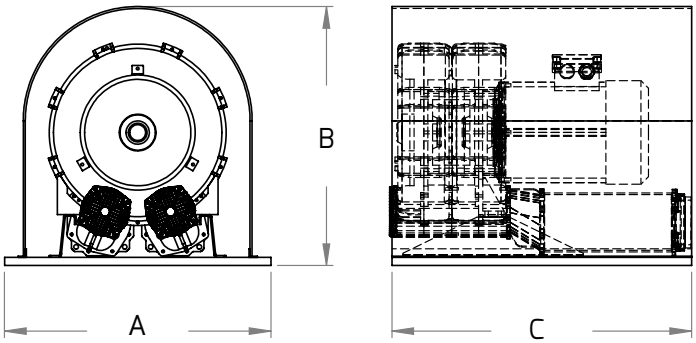
Il certificato è relativo ad uno specifico motore solamente se viene riportato il nr. di matricola. Diversamente i valori sopra indicati sono relativi alla prova di TIPO del motore, a regime termico, alla potenza, tensione e frequenza nominale; sono quindi da tollerare piccoli scostamenti dei parametri per motori in produzione. Tutti i dati riportati nel presente documento possono essere modificati dal costruttore senza alcun preavviso.
Le prove di efficienza sono state fatte dopo un rodaggio completo del motore. / The certificate is linked to a specific motor only if it shows the seriAl number, the above values are refered to the motor TYPE test, at the equilibrium temperature, nomimal power, nominal voltage and frequency. so they must be tolerated small deviations of these parameters for factory production motors. All data presented in this document can be modified by the manufacturer without prior notice.The Efficiency tests were made after a complete engine running.

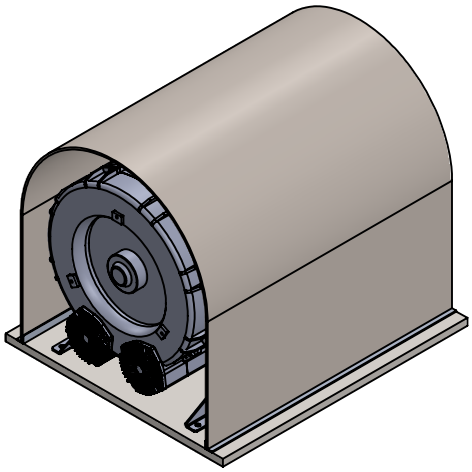
Weather Enclosures

SS1710r

FPZ weather enclosures provide protection from the sun and rain. The low profile HDPE enclosure is 1/4" thick and designed to allow for excellent air flow. The straight through design does not trap heat so an auxiliary cooling fan is not required.

Enclosures are supplied with a solid floor base with aluminum side channels. The base can be removed if it is desirable to mount the cover to an existing structure (ideal for retrofit).





Part #	Used on Models	Type	A	B	C
WE0306	SCL K03, K04, K05, K06, 06, 10DL, 15DH, R20, R30, R40	MS / MD / TS / TD	23.9"	17.0"	23.9"
WE0712	SCL K07, K08, K09, K10, K11, K12	MS / MD / TS / TD	32"	31.2"	36"

Note: contact FPZ for sizing recommendations for direct coupled blowers (GOR versions).
Dimensions in inches and are for reference only
Data subject to change without notice.

VAPOR PHASE CARBON VESSEL - Pressure Drop Calculator

Calculation Based on 4x10 Mesh Vapor Phase Carbon

Enter Data in Yellow Fields

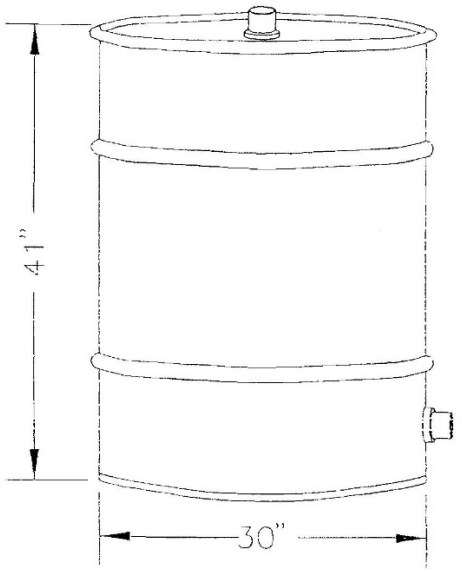
System Flowrate (cfm)	Cross Sectional Bed (ft2) 2	Note	Superficial Velocity ft/min (equals cfm / cross section) Note 1	Estimated Pressure Drop (per foot of bed depth) See Table Below	Bed Depth (ft) 3 & 4	Notes	VGAC Vessel Operational Pressure Drop - in w.c.
335	7.85		43	1.90	2.00		**3.80**

Superficial Velocity	**Equivalent Pressure Drop in w.c.**
10	0.25
15	0.5
20	0.75
25	0.9
30	1.1
35	1.3
40	1.6
45	1.9
50	2.2
55	2.5
60	2.9
65	3.2
70	3.7
75	4
80	4.4
85	4.8
90	5.2
95	5.7
100	6

1. Published Target Superficial Velocity Range = 10 to 100 ft / min
2. Cross-Sectional Bed Area equals width x depth for square vessels / diameter x pi for round vessels
3. Bed Depth = Media Volume / Cross Sectional Area.
4. Media Volume from VGAC Density = 27.8 lbs per ft3 (i.e. 1000lbs occupies 36 ft3)

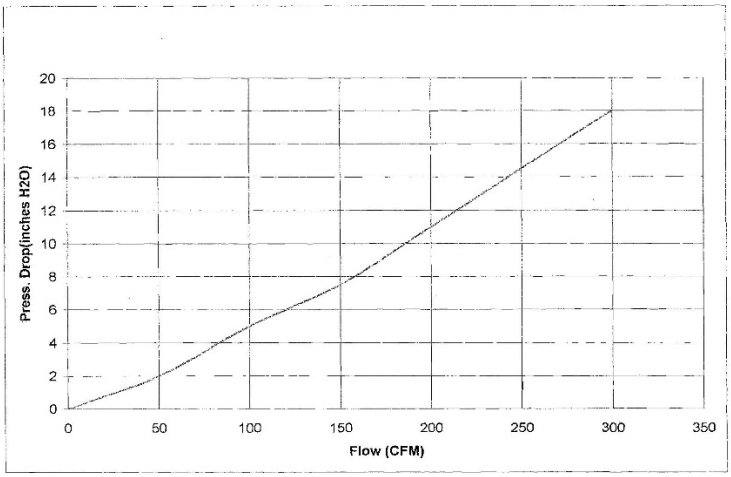
CARBON FILTRATION SYSTEMS INC.

VAPOR DRUM SERIES
Model VDS-110-4"



STANDARD FEATURES

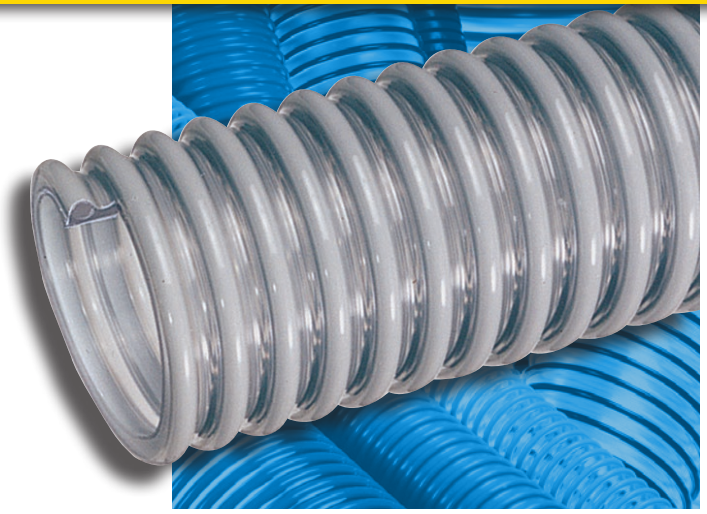
- 400 lbs. domestic source virgin 4 x 10 mesh carbon, coal or coconut base, 60 min. $CC1_4$ activity.
- Heavy duty vessel with corrosion resistant interior coating and components. 400° high temperature Epoxy lining.
- Over 700 in2 of surface area for superior air distribution and the lowest pressure drops.
- 4" FNPT inlet and outlet connections.
- 100% carbon utilization for increased service life and lower maintenance costs.



68 Mill Street · Johnston, Rhode Island 02919 · Phone: (401) 946-7838 or (401) 946-4847 · Fax: (401) 946-9722

W™ Series

Heavy Duty PVC Liquid Suction Hose



General Applications:
- Extreme cold conditions (Sizes 4" - 16")
- Fish suction
- Gold dredging
- Pumps, rental and construction dewatering
- Pumps, trash
- Slurry handling
- Water suction – heavy duty

Construction: PVC tube with rigid PVC helix.

Service Temperature Range:
Sizes 1" - 3": -4°F (-20°C) to +150°F (+65°C)*;
Sizes 4" - 16": -40°F (-40°C) to +150°F (+65°C)*

MADE IN THE USA

Phthalate FREE

The Original Heavy Duty Suction Hose

Features and Advantages:
- **"Cold-Flex" Materials (Sizes 4" - 16")** – Hose remains flexible in sub-zero temperatures.
- **Transparent Construction** – "See-the-flow." Allows for visual confirmation of material flow.
- **Convoluted Outer Cover** – Provides increased hose flexibility.

Nominal Specifications

Series Number	ID		OD		Working Pressure (psi)		Vacuum Rating Hg (in)		Min. Bending Radius at 68°F (in)	Standard Length (ft)	Weight (lbs/ft)
	(in)	(mm)	(in)	(mm)	68°F	104°F	68°F	104°F			
W100	1	25.4	1.30	33.0	55	35	Full	28	1	100	0.21
W125	1-1/4	31.7	1.60	40.6	50	30	Full	28	2	100	0.28
W150	1-1/2	38.1	1.85	47.0	50	30	Full	28	2	100	0.34
W200	2	50.8	2.40	61.0	50	30	Full	28	3	100	0.52
W250	2-1/2	63.5	2.99	75.9	45	25	Full	28	4	100	0.77
W300	3	76.2	3.64	92.5	45	25	Full	28	6	100	1.18
W400	4	101.6	4.76	121.0	35	18	Full	28	8	100	1.92
W500	5	127.0	5.75	146.0	35	18	28	25	12	100/20	2.95
W600	6	152.4	7.00	177.8	30	15	28	25	14	100/20	3.76
W800	8	203.2	9.18	233.2	30	15	28	25	24	40/20	5.99
W1000	10	254.0	11.56	293.5	25	12	28	25	39	40/20	9.74
W1200	12	304.8	13.64	346.5	20	10	28	25	59	40/20	12.77
W1400†	14	357.6	15.59	396.0	18	8	26	23	80	20	13.50
W1600†	16	408.4	17.72	450.0	12	5	24	20	95	20	16.00

NOTE: Service life may vary depending on operating conditions and type of material being conveyed.
NOTE: For details of the following compliances, refer to footnotes listed on page 63.
***Actual service temperature range is application dependent.**
†Non-stock item, minimum order required. Contact Kuriyama customer service for details.

PHTHALATE FREE(10), **RoHS**(11)

Because we continually examine ways to improve our products, we reserve the right to alter specifications or discontinue products without prior notice.

SECTION 4 - PROCESS INSTRUMENTATION

VACUUM INDICATOR(S), (-)100 TO 0 IN W.C.-V - PIC LP1-254-60V

PRESSURE INDICATOR(S), 0 TO 30 IN W.C. - PIC LP1-254-30

TEMPERATURE INDICATOR(S), 0 TO 250 F - PROSENSE T30-0250-25C

BLOWER LOW VACUUM SWITCH, RANGE 9 - 85 IN W.C - DWYER 1823-80

BLOWER DISCHARGE HIGH TEMPERATURE SWITCH, ADJ. (-)4 TO 284°F - PROSENSE TSDA25N-AP-0284-H

MS LEVEL SWITCH, 3-POSITION, PUMP ON / PUMP OFF / E-HIGH - MADISON M5920

LOW PRESSURE SERIES
PART NUMBERING SYSTEM

□ □ — □ □ — □ □ □ — □ □

SERIES TYPE

LP = Low Pressure Gauge,

MOUNTING STYLE

1 = Lower Mount
2 = Center Back Mount
3 = Back Connection, U-clamp Panel Mount
4 = Back Connection, Front Flange Panel Mount

CASE MATERIAL

BLANK = Chrome case Copper Alloy Internals
SB = Stainless Steel Case Copper Alloy Internals
SS = Stainless Steel Case 316 Stainless Internals
PS = Phenolic Case 316 Stainless Internals

CONNECTION

4 = ¼" NPT Male
2 = ½" NPT Male

DIAL SIZE

25 = 2 ½" Diameter
40 = 4" Diameter
45 = 4 ½" Diameter

RANGE

200V = 200/0" wc Vac
160V = 160/0" wc Vac
100V = 100/0" wc Vac
60V = 60/0" wc Vac
30V = 30/0" wc Vac
15V = 15/0" wc Vac
10-WC = 0/10" wc
15 = 0/15" wc
30 = 0/30" wc
60 = 0/60" wc
100 = 0/100" wc
160 = 0/160" wc
200 = 0/200" wc
10X17.5 = 0/10 oz & 0/17.5"wc
20X35 = 0/20 oz & 0/35" wc
35X60 = 0/35 oz & 0/60" wc
60X100 = 0/60 oz & 0/100" wc
100OZ = 0/100 oz
3PSI = 0/3 psi
5PSI = 0/5 psi
10PSI = 0/10 psi
15PSI = 0/15 psi
30-0-30 = 30/0/30" wc
10-0-10 = 10/0/10" wc

5

EXAMPLE: "LP1-SB-254-100"

LP = Low Pressure Gauge
1 = Lower Mount

SB = Stainless Steel Case, Copper Alloy Internals

25 = 2 ½" Diameter
4 = ¼" NPT Male

100 = 0/100" wc



NOTE: Not all part numbers or options are available from stock. Consult PIC Gauges for availability.

LOW PRESSURE SERIES
PART NUMBERING SYSTEM

□ □ — □ □ — □ □ □ — □ □

SERIES TYPE

LP = Low Pressure Gauge,

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45 = 4 ½" Diameter

RANGE

200V = 200/0" wc Vac
160V = 160/0" wc Vac
100V = 100/0" wc Vac
60V = 60/0" wc Vac
30V = 30/0" wc Vac
15V = 15/0" wc Vac
10-WC = 0/10" wc
15 = 0/15" wc
30 = 0/30" wc
60 = 0/60" wc
100 = 0/100" wc
160 = 0/160" wc
200 = 0/200" wc
10X17.5 = 0/10 oz & 0/17.5"wc
20X35 = 0/20 oz & 0/35" wc
35X60 = 0/35 oz & 0/60" wc
60X100 = 0/60 oz & 0/100" wc
100OZ = 0/100 oz
3PSI = 0/3 psi
5PSI = 0/5 psi
10PSI = 0/10 psi
15PSI = 0/15 psi
30-0-30 = 30/0/30" wc
10-0-10 = 10/0/10" wc

5

EXAMPLE: "LP1-SB-254-100"

LP = Low Pressure Gauge
1 = Lower Mount

SB = Stainless Steel Case, Copper Alloy Internals

25 = 2 ½" Diameter
4 = ¼" NPT Male

100 = 0/100" wc



NOTE: Not all part numbers or options are available from stock. Consult PIC Gauges for availability.

T30-0250-25C Cut Sheet

AUTOMATIONDIRECT.com
www.automationdirect.com



ProSense bi-metal dial thermometer, 3in diameter, 2 1/2in insertion length, 0 to 250 deg F/-18 to 120 deg C, 1/2in male NPT process connection, center back mount.

For complete product information, please see this item on our store at the following link:

https://www.automationdirect.com/pn/T30-0250-25C

Technical Specifications

Brand	ProSense
Item	Bi-metal dial thermometer
Diameter	3in
Insertion Length	2 1/2in
Scale	0 to 250 deg F/-18 to 120 deg C
Process Connection	1/2in male NPT
Mounting	Center back

Agency Approvals

UL Listed File #	None
UL Recognized File #	None
UL Hazardous File #	None
CE	None
CSA File #	None
RoHS Status	No
EU REACH	View EU REACH document

Dimensional Drawings

2D Drawing PDF Link:
https://cdn.automationdirect.com/static/drawings/T30-0250-25C.pdf
See store item page for other formats.

Dwyer

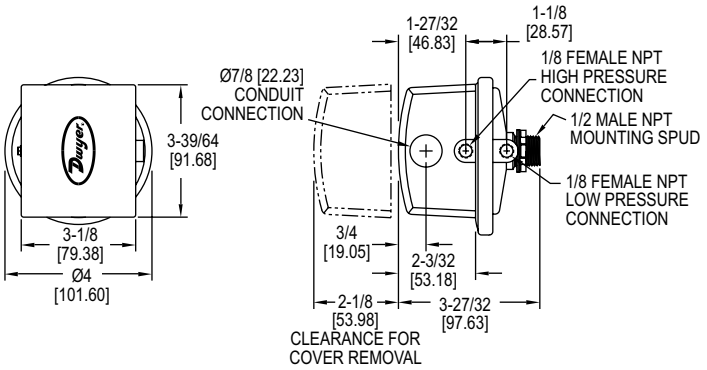
SERIES 1800

LOW DIFFERENTIAL PRESSURE SWITCH FOR GENERAL INDUSTRIAL SERVICE

Set Points from 0.07 in w.c. to 85 in w.c. Repetitive Accuracy within 2%







VIDEO ONLINE

Essential for industrial environments, the **Series 1800 Low Differential Pressure Switch for General Industrial Service** combines small size and low price with 2% repeatability for all but the most demanding applications. Set point adjustment inside the mounting stud permits mounting the switch on one side of a wall or panel with adjustment easily accessible on the opposite side. UL and CSA listed, and FM approved.

BENEFITS/FEATURES

- Compact size and repeatability provide a high-value switch useful in many industrial applications
- Designed for panel and wall mounting to easily meet mounting requirements in most industrial settings
- Pressure ranges from 0.07 in w.c. to 85 in w.c. make this switch suitable for a wide range of applications

APPLICATIONS

- Process applications
- Mechanical equipment control

SPECIFICATIONS

Service: Air and non-combustible, compatible gases.
Wetted Materials: Consult factory.
Temperature Limits: -30 to 180°F (-34 to 82.2°C); 1823-00: -20 to 180°F (-28.9 to 82.2°C).
Pressure Limits: 10 psig (68.95 kPa) continuous, 25 psig (172.4 kPa) surge.
Switch Type: Single-pole double-throw (SPDT).
Repeatability: ±2%.
Electrical Rating: 15 A @ 120-480 VAC, 60 Hz. Resistive 1/8 HP @125 VAC, 1/4 HP @ 250 VAC, 60 Hz. De-rate to 10 A for operation at high cycle rates.
Electrical Connections: 3 screw type, common, normally open and normally closed.
Process Connections: 1/8″ female NPT.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.
Set Point Adjustment: Screw type inside mounting spud.
Weight: 1 lb 5 oz (595 g).
Compliance: CE, CSA, FM, UL. Optional-EXPL explosion-proof enclosure does not possess any compliance.

MODEL CHART

Model	Operating Range, in w.c.	Approximate Deadband At Min. Set Point	Approximate Deadband At Max. Set Point
1823-00	0.07 to 0.22	0.05	0.05
1823-0	0.15 to 0.5	0.06	0.06
1823-1	0.3 to 1.0	0.08	0.08
1823-2	0.5 to 2.0	0.10	0.12
1823-5	1.5 to 5.0	0.14	0.28
1823-10	2.0 to10	0.18	0.45
1823-20	3 to 22	0.35	0.70
1823-40	5 to 44	0.56	1.10
1823-80	9 to 85	1.30	3.0

OPTIONS

Weatherproof Housing
16 ga. steel enclosure with gasketed cover (NEMA 4, IP66) for wet or oily conditions. Withstands 200 hour salt spray test. Wt. 5-1/2 lb (2.5 kg). Switch must be factory installed.
Note: To order, change 1823 base number to 1824 and add -WP suffix. **Example:** 1824-1-WP

Explosion-Proof Housing
Cast iron base with aluminum cover. Rated Class I, Div. 1 and 2, Group D; Class II, Div. 1 and 2, Groups E, F, G; Class III and NEMA 7 CD, 9 EFG. Wt. 7-1/2 lb (3.4kg). Switch must be factory installed.
Note: To order, change 1823 base number to 1824 and add -EXPL suffix. **Example:** 1824-1-EXPL

MIL Environmental Construction
Unlisted Model 1820 can be furnished with a special sealed snap switch for protection against high humidity, fungus and/or military applications. Similar to Model 1823 except deadband is slightly greater and some lower setpoints may not be possible.
Note: To order, add -MIL suffix. **Example:** 1820-2-MIL

ACCESSORIES

Model	Description
A-302F-A	303 SS static pressure tip with mounting flange; for 3/16″ ID rubber or plastic tubing; 4″ insertion depth; includes mounting screws
A-302F-B	303 SS static pressure tip with mounting flange; for 3/16″ rubber or plastic tubing; 6″ insertion depth; includes mounting screws
A-302F-C	303 SS static pressure tip with mounting flange; for 3/16″ rubber or plastic tubing; 8″ insertion depth; includes mounting screws
A-389	Mounting bracket; 16 ga. steel, zinc plated and dichromate dipped for corrosion resistance; provides rugged, permanent mounting and speeds installation
A-489	4″ straight static pressure tip with flange
A-491	6″ straight static pressure tip with flange
A-493	8″ straight static pressure tip with flange

Process Tubing Options: See page 453 (Gage Tubing Accessories)

TSDA25N-AP-0284-H Cut Sheet

AUTOMATIONDIRECT.com
www.automationdirect.com



ProSense temperature switch, integral Pt1000 RTD, -13 to 284 deg F, 50mm insertion length, 6mm probe diameter, 1/4in male NPT process connection, Output: switch PNP, N.O., Output 2: switch PNP, N.O.

For complete product information, please see this item on our store at the following link:

https://www.automationdirect.com/pn/TSDA25N-AP-0284-H

Technical Specifications

Brand	ProSense
Item	Temperature switch
Sensor Type	Integral Pt1000 RTD
Media Type	Liquid, water, oil, chemicals, gases and air
Temperature Sensing Range	-13 to 284 deg F
Setpoint Range	-4 to 284 deg F
Insertion Length	50mm
Probe Diameter	6mm

Process Connection	1/4in male NPT
Output	Switch PNP, N.O.
Output 2	Switch PNP, N.O.
Operating Voltage	9.6-32 VDC
Electrical Connection	4-pin M12 quick-disconnect
IP Rating	IP67
Additional Information	Cable purchased separately

Agency Approvals

UL Listed File #	E324411
UL Recognized File #	None
UL Hazardous File #	None
CE	View CE declarations
CSA File #	None
RoHS Status	Yes (See CE Doc)
EU REACH	View EU REACH document

Dimensional Drawings

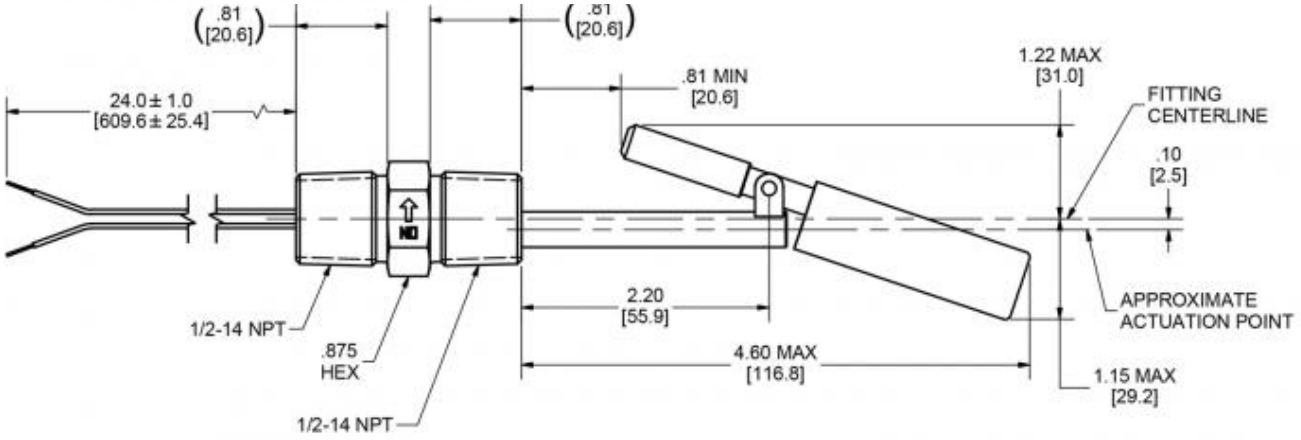
2D Drawing PDF Link:
https://cdn.automationdirect.com/static/drawings/TSDA25N-AP-0284-H.pdf
See store item page for other formats.

DATA SHEET

Side Mount, Stainless Steel

M5900 Series





Custom Configurations

Contact us directly for custom solutions.
Email: info@madisonco.com

Well-suited for corrosive environments, as well as food processing, medical, heating, and cooling applications. This series of stainless steel side-mounted float switches are among the most durable float switches in the industry.

Applicable Industries

- Food-grade fluid level control
- Hot water boilers and steam generator tanks
- Chemical tanks, fuel tanks and other hazardous locations

Features

- High-pressure and high-temperature industrial tank level control
- Available with extended stem lengths

Material

- Stem and Float: 316 Stainless Steel

Specifications

- Max. temperature: 392°F / 200°C
- Max. pressure: 300 psi
- Switch rating: 30 watt, SPST

Electrical Ratings

- 240V AC, 0.14A; 120V AC, 0.28A; 120V DC, 0.07A; 24V DC, 0.28A

Part Numbers	Mounting	Minimum Media SG	Lead Wires	Approvals
M5900 	1” x 1/2” NPT	0.75	24”, 22 AWG, Teflon Insulated (standard)	CE, UL Haz. Loc., CSA Haz. Loc., NSF
M5910 	1/2” x 1/4” NPT	0.75	24”, 22 AWG, Teflon Insulated (standard)	CE, UL Haz. Loc., CSA Haz. Loc., NSF
M5920 	1/2” x 1/2” NPT	0.75	24”, 22 AWG, Teflon Insulated (standard)	CE, UL Haz. Loc., CSA Haz. Loc., NSF

NOTE: Other fittings and voltages are available. Contact us to discuss your application.

Level Switch Electrical Considerations and Reed Switch Protection

When using Madison level switches, it is important to consider the application's electrical parameters. Our level switches utilize reed switch technology, which are glass encapsulated, magnetically actuated switches. Madison generally provides electrical ratings for resistive loads; however, where the maximum current of the load permits, the switches are capable of controlling devices such as motors, solenoids or coils that produce capacitive or inductive electrical loads. Where possible, Madison recommends the use of general-purpose/isolation relays or controllers to protect the switch.

Protect your level switch: Protection Techniques and Common Failure Modes

Reed Switch protection is the most successful method of increasing the performance and life of your level sensor. Since every application varies, it is important to understand your protection options. The life of the reed switch is typically 1 million cycles, within rated load conditions. The table below is a guide to suggested protection techniques and common failure modes associated with each load type.

Load	Load Example	Protection	Diagram	Common Failure Modes	Failure Mode Description
Resistive (DC)	Indicator Lamp, Heaters	Current Limiting Resistor	A	In-rush Current (Switching)	In-rush current exceeds rating and welds switch closed
				Over-Current (Carry)	Carry-current exceeds rating and switch welds or burns open like a fuse
Inductive & Capacitative (DC)	Relay Coil, Solenoids, Motor	Reversing Diode	B	Over-Voltage (Arcing)	Voltage arcing during switching welds contacts closed
Inductive & Capacitive (AC or DC)		Resistor & Capacitor Network	C		
Resistive, Inductive & Capacitive (AC or DC)	Indicator Lamp, Heaters, Relay Coil, Solenoids, Motor	Varistor or MOV	D	Over-Voltage (Arcing)	Transients voltage spikes exceed breakdown voltage and weld switch closed

Capacitive Load

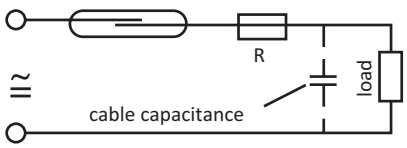


Diagram A: Current Limiting Resistor

Inductive Load

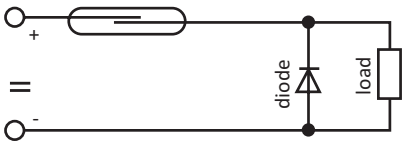


Diagram B: Reversing Diode

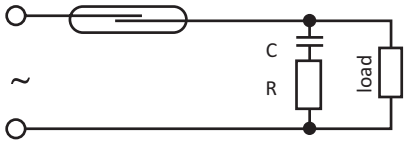


Diagram C: RC Network

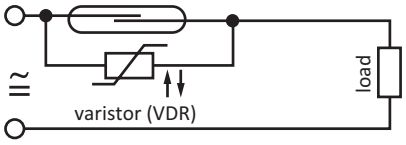


Diagram D: Varistor or MOV

For DC circuits: Insert a 1N4004 diode across the load (i.e.: relay coil) with the cathode end (marked with circular line) connected toward the positive side. This way the diode conducts only when the field collapses. General rule is to use a diode with a voltage rating at least three times the circuit voltage. A 1N4004 has a rating of 1 amp continuous, 30 amp surge, 400V max. Refer to diagram B.

For typical 120V AC circuits: Insert a 50 to 100 ohm, 1/2 watt Resistor in series with a .1 micro farad 400 to 600 volt capacitor across the switch. The capacitor is a high impedance to 60 hertz, but is essentially a short circuit to high frequencies of generated voltages. Alternately, a varistor V130LA10A by itself across the switch will also work for 120V AC. Refer to diagram D.

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Made In The USA

Not responsible for any typographic errors. Specifications are subject to change without notice. MAC_042_C 012023

SECTION 6 - POWER & CONTROL PANEL EQUIPMENT

SENTINEL TELEMETRY SYSTEM w/ 4G VERIZON MODEM - SENSAPHONE SCD-1200-4GVZ

WIRELESS MODEM ANTENNA, 3G / 4G / LTE, 16 FT CABLE - SENSAPHONE / PANORAMA B4BE-6-60-5SP

ENCLOSURE NEMA 3R, 30 X 30 X 10 - MILD STEEL / GRAY - SAGINAW SCE-30EL3010LP

60 AMP FUSIBLE ROTARY DISCONNECT SWITCH, CLASS J, 3-POLE, 600 VAC, 200KA SCCR - SOCOMEC 38613005

MOTOR CONTROL PROTECTOR, 28-40 AMP, ADJUSTABLE - ADI HMMP-63HR-40

CONTACTOR,50 AMP, 120 VAC COIL - ADI HMC-50A30-22-AL

POWER SUPPLY, 24VDC, 3.8A, 91W DIN MOUNT, CLASS 2 - ADI RHINO PSV24-100S

P1000 PLC, CPU 50MB MEMORY WITH MICRO SD CARD SLOT - ADI P1-540

P1000 PLC, 16PT 12-24VDC INPUT SINK/SOURCE - ADI P1-16ND3

P1000 PLC, 16PT RELAY OUTPUT SPST 6-27VDC / 6-240VAC - ADI P1-16TR

E-STOP MUSHROOM PUSHBUTTON, RED TRIGGER ACTION - TURN TO RELEASE - ADI GCX1131

TABLE 2

INTERLOCK SCHEDULE
NES 25-103N, REVISION A (MAY 23, 2025) BY: EMB
TENEN - S&C PROPERTIES - SVE SYSTEM 35-45 35th ST ASTORIA-QUEENS, NY

Interlock	Interlock ID	Interlock Description	B-101, SVE Blower	OPERATOR INTERFACE	Alarm Notification (Local Panel Display)	Manual Reset	Control Panel Reset (Warning / Alarm)	Sentinel Remote Telemetry Notification	Sentinel Remote Telemetry Alarm Log	Sentinel Remote Telemetry Data	INSTRUMENT TYPE	TIME DELAY	NES FACTORY SET POINT(S)
		Emergency Stop	O		Y	Y		CH 6	Y		D		
1		No alarms present	I										
2	VSL-101	SVE Blower (B-101) Influent Vacuum Switch Low	O		Y		Y	CH 1	Y		D	15 Sec	10 in WC
3	LSHH-101	Moisture Separator (T-101) Level Switch High-High	O		Y		Y	CH 2	Y		D		
4	TSH-101	SVE Blower (B-101) High Discharge Temperature	O		Y		Y	CH 3	Y		D		135 F
5	O/L-FLT	SVE Blower (B-101) Motor Overload	O		Y		Y	CH 4	Y		D		
6	THER-FLT	SVE Blower (B-101) Thermal Overload	O		Y		Y	CH 5	Y		D		
7	PWR-FLT	Main Electrical Power Fault	O					AD	Y		AD		
8	PWR	Main Electrical Power Restored						AD	Y		AD		

Note:

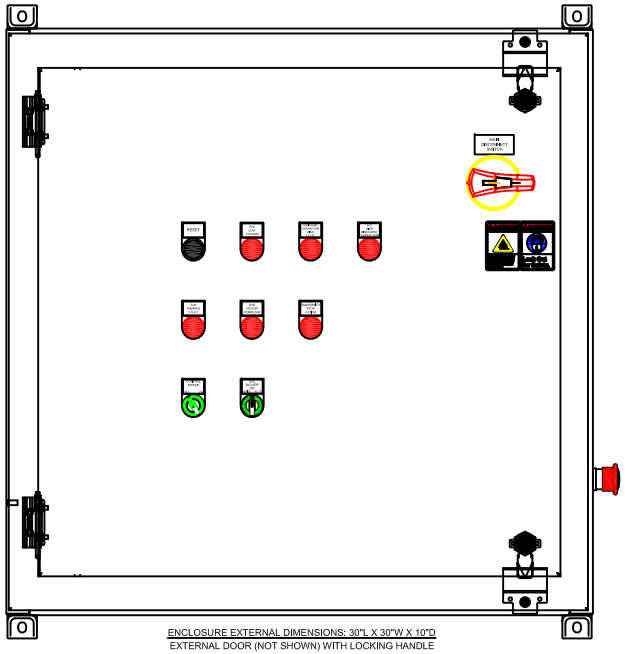
O - Off
I - On

Y - Yes

A - Analog
D - Digital
L - Logic
AD - Autodialer Internal Alarm

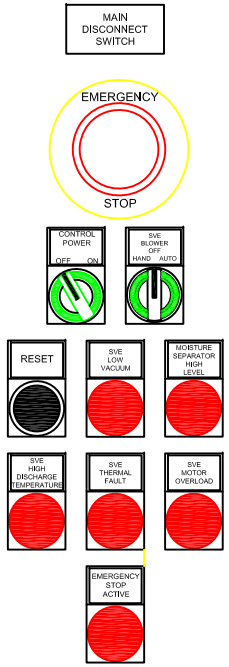
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SWING PANEL

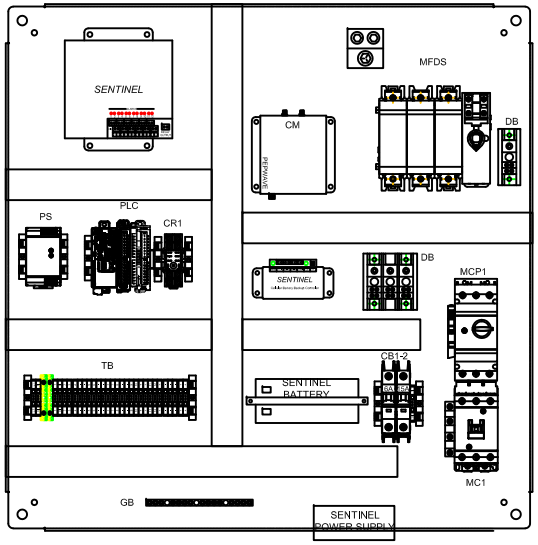


ENCLOSURE EXTERNAL DIMENSIONS: 30"L X 30"W X 10"D
EXTERNAL DOOR (NOT SHOWN) WITH LOCKING HANDLE

OPERATOR DETAILS



PANEL INTERIOR



LEGEND	
ABBREV.	DESCRIPTION
CB	- CIRCUIT BREAKER
CM	- CELLULAR MODEM
CR	- CONTROL RELAY
DB	- DISTRIBUTION BLOCK
GB / GL	- GROUND BAR / GROUND LUG
MCP / M	- MOTOR PROTECTOR / STARTER
MFDS	- MAIN FUSED DISCONNECT SWITCH
PLC	- PROGRAMMABLE LOGIC CONTROLLER
PS	- POWER SUPPLY
TB	- TERMINAL BLOCK

NOTES:
1) REFER TO TABLE 3 FOR BILL OF MATERIALS.
2) CONTROL PANEL IS UL 508A LISTED.
3) GROUND IN ACCORDANCE WITH N.E.C. ARTICLE 250.122 & LOCAL AUTHORITY HAVING JURISDICTION.

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	AS BUILT	05-23-25	EMB

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508-230-9445 (Phone) / WWW.AIRENERGY.COM

DRWN BY	KWB
DATE	03-17-25
CHK BY	
DATE	
APPR BY	
DATE	

TITLE: PANEL INTERIOR / EXTERIOR LAYOUT

TENEN - S&C PROPERTIES / SVE SYSTEM
35-45 35th ST ASTORIA-QUEENS, NY

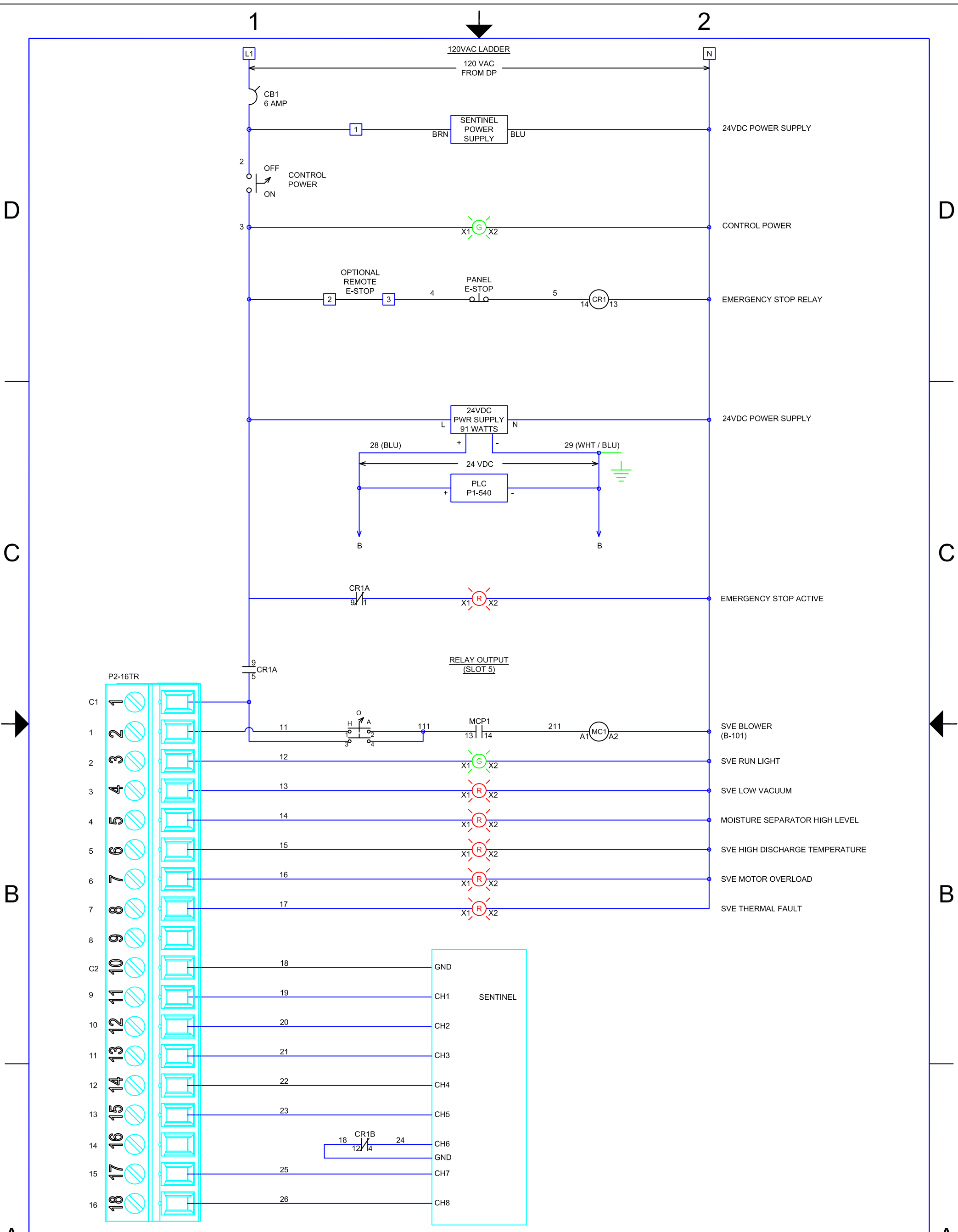
JOB NO.	SCALE	SIZE	DWG NO.	SHEET	REV
25-103N	NTS	C	I-1	1 OF 1	A

TABLE 3
ELECTRICAL BILL OF MATERIALS

REV A MAY 23, 2025

25-103N TENEN / S&C PROPERTIES - SVE SYSTEM 35-45 35th ST ASTORIA-QUEENS, NY

TAG	QUANTITY	ITEM	MODEL	MANUFACTURER
TELEMETRY	1	SENTINEL TELEMETRY SYSTEM w/ 4G VERIZON MODEM	SCD-1200-4GVZ	SENSAPHONE
TELEMETRY	1	WIRELESS MODEM ANTENNA, 3G / 4G / LTE, 16 FT CABLE	B4BE-6-60-5SP	SENSAPHONE / PANORAMA
ENCL	1	ENCLOSURE NEMA 3R, 30 X 30 X 10 - MILD STEEL / GRAY	SCE-30EL3010LP	SAGINAW
ENCL	1	BACK-PANEL 30 X 30 MILD STEEL/WHT	SCE-30P30	SAGINAW
ENCL	1	SWING-PANEL 30 X 30 - MILD STEEL / GRAY	SCE-DF30EL30LP	SAGINAW
ENCL	1	MOUNTING FEET SET OF 4 - ZINC PLATED	SCE-ELMFK4	SAGINAW
ENCL	2	PANEL WING-KNOB PAD-LOCKING HANDLE BLACK	SCE-PLWKB	SAGINAW
MDS	1	60 AMP FUSIBLE ROTARY DISCONNECT SWITCH, CLASS J, 3-POLE, 600 VAC, 200KA SCCR	38613005	SOCOMEC
F	3	CLASS J T/D FUSES 60 AMPS, 600V	JTD060	LITTELFUSE
MDS	1	MDS SHAFT, 320MM LENGTH, 10 X 10MM	14001032	SOCOMEC
MDS	1	MDS HANDLE, ROUND S0 TYPE, RED/YELLOW, 2-POS., LOCKABLE IN OFF, DEFEATABLE	141E2111	SOCOMEC
DB	1	POWER DISTRIBUTION BLOCK 175 AMP 3-POLE	PB1043	ADI - EDISON
DB	1	POWER DISTRIBUTION BLOCK COVER, 3-POLE	PBC23	ADI - EDISON
DB	1	POWER DISTRIBUTION BLOCK 175 AMP 1-POLE 600 VAC	PB1041	ADI - EDISON
DB	1	DISTRIBUTION BLOCK COVER 1-POLE	PBC21	ADI - EDISON
MCP	1	MOTOR CONTROL PROTECTOR, 28-40 AMP, ADJUSTABLE	HMMP-63HR-40	ADI
MCP	1	HMMP-63H ALARM CONTACT - LEFT	HPX2-ALM11-S	ADI
MCP	1	AUXILIARY CONTACT, [1] N.O. / [1] N.C. CONTACT, 6A @ 120 VAC/0.55A @ 120 VDC	HPX1-AUX11-F	ADI
M	1	HMMP-63H MOUNTING PLATE	HPX2-MBPT	ADI
M	1	CONTACTOR,50 AMP, 120 VAC COIL	HMC-50A30-22-AL	ADI
M	1	LINK MODULE HMMP-32H MANUAL MOTOR PROTECTOR TO HMC-9 - 22 CONTACTOR	HMX3-LM63-AC	ADI
CB	1	HEAT TRACE 15 AMP CIRCUIT BREAKER, 1-POLE, 277VAC	FAZ-D15-1-NA-SP	EATON
CB	1	CONTROL POWER 6 AMP CIRCUIT BREAKER, 1-POLE, 240VAC	FAZ-B6-1-NA-L-SP	EATON
PS	1	POWER SUPPLY, 24VDC, 3.8A, 91W DIN MOUNT, CLASS 2	PSV24-100S	ADI RHINO
PLC	1	P1000 PLC, CPU 50MB MEMORY WITH MICRO SD CARD SLOT	P1-540	ADI
PLC	1	P1000 PLC, 16PT 12-24VDC INPUT SINK/SOURCE	P1-16ND3	ADI
PLC	1	P1000 PLC, 16PT RELAY OUTPUT SPST 6-27VDC / 6-240VAC	P1-16TR	ADI
PLC	2	P1000 PLC, TERMINAL BLOCK FOR ALL 8 & 16 POINT I/O MODULES	P2-RTB	ADI
CR	1	RELAY DPDT 120VAC W/INDICATOR LIGHT	RH2B-UL-AC120V	IDEC
CR	1	SOCKET DIN RAIL/SURFACE 8-BLADE FOR RH2B FINGER SAFE	SH2B-05C	IDEC
SW	1	CONTROL POWER 2 POS SELECTOR SWITCH ILLUM. GREEN MAINTAINED	AR22-PL-210L3GZA	ADI-FUJI
SW	1	H/O/A 3 POS SELECTOR SWITCH ILLUM. GREEN SPRING RETURN	AR22-PL-611L3GZA	ADI-FUJI
PB	1	RESET PUSH BUTTON OPERATOR NON-ILLUM BLACK	GCX1100	ADI
ESTOP	1	E-STOP MUSHROOM PUSHBUTTON, RED TRIGGER ACTION - TURN TO RELEASE	GCX1131	ADI
ESTOP	1	E-STOP LEGEND PLATE	ECX1651	ADI
LT	6	ALARM PILOT LIGHT HEAD RED LED	GCX1231-120L	ADI
TB	9	TERMINAL BLOCK END ANCHORS	DN-EB35	ADI
TB	5	TERMINAL BLOCK END BARRIERS GRAY	DN-EC1210	ADI
TB	31	TERMINAL BLOCK SCREW CLAMP 30 AMP 600 V GRAY	DN-T10-A	ADI
TB	2	TERMINAL BLOCK GROUND SCREW CLAMP 600 V GREEN	DN-G8	ADI
GB	1	LOAD CENTER GROUND BAR 17 OPENINGS 15 CIRCUITS	NA-413-1	ADI - PENN UNION
GL	1	GROUNDING LUG TERMINAL, ALUMINUM, 2-HOLE, 6AWG	2-0T	NSI



REV	DESCRIPTION	DATE	APPROVED
A	AS BUILT	05-23-25	EMB

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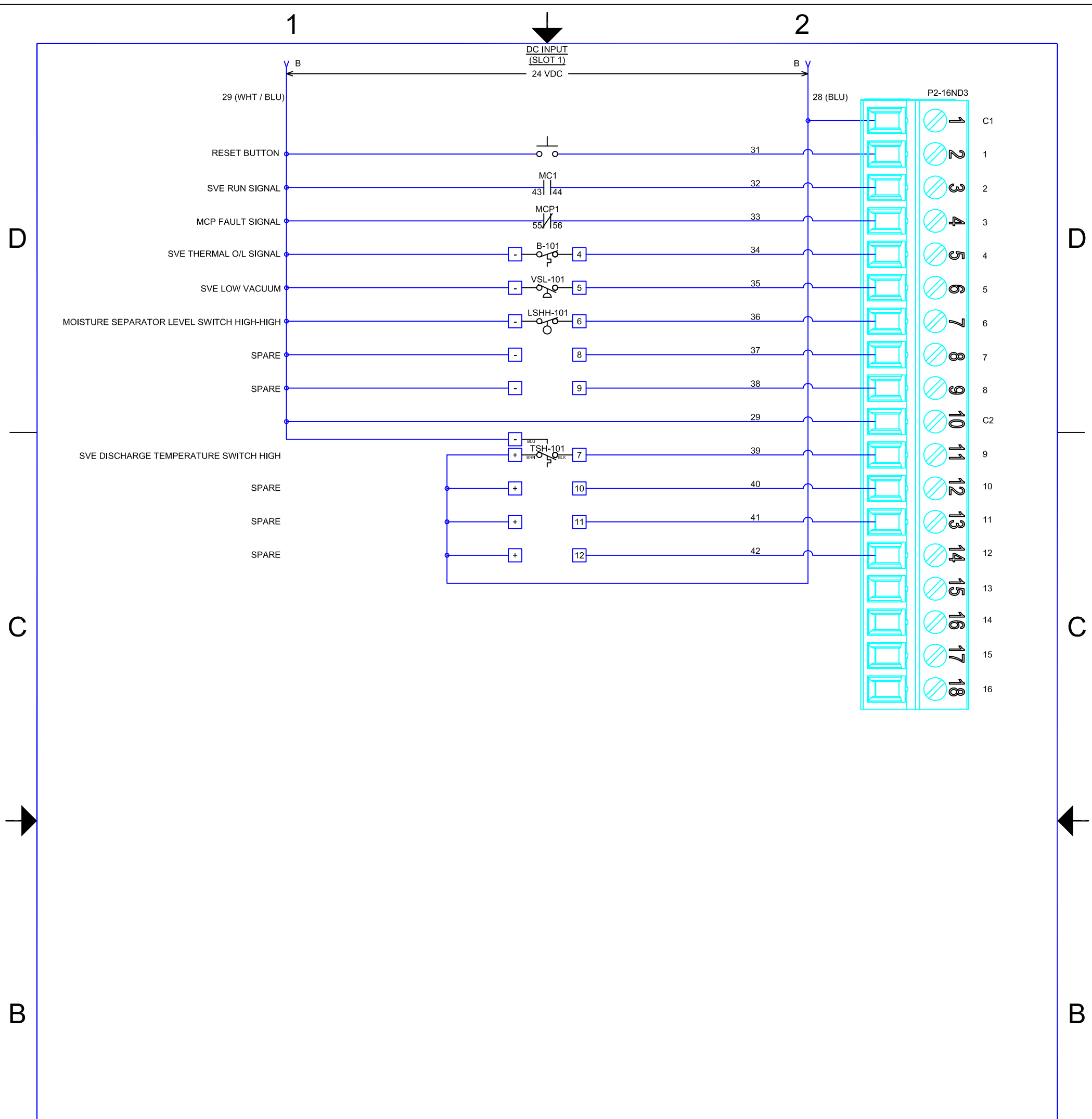
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DATE	
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DATE	

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TITLE
WIRING DIAGRAM

TENEN - S&C PROPERTIES / SVE SYSTEM
35-45 35th ST ASTORIA-QUEENS, NY

JOB NO.	SCALE	SIZE	DWG NO.	SHEET	REV
25-103N	NTS	B	I-2	1 OF 4	A



REV	DESCRIPTION	DATE	APPROVED
A	AS BUILT	05-23-25	EMB

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TITLE
WIRING DIAGRAM

TENEN - S&C PROPERTIES / SVE SYSTEM
35-45 35th ST ASTORIA-QUEENS, NY

JOB NO. 25-103N

SCALE	SIZE	DWG NO.	SHEET	REV
NTS	B	I-2	2 OF 4	A

FIELD WIRING DIAGRAM

RELAY OUTPUT

NC

C

SENTINEL

AUTODIALER

CH 8	22	PLC CH16 16 C2	SPARE
CH 7	21	PLC CH15 15 C2	SPARE
CH 6	63	CR1B 4 12	EMERGENCY STOP ACTIVE
CH 5	62	PLC CH13 13 C2	SVE THERMAL FAULT
CH 4	61	PLC CH12 12 C2	SVE MOTOR OVERLOAD
CH 3	52	PLC CH11 11 C2	SVE HIGH DISCHARGE TEMPERATURE
CH 2	51	PLC CH10 10 C2	MOISTURE SEPARATOR HIGH LEVEL
CH 1	20	PLC CH9 9 C2	SVE LOW VACUUM
G			

ALL (G) POINT ON UNIT CONNECTED INTERNALLY

POWER

ETHERNET JACK

TO ANTENNA

WIRELESS MODEM

CHARGE CONTROLLER

120V POWER SUPPLY

BATTERY BACK-UP

REV	DESCRIPTION	DATE	APPROVED
A	AS BUILT	05-23-25	EMB

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DRWN BY EMB DATE 04-08-25

CHK BY DATE

APPR BY DATE

AIR ENERGY GROUP, LLC
105 INDUSTRIAL BLVD / BROCKTON, MA 02301
508-230-9445 (Phone) / WWW.AIRENERGY.COM

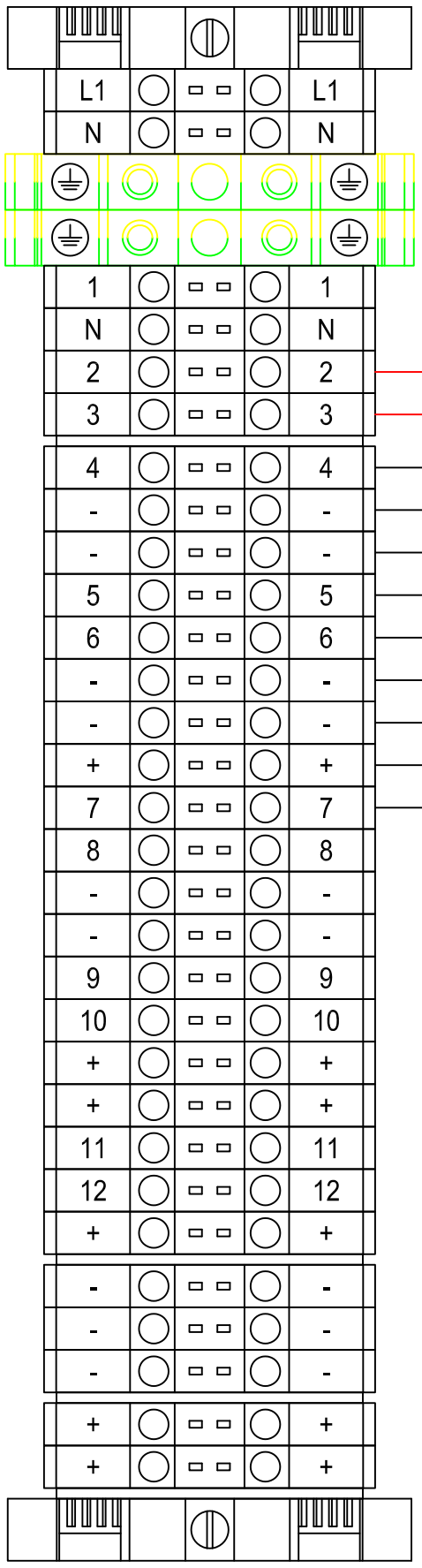
TITLE: WIRING DIAGRAM

TENEN - S&C PROPERTIES / SVE SYSTEM
35-45 35th ST ASTORIA-QUEENS, NY

JOB NO. 25-103N

SCALE	SIZE	DWG NO.	SHEET	REV
NTS	B	I-2	3 OF 4	A

FIELD TERMINAL WIRING



OPTIONAL REMOTE EMERGENCY STOP

SVE BLOWER MOTOR THERMISTER (N.C.)

SVE VACUUM SWITCH LOW (N.O.)
(VSL-101)

MOISTURE SEPARATOR LEVEL SWITCH HIGH-HIGH (N.C.)
(LSHH-101)

BLU

BRN SVE DISCHARGE TEMPERATURE SWITCH HIGH (N.O.)
(TSH-101)

BLK

REV	DESCRIPTION	DATE	APPROVED
A	AS BUILT	05-23-25	EMB

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SCALE	SIZE	DWG NO.	SHEET	REV
NTS	B	I-2	4 OF 4	A

TABLE 4
208 3 PHASE

ELECTRICAL LOAD CALCULATION COMMERCIAL BUILDING 208 V, 3 PHASE
2023 NATIONAL ELECTRICAL CODE

Customer:	TENEN / S&C PROPERTIES	Serial #	25-103N
Project:	SVE - Astoria/Queens NY	Revision A	5/23/2025

A. Lighting Loads

1. Interior continuous lighting load

	sq. ft. x		VA/sq. ft.	x 125%=	0	VA

Interior noncontinuous lighting load

	sq. ft x	3	VA/sq. ft =	0	VA

Use actual lighting load if greater

	VA actual continuous x 125% =	0	VA
	VA actual noncontinuous =	0	VA

2. Exterior lighting load

	VA x		fixtures x	125%=	0	VA

B. Receptacle Loads

1. Noncontinuous duty:

	Number of receptacles x 180 VA=	0	VA

2. Continuous Duty

	Number of receptacles x 180 VA x 125%	0	VA

C. Heating, A/C and Motor loads

1. Larger of heating or A/C load. If 3 phase, first multiply 1.732

125	VA	x	125%=	156.25	VA	

Continuous motor loads

	Total VA x 125%=	0	VA
	Noncontinuous motor load VA=	0	VA

For 3 phase motors:

Continuous motor loads

6697.6	Total VA x 1.732 x 125%=	14500	VA

Noncontinuous motor loads

	Total VA x 1.732=	0	VA

D. Largest Motor Load

1. Largest motor load from C above x 25 %. If 3 phase, first multiply by 1.732

11600.24	VA x 25%	2900.061	VA

E. Additional Loads

1. Nameplate VA ratings for additional continuous loads. If 3 phase, first multiply by 1.732

720	Total VA x 125% =	900	VA

2. Nameplate VA rating for additional noncontinuous loads. If 3 phase, first multiply by 1.732

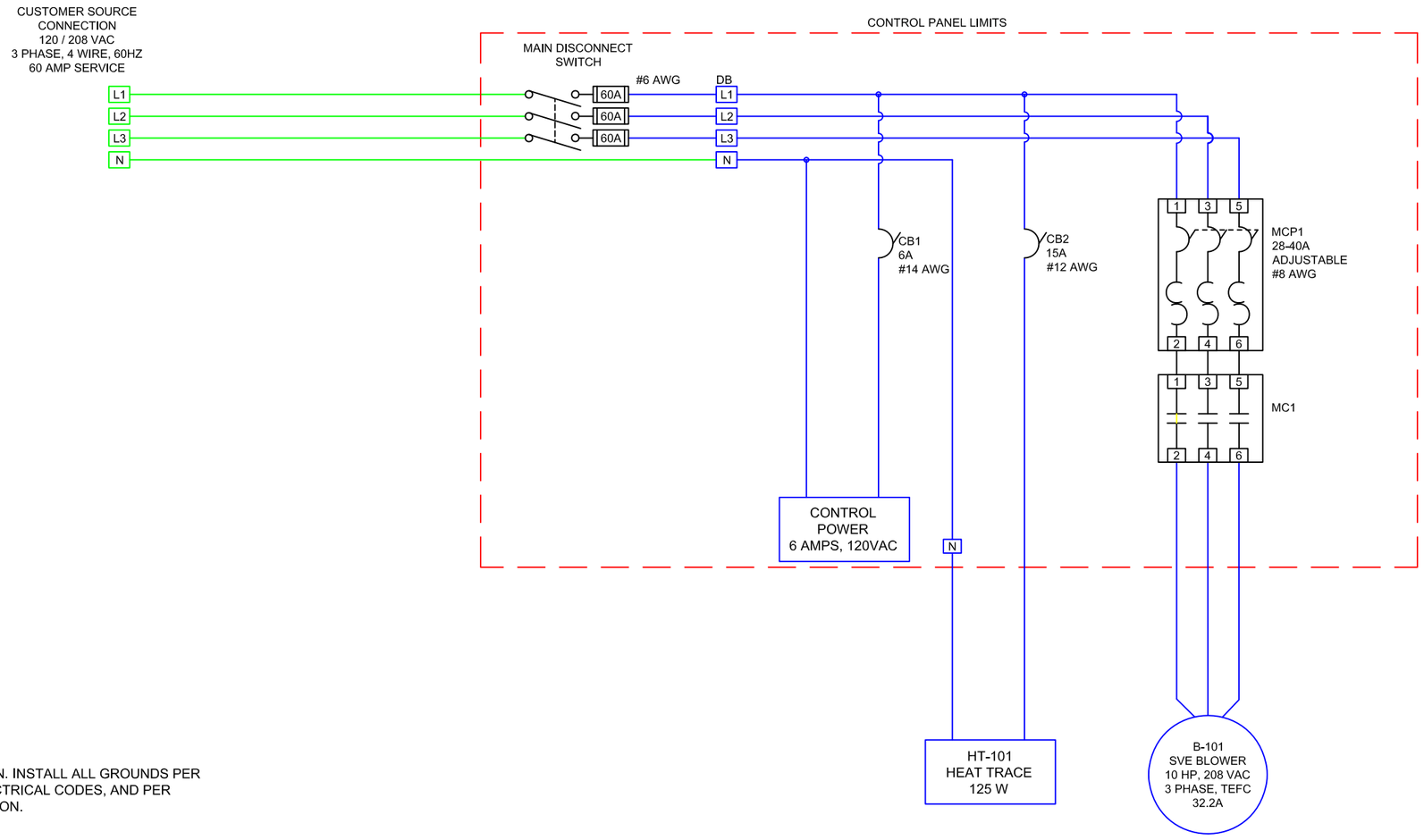
	Total VA=	0	VA

Total VA =	18456.61	VA
Total amps =	51	A

Electrical Service Connection **60** amps is suitable

A continuous load is a load where maximum current is expected to continue for 3 or more hours

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NOTES:
1. CONTROL PANEL UL 508A LISTED.
2. GROUND CONDUCTORS NOT SHOWN. INSTALL ALL GROUNDS PER NEC ARTICLES 250.122 , LOCAL ELECTRICAL CODES, AND PER THE AUTHORITY HAVING JURISDICTION.

LEGEND	
ABBREV.	DESCRIPTION
AWG	AMERICAN WIRE GAUGE
CB	CIRCUIT BREAKER
CR	CONTROL RELAY
DB	DISTRIBUTION BLOCK
MCP	MOTOR CONTROL PROTECTOR
MC	MOTOR CONTACTOR
———	CUSTOMER CONNECTIONS
- - - -	CONTROL PANEL LIMIT

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	AS BUILT	05-23-25	EMB

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KWB	03-14-25
CHK BY	DATE
APPR BY	DATE

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TITLE
LINE DIAGRAM

TENEN - S&C PROPERTIES / SVE SYSTEM
35-45 35th ST ASTORIA-QUEENS, NY

JOB NO. 25-103N

SCALE	SIZE	DWG NO.	SHEET	REV
NTS	B	E-1	1 OF 1	A

SECTION 6 - POWER & CONTROL PANEL EQUIPMENT

SENTINEL TELEMETRY SYSTEM w/ 4G VERIZON MODEM - SENSAPHONE SCD-1200-4GVZ

WIRELESS MODEM ANTENNA, 3G / 4G / LTE, 16 FT CABLE - SENSAPHONE / PANORAMA B4BE-6-60-5SP

ENCLOSURE NEMA 3R, 30 X 30 X 10 - MILD STEEL / GRAY - SAGINAW SCE-30EL3010LP

60 AMP FUSIBLE ROTARY DISCONNECT SWITCH, CLASS J, 3-POLE, 600 VAC, 200KA SCCR - SOCOMEC 38613005

MOTOR CONTROL PROTECTOR, 28-40 AMP, ADJUSTABLE - ADI HMMP-63HR-40

CONTACTOR,50 AMP, 120 VAC COIL - ADI HMC-50A30-22-AL

POWER SUPPLY, 24VDC, 3.8A, 91W DIN MOUNT, CLASS 2 - ADI RHINO PSV24-100S

P1000 PLC, CPU 50MB MEMORY WITH MICRO SD CARD SLOT - ADI P1-540

P1000 PLC, 16PT 12-24VDC INPUT SINK/SOURCE - ADI P1-16NDE

P1000 PLC, 16PT RELAY OUTPUT SPST 6-27VDC / 6-240VAC - ADI P1-16TR

P1000 PLC, TERMINAL BLOCK FOR ALL 8 & 16 POINT I/O MODULES - ADI P2-RTB

E-STOP MUSHROOM PUSHBUTTON, RED TRIGGER ACTION - TURN TO RELEASE - ADI GCX1131

SENSAPHONE®
REMOTE MONITORING SOLUTIONS



Sensaphone Sentinel with Cellular Modem
Technical Specifications

ALARM NOTIFICATION METHODS:

E-Mail, Text Messages, Voice Phone Calls

Programmable alarm escalation levels

Comprehensive scheduling per input, profile, and alarm destination

Unlimited number of User Profiles

Multiple contact types per user

INPUTS:

12 Universal Inputs

- Normally Open / Normally Closed Dry Contact
- 2.8K / 10K Thermistor
- 4-20mA Current Loop
- Pulse Count
- 12 Bit Resolution

TEMPERATURE SENSING RANGE:

-109° to 168°F | -85° to 76°C

RELAY OUTPUT:

Programmable. Rated for 1A 30VAC/ 1A 30VDC

DATA LOGGING:

Unlimited samples securely stored on the Sentinel servers

Programmable sampling Interval - 1 min to 24 hrs

User programmable channel selection

CELLULAR COMMUNICATION:

4G Cellular Modem for use on Verizon, AT&T or Rogers

BATTERY BACKUP:

4.8V 2000mAHr NiMh Battery pack (included)

12V 3000 mAHR SLA Battery (included)

Provides 8 hours of backup

LOCAL INDICATORS:

12 Alarm Status LEDs

- Power LED • Online LED
- Standby LED • Ethernet link and Activity LEDs

POWER REQUIREMENTS:

Power Requirement: 12-24DC

- Comes with 12VDC plug-in power supply
- International power options available

Current Draw: 300mA at 24VDC

ENVIRONMENTAL:

Operating Humidity:
0-90% RH, non–condensing

Operating Temperature:
32° to 122°F | 0° to 50°C

PHYSICAL:

Dimensions:
12.5 x 12.2 x 7.0” | 318 x 310 x 178mm

Weight: 10.5 lbs. | 4.7 kg

STANDARDS:

FCC Part 15 – Class A Compliant

ENCLOSURE:

NEMA-4X rated plastic housing

Continued on back

ANTENNA:

4G Frequencies: 698-960/1710-2700MHz

Peak gain: 5dBi

Pattern: Omni-directional

Height: 6.45” (164mm)

Diameter: 1.90” (48mm)

IP Rating: IP-66

ENGINEERING SPECIFICATIONS
SENSAPHONE® SENTINEL CELLULAR
SCD-1200-4GXXCD/SD

I. GENERAL

The Sensaphone Sentinel Cellular shall be a self-contained microprocessor controlled environmental monitoring system capable of monitoring up to 12 alarm channels (zones). The system shall be configured for operation by the user by means of the Sensaphone.net website and/or the Sensaphone mobile App for Android and IOS. Characteristics of the Input and Output Zones include 12 Universal Inputs and 1 Relay Output. Upon detection of any alarm or status change, the system shall commence the alarm notification process which includes dialing telephone numbers from a list associated with the particular alarm condition(s), and delivering a voice message identifying and describing the alarm condition(s) as well as sending text messages, and email notifications describing details of the alarm and its location. The system shall contain two rechargeable battery systems to maintain full operation of the device for up to 8 hours in the event of a power failure. The system shall contain a 4G/LTE cellular modem with options for either AT&T, Verizon, or Rogers cellular service for connection to the Sensaphone.net server system. The system shall utilize encrypted data transmission for secure communications. The system shall comply with Part 15 of the FCC rules for radiated and conducted emissions as well as the Canadian Interference Standard (ICES-003) for information technology equipment (ITE). The system shall have a two year warranty from the manufacturer. The system shall be a Sensaphone® Sentinel SCD-1200-4GxxCD/SD by Phonetics, Inc. dba Sensaphone.

* A cellular subscription plan through Sensaphone is required for operation.

II. I/O CHANNEL ATTRIBUTES AND FEATURES

A. Inputs

The system shall come standard with 12 universal input channels. All input channels shall be user-configurable as:

1. NO or NC digital dry contact, using internal 3.3V source voltage
2. Temperature from thermistor, using 2.8K or 10K devices
3. 4–20mA analog, using custom look-up table
4. NO or NC Pulse Count with configurable multiplier
5. NO or NC Run-Time Accumulator

The system shall have the following additional monitoring features:

1. Built-in AC power failure detection
2. Low battery detection
3. Device Offline detection

All monitored channels, including built-in monitoring features, shall allow configurable programming of pertinent operational data including, but not limited to:

1. Zone Name
2. Zone Type (NO/NC, 2.8K/10K thermistor, 4-20mA, pulse count, run-time accumulator)
3. Zone Calibration
4. High and Low Alarm Limits (-2,000,000 to 2,000,000)
5. Alarm Recognition Time (0 seconds to 8 hours)

6. Alarm Hold Time (1 second to 60 minutes)

7. Alarm Reset Time (1 minute to 8 hours)

8. Alarm on Return-to-Normal

9. Alarm Delivery Contact List (Phone numbers, text numbers, email addresses, etc…) for each zone

10. Alarm Delivery Enable/Disable for each channel to send notifications for alarms

11. Zone Enable/Disable

B. Output

The system shall have one built-in SPST 1A 30VDC/VAC relay output. The output may be programmed to switch either manually (via the website or App) or automatically using one of the following modes:

(a) Activate or Deactivate as soon as one or more selected zones exceeds the alarm limits (regardless of recognition time). Reverts when the alarm condition no longer exists.

(b) Activate or Deactivate when one or more selected zones becomes an alarm (recognition time enforced). Reverts when the alarm condition no longer exists.

(c) Activate or Deactivate while one or more selected zones has an unacknowledged alarm. Reverts once the alarm is acknowledged.

(d) Activate when a selected zone is either greater than, less than, or equal to a user configurable value and Deactivate when a selected zone is either greater than, less than, or equal to a user configurable value.

III. CELLULAR COMMUNICATIONS

The System shall contain a battery-backed 4G/LTE cellular modem with an external antenna for communication to the Sensaphone.net server system. The system shall be configured to operate with either AT&T, Verizon, or Rogers cellular service at the time of order. The System shall require a continuous cellular connection in order to operate. In areas with a poor cellular signal an optional high gain antenna shall be available. The System shall require a cellular subscription plan with Sensaphone to operate. LED indicators on the Sentinel shall be provided to indicate when the unit is online with the Sensaphone.net server system.

IV. PROGRAMMING

The System shall be fully programmable through the Sensaphone.net website. A mobile App for Android and IOS shall be provided to permit live system status as well as limited programmability.

V. ALARM NOTIFICATION

The system shall send alarm notification messages via email, text message and/or voice telephone call with a paid cellular subscription. Alarm messages will be delivered in English. Alarm messages sent via telephone shall be delivered in digitized human voice using text-to-speech technology. The system will continue to call telephone numbers and send text and email messages in succession until a positive acknowledgment of the alarm message is received. Acknowledgment is accomplished by entering a numeric code from the called telephone, or by replying to a text or email message, or by logging-in to the website or App and requesting acknowledgement. The alarm may also be acknowledged by pressing the 'Acknowledge' button on the Sentinel device itself. The system will call each programmed telephone number up to 4 times. Once the alarm is acknowledged the system shall halt the dialing process. The system shall allow for an unlimited number of users with an unlimited number of contact methods per user. The system shall allow for tiered alarm delivery schedules so that a time delay may be inserted between tiers.

VI. DEVICE SUPERVISION

The Sentinel device(s) shall be supervised by the Sensaphone.net server system. If a device stops communicating with the server for a specified period of time the system will notify selected users of the problem. When the device resumes communication with the server an optional 'return-to-normal' message will be sent.

VII. DATA LOGS

The system shall allow monitored zone values to be periodically stored in system memory at a programmable interval from 1 minute to 24 hours. Stored values shall be uploaded to the Sensaphone.net server system on a periodic basis (approximately once per hour) for permanent storage. Users shall have the capability of querying logged data values from the Sensaphone.net website and downloading the displayed data. The device shall be capable of storing up to 130,000 data points (or up to 6.5 days logging all zones at the minimum interval) in internal memory.

Premium Ethernet subscribers shall have unlimited access to logged data on the Sensaphone.net server system. Non-subscribers shall be limited to 30 days of historical data.

VIII. ALARM HISTORY LOGS

The Sensaphone.net server system shall maintain a log of all alarm events. The system shall also maintain a log of all alarm notifications including the users name, type of delivery (email, phone, text), and telephone number/email address.

IX. SYSTEM FEATURES

A. Power

The system shall be provided with a UL/CSA listed 12VDC power transformer with USA style blades that the user may plug into a 100-240VAC outlet, 50/60HZ. The system shall monitor for the presence of primary 12VDC power and shall be capable of generating an alarm if main power should fail. The system shall also contain a power management controller to distribute power to the Sentinel, modem, and battery backup system. The controller shall maintain the proper charge level to the modem backup battery.

B. Battery Backup

The system shall have two rechargeable battery systems. A nickel-metal-hydride battery pack shall be included within the Sentinel metallic enclosure. This battery shall provide up to 8 hours of continuous operation of the Sentinel in the absence of AC power. (Actual battery backup performance is dependent upon the age of the battery, the ambient temperature, and the charge condition). The Sentinel shall also contain a long-life lithium battery (type CR2) to maintain the system clock, as well as certain dynamic zone values such as pulse count, runtime, and min/max values. The lithium battery shall last 4 years or more depending on use. A 12V 3AH SLA rechargeable battery shall be included to provide backup power to the cellular modem. The 12V SLA battery shall provide up to 8 hours of continuous operation of the modem in the absence of AC power. (Actual battery backup performance is dependent upon the age of the battery, the ambient temperature, and the charge condition).

C. Visual Indicators

Each zone input shall have a corresponding LED that will indicate the alarm and acknowledgment status of each zone. The system shall also have a 'Power' led to indicate if the device is powered on. An 'Online' LED shall be included to indicate if the device is online with the Sensaphone.net server system. A 'Standby' LED shall be included to indicate if the device is operating in Standby mode.

D. Standby

The system shall be capable of operating in Standby mode. In Standby mode any detected alarms will be ignored, however, monitored values will continue to be displayed on the website and on the mobile Apps. The data logger will continue to store values while in Standby mode. Standby mode can be configured to run for a preconfigured time period in which case it will return to normal mode automatically, or it may operate in 'untimed' mode in which case it must manually be returned to normal mode. Users can enter or exit Standby mode through the website, the mobile App, or using the Standby button on the front panel of the device.

X. ENCLOSURE AND ENVIRONMENTAL

A. Enclosure

1. The SCD-1200-4GxxCD shall be housed in a NEMA 4X/IP66 polycarbonate enclosure with a clear cover.

   Dimensions: 12.5" x 12.2" x 7.0" (318 x 310 x 178 mm), 10.5 lb. (4.7 kg)

2. The SCD-1200-4GxxSD shall be housed in a NEMA 4X/IP66 polycarbonate enclosure with an opaque cover.

   Dimensions: 12.5" x 12.2" x 7.0" (318 x 310 x 178 mm), 10.5 lb. (4.7 kg)

* xx within the part number shall indicate the cellular carrier 'AT' for AT&T, 'VZ' for Verizon, or RW is for Rogers.

B. Electrical Protection

The Power input shall be protected against voltage surges with a metal oxide varistor. The Ethernet port shall be protected against voltage transients with low capacitance transient suppressors. The zone inputs shall be protected against voltage surges using metal oxide varistors and low-voltage diode clamping circuits.

C. Environmental

The system shall function over an operating range of 32°F to 122°F (0° to 50° C) at up to 0–90% RH, non-condensing. The system may be stored over the temperature range of 32° to 140°F (0° to 60° C).

D. Maintenance

The system manufacturer shall have in-house service facilities and technical assistance available during normal business hours, Monday–Friday, 8AM–5PM(EDT/EST).

*Specifications subject to change without notice.

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SENTINEL

CLOUD BASED MONITORING
OVER CELLULAR

INSTALLATION AND SETUP GUIDE
VERSION 2.2

SENSAPHONE®
REMOTE MONITORING SOLUTIONS

Every effort has been made to ensure that the information in this document is complete, accurate and up-to-date. Sensaphone assumes no responsibility for the results of errors beyond its control. Sensaphone also cannot guarantee that changes in equipment made by other manufacturers, and referred to in this manual, will not affect the applicability of the information in this manual.

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First Edition, version 2.2, June 2024

Written and produced by SENSAPHONE®.

Please address comments on this publication to:

SENSAPHONE®

901 Tryens Road

Aston, PA 19014

Important Safety Instructions

Your Sentinel has been carefully designed to give you years of safe, reliable performance. As with all electrical equipment, however, there are a few basic precautions you should take to avoid hurting yourself or damaging the unit:

- Read the installation and operating instructions in this guide carefully. Be sure to save it for future reference.
- Read and follow all warning and instruction labels on the product itself.
- To protect the Sentinel from overheating, make sure all openings on the unit are not blocked. Do not place on or near a heat source, such as a radiator or heat register.
- Do not use your Sentinel near water, or spill liquid of any kind into it.
- Be certain that your power source matches the rating in the specifications of this manual. If you're not sure of the type of power supply to your facility, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.
- Do not overload wall outlets and extension cords, as this can result in the risk of fire or electric shock.
- Never push objects of any kind into this product through ventilation holes as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock.
- To reduce the risk of electric shock, do not disassemble this product, but return it to Sensaphone Customer Service, or another approved repair facility, when any service or repair work is required. Opening or removing covers may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electric shock when the unit is subsequently used.
- If anything happens that indicates that your Sentinel is not working properly or has been damaged, unplug it immediately and follow the procedures in the manual for having it serviced. Return the unit for servicing under the following conditions:

    1. The power cord or plug is frayed or damaged.
    2. Liquid has been spilled into the product or it has been exposed to water.
    3. The unit has been dropped, or the enclosure is damaged.
    4. The unit doesn't function normally when you're following the operating instructions.

- To reduce the risk of fire or injury to persons, read and follow these instructions:

    1. Use only the specified type and size battery.
    2. Do not dispose of the battery in a fire. The cell may explode. Check with local codes for possible special disposal instructions.
    3. Do not open or mutilate batteries. Released electrolyte is corrosive and may cause damage to the eyes or skin. It may be toxic if swallowed.
    4. Exercise care in handling batteries in order not to short the battery with conducting materials such as rings, bracelets, and keys. The battery or conductor may overheat and cause burns.
    5. Remove main power connections before replacing the battery.

FCC Requirements

Part 15: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2 YEAR LIMITED WARRANTY

PLEASE READ THIS WARRANTY CAREFULLY BEFORE USING THE PRODUCT.

THIS LIMITED WARRANTY CONTAINS SENSAPHONE'S STANDARD TERMS AND CONDITIONS. WHERE PERMITTED BY THE APPLICABLE LAW, BY KEEPING YOUR SENSAPHONE PRODUCT BEYOND THIRTY (30) DAYS AFTER THE DATE OF DELIVERY, YOU FULLY ACCEPT THE TERMS AND CONDITIONS SET FORTH IN THIS LIMITED WARRANTY.

IN ADDITION, WHERE PERMITTED BY THE APPLICABLE LAW, YOUR INSTALLATION AND/OR USE OF THE PRODUCT CONSTITUTES FULL ACCEPTANCE OF THE TERMS AND CONDITIONS OF THIS LIMITED WARRANTY (HEREINAFTER REFERRED TO AS "LIMITED WARRANTY OR WARRANTY"). IF YOU DO NOT AGREE TO THE TERMS AND CONDITIONS THIS WARRANTY, INCLUDING ANY LIMITATIONS OF WARRANTY, INDEMNIFICATION TERMS OR LIMITATION OF LIABILITY, THEN YOU SHOULD NOT USE THE PRODUCT AND SHOULD RETURN IT TO THE SELLER FOR A REFUND OF THE PURCHASE PRICE. THE LAW MAY VARY BY JURISDICTION AS TO THE APPLICABILITY OF YOUR INSTALLATION OR USE ACTUALLY CONSTITUTING ACCEPTANCE OF THE TERMS AND CONDITIONS HEREIN AND AS TO THE APPLICABILITY OF ANY LIMITATION OF WARRANTY, INDEMNIFICATION TERMS OR LIMITATIONS OF LIABILITY.

1. **WARRANTOR**: IN THIS WARRANTY, WARRANTOR SHALL MEAN "DEALER, DISTRIBUTOR, AND/OR MANUFACTURER."

2. **ELEMENTS OF WARRANTY**: THIS PRODUCT IS WARRANTED TO BE FREE FROM DEFECTS IN MATERIALS AND CRAFTSMANSHIP WITH ONLY THE LIMITATIONS AND EXCLUSIONS SET OUT BELOW.

3. **WARRANTY AND REMEDY**: TWO-YEAR WARRANTY — IN THE EVENT THAT THE PRODUCT DOES NOT CONFORM TO THIS WARRANTY AT ANY TIME DURING THE TIME OF TWO YEARS FROM ORIGINAL PURCHASE, WARRANTOR WILL REPAIR THE DEFECT AND RETURN IT TO YOU AT NO CHARGE.

THIS WARRANTY SHALL TERMINATE AND BE OF NO FURTHER EFFECT AT THE TIME THE PRODUCT IS: (1) DAMAGED BY EXTRANEOUS CAUSE SUCH AS FIRE, WATER, LIGHTNING, ETC. OR NOT MAINTAINED AS REASONABLE AND NECESSARY; OR (2) MODIFIED; OR (3) IMPROPERLY INSTALLED; OR (4) MISUSED; OR (5) REPAIRED OR SERVICED BY SOMEONE OTHER THAN WARRANTORS' AUTHORIZED PERSONNEL OR SOMEONE EXPRESSLY AUTHORIZED BY WARRANTOR'S TO MAKE SUCH SERVICE OR REPAIRS; (6) USED IN A MANNER OR PURPOSE FOR WHICH THE PRODUCT WAS NOT INTENDED; OR (7) SOLD BY ORIGINAL PURCHASER.

LIMITED WARRANTY, LIMITATION OF DAMAGES AND DISCLAIMER OF LIABILITY FOR DAMAGES: THE WARRANTOR'S OBLIGATION UNDER THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF THE PRODUCT, AT THE WARRANTOR'S OPTION AS TO REPAIR OR REPLACEMENT. IN NO EVENT SHALL WARRANTORS BE LIABLE OR RESPONSIBLE FOR PAYMENT OF ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL AND/OR PUNITIVE DAMAGES OF ANY KIND, INCLUDING BUT NOT LIMITED TO ANY LABOR COSTS, PRODUCT COSTS, LOST REVENUE, BUSINESS INTERRUPTION LOSSES, LOST PROFITS, LOSS OF BUSINESS, LOSS OF DATA OR INFORMATION, OR FINANCIAL LOSS, FOR CLAIMS OF ANY NATURE, INCLUDING BUT NOT LIMITED TO CLAIMS IN CONTRACT, BREACH OF WARRANTY OR TORT, AND WHETHER OR NOT CAUSED BY WARRANTORS' NEGLIGENCE. IN THE EVENT THAT IT IS DETERMINED IN ANY ADJUDICATION THAT THE LIMITED WARRANTIES OF REPAIR OR REPLACEMENT ARE INAPPLICABLE, THEN THE PURCHASER'S SOLE REMEDY SHALL BE PAYMENT TO THE PURCHASER OF THE ORIGINAL COST OF THE PRODUCT, AND IN NO EVENT SHALL WARRANTORS BE LIABLE OR RESPONSIBLE FOR PAYMENT OF ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL AND/OR PUNITIVE DAMAGES OF ANY KIND, INCLUDING BUT NOT LIMITED TO ANY LOST REVENUE, BUSINESS INTERRUPTION LOSSES, LOST PROFITS, LOSS OF BUSINESS, LOSS OF DATA OR INFORMATION, OR FINANCIAL LOSS, FOR CLAIMS OF ANY NATURE, INCLUDING BUT NOT LIMITED TO CLAIMS IN CONTRACT, BREACH OF WARRANTY OR TORT, AND WHETHER OR NOT CAUSED BY

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REGARDLESS OF THE PLACE OF CONTRACTING OR PERFORMANCE, THIS LIMITED WARRANTY AND ALL QUESTIONS RELATING TO ITS VALIDITY, INTERPRETATION, PERFORMANCE AND ENFORCEMENT SHALL BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE LAWS OF THE STATE OF DELAWARE, WITHOUT REGARD TO THE PRINCIPLES OF CONFLICTS OF LAW.

Effective date 02/25/2015

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CHAPTER 1: INSTALLATION

INTRODUCTION

Congratulations on your purchase of the Sentinel Monitoring System. The system is designed to be an easy, cost–effective, cloud–based monitoring and data logging system to notify you when equipment or conditions go awry. The internet browser–based programming makes the device easy to use from any computer or tablet. Monitored conditions can include temperature, humidity levels, pressure, flow, leak detection, UPS systems, and more. The system allows multiple users to be notified immediately of any detected problems. Notification can occur via voice call, e–mail or SMS (text message). The internal battery backup system insures the unit will continue to run if main power fails.

FEATURES

The Sentinel includes the following key features:

- Twelve sensor inputs to monitor environmental conditions and/or alarm contacts from other equipment.
- Battery backup for uninterrupted performance.
- Notification via e–mail, text message (optional) and voice call (optional).
- Relay outputs capable of automatic or manual control.
- Cloud–based user interface for programming, data storage, and alarm delivery.
- Comes standard in weatherproof NEMA 4X enclosure
- Cellular modem available for use with AT&T, Verizon and Rogers service

TECHNICAL SUPPORT

If any questions arise upon installation or operation of the Sentinel, please contact the Sensaphone Technical Service Department at 610.558.2700 and have the following information available:

- Date of purchase _____
- Serial number _____

Technical support is available from 8:00 AM to 5:00 PM, M-F, eastern time.

ABOUT THIS MANUAL

This manual comprises the instructions necessary to install and setup the Sentinel. You should thoroughly read this manual to establish a basic understanding of the system and keep it as a reference.

INSTALLATION AND CONFIGURATION

PHYSICAL DESCRIPTION

The Sentinel is housed in a 14” x 12” x 7.4” enclosure, which can be easily mounted on a wall or back panel.

LAYOUT

The Sentinel has connections for twelve sensor inputs, an Ethernet port, and 12VDC power. See figure below:



Figure 1: Front Layout of the Sentinel

1) Acknowledge/Standby Button
2) On/Off Switch
3) Power, Online, Standby LEDs
4) Alarm LEDs
5) Power Jack
6) Ethernet Jack
7) Sensor Input Terminal Strip
8) Relay Output Input
9) Battery Module
10) Cellular Modem

SENSOR INPUTS

The sensor inputs labeled zones 1-12 are designed to interface with normally open/normally closed devices, 2.8K or 10K temperature sensors and 4-20mA transducers.

POWER LED (GREEN)

This light indicates that the Sentinel unit is powered and operational.

ALARM LEDS (RED)

The Alarm LEDs indicate if an alarm exists.

ONLINE LED (GREEN)

This light indicates that the Sentinel unit is communicating with the Sentinel servers.

STANDBY LED (YELLOW)

This light indicates that the Sentinel unit is in standby mode.

ACKNOWLEDGE/ STANDBY BUTTON

When an unacknowledged alarm exists (as indicated by a blinking red alarm LED), briefly press the button and the alarm LED will stop blinking, indicating that the alarm is acknowledged. To enter Standby mode, press and hold the button for at least 5 seconds until the Standby LED lights up, then release. To exit from Standby mode, hold the button down for 5 seconds until the Standby LED turns off.

INSTALLATION

This section provides information on:

- Operating environment
- Installation
- Connecting sensors
- Network Configuration

PARTS REQUIRED

- Screwdriver
- Computer w/Internet Connection

OPERATING ENVIRONMENT

Before you install the Sentinel be sure that your operating environment meets the physical requirements of the equipment.

Operating Temperature:	32º – 122º Fahrenheit (0º – 50º C)
Humidity:	5 – 90 %RH, non-condensing
Power:	115VAC 50/60 Hz outlet within 6’

POWER

Plug the power adapter into a 115V AC power outlet.

CELLULAR ACTIVATION

This device requires activation on the cellular network to operate. Fill-out the subscription registration form included with device and send to it Sensaphone to complete the activation process. Once it is activated power-up the device and allow a few minutes for the Sentinel to boot-up and for the modem to connect to the cellular network. Make sure the Online LED glows steadily, indicating that the device is communicating with Sensaphone.net server system. Once its online you will be able to access the device through the Sensaphone.net website.

ANTENNA INSTALLATION

Bracket Mounting - Select a suitable mounting location for the antenna on the desired surface. The orientation of the antenna should be vertical with the cable exiting downwards. When selecting a mounting location care should be taken to ensure that at least 300mm (12”) of separation is maintained between the antenna and nearby metal objects and surfaces.

When mounting the antenna to a metal housing, device enclosure or mast, care should be taken to ensure that the antenna housing is elevated above the metal surface to which it is mounted. Ensure that the selected location will enable the coaxial cable to be easily routed to the equipment. If mounting the antenna using screws it is important to check for adequate under panel clearance. It is important for RF performance that the antenna is only bracket mounted using the supplied bracket. Mounting the antenna utilizing a different bracket may adversely affect performance. The antenna can be mounted via the four 4.5mm fixing holes (suitable for M4 machine screws or 4mm self-tapping screws) or mast mounted using a jubilee or

worm drive hose clip with a maximum width of 14mm (1/2”). If you will be drilling holes to mount the antenna, the bracket can be used as a drilling template.

When ready, mount the antenna securely to the bracket using the supplied nut and washer. It is not necessary to remove the backing from the supplied adhesive pad but the pad can be utilized if a more permanent fitment to the bracket is desired. If utilizing the adhesive pad, ensure that the top surface of the bracket is clean and dry, remove the backing from the adhesive pad and stick the antenna to the bracket applying firm pressure.

Panel Mounting - Select a suitable location. The antenna must be fitted to a conductive ground plane of adequate size. It will fit panels of between 1-12mm thick (0.04-0.47”). The recommended minimum diameter of the surface is 200mm (8”). Select a mounting location taking care to ensure that there is at least 300mm (12”) of clearance from proximate metal objects. Ensure that there is adequate clearance under the mounting panel and measure to check for central positioning if necessary. Mask the panel area around the hole position to protect the surface / paintwork. Drill a pilot hole, then increase the hole size to 14mm (0.55”), ensuring that the drill / cutter bit does not hit any objects under the panel. Clean the area around the hole carefully removing all swarf. Remove any paint and primer from underneath the panel surface to ensure adequate electrical contact using washer and nut. Remove the nut and washer and then the adhesive pad backing from the underside of the antenna and feed the coaxial cable through the panel. Position the antenna over the mounting hole and stick it to the panel applying fi rm pressure. Assemble the nut and washer from under the panel and tighten fully.

Routing The Coaxial Cable - Route the coaxial cable to the Sentinel, taking care to avoid running adjacent to existing wiring or fouling any moving controls or components.

WALL MOUNT INSTALLATION

The NEMA 4X enclosure (14” x 12” x 7.4”) comes with mounting feet that must be attached to the bottom of the enclosure. The drawing below shows the location of the mounting feet for attaching the enclosure to a wall:

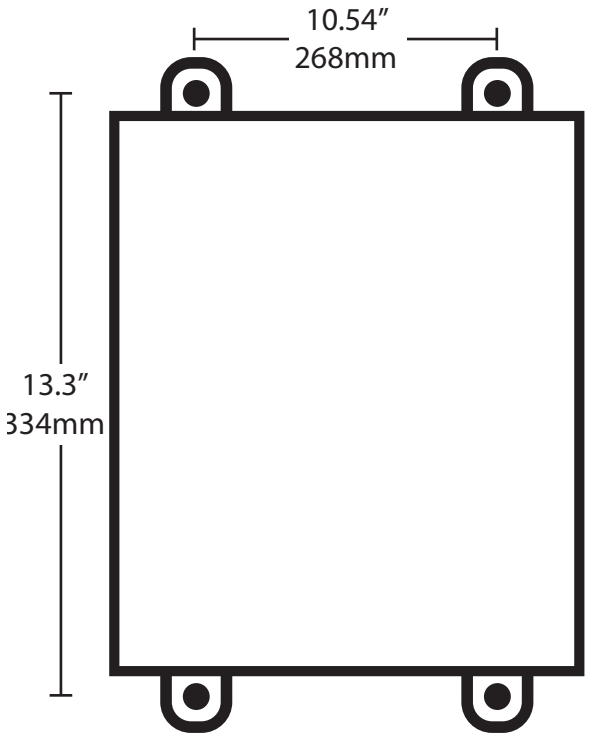


Figure 2: Sentinel mounting dimensions

TURNING THE UNIT ON

To power-up the system, plug-in the power supply and turn-on the power switch on the front of the Sentinel.

TURNING THE UNIT OFF

To power-down the system, turn-off the power switch on the front of the Sentinel, unplug the power supply, and then briefly press the OFF button on the Cellular Battery Backup Controller. This will disconnect the battery backup system and the unit will shutdown.



POWER SUPPLY

The unit comes with an external 12VDC 2A power supply that accepts 100-240VAC 50/60Hz. The power supply has been prewired to the Cellular Battery Backup Controller located inside the enclosure. This controller distributes power to the Sentinel, the cellular modem, and also controls the battery backup system for the cellular modem. Note that the Sentinel has its own internal rechargeable battery.

CELLULAR BATTERY BACKUP CONTROLLER

The Cellular Battery Backup Controller is the main power input for the system. It distributes power to the Sentinel Pro, the cellular modem, and controls the cellular battery backup system. There is no on/off switch for the controller, once power is applied it is functioning. Note that the modem also does not have a power switch so the modem will turn-on immediately as well. Only the Sentinel Pro has its own power switch.

CELLULAR BATTERY BACKUP

There is a 12V 3AH rechargeable battery located below the Sentinel Pro which is used to power the cellular modem in the event of a power failure. The entire system should operate for about 8 hours when the batteries are fully charged. The 12V battery should last for 4-5 years before needing replacement depending on usage and operating temperature.

SOLAR OPERATION

To operate the unit from a solar power system, disconnect the external power supply from the Vin terminals on the Cellular Battery Backup Controller. Next, connect the output of the solar voltage regulator to the Vin terminals. (See specifications for requirements)

CONNECTING SENSORS

The Sentinel is compatible with a wide variety of sensors including normally open/normally closed contacts, 2.8K and 10K temperature sensors, and 4–20mA current sources. Compatible sensors and accessories are shown on the Sentinel website. Sensors may be connected while the device is powered on or off. A proper size screwdriver is provided for your convenience. Contact Sensaphone or your Sensaphone reseller for assistance in selecting sensors for your monitoring requirements. A list of sensors and accessories is shown in Appendix B. Follow the instructions below to properly wire and configure the inputs for each type of electrical signal.

> **Warning**: The inputs are designed to work with low voltage signals. DO NOT connect voltages greater than 3.3V to the inputs. DO NOT connect 120VAC to the inputs.

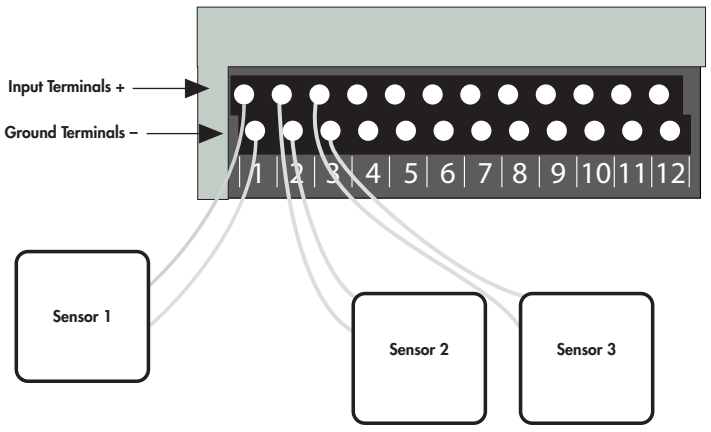
GENERAL WIRING CONSIDERATIONS

Most dry contact sensors can be connected to the Sentinel using inexpensive 2-conductor twisted-pair cable as small as #24 AWG. For temperature and 4–20mA sensors, use the wire chart below as a reference for selecting the appropriate wire gauge. Note that if the sensor is located far from the unit or if you are running cable in an electrically noisy environment, you should seriously consider using shielded cable. This will shield the signal from electrical interference, thereby preventing false readings and/or damage to the unit. For your convenience, Sensaphone has 22 gauge shielded cable available in 50' lengths (part number FGD-0010). To minimize electrical noise coupling between sensor wires and other wiring, follow the guidelines listed below:

- Route the power supply and network cables to the unit by a separate path then the wiring to the sensor inputs. Where paths must cross, their intersection should be perpendicular.
- Do not run sensor wiring and AC power in the same conduit.
- Segregate wiring by signal type. Bundle wiring with similar electrical characteristics together.
- If shielded cable is used, tie the shield to the input ground terminal.

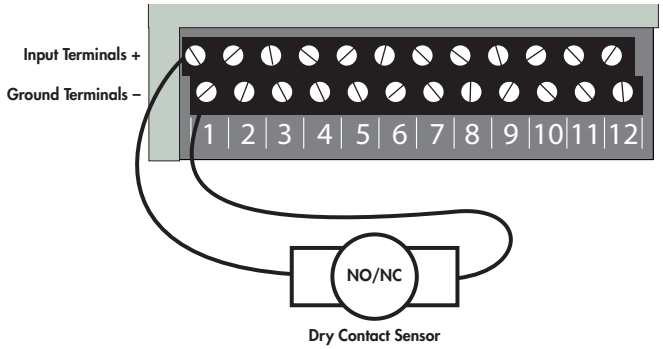
Wiring Distance	Minimum Wire Gauge
700'	#24 AWG
1500'	#22 AWG
2500'	#20 AWG

The zone terminal strip has an upper and lower level for connecting up to 12 sensors. The lower level terminals are all "ground" and are electrically connected together. The upper terminal strip is the positive connection for each sensor. See illustration below.



NORMALLY OPEN / NORMALLY CLOSED DRY CONTACTS

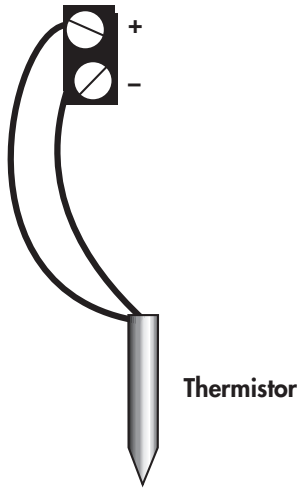
Dry contact sources consist of alarm relays or switches that are isolated and have no external voltage applied. These devices can be connected directly to the zone terminals without regard for polarity. Choose a zone and connect the wires to the corresponding screw terminals for that zone. The following figure shows how to connect a dry contact sensor:



Wiring a Dry Contact Sensor

2.8K/10K TEMPERATURE SENSORS

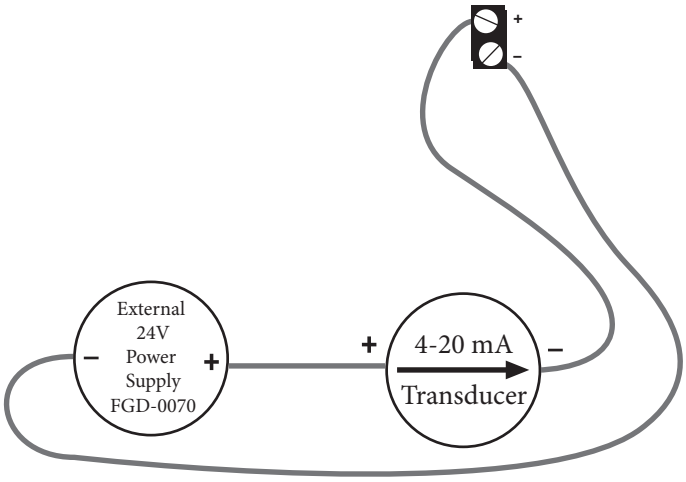
The Sentinel is compatible with 2.8K/10K temperature sensors that match the curve data listed in the tables in Appendix D. The monitoring temperature range of the 2.8K thermistor is -109 to 115°F (-85° to 57°C) and the 10K thermistor is -87° to 168°F (-66° to 76°C). Temperature sensors can be connected directly to the zone terminals without regard for polarity. Choose an alarm input and connect the wires to the corresponding screw terminals for that zone. 2.8K and 10K temperature sensors are available from Sensaphone. See Appendix B for part numbers. The figure below shows how to connect a temperature sensor:



Wiring a Temperature Sensor

4–20MA CURRENT LOOP TRANSDUCERS

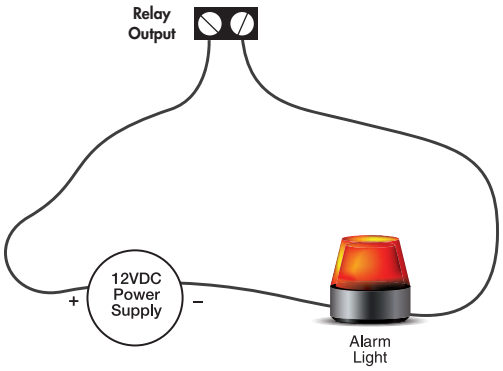
The inputs on the Sentinel are compatible with transducers that produce an analog output current of 4 to 20mA. Such transducers are available to measure tank and well levels, extreme temperatures, air pressure, water pressure, flow, voltage, current, rotational speed, etc. Contact our technical support department for assistance regarding your monitoring requirements (877-373-2700 or support@sensaphone.com). Follow the wiring diagrams below for connecting a 4–20mA device:



Wiring a 4–20mA device using an external 24 VDC supply.

RELAY OUTPUT WIRING

The Sentinel includes a relay output (switch) that can be used to turn on a light, siren, or other device whenever an alarm occurs. The output is a normally–open (i.e. off) dry contact that can be used for low voltage switching. The relay is rated for up to 30VAC/VDC 1 Amp. A sample wiring diagram is shown below:



The relay can be controlled manually (via the website or App) or automatically based on specific inputs or alarms. See chapter 3 for details.

BATTERY BACKUP

The Sentinel (in the white enclosure) has an internal rechargeable battery backup pack (part #BAT-0032) which will provide up to 8 hours of backup time in the event of a power failure. The unit will charge the battery and monitor its charge level. The percent charge can be viewed on the website. The Sentinel contains circuitry to protect the battery from deep discharge damage and will disconnect the battery when all of its available energy has been expended. The battery backup module should last 4 to 5 years.



To replace the battery pack, switch the power off, then remove the four screws on either side of the enclosure. The cover contains two switches with wires attached, carefully lift the cover off and move it out of the way without disconnecting any of the wires. Disconnect the battery connector with the red & black wires by pulling it out. Next, loosen the velcro strap and remove the battery pack. Install the new battery pack and secure the Velcro strap. Insert the battery connector into the circuit board (it doesn't matter which way you insert it). Carefully replace the cover making sure all of the leds pop through the holes, then replace the four screws.

MEMORY/CLOCK BATTERY

The Sentinel (in the white enclosure) contains a CR2 lithium battery to backup certain values in SRAM memory as well as the real-time clock. This battery should last between 5-10 years depending on how much time the device is powered off. {Note: Units manufactured prior to May 2016 contain a CR2032 lithium coin cell which has an estimated life of 2 - 5 yrs}.

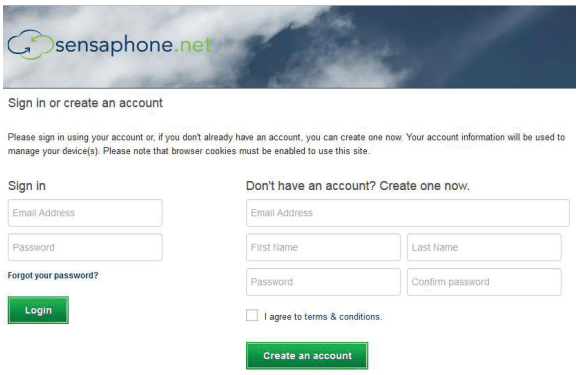
RESETTING THE SENTINEL TO FACTORY DEFAULT SETTINGS

In the event that you can no longer connect to your Sentinel, you can reset the unit to factory defaults. On the back of the unit is a small hole. Beneath the hole is a push button. Insert a paper clip or similar item into the hole and push the button for 5 seconds while the device is powered on. The Sentinel will erase all of its programming and then reboot automatically. Alternatively you can also reset the device to defaults from the Sensaphone.net website. Go to the Manage Devices page, under the Admin menu. Select the device, choose Reset to Default Values from the drop down, and click Submit.

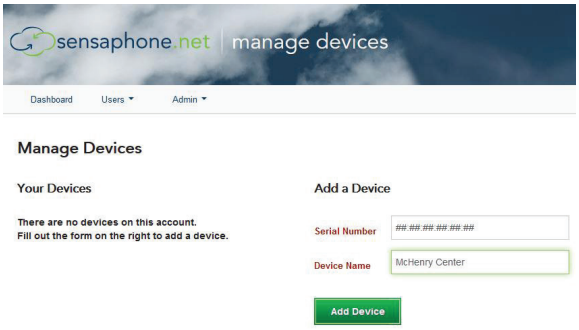
CHAPTER 2: SET UP

When your Sentinel "Online" LED is lit you can continue with the following website section.

1. Open an internet browser and go to www.sensaphone.net.
2. Fill in the form to create a new account.



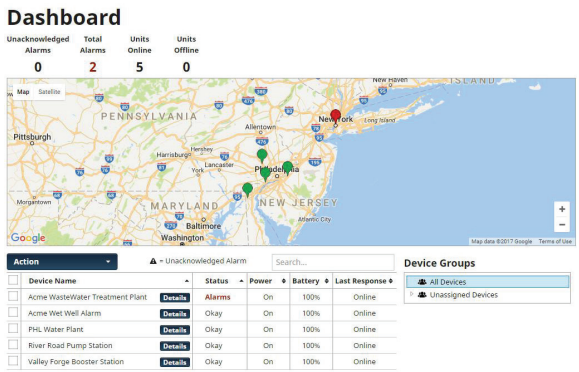
3. Once you are logged in, click *Admin*, then *Manage Devices*. In the "Add a Device" section, enter the Serial Number of your Sentinel and enter a device name. Click the *Add Device* button when finished.



Your Sentinel is now online with the Sensaphone.net website. Read the section below to learn how to view status and program your device.

DESCRIPTION OF WEB PAGES

DASHBOARD



The dashboard will list all of the devices on your account. This page is automatically updated with the most current information available.

The numbers at the top will show how many Unacknowledged Alarms, Current Alarms, Units Online, and Units Offline that currently exist for all devices on your account.

The map will show the location of any device on your account that has an address or GPS location listed. You can hover over the icon to see the device name and status. If the icon for the device is green, your device status is OK. If it is red, your device has alarms. You can click on the icon to show the zones for the selected device.

The device table will display all devices on your account. Click on the *Details* button to display and configure the zones for that device. You can also use the search box above the table to search through the table, or click on the table column headers to sort the data.

Device Name – The name of the device

Status – The current status of the device (Okay, Alarms, Offline, or Standby) If the device has any unacknowledged alarms, a symbol will be displayed in this column

Power – Displays if the device is On or Off (--- will display if the device is offline)

Battery – The current percentage of the device battery (--- will display if the device is offline)

Last Response – The time that the device last connected to the server

STANDBY MODE

Standby mode puts the Sentinel in a temporary state such that no alarms will be detected, allowing onsite personnel to perform maintenance or other tasks that may have triggered an alarm otherwise. Standby mode can be entered using the Action drop down on the Dashboard page or via the pushbutton on the front of the unit. Standby mode will persist for the duration of time entered on the Device Configure screen and will automatically exit once the time expires. When using the pushbutton you must depress the button for 5 seconds. The Standby LED will light up to indicate that the device is in Standby mode. You can also exit Standby mode using the same methods.

Standby – Allows you to put the selected devices into Standby mode

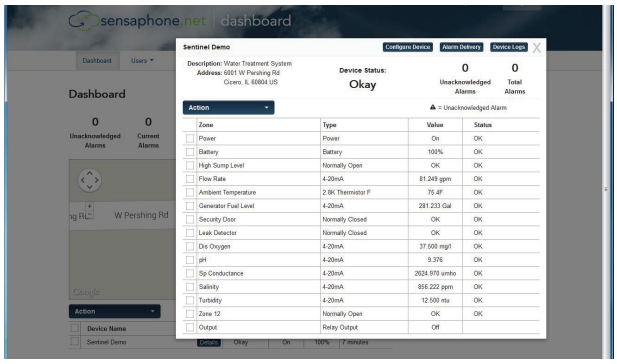
Enter – Put the Sentinel in Standby mode for the length of time that is set on the Device Configure page

Enter (Untimed) – Put the Sentinel in Standby mode until you disable it

Exit – Take the device out of Standby mode

DEVICE DETAILS

The device details page displays the sensor values for your Sentinel. This page is automatically updated with the most current information available. At the top of the page are buttons to access the *Configuration*, *Alarm Delivery* and *Logs*.



At the top of the page, you will see the device name, description, address and alarm status.

You will also see all of the zones for your device in the table.

Zone – The name of the zone

Value – The current value of the zone

Status – The current status of the zone

Min/Max – Displays the highest and lowest values recorded

If the device has any unacknowledged alarms, a symbol will be displayed in the status column

The Action dropdown menu provides options that allow you to interact with your device, such as acknowledging alarms, resetting pulse count, runtime and min/max values, and putting the device into standby mode.

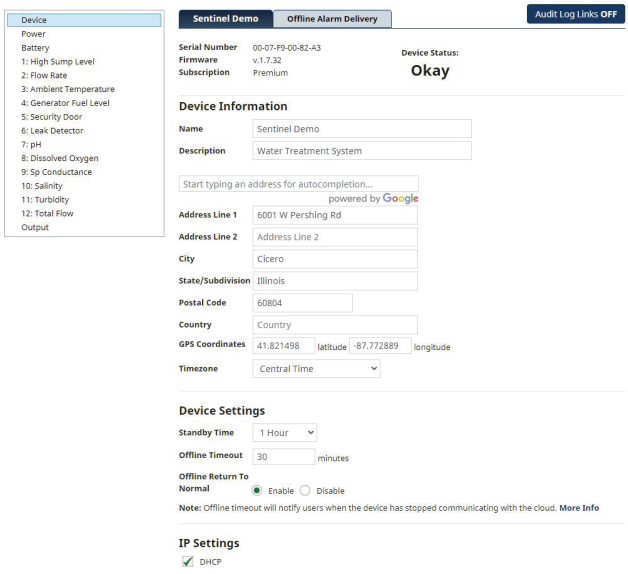
CONFIGURE DEVICE

At the top of the dashboard, click *Configure Device* to go to the device and zone programming screens.

The box on the left will display all of your configureable zones, as well as Device (for general device settings), Power, Battery and Relay Output. As you select an option, the form on the right will change to display the appropriate data. Complete the address so that the Sentinel icon will be displayed at the appropriate location on the dashboard map. The gps coordinates will be automatically computed based on the address you enter after you click Save. If the computed coordinates are off you can override them by entering your own. To have the coordinates recompute based on the address you must delete them, then click Save again.

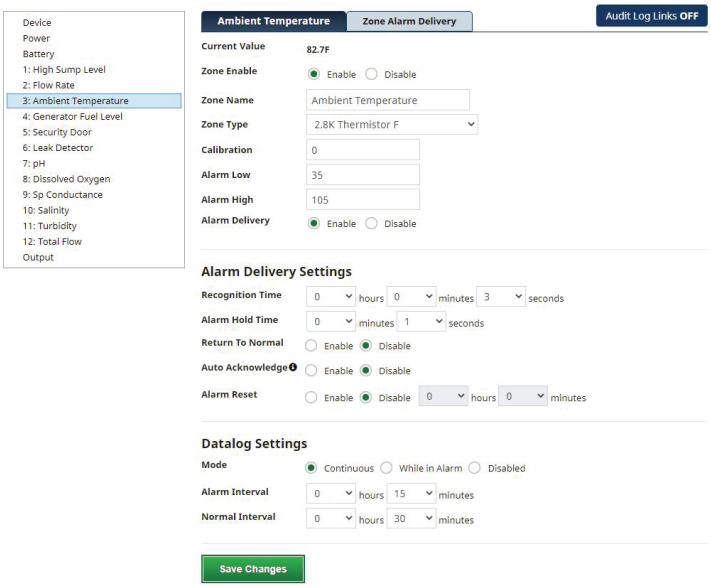
This page also contains settings for the *Device Offline* alarm and for *Standby Mode*. The *Device Offline* alarm will notify you if your devices stop communicating with the sensaphone.net servers for the programmed time duration. You can also receive a notification when the device comes back online by enabling the "Offline Return-To-Normal" option. You can create a custom list of people to be notified specifically for offline alarms by selecting the "Offline Alarm Delivery tab" at the top of this section and choosing Custom Alarm Delivery.

Once you have completed your programming, click on the *Save Settings* button at the bottom of the page.



Zone Programming

Select the zone you would like to configure from the box from the left. A sample screen for a temperature sensor is shown below.



ZONE PARAMETER DEFINITIONS

Enable/Disable: This setting determines if the Zone is being used (Enabled) or not (Disabled). Selecting Disabled will remove the gauge from the Summary screen.

Name: Enter a name for the sensor you are monitoring which describes its purpose and/or location. The name will appear on the Device Details screen as well as on alarm messages.

Type: Choose the type of sensor you are connecting to the Zone input. For temperature sensors choose either degrees F or C.

Units: The Units field is used to describe the units of measure for the value being monitored. When Temperature is selected the Units field will automatically display F (Fahrenheit) or C (Celsius). When a 4-20mA type is selected you can enter the appropriate text for the monitored condition (e.g. %RH, PSI, GPM, RPM,…). When you select Normally Open (NO) or Normally Closed (NC) you can choose from several preset descriptions for the Open and Closed state of the input. The first word always describes the Open state of the contact and the second the Closed state. If you choose Custom you can enter your own text for the Open and Closed states. To do this simply type the words into the lower Units field and separate them with a slash (/). For example, "Slow/Fast", "Safe/Danger", "Dry/Wet".

Calibration: This field can be used to offset the Zone value either positive or negative if there is some error in the reading.

Alarm Low: This is used to determine the low level at which a temperature or 4–20mA Zone has reached the alarm threshold. The value must fall below the Alarm Limit to trip an alarm.

Alarm High: This is used to determine the high level at which a temperature or 4–20mA Zone has reached the alarm threshold. The value must exceed the Alarm Limit to trip an alarm.

Table Low: The Table Low value is used to define the lower range (4mA) of your 4-20mA sensor.

Table High: The Table High value is used to define the upper range (20mA) of your 4-20mA sensor.

Alarm Delivery Enable/Disable: When Enabled, alarm messages will be delivered, if set to Disabled alarm messages will not be delivered.

Recognition Time: This is the length of time that an alarm condition must be present before a valid alarm exists and message delivery is started.

Alarm Hold Time: When an alarm occurs, the *Alarm Hold Time* will latch the alarm condition for the programmed time period, thus preventing redundant alarms from sending additional notification messages. This is useful for alarms that are likely to trip several times within a short time period, such as motion detectors.

Return to Normal Enable/Disable: This feature instructs the Sentinel to send a message when a zone input has changed from an alarm condition back to a normal condition. Anyone who received the original alarm message will also be sent the Return-to-Normal message.

Auto Acknowledge Enable/Disable: Enabling this option will automatically acknowledge an alarm when the zone goes back to normal. As a result, all remaining alarm notifications will be cancelled.

Alarm Reset Enable/Disable: This setting enables or disables the Alarm Reset Feature. The Alarm Reset feature is used to re-send alarm messages in the event that a fault condition is not corrected in a timely fashion. If an alarm continues to exist for the duration of the programmed Reset Time (see below) the alarm will reset (reactivate) and the alarm message delivery process will begin all over again. This is an optional feature.

Alarm Reset Time: This is the time allowed for an alarm's fault condition to be corrected before the Sentinel resets (reactivates) the alarm and begins the message delivery process all over again. It is recommended that this be set to no lower than 30 minutes to prevent numerous messages from being sent.

Datalogging Mode: The Sentinel has two modes of data logging for each zone: Continuous or While In Alarm. In Continuous mode the unit will log the value of the input on a fixed time interval all the time. The Normal Interval sets the logging rate while the value is within the normal range. The Alarm Interval sets the logging rate while the value is an alarm condition. By choosing the While In Alarm mode you can choose to have the unit only log values when it exceeds the alarm limits.

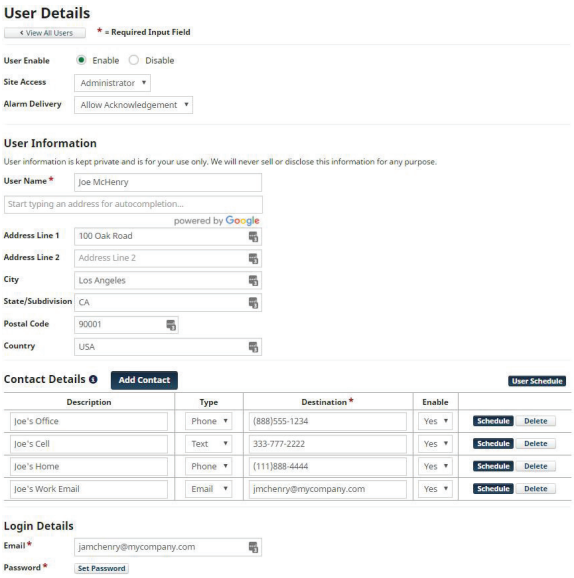
Alarm Datalog Interval: This is the interval that data will be logged while the input is beyond the programmed alarm limits. (Note: this is regardless of the programmed Alarm Recognition Time).

Normal Datalog Interval: This is the interval that data will be logged while the input is within the programmed alarm limits. To maximize the available memory for datalogging, set the Datalog Interval for each zone to multiples of each other. For example, Zone 1 can be set to 10 minutes, Zone 2 to 30 minutes, Zone 3 to 60 minutes, etc…

MANAGE USERS

The sensaphone.net website allows you to set up users that will be linked to your account. Each user can be configured to have their own login for website access and/or be contacted for alarms. In addition, you can choose to give alarm acknowledgement capability to each user.

There are several levels of permissions that can be assigned to each user. You can also enter contact information for alarm delivery purposes. From the main menu, select *Users*, then *Manage Users*. To add a new user, click on the *Add User* button. The example below shows a user setup as an administrator with four contact destinations.



The following defines the various permission levels:

Administrator – Full site access, all devices on your account

Supervisor – Gives the user access to the Dashboard, device-specific pages (for example, Device Details), Manage Users, and Manage User Groups, but for only the devices you choose for them (chosen under the Device Groups section of the form). Supervisors will have the ability to create new users, but they can only give the users Supervisor access or lower.

User – Gives the user access to the Dashboard, but only shows the devices you choose for them (chosen under the Device Groups section of the form)

None – No access to the website

Alarm Delivery – Choose whether you would like the user to be able to receive alarm notifications or not.

Disabled – No alarm delivery

Inform Only – User is notified about the alarm, but cannot acknowledge it

Allow Acknowledgement – User is notified about the alarm and is able to acknowledge it

User Information

Next, enter details about this user. The user's name is the only required information.

Contact Details

The 'Contact Details' section is where you enter the telephone numbers, text numbers, and email addresses to send alarm messages. See sample programming in the figure above. To add additional contacts click "Add Contact". Be sure to add all of your possible contact methods in this section. You can choose which ones get used on the Default Alarm Delivery Schedule or Zone Alarm Delivery Schedule.

Telephone Number Programming

A '1' at the beginning of the telephone number is not required for calls to the USA, Canada, or other countries that are part of the North American Numbering Plan (NANP). See list below:

Countries in the North American Numbering Plan:

- United States
- Canada
- Caribbean Islands
    - Anguilla, Antigua & Barbuda, The Bahamas, Barbados, Bermuda, British Virgin Islands, Cayman Islands, Dominica, The Dominican Republic, Grenada, Jamaica, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Sint Maarten, Trinidad and Tobago, Turks & Caicos
- U.S. Territories
    - American Samoa, Guam, Northern Mariana Islands, Puerto Rico, U.S. Virgin Islands*

*Technically some of these are not in North America, but since they are part of the U.S., they use the U.S. telephone system.

F**or all other countries** you have to enter an exit code first (+ or 011), then the country code, and then the number. Do not include trunk codes which are typically displayed as (0) near the beginning of the number.

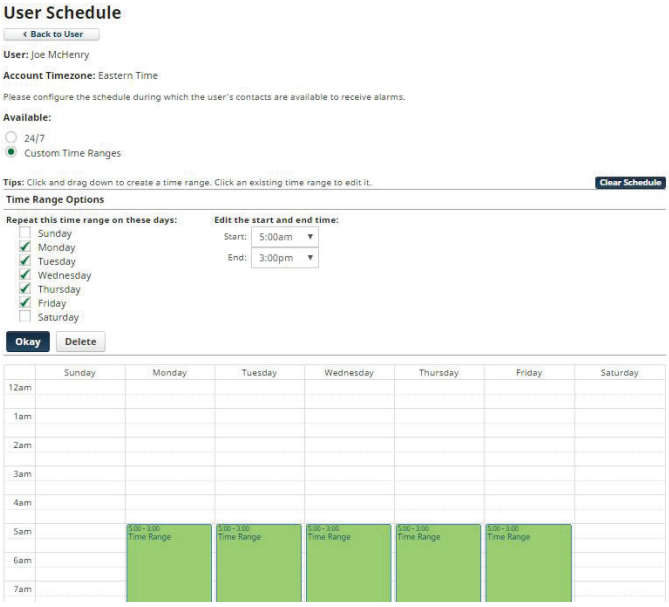
• For example, a call to the UK could be programmed as either:

+44 20 7950 4631

or

011 44 20 7950 4631

You can also create a time schedule to limit when you'll receive alarm messages. There is an overall *User Schedule* as well as individual Schedules for each contact. The default setting for all schedules is enabled, 24/7. In the sample screen below, the highlighted section shows the times when this user will be contacted for alarms:



*Note that if you configure both a User Schedule and individual Contact Schedules, there must be overlap in order for alarm messages to be delivered.

Login Details

Users will login with an email address and password. Enter this information in the *Login Details* section. In the event that a user forgets his/her password they can use the reset password feature on the main login page.

Device Access

For accounts with multiple users and/or devices, you can choose to limit a user's access to selected devices. In the *Device Access* section, choose which units this User can access. See sample screen below:



Click on 'Save Changes' once you are finished.

MANAGE USER GROUPS

Allows you to set up groups of users that can be used on other site pages.

Select the group you wish to edit from the dropdown menu, or select *Create New Group* to make a new group.

Make sure to give each group a unique, descriptive name so they can be easily referenced.

Click on the plus icon to add users to the group. A pop up modal window will show that will list all the alarm users you have added to your account from the Manage Users page (see that page description for more information).

You can select an entire user (all destinations listed under that user at the time of the alarm will be notified) or individual destinations of the user.

Click on the red X icon to remove that user from the group.

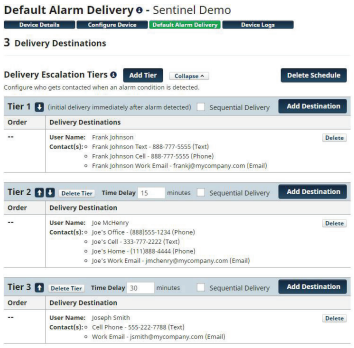
Once you are finished adding and removing users, click on the *Save Group* button at the bottom of the page.

ALARM DELIVERY

The Alarm Delivery section is where you configure the people that will be contacted when an alarm occurs. You can setup a *Default Alarm Delivery Schedule* (i.e. contact list) for each device or you can create a separate *Zone Alarm Delivery Schedule* for each individual zone. A combination of both can also be used (e.g. some zones use the default schedule and others use a custom schedule). The first step is to configure your Users and Contacts as described in the *Manage Users* section. If you haven't completed that step please do it first.

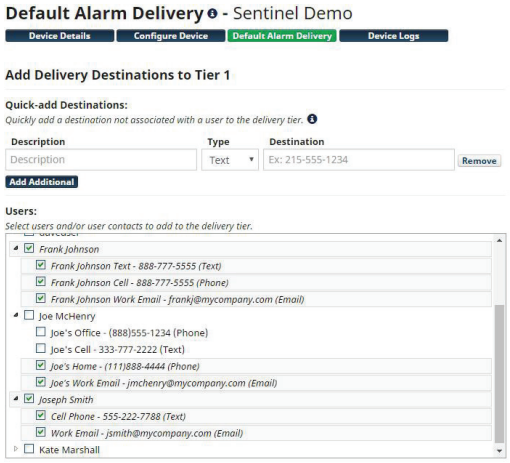
Default Alarm Delivery Schedule

To get started select a device from the Dashboard and click *Details*. Next click the *Default Alarm Delivery* button. Click the *Add Destination* button to select people from your User list. You can select all of the User contacts or just a few if desired. See sample screen below:



Continue clicking the *Add Destination* button to add additional User's to the list. If you would like to insert a delay between the first User (or group of Users) and the next User, click the *Add Tier* button and enter the delay time. Users in this Tier will not be contacted until the delay time expires. Click *Save Changes* when your schedule is complete.

*Note that the Tier Delay timer starts at the time the alarm occurs. If the alarm is acknowledged before the delay time expires then Users in the 2nd Tier (and beyond) will not receive the alarm message. See sample programming screen below:



Zone Alarm Delivery Schedule

A Zone Alarm Delivery Schedule is an alarm contact list that only applies to one specific zone. You can create a separate Zone Alarm Delivery Schedule for each individual zone if required. To configure a *Zone Alarm Delivery Schedule* select a Zone from the *Device Details* page. Then click the *Zone Alarm Delivery* tab on the right. Select *Custom* to configure a contact list for the selected zone. Follow the steps as described above to complete the schedule.

Quick-Add Destinations

Quick-Add Destinations are those that can be easily entered to the notification list without creating a User Account. Note, however, that destinations added here will be inform-only (e.g. **cannot acknowledge alarms**). This entry method is useful for sending messages to people who do not require a user account in the system but may want to be informed when a particular alarm occurs.

Alarm Acknowledgment

Alarms can be acknowledged from the dashboard page by selecting a device using the checkboxes next to each device, and then clicking the "Action" drop-down at the top of the screen. You can acknowledge both Device Offline alarms or Zone alarms. Devices with 'Unacknowledged' alarms are identified with an exclamation point within a triangle. Once the alarm is acknowledged this symbol will disappear. You can acknowledge multiple alarms on multiple devices at the same time. Alarms can also be acknowledged during telephone calls by entering 555 when prompted, or by clicking the web link contained in email and text messages

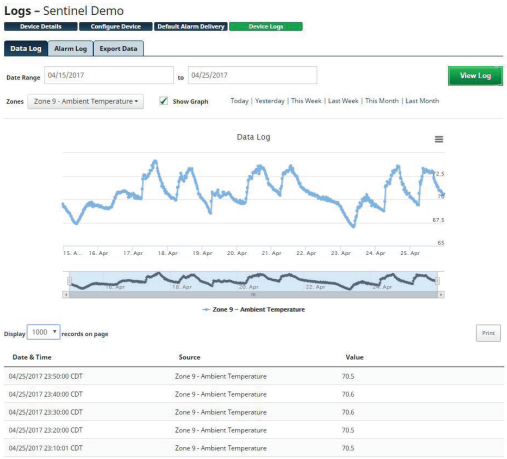
LOGS

The Sentinel includes an Alarm Log and Data Log. The Alarm Log lists all alarm activity for the selected device. You can narrow down the messages by individual zones or you can select multiple zones. The Data Log contains the recorded values for each zone based on the parameters you set up on the Zone Configuration screens. You can display the values on the screen as well as graph them. There is also an option to Save the data to a file. To get to the Device Logs section, click the *Details* button from the Dashboard for the device you would like to view, then click the *Device Logs* button.

Alarm Log – Shows the history of all alarm notifications that were sent for the device

Data Log – Show the history of all logged zone values and statuses for the device

Export Data - Allows you to save selected Alarm Log or Data Log records in either CSV or pdf format. Note that CSV formatted files can be opened in Microsoft Excel.



Note that for Normally Open and Normally Closed zone types, the Sentinel will record a "0" when the input is presented with an open circuit and a "1" when the input has a closed circuit. Depending on your sensor and programming, this may represent either a normal or alarm condition.

DEVICE MANAGEMENT

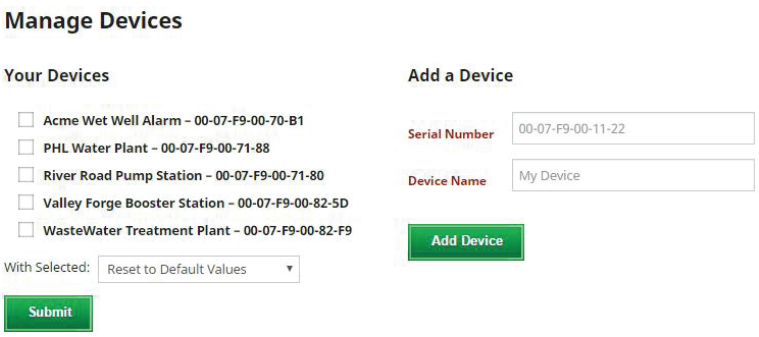
You can add, modify, and remove Sentinel devices from your account on the Manage Devices screen. From the main menu select Admin, then Manage Devices. Listed below are the device-related actions that can be done.

Adding Devices - To add a new device to your account, enter the device serial number (located on the bottom of the unit in the format 00:07:F9:00:00:00) and give the device a name, then click *Add Device*.

Reboot Device - To reboot your device, select it from the list to the left and then choose Reboot Device from the drop down box at the bottom of the page, then click Submit. Your Sentinel will reboot and then reconnect within a few minutes. Your Sentinelgramming will remain intact.

Remove From Account - To remove a device from your account, select it from the list to the left and then choose Remove from Account from the drop-down box at the bottom of the page. Then click *Submit.*

Reset to Default Values - To reset a device to default settings, select it from the list to the left and then choose *Reset to Default Values* from the drop-down box at the bottom of the page. Then click *Submit.* Allow several minutes for your device to complete the reset process.



DEVICE GROUPS

In cases where you have many devices and many users it may be desirable to create Device Groups. These can make it easier to assign device permissions to specified Users. From the main menu select Admin, then Device Groups. In the main window, you will see a list of all your devices and any groups you may have already created. Devices are shown with a green device icon and groups are shown with a black icon. You can have multiple groups, and you can even have groups within a group. If a device icon is lined up on the left-most side of the window, they are not in a group.

To add a new group, click on the Add Group button at the top of the page. A 'New Group' icon will appear in the list. You can rename the group by right clicking on it and selecting Rename. To move a device into a group, click on the device and drag it into the group. Continue adding devices until you're finished, then click Save Groups.

The blue number shown on the group icon shows how many devices are within that group. To remove a group, right click on the group and select Delete. Any devices in that group will be moved up one level. For example, if a group that had two devices was deleted, the two devices would be shifted to the left and would no longer be in any group. You can also click and drag a device or group to reorder them. To search through your devices click on Filters. You can choose to hide any device or group that does not match your search, and you can choose to only search through your devices and not your groups. Once you are finished editing your groups, click on the Save Groups button at the bottom of the page.

ACCOUNT SETTINGS

The Account settings page is used to configure a number of options that apply across the board to your account. This page is only available to users with 'Admin' site access level. To access the account page select 'Admin' from the main menu, then 'Account'.

NAME: Give your account a 'Name' that best describes the organization managing your devices.

TIME ZONE: Set the 'Time Zone', which will serve as the default for all of your users. This will be important to ensure that any schedules you configure will operate at the appropriate times.

There are several 'Account Features' that you can configure to have the system operate in a certain manner.

REQUIRE SITE USER: When Admins and Supervisors are configuring Users, you can force the system to require that all User's receive website access by checking the 'Require Site User' box.

REQUIRE ALARM USER: Similarly, you can also require all Users to have the ability to receive alarm notifications by checking the 'Require Alarm User' box.

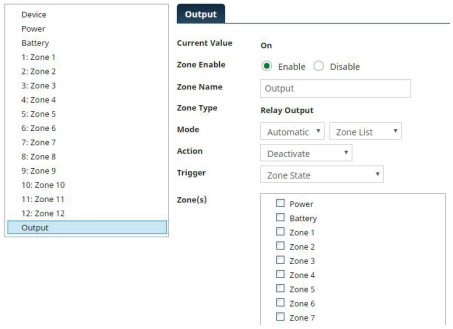
USER GROUPS: You can choose whether or not to allow 'User Groups' to be created within the system. Check the 'User Groups' check box to permit user groups to be used within the system.

HIDE DISABLED ALARMS: On the device details page you choose to hide the alarm status of a zone if 'Alarm Delivery' is set to disabled for the selected zone. This can be convenient when a zone is beyond the alarm limits for maintenance reasons and you don't want to display the status as 'Alarm'.

CSV Email: Enabling this setting exposes an option on the User pages to use the CSV email message format used by some state department of environmental protection agencies (such as the MASS DEP). Note that enabling this option will expose a similar setting on the User pages so that you can create a specific user with a specific email address to receive the specially formatted message.

CHAPTER 3: CONFIGURING THE RELAY OUTPUT

The Sentinel includes a relay output that can be used to control a light, siren, or other low voltage device. The output can be configured to switch either manually or automatically when a zone changes state or exceeds the alarm limits. To program the output click *Output* from the *Device Details* or *Configure Device* screen. The following configuration page will appear:



Enter a Name so that you'll know what the Output will be controlling. The Output can operate in Manual mode or Automatic mode. In manual mode you can turn the relay ON or OFF through the web page or the mobile App. To manually switch the relay output, click in the State field and select either ON or OFF, then click *Save Changes*. The change request will be sent to the Sentinel and the *Current Value* will update after the output change has successfully completed.

In Automatic mode the relay can be programmed to turn-on automatically when certain conditions are met. Listed below is a description of the parameters that apply to the automatic modes.

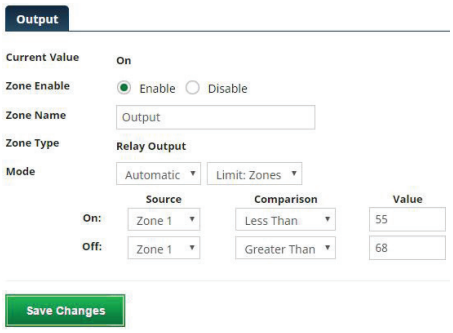
Input Selection - Next to the Automatic mode selection box is another drop-down that allows you to select which zones will control the output. There are four options (Zone List, Type List, All Inputs, and Limit: Zones).

Zone List: This option allows you to individually select which zones will cause the output to switch. Check the boxes next to the desired zones.

Type List: This option allows you select zones based on the zone Type. For example, you could have all of the zones configured for Temperature control the output.

All Inputs: This option selects all of the inputs (zones).

Limit: Zones: This option allows you to independently control the output based on the value of one or two zones using greater-than, less-than, or equal-to comparison statements. A separate Output-On and Output-Off instruction can be configured with its own comparison value. See sample below:



Action - This setting determines what the Output will do when the selected zone (or zones) exceeds the alarm limits. You can have the relay Activate (turn-on), Deactivate (turn-off), or Cycle (ON under normal conditions, momentarily OFF for 10 seconds when an alarm condition occurs, then back ON).

Trigger - The trigger determines what will cause the output to change state. There are 3 options to choose from which are described below:

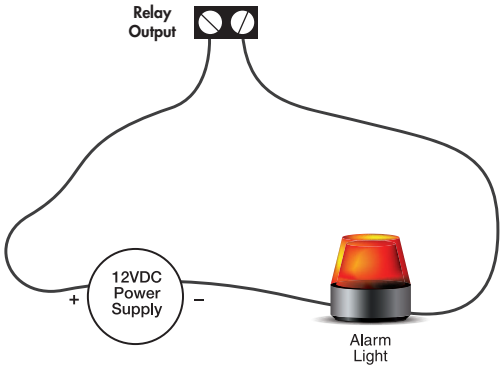
Unacknowledged Alarms: Choosing this option will make the Output change to the setting defined by the Action for as long as an Unacknowledged Alarm persists on the selected zones. Once the alarm is acknowledged the Output will revert back to its normal position.

Alarm Condition: Choosing this option will make the Output change to the setting defined by the *Action* for as long as the selected input(s) remain in Alarm, regardless of acknowledgement. Once the selected zones return to their normal state the Output will revert back to its normal position.

Zone State: Choosing this option will make the output change to the setting defined by the *Action* as soon as the selected zones exceed the alarm limits. In other words, the alarm recognition time is not enforced, and the Output will change instantly. Once the selected zones return to their normal state the Output will revert back to its normal position.

Relay Output Wiring

The relay output can be used to turn on a light, siren, or other low voltage device. The relay is rated for up to 30VAC/VDC 1 Amp. A sample wiring diagram is shown below:



APPENDIX A: WEEKLY TESTING PROCEDURE

We recommend that you test your Sensaphone weekly to be sure it is functioning properly. This will ensure that when a problem arises the Sensaphone will be ready to alert the appropriate personnel.

There are several tests that can be performed:

1.) Create an alarm on each zone by tripping all connected sensors.

Temperature sensors: Heat or cool the sensor.

Motion sensors: Have someone walk in front of the sensor.

Door/window sensors: open the door/window.

Water sensors: Apply a small amount of water beneath the sensor or use a wet towel and touch it to the sensor probes.

Humidity sensors: Raise the humidity around the sensor by holding a cup of very hot water beneath the sensor.

2.) Allow the unit to contact all programmed users. This will make sure that the Sensaphone is programmed properly. It will also prepare personnel to respond appropriately when they receive a message from the Sensaphone.

3.) Test the battery (if installed) by unplugging the AC adapter and making sure that the Sensaphone continues to function. Keep the AC adapter unplugged so that a Power Failure alarm occurs. Plug in the AC adapter after the unit has finished.

4.) Keep a log of your tests, noting the date and whether the Sentinel passed in each category tested. An example of such a log is shown below. (See "Test Log" at the end of this manual.)

WEB600 Test Log

Date	Inputs		Alarm		Battery		
	Pass	Fail	Pass	Fail	Pass	Fail	
07/19/09	☒	☐	☒	☐	☒	☐	Bob H
08/20/09	☒	☐	☒	☐	☒	☐	Alex G.
09/19/09	☒	☐	☒	☐	☒	☐	Bob H.
	☐	☐	☐	☐	☐	☐	
	☐	☐	☐	☐	☐	☐	

If you require assistance, call Sensaphone Technical Support at 610-558-2700.

APPENDIX B: ACCESSORIES

The sensors listed below are available from Sensaphone, and represent the most commonly used zone devices. Other dry contact sensors, designed for more specialized applications, may also be used. Commercial or industrial electrical supply houses can provide devices to monitor virtually any condition. For further information, contact Sensaphone Customer Service at 610-558-2700.

Part #	Description	Part #	Sensor/Switch
BAT-0032	Sentinel Battery	FGD-0100	2.8k Remote Temperature Sensor
FGD-0006	Magnetic Reed Switch	FGD-0101	2.8k Weatherproof Temperature Probe
FGD-0007	Passive Infra-Red Detector	FGD-0102	10k Weatherproof Temperature Probe
FGD-0010	50' two-conductor #22AWG shielded Cable	FGD-0103	10k Indoor Decorator
FGD-0013	Spot Water Detector	FGD-0104	10k Outdoor Air Weatherproof
FGD-0022	Temp° Alert	FGD-0301	Pressure Sensor
FGD-0027	Humidistat	FGD-0303	Vibration Sensor
FGD-0049	Smoke Detector with Built-in Relay		
FGD-0052	Humidity 4-20mA Transmitter		
FGD-0053	24VDC Power Supply		
FGD-0054	Power-Out Alert		
FGD-0056	Zone Water Detector w/Water Rope		
FGD-0063	Additional 10' Water Rope for FGD-0056		
FGD-0065	Carbon Monoxide Sensor		
FGD-0066	Air Quality Sensor		
FGD-0067	Surge Suppressor		
FGD-0070	Power supply with battery backup		

APPENDIX C: SPECIFICATIONS

ALERT ZONES

Number of Zones: 12

Zone Connector: terminal block

Zone Types: N.O./N.C. contact, 2.8K Thermistor (-109° to 115°F, -85° to 57°C) And 10K Thermistor (-87° to 168°F; -66° to 76°C), and 4-20mA (-80,000.0 to 80,000.0

Zone Characteristics: 28.7KΩ to 3.3V (temperature/contact) or 250 Ohms to ground (4-20mA)

A/D Converter Resolution: 12 bits ±2 LSB

Zone Protection: 5.5VDC Metal Oxide Varistor with fast acting diode clamps.

Pulse Counting: 1ms minimum duration, 1 pulse-per-second maximum rate

RELAY OUTPUT

Rated for 1A 30VAC/ 1A 30VDC Maximum

DATA LOGGING

1 minute to 24 hour sampling rate

User programmable channel selection

Zones 1 – 12

Battery

Input Power

LED INDICATORS

Power: On steady when the unit is powered on.

Alarm: Off when no alarm exists.

Ethernet Link and Activity LEDs

Online

Standby

COMMUNICATION TYPE:

4G/LTE Cellular via AT&T, Verizon, or Rogers

POWER SUPPLY

Power Supply: 120VAC/12VDC 50/60Hz 30W wall plug-in transformer w/6’ cord.

Power Consumption: 15 Watts

Power Protection: Metal Oxide Varistor

BATTERY BACKUP

Rechargeable Battery: Internal 8 Hr NiMH Battery Pack (Part # BAT-0032)

Memory/Clock Battery: Internal 5-10 yr CR2 lithium (Part # BAT-0033)

Cellular Battery: 3AH SLA Battery (BAT-0005)

ENVIRONMENTAL

Operating Temperature: 32–122° F (0–50° C)

Operating Humidity: 0–90% RH non-condensing

Storage Temperature: 32°–140° F (0–60° C)

PHYSICAL

Enclosure: High impact polycarbonate, UL Type 4X (IP66)

Physical Dimensions: 14” x 12” x 7.4” (356 mm x 305 mm x 188 mm)

Weight: 14 lb. (6.35 kg)

APPENDIX D: THERMISTORS

2.8K THERMISTOR DATA

Degrees Celsius	Resistance (Ohms)
-50	187,625
-40	94,206
-30	49,549
-20	27,180
-10	15,491
0	9,142
10	5,572
20	3,498
30	2,256
40	1,491
50	1,009
60	697
70	490
80	351

10K THERMISTOR DATA

Degrees Celsius	Resistance (Ohms)
-50	441.3K
-40	239.8K
-30	135.2K
-20	78.91K
-10	47.54K
0	29.49K
10	18.79K
20	12.25K
30	8,194K
40	5,592
50	3,893
60	2,760
70	1,990
80	1,458
90	1,084
100	816.8
120	481.8
130	376.4
140	297.2
150	237.0

APPENDIX E: POST & CONNECTION ERROR CODES

When the device boots up it runs a Power On Self Test (e.g. POST). During this process the Online LED will go through a series of blink patterns. This can take a few minutes while it tests various functions and connects to the Sensaphone.net servers. If a problem occurs, the Online LED will blink a repetitive pattern of 'x' blinks followed by a 5 second pause. The table below defines the possible errors based on the number led of blinks.

Online LED Blink Codes	Failure indication	Description	Corrective Action?
OFF	Idle	Unit does not have a secure connection to the server, nor attempting to establish a secure connection	"Unit is initializing, either on power-up or rebooting. Most of the initial boot time is spent initializing memory, which can take a few minutes. * If the power LED is also OFF, the unit may have its power cable disconnected and its internal battery is depleted. * A less likely possibility is the online LED is disconnected or faulty."
flickering	Negotiating	Unit is negotiating a secure connection	The online LED flickering or blinking irregularly is normal when the unit is negotiating the secure connection. In contrast, the error code blinks steadily, then has a 5 second OFF period between error blinks.
ON	Connected	Unit has established a secure connection with the server	Secure connection with the server is established – OK!
1	Operating system initialization in progress	The unit's operating system's I/O is initializing	There is a fault in the firmware if this error code persists.
2	Real-time clock initialization failed	Internal clock not functioning	Possibly a hardware fault with the processor's internal RAM or RTC oscillator failure
3	Ethernet device initiailzation failed	Failed to configure ethernet chip	Probably a hardware fault.
4	Ethernet cable failed	Ethernet cable appears to be disconnected during boot	The Ethernet cable may be disconnected or otherwise faulty
5	DHCP failed	Unable to bind IP address	If using static IP, there may be an error in the IP, DNS, gateway or netmask. If using DHCP, problem may be with DHCP server.
6	Secure negotiation in progress	The unit's operating system's I/O has finished initializing, will now proceed with the secure connection negotiation	"There is a fault in program execution if this error code occurs, perhaps the memory has been corrupted. * A less likely possibility is the processor's internal RAM is faulty."
7	DNS link failed	DNS link failed	"DNS address may be incorrect, or perhaps the DNS server is down. Also check the Ethernet cable: if disconnected while securely connected to the server, reconnection attempts while the cable is disconnected will fail here."
8	IP address failed	IP address could not be resolved	If using static IP, the IP address may be incorrect
9	TCP socket failed	TCP socket to the secure server failed to connect	Port 443 may be blocked. Or perhaps the remote server is unavailable – this is the first attempt at connecting with the remote server. Will attempt to reconnect to another server.
10	SSL connect failed	SSL connection to the secure server failed to connect	Server may have SSL disabled?
11	SSL handshake failed	SSL handshake failed	If this keeps happening, the problem may be the server has changed its SSL certificate.

12	Server dropped the connection	The server dropped the established secure connection for some reason	Probably a glitch. Unit will reestablish the secure connection in a minute. (This is the catch-all error code for the server dropping the connection – there are many possible reasons).
13	SSL invalid MAC	The server dropped the established secure connection due to an invalid MAC	Probably a glitch, unit will reestablish the secure connection in a minute.
14	TCP read error	The server dropped the established secure connection due to a read error	Probably a glitch. Unit will reestablish the secure connection in a minute. If this keeps occurring, the server may be restarting/rebooting and may take about 8 minutes to reconnect.
15	Ethernet cable disconnected	The Ethernet cable disconnected or failed while the secure connection was established	Reconnect or replace the Ethernet cable
16	Reserved		
17	TCP write error	The unit had a problem transmitting over Ethernet	Probably a glitch. Unit will reestablish the secure connection in a minute. If this keeps occurring, there may be a problem with the real-time clock getting stuck - check if the lithium battery is below 30% (2.3V; nominal voltage is 3.0V).
18	TCP socket closed	The TCP socket between the unit and the server is unexpectedly closed.	Unit will reboot if this error occurs 6 times, which may clear the problem. Manual reboot would be the equivalent.
19	HTTP JSON parse error	The JSON message from the server is garbled or not present	Corrupt data communication. If a cellular or satellite connection, check for weak signal

APPENDIX F: RETURNING THE UNIT FOR REPAIR

In the event that the Sentinel does not function properly, we suggest that you do the following:

1) Record your observations regarding the Sentinel's malfunction.

2) Call the Technical Service Department at 610-558-2700 prior to sending the unit to Sensaphone for repair.

If the unit must be sent to Sensaphone for Servicing, please do the following:

1) Unplug the AC power supply from the wall outlet and disconnect all sensors from the alert zones.

2) Carefully pack the unit to avoid damage in transit. Use the original container (if available) or a sturdy shipping box.

3) You must include the following information to avoid shipping delays:

    a) Your name, address and telephone number.

    b) A note explaining the problem.

4) Ship your package to the address below:

SERVICE DEPARTMENT

SENSAPHONE

901 Tryens Road

Aston, PA 19014

5) Ship prepaid and insured via UPS or US Mail to ensure a traceable shipment with recourse for damage or replacement.

APPENDIX G: TEST LOG

Date	Inputs		Alarms		Battery						Tested By
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	

Installation Instructions
B4BE[E]-6-60 Bracket Mount Antenna / LPB-6-60 Panel Mount Antenna

SW3-205 - Document Version 2

A. Introduction

The B4BE-6-60 / LPB-6-60 antennas cover 2G/3G/4G and 5G frequencies (617-960/1710-6000MHz). The B4BE[E] antennas are supplied with a wall / mast mount bracket as standard but can also be mounted on metal panels or enclosures of sufficient size as can the LPB-6-60 type antennas.

The B4BE-6-60 / LPB-6-60 antenna is supplied with fitted CS29 low loss cable and the B4BEE-6-60 is supplied fitted with RG174 coaxial cable. All three products are available with a variety of cable lengths and co-axial connectors.

B. Mounting requirements and selecting location

Bracket Mounting for B4BE[E]-6-60: Select a suitable mounting location for the antenna on the desired surface. The orientation of the antenna should be vertical with the cable exiting downwards. When selecting a mounting location care should be taken to ensure that at least 300mm (12") of separation is maintained between the antenna and nearby metal objects and surfaces. When mounting the antenna to a metal housing, device enclosure or mast care should be taken to ensure that the antenna housing is elevated above the metal surface to which it is mounted. Ensure that the selected location will enable the coaxial cable to be easily routed to the equipment. If mounting the antenna using screws it is important to check for adequate under panel clearance.It is important for RF performance that the antenna is only bracket mounted using the supplied bracket. Mounting the antenna utilising a different bracket may adversely affect performance.

Panel Mounting B4BE[E]-6-60 / LPB-6-60: The antenna must be fitted to a conductive ground plane of adequate size. It will fit panels of between 1-12mm thick (0.04-0.47") The recommended minimum diameter of the surface is 200mm (8"). Select a mounting location taking care to ensure that there is at least 300mm (12") of clearance from proximate metal objects. Ensure that there is adequate clearance under the mounting panel and measure to check for central positioning if necessary.

C. Antenna Mounting

Bracket Mounting for B4BE[E]-6-60: Check that you have the required mounting hardware and equipment available. The antenna can be bracket mounted via the supplied fixing holes (suitable for machine screws or self-tapping screws) or mast mounted using a suitable jubilee or worm drive hose clip. If drilling holes to mount the antenna the bracket can be used as a drilling template. When ready mount the antenna securely to the bracket using the supplied nut and washer. It is not necessary to remove the backing from the supplied adhesive pad but the pad can be utilised if a more permanent fitment to the bracket is desired. If utilising the adhesive pad, ensure that the top surface of the bracket is clean and dry, remove the backing from the adhesive pad and stick the antenna to the bracket applying firm pressure.

Panel Mounting B4BE[E]-6-60 / LPB-6-60: Mask the panel area around the hole position to protect the surface / paintwork. Drill a pilot hole, then increase the hole size to 12mm (1/2"), ensuring that the drill / cutter bit does not hit any objects under the panel. Clean the area around the hole carefully removing all swarf. Remove any paint and primer from underneath the panel surface to ensure adequate electrical contact using washer and nut.

Remove the nut and washer and then the adhesive pad backing from the underside of the antenna and feed the coaxial cable through the panel. Position the antenna over the mounting hole and stick it to the panel applying firm pressure. Assemble the nut and washer from under the panel and tighten fully.

D. Routing and terminating coaxial cable(s)

Route the coaxial cables to the radio equipment, taking care to avoid running them adjacent to any existing wiring or fouling any moving components. Be careful to observe the cable bend radius of 25mm (1") for the B4BE/LPB and 12mm (1/2") for the B4BEE.

E. Commission and test

Check the comms cables:

- Carry out VSWR check, the VSWR should measure <2.5:1 in transmit band.
- Connect the Cellular/LTE cable.

F. Notices

DO NOT

- operate the transmitter when someone is within 20cm (8") of the antenna.
- operate the equipment in an explosive atmosphere.
- attempt to install the antennas without the proper safe equipment to access the install location.
- install the antenna in such a way that it may fall and cause injury.
- install the antenna near overhead power lines
- chew parts or put them in mouth, keep away from unsupervised children.

European Waste Electronic Equipment Directive 2002/96/EC
Waste electrical products should not be disposed of with household waste. All electronic products with the WEEE logo must be collected and sent to approved operators for safe disposal or recycling. Please recycle where facilities exist. Many electrical/electronic equipment retailers facilitate "Distributor Take-Back scheme"for household WEEE. Check with your Local Authority or electronic retailers for designated collection facilities where WEEE can be disposed of for free.

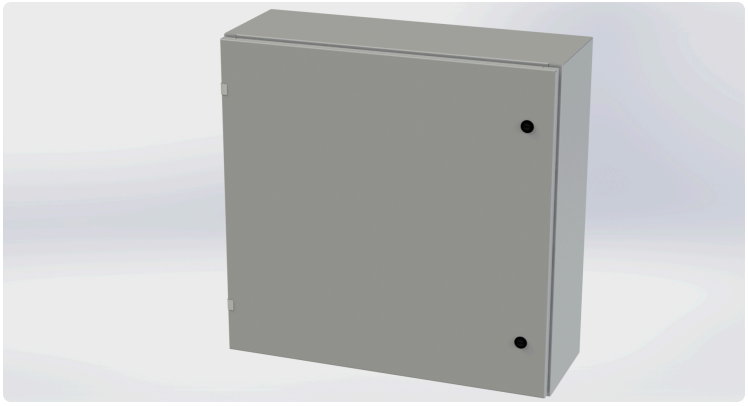
Directive 2011/65/EU (RoHS 2)
RoHS 2 compliance is declared per Directive 2011/65/EU and its subsequent amendments with exemption 6.c applied.

REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals, EC 1907/2006) This product contains Lead (CAS No. 7439-92-1) which is classified as an SVHC (Substance of Very High Concern) as being toxic to reproduction under Article 57c. of REACH. **Do not chew parts or put them in mouth, keep away from unsupervised children. Dispose of parts as WEEE waste do not send to landfill.**

Waiver: This document represents information compiled to the best of our present knowledge. It is not intended as a representation or warranty of fitness of the products described for any particular purpose. This document details guidelines for general information purposes only. Always seek specialist advice when planning installations.

Saginaw Control and Engineering
95 Midland Road Saginaw, MI 48638-5770
(800) 234-6871 - Fax: (989) 799-4524
SCE@SaginawControl.com

SCE-30EL3010LP



Product Specifications:

Part Number: SCE-30EL3010LP
Description: EL Enclosure
Height: 30.00"
Width: 30.00"
Depth: 10.00"
Price Code: E3
List Price: $461.49
Catalog Page: 90
Est. Ship Weight: 82.00 lbs

Construction
- 0.075 In. carbon steel.
- Seams continuously welded and ground smooth.
- Flange trough collar around all sides of door opening.
- Pour in place oil & water resistant gasket
- Collar studs 3/8-16 provided for mounting optional panels.
- Concealed hinges.
- Removable and interchangeable doors.
- Black quarter turn latches.
- Latches are opened or closed with a screwdriver.
- Mounting holes in back of enclosure.
- Mounting hardware, sealing washer and hole plug included.
- Removable print pocket furnished if height and width of enclosure is greater than 12 inches.
- Ground studs on door and body.

Application
Designed to house electrical and electronic controls, instruments and components. Provides protection from dust, oil and water. For outdoor application a drip shield and drain vent is recommended.

For details about the design, performance expectations, applications and design suggestions - See Design Considerations www.saginawcontrol.com/instman/considerations.pdf

Options
- Optional tamper-resistant inserts are available. - Optional mounting feet available. - Door hardware available. - Interchangeable latches and handles available in the accessory section.

Finish
ANSI-61 gray powder coating inside and out. Optional sub-panels are powder coated white.

Industry Standards - (IS4)
- NEMA Type 3R, 4, 12 and Type 13
- UL Listed Type 3R, 4 and 12
- CSA Type 3R, 4 and 12
- IEC 60529
- IP 66

Notes
Provision for Lifting Lugs will be included on enclosures with Height >48" and with Depth >16". The Lifting Lug assembly will be included with the enclosure bolt pack.

Special Instructions apply for IS3, IS4 and IS6 to maintain the environmental rating of Type 3R for these parts. Instructions are located on the enclosure door. Drip shield is required on IS3, drip shield is recommended on IS4 and IS6. Drain holes are required on all.

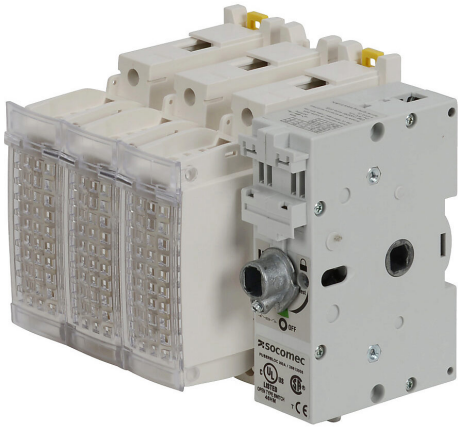
Optional Accessories
SCE-30P30 Subpanel, Bent
SCE-30P30GALV Subpanel, Bent Galvanized
SCE-BVK Breather Vent
SCE-DF30EL30LP Panel, Dead Front (Wall Mount)
SCE-DS30N4 Shield, Drip
SCE-ELFM30H EL Flush Mount Frame
SCE-ELFM30W EL Flush Mount Frame
SCE-ELMFK4 Foot Kit, EL Mounting (4pc.)
SCE-ELMFK4SS6-OS Foot Kit, S.S. EL Mounting (4pc.)
SCE-ELSP3 KIT, Swing-Out Panel (20 High & Up)
SCE-RD30EL30 Door, Replacement

Similar Part Numbers
SCE-20EL2006LPEL Enclosure
SCE-20EL2008LPEL Enclosure
SCE-20EL2010LPEL Enclosure
SCE-20EL2012LPEL Enclosure
SCE-20EL2408LPEL Enclosure
SCE-24EL2006LPEL Enclosure
SCE-24EL2008LPEL Enclosure
SCE-24EL2010LPEL Enclosure
SCE-24EL2012LPEL Enclosure
SCE-24EL2016LPEL Enclosure

Installation Information
- Mounting Foot Kit for Enviroline Enclosures
- EL Flush Mount Frame
- Drip Shield Kit Assembly
- Dead Front Wall Mount Installation Instructions. EL-LP
- Swing Panel Assembly for Enviroline Enclosures
- Swing Panel ELSP3 for Encl. Height > 16
- Dead Front Wall Mount < 20 In Height Installation Instructions. EL-LP
- Swing Panel ELSP for Encl. Height <= 16
- Sealing Washer Specifications
- Design Considerations When Specifying Your Enclosure
- Sub-Plate Layout & Grounding for 3/8-16
- Service Parts Wall Mount Enclosures
- Dead Front Wall Mount Installation Instructions. EL-LP REV. 2
- Dead Front Wall Mount < 20 In Height Installation Instructions. EL-LP REV. 2

38613005 Cut Sheet

AUTOMATIONDIRECT.com
www.automationdirect.com



Socomec FUSERBLOC series rotary disconnect switch, fusible, Class J, load break capable, 3-pole, 600 VAC/250 VDC, 60A, 100kA SCCR, DIN rail or panel mount, UL 98 rated, front or side operated, accepts 10 x 10mm size shaft.

For complete product information, please see this item on our store at the following link:

https://www.automationdirect.com/pn/38613005

Technical Specifications

Brand	Socomec
Item	Disconnect switch
Series	FUSERBLOC
Fuse Class	Class J
Fusible	Yes
Load Break Capable	Yes
Number of Poles	3
Voltage Rating	600 VAC/250 VDC

Amperage Rating	60A
SCCR Rating	100kA SCCR
Mounting	DIN rail or panel
UL Rating	UL 98 rated
Configuration	Front or side operated
Shaft Size	Accepts 10 x 10mm size shaft
Handle Type	Rotary
Additional Information	Purchase fuses and handle separately

Agency Approvals

UL Listed File #	E201138
UL Recognized File #	None
UL Hazardous File #	None
CE	View CE declarations
CSA File #	112964
RoHS Status	Yes (See CE Doc)
EU REACH	View EU REACH document

Dimensional Drawings

2D Drawing PDF Link:
https://cdn.automationdirect.com/static/drawings/38613005.pdf
See store item page for other formats.

HMMP-63HR-40 Cut Sheet

AUTOMATIONDIRECT.com
www.automationdirect.com



IronHorse manual motor protector, rotary, 40A, thermal overload, 28-40A adjustable, 520A instantaneous trip rating, 55mm frame.

For complete product information, please see this item on our store at the following link:

https://www.automationdirect.com/pn/HMMP-63HR-40

Technical Specifications

Brand	IronHorse
Item	Motor protector
Starter Type	Manual
Actuator Type	Rotary
Amperage Rating	40A
Voltage Rating	600 VAC
Horsepower Rating	30hp
Relay Type	Thermal overload
Operation Type	Bi-metallic
Full Load Amperage Range	28-40A adjustable
Instantaneous Trip Rating	520A
Number of Poles	3

Power Poles	(3) N.O.
Trip Class	Trip Class 10
Phase Loss Sensitive	Yes
Ground Fault Protection	No
SCCR Rating	50kA SCCR
UL Rating	UL 508 rated
Frame	55mm
Mounting	35mm DIN rail or panel
Connection	Screw terminal
Additional Information	For UL Type E listing, short circuit alarm contact block HPX1-MALM11-S must be added. Suitable as a motor disconnect

Agency Approvals

UL Listed File #	E195426, E531281
CE	View CE declarations
CSA File #	None
RoHS Status	Yes (See CE Doc)
EU REACH	View EU REACH document

Dimensional Drawings

2D Drawing PDF Link:
https://cdn.automationdirect.com/static/drawings/2d/HMMP-63HR-40.pdf
See store item page for other formats.

HMC-50A30-22-AL Cut Sheet

AUTOMATIONDIRECT.com
www.automationdirect.com



IronHorse IEC contactor, 50A, (3) N.O. power poles, (2) N.O./(2) N.C. auxiliary contacts, 120 VAC (50/60Hz) coil voltage.

For complete product information, please see this item on our store at the following link:

https://www.automationdirect.com/pn/HMC-50A30-22-AL

Technical Specifications

Brand	IronHorse
Item	Contactor
Contactor Type	IEC
Actuator Type	Magnetic
Amperage Rating	50A
Power Poles	(3) N.O.
Auxiliary Contacts	(2) N.O./(2) N.C.
Coil Voltage	120 VAC (50/60Hz)
Horsepower Rating	40hp
SCCR Rating	5kA SCCR
Mounting	35mm DIN rail or panel

Agency Approvals

UL Listed File #	E191059
CE	View CE declarations
CSA File #	None
RoHS Status	Yes (See CE Doc)
EU REACH	View EU REACH document

Dimensional Drawings

2D Drawing PDF Link:
https://cdn.automationdirect.com
/static/drawings/2d/HMC-50A30-22-AL.pdf
See store item page for other formats.

PSV24-100S Cut Sheet

AUTOMATIONDIRECT.com
www.automationdirect.com



RHINO PSV series switching power supply, 24 VDC @ 3.8A/91W (adjustable), 120/240 VAC nominal input, 1-phase, enclosed, plastic housing, 35mm DIN rail mount, screw terminals, NEC Class 2.

For complete product information, please see this item on our store at the following link:

https://www.automationdirect.com/pn/PSV24-100S

Technical Specifications

Brand	RHINO
Item	Power supply
Series	PSV
Power Supply Type	Switching
Efficiency	87% @115 VAC, 89% @230 VAC
Output Configuration	Single output
Output	24 VDC @ 3.8A/91W (adjustable)
Output Voltage Range	22-24 VDC
Input voltage range	85-264 VAC
Number of Input Phases	1
Protection Type(s)	• overvoltage • short circuit • overload

Remote On/Off	No
Voltage Monitoring	Yes
Enclosure Type	Enclosed
Housing Material	Plastic
IP Rating	IP20
Mounting	35mm DIN rail
Connector Type	Screw terminals
NEC Class 2	Yes
Integrated UPS Battery Control	No
Operating Temperature	-20 to 70 deg

Agency Approvals

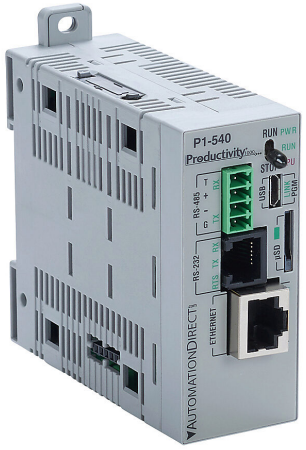
UL Listed File #	E197592
UL Recognized File #	E198298
UL Hazardous File #	None
CE	View CE declarations
CSA File #	None
RoHS Status	Yes (See CE Doc)
EU REACH	View EU REACH document

Dimensional Drawings

2D Drawing PDF Link:
https://cdn.automationdirect.com/static/drawings/PSV24-100S.pdf
See store item page for other formats.

P1-540 Cut Sheet

AUTOMATIONDIRECT.com
www.automationdirect.com



Productivity1000 CPU, up to 50 MB ladder memory, microSD card slot, (1) Ethernet 10/100Base-T (RJ45), (1) RS-232 (RJ12), (1) RS-485 (4-pin terminal) and (1) microB-USB port(s), external 24 VDC required, battery included.

For complete product information, please see this item on our store at the following link:

https://www.automationdirect.com/pn/P1-540

Technical Specifications

Brand	Productivity1000
Item	CPU
Total Memory	Up to 50 MB
Ladder Memory	Up to 50 MB
User Data Memory	Up to 50 MB
Removable Media Type	MicroSD card slot
Programming Language	Ladder
Programming Software	Productivity Suite programming software v3.0 or later
Communication Port and Connection Type(s)	• (1) Ethernet 10/100Base-T (RJ45) • (1) RS-232 (RJ12) • (1) RS-485 (4-pin terminal) • (1) microB-USB
Port Protocol(s)	• MQTT Client • Modbus RTU Master/Slave • Modbus TCP • ASCII In/out • EtherNet/IP explicit messaging scanner/adapter • EtherNet/IP implicit messaging scanner/adapter • webserver (non-secure HTTP) • programming and monitoring
Port Speed(s)	• 10/100 Mbps • up to 115.2k baud
Real Time Clock/Calendar	Yes
Retentive Memory	Yes
Battery Backup	Yes
Maximum Expansion Modules Allowed	15
External Power Requirement	24 VDC
Includes	D2-BAT-1 battery
Dangerous Goods	• Battery Installed: No • Packaging Instructions: 969 • UN Number: UN3091 • Hazard Type: Lithium Batteries • Battery Type: Button • Lithium Content: 0.17 • Replacement Battery: D2-BAT-1 • Generic Battery: CR2354

Agency Approvals

UL Listed File #	E139594
UL Recognized File #	None
UL Hazardous File #	None
CE	View CE declarations
CSA File #	None
RoHS Status	Yes (See CE Doc)
EU REACH	View EU REACH document

Dimensional Drawings

2D Drawing PDF Link:
https://cdn.automationdirect.com/static/drawings/P1-540.pdf
See store item page for other formats.

P1-16ND3 Cut Sheet

AUTOMATIONDIRECT.com
www.automationdirect.com



Productivity1000 discrete input module, 16-point, 12-24 VDC, sinking/sourcing, 2 isolated common(s), 8 point(s) per common. Requires P2-RTB or P2-RTB-1 removable terminal block or ZIPLink pre-wired cables.

For complete product information, please see this item on our store at the following link:

https://www.automationdirect.com/pn/P1-16ND3

Technical Specifications

Brand	Productivity1000
Item	Input module
I/O Module Type	Discrete
Number of Input Points	16
Nominal Input Voltage	12-24 VDC
Discrete Input Type	Sinking/sourcing
Number of Isolated Input Commons	2
Number of Points per Common	8
Requires	P2-RTB or P2-RTB-1 removable terminal block or ZIPLink pre-wired cables
Programming Software	Productivity Suite programming software v3.3 or later

Agency Approvals

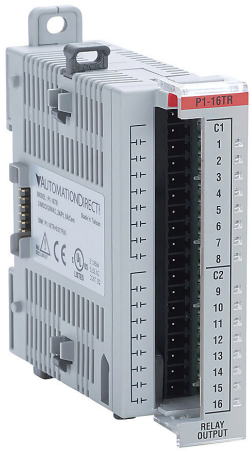
UL Listed File #	E139594
UL Recognized File #	None
UL Hazardous File #	None
CE	View CE declarations
CSA File #	None
RoHS Status	Yes (See CE Doc)
EU REACH	View EU REACH document

Dimensional Drawings

2D Drawing PDF Link:
https://cdn.automationdirect.com/static/drawings/P1-16ND3.pdf
See store item page for other formats.

P1-16TR Cut Sheet

AUTOMATIONDIRECT.com
www.automationdirect.com



Productivity1000 relay output module, 16-point, 6-24 VDC/6-120 VAC, (16) Form A (SPST) no-suppression, 2 isolated common(s), 8 point(s) per common, 2A/point, 8A/common. Requires P2-RTB or P2-RTB-1 removable terminal block or ZIPLink pre-wired cables.

For complete product information, please see this item on our store at the following link:

https://www.automationdirect.com/pn/P1-16TR

Technical Specifications

Brand	Productivity1000
Item	Output module
I/O Module Type	Relay
Number of Output Points	16
Nominal Output Voltage	6-24 VDC/6-120 VAC
Relay Configuration	(16) Form A (SPST) no-suppression relays
Number of Isolated Commons	2
Jumper Selectable Isolation	No

Number of Points per Common	8
Load Current	2A/point, 8A/common
Fuse Type	External fusing 8A max (user supplied)
Requires	P2-RTB or P2-RTB-1 removable terminal block or ZIPLink pre-wired cables
Programming Software	Productivity Suite programming software v3.0 or later

Agency Approvals

UL Listed File #	E139594
UL Recognized File #	None
UL Hazardous File #	None
CE	View CE declarations
CSA File #	None
RoHS Status	Yes (See CE Doc)
EU REACH	View EU REACH document

Dimensional Drawings

2D Drawing PDF Link:
https://cdn.automationdirect.com/static/drawings/P1-16TR.pdf
See store item page for other formats.

GCX1131 Cut Sheet



AutomationDirect emergency stop pushbutton, IP65, 22mm, twist-to-release, (1) N.C. contact(s), metal base, metal bezel, Operator: red, mushroom, 40mm, round, plastic.

For complete product information, please see this item on our store at the following link:

https://www.automationdirect.com/pn/GCX1131

Technical Specifications

Brand	AutomationDirect
Item	Emergency stop pushbutton
IP Rating	IP65
Barrel Size	22mm
Action	Twist-to-release
Contact Type	(1) N.C.
Base Material	Metal
Bezel Material	Metal
Operator Color	Red
Operator Type	Mushroom
Operator Size	40mm
Operator Shape	Round
Operator Material	Plastic

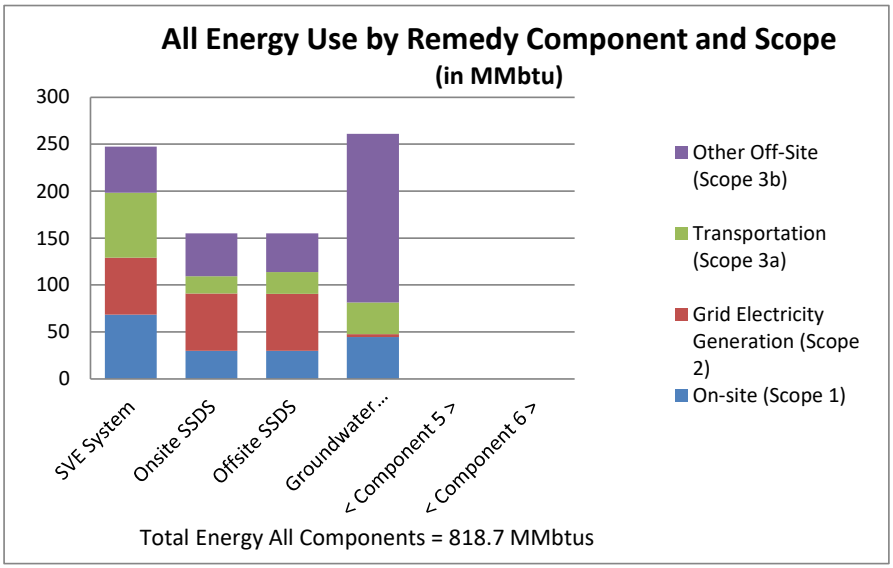
Agency Approvals

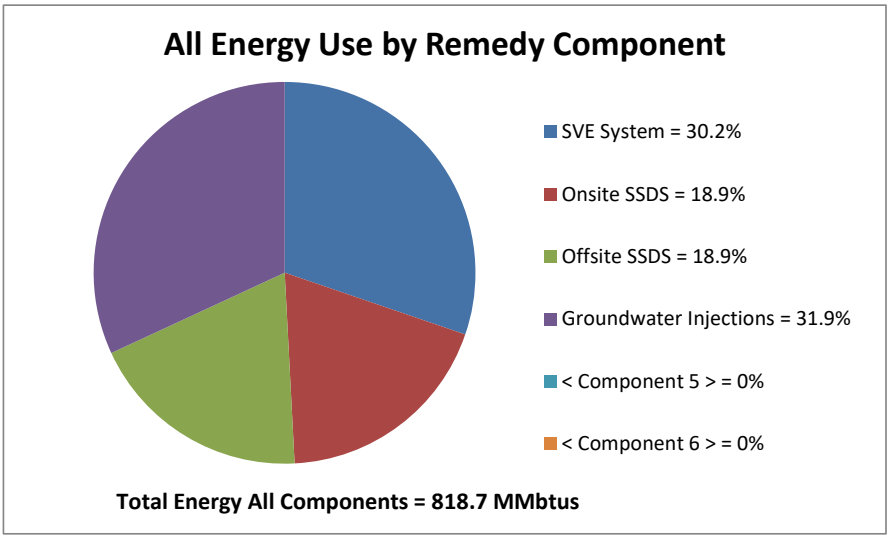
UL Listed File #	None
UL Recognized File #	E189258
UL Hazardous File #	None
CE	View CE declarations
RoHS Status	Yes (See CE Doc)
EU REACH	View EU REACH document

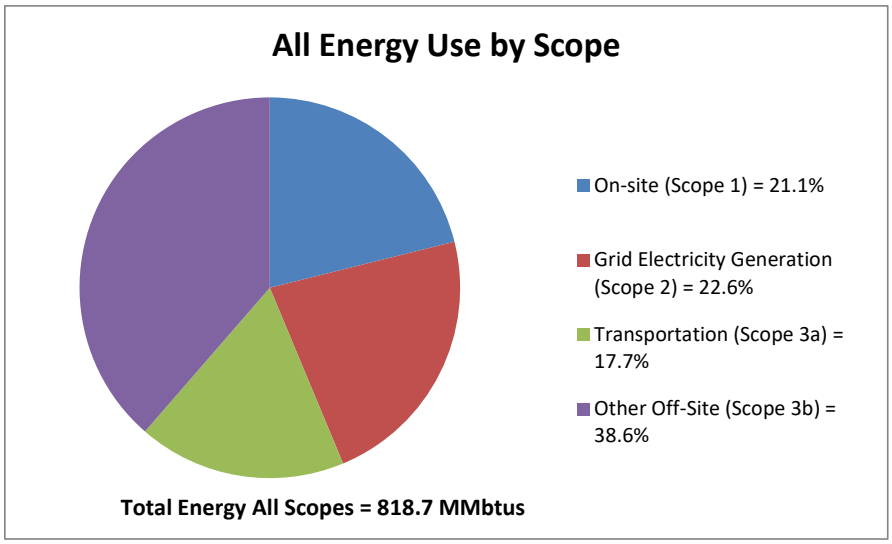
Dimensional Drawings

2D Drawing PDF Link:
https://cdn.automationdirect.com/static/drawings/GCX1131.pdf
See store item page for other formats.

APPENDIX 11 – ENVIRONMENTAL FOOTPRINT ANALYSIS


All Energy Use by Remedy Component and Scope
(in MMbtu)
300
250
200
150
100
50
0
SVE System
Onsite SSDS
Offsite SSDS
Groundwater ...
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
Total Energy All Components = 818.7 MMbtus


All Energy Use by Remedy Component
SVE System = 30.2%
Onsite SSDS = 18.9%
Offsite SSDS = 18.9%
Groundwater Injections = 31.9%
< Component 5 > = 0%
< Component 6 > = 0%
Total Energy All Components = 818.7 MMbtus


All Energy Use by Scope
On-site (Scope 1) = 21.1%
Grid Electricity Generation (Scope 2) = 22.6%
Transportation (Scope 3a) = 17.7%
Other Off-Site (Scope 3b) = 38.6%
Total Energy All Scopes = 818.7 MMbtus

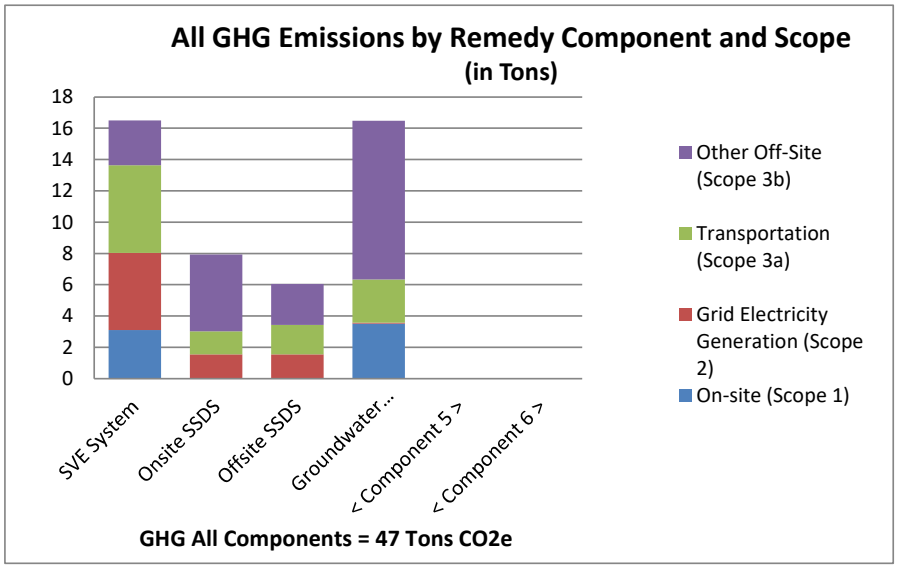
Total Energy
MMbtus

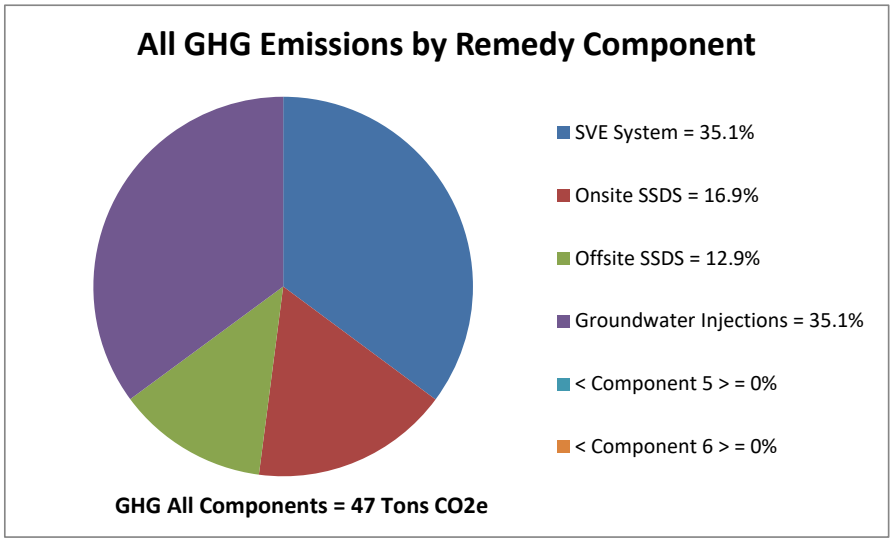
	SVE Systen	Onsite SSD	Offsite SSD	Groundwa	< Compon	< Compon	Total	
On-site (Scope 1)	68.3	30.0	29.9	44.7	0.0	0.0	172.9	
' Generation (Scope 2)	60.7	60.9	60.7	2.8	0.0	0.0	185.0	d Electricity
ısportation (Scope 3a)	69.2	18.3	23.2	34.0	0.0	0.0	144.8	Trar
ıer Off-Site (Scope 3b)	49.3	45.9	41.3	179.6	0.0	0.0	316.0	Otl
Total	247.5	155.1	155.1	261.0	0.0	0.0	818.7	

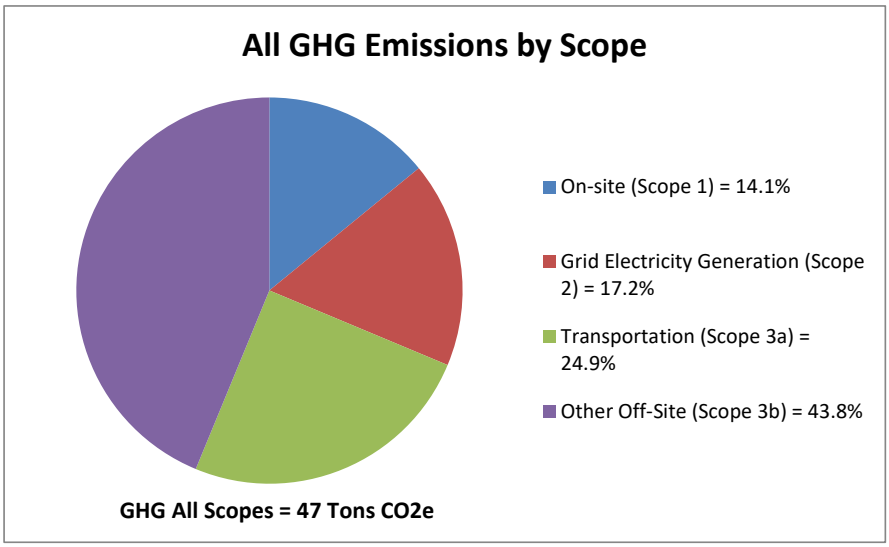
SVE System = 30.2%
Onsite SSDS = 18.9%
Offsite SSDS = 18.9%
Groundwater Injections = 31.9%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 21.1%
Grid Electricity Generation (Scope 2) = 22.6%
Transportation (Scope 3a) = 17.7%
Other Off-Site (Scope 3b) = 38.6%

Total Energy All Components = 818.7 MMbtus
Total Energy All Scopes = 818.7 MMbtus


All GHG Emissions by Remedy Component and Scope
(in Tons)
18
16
14
12
10
8
6
4
2
0
SVE System
Onsite SSDS
Offsite SSDS
Groundwater ...
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
GHG All Components = 47 Tons CO2e


All GHG Emissions by Remedy Component
SVE System = 35.1%
Onsite SSDS = 16.9%
Offsite SSDS = 12.9%
Groundwater Injections = 35.1%
< Component 5 > = 0%
< Component 6 > = 0%
GHG All Components = 47 Tons CO2e

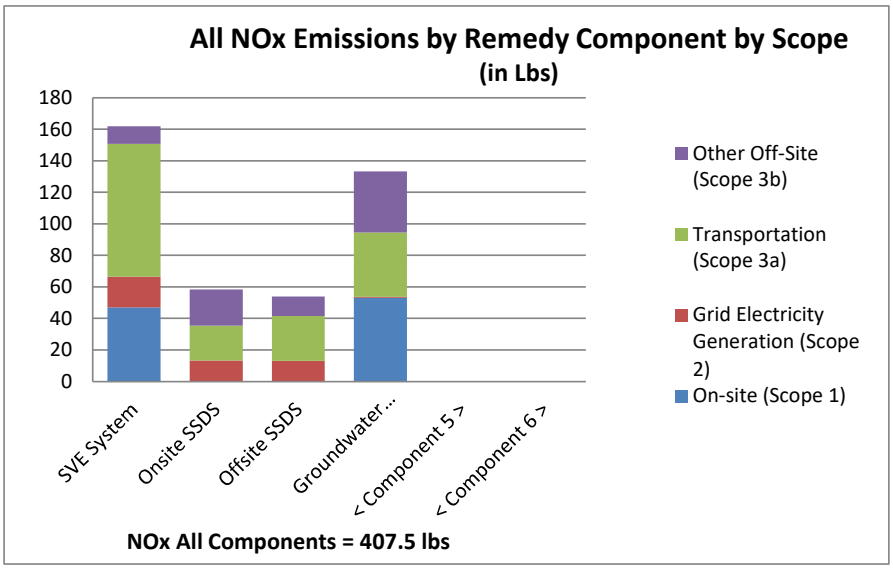

All GHG Emissions by Scope
On-site (Scope 1) = 14.1%
Grid Electricity Generation (Scope 2) = 17.2%
Transportation (Scope 3a) = 24.9%
Other Off-Site (Scope 3b) = 43.8%
GHG All Scopes = 47 Tons CO2e

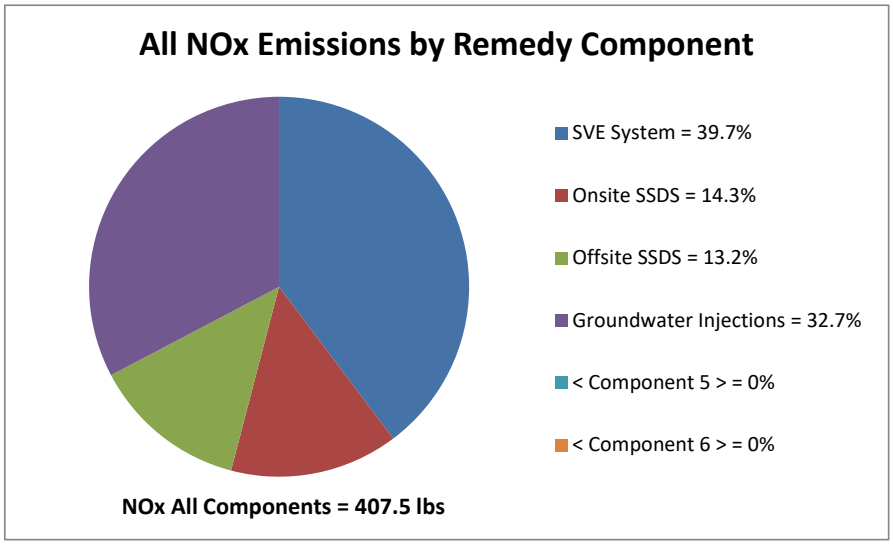
GHG Tons CO2e	SVE Systen	Onsite SSD	Offsite SSD	Groundwa	< Compone	< Compone	Total	
On-site (Scope 1)	3.1	0.0	0.0	3.5	0.0	0.0	6.6	
Generation (Scope 2)	4.9	1.5	1.5	0.1	0.0	0.0	8.1	d Electricity
nsportation (Scope 3a)	5.6	1.5	1.9	2.7	0.0	0.0	11.7	Trar
ner Off-Site (Scope 3b)	2.9	4.9	2.6	10.2	0.0	0.0	20.5	Oth
Total	16.5	7.9	6.0	16.5	0.0	0.0	47.0	

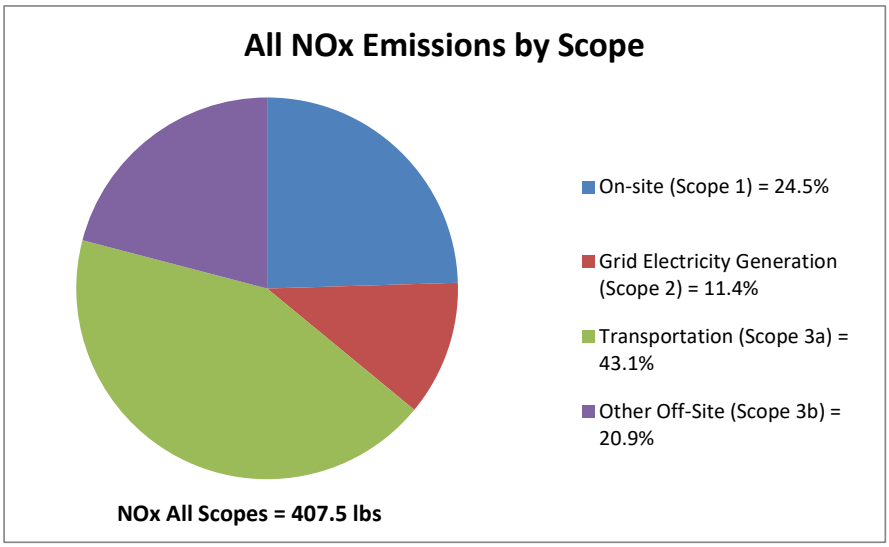
SVE System = 35.1%
Onsite SSDS = 16.9%
Offsite SSDS = 12.9%
Groundwater Injections = 35.1%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 14.1%
Grid Electricity Generation (Scope 2) = 17.2%
Transportation (Scope 3a) = 24.9%
Other Off-Site (Scope 3b) = 43.8%

GHG All Components = 47 Tons CO2e
GHG All Scopes = 47 Tons CO2e


All NOx Emissions by Remedy Component by Scope
(in Lbs)
180
160
140
120
100
80
60
40
20
0
SVE System
Onsite SSDS
Offsite SSDS
Groundwater...
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
NOx All Components = 407.5 lbs


All NOx Emissions by Remedy Component
SVE System = 39.7%
Onsite SSDS = 14.3%
Offsite SSDS = 13.2%
Groundwater Injections = 32.7%
< Component 5 > = 0%
< Component 6 > = 0%
NOx All Components = 407.5 lbs

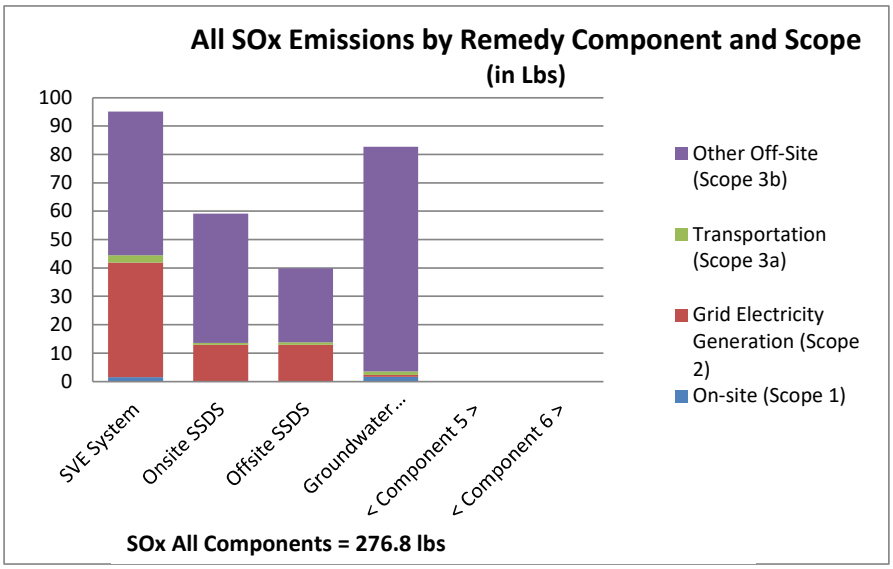

All NOx Emissions by Scope
On-site (Scope 1) = 24.5%
Grid Electricity Generation (Scope 2) = 11.4%
Transportation (Scope 3a) = 43.1%
Other Off-Site (Scope 3b) = 20.9%
NOx All Scopes = 407.5 lbs

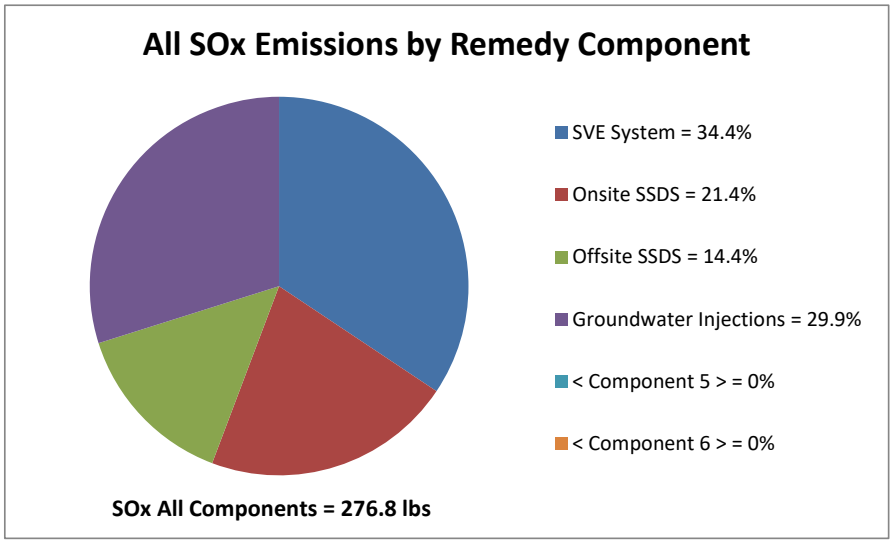
NOx lbs	SVE Systen	Onsite SSD	Offsite SSD	Groundwa	< Compon	< Compon	Total	
On-site (Scope 1)	46.9	0.0	0.0	53.0	0.0	0.0	100.0	
Generation (Scope 2)	19.6	13.2	13.2	0.6	0.0	0.0	46.6	d Electricity
nsportation (Scope 3a)	84.1	22.2	28.3	40.9	0.0	0.0	175.5	Trar
ner Off-Site (Scope 3b)	11.2	23.0	12.3	38.8	0.0	0.0	85.4	Oth
Total	161.9	58.4	53.8	133.3	0.0	0.0	407.5	

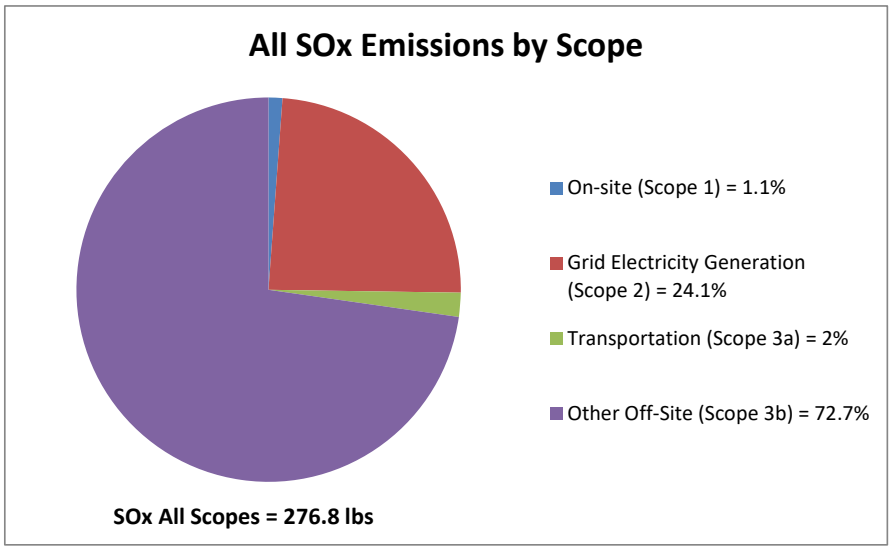
SVE System = 39.7%
Onsite SSDS = 14.3%
Offsite SSDS = 13.2%
Groundwater Injections = 32.7%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 24.5%
Grid Electricity Generation (Scope 2) = 11.4%
Transportation (Scope 3a) = 43.1%
Other Off-Site (Scope 3b) = 20.9%

NOx All Components = 407.5 lbs
NOx All Scopes = 407.5 lbs


All SOx Emissions by Remedy Component and Scope
(in Lbs)
100
90
80
70
60
50
40
30
20
10
0
SVE System
Onsite SSDS
Offsite SSDS
Groundwater...
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
SOx All Components = 276.8 lbs


All SOx Emissions by Remedy Component
SVE System = 34.4%
Onsite SSDS = 21.4%
Offsite SSDS = 14.4%
Groundwater Injections = 29.9%
< Component 5 > = 0%
< Component 6 > = 0%
SOx All Components = 276.8 lbs

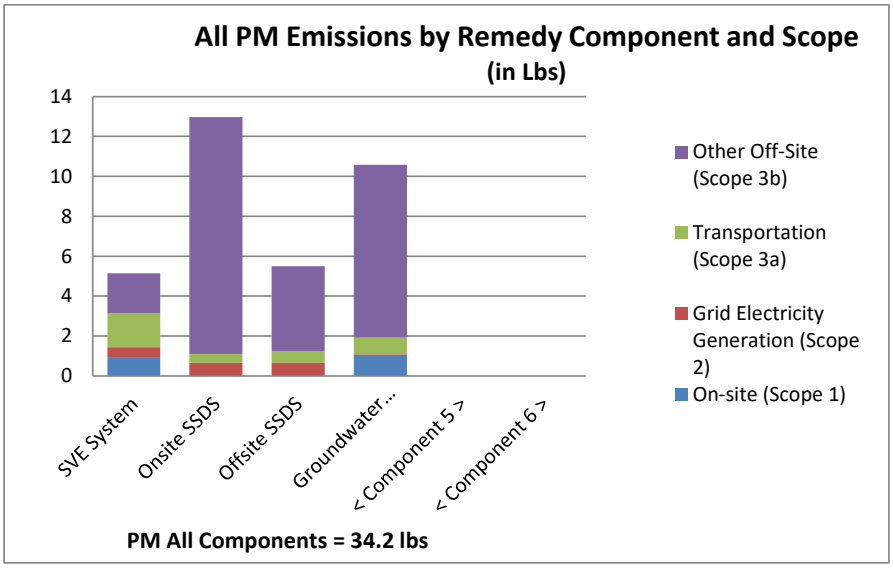

All SOx Emissions by Scope
On-site (Scope 1) = 1.1%
Grid Electricity Generation (Scope 2) = 24.1%
Transportation (Scope 3a) = 2%
Other Off-Site (Scope 3b) = 72.7%
SOx All Scopes = 276.8 lbs

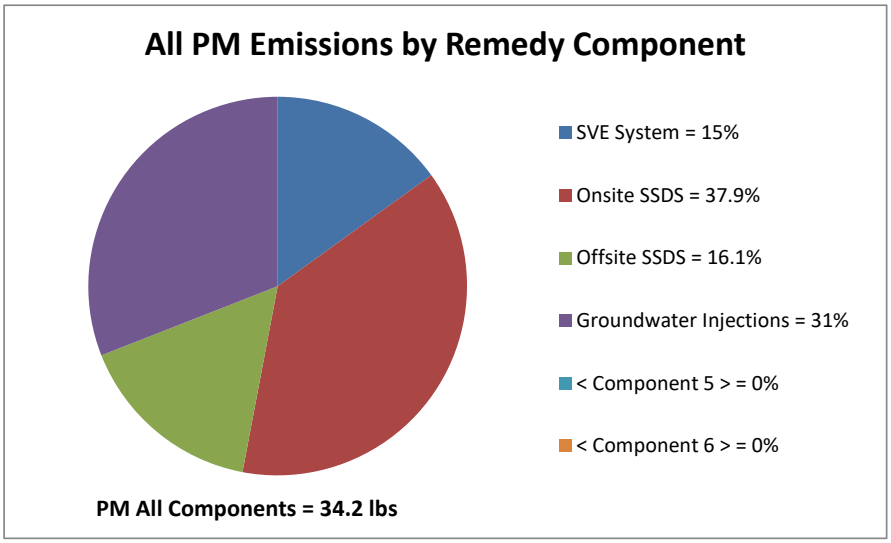
SOx lbs	SVE Systen	Onsite SSD	Offsite SSD	Groundwa	< Compone	< Compone	Total	
On-site (Scope 1)	1.5	0.0	0.0	1.7	0.0	0.0	3.2	
Generation (Scope 2)	40.4	12.9	12.9	0.6	0.0	0.0	66.7	d Electricity
nsportation (Scope 3a)	2.7	0.7	0.9	1.3	0.0	0.0	5.6	Trar
ner Off-Site (Scope 3b)	50.6	45.5	26.1	79.1	0.0	0.0	201.3	Oth
Total	95.1	59.1	39.8	82.7	0.0	0.0	276.8	

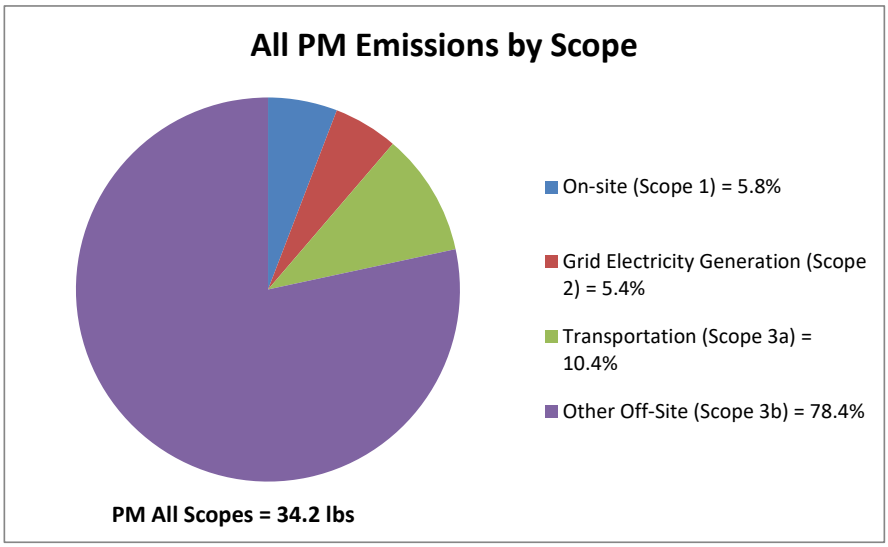
SVE System = 34.4%
Onsite SSDS = 21.4%
Offsite SSDS = 14.4%
Groundwater Injections = 29.9%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 1.1%
Grid Electricity Generation (Scope 2) = 24.1%
Transportation (Scope 3a) = 2%
Other Off-Site (Scope 3b) = 72.7%

SOx All Components = 276.8 lbs
SOx All Scopes = 276.8 lbs


All PM Emissions by Remedy Component and Scope
(in Lbs)
14
12
10
8
6
4
2
0
SVE System
Onsite SSDS
Offsite SSDS
Groundwater...
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
PM All Components = 34.2 lbs


All PM Emissions by Remedy Component
SVE System = 15%
Onsite SSDS = 37.9%
Offsite SSDS = 16.1%
Groundwater Injections = 31%
< Component 5 > = 0%
< Component 6 > = 0%
PM All Components = 34.2 lbs


All PM Emissions by Scope
On-site (Scope 1) = 5.8%
Grid Electricity Generation (Scope 2) = 5.4%
Transportation (Scope 3a) = 10.4%
Other Off-Site (Scope 3b) = 78.4%
PM All Scopes = 34.2 lbs

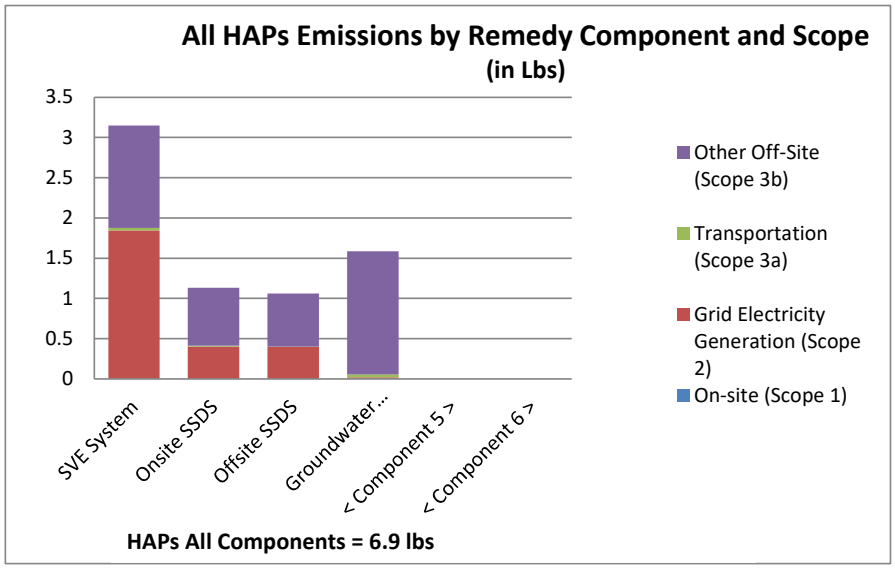
PM lbs

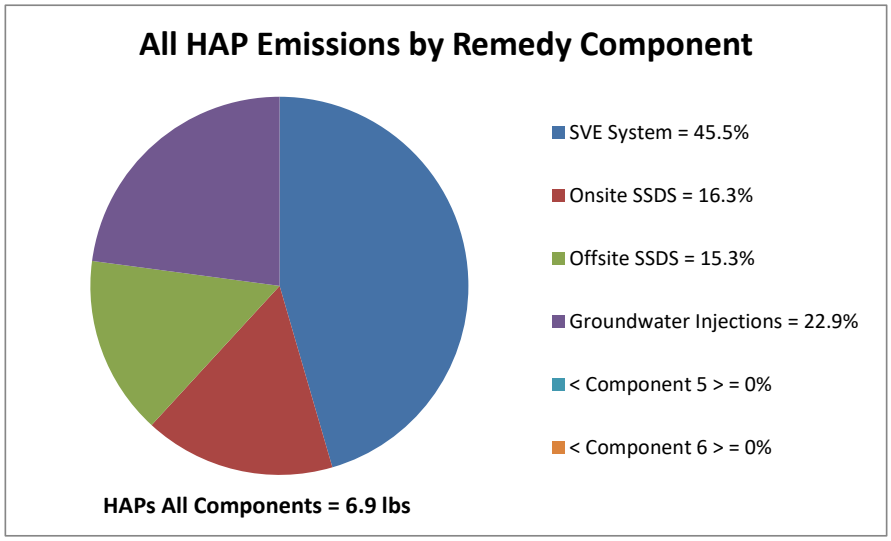
	SVE Systen	Onsite SSD	Offsite SSD	Groundwa	< Compon	< Compon	Total	
On-site (Scope 1)	0.9	0.0	0.0	1.1	0.0	0.0	2.0	
Generation (Scope 2)	0.5	0.7	0.7	0.0	0.0	0.0	1.9	d Electricity
nsportation (Scope 3a)	1.7	0.4	0.6	0.8	0.0	0.0	3.5	Trar
ner Off-Site (Scope 3b)	2.0	11.9	4.3	8.7	0.0	0.0	26.8	Oth
Total	5.1	13.0	5.5	10.6	0.0	0.0	34.2	

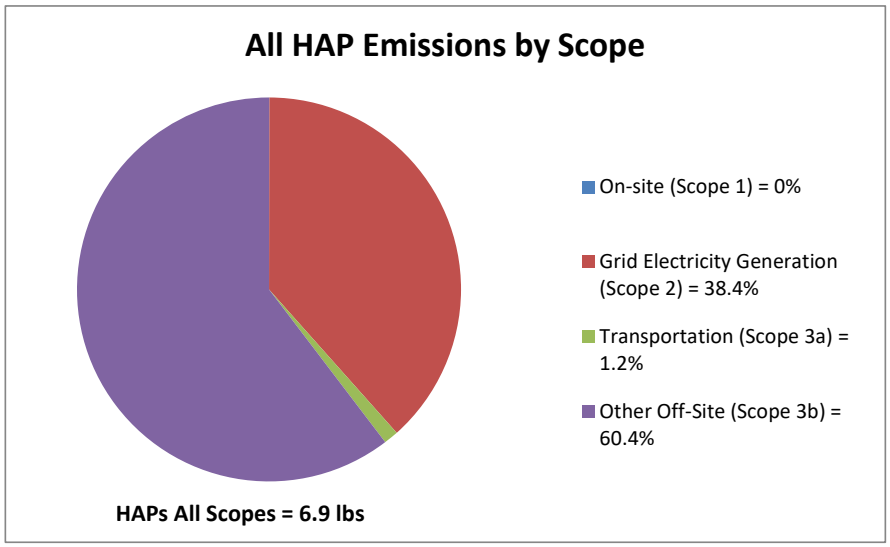
SVE System = 15%
Onsite SSDS = 37.9%
Offsite SSDS = 16.1%
Groundwater Injections = 31%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 5.8%
Grid Electricity Generation (Scope 2) = 5.4%
Transportation (Scope 3a) = 10.4%
Other Off-Site (Scope 3b) = 78.4%

PM All Components = 34.2 lbs
PM All Scopes = 34.2 lbs


All HAPs Emissions by Remedy Component and Scope
(in Lbs)
3.5
3
2.5
2
1.5
1
0.5
0
SVE System
Onsite SSDS
Offsite SSDS
Groundwater ...
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
HAPs All Components = 6.9 lbs


All HAP Emissions by Remedy Component
SVE System = 45.5%
Onsite SSDS = 16.3%
Offsite SSDS = 15.3%
Groundwater Injections = 22.9%
< Component 5 > = 0%
< Component 6 > = 0%
HAPs All Components = 6.9 lbs


All HAP Emissions by Scope
On-site (Scope 1) = 0%
Grid Electricity Generation (Scope 2) = 38.4%
Transportation (Scope 3a) = 1.2%
Other Off-Site (Scope 3b) = 60.4%
HAPs All Scopes = 6.9 lbs

HAPs
lbs

	SVE Systen	Onsite SSD	Offsite SSD	Groundwa	< Compone	< Compone	Total
On-site (Scope 1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
' Generation (Scope 2)	1.8	0.4	0.4	0.0	0.0	0.0	2.7
ısportation (Scope 3a)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
ıer Off-Site (Scope 3b)	1.3	0.7	0.7	1.5	0.0	0.0	4.2
Total	3.1	1.1	1.1	1.6	0.0	0.0	6.9

SVE System = 45.5%
Onsite SSDS = 16.3%
Offsite SSDS = 15.3%
Groundwater Injections = 22.9%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 0%
Grid Electricity Generation (Scope 2) = 38.4%
Transportation (Scope 3a) = 1.2%
Other Off-Site (Scope 3b) = 60.4%

HAPs All Components = 6.9 lbs
HAPs All Scopes = 6.9 lbs

Environmental Footprint Summary

Core Element	Metric		Unit of Measure	Footprint						
				SVE System	Onsite SSDS	Offsite SSDS	Groundwater Injections	< Component 5 >	< Component 6 >	Total
Materials & Waste	M&W-1	Refined materials used on-site	Tons	2.2	1.8	0.7	7.4	0.0	0.0	12.1
	M&W-2	% of refined materials from recycled or reused material	%	0.0%	0.0%	0.0%	0.0%			0.0%
	M&W-3	Unrefined materials used on-site	Tons	0.660	0.000	0.000	2.527	0.000	0.000	3.2
	M&W-4	% of unrefined materials from recycled or reused material	%	0.0%			0.0%			0.0%
	M&W-5	On-site hazardous waste disposed of off-site	Tons	0.7	0.6	0.0	0.0	0.0	0.0	1.3
	M&W-6	On-site non-hazardous waste disposed of off-site	Tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M&W-7	Recycled or reused waste	Tons	1.1	1.1	0.0	0.0	0.0	0.0	2.3
	M&W-8	% of total potential waste recycled or reused	%	62.0%	65.5%					63.7%
Water (used on-site)	W-1	Public water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-2	Groundwater use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-3	Surface water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-4	Reclaimed water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-5	Storm water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-6	User-defined water resource #1	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-7	User-defined water resource #2	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-8	Wastewater generated	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy	E-1	Total energy used (on-site and off-site)	MMBtu	247.5	155.1	155.1	261.0	0.0	0.0	818.7
	E-2	Energy voluntarily derived from renewable resources								
	E-2A	On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation	MMBtu	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-2B	Voluntary purchase of renewable electricity	MWh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-3	Voluntary purchase of RECs	MWh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-4	On-site grid electricity use	MWh	8.760	8.784	8.760	0.400	0.000	0.000	26.7
Air	A-1	On-site NOx, SOx, and PM emissions	Pounds	49.3	0.0	0.0	55.8	0.0	0.0	105.1
	A-2	On-site HAP emissions	Pounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	A-3	Total NOx, SOx, and PM emissions	Pounds	262.2	130.5	99.2	226.6	0.0	0.0	718.5
	A-3A	Total NOx emissions	Pounds	161.9	58.4	53.8	133.3	0.0	0.0	407.5
	A-3B	Total SOx emissions	Pounds	95.1	59.1	39.8	82.7	0.0	0.0	276.8
	A-3C	Total PM emissions	Pounds	5.1	13.0	5.5	10.6	0.0	0.0	34.2
	A-4	Total HAP emissions	Pounds	3.1	1.1	1.1	1.6	0.0	0.0	6.9
	A-5	Total greenhouse gas emissions	Tons CO2e*	16.5	7.9	6.0	16.5	0.0	0.0	47.0
Land & Ecosystems	Qualitative Description									

** Total greenhouse gases emissions (in CO2e) include consideration of CO2, CH4, and N2O (Nitrous oxide) emissions.*
"MMBtu" = millions of Btus
"MG" = millions of gallons
"CO2e" = carbon dioxide equivalents of global warming potential
"MWh" = megawatt hours (i.e., thousands of kilowatt-hours or millions of Watt-hours)
"Tons" = short tons (2,000 pounds)

The above metrics are consistent with EPA's Methodology for Understanding and Reducing a Project's Environmental Footprint (EPA 542-R-12-002), February 2012

Notes:

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019
Teitelbaum Dry Cleaning Inc. - Teitelbaum Remedial Action

Input Summary

Remedy Component Number →		1	2	3	4	5	6									Remedy Component Subtotals						
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations)																				
Item		SVE System	Onsite SSDS	Offsite SSDS	Groundwater Injections	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
On-Site																						
On-site Renewable Energy																						
Renewable electricity generated on-site	MWh	0	0	0	0											0	0	0	0	0	0	0
Landfill gas combusted on-site for energy use	ccf CH_4	0	0	0	0											0	0	0	0	0	0	0
On-site biodiesel use	gal	0	0	0	0											0	0	0	0	0	0	0
On-site biodiesel use - Other	gal	0	0	0	0											0	0	0	0	0	0	0
User-defined on-site renewable energy use #1	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined on-site renewable energy use #2	TBD	0	0	0	0											0	0	0	0	0	0	0
On-Site Conventional Energy																						
Grid electricity	MWh	8.76	8.784	8.76	0.4											8.76	8.784	8.76	0.4	0	0	26.704
On-site diesel use - Other	Gal	276	0	0	312											276	0	0	312	0	0	588
On-site diesel use <75 hp	Gal	0	0	0	0											0	0	0	0	0	0	0
On-site diesel use 75<hp<750	Gal	0	0	0	0											0	0	0	0	0	0	0
On-site diesel use >750 hp	Gal	0	0	0	0											0	0	0	0	0	0	0
On-site gasoline use - Other	Gal	0	0	0	0											0	0	0	0	0	0	0
On-site gasoline use <25 hp	Gal	0	0	0	0											0	0	0	0	0	0	0
On-site gasoline use >25 hp	Gal	0	0	0	0											0	0	0	0	0	0	0
On-site natural gas use	ccf	0	0	0	0											0	0	0	0	0	0	0
On-site compressed natural gas use - Other	ccf	0	0	0	0											0	0	0	0	0	0	0
On-site compressed natural gas use	ccf	0	0	0	0											0	0	0	0	0	0	0
On-site liquified petroleum gas use - Other	gal	0	0	0	0											0	0	0	0	0	0	0
On-site liquified petroleum gas use	gal	0	0	0	0											0	0	0	0	0	0	0
Other forms of on-site conventional energy use #1	TBD	0	0	0	0											0	0	0	0	0	0	0
Other forms of on-site conventional energy use #2	TBD	0	0	0	0											0	0	0	0	0	0	0
Other On-site Emissions																						
On-site HAP process emissions	Lbs	0	0	0	0											0	0	0	0	0	0	0
On-site GHG emissions	Lbs CO2e	0	0	0	0											0	0	0	0	0	0	0
On-site carbon storage	Lbs CO2e	0	0	0	0											0	0	0	0	0	0	0
GHG avoided by flaring on-site landfill methane	ccf CH4	0	0	0	0											0	0	0	0	0	0	0
Other on-site NOx emissions or reductions	Lbs	0	0	0	0											0	0	0	0	0	0	0
Other on-site SOx emissions or reductions	Lbs	0	0	0	0											0	0	0	0	0	0	0
Other on-site PM emissions or reductions	Lbs	0	0	0	0											0	0	0	0	0	0	0
Electricity Generation																						
Grid electricity	MWh	8.76	8.784	8.76	0.4											8.76	8.784	8.76	0.4	0	0	26.704
Voluntary purchase of renewable electricity	MWh	0	0	0	0											0	0	0	0	0	0	0
Voluntary purchase of RECs	MWh	0	0	0	0											0	0	0	0	0	0	0
Transportation																						
Transportation Fuel Use Breakdown																						
Biodiesel use - Personnel Transport	gal	0	0	0	0											0	0	0	0	0	0	0
Biodiesel use - Personnel Transport - User Defined	gal	0	0	0	0											0	0	0	0	0	0	0
Biodiesel use - Equipment Transport	gal	0	0	0	0											0	0	0	0	0	0	0
Biodiesel use - Equipment Transport - User Defined	gal	0	0	0	0											0	0	0	0	0	0	0
Biodiesel use - Material Transport	gal	0	0	0	0											0	0	0	0	0	0	0
Biodiesel use - Material Transport - User Defined	gal	0	0	0	0											0	0	0	0	0	0	0
Biodiesel use - Waste Transport	gal	0	0	0	0											0	0	0	0	0	0	0
Biodiesel use - Waste Transport - User Defined	gal	0	0	0	0											0	0	0	0	0	0	0
Diesel use - Personnel Transport - other vehicles	gal	120.8	60.4	0	151											120.8	60.4	0	151	0	0	332.2
Diesel use - Personnel Transport - car	gal	0	0	0	0											0	0	0	0	0	0	0
Diesel use - Personnel Transport - passenger truck	gal	0	0	0	0											0	0	0	0	0	0	0
Diesel use - Personnel Transport - User Defined	gal	0	0	0	0											0	0	0	0	0	0	0
Diesel use - Equipment Transport	gal	152	0	0	50.7											152	0	0	50.7	0	0	202.7
Diesel use - Equipment Transport - User Defined	gal	0	0	0	0											0	0	0	0	0	0	0
Diesel use - Material Transport	gal	177.334	44.332	166.666	37.998											177.334	44.332	166.666	37.998	0	0	426.33
Diesel use - Material Transport - User Defined	gal	0	0	0	0											0	0	0	0	0	0	0
Diesel use - Waste Transport	gal	44.1	25.4	0	0											44.1	25.4	0	0	0	0	69.5
Diesel use - Waste Transport - User Defined	gal	0	0	0	0											0	0	0	0	0	0	0
Gasoline use - Personnel Transport - other vehicles	gal	0	0	0	0											0	0	0	0	0	0	0
Gasoline use - Personnel Transport - car	gal	4.4	2	0.4	5.2											4.4	2	0.4	5.2	0	0	12
Gasoline use - Personnel Transport - passenger truck	gal	0	0	0	0											0	0	0	0	0	0	0
Gasoline use - Personnel Transport - User Defined	gal	0	0	0	0											0	0	0	0	0	0	0
Gasoline use - Equipment Transport	gal	0	0	0	0											0	0	0	0	0	0	0
Gasoline use - Equipment Transport - User Defined	gal	0	0	0	0											0	0	0	0	0	0	0
Natural Gas use - Personnel Transport	ccf	0	0	0	0											0	0	0	0	0	0	0
Natural Gas use - Personnel Transport - User Defined	ccf	0	0	0	0											0	0	0	0	0	0	0
Natural Gas use - Equipment Transport	ccf	0	0	0	0											0	0	0	0	0	0	0

Input Summary

Remedy Component Number →		1	2	3	4	5	6									Remedy Component Subtotals						
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Item		SVE System	Onsite SSDS	Offsite SSDS	Groundwater Injections	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
Conventional Energy																						
Transportation diesel use	gal	494.234	130.132	166.666	239.698											494.234	130.132	166.666	239.698	0	0	1030.73
Transportation gasoline use	gal	4.4	2	0.4	5.2											4.4	2	0.4	5.2	0	0	12
Transportation natural gas use	ccf	0	0	0	0											0	0	0	0	0	0	0
User-defined conventional energy transportation #1	TBD	10	10	10	10											10	10	10	10	0	0	40
User-defined conventional energy transportation #2	TBD	0	0	0	0											0	0	0	0	0	0	0
Renewable Energy																						
Transportation biodiesel use	gal	0	0	0	0											0	0	0	0	0	0	0
User-defined renewable energy transportation #1	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined renewable energy transportation #2	TBD	0	0	0	0											0	0	0	0	0	0	0
Off-Site																						
Construction Materials																						
Aluminum, Rolled Sheet	lb	0	0	0	0											0	0	0	0	0	0	0
Asphalt, mastic	lb	0	0	0	0											0	0	0	0	0	0	0
Asphalt, paving-grade	lb	0	0	0	0											0	0	0	0	0	0	0
Ethanol, Corn, 95%	lb	0	0	0	0											0	0	0	0	0	0	0
Ethanol, Corn, 99.7%	lb	0	0	0	0											0	0	0	0	0	0	0
Ethanol, Petroleum, 99.7%	lb	0	0	0	0											0	0	0	0	0	0	0
Gravel/Sand Mix, 65% Gravel	lb	0	0	0	0											0	0	0	0	0	0	0
Gravel/sand/clay	lb	0	0	0	0											0	0	0	0	0	0	0
HDPE	lb	0	0	0	0											0	0	0	0	0	0	0
Photovoltaic system (installed)	W	0	0	0	0											0	0	0	0	0	0	0
PVC	lb	506	0	600	394											506	0	600	394	0	0	1500
Portland cement, US average	lb	3913	950	0	3952																	
Ready-mixed concrete, 20 MPa	ft3	0	0	0	0											0	0	0	0	0	0	0
Round Gravel	lb	0	90	0	0											0	90	0	0	0	0	90
Sand	lb	1320	0	0	5054											1320	0	0	5054	0	0	6374
Stainless Steel	lb	0	2490.4	800	0											0	2490.4	800	0	0	0	3290.4
Steel	lb	0	0	0	0											0	0	0	0	0	0	0
Other refined construction materials	lb	0	50	0	0											0	50	0	0	0	0	50
Other unrefined construction materials	lb	0	0	0	0											0	0	0	0	0	0	0
Treatment Materials & Chemicals																						
Cheese Whey	lbs	0	0	0	0											0	0	0	0	0	0	0
Emulsified vegetable oil	lbs	0	0	0	0											0	0	0	0	0	0	0
Granular activated carbon, primary	lbs	0	0	0	0											0	0	0	0	0	0	0
Granular activated carbon, regenerated	lbs	0	0	0	0											0	0	0	0	0	0	0
Hydrogen Peroxide, 50% in H2O	lbs	0	0	0	0											0	0	0	0	0	0	0
Iron (II) Sulfate	lbs	0	0	0	0											0	0	0	0	0	0	0
Lime, Hydrated, Packed	lbs	0	0	0	0											0	0	0	0	0	0	0
Molasses	lbs	0	0	0	0											0	0	0	0	0	0	0
Phosphoric Acid, 70% in H2O	lbs	0	0	0	0											0	0	0	0	0	0	0
Potassium Permanganate	lbs	0	0	0	0											0	0	0	0	0	0	0
Sodium Hydroxide, 50% in H2O	lbs	0	0	0	0											0	0	0	0	0	0	0
Other Treatment Chemicals & Materials	lbs	0	0	0	10502											0	0	0	10502	0	0	10502
Material Type																						
Total Virgin Refined Materials	tons	2.2095	1.7902	0.7	7.424											2.2095	1.7902	0.7	7.424	0	0	12.1237
Total Recycled Refined Materials	tons	0	0	0	0											0	0	0	0	0	0	0
Total Reused Refined Materials	tons	0	0	0	0											0	0	0	0	0	0	0
Total Refined Material	tons	2.2095	1.7902	0.7	7.424											2.2095	1.7902	0.7	7.424	0	0	12.1237
Total Virgin Unrefined Materials	tons	0.66	0	0	2.527											0.66	0	0	2.527	0	0	3.187
Total Recycled Unrefined Materials	tons	0	0	0	0											0	0	0	0	0	0	0
Total Reused Unrefined Materials	tons	0	0	0	0											0	0	0	0	0	0	0
Total Unrefined Material	tons	0.66	0	0	2.527											0.66	0	0	2.527	0	0	3.187
Fuel Processing																						
Biodiesel produced	gal	0	0	0	0											0	0	0	0	0	0	0
Diesel produced	gal	770.234	130.132	166.666	551.698											770.234	130.132	166.666	551.698	0	0	1618.73
Gasoline produced	gal	4.4	2	0.4	5.2											4.4	2	0.4	5.2	0	0	12
Compressed natural gas produced	ccf	0	0	0	0											0	0	0	0	0	0	0
Liquified petroleum gas produced	gal	0	0	0	0											0	0	0	0	0	0	0
Natural gas produced	ccf	0	0	0	0											0	0	0	0	0	0	0
Water Use																						
Public Water Supply	gal x 1000	0.069	0	0	19.252											0.069	0	0	19.252	0	0	19.321
Extracted Groundwater	gal x 1000	0	0	0	0											0	0	0	0	0	0	0
Surface Water	gal x 1000	0	0	0	0											0	0	0	0	0	0	0
Reclaimed Water	gal x 1000	0	0	0	0											0	0	0	0	0	0	0
Collected/Diverted Storm Water	gal x 1000	0	0	0	0											0	0	0	0	0	0	0
User-defined water resource #1	gal x 1000	0	0	0	0											0	0	0	0	0	0	0
User-defined water resource #2	gal x 1000	0	0	0	0											0	0	0	0	0	0	0

Input Summary

Remedy Component Number →		1	2	3	4	5	6									Remedy Component Subtotals						
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Waste/Recycle Handling																						
Hazardous waste incineration	lbs	0	0	0	0											0	0	0	0	0	0	0
Off-site waste water treatment (POTW)	gal x 1000	0	0	0	0											0	0	0	0	0	0	0
Off-site non-hazardous waste landfill	tons	0	0	0	0											0	0	0	0	0	0	0
Off-site hazardous waste landfill	tons	0.7	0.6	0	0											0.7	0.6	0	0	0	0	1.3
Recycled/Reused On-Site	tons	0	0	0	0											0	0	0	0	0	0	0
Recycled/Reused Off-Site	tons	1.14	1.14	0	0											1.14	1.14	0	0	0	0	2.28
Solid Waste Totals																						
Total Non-Hazardous Waste	tons	0	0	0	0											0	0	0	0	0	0	0
Total Hazardous Waste	tons	0.7	0.6	0	0											0.7	0.6	0	0	0	0	1.3
Total Recycled/Reused	tons	1.14	1.14	0	0											1.14	1.14	0	0	0	0	2.28
Total Waste (all types)	tons	1.84	1.74	0	0											1.84	1.74	0	0	0	0	3.58
Lab Services																						
Off-site Laboratory Analysis - Other	sample	0	0	0	0											0	0	0	0	0	0	0
Off-site Laboratory Analysis - Metals	sample	0	0	0	2											0	0	0	2	0	0	2
Off-site Laboratory Analysis - Mercury	sample	0	0	0	0											0	0	0	0	0	0	0
Off-site Laboratory Analysis - Inorganic Anions	sample	0	0	0	2											0	0	0	2	0	0	2
Off-site Laboratory Analysis - Alkalinity	sample	0	0	0	2											0	0	0	2	0	0	2
Off-site Laboratory Analysis - Perchlorate	sample	0	0	0	0											0	0	0	0	0	0	0
Off-site Laboratory Analysis - Nitrogen/Nitrate	sample	0	0	0	2											0	0	0	2	0	0	2
Off-site Laboratory Analysis - Sulfate	sample	0	0	0	2											0	0	0	2	0	0	2
Off-site Laboratory Analysis - PCBs	sample	0	0	0	0											0	0	0	0	0	0	0
Off-site Laboratory Analysis - VOCs	sample	2	7	4	9											2	7	4	9	0	0	22
Off-site Laboratory Analysis - SVOCs	sample	0	0	0	0											0	0	0	0	0	0	0
Resource Extraction for Electricity																						
Coal extraction and processing	MWh	2.6718	0.52704	0.5256	0.024											2.6718	0.52704	0.5256	0.024	0	0	3.74844
Natural gas extraction and processing	MWh	2.96964	0.8784	0.876	0.04											2.96964	0.8784	0.876	0.04	0	0	4.76404
Nuclear fuel extraction and processing	MWh	1.73448	0.17568	0.1752	0.008											1.73448	0.17568	0.1752	0.008	0	0	2.09336
Oil extraction and processing	MWh	0.06132	0.4392	0.438	0.02											0.06132	0.4392	0.438	0.02	0	0	0.95852
Other fuel extraction and processing	MWh	0.00876	0	0	0											0.00876	0	0	0	0	0	0.00876
Electricity Transmission																						
Transmission and distribution losses	MWh	8.76	8.784	8.76	0.4											8.76	8.784	8.76	0.4	0	0	26.704

Input Summary

Remedy Component Number →		1	2	3	4	5	6									Remedy Component Subtotals						
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations)																				
Item		SVE System	Onsite SSDS	Offsite SSDS	Groundwater Injections	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
Other																						
User-defined material #1	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #2	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #3	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #4	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #5	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #6	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #7	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #8	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #9	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #10	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #11	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #12	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #13	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #14	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #15	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #16	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #17	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #18	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #19	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined material #20	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined Waste Destinations																						
User-defined recycled/reused on-site #1	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused on-site #2	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused on-site #3	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused off-site #1	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused off-site #2	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused off-site #3	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined non-hazardous waste destination #1	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined non-hazardous waste destination #2	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined non-hazardous waste destination #3	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined hazardous waste destination #1	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined hazardous waste destination #2	TBD	0	0	0	0											0	0	0	0	0	0	0
User-defined hazardous waste destination #3	TBD	0	0	0	0											0	0	0	0	0	0	0

Groundwater Injections - On-Site Footprint (Scope 1)

Contributors to Footprints	Units	Usage	Energy		GHG		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
On-Site														
On-site Renewable Energy														
Renewable electricity generated on-site	MWh	0	3.413	0										
Landfill gas combusted on-site for energy use	ccf CH4	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
On-site biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
On-site biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
User-defined on-site renewable energy use #1	gal	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined on-site renewable energy use #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
On-site Renewable Energy Subtotals				**0**		**0**		**0**		**0**		**0**		**0**
Notes:														
On-site Conventional Energy														
On-site grid electricity	MWh	0.4	3.413	1.3652										
On-site diesel use - Other	Gal	312	0.139	43.368	22.5	7020	0.17	53.04	0.0054	1.6848	0.0034	1.0608	0.0000052	0.0016224
On-site diesel use <75 hp	Gal	0	0.139	0	22.21	0	0.1565	0	0.000145	0	0.0145	0	0.00004	0
On-site diesel use 75<hp<750	Gal	0	0.139	0	22.24	0	0.101	0	0.00013	0	0.009	0	0.00004	0
On-site diesel use >750 hp	Gal	0	0.139	0	22.24	0	0.149	0	0.00013	0	0.006	0	0.00004	0
On-site gasoline use - Other	Gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
On-site gasoline use <25 hp	Gal	0	0.124	0	17.48	0	0.037	0	0.00025	0	0.165	0	0.00008	0
On-site gasoline use >25 hp	Gal	0	0.124	0	19.93	0	0.032	0	0.00029	0	0.002	0	0.00009	0
On-site natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
On-site compressed natural gas use - Other	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site compressed natural gas use	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site liquified petroleum gas use - Other	gal	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
On-site liquified petroleum gas use	gal	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
Other forms of on-site conventional energy use #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Other forms of on-site conventional energy use #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
On-site Conventional Energy Subtotals				**45**		**7,020**		**53**		**2**		**1**		**0**
Notes:														
Other On-site Emissions														
On-site HAP process emissions	lbs	0											1	0
On-site GHG emissions	lbs CO2e	0			1	0								
On-site carbon storage	lbs CO2e	0			1	0								
GHG avoided by flaring on-site landfill methane	Lbs	0			-262	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Other on-site NOx emissions or reductions	lbs	0					1	0						
Other on-site SOx emissions or reductions	lbs	0							1	0				
Other on-site PM emissions or reductions	lbs	0									1	0		
User-defined recycled/reused on-site #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused on-site #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
On-site Totals				**44.73**		**7,020**		**53**		**2**		**1**		**0**

Groundwater Injections - Electricity Generation Footprint (Scope 2)

Contributors to Footprints	Units	Usage	Energy		GHG		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Electricity Generation														
Grid electricity	MWh	0.4	6.929	2.7716	352	140.8	1.504	0.6016	1.46966	0.587864	0.07546	0.030184	0.0454035	0.0181614
Voluntary purchase of renewable electricity	MWh	0												
Voluntary purchase of RECs	MWh	0												
Notes:														

Groundwater Injections - Transportation Footprint (Scope 3a)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Conventional Energy														
Transportation diesel use	gal	239.698	0.139	33.318022	22.5	5393.205	0.17	40.74866	0.0054	1.2943692	0.0034	0.8149732	0.0000052	0.0012464
Transportation diesel use - car	gal	0	0.139	0	22.57	0	0.015	0	0.0002	0	0.003	0	0.00252	0
Transportation diesel use - passenger truck	gal	0	0.139	0	22.545	0	0.0585	0	0.0002	0	0.007	0	0.002605	0
Transportation diesel use - User Defined	gal	0	0.139	0	22.5	0	0.17	0	0.0054	0	0.0034	0	0.0000052	0
Transportation gasoline use	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation gasoline use - car	gal	5.2	0.124	0.6448	19.77	102.804	0.027	0.1404	0.00036	0.001872	0.003	0.0156	0.0067	0.03484
Transportation gasoline use - passenger truck	gal	0	0.124	0	19.79	0	0.035	0	0.00036	0	0.003	0	0.00661	0
Transportation gasoline use - User Defined	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use - User Defined	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
User-defined conventional energy transportation #1	TBD	10	0	0	0	0	0	0	0	0	0	0	0	0
User-defined conventional energy transportation #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Conventional Energy Subtotals				**34**		**5,496**		**41**		**1**		**1**		**0**
Notes:														
Renewable Energy														
Transportation biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
User-defined renewable energy transportation #1	TBD	0	Biodiesel		0	0	0	0	0	0	0	0	Ref.	
User-defined renewable energy transportation #2	TBD	0	mpg or pmp		0	0	0	0	0	0	0	0	0	0
Renewable Energy Subtotals				**0**		**0**		**0**		**0**		**0**		**0**
Notes:														
Transportation Totals				**34**		**5496**		**41**		**1**		**1**		**0**

Groundwater Injections - Off-Site Footprint (Scope 3b)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Construction Materials														
Aluminum, Rolled Sheet	lb	0	0.0633	0	9.15	0	0.0148	0	0.0283	0	0.0088	0	0.00102	0
Asphalt, mastic	lb	0	0.0412	0	0.85	0	0.00271	0	0.00798	0	0.000766	0	0.00107	0
Asphalt, paving-grade	lb	0	0.5	0	8.58	0	0.0299	0	0.0969	0	0.0091	0	0.0133	0
Ethanol, Corn, 95%	lb	0	0.0318	0	-0.0199	0	0.00425	0	0.00303	0	0.000469	0	0.0000846	0
Ethanol, Corn, 99.7%	lb	0	0.0324	0	0.0591	0	0.00431	0	0.0031	0	0.000472	0	0.000087	0
Ethanol, Petroleum, 99.7%	lb	0	0.0205	0	1.25	0	0.00199	0	0.00214	0	0.000277	0	0.0000589	0
Gravel/Sand Mix, 65% Gravel	lb	0	0.0000248	0	0.0024	0	0.000018	0	4.52E-06	0	2.61E-06	0	3.08E-07	0
Gravel/sand/clay	lb	0	0.000028	0	0.00335	0	0.0000165	0	0.000015	0	0.000002	0	2.05E-10	0
HDPE	lb	0	0.0332	0	1.94	0	0.00325	0	0.00409	0	0.000439	0	0.0000641	0
Photovoltaic system (installed)	W	0	0.0336	0	4.47	0	0.015	0	0.032	0	0.00063	0	0.0000029	0
PVC	lb	394	0.0262	10.3228	2.02	795.88	0.004	1.576	0.00274	1.07956	0.000372	0.146568	0.000375	0.14775
Portland cement, US average	lb	0	0.0139	0	1.34	0	0.00654	0	0.0104	0	0.00378	0	0.00097	0
Ready-mixed concrete, 20 MPa	ft3	0	0.217	0	19.5	0	0.0975	0	0.154	0	0.057	0	0.0141	0
Round Gravel	lb	0	0.0000248	0	0.0024	0	0.000018	0	4.52E-06	0	2.61E-06	0	3.08E-07	0
Sand	lb	5054	0.0000248	0.1253392	0.0024	12.1296	0.000018	0.090972	4.52E-06	0.0228441	2.61E-06	0.0131909	3.08E-07	0.0015566
Stainless Steel	lb	0	0.0116	0	3.4	0	0.0075	0	0.012	0	0.0044	0	0.000144	0
Steel	lb	0	0.0044	0	1.1	0	0.0014	0	0.0017	0	0.00056	0	0.000067	0
Other refined construction materials	lb	0	0.01885	0	2.115	0	0.0040375	0	0.0051325	0	0.0014428	0	0.0001625	0
Other unrefined construction materials	lb	0	0.000028	0	0.00335	0	0.0000165	0	0.000015	0	0.000002	0	2.05E-10	0

Notes:

Groundwater Injections - Off-Site Footprint (Scope 3b)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Treatment Materials & Chemicals														
Cheese Whey	lbs	0	0.0025	0	0.031	0	0.000062	0	0.000033	0	0.000002	0	NP	
Emulsified vegetable oil	lbs	0	0.0077	0	3.44	0	0.0066	0	0.0019	0	0.000033	0	NP	
Granular activated carbon, primary	lbs	0	0.0356	0	4.82	0	0.0793	0	0.128	0	0.000987	0	0.000657	0
Granular activated carbon, regenerated	lbs	0	0.00873	0	1.7	0	0.00733	0	0.0129	0	0.000886	0	0.000671	0
Hydrogen Peroxide, 50% in H2O	lbs	0	0.00979	0	1.19	0	0.00142	0	0.0024	0	0.000308	0	0.0000629	0
Iron (II) Sulfate	lbs	0	0.00147	0	0.167	0	0.000316	0	0.000589	0	0.000103	0	0.000023	0
Lime, Hydrated, Packed	lbs	0	0.00206	0	0.762	0	0.000513	0	0.000358	0	0.00013	0	6.57E-06	0
Molasses	lbs	0	0.0044	0	0.48	0	0.0011	0	0.00024	0	0.0000041	0	NP	
Phosphoric Acid, 70% in H2O	lbs	0	0.0067	0	0.882	0	0.00282	0	0.0294	0	0.00171	0	0.000163	0
Potassium Permanganate	lbs	0	0.00981	0	1.16	0	0.00234	0	0.0032	0	0.000422	0	0.000122	0
Sodium Hydroxide, 50% in H2O	lbs	0	0.00977	0	1.09	0	0.00194	0	0.00352	0	0.000403	0	0.000129	0
Other Treatment Chemicals & Materials	lbs	10502	0.015	157.53	1.67	17538.34	0.003	31.506	0.0065	68.263	0.00061	6.40622	0.000016	0.168032
Notes:														
Fuel Processing														
Biodiesel produced	gal	0	0.029	0	-16.8	0	0.018	0	0.033	0	0.00082	0	NP	
Diesel produced	gal	551.698	0.017	9.378866	3.02	1666.128	0.0051	2.8136598	0.0062	3.4205276	0.0017	0.9378866	0.0011	0.6068678
Gasoline produced	gal	5.2	0.033	0.1716	2.8	14.56	0.0046	0.02392	0.005	0.026	0.0015	0.0078	0.001	0.0052
Liquefied Petroleum Gas Produced	gal	0	0.088	0	1.47	0	0.0016	0	0.0024	0	0.0007	0	0.0003	0
Natural Gas - Compressed Produced	ccf	0	19.983	0	343.92	0	0.4732	0	2.1651	0	0.1846	0	0.2895	0
Natural Gas Produced	ccf	0	0.0052	0	2.2	0	0.0037	0	0.0046	0	0.000072	0	0.0000061	0
Fuel Processing Subtotals				**9.550466**		**1680.688**		**2.8375798**		**3.4465276**		**0.9456866**		**0.6120678**
Notes:														
Public water	gal x 1000	19.252	0.0092	0.1771184	5	96.26	0.0097	0.1867444	0.0059	0.1135868	0.016	0.308032	0.000015	0.0002888
User-defined water resource #1	gal x 1000	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined water resource #2	gal x 1000	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														

Groundwater Injections - Off-Site Footprint (Scope 3b)

			Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
Category	Units	Usage	Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Off-Site Services														
Hazardous waste incineration	lb	0	0.00609	0	2.43	0	0.0016	0	0.00167	0	0.000209	0	0.000087	0
Off-site waste water treatment (POTW)	gal x 1000	0	0.015	0	4.4	0	0.016	0	0.015	0	NP		NP	
Off-site non-hazardous waste landfill	ton	0	0.16	0	25	0	0.14	0	0.075	0	0.4	0	0.0014	0
Off-site hazardous waste landfill	ton	0	0.18	0	27.5	0	0.154	0	0.0825	0	0.44	0	0.00154	0
Off-site Laboratory Analysis - Other	sample	0	0.058071	0	6.8534384	0	0.131402	0	0.3038758	0	0.0455698	0	0.0330165	0
Off-site Laboratory Analysis - Metals	sample	2	0.212	0.424	27.4693	54.9386	0.6423	1.2846	1.5072	3.0144	0.2264	0.4528	0.1643	0.3286
Off-site Laboratory Analysis - Mercury	sample	0	0.0731715	0	9.325458	0	0.2127439	0	0.4982396	0	0.0747359	0	0.0542332	0
Off-site Laboratory Analysis - Inorganic Anions	sample	2	0.0074025	0.0148049	0.6459478	1.2918956	0.0067681	0.0135362	0.0147929	0.0295857	0.0022024	0.0044048	0.0015542	0.0031085
Off-site Laboratory Analysis - Alkalinity	sample	2	0.0174398	0.0348797	1.3381922	2.6763844	0.0070106	0.0140213	0.0132496	0.0264993	0.00194	0.0038801	0.0012831	0.0025662
Off-site Laboratory Analysis - Perchlorate	sample	0	0.023885	0	1.8717054	0	0.0079807	0	0.0141535	0	0.0020547	0	0.0012875	0
Off-site Laboratory Analysis - Nitrogen/Nitrate	sample	2	0.0336475	0.067295	4.29897	8.59794	0.0954592	0.1909184	0.2226646	0.4453292	0.0335099	0.0670198	0.0242506	0.0485012
Off-site Laboratory Analysis - Sulfate	sample	2	0.0141225	0.0282449	1.4726728	2.9453456	0.0079807	0.0159613	0.0136024	0.0272048	0.0019797	0.0039595	0.0012015	0.002403
Off-site Laboratory Analysis - PCBs	sample	0	0.0512769	0	5.224902	0	0.0833339	0	0.1904774	0	0.0284393	0	0.0212083	0
Off-site Laboratory Analysis - VOCs	sample	9	0.0762045	0.6858404	9.016814	81.151326	0.104498	0.9404824	0.2270738	2.0436642	0.0339508	0.3055576	0.0235892	0.212303
Off-site Laboratory Analysis - SVOCs	sample	0	0.0715602	0	7.870422	0	0.1459445	0	0.3373038	0	0.0504853	0	0.0372577	0
Notes:														
Resource Extraction for Electricity														
Coal extraction and processing	MWh	0.024	3.1	0.0732912	180.0	4.32	0.8	0.01848	0.2	0.0036	0.0	0.000432	NP	
Natural gas extraction and processing	MWh	0.04	1.6	0.065272	270.0	10.8	0.2	0.0072	13.0	0.52	0.0	0.000284	NP	
Nuclear fuel extraction and processing	MWh	0.008	0.2	0.0012438	25.0	0.2	0.2	0.0012	0.5	0.004	0.0	0.000012	NP	
Oil extraction and processing	MWh	0.02	2.3	0.045908	270.0	5.4	1.7	0.034	0.1	0.00138	0.0	0.00084	NP	
Other fuel extraction and processing	MWh	0	0	0	0	0	0	0	0	0	0	0	0	0
Resource Extraction Subtotals				**0.185715**		**20.72**		**0.06088**		**0.52898**		**0.001568**		**0**
Notes:														
Electricity Transmission														
Transmission and distribution losses	MWh	0.4	1.0342	0.41368	35.2	14.08	0.1504	0.06016	0.146966	0.0587864	0.007546	0.0030184	0.0045403	0.0018161
Notes:														

Groundwater Injections - Off-Site Footprint (Scope 3b)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
User-defined Materials														
User-defined material #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #4	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #5	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #6	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #7	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #8	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #9	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #10	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #11	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #12	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #13	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #14	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #15	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #16	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #17	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #18	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #19	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #20	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
User-defined Waste Destinations														
User-defined recycled/reused off-site #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #3	TBD	0	y(MMBtu/u		lbs CO2e/u		Ox(lbs/unit		Ox(lbs/unit		M(lbs/unit)		APs(lbs/unit	
User-defined non-hazardous waste destination #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined non-hazardous waste destination #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined non-hazardous waste destination #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
Off-site Totals				**179.56018**		**20309.699**		**38.777856**		**79.099968**		**8.6619057**		**1.5289932**

Groundwater Injections - Intermediate Totals

			Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
Category	Units	Usage	Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Total Grid Electricity Footprint														
On-site grid electricity	MWh	0.4	3.413	1.3652										
Electricity Generation														
Grid electricity	MWh	0.4	6.929	2.7716	1124.3	449.72	2.2421	0.89684	4.6078874	1.843155	0.057518	0.0230072	0.2102371	0.0840948
Resource Extraction for Electricity														
Coal extraction and processing	MWh	0.024	3.1	0.0732912	180.0	4.32	0.8	0.01848	0.2	0.0036	0.0	0.000432	NP	
Natural gas extraction and processing	MWh	0.04	1.6	0.065272	270.0	10.8	0.2	0.0072	13.0	0.52	0.0	0.000284	NP	
Nuclear fuel extraction and processing	MWh	0.008	0.2	0.0012438	25.0	0.2	0.2	0.0012	0.5	0.004	0.0	0.000012	NP	
Oil extraction and processing	MWh	0.02	2.3	0.045908	270.0	5.4	1.7	0.034	0.1	0.00138	0.0	0.00084	NP	
Other fuel extraction and processing	MWh	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Electricity Transmission														
Transmission and distribution losses	MWh	0.4	1.0342	0.41368	112.43	44.972	0.22421	0.089684	0.4607887	0.1843155	0.0057518	0.0023007	0.0210237	0.0084095
Total Grid Electricity Footprint				**5**		**515**		**1**		**3**		**0**		**0**
Total Fuel Footprints														
Total Gasoline Footprint														
On-site gasoline use - Other	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
On-site gasoline use <25 hp	gal	0	0.124	0	17.48	0	0.037	0	0.00025	0	0.165	0	0.00008	0
On-site gasoline use >25 hp	gal	0	0.124	0	19.93	0	0.032	0	0.00029	0	0.002	0	0.00009	0
Transportation gasoline use	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation gasoline use - car	gal	5.2	0.124	0.6448	19.77	102.804	0.027	0.1404	0.00036	0.001872	0.003	0.0156	0.0067	0.03484
Transportation gasoline use - passenger truck	gal	0	0.124	0	19.79	0	0.035	0	0.00036	0	0.003	0	0.00661	0
Transportation gasoline use - User Defined	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Gasoline produced	gal	5.2	0.033	0.1716	2.8	14.56	0.0046	0.02392	0.005	0.026	0.0015	0.0078	0.001	0.0052
Total Gasoline Footprint		**5.2**		**0.8164**		**117.364**		**0.16432**		**0.027872**		**0.0234**		**0.04004**
Total Diesel Footprint														
On-site diesel use - Other	gal	312	0.139	43.368	22.5	7020	0.17	53.04	0.0054	1.6848	0.0034	1.0608	0.0000052	0.0016224
On-site diesel use <75 hp	gal	0	0.139	0	22.21	0	0.1565	0	0.000145	0	0.0145	0	0.00004	0
On-site diesel use 75<hp<750	gal	0	0.139	0	22.24	0	0.101	0	0.00013	0	0.009	0	0.00004	0
On-site diesel use >750 hp	gal	0	0.139	0	22.24	0	0.149	0	0.00013	0	0.006	0	0.00004	0
Transportation diesel use	gal	239.698	0.139	33.318022	22.5	5393.205	0.17	40.74866	0.0054	1.2943692	0.0034	0.8149732	0.0000052	0.0012464
Transportation diesel use - car	gal	0	0.139	0	22.57	0	0.015	0	0.0002	0	0.003	0	0.00252	0
Transportation diesel use - passenger truck	gal	0	0.139	0	22.545	0	0.0585	0	0.0002	0	0.007	0	0.002605	0
Transportation diesel use - User Defined	gal	0	0.139	0	22.5	0	0.17	0	0.0054	0	0.0034	0	0.0000052	0
Diesel produced	gal	551.698	0.017	9.378866	3.02	1666.128	0.0051	2.8136598	0.0062	3.4205276	0.0017	0.9378866	0.0011	0.6068678
Total Diesel Footprint		**551.698**		**86.064888**		**14079.333**		**96.60232**		**6.3996968**		**2.8136598**		**0.6097366**
Total Biodiesel Footprint														
On-site biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
On-site biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Biodiesel produced	gal	0	0.029	0	-16.8	0	0.018	0	0.033	0	0.00082	0	NP	
Total Biodiesel Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Natural Gas Footprint														
On-site natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use - User Defined	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Natural gas produced	ccf	0	0.0052	0	2.2	0	0.0037	0	0.0046	0	0.000072	0	0.0000061	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Liquified Petroleum Gas Footprint														
On-site liquified petroleum gas use - Other	ccf	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
On-site liquified petroleum gas use	ccf	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
Liquified petroleum gas produced	ccf	0	0.088	0	1.47	0	0.0016	0	0.0024	0	0.0007	0	0.0003	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Compressed Gas Footprint														
On-site compressed gas use - Other	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site compressed gas use	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
Compressed gas produced	ccf	0	19.983	0	343.92	0	0.4732	0	2.1651	0	0.1846	0	0.2895	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**

Notes:

Note: Please refer to the "Default Conversions" tab for references for the default conversion factors used on this calculation sheet.

Space below available for notes and calculations:

SVE System - On-Site Footprint (Scope 1)

Contributors to Footprints	Units	Usage	Energy		GHG		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
On-Site														
On-site Renewable Energy														
Renewable electricity generated on-site	MWh	0	3.413	0										
Landfill gas combusted on-site for energy use	ccf CH4	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
On-site biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
On-site biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
User-defined on-site renewable energy use #1	gal	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined on-site renewable energy use #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
On-site Renewable Energy Subtotals				**0**		**0**		**0**		**0**		**0**		**0**
Notes:														
On-site Conventional Energy														
On-site grid electricity	MWh	8.76	3.413	29.89788										
On-site diesel use - Other	Gal	276	0.139	38.364	22.5	6210	0.17	46.92	0.0054	1.4904	0.0034	0.9384	0.0000052	0.0014352
On-site diesel use <75 hp	Gal	0	0.139	0	22.21	0	0.1565	0	0.000145	0	0.0145	0	0.00004	0
On-site diesel use 75<hp<750	Gal	0	0.139	0	22.24	0	0.101	0	0.00013	0	0.009	0	0.00004	0
On-site diesel use >750 hp	Gal	0	0.139	0	22.24	0	0.149	0	0.00013	0	0.006	0	0.00004	0
On-site gasoline use - Other	Gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
On-site gasoline use <25 hp	Gal	0	0.124	0	17.48	0	0.037	0	0.00025	0	0.165	0	0.00008	0
On-site gasoline use >25 hp	Gal	0	0.124	0	19.93	0	0.032	0	0.00029	0	0.002	0	0.00009	0
On-site natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
On-site compressed natural gas use - Other	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site compressed natural gas use	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site liquified petroleum gas use - Other	gal	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
On-site liquified petroleum gas use	gal	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
Other forms of on-site conventional energy use #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Other forms of on-site conventional energy use #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
On-site Conventional Energy Subtotals				**68**		**6,210**		**47**		**1**		**1**		**0**
Notes:														
Other On-site Emissions														
On-site HAP process emissions	lbs	0											1	0
On-site GHG emissions	lbs CO2e	0			1	0								
On-site carbon storage	lbs CO2e	0			1	0								
GHG avoided by flaring on-site landfill methane	Lbs	0			-262	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Other on-site NOx emissions or reductions	lbs	0					1	0						
Other on-site SOx emissions or reductions	lbs	0							1	0				
Other on-site PM emissions or reductions	lbs	0									1	0		
User-defined recycled/reused on-site #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused on-site #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
On-site Totals				**68.26**		**6,210**		**47**		**1**		**1**		**0**

Teitelbaum Dry Cleaning Inc.
Teitelbaum Remedial Action
SVE System

SVE System - Electricity Generation Footprint (Scope 2)

Contributors to Footprints	Units	Usage	Energy		GHG		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Electricity Generation														
Grid electricity	MWh	8.76	6.929	60.69804	1124.3	9848.868	2.2421	19.640796	4.6078874	40.365094	0.057518	0.5038577	0.2102371	1.8416769
Voluntary purchase of renewable electricity	MWh	0												
Voluntary purchase of RECs	MWh	0												
Notes:														

SVE System - Transportation Footprint (Scope 3a)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Conventional Energy														
Transportation diesel use	gal	494.234	0.139	68.698526	22.5	11120.265	0.17	84.01978	0.0054	2.6688636	0.0034	1.6803956	0.0000052	0.00257
Transportation diesel use - car	gal	0	0.139	0	22.57	0	0.015	0	0.0002	0	0.003	0	0.00252	0
Transportation diesel use - passenger truck	gal	0	0.139	0	22.545	0	0.0585	0	0.0002	0	0.007	0	0.002605	0
Transportation diesel use - User Defined	gal	0	0.139	0	22.5	0	0.17	0	0.0054	0	0.0034	0	0.0000052	0
Transportation gasoline use	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation gasoline use - car	gal	4.4	0.124	0.5456	19.77	86.988	0.027	0.1188	0.00036	0.001584	0.003	0.0132	0.0067	0.02948
Transportation gasoline use - passenger truck	gal	0	0.124	0	19.79	0	0.035	0	0.00036	0	0.003	0	0.00661	0
Transportation gasoline use - User Defined	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use - User Defined	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
User-defined conventional energy transportation #1	TBD	10	0	0	0	0	0	0	0	0	0	0	0	0
User-defined conventional energy transportation #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Conventional Energy Subtotals				**69**		**11,207**		**84**		**3**		**2**		**0**
Notes:														
Renewable Energy														
Transportation biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
User-defined renewable energy transportation #1	TBD	0	Biodiesel		0	0	0	0	0	0	0	0	Ref.	
User-defined renewable energy transportation #2	TBD	0	mpg or pmp		0	0	0	0	0	0	0	0	0	0
Renewable Energy Subtotals				**0**		**0**		**0**		**0**		**0**		**0**
Notes:														
Transportation Totals				**69**		**11207**		**84**		**3**		**2**		**0**

SVE System - Off-Site Footprint (Scope 3b)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Construction Materials														
Aluminum, Rolled Sheet	lb	0	0.0633	0	9.15	0	0.0148	0	0.0283	0	0.0088	0	0.00102	0
Asphalt, mastic	lb	0	0.0412	0	0.85	0	0.00271	0	0.00798	0	0.000766	0	0.00107	0
Asphalt, paving-grade	lb	0	0.5	0	8.58	0	0.0299	0	0.0969	0	0.0091	0	0.0133	0
Ethanol, Corn, 95%	lb	0	0.0318	0	-0.0199	0	0.00425	0	0.00303	0	0.000469	0	0.0000846	0
Ethanol, Corn, 99.7%	lb	0	0.0324	0	0.0591	0	0.00431	0	0.0031	0	0.000472	0	0.000087	0
Ethanol, Petroleum, 99.7%	lb	0	0.0205	0	1.25	0	0.00199	0	0.00214	0	0.000277	0	0.0000589	0
Gravel/Sand Mix, 65% Gravel	lb	0	0.0000248	0	0.0024	0	0.000018	0	4.52E-06	0	2.61E-06	0	3.08E-07	0
Gravel/sand/clay	lb	0	0.000028	0	0.00335	0	0.0000165	0	0.000015	0	0.000002	0	2.05E-10	0
HDPE	lb	0	0.0332	0	1.94	0	0.00325	0	0.00409	0	0.000439	0	0.0000641	0
Photovoltaic system (installed)	W	0	0.0336	0	4.47	0	0.015	0	0.032	0	0.00063	0	0.0000029	0
PVC	lb	506	0.0262	13.2572	2.02	1022.12	0.004	2.024	0.00274	1.38644	0.000372	0.188232	0.000375	0.18975
Portland cement, US average	lb	0	0.0139	0	1.34	0	0.00654	0	0.0104	0	0.00378	0	0.00097	0
Ready-mixed concrete, 20 MPa	ft3	0	0.217	0	19.5	0	0.0975	0	0.154	0	0.057	0	0.0141	0
Round Gravel	lb	0	0.0000248	0	0.0024	0	0.000018	0	4.52E-06	0	2.61E-06	0	3.08E-07	0
Sand	lb	1320	0.0000248	0.032736	0.0024	3.168	0.000018	0.02376	4.52E-06	0.0059664	2.61E-06	0.0034452	3.08E-07	0.0004066
Stainless Steel	lb	0	0.0116	0	3.4	0	0.0075	0	0.012	0	0.0044	0	0.000144	0
Steel	lb	0	0.0044	0	1.1	0	0.0014	0	0.0017	0	0.00056	0	0.000067	0
Other refined construction materials	lb	0	0.01885	0	2.115	0	0.0040375	0	0.0051325	0	0.0014428	0	0.0001625	0
Other unrefined construction materials	lb	0	0.000028	0	0.00335	0	0.0000165	0	0.000015	0	0.000002	0	2.05E-10	0

Notes:

SVE System - Off-Site Footprint (Scope 3b)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Treatment Materials & Chemicals														
Cheese Whey	lbs	0	0.0025	0	0.031	0	0.000062	0	0.000033	0	0.000002	0	NP	
Emulsified vegetable oil	lbs	0	0.0077	0	3.44	0	0.0066	0	0.0019	0	0.000033	0	NP	
Granular activated carbon, primary	lbs	0	0.0356	0	4.82	0	0.0793	0	0.128	0	0.000987	0	0.000657	0
Granular activated carbon, regenerated	lbs	0	0.00873	0	1.7	0	0.00733	0	0.0129	0	0.000886	0	0.000671	0
Hydrogen Peroxide, 50% in H2O	lbs	0	0.00979	0	1.19	0	0.00142	0	0.0024	0	0.000308	0	0.0000629	0
Iron (II) Sulfate	lbs	0	0.00147	0	0.167	0	0.000316	0	0.000589	0	0.000103	0	0.000023	0
Lime, Hydrated, Packed	lbs	0	0.00206	0	0.762	0	0.000513	0	0.000358	0	0.00013	0	6.57E-06	0
Molasses	lbs	0	0.0044	0	0.48	0	0.0011	0	0.00024	0	0.0000041	0	NP	
Phosphoric Acid, 70% in H2O	lbs	0	0.0067	0	0.882	0	0.00282	0	0.0294	0	0.00171	0	0.000163	0
Potassium Permanganate	lbs	0	0.00981	0	1.16	0	0.00234	0	0.0032	0	0.000422	0	0.000122	0
Sodium Hydroxide, 50% in H2O	lbs	0	0.00977	0	1.09	0	0.00194	0	0.00352	0	0.000403	0	0.000129	0
Other Treatment Chemicals & Materials	lbs	0	0.015	0	1.67	0	0.003	0	0.0065	0	0.00061	0	0.000016	0
Notes:														
Fuel Processing														
Biodiesel produced	gal	0	0.029	0	-16.8	0	0.018	0	0.033	0	0.00082	0	NP	
Diesel produced	gal	770.234	0.017	13.093978	3.02	2326.1067	0.0051	3.9281934	0.0062	4.7754508	0.0017	1.3093978	0.0011	0.8472574
Gasoline produced	gal	4.4	0.033	0.1452	2.8	12.32	0.0046	0.02024	0.005	0.022	0.0015	0.0066	0.001	0.0044
Liquefied Petroleum Gas Produced	gal	0	0.088	0	1.47	0	0.0016	0	0.0024	0	0.0007	0	0.0003	0
Natural Gas - Compressed Produced	ccf	0	19.983	0	343.92	0	0.4732	0	2.1651	0	0.1846	0	0.2895	0
Natural Gas Produced	ccf	0	0.0052	0	2.2	0	0.0037	0	0.0046	0	0.000072	0	0.0000061	0
Fuel Processing Subtotals				**13.239178**		**2338.4267**		**3.9484334**		**4.7974508**		**1.3159978**		**0.8516574**
Notes:														
Public water	gal x 1000	0.069	0.0092	0.0006348	5	0.345	0.0097	0.0006693	0.0059	0.0004071	0.016	0.001104	0.000015	1.035E-06
User-defined water resource #1	gal x 1000	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined water resource #2	gal x 1000	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														

SVE System - Off-Site Footprint (Scope 3b)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Off-Site Services														
Hazardous waste incineration	lb	0	0.00609	0	2.43	0	0.0016	0	0.00167	0	0.000209	0	0.000087	0
Off-site waste water treatment (POTW)	gal x 1000	0	0.015	0	4.4	0	0.016	0	0.015	0	NP		NP	
Off-site non-hazardous waste landfill	ton	0	0.16	0	25	0	0.14	0	0.075	0	0.4	0	0.0014	0
Off-site hazardous waste landfill	ton	0.7	0.18	0.126	27.5	19.25	0.154	0.1078	0.0825	0.05775	0.44	0.308	0.00154	0.001078
Off-site Laboratory Analysis - Other	sample	0	0.058071	0	6.8534384	0	0.131402	0	0.3038758	0	0.0455698	0	0.0330165	0
Off-site Laboratory Analysis - Metals	sample	0	0.212	0	27.4693	0	0.6423	0	1.5072	0	0.2264	0	0.1643	0
Off-site Laboratory Analysis - Mercury	sample	0	0.0731715	0	9.325458	0	0.2127439	0	0.4982396	0	0.0747359	0	0.0542332	0
Off-site Laboratory Analysis - Inorganic Anions	sample	0	0.0074025	0	0.6459478	0	0.0067681	0	0.0147929	0	0.0022024	0	0.0015542	0
Off-site Laboratory Analysis - Alkalinity	sample	0	0.0174398	0	1.3381922	0	0.0070106	0	0.0132496	0	0.00194	0	0.0012831	0
Off-site Laboratory Analysis - Perchlorate	sample	0	0.023885	0	1.8717054	0	0.0079807	0	0.0141535	0	0.0020547	0	0.0012875	0
Off-site Laboratory Analysis - Nitrogen/Nitrate	sample	0	0.0336475	0	4.29897	0	0.0954592	0	0.2226646	0	0.0335099	0	0.0242506	0
Off-site Laboratory Analysis - Sulfate	sample	0	0.0141225	0	1.4726728	0	0.0079807	0	0.0136024	0	0.0019797	0	0.0012015	0
Off-site Laboratory Analysis - PCBs	sample	0	0.0512769	0	5.224902	0	0.0833339	0	0.1904774	0	0.0284393	0	0.0212083	0
Off-site Laboratory Analysis - VOCs	sample	2	0.0762045	0.152409	9.016814	18.033628	0.104498	0.2089961	0.2270738	0.4541476	0.0339508	0.0679017	0.0235892	0.0471784
Off-site Laboratory Analysis - SVOCs	sample	0	0.0715602	0	7.870422	0	0.1459445	0	0.3373038	0	0.0504853	0	0.0372577	0
Notes:														
Resource Extraction for Electricity														
Coal extraction and processing	MWh	2.6718	3.1	8.1591428	180.0	480.924	0.8	2.057286	0.2	0.40077	0.0	0.0480924	NP	
Natural gas extraction and processing	MWh	2.96964	1.6	4.8458586	270.0	801.8028	0.2	0.5345352	13.0	38.60532	0.0	0.0210844	NP	
Nuclear fuel extraction and processing	MWh	1.73448	0.2	0.2696631	25.0	43.362	0.2	0.260172	0.5	0.86724	0.0	0.0026017	NP	
Oil extraction and processing	MWh	0.06132	2.3	0.1407539	270.0	16.5564	1.7	0.104244	0.1	0.0042311	0.0	0.0025754	NP	
Other fuel extraction and processing	MWh	0.00876	0	0	0	0	0	0	0	0	0	0	0	0
Resource Extraction Subtotals				**13.415418**		**1342.6452**		**2.9562372**		**39.877561**		**0.074354**		**0**
Notes:														
Electricity Transmission														
Transmission and distribution losses	MWh	8.76	1.0342	9.059592	112.43	984.8868	0.22421	1.9640796	0.4607887	4.0365094	0.0057518	0.0503858	0.0210237	0.1841677
Notes:														

SVE System - Off-Site Footprint (Scope 3b)

			Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
Category	Units	Usage	Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
User-defined Materials														
User-defined material #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #4	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #5	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #6	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #7	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #8	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #9	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #10	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #11	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #12	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #13	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #14	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #15	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #16	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #17	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #18	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #19	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #20	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
User-defined Waste Destinations														
User-defined recycled/reused off-site #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #3	TBD	0	y(MMBtu/u		lbs CO2e/u		Dx(lbs/unit		Dx(lbs/unit		M(lbs/unit)		APs(lbs/unit	
User-defined non-hazardous waste destination #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined non-hazardous waste destination #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined non-hazardous waste destination #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
Off-site Totals				**49.283168**		**5728.8753**		**11.233976**		**50.616232**		**2.0094205**		**1.2742391**

SVE System - Intermediate Totals

			Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
Category	Units	Usage	Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Total Grid Electricity Footprint														
On-site grid electricity	MWh	8.76	3.413	29.89788										
Electricity Generation														
Grid electricity	MWh	8.76	6.929	60.69804	1124.3	9848.868	2.2421	19.640796	4.6078874	40.365094	0.057518	0.5038577	0.2102371	1.8416769
Resource Extraction for Electricity														
Coal extraction and processing	MWh	2.6718	3.1	8.1591428	180.0	480.924	0.8	2.057286	0.2	0.40077	0.0	0.0480924	NP	
Natural gas extraction and processing	MWh	2.96964	1.6	4.8458586	270.0	801.8028	0.2	0.5345352	13.0	38.60532	0.0	0.0210844	NP	
Nuclear fuel extraction and processing	MWh	1.73448	0.2	0.2696631	25.0	43.362	0.2	0.260172	0.5	0.86724	0.0	0.0026017	NP	
Oil extraction and processing	MWh	0.06132	2.3	0.1407539	270.0	16.5564	1.7	0.104244	0.1	0.0042311	0.0	0.0025754	NP	
Other fuel extraction and processing	MWh	0.00876	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Electricity Transmission														
Transmission and distribution losses	MWh	8.76	1.0342	9.059592	112.43	984.8868	0.22421	1.9640796	0.4607887	4.0365094	0.0057518	0.0503858	0.0210237	0.1841677
Total Grid Electricity Footprint				**113**		**12176**		**25**		**84**		**1**		**2**
Total Fuel Footprints														
Total Gasoline Footprint														
On-site gasoline use - Other	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
On-site gasoline use <25 hp	gal	0	0.124	0	17.48	0	0.037	0	0.00025	0	0.165	0	0.00008	0
On-site gasoline use >25 hp	gal	0	0.124	0	19.93	0	0.032	0	0.00029	0	0.002	0	0.00009	0
Transportation gasoline use	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation gasoline use - car	gal	4.4	0.124	0.5456	19.77	86.988	0.027	0.1188	0.00036	0.001584	0.003	0.0132	0.0067	0.02948
Transportation gasoline use - passenger truck	gal	0	0.124	0	19.79	0	0.035	0	0.00036	0	0.003	0	0.00661	0
Transportation gasoline use - User Defined	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Gasoline produced	gal	4.4	0.033	0.1452	2.8	12.32	0.0046	0.02024	0.005	0.022	0.0015	0.0066	0.001	0.0044
Total Gasoline Footprint		**4.4**		**0.6908**		**99.308**		**0.13904**		**0.023584**		**0.0198**		**0.03388**
Total Diesel Footprint														
On-site diesel use - Other	gal	276	0.139	38.364	22.5	6210	0.17	46.92	0.0054	1.4904	0.0034	0.9384	0.0000052	0.0014352
On-site diesel use <75 hp	gal	0	0.139	0	22.21	0	0.1565	0	0.000145	0	0.0145	0	0.00004	0
On-site diesel use 75<hp<750	gal	0	0.139	0	22.24	0	0.101	0	0.00013	0	0.009	0	0.00004	0
On-site diesel use >750 hp	gal	0	0.139	0	22.24	0	0.149	0	0.00013	0	0.006	0	0.00004	0
Transportation diesel use	gal	494.234	0.139	68.698526	22.5	11120.265	0.17	84.01978	0.0054	2.6688636	0.0034	1.6803956	0.0000052	0.00257
Transportation diesel use - car	gal	0	0.139	0	22.57	0	0.015	0	0.0002	0	0.003	0	0.00252	0
Transportation diesel use - passenger truck	gal	0	0.139	0	22.545	0	0.0585	0	0.0002	0	0.007	0	0.002605	0
Transportation diesel use - User Defined	gal	0	0.139	0	22.5	0	0.17	0	0.0054	0	0.0034	0	0.0000052	0
Diesel produced	gal	770.234	0.017	13.093978	3.02	2326.1067	0.0051	3.9281934	0.0062	4.7754508	0.0017	1.3093978	0.0011	0.8472574
Total Diesel Footprint		**770.234**		**120.1565**		**19656.372**		**134.86797**		**8.9347144**		**3.9281934**		**0.8512626**
Total Biodiesel Footprint														
On-site biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
On-site biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Biodiesel produced	gal	0	0.029	0	-16.8	0	0.018	0	0.033	0	0.00082	0	NP	
Total Biodiesel Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Natural Gas Footprint														
On-site natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use - User Defined	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Natural gas produced	ccf	0	0.0052	0	2.2	0	0.0037	0	0.0046	0	0.000072	0	0.0000061	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Liquified Petroleum Gas Footprint														
On-site liquified petroleum gas use - Other	ccf	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
On-site liquified petroleum gas use	ccf	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
Liquified petroleum gas produced	ccf	0	0.088	0	1.47	0	0.0016	0	0.0024	0	0.0007	0	0.0003	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Compressed Gas Footprint														
On-site compressed gas use - Other	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site compressed gas use	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
Compressed gas produced	ccf	0	19.983	0	343.92	0	0.4732	0	2.1651	0	0.1846	0	0.2895	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**

Notes:

Note: Please refer to the "Default Conversions" tab for references for the default conversion factors used on this calculation sheet.

Space below available for notes and calculations:

Onsite SSDS - On-Site Footprint (Scope 1)

Contributors to Footprints	Units	Usage	Energy		GHG		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
On-Site														
On-site Renewable Energy														
Renewable electricity generated on-site	MWh	0	3.413	0										
Landfill gas combusted on-site for energy use	ccf CH4	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
On-site biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
On-site biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
User-defined on-site renewable energy use #1	gal	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined on-site renewable energy use #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
On-site Renewable Energy Subtotals				**0**		**0**		**0**		**0**		**0**		**0**
Notes:														
On-site Conventional Energy														
On-site grid electricity	MWh	8.784	3.413	29.979792										
On-site diesel use - Other	Gal	0	0.139	0	22.5	0	0.17	0	0.0054	0	0.0034	0	0.0000052	0
On-site diesel use <75 hp	Gal	0	0.139	0	22.21	0	0.1565	0	0.000145	0	0.0145	0	0.00004	0
On-site diesel use 75<hp<750	Gal	0	0.139	0	22.24	0	0.101	0	0.00013	0	0.009	0	0.00004	0
On-site diesel use >750 hp	Gal	0	0.139	0	22.24	0	0.149	0	0.00013	0	0.006	0	0.00004	0
On-site gasoline use - Other	Gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
On-site gasoline use <25 hp	Gal	0	0.124	0	17.48	0	0.037	0	0.00025	0	0.165	0	0.00008	0
On-site gasoline use >25 hp	Gal	0	0.124	0	19.93	0	0.032	0	0.00029	0	0.002	0	0.00009	0
On-site natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
On-site compressed natural gas use - Other	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site compressed natural gas use	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site liquified petroleum gas use - Other	gal	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
On-site liquified petroleum gas use	gal	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
Other forms of on-site conventional energy use #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Other forms of on-site conventional energy use #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
On-site Conventional Energy Subtotals				**30**		**0**		**0**		**0**		**0**		**0**
Notes:														
Other On-site Emissions														
On-site HAP process emissions	lbs	0											1	0
On-site GHG emissions	lbs CO2e	0			1	0								
On-site carbon storage	lbs CO2e	0			1	0								
GHG avoided by flaring on-site landfill methane	Lbs	0			-262	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Other on-site NOx emissions or reductions	lbs	0					1	0						
Other on-site SOx emissions or reductions	lbs	0							1	0				
Other on-site PM emissions or reductions	lbs	0									1	0		
User-defined recycled/reused on-site #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused on-site #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
On-site Totals				**29.98**		**0**		**0**		**0**		**0**		**0**

Onsite SSDS - Electricity Generation Footprint (Scope 2)

Contributors to Footprints	Units	Usage	Energy		GHG		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Electricity Generation														
Grid electricity	MWh	8.784	6.929	60.864336	352	3091.968	1.504	13.211136	1.46966	12.909493	0.07546	0.6628406	0.0454035	0.3988243
Voluntary purchase of renewable electricity	MWh	0												
Voluntary purchase of RECs	MWh	0												
Notes:														

Onsite SSDS - Transportation Footprint (Scope 3a)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Conventional Energy														
Transportation diesel use	gal	130.132	0.139	18.088348	22.5	2927.97	0.17	22.12244	0.0054	0.7027128	0.0034	0.4424488	0.0000052	0.0006767
Transportation diesel use - car	gal	0	0.139	0	22.57	0	0.015	0	0.0002	0	0.003	0	0.00252	0
Transportation diesel use - passenger truck	gal	0	0.139	0	22.545	0	0.0585	0	0.0002	0	0.007	0	0.002605	0
Transportation diesel use - User Defined	gal	0	0.139	0	22.5	0	0.17	0	0.0054	0	0.0034	0	0.0000052	0
Transportation gasoline use	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation gasoline use - car	gal	2	0.124	0.248	19.77	39.54	0.027	0.054	0.00036	0.00072	0.003	0.006	0.0067	0.0134
Transportation gasoline use - passenger truck	gal	0	0.124	0	19.79	0	0.035	0	0.00036	0	0.003	0	0.00661	0
Transportation gasoline use - User Defined	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use - User Defined	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
User-defined conventional energy transportation #1	TBD	10	0	0	0	0	0	0	0	0	0	0	0	0
User-defined conventional energy transportation #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Conventional Energy Subtotals				**18**		**2,968**		**22**		**1**		**0**		**0**
Notes:														
Renewable Energy														
Transportation biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
User-defined renewable energy transportation #1	TBD	0	Biodiesel		0	0	0	0	0	0	0	0	Ref.	
User-defined renewable energy transportation #2	TBD	0	mpg or pmp		0	0	0	0	0	0	0	0	0	0
Renewable Energy Subtotals				**0**		**0**		**0**		**0**		**0**		**0**
Notes:														
Transportation Totals				**18**		**2968**		**22**		**1**		**0**		**0**

Onsite SSDS - Off-Site Footprint (Scope 3b)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Construction Materials														
Aluminum, Rolled Sheet	lb	0	0.0633	0	9.15	0	0.0148	0	0.0283	0	0.0088	0	0.00102	0
Asphalt, mastic	lb	0	0.0412	0	0.85	0	0.00271	0	0.00798	0	0.000766	0	0.00107	0
Asphalt, paving-grade	lb	0	0.5	0	8.58	0	0.0299	0	0.0969	0	0.0091	0	0.0133	0
Ethanol, Corn, 95%	lb	0	0.0318	0	-0.0199	0	0.00425	0	0.00303	0	0.000469	0	0.0000846	0
Ethanol, Corn, 99.7%	lb	0	0.0324	0	0.0591	0	0.00431	0	0.0031	0	0.000472	0	0.000087	0
Ethanol, Petroleum, 99.7%	lb	0	0.0205	0	1.25	0	0.00199	0	0.00214	0	0.000277	0	0.0000589	0
Gravel/Sand Mix, 65% Gravel	lb	0	0.0000248	0	0.0024	0	0.000018	0	4.52E-06	0	2.61E-06	0	3.08E-07	0
Gravel/sand/clay	lb	0	0.000028	0	0.00335	0	0.0000165	0	0.000015	0	0.000002	0	2.05E-10	0
HDPE	lb	0	0.0332	0	1.94	0	0.00325	0	0.00409	0	0.000439	0	0.0000641	0
Photovoltaic system (installed)	W	0	0.0336	0	4.47	0	0.015	0	0.032	0	0.00063	0	0.0000029	0
PVC	lb	0	0.0262	0	2.02	0	0.004	0	0.00274	0	0.000372	0	0.000375	0
Portland cement, US average	lb	0	0.0139	0	1.34	0	0.00654	0	0.0104	0	0.00378	0	0.00097	0
Ready-mixed concrete, 20 MPa	ft3	0	0.217	0	19.5	0	0.0975	0	0.154	0	0.057	0	0.0141	0
Round Gravel	lb	90	0.0000248	0.002232	0.0024	0.216	0.000018	0.00162	4.52E-06	0.0004068	2.61E-06	0.0002349	3.08E-07	2.772E-05
Sand	lb	0	0.0000248	0	0.0024	0	0.000018	0	4.52E-06	0	2.61E-06	0	3.08E-07	0
Stainless Steel	lb	2490.4	0.0116	28.88864	3.4	8467.36	0.0075	18.678	0.012	29.8848	0.0044	10.95776	0.000144	0.3586176
Steel	lb	0	0.0044	0	1.1	0	0.0014	0	0.0017	0	0.00056	0	0.000067	0
Other refined construction materials	lb	50	0.01885	0.9425	2.115	105.75	0.0040375	0.201875	0.0051325	0.256625	0.0014428	0.0721375	0.0001625	0.0081263
Other unrefined construction materials	lb	0	0.000028	0	0.00335	0	0.0000165	0	0.000015	0	0.000002	0	2.05E-10	0

Notes:

Onsite SSDS - Off-Site Footprint (Scope 3b)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Treatment Materials & Chemicals														
Cheese Whey	lbs	0	0.0025	0	0.031	0	0.000062	0	0.000033	0	0.000002	0	NP	
Emulsified vegetable oil	lbs	0	0.0077	0	3.44	0	0.0066	0	0.0019	0	0.000033	0	NP	
Granular activated carbon, primary	lbs	0	0.0356	0	4.82	0	0.0793	0	0.128	0	0.000987	0	0.000657	0
Granular activated carbon, regenerated	lbs	0	0.00873	0	1.7	0	0.00733	0	0.0129	0	0.000886	0	0.000671	0
Hydrogen Peroxide, 50% in H2O	lbs	0	0.00979	0	1.19	0	0.00142	0	0.0024	0	0.000308	0	0.0000629	0
Iron (II) Sulfate	lbs	0	0.00147	0	0.167	0	0.000316	0	0.000589	0	0.000103	0	0.000023	0
Lime, Hydrated, Packed	lbs	0	0.00206	0	0.762	0	0.000513	0	0.000358	0	0.00013	0	6.57E-06	0
Molasses	lbs	0	0.0044	0	0.48	0	0.0011	0	0.00024	0	0.0000041	0	NP	
Phosphoric Acid, 70% in H2O	lbs	0	0.0067	0	0.882	0	0.00282	0	0.0294	0	0.00171	0	0.000163	0
Potassium Permanganate	lbs	0	0.00981	0	1.16	0	0.00234	0	0.0032	0	0.000422	0	0.000122	0
Sodium Hydroxide, 50% in H2O	lbs	0	0.00977	0	1.09	0	0.00194	0	0.00352	0	0.000403	0	0.000129	0
Other Treatment Chemicals & Materials	lbs	0	0.015	0	1.67	0	0.003	0	0.0065	0	0.00061	0	0.000016	0
Notes:														
Fuel Processing														
Biodiesel produced	gal	0	0.029	0	-16.8	0	0.018	0	0.033	0	0.00082	0	NP	
Diesel produced	gal	130.132	0.017	2.212244	3.02	392.99864	0.0051	0.6636732	0.0062	0.8068184	0.0017	0.2212244	0.0011	0.1431452
Gasoline produced	gal	2	0.033	0.066	2.8	5.6	0.0046	0.0092	0.005	0.01	0.0015	0.003	0.001	0.002
Liquefied Petroleum Gas Produced	gal	0	0.088	0	1.47	0	0.0016	0	0.0024	0	0.0007	0	0.0003	0
Natural Gas - Compressed Produced	ccf	0	19.983	0	343.92	0	0.4732	0	2.1651	0	0.1846	0	0.2895	0
Natural Gas Produced	ccf	0	0.0052	0	2.2	0	0.0037	0	0.0046	0	0.000072	0	0.0000061	0
Fuel Processing Subtotals				**2.278244**		**398.59864**		**0.6728732**		**0.8168184**		**0.2242244**		**0.1451452**
Notes:														
Public water	gal x 1000	0	0.0092	0	5	0	0.0097	0	0.0059	0	0.016	0	0.000015	0
User-defined water resource #1	gal x 1000	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined water resource #2	gal x 1000	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														

Onsite SSDS - Off-Site Footprint (Scope 3b)

			Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
Category	Units	Usage	Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Off-Site Services														
Hazardous waste incineration	lb	0	0.00609	0	2.43	0	0.0016	0	0.00167	0	0.000209	0	0.000087	0
Off-site waste water treatment (POTW)	gal x 1000	0	0.015	0	4.4	0	0.016	0	0.015	0	NP		NP	
Off-site non-hazardous waste landfill	ton	0	0.16	0	25	0	0.14	0	0.075	0	0.4	0	0.0014	0
Off-site hazardous waste landfill	ton	0.6	0.18	0.108	27.5	16.5	0.154	0.0924	0.0825	0.0495	0.44	0.264	0.00154	0.000924
Off-site Laboratory Analysis - Other	sample	0	0.058071	0	6.8534384	0	0.131402	0	0.3038758	0	0.0455698	0	0.0330165	0
Off-site Laboratory Analysis - Metals	sample	0	0.212	0	27.4693	0	0.6423	0	1.5072	0	0.2264	0	0.1643	0
Off-site Laboratory Analysis - Mercury	sample	0	0.0731715	0	9.325458	0	0.2127439	0	0.4982396	0	0.0747359	0	0.0542332	0
Off-site Laboratory Analysis - Inorganic Anions	sample	0	0.0074025	0	0.6459478	0	0.0067681	0	0.0147929	0	0.0022024	0	0.0015542	0
Off-site Laboratory Analysis - Alkalinity	sample	0	0.0174398	0	1.3381922	0	0.0070106	0	0.0132496	0	0.00194	0	0.0012831	0
Off-site Laboratory Analysis - Perchlorate	sample	0	0.023885	0	1.8717054	0	0.0079807	0	0.0141535	0	0.0020547	0	0.0012875	0
Off-site Laboratory Analysis - Nitrogen/Nitrate	sample	0	0.0336475	0	4.29897	0	0.0954592	0	0.2226646	0	0.0335099	0	0.0242506	0
Off-site Laboratory Analysis - Sulfate	sample	0	0.0141225	0	1.4726728	0	0.0079807	0	0.0136024	0	0.0019797	0	0.0012015	0
Off-site Laboratory Analysis - PCBs	sample	0	0.0512769	0	5.224902	0	0.0833339	0	0.1904774	0	0.0284393	0	0.0212083	0
Off-site Laboratory Analysis - VOCs	sample	7	0.0762045	0.5334314	9.016814	63.117698	0.104498	0.7314863	0.2270738	1.5895166	0.0339508	0.2376559	0.0235892	0.1651245
Off-site Laboratory Analysis - SVOCs	sample	0	0.0715602	0	7.870422	0	0.1459445	0	0.3373038	0	0.0504853	0	0.0372577	0
Notes:														
Resource Extraction for Electricity														
Coal extraction and processing	MWh	0.52704	3.1	1.6094748	180.0	94.8672	0.8	0.4058208	0.2	0.079056	0.0	0.0094867	NP	
Natural gas extraction and processing	MWh	0.8784	1.6	1.4333731	270.0	237.168	0.2	0.158112	13.0	11.4192	0.0	0.0062366	NP	
Nuclear fuel extraction and processing	MWh	0.17568	0.2	0.0273133	25.0	4.392	0.2	0.026352	0.5	0.08784	0.0	0.0002635	NP	
Oil extraction and processing	MWh	0.4392	2.3	1.0081397	270.0	118.584	1.7	0.74664	0.1	0.0303048	0.0	0.0184464	NP	
Other fuel extraction and processing	MWh	0	0	0	0	0	0	0	0	0	0	0	0	0
Resource Extraction Subtotals				**4.0783009**		**455.0112**		**1.3369248**		**11.616401**		**0.0344333**		**0**
Notes:														
Electricity Transmission														
Transmission and distribution losses	MWh	8.784	1.0342	9.0844128	35.2	309.1968	0.1504	1.3211136	0.146966	1.2909493	0.007546	0.0662841	0.0045403	0.0398824
Notes:														

Onsite SSDS - Off-Site Footprint (Scope 3b)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
User-defined Materials														
User-defined material #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #4	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #5	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #6	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #7	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #8	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #9	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #10	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #11	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #12	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #13	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #14	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #15	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #16	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #17	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #18	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #19	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
User-defined Waste Destinations														
User-defined recycled/reused off-site #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #3	TBD	0	y(MMBtu/u		lbs CO2e/u		Dx(lbs/unit		Dx(lbs/unit)		M(lbs/unit)		APs(lbs/unit	
User-defined non-hazardous waste destination #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined non-hazardous waste destination #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined non-hazardous waste destination #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
Off-site Totals				**45.915761**		**9815.7503**		**23.036293**		**45.505017**		**11.85673**		**0.7178477**

Onsite SSDS - Intermediate Totals

			Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
Category	Units	Usage	Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Total Grid Electricity Footprint														
On-site grid electricity	MWh	8.784	3.413	29.979792										
Electricity Generation														
Grid electricity	MWh	8.784	6.929	60.864336	1124.3	9875.8512	2.2421	19.694606	4.6078874	40.475683	0.057518	0.5052381	0.2102371	1.8467226
Resource Extraction for Electricity														
Coal extraction and processing	MWh	0.52704	3.1	1.6094748	180.0	94.8672	0.8	0.4058208	0.2	0.079056	0.0	0.0094867	NP	
Natural gas extraction and processing	MWh	0.8784	1.6	1.4333731	270.0	237.168	0.2	0.158112	13.0	11.4192	0.0	0.0062366	NP	
Nuclear fuel extraction and processing	MWh	0.17568	0.2	0.0273133	25.0	4.392	0.2	0.026352	0.5	0.08784	0.0	0.0002635	NP	
Oil extraction and processing	MWh	0.4392	2.3	1.0081397	270.0	118.584	1.7	0.74664	0.1	0.0303048	0.0	0.0184464	NP	
Other fuel extraction and processing	MWh	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Electricity Transmission														
Transmission and distribution losses	MWh	8.784	1.0342	9.0844128	112.43	987.58512	0.22421	1.9694606	0.4607887	4.0475683	0.0057518	0.0505238	0.0210237	0.1846723
Total Grid Electricity Footprint				**104**		**11318**		**23**		**56**		**1**		**2**
Total Fuel Footprints														
Total Gasoline Footprint														
On-site gasoline use - Other	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
On-site gasoline use <25 hp	gal	0	0.124	0	17.48	0	0.037	0	0.00025	0	0.165	0	0.00008	0
On-site gasoline use >25 hp	gal	0	0.124	0	19.93	0	0.032	0	0.00029	0	0.002	0	0.00009	0
Transportation gasoline use	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation gasoline use - car	gal	2	0.124	0.248	19.77	39.54	0.027	0.054	0.00036	0.00072	0.003	0.006	0.0067	0.0134
Transportation gasoline use - passenger truck	gal	0	0.124	0	19.79	0	0.035	0	0.00036	0	0.003	0	0.00661	0
Transportation gasoline use - User Defined	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Gasoline produced	gal	2	0.033	0.066	2.8	5.6	0.0046	0.0092	0.005	0.01	0.0015	0.003	0.001	0.002
Total Gasoline Footprint		**2**		**0.314**		**45.14**		**0.0632**		**0.01072**		**0.009**		**0.0154**
Total Diesel Footprint														
On-site diesel use - Other	gal	0	0.139	0	22.5	0	0.17	0	0.0054	0	0.0034	0	0.0000052	0
On-site diesel use <75 hp	gal	0	0.139	0	22.21	0	0.1565	0	0.000145	0	0.0145	0	0.00004	0
On-site diesel use 75<hp<750	gal	0	0.139	0	22.24	0	0.101	0	0.00013	0	0.009	0	0.00004	0
On-site diesel use >750 hp	gal	0	0.139	0	22.24	0	0.149	0	0.00013	0	0.006	0	0.00004	0
Transportation diesel use	gal	130.132	0.139	18.088348	22.5	2927.97	0.17	22.12244	0.0054	0.7027128	0.0034	0.4424488	0.0000052	0.0006767
Transportation diesel use - car	gal	0	0.139	0	22.57	0	0.015	0	0.0002	0	0.003	0	0.00252	0
Transportation diesel use - passenger truck	gal	0	0.139	0	22.545	0	0.0585	0	0.0002	0	0.007	0	0.002605	0
Transportation diesel use - User Defined	gal	0	0.139	0	22.5	0	0.17	0	0.0054	0	0.0034	0	0.0000052	0
Diesel produced	gal	130.132	0.017	2.212244	3.02	392.99864	0.0051	0.6636732	0.0062	0.8068184	0.0017	0.2212244	0.0011	0.1431452
Total Diesel Footprint		**130.132**		**20.300592**		**3320.9686**		**22.786113**		**1.5095312**		**0.6636732**		**0.1438219**
Total Biodiesel Footprint														
On-site biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
On-site biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Biodiesel produced	gal	0	0.029	0	-16.8	0	0.018	0	0.033	0	0.00082	0	NP	
Total Biodiesel Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Natural Gas Footprint														
On-site natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use - User Defined	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Natural gas produced	ccf	0	0.0052	0	2.2	0	0.0037	0	0.0046	0	0.000072	0	0.0000061	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Liquified Petroleum Gas Footprint														
On-site liquified petroleum gas use - Other	ccf	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
On-site liquified petroleum gas use	ccf	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
Liquified petroleum gas produced	ccf	0	0.088	0	1.47	0	0.0016	0	0.0024	0	0.0007	0	0.0003	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Compressed Gas Footprint														
On-site compressed gas use - Other	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site compressed gas use	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
Compressed gas produced	ccf	0	19.983	0	343.92	0	0.4732	0	2.1651	0	0.1846	0	0.2895	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**

Notes:

Note: Please refer to the "Default Conversions" tab for references for the default conversion factors used on this calculation sheet.

Space below available for notes and calculations:

Offsite SSDS - On-Site Footprint (Scope 1)

Contributors to Footprints	Units	Usage	Energy		GHG		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
On-Site														
On-site Renewable Energy														
Renewable electricity generated on-site	MWh	0	3.413	0										
Landfill gas combusted on-site for energy use	ccf CH4	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
On-site biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
On-site biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
User-defined on-site renewable energy use #1	gal	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined on-site renewable energy use #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
On-site Renewable Energy Subtotals				**0**		**0**		**0**		**0**		**0**		**0**
Notes:														
On-site Conventional Energy														
On-site grid electricity	MWh	8.76	3.413	29.89788										
On-site diesel use - Other	Gal	0	0.139	0	22.5	0	0.17	0	0.0054	0	0.0034	0	0.0000052	0
On-site diesel use <75 hp	Gal	0	0.139	0	22.21	0	0.1565	0	0.000145	0	0.0145	0	0.00004	0
On-site diesel use 75<hp<750	Gal	0	0.139	0	22.24	0	0.101	0	0.00013	0	0.009	0	0.00004	0
On-site diesel use >750 hp	Gal	0	0.139	0	22.24	0	0.149	0	0.00013	0	0.006	0	0.00004	0
On-site gasoline use - Other	Gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
On-site gasoline use <25 hp	Gal	0	0.124	0	17.48	0	0.037	0	0.00025	0	0.165	0	0.00008	0
On-site gasoline use >25 hp	Gal	0	0.124	0	19.93	0	0.032	0	0.00029	0	0.002	0	0.00009	0
On-site natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
On-site compressed natural gas use - Other	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site compressed natural gas use	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site liquified petroleum gas use - Other	gal	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
On-site liquified petroleum gas use	gal	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
Other forms of on-site conventional energy use #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Other forms of on-site conventional energy use #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
On-site Conventional Energy Subtotals				**30**		**0**		**0**		**0**		**0**		**0**
Notes:														
Other On-site Emissions														
On-site HAP process emissions	lbs	0											1	0
On-site GHG emissions	lbs CO2e	0			1	0								
On-site carbon storage	lbs CO2e	0			1	0								
GHG avoided by flaring on-site landfill methane	Lbs	0			-262	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Other on-site NOx emissions or reductions	lbs	0					1	0						
Other on-site SOx emissions or reductions	lbs	0							1	0				
Other on-site PM emissions or reductions	lbs	0									1	0		
User-defined recycled/reused on-site #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused on-site #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
On-site Totals				**29.90**		**0**		**0**		**0**		**0**		**0**

Offsite SSDS - Electricity Generation Footprint (Scope 2)

Contributors to Footprints	Units	Usage	Energy		GHG		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Electricity Generation														
Grid electricity	MWh	8.76	6.929	60.69804	352	3083.52	1.504	13.17504	1.46966	12.874222	0.07546	0.6610296	0.0454035	0.3977346
Voluntary purchase of renewable electricity	MWh	0												
Voluntary purchase of RECs	MWh	0												
Notes:														

Offsite SSDS - Transportation Footprint (Scope 3a)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Conventional Energy														
Transportation diesel use	gal	166.666	0.139	23.166574	22.5	3749.985	0.17	28.33322	0.0054	0.8999964	0.0034	0.5666644	0.0000052	0.0008667
Transportation diesel use - car	gal	0	0.139	0	22.57	0	0.015	0	0.0002	0	0.003	0	0.00252	0
Transportation diesel use - passenger truck	gal	0	0.139	0	22.545	0	0.0585	0	0.0002	0	0.007	0	0.002605	0
Transportation diesel use - User Defined	gal	0	0.139	0	22.5	0	0.17	0	0.0054	0	0.0034	0	0.0000052	0
Transportation gasoline use	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation gasoline use - car	gal	0.4	0.124	0.0496	19.77	7.908	0.027	0.0108	0.00036	0.000144	0.003	0.0012	0.0067	0.00268
Transportation gasoline use - passenger truck	gal	0	0.124	0	19.79	0	0.035	0	0.00036	0	0.003	0	0.00661	0
Transportation gasoline use - User Defined	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use - User Defined	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
User-defined conventional energy transportation #1	TBD	10	0	0	0	0	0	0	0	0	0	0	0	0
User-defined conventional energy transportation #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Conventional Energy Subtotals				**23**		**3,758**		**28**		**1**		**1**		**0**
Notes:														
Renewable Energy														
Transportation biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
User-defined renewable energy transportation #1	TBD	0	Biodiesel		0	0	0	0	0	0	0	0	Ref.	
User-defined renewable energy transportation #2	TBD	0	mpg or pmp		0	0	0	0	0	0	0	0	0	0
Renewable Energy Subtotals				**0**		**0**		**0**		**0**		**0**		**0**
Notes:														
Transportation Totals				**23**		**3758**		**28**		**1**		**1**		**0**

Offsite SSDS - Off-Site Footprint (Scope 3b)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Construction Materials														
Aluminum, Rolled Sheet	lb	0	0.0633	0	9.15	0	0.0148	0	0.0283	0	0.0088	0	0.00102	0
Asphalt, mastic	lb	0	0.0412	0	0.85	0	0.00271	0	0.00798	0	0.000766	0	0.00107	0
Asphalt, paving-grade	lb	0	0.5	0	8.58	0	0.0299	0	0.0969	0	0.0091	0	0.0133	0
Ethanol, Corn, 95%	lb	0	0.0318	0	-0.0199	0	0.00425	0	0.00303	0	0.000469	0	0.0000846	0
Ethanol, Corn, 99.7%	lb	0	0.0324	0	0.0591	0	0.00431	0	0.0031	0	0.000472	0	0.000087	0
Ethanol, Petroleum, 99.7%	lb	0	0.0205	0	1.25	0	0.00199	0	0.00214	0	0.000277	0	0.0000589	0
Gravel/Sand Mix, 65% Gravel	lb	0	0.0000248	0	0.0024	0	0.000018	0	4.52E-06	0	2.61E-06	0	3.08E-07	0
Gravel/sand/clay	lb	0	0.000028	0	0.00335	0	0.0000165	0	0.000015	0	0.000002	0	2.05E-10	0
HDPE	lb	0	0.0332	0	1.94	0	0.00325	0	0.00409	0	0.000439	0	0.0000641	0
Photovoltaic system (installed)	W	0	0.0336	0	4.47	0	0.015	0	0.032	0	0.00063	0	0.0000029	0
PVC	lb	600	0.0262	15.72	2.02	1212	0.004	2.4	0.00274	1.644	0.000372	0.2232	0.000375	0.225
Portland cement, US average	lb	0	0.0139	0	1.34	0	0.00654	0	0.0104	0	0.00378	0	0.00097	0
Ready-mixed concrete, 20 MPa	ft3	0	0.217	0	19.5	0	0.0975	0	0.154	0	0.057	0	0.0141	0
Round Gravel	lb	0	0.0000248	0	0.0024	0	0.000018	0	4.52E-06	0	2.61E-06	0	3.08E-07	0
Sand	lb	0	0.0000248	0	0.0024	0	0.000018	0	4.52E-06	0	2.61E-06	0	3.08E-07	0
Stainless Steel	lb	800	0.0116	9.28	3.4	2720	0.0075	6	0.012	9.6	0.0044	3.52	0.000144	0.1152
Steel	lb	0	0.0044	0	1.1	0	0.0014	0	0.0017	0	0.00056	0	0.000067	0
Other refined construction materials	lb	0	0.01885	0	2.115	0	0.0040375	0	0.0051325	0	0.0014428	0	0.0001625	0
Other unrefined construction materials	lb	0	0.000028	0	0.00335	0	0.0000165	0	0.000015	0	0.000002	0	2.05E-10	0

Notes:

Offsite SSDS - Off-Site Footprint (Scope 3b)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Treatment Materials & Chemicals														
Cheese Whey	lbs	0	0.0025	0	0.031	0	0.000062	0	0.000033	0	0.000002	0	NP	
Emulsified vegetable oil	lbs	0	0.0077	0	3.44	0	0.0066	0	0.0019	0	0.000033	0	NP	
Granular activated carbon, primary	lbs	0	0.0356	0	4.82	0	0.0793	0	0.128	0	0.000987	0	0.000657	0
Granular activated carbon, regenerated	lbs	0	0.00873	0	1.7	0	0.00733	0	0.0129	0	0.000886	0	0.000671	0
Hydrogen Peroxide, 50% in H2O	lbs	0	0.00979	0	1.19	0	0.00142	0	0.0024	0	0.000308	0	0.0000629	0
Iron (II) Sulfate	lbs	0	0.00147	0	0.167	0	0.000316	0	0.000589	0	0.000103	0	0.000023	0
Lime, Hydrated, Packed	lbs	0	0.00206	0	0.762	0	0.000513	0	0.000358	0	0.00013	0	6.57E-06	0
Molasses	lbs	0	0.0044	0	0.48	0	0.0011	0	0.00024	0	0.0000041	0	NP	
Phosphoric Acid, 70% in H2O	lbs	0	0.0067	0	0.882	0	0.00282	0	0.0294	0	0.00171	0	0.000163	0
Potassium Permanganate	lbs	0	0.00981	0	1.16	0	0.00234	0	0.0032	0	0.000422	0	0.000122	0
Sodium Hydroxide, 50% in H2O	lbs	0	0.00977	0	1.09	0	0.00194	0	0.00352	0	0.000403	0	0.000129	0
Other Treatment Chemicals & Materials	lbs	0	0.015	0	1.67	0	0.003	0	0.0065	0	0.00061	0	0.000016	0
Notes:														
Fuel Processing														
Biodiesel produced	gal	0	0.029	0	-16.8	0	0.018	0	0.033	0	0.00082	0	NP	
Diesel produced	gal	166.666	0.017	2.833322	3.02	503.33132	0.0051	0.8499966	0.0062	1.0333292	0.0017	0.2833322	0.0011	0.1833326
Gasoline produced	gal	0.4	0.033	0.0132	2.8	1.12	0.0046	0.00184	0.005	0.002	0.0015	0.0006	0.001	0.0004
Liquefied Petroleum Gas Produced	gal	0	0.088	0	1.47	0	0.0016	0	0.0024	0	0.0007	0	0.0003	0
Natural Gas - Compressed Produced	ccf	0	19.983	0	343.92	0	0.4732	0	2.1651	0	0.1846	0	0.2895	0
Natural Gas Produced	ccf	0	0.0052	0	2.2	0	0.0037	0	0.0046	0	0.000072	0	0.0000061	0
Fuel Processing Subtotals				**2.846522**		**504.45132**		**0.8518366**		**1.0353292**		**0.2839322**		**0.1837326**
Notes:														
Public water	gal x 1000	0	0.0092	0	5	0	0.0097	0	0.0059	0	0.016	0	0.000015	0
User-defined water resource #1	gal x 1000	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined water resource #2	gal x 1000	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														

Offsite SSDS - Off-Site Footprint (Scope 3b)

			Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
Category	Units	Usage	Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Off-Site Services														
Hazardous waste incineration	lb	0	0.00609	0	2.43	0	0.0016	0	0.00167	0	0.000209	0	0.000087	0
Off-site waste water treatment (POTW)	gal x 1000	0	0.015	0	4.4	0	0.016	0	0.015	0	NP		NP	
Off-site non-hazardous waste landfill	ton	0	0.16	0	25	0	0.14	0	0.075	0	0.4	0	0.0014	0
Off-site hazardous waste landfill	ton	0	0.18	0	27.5	0	0.154	0	0.0825	0	0.44	0	0.00154	0
Off-site Laboratory Analysis - Other	sample	0	0.058071	0	6.8534384	0	0.131402	0	0.3038758	0	0.0455698	0	0.0330165	0
Off-site Laboratory Analysis - Metals	sample	0	0.212	0	27.4693	0	0.6423	0	1.5072	0	0.2264	0	0.1643	0
Off-site Laboratory Analysis - Mercury	sample	0	0.0731715	0	9.325458	0	0.2127439	0	0.4982396	0	0.0747359	0	0.0542332	0
Off-site Laboratory Analysis - Inorganic Anions	sample	0	0.0074025	0	0.6459478	0	0.0067681	0	0.0147929	0	0.0022024	0	0.0015542	0
Off-site Laboratory Analysis - Alkalinity	sample	0	0.0174398	0	1.3381922	0	0.0070106	0	0.0132496	0	0.00194	0	0.0012831	0
Off-site Laboratory Analysis - Perchlorate	sample	0	0.023885	0	1.8717054	0	0.0079807	0	0.0141535	0	0.0020547	0	0.0012875	0
Off-site Laboratory Analysis - Nitrogen/Nitrate	sample	0	0.0336475	0	4.29897	0	0.0954592	0	0.2226646	0	0.0335099	0	0.0242506	0
Off-site Laboratory Analysis - Sulfate	sample	0	0.0141225	0	1.4726728	0	0.0079807	0	0.0136024	0	0.0019797	0	0.0012015	0
Off-site Laboratory Analysis - PCBs	sample	0	0.0512769	0	5.224902	0	0.0833339	0	0.1904774	0	0.0284393	0	0.0212083	0
Off-site Laboratory Analysis - VOCs	sample	4	0.0762045	0.3048179	9.016814	36.067256	0.104498	0.4179922	0.2270738	0.9082952	0.0339508	0.1358034	0.0235892	0.0943569
Off-site Laboratory Analysis - SVOCs	sample	0	0.0715602	0	7.870422	0	0.1459445	0	0.3373038	0	0.0504853	0	0.0372577	0
Notes:														
Resource Extraction for Electricity														
Coal extraction and processing	MWh	0.5256	3.1	1.6050773	180.0	94.608	0.8	0.404712	0.2	0.07884	0.0	0.0094608	NP	
Natural gas extraction and processing	MWh	0.876	1.6	1.4294568	270.0	236.52	0.2	0.15768	13.0	11.388	0.0	0.0062196	NP	
Nuclear fuel extraction and processing	MWh	0.1752	0.2	0.0272387	25.0	4.38	0.2	0.02628	0.5	0.0876	0.0	0.0002628	NP	
Oil extraction and processing	MWh	0.438	2.3	1.0053852	270.0	118.26	1.7	0.7446	0.1	0.030222	0.0	0.018396	NP	
Other fuel extraction and processing	MWh	0	0	0	0	0	0	0	0	0	0	0	0	0
Resource Extraction Subtotals				**4.067158**		**453.768**		**1.333272**		**11.584662**		**0.0343392**		**0**
Notes:														
Electricity Transmission														
Transmission and distribution losses	MWh	8.76	1.0342	9.059592	35.2	308.352	0.1504	1.317504	0.146966	1.2874222	0.007546	0.066103	0.0045403	0.0397735
Notes:														

Offsite SSDS - Off-Site Footprint (Scope 3b)

			Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv.		Conv.		Conv.		Conv.		Conv.		Conv.	
Category	Units	Usage	Factor	MMBtus	Factor	lbs CO2e	Factor	lbs	Factor	lbs	Factor	lbs	Factor	lbs
User-defined Materials														
User-defined material #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #4	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #5	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #6	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #7	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #8	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #9	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #10	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #11	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #12	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #13	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #14	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #15	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #16	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #17	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #18	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #19	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #20	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
User-defined Waste Destinations														
User-defined recycled/reused off-site #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #3	TBD	0	y(MMBtu/u		lbs CO2e/u		Ox(lbs/unit		Ox(lbs/unit)		M(lbs/unit)		APs(lbs/unit	
User-defined non-hazardous waste destination #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined non-hazardous waste destination #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined non-hazardous waste destination #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
Off-site Totals				**41.27809**		**5234.6386**		**12.320605**		**26.059709**		**4.2633777**		**0.6580629**

Offsite SSDS - Intermediate Totals

			Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
Category	Units	Usage	Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Total Grid Electricity Footprint														
On-site grid electricity	MWh	8.76	3.413	29.89788										
Electricity Generation														
Grid electricity	MWh	8.76	6.929	60.69804	1124.3	9848.868	2.2421	19.640796	4.6078874	40.365094	0.057518	0.5038577	0.2102371	1.8416769
Resource Extraction for Electricity														
Coal extraction and processing	MWh	0.5256	3.1	1.6050773	180.0	94.608	0.8	0.404712	0.2	0.07884	0.0	0.0094608	NP	
Natural gas extraction and processing	MWh	0.876	1.6	1.4294568	270.0	236.52	0.2	0.15768	13.0	11.388	0.0	0.0062196	NP	
Nuclear fuel extraction and processing	MWh	0.1752	0.2	0.0272387	25.0	4.38	0.2	0.02628	0.5	0.0876	0.0	0.0002628	NP	
Oil extraction and processing	MWh	0.438	2.3	1.0053852	270.0	118.26	1.7	0.7446	0.1	0.030222	0.0	0.018396	NP	
Other fuel extraction and processing	MWh	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Electricity Transmission														
Transmission and distribution losses	MWh	8.76	1.0342	9.059592	112.43	984.8868	0.22421	1.9640796	0.4607887	4.0365094	0.0057518	0.0503858	0.0210237	0.1841677
Total Grid Electricity Footprint				**104**		**11288**		**23**		**56**		**1**		**2**
Total Fuel Footprints														
Total Gasoline Footprint														
On-site gasoline use - Other	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
On-site gasoline use <25 hp	gal	0	0.124	0	17.48	0	0.037	0	0.00025	0	0.165	0	0.00008	0
On-site gasoline use >25 hp	gal	0	0.124	0	19.93	0	0.032	0	0.00029	0	0.002	0	0.00009	0
Transportation gasoline use	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation gasoline use - car	gal	0.4	0.124	0.0496	19.77	7.908	0.027	0.0108	0.00036	0.000144	0.003	0.0012	0.0067	0.00268
Transportation gasoline use - passenger truck	gal	0	0.124	0	19.79	0	0.035	0	0.00036	0	0.003	0	0.00661	0
Transportation gasoline use - User Defined	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Gasoline produced	gal	0.4	0.033	0.0132	2.8	1.12	0.0046	0.00184	0.005	0.002	0.0015	0.0006	0.001	0.0004
Total Gasoline Footprint		**0.4**		**0.0628**		**9.028**		**0.01264**		**0.002144**		**0.0018**		**0.00308**
Total Diesel Footprint														
On-site diesel use - Other	gal	0	0.139	0	22.5	0	0.17	0	0.0054	0	0.0034	0	0.0000052	0
On-site diesel use <75 hp	gal	0	0.139	0	22.21	0	0.1565	0	0.000145	0	0.0145	0	0.00004	0
On-site diesel use 75<hp<750	gal	0	0.139	0	22.24	0	0.101	0	0.00013	0	0.009	0	0.00004	0
On-site diesel use >750 hp	gal	0	0.139	0	22.24	0	0.149	0	0.00013	0	0.006	0	0.00004	0
Transportation diesel use	gal	166.666	0.139	23.166574	22.5	3749.985	0.17	28.33322	0.0054	0.8999964	0.0034	0.5666644	0.0000052	0.0008667
Transportation diesel use - car	gal	0	0.139	0	22.57	0	0.015	0	0.0002	0	0.003	0	0.00252	0
Transportation diesel use - passenger truck	gal	0	0.139	0	22.545	0	0.0585	0	0.0002	0	0.007	0	0.002605	0
Transportation diesel use - User Defined	gal	0	0.139	0	22.5	0	0.17	0	0.0054	0	0.0034	0	0.0000052	0
Diesel produced	gal	166.666	0.017	2.833322	3.02	503.33132	0.0051	0.8499966	0.0062	1.0333292	0.0017	0.2833322	0.0011	0.1833326
Total Diesel Footprint		**166.666**		**25.999896**		**4253.3163**		**29.183217**		**1.9333256**		**0.8499966**		**0.1841993**
Total Biodiesel Footprint														
On-site biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
On-site biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Biodiesel produced	gal	0	0.029	0	-16.8	0	0.018	0	0.033	0	0.00082	0	NP	
Total Biodiesel Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Natural Gas Footprint														
On-site natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use - User Defined	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Natural gas produced	ccf	0	0.0052	0	2.2	0	0.0037	0	0.0046	0	0.000072	0	0.0000061	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Liquified Petroleum Gas Footprint														
On-site liquified petroleum gas use - Other	ccf	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
On-site liquified petroleum gas use	ccf	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
Liquified petroleum gas produced	ccf	0	0.088	0	1.47	0	0.0016	0	0.0024	0	0.0007	0	0.0003	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Compressed Gas Footprint														
On-site compressed gas use - Other	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site compressed gas use	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
Compressed gas produced	ccf	0	19.983	0	343.92	0	0.4732	0	2.1651	0	0.1846	0	0.2895	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**

Notes:

Note: Please refer to the "Default Conversions" tab for references for the default conversion factors used on this calculation sheet.

Space below available for notes and calculations:

APPENDIX 12 – REMEDIAL SYSTEM OPTIMIZATION TABLE OF CONTENTS

REMEDIAL SYSTEM OPTIMIZATION FOR TEITELBAUM DRY CLEANING INC.

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APPENDIX 13 – REQUEST TO IMPORT/REUSE FILL MATERIAL FORM

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e). Use of this form is not a substitute for reading the applicable Technical Guidance document.

SECTION 1 – SITE BACKGROUND

The allowable site use is: Choose an item

Have Ecological Resources been identified? Choose an item

Is this soil originating from the site? Choose an item

How many cubic yards of soil will be imported/reused? Choose an item

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone? Choose an item

Does it contain less than 10%, by weight, material that would pass a size 10 sieve? Choose an item

Does it contain less than 10%, by weight, material that would pass a size 100 sieve? Choose an item

Is this virgin material from a permitted mine or quarry? Choose an item

Is this material recycled concrete or brick from a DEC registered processing facility? Choose an item

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.4(e)5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

_____ _____

Signature Date

_____

Print Name

_____

Firm

Revised August 2014